UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2021

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

Commission file number: 001-34180

FLUIDIGM CORPORATION

(Exact name of registrant as specified in its charter)

Delaware	**77-0513190**
State or other jurisdiction of incorporation or organization	I.R.S. Employer Identification No.

2 Tower Place, Suite 2000	**South San Francisco,**	**CA**	**94080**
Address of principal executive offices			Zip Code

Registrant's telephone number, including area code: **(650) 266-6000**

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.001 par value per share	**FLDM**	**The Nasdaq Global Select Market**

Securities registered pursuant to Section 12(g) of the Act:
None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Exchange Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☒
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. Yes ☒ No ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

As of June 30, 2021, the aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant was approximately $463,753,327, based on the closing sale price on that date. Shares of common stock held by each executive officer and director and by each other person who may be deemed to be an affiliate of the Registrant have been excluded from this computation. The determination of affiliate status for this purpose is not necessarily a conclusive determination for other purposes.

As of February 28, 2022, there were 77,198,577 shares of the registrant's common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement in connection with the registrant's annual meeting of stockholders, scheduled to be held in May 2022, are incorporated by reference in Part III of this report. Except as expressly incorporated by reference, the registrant's Proxy Statement shall not be deemed to be part of this report.

Fluidigm Corporation

Fiscal Year 2021
Form 10-K
Annual Report

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Special Note Regarding Forward-looking Statements and Industry Data

This Annual Report on Form 10-K (Form 10-K) contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended (the Securities Act), and Section 21E of the Securities Exchange Act of 1934, as amended (the Exchange Act), that are based on our management's beliefs and assumptions and on information currently available to our management. The forward-looking statements are contained principally in the sections entitled "Business," "Risk factors," and "Management's discussion and analysis of financial condition and results of operations." Forward-looking statements include information concerning our possible or assumed future cash flow, revenue, sources of revenue and results of operations, cost of product revenue and product margin, operating and other expenses, unit sales and the selling prices of our products, business strategies, financing plans and our ability to continue as a going concern, expansion of our business, investments to expand our customer base, plans for our products, competitive position, industry environment, potential growth opportunities, market growth expectations, the effects of competition, our planned use of the proceeds from the strategic investment transaction (described under *Recent Key Developments*) (the Private Placement Issuance), cost structure optimization, acceleration of growth, the expected timing and closing of the Private Placement Issuance, expectations regarding the issuance of the Series B Preferred Stock (as defined below), and other expectations for us following the closing of the Private Placement Issuance, including the achievement of its potential benefits. Forward-looking statements include statements that are not historical facts and can be identified by terms such as "anticipates," "believes," "could," "seeks," "estimates," "expects," "intends," "may," "plans," "potential," "predicts, "projects," "should," "will," "would," or similar expressions and the negatives of those terms.

Forward-looking statements involve known and unknown risks, uncertainties, and other factors that may cause our actual results, performance, or achievements to be materially different from any future results, performance, or achievements expressed or implied by the forward-looking statements. We discuss these risks in greater detail in the section entitled "Risk factors" and elsewhere in this Form 10-K. Given these uncertainties, you should not place undue reliance on these forward-looking statements.

Forward-looking statements represent our management's beliefs and assumptions only as of the date of this Form 10-K. Except as required by law, we assume no obligation to update these forward-looking statements, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future. You should read this Form 10-K completely and with the understanding that our actual future results may be materially different from what we expect.

This Form 10-K also contains estimates, projections and other information concerning our industry, our business, and the markets for certain of our products, including data regarding the estimated size of those markets. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained this industry, business, market, and other data from reports, research surveys, studies, and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data, and similar sources.

Unless the context requires otherwise, references in this Annual Report on Form 10-K to "Fluidigm," the "Company," "we," "us," and "our" refer to Fluidigm Corporation and its subsidiaries.

PART I

ITEM 1. BUSINESS

Overview

Fluidigm improves life by driving meaningful insights in health and disease. Our innovative technologies explore the biological complexities of disease to advance human health through research, diagnostics and clinical applications. We create, manufacture, and market a range of products and services, including instruments, consumables, reagents and software that are used by researchers and clinical labs worldwide. Our customers are leading academic and government laboratories, as well as pharmaceutical, biotechnology, plant and animal research organizations, and clinical laboratories worldwide. Together with our customers, we strive to increase the quality of life for all.

Our mass cytometry systems (legacy Helios™ and newly introduced revolutionary CyTOF XT) deeply profiles cell phenotype and function. Referenced by more than fifteen hundred peer-reviewed publications around the world, mass cytometry has set a new standard in human immune profiling. Transforming biological imaging, our Hyperion™ Imaging System enables highly multiplexed protein biomarker detection at a single cellular level in tissues and tumors while still preserving tissue architecture and cellular morphology information using Imaging Mass Cytometry™ (IMC™).

Our microfluidic systems complement our mass cytometry offerings by providing highly scalable and automated workflows for quantitative polymerase chain reaction (PCR), gene expression, copy number variation analysis, and next-generation sequencing (NGS) library preparation. Used to detect somatic and genomic variations from a range of different sample types, these automated systems provide the cost efficiencies, flexibility and proven analytical performance that customers need to meet the increasing demands of molecular biomarker analysis for diagnostics and research applications.

Recent Key Developments

Strategic Investment Transaction

On January 23, 2022, we entered into (i) a Loan Agreement (the Casdin Loan Agreement) with Casdin Private Growth Equity Fund II, L.P. and Casdin Partners Master Fund, L.P. (collectively, Casdin) and (ii) a Loan Agreement (the Viking Loan Agreement, and together with the Casdin Loan Agreement, the Bridge Loan Agreements) with Viking Global Opportunities Illiquid Investments Sub-Master LP and Viking Global Opportunities Drawdown (Aggregator) LP (collectively, Viking and, together with Casdin, the Purchasers and each, a Purchaser). Each Bridge Loan Agreement provides for a $12.5 million term loan to us (each, a Bridge Loan and collectively, the Bridge Loans). Subject to approval by our stockholders, upon the issuance of the shares of Series B Preferred Stock (as defined below) pursuant to the Purchase Agreements (as defined below), the Bridge Loans will be automatically converted into shares of Series B-1 Preferred Stock (as defined below) or Series B-2 Preferred Stock (as defined below), as applicable, in accordance with the terms of the Bridge Loan Agreements. The Bridge Loans were fully drawn on January 24, 2022. The proceeds of the Bridge Loans may be used for working capital and general corporate purposes.

Also on January 23, 2022, we entered into separate Series B Convertible Preferred Stock Purchase Agreements (the Purchase Agreements) with each of the Purchasers pursuant to which, among other things, at the closing of the transactions contemplated thereby, and on the terms and subject to the conditions set forth therein, including the approval of our stockholders, we will issue and sell an aggregate of $225 million of convertible preferred stock, consisting of: (i) 112,500 shares of our Series B-1 Convertible Preferred Stock, par value $0.001 per share (the Series B-1 Preferred Stock), at a purchase price of $1,000.00 per share to Casdin, and (ii) 112,500 shares of our Series B-2 Convertible Preferred Stock, par value $0.001 per share (the Series B-2 Preferred Stock, and together with the Series B-1 Preferred Stock, the Series B Preferred Stock) at a purchase price of $1,000.00 per share to Viking (clauses (i) and (ii), the Preferred Equity Financing, and together with the issuance of shares of Series B Preferred Stock in connection with the conversion of the Bridge Loans, the Private Placement Issuance). The Series B Preferred Stock to be purchased by Casdin and Viking pursuant to the Purchase Agreements is in addition to any Series B Preferred Stock to be issued upon conversion of outstanding amounts under the Bridge Loan Agreements. The proceeds of the Preferred Equity Transactions will be used by us for expenses related to the Preferred Equity Transactions, as well as working capital, general corporate purposes and merger and acquisition opportunities that we may identify from time to time.

In connection with the Private Placement Issuance, we will change our name to “Standard BioTools Inc.” and Dr. Michael Egholm will be appointed as the Company’s President and Chief Executive Officer and as a member of our Board of Directors (the Board), each occurring upon the closing of the transactions contemplated by the Purchase Agreements (Closing). Dr. Egholm will succeed Chris Linthwaite, who will continue as our Chief Executive Officer until the earlier of the Closing or May 15, 2022.

The Closing is subject to customary closing conditions for a transaction of this nature, including approval by our stockholders of the issuance of the Series B Preferred Stock in connection with the Private Placement Issuance. Each Private Placement Issuance is also conditioned on the substantially contemporaneous consummation of the other Private Placement Issuance.

Our Board has called a special meeting to be held on March 25, 2022 (the Special Meeting) to ask our stockholders to consider, vote upon and approve (i) a proposal to amend our Eighth Amended and Restated Certificate of Incorporation (the Charter) to, among other things, increase the number of shares of our common stock, par value $0.001 per share, (the Common Stock) that we are authorized to issue from two hundred million (200,000,000) shares to four hundred million (400,000,000) shares and to change our name to Standard BioTools Inc. (together, the Charter Amendment Proposal); and (ii) to approve the issuance of (A) the Series B-1 Preferred Stock and the Series B-2 Preferred Stock pursuant to the Purchase Agreements, (B) the Series B-1 Preferred Stock and the Series B-2 Preferred Stock issuable pursuant to the terms of the Bridge Loan Agreements and (C) the Common Stock issuable upon the conversion of the Series B Preferred Stock. clauses (A) through (C), the Private Placement Issuance Proposal). The Private Placement Issuance Proposal is conditioned on the approval of the Charter Amendment Proposal. The Charter Amendment Proposal is conditioned on the approval of the Private Placement Issuance Proposal. If both proposals do not receive the requisite vote for approval, neither the Charter Amendment Proposal nor the Private Placement Issuance Proposal will take effect. The parties have agreed that they will not be obligated to close the Preferred Equity Financing if the Charter Amendment Proposal has not been approved at the Special Meeting.

If the Charter Amendment Proposal and the Private Placement Issuance Proposal are not approved by our stockholders at the Special Meeting or the Purchase Agreements are otherwise terminated, then the Bridge Loans will become convertible, at each lender's option, into Common Stock at an initial conversion rate of 352.1126 shares of Common Stock per $1,000 of conversion amount, subject to the cap set forth in the Bridge Loan Agreements. The conversion rate is subject to customary adjustments as set forth in the Bridge Loan Agreements. The Bridge Loans bear interest (i) from and including the effective date of the Bridge Loan Agreements to but excluding March 1, 2022, at 10%, (ii) from and including March 1, 2022 to but excluding June 1, 2022, at 12%, (iii) from and including June 1, 2022 to but excluding September 1, 2022, at 14%, and (iv) from and including September 1, 2022 and thereafter, at 16%. Interest accrues daily and is payable in kind by adding the accrued interest to the outstanding principal amount on the last date of each month. The Bridge Loans mature on the 91st calendar day after the latest maturity date of the loans borrowed under our Loan and Security Agreement, dated as of August 2, 2018, with Silicon Valley Bank, and the principal, together with accrued and unpaid interest, is due on the maturity date.

Market Opportunity

We believe that we have large, multi-billion-dollar market opportunities for our products. We are a leader in the high-growth cytometry market for high parameter applications and high-plex imaging. Through our work with outside consultants and internal market analysis, we believe that the current potential market for mass cytometry high-parameter applications and addressable markets for spatial imaging is just under $1 billion, but expected to be approximately $3 billion by 2025, growing at a compound annual growth rate of approximately 27% over the next five years. We believe we will gain greater access to this market as use of our products expands beyond research to translational and clinical use.

For our microfluidics products, our work with outside consultants and market analysis indicate a potential opportunity in the respiratory and COVID-19 molecular diagnostics markets. We believe that our differentiated PCR microfluidics products could be well-suited to serve the needs of the diagnostics market. Our participation in COVID-19 testing provides an entry point if we choose to explore the diagnostics opportunity. The current markets for our products address a broad range of biological analysis approaches, including the genome, proteome, transcriptome, epigenome and microbiome used by academic life science research customers, as well as applied markets customers, including diagnostic and clinical research laboratories, biopharmaceutical companies, biorepositories and agricultural biotechnology entities. Our markets are increasingly looking to study data sets spanning these approaches in a concerted manner to reveal, understand, and address the biological complexities of disease.

In 2020, we were awarded the NIH Contract under the RADx program to support the expansion of our production capacity and throughput capabilities for COVID-19 testing with our microfluidics technology. As of December 31, 2021, we have achieved the required milestones and have received the total NIH Contract value of $34.0 million. Proceeds from the NIH Contract have been primarily used for capital expenditures to expand production capacity and, to a lesser extent, to offset applicable operating costs. With the funding from the NIH Contract, integrated fluidic circuit (IFC) manufacturing capacity increased from 12,000 IFCs per month to 36,000 IFCs per month in our Singapore facility.

One of the milestones under the NIH Contract was submitting a request with the FDA for Emergency Use Authorization (EUA) of the Advanta Dx COVID-19 EASE Assay. We were granted an EUA for this assay in February

2022. This test is authorized for the qualitative detection of nucleic acid from SARS-CoV-2 in nasopharyngeal swab, oropharyngeal swab, mid-turbinate nasal swab, and anterior nasal swab specimens from individuals suspected of COVID-19 by their healthcare provider.

In 2021:

- Fluidigm made significant strides in product innovation in the form of two new, world-class instrument systems, CyTOF® XT and Biomark™ X. Biomark X is our next generation qPCR platform, integrating the Fluidigm Juno and Biomark HD instruments into a single platform while adding sample-to-answer capabilities. CyTOF XT is the fourth-generation CyTOF instrument, designed to simplify the design and execution of deep cell profiling studies, standardize sample analysis with reproducible workflows and automation and accelerate novel therapeutic development. Both new instrument platforms provide customers with significant value at more economical price points relative to prior generation instruments and include significant enhancements that positively impact instrument operating efficiency and productivity.

- We delivered the Signature Q100 microfluidics platform to our OEM partner, Olink®, showcasing how strategic partnerships support our Vision 2025 growth plan and ability to expand Fluidigm's customer base for instruments and consumables usage.

- The Company focused on partnership and collaboration to accelerate customer adoption of its technology, innovate products or penetrate new markets. Fluidigm completed the milestones under its agreement with the National Institutes of Health, National Institute of Biomedical Imaging and Bioengineering, under the agency's Rapid Acceleration of Diagnostics (RADx) initiative. In addition, the Company completed all milestones in its collaboration with the Defense Advanced Research Projects Agency (DARPA) and its Epigenetic Characterization and Observation program that supports development of innovative programs based on our microfluidics technology.

- As of year-end 2021, 188 clinical trials were underway using CyTOF technology. Total publications and preprints involving CyTOF technology exceeded 1,846, including 179 publications and preprints for Imaging Mass Cytometry.

Products

We market innovative technologies and life science tools, including preparatory and analytical instruments for Mass Cytometry, PCR, Library Prep, Single Cell Genomics, and consumables, including IFCs, assays, and reagents. Our primary product offerings are summarized in the table below:

Product	Product Description	Applications
Mass Cytometry		
Analytical Systems:		
Helios™, a CyTOF system	The Helios mass cytometry system performs high-parameter (>50) single-cell analysis using antibodies conjugated to metal isotopes.	Mass Cytometry
CyTOF system, XT, a CyTOF system	The CyTOF XT mass cytometry system performs highly automated high-parameter (>50) single-cell analysis using antibodies conjugated to metal isotopes.	Mass Cytometry
Hyperion™ Imaging System	The Hyperion Imaging System brings together imaging capability with proven high-parameter CyTOF technology to enable the simultaneous detection of up to 38 protein markers in the spatial context of the tissue microenvironment.	Imaging Mass Cytometry

Product	Product Description	Applications
Hyperion™ Tissue Imager	The Hyperion Tissue Imager scans tissues at 1 micron resolution. It can be purchased as an upgrade for the Helios system to enable imaging capability, then referred to as Hyperion Imaging System.	Imaging Mass Cytometry
Flow Conductor	Flow Conductor is an integrated sample preparation system for flow or mass cytometry assays.	Mass Cytometry
Assays and Reagents:		
Maxpar® Reagents	Maxpar® reagents are included in multiple product lines addressing needs in functional and phenotypic profiling of single cells, as well as nucleic acid detection. The product lines include more than 800 pre-conjugated antibodies, application-specific kits, and custom antibody labeling services.	Mass Cytometry and Imaging Mass Cytometry
Maxpar Direct Immune Profiling Assay	The assay enables identification and characterization of 37 immune cell populations with automated software. The kit contains 30 pre-titrated antibodies provided in a dry single-tube format and is also compatible with additional expansion panels focusing on specific cell populations.	Mass Cytometry
Maxpar On Demand Reagents	Made to order conjugated antibodies, pre-verified and available with seven-day turn-around	Mass Cytometry
Maxpar IMC Panel Kits for Immuno-oncology	Contains a mix of non-overlapping metal-conjugated antibodies to deeply profile tumor-infiltrating lymphocytes, immune cell activation states or tissue architecture. These new panels can be easily mixed and matched or combined as an 18-marker panel to broadly profile immune infiltrates.	Mass Cytometry
Software:		
CyTOF Software v7.0	Streamlines the selection and acquisition of multiple Regions of Interest (ROI) from each slide.	Mass Cytometry
CyTOF Software 8.0	Streamlines and automates the sample acquisition for CyTOF XT to measure 50+ markers for single-cell cytometry	Mass Cytometry
Microfluidics		
Preparatory Instruments:		
Juno System	An integrated system that automates the preparation of RNA-seq and amplicon-based libraries for next-generation sequencing (NGS). Additionally, Juno automates microfluidic-based PCR workflows by processing IFCs prior to analysis on Biomark HD or EP1 platforms.	Library preparation for RNA-seq and targeted NGS. PCR applications include sequence detection, sample identification, genotyping, gene expression, and real-time digital PCR

Product	Product Description	Applications
Analytical Instruments:		
Biomark HD System	Real-time PCR analytical instrument for microfluidics-based workflows using Fluidigm IFCs.	Sequence detection, sample identification, genotyping, gene expression, and real-time digital PCR Expression
EP1 System	End-point PCR analytical instrument for microfluidics-based workflows using Fluidigm IFCs.	Genotyping, sample identification, and digital PCR
Integrated Fluidic Circuits (IFCs):		
Library Preparation (LP) IFCs	LP and 48.Atlas IFCs for NGS LP supporting RNA-Seq and targeted amplicon-based sequencing.	Library preparation for RNA-seq and targeted NGS
Juno Genotyping IFC	IFC that incorporates preamplification for genotyping of 96 samples and 96 markers in a single run.	Genotyping, sample identification
Dynamic Array IFCs	IFCs based on matrix architecture, allowing users to (i) individually assay up to 24 samples against up to 192 assays, (ii) individually assay up to 48 samples against up to 48 assays, (iii) individually assay up to 96 samples against up to 96 assays, or (iv) individually assay up to 192 samples against up to 24 assays.	Real-time and end-point PCR; Sequence detection, sample identification, genotyping, gene expression, and real-time digital PCR
Digital Array IFCs	IFCs based on partitioning architecture allowing users to (i) individually assay up to 12 samples or panels across 765 chambers, or to (ii) individually assay up to 48 samples across 770 chambers per IFC.	Real-time and end-point digital PCR, Copy Number Variation and variant detection
Flex Six IFC	IFC that incorporates six 12 X 12 partitions that can be organized in any configuration, in up to six separate experimental runs.	Gene Expression and SNP Genotyping
Assays and Reagents:		
Advanta RNA-Seq NGS Library Prep Kit	Integrated solution for automated NGS library prep. Used with the Juno system with the Advanta RNA-Seq reagents and 48.Atlas IFCs, supports simultaneous processing of up to 48 total RNA samples.	RNA-seq library preparation for NGS
Advanta™ Dx SARS-CoV-2 RT-PCR Assay	qPCR-based test that takes advantage of Fluidigm proprietary microfluidics technology and the Juno™ and Biomark™ HD systems.	Enables qualitative detection of nucleic acid from SARS-CoV-2 in saliva specimens collected without preservatives in a sterile container from individuals suspected of COVID-19 by their healthcare provider; authorized for use with the AZOVA COVID-19 Test Collection Kit for self-collection of saliva specimens at home with or without the supervision of a healthcare provider

Product	Product Description	Applications
Advanta™ Dx COVID-19 EASE Assay	qPCR-based test that takes advantage of Fluidigm proprietary microfluidics technology	Enables qualitative detection of nucleic acid from SARS-CoV-2 in nasopharyngeal swab, oropharyngeal swab, mid-turbinate nasal swab, and anterior nasal swab specimens from individuals suspected of COVID-19 by their healthcare provider
Delta Gene and SNP Type Assays	Custom designed assays targeted to genomic regions of interest for genotyping and gene expression.	Gene Expression, Single-Cell Targeted Gene Expression, SNP Genotyping
Access Array Target-Specific Primers and Targeted Sequencing Prep Primers	Custom designed assays for NGS library preparation using Access Array chemistry on the Access Array or Juno systems.	Library preparation for targeted NGS
Targeted DNA Seq Library Assays	Custom designed assays for NGS library preparation using Targeted DNA Sequencing Library Preparation chemistry on the Juno systems.	Library preparation for targeted NGS
Single Cell Microfluidics		
Preparatory Instrument:		
C1 System	Sample preparation system that rapidly and reliably isolates and processes individual cells for genomic analysis.	Single-Cell NGS library preparation for RNA sequencing including full-length, end-counting, and total RNA applications; single-cell targeted gene expression by real-time PCR including microRNA analysis; single-cell epigenetics and multi-omic applications including ATAC-seq and REAP-Seq (RNA and Protein); single-cell NGS library preparation for DNA sequencing including targeted, whole exome and whole genome applications
Preparatory Analytical Instruments:		
C1 IFCs	IFCs that capture up to 800 cells between 5-25 microns in diameter and then automatically process the cells for a variety of genomic analysis using thermal and pneumatic controls at nanoliter scale.	Single-Cell NGS library preparation for RNA sequencing including full-length, end-counting, and total RNA applications; single-cell targeted gene expression by real-time PCR including microRNA analysis; single-cell epigenetics and multi-omic applications including ATAC-seq and REAP-Seq (RNA and Protein); single-cell NGS library preparation for DNA sequencing including targeted, whole exome and whole genome applications

Technology

Multi-Layer Soft Lithography

Our IFCs are manufactured using multi-layer soft lithography (MSL) technology to create valves, chambers, channels and other fluidic components on our IFCs that allow nanoliter quantities of fluids to be precisely manipulated within the IFC. We have developed commercial manufacturing processes to fabricate valves, channels, vias, and chambers with dimensions in the ten to 100 micron range, at high density and with high yields.

Integrated Fluidic Circuits

Our IFCs incorporate several different types of technology that together enable us to use MSL technology to rapidly design and deploy new microfluidic applications. The first level of our IFC technology is a library of components that perform basic microfluidic functions, such as pumps, mixers, single-cell capture chambers, separation columns, control logic, and reaction chambers. The second level of our IFC technology comprises the architectures we have designed to exploit our ability to conduct thousands of reactions on a single IFC. The third level of our IFC technology involves the interaction of our IFCs with the actual laboratory environment. Our IFCs are built on specially designed input frames that are compatible with most commonly used laboratory systems.

Instrumentation and Software

Our mass cytometry instrumentation technology includes a custom-designed inductively coupled plasma ion source, ion-optical and vacuum systems, and instrument control electronics. With our CyTOF systems, individual cells are atomized, ionized, and extracted. A time-of-flight mass analyzer separates atomic ions of different mass-to-charge ratios, providing information on temporal distribution of ions. The Hyperion Imaging System combines mass cytometry technology with imaging capability to enable simultaneous interrogation of up to 38 protein markers in the spatial context of the tissue microenvironment. Our systems have the ability to utilize up to 135 channels to detect additional parameters to meet future market needs. Lastly, our Flow Conductor sample preparation system provides sample preparation capabilities for both flow and mass cytometry assays. The Flow Conductor system can process up to 100 antibodies at a time and simultaneously stain and prepare up to 18 specimens.

Our Biomark HD system includes our custom thermal cycler, the FC1 cycler, and a sophisticated fluorescence imaging system. Our EP1 instrument is a fluorescence reader designed for end-point imaging, suitable for genotyping and digital PCR applications. Our C1 system combines the hardware elements of our IFC controllers and FC1 cycler with sophisticated scripting and protocol control software to enable automation of single-cell capture and preparation for subsequent analysis. Certain capabilities of the C1 system have been used to create our Juno system, which serves as a universal controller and cycler for our Dynamic Array IFCs. Our Polaris system combines the capabilities of all these instruments by incorporating thermal cycling, IFC control, environmental regulation, and imaging.

We have developed instrumentation technology to load samples and reagents onto our IFCs and to control and monitor reactions within our IFCs. Our line of IFC controllers consists of commercial pneumatic components and both custom and commercial electronics. They apply precise control of multiple pressures to move fluid and control valve states in a microfluidic IFC.

We also offer specialized software to manage and analyze the unusually large amounts of data produced by our systems. We offer Fluidigm Cytobank, our cloud-based platform of analytical tools, FCS Express7 Flow, and Maxpar Pathsetter data analysis packages for use with the CyTOF systems. For our Imaging Mass Cytometry platform, Hyperion, we offer various state of the art software packages to enable data analysis from basic to translational research: CyTOF Software 7.0, MCD Viewer, histoCAT, Visiopharm Phenomap and Indica Lab Halo. Our bioinformatic toolset, the Singular software, facilitates the analysis and visualization of single-cell gene expression data. More recently, we extended the scope of the toolset to include DNA analysis tools. We also developed the C1 Script Builder software to enable customers to take full advantage of the flexibility of C1 IFC architecture by allowing them to program their own control scripts for the C1 system.

Assays and Reagents

We manufacture over 800 metal-conjugated antibodies for use with our mass cytometry and Imaging Mass Cytometry instruments to allow detection of up to 48 protein targets simultaneously in a single cell for a total of more than 50 detected cellular parameters. Our metal-conjugated antibodies are manufactured using metal-chelating polymers, which are produced using proprietary polymerization processes and subsequent post-polymerization modifications.

Our Delta Gene and single nucleotide polymorphism type (SNP Type) assay products consist of assay design and custom content delivery systems for gene expression and genotyping, respectively. These offerings provide low-cost alternatives to other available chemistries and allow customers to use IFCs in more flexible ways. PCR assay reagents need to be specific to the gene targets of interest but the process of designing a set of assays may delay the implementation experiments or require the use of expensive pre-designed assays. We have developed a process to provide customers with validated assays for their targets of interest.

Genomics

One primary area of focus within life science research is genetic analysis, the study of genes and their functions. The hereditary material or nucleic acid of an organism is often referred to as its genome, the protein-encoding regions of which are commonly known as genes. Analysis of variations in genomes, genes and gene activity in and between organisms can provide valuable insight into their health and functioning. Single-cell genomics is the study of the sequence and expression of genes and their ultimate functions at the individual cell level.

There are several forms of genetic analysis in use today, including genotyping, gene expression analysis and NGS:

- Genotyping involves the analysis of DNA variations across individual genomes. There are multiple forms of variants, including single nucleotide polymorphism (SNPs), insertion-deletions and copy number variation. A common application of genotyping focuses on analyzing SNPs to determine whether a SNP or group of SNPs are associated with a particular genetic trait, such as propensity for a disease.
- Gene expression analysis involves measuring the levels of particular ribonucleic acid sequences known as messenger RNAs (mRNAs), which have been transcribed from genes. Determining these levels is important because mRNAs are often translated by the cell into proteins and may affect the activity of the cell or the larger organism.
- NGS is a process by which researchers are able to determine the particular order of nucleotide bases that comprise all or a portion of a particular gene or genome (in the case of DNA sequencing) or gene transcript or sample transcriptome (in the case of RNA sequencing). NGS is routinely used for studies across the research continuum including basic research, biomarker discovery, translational research, and clinical research.

Gene expression and genotyping are studied through a combination of various technology platforms that characterize gene function and genetic variation. These platforms often rely on PCR amplification to generate exponential copies of a DNA sample to provide sufficient signal to facilitate detection. Real-time quantitative PCR (real-time qPCR) is a more advanced form of PCR that makes it possible to quantify the number of copies of DNA present in a sample.

Proteomics

Another focus within life science research is single cell protein analysis, the study of proteins and their structures and functions. Proteins perform a vast array of functions within living organisms, including catalyzing metabolic reactions, replicating DNA, signaling response to stimuli and transporting molecules from one location to another. The proteome varies and is dynamic. Every cell in an individual organism has the same set of genes, but the set of proteins produced in different tissues differ from one another and are dependent on gene expression. Protein analysis is required to profile and understand cellular function as well as the interaction in tissues and other complex microenvironments.

There are several forms of high-throughput protein analysis in use today, including mass spectrometry, traditional flow cytometry, immunohistochemistry and both suspension and Imaging Mass Cytometry.

- Mass spectrometry is an analytical chemistry technique that measures the mass-to-charge ratio in molecules using external electric and magnetic fields. Mass spectrometry techniques are limited to bulk samples and provide an understanding of global protein dynamics on a tissue or organism level, but do not, by themselves, enable researchers to analyze data at a single cell level.
- Traditional flow cytometry utilizes a suspension of cells in a stream of fluid and passes them through an electronic detection apparatus to allow simultaneous multi-parameter analysis of the physical and chemical characteristics of up to thousands of cells per second. Although traditional flow cytometry technologies are high-throughput with single-cell analysis capabilities, a key limitation is the use of fluorescent dyes to label antibodies for detection. These fluorescent labels have emission spectra that typically overlap, making it challenging to optimize reagents to analyze many protein markers at once. In general, the number of protein targets for conventional flow cytometry is less than about 10 with significant reagent optimization often involved.

- Immunohistochemistry is a method by which cells in a tissue section are stained with antibodies and then imaged with a conventional or fluorescent microscope. Antibodies selected to bind to proteins of interest can be conjugated with either chromogenic or fluorescent labels, allowing cellular proteins to be visualized in spatial context. Immunohistochemistry is used broadly throughout the life sciences industry, and in clinical research to better understand the characteristics and relationship of cancerous versus normal cells in biopsy tissue. In general, the number of simultaneously imageable proteins is less than five, with researchers only able to achieve a higher-parameter resolution using serial sections (several adjacent sections of the same tissue) or other highly laborious, more serial staining methods.

- Suspension mass cytometry is similar to traditional flow cytometry but is based primarily on antibodies using heavy metal isotope labels rather than fluorescent labels for detection of proteins, enabling the significant expansion of the number of parameters analyzed per individual cell versus conventional flow cytometry technologies, as well as providing superior data quality. With high-throughput, single-cell analysis capabilities and the ability to analyze more protein markers per individual cell, researchers have more granular information, which allows them to identify and characterize even finer subpopulations of cells.

- Imaging mass cytometry is similar to immunohistochemistry, but is also based primarily on antibodies using heavy metal isotope labels rather than fluorescent or chromogenic labels for detection of proteins. This method enables a significant expansion of the number of parameters simultaneously analyzed per tissue section rather than in adjacent sections or via serial staining protocols.

Customers

With the exception of our Advanta™ Dx SARS-CoV-2 RT-PCR Assay (Rx Only), which has been authorized for in vitro diagnostic use by clinical laboratories under Emergency Use Authorizations (EUAs) in the United States and CE-IVD in Europe, and our Advanta™ Dx COVID-19 EASE Assay, which has been authorized for in vitro diagnostic use by clinical laboratories under Emergency Use Authorizations (EUAs) in the United States, being performed on our instruments, we sell our instruments for research use only to leading academic research institutions, translational research and medicine centers, cancer centers, clinical research laboratories, and biopharmaceutical, biotechnology, and plant and animal research companies. No single customer represented more than 10% of our total revenue for 2021, 2020, or 2019.

Marketing, Sales, Service and Support

We distribute our systems through our direct sales force and support organizations located in North America, Europe, and Asia-Pacific, and through distributors or sales agents in several European, Latin American, Middle Eastern, and Asia-Pacific countries. Our sales and marketing efforts are targeted at laboratory directors and principal investigators at leading academic, translational research, healthcare consortiums, and biopharmaceutical companies who need reliable life science automation solutions to power their disease research with the goal of providing actionable insights.

Our sales process often involves numerous interactions and demonstrations with multiple people within an organization. Some potential customers conduct in-depth evaluations of the system, including running experiments on our system and competing systems. In addition, in most countries, sales to academic or governmental institutions require participation in a tender process involving preparation of extensive documentation and a lengthy review process. As a result of these factors and the budget cycles of our customers, our sales cycle, the time from initial contact with a customer to our receipt of a purchase order, can often be 12 months or longer.

Manufacturing

Our manufacturing operations are primarily located in Singapore and Canada. Our facility in Singapore manufactures our IFCs and manages production of our microfluidics instruments, which are assembled by our contract manufacturer located within our Singapore facility. All of our IFCs for commercial sale and some IFCs for our research and development purposes are also fabricated at our Singapore facility. Our mass cytometry instruments and reagents for commercial sale, as well as for internal research and development purposes, are manufactured at our facility in Canada.

We rely on a limited number of suppliers for certain components and materials used in our products. Key components in our products that are supplied by sole or limited source suppliers include a specialized polymer and other specialized materials from which our IFC cores are fabricated, specialized custom camera lenses, fiber light guides, and other components required for the reader of our Biomark system; specialized pneumatic and electronic components for our C1, Juno, Callisto, and Polaris systems; the electron multiplier detector included in, and certain metal isotopes used with, our CyTOF systems; specially developed lasers used in our Hyperion Imaging System; and certain raw materials for our Delta Gene and SNP Type assays and Access Array Target-Specific primers. The loss of a single or sole source supplier would

require significant time and effort to locate and qualify an alternative source of supply, if at all, and could adversely impact our business. For additional information, please see the section entitled “Risk factors” in Part I, Item 1A of this Form 10-K.

Research and Development

We have assembled experienced research and development teams at our South San Francisco, California, Markham, Ontario, Canada, and Singapore locations with the scientific, engineering, software, bioinformatic, and process talent that we believe is required to grow our business.

The largest component of our current research and development effort is in the areas of new products, new applications and new content. We launched our Hyperion Imaging System in October 2017. The Hyperion Imaging System provides spatial resolution of protein expression in complex tissue samples at the single-cell level, quantitative measurement using metal isotope tags, and analysis of up to 40 proteins, while having 135 channels available. We also developed metal-labeled antibodies compatible with formalin fixed paraffin embedded tissue samples, to be used with the Hyperion Imaging System.

In 2019, we launched the Maxpar Direct Immune Profiling Assay, a sample-to-answer workflow for comprehensive human immune profiling for use with our CyTOF systems, that puts pre-titrated antibodies in dry format in a single tube, with automated software that provides data analysis in as few as five minutes. This assay is reproducible from site-to-site and lot-to-lot, which is important for translational and pharma/biotech research work. We have collaborated with industry partners to enable workflows and software for the Hyperion and CyTOF systems. Also in 2019, we added seven new metal antibody labels, becoming the first company to enable 50-plex cytometry panels, and launched three Imaging Mass Cytometry panel kits as well as CyTOF Software v7.0, an updated CyTOF software application.

In May 2021, we launched the new, fourth generation cell suspension mass cytometry system, CyTOF XT. It’s main features include automation of sample introduction and acquisition, enabling unattended operation for 23 hours at high stability, lower cost of ownership and enhanced performance in resolution of cell populations. The system enables storage of pelleted samples in the cooled autosampler, automated resuspension of pellets, and addition of beads standards.

We also invest significantly in research and development efforts to expand our microfluidics applications. For example, we continue to develop and commercialize various panel sets for cancer research for use with our systems. In 2017, we successfully launched the Advanta™ Immuno-Oncology Gene Expression Assay, which is a 170-gene expression qPCR assay that enables profiling of tumor immunobiology and new biomarker identification. In 2019, we launched the Advanta™ RNA-Seq NGS Library Prep Kit. Designed to drive significant improvement in the RNA-seq workflow, the Advanta RNA-Seq NGS Library Prep Kit together with the Juno™ system delivers an integrated solution for automated, cost-efficient NGS library prep. In 2020, we expanded our microfluidics franchise to develop products for the COVID-19 testing marketplace. We launched the AdvantaDx SARS-CoV-2 RT-PCR assay. In addition, we secured significant development partnerships, including for development of OEM systems using our microfluidics technology.

The second component of our research and development effort is to continuously develop new manufacturing processes and test methods to drive down manufacturing costs, increase manufacturing throughput, widen fabrication process capability, and support new microfluidic devices and designs.

Our research and development expenses were $37.9 million, $36.5 million and $31.6 million in 2021, 2020, and 2019 respectively.

Competition

The life science markets are highly competitive and expected to grow more competitive with the increasing knowledge gained from ongoing research and development. We believe that the principal competitive factors in our target markets include competition for human resources; cost of capital equipment and supplies; reputation among customers; innovation in product offerings; flexibility and ease of use; accuracy and reproducibility of results; and compatibility with existing laboratory processes, tools, and methods.

We compete with both established and development stage life science companies that design, manufacture, and market instruments for gene expression analysis, genotyping, other nucleic acid detection, protein expression analysis, imaging, and additional applications. In addition, a number of other companies and academic groups are in the process of developing novel technologies for life science markets. Many of our competitors enjoy several competitive advantages over us, including significantly greater name recognition; greater financial and human resources; broader product lines and product packages; larger sales forces and e-commerce channels; larger and more geographically dispersed customer support organization; substantial intellectual property portfolios; larger and more established customer bases and relationships; greater resources dedicated to marketing efforts; better established and larger scale manufacturing capability; and greater

resources and longer experience in research and development. For additional information, please see the section entitled “Risk factors” in Part I, Item 1A of this Form 10-K.

To successfully compete with existing products and future technologies, we need to demonstrate to potential customers that the performance of our technologies and products, the solutions we provide our customers, as well as our customer support capabilities, are superior to those of our competitors. To differentiate our company from other, larger enterprises, we need to introduce new and innovative offerings regularly and maintain a well-staffed commercial team “in the field” to successfully communicate the advantages of our products and overcome potential obstacles to acceptance of our products. In addition, ongoing collaborations and partnerships with key opinion leaders are desirable to demonstrate both biological innovation and applications that solve customer problems.

Intellectual Property

Patents

We have developed a portfolio of issued patents and patent applications directed to commercial products and technologies in development. As of December 31, 2021, we owned or licensed more than 410 patents and we had approximately 130 pending patent applications worldwide. Our utility patents have expiration dates ranging up to 2039, and our design patents have expiration dates ranging up to 2044.

License Agreements

We have entered into licenses for technologies from various companies and academic institutions.

Microfluidic Technologies. Our core microfluidics technology originated at the California Institute of Technology (Caltech) in the laboratory of Professor Stephen Quake, who is a co-founder of Fluidigm. We license microfluidics technology from Caltech, Harvard University, and Caliper Life Sciences, Inc. (Caliper), now a PerkinElmer company.

- We exclusively license from Caltech relevant patent filings relating to developed technologies that enable the production of specialized valves and pumps capable of controlling fluid flow at nanoliter volumes. The license agreement will terminate as to each country and licensed product upon expiration of the last-to-expire patent covering licensed products in each country. The U.S. issued patents we have licensed from Caltech expire between now and 2025.
- We have entered into a co-exclusive license agreement with Harvard University for the license of relevant patent filings relating to microfluidic technology. The license agreement will terminate with the last-to-expire of the licensed patents. The U.S. issued patents we have licensed from Harvard University expire between now and 2027.

Mass Cytometry. Some of the intellectual property rights covering our mass cytometry products were subject to a license agreement (the Original License Agreement) between Fluidigm Canada Inc. (Fluidigm Canada), and PerkinElmer Health Sciences, Inc. (PerkinElmer). Under the Original License Agreement, Fluidigm Canada received an exclusive, royalty bearing, worldwide license to certain patents owned by PerkinElmer in the field of inductively coupled plasma (ICP) -based mass cytometry, including the analysis of elemental tagged materials in connection therewith (the Patents), and a non-exclusive license for reagents outside the field of ICP-based mass cytometry. In November 2015, we entered into a patent purchase agreement with PerkinElmer pursuant to which we purchased the Patents for a purchase price of $6.5 million and a patent assignment agreement pursuant to which PerkinElmer transferred and assigned to us all rights, title, privileges, and interest in and to the Patents and the Original License Agreement. Accordingly, we have no further financial obligations to PerkinElmer under the Original License Agreement. Contemporaneously with the purchase of the Patents, we entered into a license agreement with PerkinElmer pursuant to which we granted PerkinElmer a worldwide, non-exclusive, fully paid-up license to the Patents in fields other than (i) ICP-based mass analysis of atomic elements associated with a biological material, including any elements that are unnaturally bound, directly or indirectly, to such biological material (Mass Analysis) and (ii) the development, design, manufacture, and use of equipment or associated reagents for such Mass Analysis. The license will terminate on the last expiration date of the Patents, currently expected to be in November 2026, unless earlier terminated pursuant to the terms of the license agreement.

InstruNor AS. In January 2020, we completed the acquisition of InstruNor AS (InstruNor) for $7.2 million, including $5.2 million in cash and $2.0 million in stock. InstruNor provides automated sample preparation solutions for mass cytometry and flow cytometry instrument markets and is now part of Fluidigm’s mass cytometry business. Included in this acquisition were certain intellectual property portfolio assets comprising patents and/or patent applications directed to

various aspects of automated cell pretreatment instruments. The expiration dates for the issued patents in this patent portfolio extend to March 2033.

Any loss, termination, or adverse modification of our licensed intellectual property rights could have a material adverse effect on our business, operating results, and financial condition. For additional information, please see the section entitled “Risk factors” in Part I, Item 1A of this Form 10-K.

Other

In addition to pursuing patents and licenses on key technologies, we have taken steps to protect our intellectual property and proprietary technology by entering into confidentiality agreements and intellectual property assignment agreements with our employees, consultants, corporate partners, and, when needed, our advisers.

Government Regulation

Under section 564 of the Federal Food, Drug, and Cosmetic Act (FD&C Act), the FDA has authority to allow certain unapproved medical products or unapproved uses of approved medical products to be used during a public health emergency. In issuing an EUA, the FDA will consider the totality of scientific evidence available to the FDA regarding safety, efficacy and known and potential risks of such products and availability of alternatives to the emergency use products, among others. EUAs issued by the FDA will specify the scope of authorization and conditions of authorization, including limitations on distribution and conditions related to product advertising and promotion. Once granted, an EUA is effective until the declaration that circumstances exist justifying the authorization of the emergency use is terminated under Section 564(b)(2) of the FD&C Act or the EUA is revoked under Section 564(g) of the FD&C Act, after which the product must be cleared or approved by the FDA under a traditional pathway in order to remain on the market or to continue commercialization of the product.

In August 2020, the FDA granted an EUA for our Advanta Dx SARS-CoV-2 RT-PCR Assay for the qualitative detection of nucleic acid from SARS-CoV-2 in saliva specimens collected without preservatives in a sterile container from individuals suspected of COVID-19 by their healthcare providers. As set forth in the EUA, we are required to comply with the conditions of authorization, including certain requirements pertaining to FDA notification, distribution, printed materials, advertising and promotion. If we, our distributors, or authorized laboratories do not comply with the EUA requirements, our business, financial condition and results of operations may be adversely impacted, and we may be subject to regulatory or enforcement actions, including the issuance of an untitled letter, a warning letter, penalties, or fines, among other adverse actions.

If the FDA’s policies and guidance change unexpectedly and/or materially or if we misinterpret them, potential sales of our Advanta Dx SARS-CoV-2 RT-PCR Assay could be adversely impacted. In addition, the FDA will revoke an EUA where it is determined that the underlying public health emergency no longer exists or warrants such authorization, or if new evidence becomes available that indicates the test does not meet the conditions of authorization or perform as provided in the EUA application. We cannot predict how long this EUA will remain effective. The termination or revocation of the EUA and changing policies and regulatory requirements could adversely impact our business, financial condition and results of operations. Given the uncertain nature of the COVID-19 pandemic and future legislation and regulation in this space, we can provide no assurance with respect to our ability to achieve or sustain profitability on a quarterly or annual basis.

Except for the Advanta Dx COVID-19 EASE Assay authorized by the FDA under the EUA granted in February 2022 and the Advanta Dx SARS-CoV-2 RT-PCR Assay authorized by the FDA under the EUA granted in August 2020, subsequently updated for use with the AZOVA COVID-19 Test Collection Kit, among other updates, all of our other products are currently labeled and sold for research purposes only, and we sell them to academic institutions, life sciences and clinical research laboratories that conduct research, and biopharmaceutical and biotechnology companies for non-diagnostic and non-clinical purposes. Our products are not intended or promoted for use in clinical practice in the diagnosis of disease or other conditions, and they are labeled, “For research use only. Not for use in diagnostic procedures.” Accordingly, they are not subject to pre- and post-market controls for medical devices by the FDA. The FDA regulations require that research use only products be labeled, “For Research Use Only. Not for use in diagnostic procedures,” or RUO products.

In November 2013, the FDA issued a final guidance document stating that merely including a labeling statement that the product is for research purposes only will not necessarily render the device exempt from the FDA’s clearance, approval, or other regulatory requirements if the totality of circumstances surrounding the distribution of the product indicate that the manufacturer knows its product is being used by customers for diagnostic uses or the manufacturer intends such a use. These circumstances may include, among other things, written or verbal marketing claims regarding a product’s performance in clinical diagnostic applications and a manufacturer’s provision of technical support for such activities. In the

future, certain of our products or related applications could become subject to regulation as medical devices by the FDA. If we wish to label and market our products for use in performing clinical diagnostics, thus subjecting them to regulation by the FDA under pre-market and post-market control as medical devices, unless an exemption applies, we would be required to obtain either prior 510(k) clearance or prior pre-market approval (PMA) from the FDA before commercializing the product. The FDA classifies medical devices into one of three classes. Devices deemed to pose lower risk to the patient are placed in either class I or II, which, unless an exemption applies, requires the manufacturer to submit a pre-market notification requesting FDA clearance for commercial distribution pursuant to Section 510(k) of the FD&C Act. This process, known as 510(k) clearance, requires that the manufacturer demonstrate that the device is substantially equivalent to a previously cleared and legally marketed 510(k) device or a "pre-amendment" class III device for which pre-market approval applications (PMAs) have not been required by the FDA. This FDA review process typically takes from four to twelve months, although it can take longer. Most class I devices are exempted from this 510(k) premarket submission requirement. Devices deemed by the FDA to pose the greatest risk, such as life-sustaining, life-supporting, or implantable devices, or those deemed not substantially equivalent to a legally marketed predicate device, are placed in class III. Class III devices typically require PMA approval. To obtain PMA approval, an applicant must demonstrate the reasonable safety and effectiveness of the device based, in part, on data obtained in clinical studies. PMA reviews generally last between one and two years, although they can take longer. Both the 510(k) and the PMA processes can be expensive and lengthy and may not result in clearance or approval. If we are required to submit our products for pre-market review by the FDA, we may be required to delay marketing and commercialization while we obtain pre-market clearance or approval from the FDA. There would be no assurance that we could ever obtain such clearance or approval.

In some cases, our customers may use our RUO products in their own laboratory-developed tests (LDTs) or in other FDA-regulated products for clinical diagnostic use. The FDA has historically exercised enforcement discretion in not enforcing the medical device regulations against LDTs and LDT manufacturers. However, on October 3, 2014, the FDA issued two draft guidance documents that set forth the FDA's proposed risk-based framework for regulating LDTs, which are designed, manufactured, and used within a single laboratory. In January 2017, the FDA announced that it would not issue final guidance on the oversight of LDTs and LDT manufacturers, but would seek further public discussion on an appropriate oversight approach and give Congress an opportunity to develop a legislative solution. More recently, the FDA has issued warning letters to genomics labs for illegally marketing genetic tests that claim to predict patients' responses to specific medications, noting that the FDA has not created a legal "carve-out" for LDTs and retains discretion to take action when appropriate, such as when certain genomic tests raise significant public health concerns. As laboratories and manufacturers develop more complex genetic tests and diagnostic software, the FDA may increase its regulation of LDTs. Any future legislative or administrative rule making or oversight of LDTs and LDT manufacturers if and when finalized, may impact the sales of our products and how customers use our products, and may require us to change our business model in order to maintain compliance with these laws.

We would become subject to additional FDA requirements if our products are determined to be medical devices or if we elect to seek 510(k) clearance or pre-market approval. We would need to continue to invest significant time and other resources to ensure ongoing compliance with FDA quality system regulations and other post-market regulatory requirements. For additional information, please see the section entitled "Risk factors" in Part I, Item 1A of this Form 10-K.

International sales of medical devices are subject to foreign government regulations, which vary substantially from country to country. Outside of the EU, regulatory approval needs to be sought on a country-by-country basis in order to market medical devices. Although there is a trend towards harmonization of quality system, standards and regulations in each country may vary substantially which can affect timelines of introduction.

Other U.S. Healthcare Regulatory Requirements

Medical device companies are subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which they conduct their business and may constrain the financial arrangements and relationships through which we research, as well as sell, market and distribute products for which we obtain marketing authorization. Such laws include, without limitation, state and federal anti-kickback, fraud and abuse, false claims, data privacy and security, and transparency laws and regulations related to interactions and financial arrangements with healthcare professionals and healthcare organizations, payments and other transfers of value made to physicians and other healthcare providers, among others. If our operations are found to be in violation of any of applicable laws or any other governmental regulations that apply, we may be subject to penalties, including, without limitation, administrative, civil and criminal penalties, damages, fines, disgorgement, the curtailment or restructuring of operations, integrity oversight and reporting obligations, exclusion from participation in federal and state healthcare programs and imprisonment. Changes in healthcare regulations, statutes or the interpretation of existing regulations could also impact our business in the future, expose use to increased liabilities, and increase the costs of our operations.

Environmental Matters

We are subject to many federal, state, local, and foreign environmental regulations. To comply with applicable regulations, we have and will continue to incur significant expense and allocate valuable internal resources to manage compliance-related issues. In addition, such regulations could restrict our ability to expand or equip our facilities, or could require us to acquire costly equipment or to incur other significant expenses to comply with the regulations. For example, the Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Directive (RoHS), the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) and the Waste Electrical and Electronic Equipment Directive (WEEE), enacted in the European Union, regulate the use of certain hazardous substances, notification of customers of the presence of any substances of very high concern in products, and require the collection, reuse, and recycling of waste from, products we manufacture. Certain of our products sold in these countries are subject to RoHS, REACH and WEEE requirements. If we fail to comply with any present and future regulations, we could be subject to future fines, penalties, and restrictions, such as the suspension of manufacturing of our products or a prohibition on the sale of products we manufacture. For additional information, please see the section entitled “Risk factors” in Part I, Item 1A of this Form 10-K.

Additionally, our research and development and manufacturing processes involve the controlled use of hazardous materials, including flammables, toxics, corrosives, and biologics. Our research and manufacturing operations produce hazardous biological and chemical waste products. We seek to comply with applicable laws regarding the handling and disposal of such materials. The volume of such materials used or generated at our facilities is small. However, we cannot eliminate the risk of accidental contamination or discharge and any resultant injury from these materials. We do not currently maintain separate environmental liability coverage and any such contamination or discharge could result in significant cost to us in penalties, damages, and suspension of our operations.

Geographic Area Information

During the last three years, a significant portion of our revenue was generated outside of the United States. Total revenue received from customers outside the United States equaled $70.4 million, or 54% of our total revenue, in 2021, compared to $66.2 million, or 48% of our total revenue, in 2020, and $73.9 million, or 63% of our total revenue, in 2019. The majority of our long-lived assets are located within the United States, in Singapore and in Canada. Please see Note 6 and Note 16 to our audited consolidated financial statements for additional information regarding geographic areas.

Seasonality

Our business is not subject to significant seasonality. However, the timing of customer orders and shipments, customer budget and spending cycles, and new product releases can result in variability in our quarterly revenues.

Raw Materials

Certain raw materials used in our Delta Gene and SNP Type assays and Access Array target-specific primers are available from a limited number of sources. Additionally, certain metals used in our Maxpar reagents are available from a sole source. Currently, we do not have supply agreements with these suppliers. While we generally attempt to keep our inventory at minimal levels, we purchase incremental inventory as circumstances warrant to protect our supply chain.

Backlog

We manufacture products based on forecasts of our customers’ demand and advance non-binding commitments from customers as to future purchases. Our customers generally do not place purchase orders far in advance. A substantial portion of our products are sold on the basis of standard purchase orders that are cancellable prior to shipment without penalty. Accordingly, backlog at any given time is not a meaningful indicator of future sales.

Human Resource Capital

Our team members share our commitment to improving the human condition and, in turn, Fluidigm strives to create an environment where our people can do their best work. We know that our employees, who supply the ideas, energy, and innovation that powers our business, are Fluidigm's most valued assets.

We are a values-driven organization. We believe strong shared values are essential for Fluidigm to evolve and grow and to be successful for the long-term. Our values inform our relationships with customers, suppliers, investors and each other. They ensure that we model respect and inclusiveness in our words and actions. Our core values, conceived and developed by our employees, define us when we are at our best and guide us in all that we do. Our core values are to:

- Create what customers need next
- Drive to make a difference
- Collaborate and learn
- Step up

A Growing Global Workforce

As of December 31, 2021, Fluidigm had 615 employees worldwide, 45% of whom were female. In the United States, 38% of our employees were female as of December 31, 2021. None of our employees are represented by a labor union nor are they subject to a collective bargaining agreement.

The table below provides an overview of our employees by function, geographic location, and gender as of December 31, 2021:

	United States	Canada	Singapore	Other	Total	Male	Female	Total
Manufacturing	16	61	68	—	145	69	76	145
Research and Development	44	73	23	—	140	88	52	140
Sales and Marketing	84	32	8	86	210	120	90	210
General and Administration	62	22	31	5	120	59	61	120
Total	206	188	130	91	615	336	279	615

Employee Safety and COVID-19

Employee safety has always been paramount at Fluidigm, a commitment very much in evidence as we continue to navigate the challenges of the COVID-19 pandemic. At the outset of the crisis, we tasked a global, interdisciplinary team of leaders in environmental health and safety, human resources, legal, facilities and information technology to develop guidelines and processes for new health and well-being protocols. Also developed were new practices for cross-functional, remote teamwork, operating disciplines and training programs.

To keep our employees safe, we provide to those who can work remotely the tools and resources to do so. Our pivot to remote work has been successful, with employees taking advantage of our technology resources. Essential work continues not only at our facilities and labs, but also every day in home offices, living rooms, kitchens and spare rooms, made possible by our IT systems and the collective commitment of our people. Many of our employees have worked on-site in labs and other facilities throughout the pandemic, and we have adopted a range of protocols and practices to keep them safe.

We have empowered each Fluidigm business location to adopt health and safety recommendations that address local requirements, and we have made site-specific COVID-19 prevention plans readily available for all our employees. In addition, we provide team members practical recommendations based on guidelines from the Centers for Disease Control and Prevention, the World Health Organization, the U.S. Department of Health and Human Services, the Occupational Safety and Health Administration, and other regional government entities. We are committed to updating these recommendations and communicating new pertinent information when available.

One of the key learnings of the extended pandemic is that there are many ways for work to get done. Since the early days of the global health crisis, Fluidigm colleagues around the world have stepped up to make virtual work remarkably successful across a diverse range of teams in every part of the Company. Each Fluidigm site will determine how and when more people return, based on site-specific factors related to health and safety, the needs of the business and each individual's ability to work remotely versus the necessity to be onsite. We are prepared to be flexible as new information becomes available or as conditions change. As we consider a return to the workplace for more people, safety is our priority. We think

this is an opportunity to make Fluidigm a place to do your very best work in a way that is safe, flexible, collaborative and right for Fluidigm.

Compensation and Benefits

The primary goal of our compensation program is to ensure that we attract, hire, and retain talented and highly skilled team members who are motivated to achieve or exceed our corporate goals.

We offer competitive total reward packages comprising various elements including market-driven base pay, short- and long-term incentives in the form of performance-based cash and equity, as well as comprehensive health and welfare benefits that include medical, dental, vision, group life, disability, and accidental death and dismemberment insurance, as well as our 401(k) or comparable non-U.S. retirement plans, subject to applicable law. We also provide vacation and other paid holidays to all employees at levels that we believe are comparable to those provided at peer companies.

Our intention is to align our compensation practices with the changing marketplace, working to exceed our peer competitors. By doing so, we strive to provide incentives to our team members to achieve short- and long-term business goals, ensuring they feel rewarded for their performance and contributions.

Professional Development

In addition to providing attractive and competitive total rewards packages, Fluidigm believes in fostering individual and organizational effectiveness by offering our team members a variety of professional development programs. These programs are designed to:

- inform, educate, and inspire our people to reach their professional goals;
- provide professional growth opportunities in different, easily accessible ways to accommodate diverse learning styles, including via classroom/live instructor-led trainings, online/e-learning modules, webinar/virtual trainings, blended learning, and professional coaching;
- provide individuals and the organization with the knowledge and skills to respond effectively to customer needs as well as current and future business demands; and
- provide ongoing support to the organization's development efforts.

Our culture is one that actively supports participation in learning activities and the application of new knowledge and skills on the job. As such, we strive to create a work environment that both challenges and supports all our team members to do their best work.

Diversity and Inclusion

At Fluidigm, our commitment to diversity, inclusion and equity is reflective of our values. We believe that we are strongest when we embrace all forms of diversity, and that it is essential to seek out diverse, innovative ideas and foster an inclusive culture where all colleagues are respected and engaged. We apply this commitment to diversity to every aspect of the employee experience, from recruitment to development, training and advancement. As Fluidigm evolves, we will continue to build an inclusive and diverse culture that empowers all of us.

Corporate and Available Information

We were incorporated in California in May 1999 as Mycometrix Corporation, changed our name to Fluidigm Corporation in April 2001, and reincorporated in Delaware in July 2007. Our principal executive offices are located at Two Tower Place, South San Francisco, California 94080. Our telephone number is (650) 266-6000. Our website address is www.fluidigm.com. We make available on our website, free of charge, our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and any amendments to those reports, as soon as reasonably practicable after we electronically file such material with, or furnish it to, the Securities and Exchange Commission (SEC). Our SEC reports can be accessed through the investor relations page of our website located at http://investors.fluidigm.com. The SEC also maintains an Internet site at www.sec.gov that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC.

The contents of our website are not a part of, and are not incorporated by reference into, this Annual Report on Form 10-K or any other report or document we file with the SEC. Any reference to our website is intended to be an inactive textual reference only.

We intend to use our website, www.fluidigm.com as a means of disclosing material non-public information and for complying with our disclosure obligations under SEC Regulation FD. Such disclosures will be included on our website under “About Us > Investors.” Accordingly, investors should monitor the “Investors” section of our website, in addition to following our press releases, SEC filings, and public conference calls and webcasts.

ITEM 1A. RISK FACTORS

We operate in a rapidly changing environment that involves numerous uncertainties and risks. The following risks and uncertainties may have a material and adverse effect on our business, financial condition, or results of operations. You should consider these risks and uncertainties carefully, together with all of the other information included or incorporated by reference in this Annual Report on Form 10-K. The risks described below are not the only ones we face. Our business is also subject to the risks that affect many other companies, such as employment relations, general economic conditions, global sociopolitical events and international operations. Further, additional risks not currently known to us or that we currently believe are immaterial may in the future materially and adversely affect our business, operations, liquidity and stock price. If any of these risks occur, our business, results of operations, or financial condition could suffer, the trading price of our securities could decline, and you may lose all or part of your investment.

Summary of Risk Factors

Risks Related to the Private Placement Issuance

- The pending strategic Private Placement Issuance may not be consummated or may be delayed.
- While the Private Placement Issuance is pending, we are subject to business uncertainties and contractual restrictions that could harm our business relationships, financial condition, operating results and business.
- We have incurred, and will incur, substantial expenses in connection with the Private Placement Issuance.
- Following the Closing, the Purchasers will own a significant portion of our total outstanding voting securities and may prevent other stockholders from influencing material corporate decisions following completion of the Private Placement Issuance.
- We may not be able to realize the anticipated benefits of the Private Placement Issuance, and we will be subject to business uncertainties that could adversely affect our business.
- The Private Placement Issuance, if consummated, will cause dilution to our current stockholders.
- The market value of our common stock could decline if the Purchasers sell their Series B Preferred Stock or common stock after certain transfer restrictions expire.

Risks Related to our Business, Industry, and Strategy

- The COVID-19 pandemic has significantly affected our business operations.
- Our financial results and revenue growth rates have varied significantly from quarter-to-quarter and year-to-year, and may not be consistent with expectations.
- We have incurred losses since inception, and we may continue to incur substantial losses for the foreseeable future.
- The life science markets are highly competitive and subject to rapid technological change.
- If our research and product development efforts do not result in commercially viable products within anticipated timelines, if at all, our business and results of operations will be adversely affected.
- Our future success is dependent upon our ability to expand our customer base and introduce new applications.
- If our products fail to achieve and sustain sufficient market acceptance, our revenue will be adversely affected.
- Our business growth strategy involves the potential for significant acquisitions.
- Our efficiency and cost-savings initiatives could be disruptive to our operations.
- Implementation of a company-wide enterprise resource planning (ERP) system could adversely affect our business.

Risks Related to Operations and Reliance on Third Parties

- We may experience development or manufacturing problems or delays.
- Our business depends on research and development spending levels of our customers.
- Disruption of our manufacturing facilities or other operations, or in the operations of our customers or business partners, could result in cancellation of orders, delays in deliveries or other business activities, or loss of customers.
- We rely on single and sole source suppliers for some of the components and materials used in our products.
- Any disruption or delay in the shipping or off-loading of our products may have an adverse effect on our financial condition and results of operations.
- Our business operations depend upon the continuing efforts of our management team and other key employees.
- Our distribution capabilities and direct sales, field support, and marketing forces must be sufficient to meet our customers' needs.

- To use our analytical systems, customers typically need to purchase specialized reagents.
- Security breaches, loss of data, cyberattacks, and other IT failures could adversely affect our business.

Risks Related to Quality and the Regulatory Environment

- Our products could have defects or errors.
- Although the FDA granted Emergency Use Authorization (EUA) for our Advanta Dx SARS-CoV-2 RT-PCR Assay in August 2020 and an update to our EUA for use of the AZOVA COVID-19 Test Collection Kit in February 2021, among other updates, these authorizations are only valid during the COVID-19 public health emergency.
- To the extent we elect to label and promote any of our non-EUA products as medical devices, we would be required to obtain prior approval or clearance by the FDA or comparable foreign regulatory authority.
- Compliance or the failure to comply with current and future regulations affecting our products and business operations worldwide could cause us significant expense and adversely impact our business.

Risks Related to Economic Conditions and Operating a Global Business

- We generate a substantial portion of our revenue internationally.
- Adverse conditions in the global economy may significantly harm our revenue, profitability, and results of operations.
- We are subject to fluctuations in the exchange rate of the U.S. dollar and foreign currencies.

Financial, Tax, and Accounting Risks

- We believe that our current level of cash and cash equivalents, together with committed financing facilities, are not sufficient to fund ongoing operations for at least the twelve-month period after the financial statements were issued. The existence of these conditions raises substantial doubt about our ability to continue as a “going concern” for at least the twelve-month period following the date the financial statements were issued.
- Our future capital needs are uncertain and we may need to raise additional funds in the future.
- Any failure to maintain effective internal control over financial reporting could adversely affect our business.
- We may not realize the value of our goodwill or other intangible assets.
- If we fail to comply with the covenants and other obligations under our debt facilities, the lenders may be able to accelerate amounts owed under the facilities and, in the case of our Credit Facility (as defined herein), may foreclose upon the assets securing our obligations.
- We are subject to risks related to taxation in multiple jurisdictions.
- We have a significant amount of outstanding indebtedness.

Risks Related to Intellectual Property

- Our ability to protect our intellectual property and proprietary technology is uncertain.
- We may be involved in lawsuits to protect or enforce our patents and proprietary rights.
- We may be subject to damages resulting from claims that we or our employees have wrongfully used or disclosed alleged trade secrets.
- We depend on certain technologies that are licensed to us.
- We are subject to certain manufacturing restrictions related to licensed technologies that were developed with the financial assistance of U.S. governmental grants.
- We are subject to certain obligations and restrictions relating to technologies developed in cooperation with Canadian government agencies.

Risks Related to Our Common Stock

- Our stock price is volatile.
- Future sales of our common stock in the public market could cause our stock price to fall.
- If securities or industry analysts publish unfavorable research about us or cease to cover our business, our stock price and/or trading volume could decline.
- Any conversions of our 2014 Notes or 2019 Notes will dilute the ownership interest of our existing stockholders.

RISKS RELATED TO THE PRIVATE PLACEMENT ISSUANCE

The pending strategic Private Placement Issuance may not be consummated or may be delayed, and any failure to complete the Private Placement Issuance could materially and adversely impact our financial condition, results of operations, growth prospects and/or stock price.

As further described in Item 1, *Business*, we entered into (i) the Casdin Loan Agreement and (ii) the Viking Loan Agreement (the Bridge Loan Agreements). Each Bridge Loan Agreement provides for a Bridge Loan of $12.5 million to the Company. The Bridge Loans were fully drawn on January 24, 2022.

Also, as further described in Item 1, *Business*, on January 23, 2022, we entered into separate Purchase Agreements with each of the Purchasers, pursuant to which, among other things, at the Closing, and on the terms and subject to the conditions set forth therein, the Company will issue and sell in a private placement (a) to Casdin, 112,500 shares of the Company's newly designated Series B-1 Convertible Preferred Stock in exchange for $112.5 million, and (b) to Viking, 112,500 shares of the Company's newly designated Series B-2 Convertible Preferred Stock in exchange for $112.5 million.

Consummation of the Private Placement Issuance is subject to certain closing conditions, a number of which are not within our control, including stockholder approval of the Private Placement Issuance. We cannot predict with certainty whether or when any of the required closing conditions will be satisfied, and we can provide no assurance that all closing conditions will be satisfied or waived (where permissible) or that the Private Placement Issuance will be consummated timely or at all. Any failure to satisfy the closing conditions may prevent, delay or otherwise materially adversely affect the completion of the Private Placement Issuance. If the Private Placement Issuance is not consummated, our ongoing business and financial results may be materially adversely affected and we will be subject to a number of risks, including the following:

- the Purchase Agreements may be terminated;
- we may be unable to meet our debt maintenance or repayment obligations;
- we may lose the anticipated benefits of the Private Placement Issuance and access to the relationships and expertise of the Purchasers, which could negatively impact our financial results, growth prospects and strategic plans;
- our management may be required to divert attention from our business in order to negotiate an alternative transaction;
- we will be liable for significant transaction costs, including legal, accounting, financial advisory and other costs relating to the Private Placement Issuance; and
- we may be required to pay termination fees as required under the Purchase Agreements.

In addition, if the Private Placement Issuance is not completed, we may experience negative reactions from the financial markets and from our existing stockholders, customers, partners, employees, vendors and creditors. The trading price of our common stock may decline to the extent that the current market price for our common stock reflects a market assumption that the Private Placement Issuance will be completed. We may be unable to find a comparable alternative transaction that would allow us to meet our debt and other obligations as they come due, which could have important consequences, including potentially forcing us into bankruptcy or liquidation. These risks may materialize and may adversely affect our business, financial position, results of operations and cash flows, as well as the price of our common stock.

Litigation relating to the Private Placement Issuance may be filed that could prevent or delay the Private Placement Issuance closing and/or result in the payment of damages.

In connection with the Private Placement Issuance, it is possible that stockholders or other parties may file putative class action or other lawsuits against us or the Purchasers. Among other remedies, these parties could seek damages and/or to enjoin the Special Meeting. The outcome of any litigation is uncertain, and any such potential lawsuits could prevent or delay the Closing of the Private Placement Issuance and/or result in substantial costs to us. Any such actions may create uncertainty relating to the Private Placement Issuance and may be costly and distracting to management. Further, the defense or settlement of any lawsuit or claim that remains unresolved at the time the Private Placement Issuance is completed may adversely affect our business, financial condition, results of operations and cash flows.

In addition, in connection with the announcement of the Private Placement Issuance, we entered into an indemnification agreement with Dr. Egholm for indemnification with respect to potential claims by a prior employer against Dr. Egholm that may arise in connection with his engagement with us and becoming our Chief Executive Officer. We are currently responding to certain inquiries that a prior employer has made in connection with Dr. Egholm's signed offer letter to become our Chief

Executive Officer. Any claims for indemnification made by Dr. Egholm could cause us to incur costs and expenses. To the extent that we expend funds to indemnify Dr. Egholm, those funds will be unavailable for other purposes.

While the Private Placement Issuance is pending, we are subject to business uncertainties and contractual restrictions that could harm our business relationships, financial condition, operating results and business.

During the period prior to the Closing of the Private Placement Issuance and pursuant to the terms of the Purchase Agreements, we are exposed to certain inherent risks and contractual restrictions that could harm our business relationships, financial condition, operating results, and business, including:

- potential uncertainty in the marketplace, which could lead current and prospective customers to purchase products and services from other providers or delay purchasing from us;
- difficulties maintaining existing and/or establishing new business relationships, including business relationships with significant customers, suppliers and partners;
- the possibility of disruption to our business and operations resulting from the announcement and pendency of the Private Placement Issuance, including diversion of management attention and resources;
- the inability to attract and retain key personnel and recruit prospective employees, and the possibility that our current employees could be distracted, and their productivity decline as a result, due to uncertainty regarding the Private Placement Issuance;
- the inability to pursue alternative business opportunities or make changes to our business pending the completion of the Private Placement Issuance, and other restrictions on our ability to conduct our business;
- our inability to take certain actions that we might believe are beneficial for our business;
- the amount of the costs, fees, expenses and charges related to the Purchase Agreements and the Private Placement Issuance, which may materially and adversely affect our financial condition; and
- other developments beyond our control, including, but not limited to, changes in domestic or global economic conditions, that may affect the timing or success of the Private Placement Issuance.

If any one or more of these effects were to occur, they could materially and adversely impact our business, cash flow, results of operations or financial condition, as well as the market price of our common stock and our perceived value, regardless of whether the Private Placement Issuance is completed.

The Purchase Agreements limit our ability to pursue alternatives to the Private Placement Issuance.

The Purchase Agreements contain certain customary restrictions on our ability to solicit proposals from third parties for alternative transactions, including a strategic investment or a sale of the Company. In addition, subject to certain customary "fiduciary out" exceptions, our board of directors is required to recommend that our stockholders vote in favor of the approval of the Private Placement Issuance. In connection with termination of the Purchase Agreements under specified circumstances, we will be obligated to pay each Purchaser a termination fee of up to $5,000,000. Moreover, we may be required to reimburse each Purchaser for an amount not to exceed $1,250,000 for each Purchaser's documented expenses if the Purchase Agreements are terminated for any reason other than the applicable Purchaser's breach of its Purchase Agreement. The payment of these fees and expenses could materially and adversely impact our business, cash flow, results of operations or financial condition.

These provisions might discourage an otherwise-interested third party from considering or proposing an alternative transaction, including a transaction that may be deemed to offer greater value to our stockholders than the Private Placement Issuance.

Actions of activist stockholders or other parties may impair our ability to consummate the Private Placement Issuance or otherwise could negatively impact our business.

Actions taken by activist stockholders could impair our ability to satisfy conditions to the consummation of the Private Placement Issuance, including receiving the requisite stockholder approval, or otherwise preclude us from consummating the Private Placement Issuance. Such activist stockholders could also take actions that disrupt our business, divert the time and attention of management and our employees away from our business operations, cause us to incur substantial additional expense, create perceived uncertainties among current and potential customers, clients, suppliers, employees and other constituencies as to our future direction as a consequence thereof, which may result in lost sales or other business arrangements and the loss of potential business opportunities, and make it more difficult to attract and retain qualified personnel and business partners. Actions that our board of directors has taken, and may take in the future, in response to any offer or proposal by activist stockholders may result in litigation against us, which could also be a significant distraction for our management and

employees and may require us to incur significant costs or otherwise result in an adverse effect on us. In addition, actual or perceived actions of activist stockholders may cause significant fluctuations in the trading price of our common stock that do not necessarily reflect the underlying fundamentals and prospects of our business.

We have incurred, and will incur, substantial expenses in connection with the Private Placement Issuance.

We have incurred, and will incur, substantial expenses in connection with and as a result of the Private Placement Issuance, including financial advisory, legal, accounting, consulting and other advisory fees and expenses. A portion of the costs related to the Private Placement Issuance will be incurred regardless of whether the Private Placement Issuance is completed. While we have assumed that a certain level of transaction expenses will be incurred, factors beyond our control could affect the total amount or the timing of these expenses. Some of the expenses that will be incurred, by their nature, are difficult to estimate accurately. These expenses will exceed the costs historically borne by us and could adversely affect our financial condition and results of operations prior to and following the Private Placement Issuance.

Following the Closing, the Purchasers will own a significant portion of our total outstanding voting securities and may prevent other stockholders from influencing material corporate decisions following completion of the Private Placement Issuance, and the Purchasers' interests may conflict with those of our other stockholders.

Assuming the Closing occurs on April 1, 2022 (the Assumed Closing Date), the Series B Preferred Stock will initially be convertible into up to approximately 75,157,929 shares of our common stock (without giving effect to limitations associated with any conversion cap), including any shares of our common stock issuable upon conversion of the Series B Preferred Stock issued upon conversion of the Bridge Loans. On an as-converted basis, we expect this to collectively represent approximately 49.4% of our issued and outstanding common stock immediately following the Closing (equating to approximately 24.7% per Purchaser) based on the number of shares of common stock outstanding as of January 31, 2022, but assuming full conversion of all Series B Preferred Stock (without giving effect to limitations associated with any conversion cap) immediately following the Assumed Closing Date. As a result, the Purchasers are expected to be our largest stockholders. This concentration of ownership, together with the voting rights, director designation rights and consent rights granted to the Purchasers as part of the Private Placement Issuance, may be perceived negatively by other investors and, as a result, may adversely affect the market price of our common stock. The Purchasers, if they acted together, could significantly influence all matters requiring approval by our stockholders, including the election of directors and the approval of mergers or other business combination transactions. The interests of the Purchasers may not always coincide with our interests or the interests of other stockholders.

We may not be able to realize the anticipated benefits of the Private Placement Issuance, and we will be subject to business uncertainties that could adversely affect our business.

The anticipated benefits of the Private Placement Issuance, including, among others: (i) to capitalize Fluidigm appropriately; (ii) to avoid frequently recurring liquidity concerns that temper stock price performance; (iii) to manage operating expenses; (iv) to find new sources of growth both organic and inorganic; and (v) to implement management changes as necessary to achieve the foregoing may not be realized fully or at all, or may take longer to realize than we currently expect. Additionally, the Purchasers are preeminent investors in the life sciences market, and the Company may not realize the benefits from their domain experience and success in building growth companies in life sciences. Actual operating, strategic and revenue opportunities, if achieved at all, may be less significant than we expect or may take longer to achieve than we anticipate. If we are not able to achieve these objectives and realize the anticipated benefits from the Private Placement Issuance within the anticipated timing or at all, our business, financial condition and operating results may be adversely affected. Parties with whom we do business may experience uncertainty associated with the Private Placement Issuance. Our business relationships may be subject to disruption as customers, partners, vendors, landlords and other parties with whom we do business may attempt to delay or defer entering into new business relationships with us, negotiate changes in existing business relationships, terminate their contracts with us, or consider entering into business relationships with our competitors following the Private Placement Issuance. The occurrence of any of these events could have an adverse effect on our operating results, particularly during the period immediately following the Closing. Uncertainty about the effect of the Private Placement Issuance could also have an adverse effect on our employee relations. This uncertainty may impair our ability to attract, retain and motivate key personnel until the Private Placement Issuance is consummated and for a period of time thereafter. Any loss of key personnel, including members of our senior management team, could have an adverse effect on our operations and financial results.

The Private Placement Issuance, if consummated, will cause dilution to our current stockholders, which may negatively affect the market price of our common stock.

If our stockholders approve the Private Placement Issuance, upon the Closing, the Series B-1 Preferred Stock issued pursuant to the B-1 Purchase Agreement and Casdin Loan Agreement will initially be convertible into an aggregate of

approximately 37,578,964 shares of our common stock (subject to adjustment), and the Series B-2 Preferred Stock issued pursuant to the B-2 Purchase Agreement and Viking Loan Agreement will initially be convertible into an aggregate of approximately 37,578,964 shares of our Common Stock (subject to adjustment), assuming the Closing occurs on the Assumed Closing Date, and without giving effect to limitations associated with any conversion cap. On an as-converted basis, and assuming the Closing occurs on the Assumed Closing Date, we currently expect this to represent an aggregate of approximately 49.4% of our issued and outstanding shares of Common Stock immediately following the Closing (equating to approximately 24.7% per Purchaser) based on the number of shares of Common Stock outstanding as of January 31, 2022, but assuming full conversion of all Series B Preferred Stock (without giving effect to limitations associated with any conversion cap) immediately following the Closing. In connection with the Closing of the Private Placement Issuance, we also intend to adopt a 2022 Inducement Equity Incentive Plan (the "Inducement Plan"). The initial share reserve under the Inducement Plan is estimated to be 5% of the outstanding shares of Common Stock at the Closing, calculated on a fully diluted basis (assuming all equity awards to be granted in connection with the Closing are outstanding). As a result, our current stockholders will experience substantial dilution of any earnings per share we may have in the future, as well as of ownership percentage and voting rights. This could have the effect of depressing the market price of our common stock.

The market value of our common stock could decline if the Purchasers sell their Series B Preferred Stock or common stock after certain transfer restrictions expire or if our current stockholders sell large amounts of common stock following the Private Placement Issuance.

Pursuant to the Registration Rights Agreement that we entered into on January 23, 2022 with the Purchasers, we agreed to certain customary registration rights with respect to shares issuable under the Bridge Loan Agreements and the Purchase Agreements, including (i) any shares of common stock acquired by any Purchaser pursuant to the conversion of the Series B Preferred Stock in accordance with the Certificates of Designations, (ii) common stock issued upon conversion of the Bridge Loans if no Series B Preferred Stock is issued in accordance with the Bridge Loan Agreements and (iii) any shares of common stock acquired by any Purchaser pursuant to preemptive rights under the Purchase Agreements, which means that such shares would become eligible for resale in the public markets following the expiration of any applicable transfer restrictions. Any sale of such shares, or the anticipation of the possibility of such sales, could create downward pressure on the market price of our common stock. Furthermore, our current stockholders may decide to reduce their investment in us due to the changes to our investment profile as a result of the Private Placement Issuance, and may sell large amounts of common stock leading up to or following the Private Placement Issuance. Such sales of our common stock could have the effect of depressing the market price of our common stock.

RISKS RELATED TO OUR BUSINESS, INDUSTRY, AND STRATEGY

The global COVID-19 pandemic has significantly affected our business operations and could continue to adversely impact our financial position and cash flows to an extent that is unknown and difficult to predict.

The pandemic and international public health emergency caused by SARS-CoV-2, the novel strain of coronavirus that causes the disease commonly known as COVID-19, has adversely affected all the countries in which we and our customers, suppliers, and other business partners operate, disrupting supply chains, causing significant volatility in global financial markets, and raising the prospect of an extended global recession. Public health problems resulting from COVID-19 and precautionary measures instituted by governments and businesses to mitigate its spread and resurgence, including travel restrictions and quarantines, could continue to contribute to a general slowdown in the global economy, cause increasingly adverse impacts on our customers, suppliers, and other business partners, and further disrupt our operations. Changes in our operations as a result of the COVID-19 pandemic have resulted in inefficiencies and delays, including in sales and product development efforts, and additional costs related to business continuity initiatives that cannot be fully mitigated through succession planning, employees working remotely, or teleconferencing technologies.

The COVID-19 pandemic and related governmental and societal reactions have had, and may continue to have, a negative impact on our business, liquidity, results of operations, and stock price due to the occurrence of some or all of the following events or circumstances among others:

- reduced demand for some of our products and services due to the impact of COVID-19 on our customers, including in the global academic research community;
- the negative impact of ongoing travel restrictions and social distancing policies on our sales operations, marketing efforts, and customer field support;
- diminished business productivity due to inefficiencies in employees working from home or increasing physical distancing and other pandemic response protocols in our production facilities;

- increased voluntary turnover, together with impaired ability to hire and effectively train new personnel due to labor shortages, travel restrictions, and physical distancing protocols;
- increased susceptibility to the risk of information technology security breaches and other disruptions due to increased volumes of remote access to our information systems from our employees working at home;
- increased operating costs if one of our facilities were to experience a COVID-19 outbreak;
- disruption of the operations of our contract manufacturers, suppliers, and other business partners;
- shortages or delays in the supply of components and materials used in our products; and
- increased volatility in our stock price due to financial market instability.

In addition to its negative impact on some aspects of our business, the COVID-19 pandemic has been a source of opportunity for our diagnostics business, opening up external funding sources to support innovation and product development and resulting in increased revenues due to sales of our Advanta Dx SARS-CoV-2 RT-PCR test and related sales of our microfluidics instruments. However, as vaccines and alternative testing options for the coronavirus have become available and the perceived threat of the pandemic has receded, the demand for our COVID-19 testing products has slowed, resulting in a corresponding decline in related revenue.

In 2021, factors such as supply chain constraints, China trade restrictions, and the ongoing slowdown in the Asia-Pacific region caused our overall revenues to decline more than expected. The extent to which the COVID-19 pandemic will continue to impact our business and financial results will depend on future developments, which are highly uncertain and cannot be predicted with confidence, such as the continued spread and resurgences of the coronavirus; the emergence of new strains of the disease, such as the Delta and Omicron variants; the availability, efficacy, and acceptance of COVID-19 vaccines; the scope and duration of the public health emergency; and COVID-19 mitigation measures such as travel bans and restrictions, social distancing, quarantines, and business shutdowns and closures.

Because the severity, magnitude, and duration of the COVID-19 pandemic and its economic consequences are uncertain, we are unable to predict the impact of COVID-19 on our operations, our financial performance, and our ability to successfully execute our business strategies and initiatives. The ultimate impact of the COVID-19 pandemic on our operations and financial performance depends on many factors that are not within our control, including, but not limited, to: governmental, business, and individual actions that have been and continue to be taken in response to the pandemic (including restrictions on travel, transport and workforce pressures); the impact of the pandemic and actions taken in response on global and regional economies, travel, and economic activity; the availability of federal, state, local or non-U.S. funding programs; general economic uncertainty in key global markets and financial market volatility; global economic conditions and levels of economic growth; labor and materials shortages; supply chain difficulties, including disruption of logistics, shipping, and other distribution operations; and the pace of recovery when the threat of COVID-19 subsides.

As the COVID-19 pandemic continues to affect our operating and financial results, it may also have the effect of heightening many of the other risks described in our other risk factors below. COVID-19 may also affect our operating and financial results in a manner that is not presently known to us or that we currently do not expect to present significant risks to our operations or financial results, particularly if the pandemic and its associated impacts reoccur in the coming months.

Our financial results and revenue growth rates have varied significantly from quarter-to-quarter and year-to-year due to a number of factors, and a significant variance in our operating results or rates of growth from our financial guidance or market expectations, if any, could lead to substantial volatility in our stock price.

Our revenue, results of operations, and revenue growth rates have varied in the past and may continue to vary significantly from quarter-to-quarter or year-to-year. We may experience substantial variability in our product mix from period-to-period as revenue from sales of our instruments relative to sales of our consumables may fluctuate or deviate significantly from expectations. Although our revenue increased year-over-year in 2020 compared to 2019 and in 2019 compared to 2018, we experienced a year-over-year decline in revenue in 2021 compared to 2020, and we may be similarly unable to achieve revenue growth in future periods. Variability in our quarterly or annual results of operations, mix of product revenue, including any decline in our revenue related to the COVID-19 pandemic, or variability in rates of revenue growth, if any, may lead to volatility in our stock price as research analysts and investors respond to these fluctuations. These fluctuations are due to numerous factors that are difficult to forecast, including:

- fluctuations in demand for our products;
- changes in customer budget cycles, capital spending, and the availability of VAT and import tax exemptions;
- seasonal variations in customer operations;
- tendencies among some customers to defer purchase decisions to the end of the quarter;

- the large unit value of our systems, particularly our proteomics systems;
- changes in our pricing and sales policies or the pricing and sales policies of our competitors;
- our ability to design, manufacture, market, sell, and deliver products to our customers in a timely and cost-effective manner;
- our ability to timely obtain adequate quantities of the materials or components used in our products, which in certain cases are purchased through sole and single source suppliers;
- staffing shortages, lack of skilled labor, increased turnover, and competitive job markets;
- fluctuations or reductions in revenue from sales of legacy instruments that may have contributed significant revenue in prior periods;
- quality control or yield problems in our manufacturing operations;
- new product introductions and enhancements by us and our competitors;
- unanticipated increases in costs or expenses;
- our complex, variable and, at times, lengthy sales cycle;
- trade restrictions and government protectionism;
- global economic conditions; and
- fluctuations in foreign currency exchange rates.

Additionally, we have certain customers who have historically placed large orders in multiple quarters during a calendar year. A significant reduction in orders from one or more of these customers could adversely affect our revenue and operating results, and if these customers defer or cancel purchases or otherwise alter their purchasing patterns, our financial results and actual results of operations could be significantly impacted. Other unknown or unpredictable factors also could harm our results.

The foregoing factors, as well as other factors, could materially and adversely affect our quarterly and annual results of operations and rates of revenue growth, if any. We have experienced significant revenue growth in the past but we may not achieve similar growth rates in future periods. You should not rely on our operating results for any prior quarterly or annual period as an indication of our future operating performance. If we are unable to achieve adequate revenue growth, our operating results could suffer and our stock price could decline. In addition, a significant amount of our operating expenses are relatively fixed due to our manufacturing, research and development, and sales and general administrative efforts. Any failure to adjust spending quickly enough to compensate for a shortfall relative to our anticipated revenue could magnify the adverse impact of such shortfalls on our results of operations. We expect that our sales will continue to fluctuate on an annual and quarterly basis and that our financial results for some periods may be below those projected by securities analysts, which could significantly decrease the price of our common stock.

We have incurred losses since inception, and we may continue to incur substantial losses for the foreseeable future.

We have incurred significant losses in each fiscal year since our inception, including net losses of $59.2 million, $53.0 million, and $64.8 million during the years 2021, 2020, and 2019, respectively. As of December 31, 2021, we had an accumulated deficit of $736.0 million. These losses have resulted principally from costs incurred in our research and development programs, and from our manufacturing costs and selling, general, and administrative expenses. To date, we have funded our operations primarily through equity offerings, the issuance of debt instruments, and from sales of our products. Until we are able to generate additional revenue to support our level of operating expenses, we will continue to incur operating and net losses and negative cash flow from operations.

We believe that our continued investment in research and development, sales, and marketing is essential to our long-term competitive position and future revenue growth and, as a result, we may incur operating losses for the foreseeable future and may never achieve profitability.

The life science markets are highly competitive and subject to rapid technological change, and we may not be able to successfully compete.

The markets for our products are characterized by rapidly changing technology, evolving industry standards, changes in customer needs, emerging competition, new product introductions, and strong price competition. We compete with both established and development stage life science research companies that design, manufacture, and market instruments and consumables for gene expression analysis, single-cell targeted gene expression and protein expression analysis, SNP genotyping, quantitative polymerase chain reaction (qPCR), digital PCR, flow cytometry, tissue imaging, and additional

applications using well established laboratory techniques, as well as newer technologies such as bead encoded arrays, microfluidics, next-generation DNA sequencing (NGS), microdroplets, spatial protein expression, and photolithographic arrays. Most of our current competitors have significantly greater name recognition, greater financial and human resources, broader product lines and product packages, larger sales forces, larger existing installed bases, larger intellectual property portfolios, and greater experience and scale in research and development, manufacturing, and marketing than we do.

We consider Agilent Technologies, Inc., Thermo Fisher Scientific Inc. (Thermo), Bio-Rad Laboratories, Inc., NanoString Technologies, Inc. (NanoString), and Agena Bioscience, Inc. to be our principal competitors in the microfluidics space. We believe that Cytek Biosciences, Inc. and Becton, Dickinson and Company are currently our principal competitors for our mass cytometry market share, and that IonPath Inc., Akoya Biosciences, Inc., NanoString, and 10x Genomics, Inc. are our principal competitors for our Imaging Mass Cytometry™ market share. While the aforementioned principal competitors are the largest and most prevalent in their representative technology areas, the combined markets in which we compete have an additional 10 to 20 smaller competitors with competing approaches and technologies that we routinely face in selling situations.

Competitors may be able to respond more quickly and effectively than we can to new or changing opportunities, technologies, standards, or customer requirements. In light of these advantages, even if our technology is more effective than the product or service offerings of our competitors, current or potential customers might accept competitive products and services in lieu of purchasing our technology. We anticipate that we will continue to face increased competition in the future as existing companies and competitors develop new or improved products and as new companies enter the market with new technologies. Increased competition is likely to result in pricing pressures, which could reduce our profit margins and increase our sales and marketing expenses. In addition, mergers, consolidations, or other strategic transactions between two or more of our competitors, or between our competitor and one of our key customers, could change the competitive landscape and weaken our competitive position, adversely affecting our business.

If our research and product development efforts do not result in commercially viable products within anticipated timelines, if at all, our business and results of operations will be adversely affected.

Our business is dependent on the improvement of our existing products, our development of new products to serve existing markets, and our development of new products to create new markets and applications that were previously not practical with existing systems. We intend to devote significant personnel and financial resources to research and development activities designed to advance the capabilities of our technology. We have developed design rules for the implementation of our technology that are frequently revised to reflect new insights we have gained about the technology. In addition, we have discovered that biological or chemical reactions sometimes behave differently when implemented on our systems rather than in a standard laboratory environment. Furthermore, many such reactions take place within the confines of single cells, which have also demonstrated unexpected behavior when grown and manipulated within microfluidic environments. As a result, research and development efforts may be required to transfer certain reactions and cell handling techniques to our systems. In the past, product development projects have been significantly delayed when we encountered unanticipated difficulties in implementing a process on our systems. We may have similar delays in the future, and we may not obtain any benefits from our research and development activities. Any delay or failure by us to develop and release new products or product enhancements would have a substantial adverse effect on our business and results of operations.

Market opportunities may not develop as quickly as we expect, limiting our ability to successfully sell our products, or our product development and strategic plans may change and our entry into certain markets may be delayed, if it occurs at all.

The application of our technologies to high-throughput genomics, single-cell genomics and, particularly, mass cytometry applications are in many cases emerging market opportunities. We believe these opportunities will take several years to develop or mature and we cannot be certain that these market opportunities will develop as we expect. The future growth of our markets and the success of our products depend on many factors beyond our control, including recognition and acceptance by the scientific community, and the growth, prevalence, and costs of competing methods of genetic and protein analysis. Additionally, our success depends on the ability of our sales organization to successfully sell our products into these new markets. If we are not able to successfully market and sell our products, or to achieve the revenue or margins we expect, our operating results may be harmed and we may not recover our product development and marketing expenditures. In addition, our product development and strategic plans may change, which could delay or impede our entry into these markets.

Our future success is dependent upon our ability to expand our customer base and introduce new applications.

Our customer base is primarily composed of academic research institutions, translational research and medicine centers, cancer centers, clinical research laboratories, biopharmaceutical, biotechnology, and plant and animal research companies, and contract research organizations that perform analyses for research and commercial purposes. Our success will depend, in part,

upon our ability to increase our market share among these customers, attract additional customers outside of these markets, and market new applications to existing and new customers as we develop such applications. Attracting new customers and introducing new applications require substantial time and expense. For example, it may be difficult to identify, engage, and market to customers who are unfamiliar with the current applications of our systems. Any failure to expand our existing customer base or launch new applications would adversely affect our ability to increase our revenue.

If our products fail to achieve and sustain sufficient market acceptance, our revenue will be adversely affected.

Our success depends on our ability to develop and market products that are recognized and accepted as reliable, enabling and cost-effective. Most of our potential customers already use expensive research systems in their laboratories and may be reluctant to replace those systems. Market acceptance of our systems will depend on many factors, including our ability to convince potential customers that our systems are an attractive alternative to existing technologies. Compared to some competing technologies, our technology is relatively new, and most potential customers have limited knowledge of, or experience with, our products. Prior to adopting our systems, some potential customers may need to devote time and effort to testing and validating our systems. Any failure of our systems to meet these customer benchmarks could result in customers choosing to retain their existing systems or to purchase systems other than ours, and revenue from the sale of legacy instruments that may have contributed significant revenue in prior periods may decrease.

In addition, it is important that our systems be perceived as accurate and reliable by the scientific and medical research community as a whole. Historically, a significant part of our sales and marketing efforts has been directed at convincing industry leaders of the advantages of our systems and encouraging such leaders to publish or present the results of their evaluation of our system. If we are unable to continue to induce leading researchers to use our systems, or if such researchers are unable to achieve and publish or present significant experimental results using our systems, acceptance and adoption of our systems will be slowed and our ability to increase our revenue would be adversely affected.

We may not be able to develop new products or enhance the capabilities of our existing systems to keep pace with rapidly changing technology and customer requirements, which could have a material adverse effect on our business, revenue, financial condition, and operating results.

Our success depends on our ability to develop new products and applications for our technology in existing and new markets, while improving the performance and cost-effectiveness of our systems. New technologies, techniques, or products could emerge that might offer better combinations of price and performance than our current or future product lines and systems. Existing markets for our products, including high-throughput genomics, single-cell genomics and mass cytometry, as well as potential markets for our products such as high-throughput NGS and molecular applications, are characterized by rapid technological change and innovation. It is critical to our success for us to anticipate changes in technology and customer requirements and to successfully introduce new, enhanced, and competitive technology to meet our customers' and prospective customers' needs on a timely and cost-effective basis. Developing and implementing new technologies will require us to incur substantial development costs and we may not have adequate resources available to be able to successfully introduce new applications of, or enhancements to, our systems. We cannot guarantee that we will be able to maintain technological advantages over emerging technologies in the future. While we typically plan improvements to our systems, we may not be able to successfully implement these improvements. If we fail to keep pace with emerging technologies, demand for our systems will not grow and may decline, and our business, revenue, financial condition, and operating results could suffer materially. In addition, if we introduce enhanced systems but fail to manage product transitions effectively, customers may delay or forgo purchases of our systems and our operating results may be adversely affected by product obsolescence and excess inventory. Even if we successfully implement some or all of these planned improvements, we cannot guarantee that our current and potential customers will find our enhanced systems to be an attractive alternative to existing technologies, including our current products.

Our efficiency and cost-savings initiatives could be disruptive to our operations and adversely affect our results of operations and financial condition.

From time to time, we have implemented efficiency and cost-savings initiatives intended to stabilize our business operations. These efficiency initiatives have included targeted workforce reductions, optimizing our facilities, and reducing excess space. In 2020, in response to the uncertainty arising from the COVID-19 pandemic, we initiated a range of additional actions aimed at temporarily reducing our operating expenses and preserving liquidity, including implementing temporary enterprise-wide salary reductions of 20% for employees at or above the 'director' level and 10% for all others, temporarily reducing our board members' cash retainers by 20%, and constraining hiring. Although we discontinued our hiring constraints and pandemic-related pay reductions in 2020, we regularly review other possible actions to preserve liquidity and optimize our organization. For example, we may need to decrease or defer capital expenditures and development activities or implement further operating expense reduction measures. The implementation of these and other efficiency and cost-savings initiatives

could impair our ability to invest in developing, marketing and selling new and existing products, be disruptive to our operations, make it difficult to attract or retain employees, result in higher than anticipated charges, divert the attention of management, result in a loss of accumulated knowledge, impact our customer and supplier relationships, and otherwise adversely affect our results of operations and financial condition.

If we seek to implement a company-wide enterprise resource planning (ERP) system, such implementation could adversely affect our business and results of operations or the effectiveness of internal control over financial reporting.

We are considering implementing a company-wide ERP system to handle the business and financial processes within our operations and corporate functions. ERP implementations are complex and time-consuming projects that involve substantial expenditures on system software and implementation activities that can continue for several years. ERP implementations also require transformation of business and financial processes in order to reap the benefits of the ERP system. If we decide to implement a company-wide ERP system, our business and results of operations could be adversely affected if we experience operating problems and/or cost overruns during the ERP implementation process, or if the ERP system and the associated process changes do not give rise to the benefits that we expect. If we do not effectively implement the ERP system as planned or if the system does not operate as intended, our business, results of operations, and internal controls over financial reporting could be adversely affected.

Our business growth strategy involves the potential for significant acquisitions, and our operating results and prospects could be harmed if we are unable to integrate future acquisitions successfully.

We may acquire other businesses to improve our product offerings or expand into new markets. Our future acquisition strategy will depend on our ability to identify, negotiate, complete, and integrate acquisitions and, if necessary, to obtain satisfactory debt or equity financing to fund those acquisitions. Mergers and acquisitions are inherently risky, and any transaction we complete may not be successful. Any merger or acquisition we may pursue would involve numerous risks, including but not limited to the following:

- difficulties in integrating and managing the operations, technologies, and products of the companies we acquire;
- diversion of our management’s attention from normal daily operation of our business;
- our inability to maintain the key business relationships and the reputations of the businesses we acquire;
- our inability to retain key personnel of the acquired company;
- uncertainty of entry into markets in which we have limited or no prior experience and in which competitors have stronger market positions;
- our dependence on unfamiliar affiliates and customers of the companies we acquire;
- insufficient revenue to offset our increased expenses associated with acquisitions;
- our responsibility for the liabilities of the businesses we acquire, including those which we may not anticipate;
- the possibility that we may not realize the value of acquired assets recorded as goodwill or intangible assets, and would be required to incur material charges relating to the impairment of those assets; and
- our inability to maintain internal standards, controls, procedures, and policies.

We may be unable to secure the equity or debt funding necessary to finance future acquisitions on terms that are acceptable to us. If we finance acquisitions by issuing equity or convertible debt securities, our existing stockholders will likely experience dilution, and if we finance future acquisitions with debt funding, we will incur interest expense and may have to comply with financial covenants and secure that debt obligation with our assets.

RISKS RELATED TO OPERATIONS AND RELIANCE ON THIRD PARTIES

We may experience development or manufacturing problems or delays that could limit the potential growth of our revenue or increase our losses.

We may encounter unforeseen situations in the manufacturing and assembly of our products that would result in delays or shortfalls in our production. For example, our production processes and assembly methods may have to change to accommodate any significant future expansion of our manufacturing capacity, which may increase our manufacturing costs, delay production of our products, reduce our product margin, and adversely impact our business. Conversely, if demand for our products shifts such that a manufacturing facility is operated below its capacity for an extended period, we may adjust our manufacturing operations to reduce fixed costs, which could lead to uncertainty and delays in manufacturing times and quality during any transition period.

Additionally, all of our integrated fluidic circuits (IFCs) for commercial sale are manufactured at our facility in Singapore. Production of the elastomeric block that is at the core of our IFCs is a complex process requiring advanced clean rooms, sophisticated equipment, and strict adherence to procedures. Any contamination of the clean room, equipment malfunction, or failure to strictly follow procedures can significantly reduce our yield in one or more batches. We have in the past experienced variations in yields due to such factors. A drop in yield can increase our cost to manufacture our IFCs or, in more severe cases, require us to halt the manufacture of our IFCs until the problem is resolved. Identifying and resolving the cause of a drop in yield can require substantial time and resources.

Furthermore, developing an IFC for a new application may require developing a specific production process for that type of IFC. While all of our IFCs are produced using the same basic processes, significant variations may be required to ensure adequate yield of any particular type of IFC. Developing such a process can be time consuming, and any unexpected difficulty in doing so can delay the introduction of a product.

If our manufacturing activities are adversely impacted, or if we are otherwise unable to keep up with demand for our products by successfully manufacturing, assembling, testing, and shipping our products in a timely manner, our revenue could be impaired, market acceptance for our products could be adversely affected and our customers might instead purchase our competitors' products.

Our business depends on research and development spending levels of our customers, a reduction in which could limit our ability to sell our products and adversely affect our business.

We expect that our revenue in the foreseeable future will continue to be derived primarily from sales of our systems, IFCs, assays, and reagents to academic research institutions, translational research and medicine centers, cancer centers, clinical research laboratories biopharmaceutical, biotechnology, and plant and animal research companies, and contract research organizations worldwide. Our success will depend upon their demand for and use of our products. Accordingly, the spending policies and practices of these customers—which have been impacted by the COVID-19 pandemic and may additionally be impacted by other factors—have had and will continue to have a significant effect on the demand for our technology. These policies may be based on a wide variety of factors, including concerns regarding any future federal government budget sequestrations, the availability of resources to make purchases, the spending priorities among various types of equipment, policies regarding spending during recessionary periods, tariffs and trade restrictions, and changes in the political climate. In addition, academic, governmental, and other research institutions that fund research and development activities may be subject to stringent budgetary constraints that could result in spending reductions, reduced allocations, or budget cutbacks, which could jeopardize the ability of these customers to purchase our products. Our operating results have fluctuated and may continue to fluctuate substantially due to reductions and delays in research and development expenditures by our customers. For example, reductions in operating expenditures by global academic research facilities because of the COVID-19 pandemic have resulted in lower than expected sales of our mass cytometry instruments. Additionally, the imposition of tariffs and delays in issuing VAT and import tax exemptions have adversely affected the sales of our products in China. Similar reductions and delays in customer spending have resulted and may continue to result from other factors that are not within our control, such as:

- changes in economic conditions;
- natural disasters or public health crises;
- changes in government programs that provide funding to research institutions and companies;
- macroeconomic conditions and the political climate;
- governmental protectionism, the escalation of tariffs and other trade barriers;
- availability of tax permits and incentives, including VAT and import tax exemptions;
- changes in the regulatory environment affecting life science and plant and animal research companies engaged in research and commercial activities;
- changes in our customers' research priorities;
- differences in budget cycles across various geographies and industries;
- personnel shortages among our customers;
- market-driven pressures on companies to consolidate operations and reduce costs;
- mergers and acquisitions in the life science and plant and animal research industries; and
- other factors affecting research and development spending.

Any decrease in our customers' budgets or expenditures or in the size, scope, or frequency of capital or operating expenditures, as well as any increase in local tariffs could materially and adversely affect our operations or financial condition.

If one or more of our manufacturing facilities become unavailable or inoperable, we will be unable to continue manufacturing our instruments, IFCs, assays and/or reagents and, as a result, our business will be harmed until we are able to secure a new facility.

We manufacture our microfluidics analytical and preparatory instruments and IFCs for commercial sale at our facility in Singapore and our mass cytometry instruments, assays, and reagents for commercial sale at our facility in Canada. No other manufacturing facilities are currently available to us, particularly facilities of the size and scope of our Singapore and Canada operations. Our facilities and the equipment we use to manufacture our instruments, IFCs, assays, and reagents would be costly to replace and could require substantial lead times to repair or replace. Our facilities may be harmed or rendered inoperable by natural or man-made disasters, which may render it difficult or impossible for us to manufacture our products for some period of time. If any of our facilities become unavailable to us, we cannot provide assurances that we will be able to secure a new manufacturing facility on acceptable terms, if at all. The inability to manufacture our products, combined with our limited inventory of manufactured supplies, may result in the loss of customers or harm our reputation, and we may be unable to reestablish relationships with those customers in the future. Although we possess insurance for damage to our property and the disruption of our business, this insurance may not be sufficient to cover all of our potential losses and may not continue to be available to us on acceptable terms, or at all. If our manufacturing capabilities are impaired, we may not be able to manufacture and ship our products in a timely manner, which would adversely impact our business.

Disruption of our manufacturing facilities or other operations, or in the operations of our customers or business partners, due to earthquake, flood, other natural catastrophic events, public health crises, or terrorism could result in cancellation of orders, delays in deliveries or other business activities, or loss of customers and could seriously harm our business.

We have significant manufacturing operations in Singapore and Canada and operations in the United States. In addition, our business is international in nature, with our sales, service and administrative personnel and our customers located in numerous countries throughout the world. Operations at our manufacturing facilities and our subcontractors, as well as our other operations and those of our customers, are subject to disruption for a variety of reasons, including work stoppages, acts of war, terrorism, public health crises (including the ongoing COVID-19 pandemic), fire, earthquake, volcanic eruptions, energy shortages, flooding, or other natural disasters. Such disruption could cause delays in, among other things, shipments of products to our customers, our ability to perform services requested by our customers, or the installation of our products at customer sites.

We cannot provide any assurance that alternate means of conducting our operations (whether through alternate production capacity or service providers or otherwise) would be available if a major disruption were to occur or that, if such alternate means were available, they could be obtained on favorable terms.

We rely on a limited number of third-party suppliers for some of the components and materials used in our products, and the loss of any of these suppliers, or delays or problems in the supply of components and materials could harm our business.

We rely on a limited number of third-party suppliers for certain components and materials used in our products, including single and sole source suppliers. Additionally, several of our instruments are assembled at the facilities of contract manufacturers in Singapore. We do not have long-term contracts with our suppliers of these components and materials or our assembly service providers. The loss of a single or sole source supplier of any of the following components and/or materials would require significant time and effort to locate and qualify an alternative source of supply, if at all:

- The IFCs used in our microfluidic systems are fabricated using a specialized polymer, and other specialized materials, that are available from a limited number of sources. In the past, we have encountered quality issues that have reduced our manufacturing yield or required the use of additional manufacturing processes.
- The electron multiplier detector included in the Hyperion/CyTOF systems and certain metal isotopes used with the Hyperion/CyTOF systems are purchased from sole source suppliers.
- The raw materials for our Delta Gene and SNP Type assays and Access Array target-specific primers are available from a limited number of sources.

Our reliance on single and sole source suppliers and assembly service providers also subjects us to other risks that could harm our business, including the following:

- we may be subject to increased component or assembly costs and
- we may not be able to obtain adequate supply or services in a timely manner or on commercially reasonable terms.

In connection with the global supply chain disruptions following the onset of the COVID-19 pandemic, we experienced and are continuing to experience problems with some of our suppliers. In the third quarter of 2021, shortages of certain components caused a backlog and we were unable to fulfill all of the demand for our products during the quarter. We have in the past experienced supply issues, as well as quality control problems such as manufacturing errors, with some of our suppliers, and may again experience problems in the future. We may not be able to quickly establish additional or replacement suppliers, particularly for our single source components, or assembly service providers. Any continued or future interruption or delay in the supply of components or materials or assembly of our instruments, or our inability to obtain components, materials, or assembly services from alternate sources at acceptable prices in a timely manner, could impair our ability to meet the demand of our customers and cause them to cancel orders or switch to competitive products, which would harm our business.

We may not be able to convert our orders in backlog into revenue.

Our backlog represents product orders from our customers that we have confirmed but have not been able to fulfill, and, accordingly, for which we have not yet recognized revenue. We may not receive revenue from these orders, and any order backlog we report may not be indicative of our future revenue.

Many events can cause an order to be delayed or not completed at all, some of which may be out of our control, including the potential impacts from the COVID-19 pandemic and our suppliers not being able to provide us with products or components. If we delay fulfilling customer orders or if customers reconsider their orders, those customers may seek to cancel or modify their orders with us. Customers may otherwise seek to cancel or delay their orders even if we are prepared to fulfill them. If our orders in backlog do not result in sales, our operating results may suffer.

Any disruption or delay in the shipping or off-loading of our products, whether domestically or internationally, may have an adverse effect on our financial condition and results of operations.

We rely on shipping providers to deliver products to our customers globally. Labor, tariff, or World Trade Organization-related disputes, piracy, physical damage to shipping facilities or equipment caused by severe weather or terrorist incidents, congestion at shipping facilities, complications related to public health crises (including the ongoing COVID-19 pandemic), inadequate equipment to load, dock, and offload our products, energy-related tie-ups, or other factors could disrupt or delay shipping or off-loading of our products domestically and internationally. Such disruptions or delays may have an adverse effect on our financial condition and results of operations.

Our business operations depend upon the continuing efforts of our management team and other skilled and experienced personnel, and if we are unable to retain them or to recruit and train new key executives, scientists, and technical support personnel, we may be unable to achieve our goals.

Our success depends largely on the skills, experience, and performance of our management team and scientific and technical support personnel. The loss of the services of certain members of our management team or our scientific or technical support staff might significantly delay or prevent the development of our products or achievement of other business objectives by diverting management’s attention to transition matters and identification of suitable replacements, and staffing shortages could also negatively impact our ability to expand and scale functions that are needed to support the development of our products and the growth of our business. Our research and product development efforts could also be delayed or curtailed if we are unable to attract, train, and retain highly skilled employees, particularly, senior scientists and engineers. Competition for qualified senior management and key employees in our industry is intense. We have experienced increased turnover at all levels since the start of the COVID-19 pandemic and general labor shortages in various areas of our business, all of which could have a material adverse impact on our business. We may need to increase employee wages and benefits in order to attract and retain the personnel necessary to achieve our goals, and our business, operations, and financial results may suffer if we are unable to do so. We do not maintain significant key person life insurance with any of our employees and all our employees, including our management team, may terminate employment without notice and without cause or good reason.

Additionally, to expand our research and product development efforts, we need to retain and recruit scientists skilled in areas such as molecular and cellular biology, assay development, engineering physics, and manufacturing. We also need highly trained technical support personnel with the necessary scientific background and ability to understand our systems at a technical level to effectively support potential new customers and the expanding needs of current customers. Competition for these people is intense and we may face challenges in retaining and recruiting such individuals if, for example, our stock price declines, reducing the retention value of equity awards, or our business or technology is no longer perceived as leading in our field. Because of the complex and technical nature of our systems and the dynamic market in which we compete, any failure to attract and retain a sufficient number of qualified employees could materially harm our ability to develop and commercialize our technology.

If we are unable to expand our direct sales, field support, and marketing forces or distribution capabilities to adequately address our customers' needs, our business will be adversely affected.

We may not be able to market, sell, and, distribute our products effectively enough to support our planned growth. We sell our products primarily through our own sales force and through distributors in certain territories. Our future sales will depend in large part on our ability to continue to increase the scope of our marketing efforts and develop and substantially expand our direct sales force and field application specialist and service engineer teams. Our products are technically complex and used for highly specialized applications. As a result, we believe it is necessary to continue to develop a direct sales force that includes people with specific scientific backgrounds and expertise, and a marketing group with technical sophistication.

In the past year, we have experienced significant changes and increased turnover in our sales and marketing organizations, and we face considerable challenges in recruiting and training qualified replacements. Our future success will depend largely on our ability to recruit, retain, and motivate the skilled sales and marketing force necessary to support our business activities, and any failure to maintain competitive levels of compensation will negatively impact our ability to so. Because competition for such employees is intense, we can provide no assurance that we will be able to retain them on favorable or commercially reasonable terms, if at all. Failure to attract and retain our current personnel or to build an efficient and effective sales and marketing force would negatively impact sales of our products and reduce our revenue and profitability.

In addition, we may continue to enlist one or more sales representatives and distributors to assist with sales, distribution, and customer support globally or in certain regions of the world. If we do seek to enter into such arrangements, we may not be successful in attracting desirable sales representatives and distributors, or we may not be able to enter into such arrangements on favorable terms. If our sales and marketing efforts, or those of any third-party sales representatives and distributors, are not successful, our technologies and products may not gain market acceptance, which would materially and adversely impact our business operations.

To use our products—our Biomark, EP1, CyTOF, and Hyperion systems in particular—customers typically need to purchase specialized reagents. Any interruption in the availability of these reagents for use in our products could limit our ability to market our products.

Our products, our Biomark, EP1, CyTOF, and Hyperion systems in particular, must be used in conjunction with one or more reagents designed to produce or facilitate the particular biological or chemical reaction desired by the user. Many of these reagents are highly specialized and available to the user only from a single supplier or a limited number of suppliers. Although we sell reagents for use with certain of our products, our customers may purchase these reagents directly from third-party suppliers, and we have no control over the supply of those materials. In addition, our products are designed to work with these reagents as they are currently formulated. We have no control over the formulation of reagents sold by third-party suppliers, and the performance of our products might be adversely affected if the formulation of these reagents is changed. If one or more of these reagents were to become unavailable or were reformulated, our ability to market and sell our products could be materially and adversely affected.

In addition, the use of a reagent for a particular process may be covered by one or more patents relating to the reagent itself, the use of the reagent for the particular process, the performance of that process, or the equipment required to perform the process. Typically, reagent suppliers, who are either the patent holders or their authorized licensees, sell the reagents along with a license or covenant not to sue with respect to such patents. The license accompanying the sale of a reagent often purports to restrict the purposes for which the reagent may be used. If a patent holder or authorized licensee were to assert against us or our customers that the license or covenant relating to a reagent precluded its use with our systems, our ability to sell and market our products could be materially and adversely affected. For example, our Biomark system involves real-time quantitative polymerase chain reaction (qPCR) technology. Leading suppliers of reagents for real-time qPCR reactions include Life Technologies Corporation (now part of Thermo) and Roche Diagnostics Corporation, who are our direct competitors, and their licensees. These real-time qPCR reagents are typically sold pursuant to limited licenses or covenants not to sue with respect to patents held by these companies. We do not have any contractual supply agreements for these real-time qPCR reagents, and we cannot assure you that these reagents will continue to be available to our customers for use with our systems, or that these patent holders will not seek to enforce their patents against us, our customers, or suppliers.

Security breaches, loss of data, cyberattacks, and other information technology failures could disrupt our operations, damage our reputation, and adversely affect our business, operations, and financial results.

We are dependent upon our data and information technology systems for the effective operation of our business and for the secure maintenance and storage of confidential data relating to our business and third-party businesses. Our information technology systems may be damaged, disrupted or shut down due to attacks by experienced programmers or hackers who may be able to penetrate our security controls and deploy computer viruses, cyberattacks, phishing schemes, or other malicious software programs, or due to employee error or malfeasance, power outages, hardware failures, telecommunication or utility

failures, catastrophes or other unforeseen events, and our system redundancy and other disaster recovery planning may be ineffective or inadequate in preventing or responding to any of these circumstances. Any such compromise of our information technology systems could result in the unauthorized publication of our confidential business or proprietary information and unauthorized release of customer, supplier or employee data, any of which could expose us to a risk of legal claims or proceedings, liability under privacy or other laws, disruption of our operations and damage to our reputation, which could divert our management's attention from the operation of our business and materially and adversely affect our business, revenues and competitive position. In addition, our liability insurance may not be sufficient in type or amount to cover us against claims related to security breaches, cyberattacks and other related breaches. The cost and operational consequences of implementing further data protection measures, either as a response to specific breaches or as a result of evolving risks, could be significant. In addition, our inability to use or access our information systems at critical points in time could adversely affect the timely and efficient operation of our business. Any delayed sales, significant costs or lost customers resulting from these technology failures could adversely affect our business, operations, and financial results.

We have implemented security controls to protect our information technology infrastructure but, due to the ever-evolving nature of information security threats, we are not fully insulated from technology disruptions that could adversely impact us. For example, in early 2019, we experienced a ransomware attack that infiltrated and encrypted certain of our information technology systems, including systems containing critical business data. Immediately following the attack, actions were taken to recover the compromised systems and we were able to restore their operation without significant loss of business data within weeks. Based on the nature of the attack and its impact on our systems, we believe no confidential data was lost or disclosed. If, however, confidential data were determined to have been released in the course of any future event, it is possible that we could be the subject of actions by governmental authorities or claims from persons alleging they suffered damages from such a release. We believe our mitigation measures and expanded information security program have reduced, but cannot eliminate, the risk of a similar attack, and we anticipate additional work and expense in the future as we continuously improve our security processes and initiatives in response to ever-changing information security challenges.

In addition to risks affecting our own systems, we could also be negatively impacted by a data breach or cyber incident happening to a third party's network and affecting us. Third parties with which we conduct business have access to certain portions of our sensitive data, including information pertaining to our customers and employees. In the event that these third parties do not adequately safeguard our data, security breaches could result and negatively impact our business, operations, and financial results.

Due to the COVID-19 pandemic, we have an increased number of employees working remotely. As a result, we may have increased cyber security and data security risks, due to increased use of home wi-fi networks and virtual private networks, as well as increased disbursement of physical machines. While we have implemented security controls, updated our policies, and augmented our information security training program to reduce the risk of cyberattacks and security breaches, there is no guarantee that these measures will be adequate to safeguard all systems with the increased number of employees working remotely.

RISKS RELATED TO QUALITY AND THE REGULATORY ENVIRONMENT

Our products could have defects or errors, which may give rise to claims against us, adversely affect market adoption of our systems, and adversely affect our business, financial condition, and results of operations.

Our systems utilize novel and complex technology and such systems may develop or contain undetected defects or errors. We cannot assure you that material performance problems, defects, or errors will not arise, and as we increase the density and integration of our systems, these risks may increase. We generally provide warranties that our systems will meet performance expectations and will be free from defects. The costs incurred in correcting any defects or errors may be substantial and could adversely affect our operating margins. For example, we have experienced a performance issue with respect to certain IFCs used in our C1 systems due to the presence of more than one cell in an IFC chamber. Although we have redesigned such C1 IFCs, we may experience additional unexpected product defects or errors that could affect our ability to adequately address these performance issues.

In manufacturing our products, including our systems, IFCs, and assays, we depend upon third parties for the supply of various components, many of which require a significant degree of technical expertise to produce. In addition, we purchase certain products from third-party suppliers for resale. If our suppliers fail to produce components to specification or provide defective products to us for resale and our quality control tests and procedures fail to detect such errors or defects, or if we or our suppliers use defective materials or workmanship in the manufacturing process, the reliability and performance of our products will be compromised.

If our products contain defects, we may experience:

- a failure to achieve market acceptance or expansion of our product sales;
- loss of customer orders and delay in order fulfillment;
- damage to our brand reputation;
- increased cost of our warranty program due to product repair or replacement;
- product recalls or replacements;
- inability to attract new customers;
- diversion of resources from our manufacturing and research and development departments into our service department; and
- legal claims against us, including product liability claims, which could be costly and time consuming to defend and result in substantial damages.

In addition, certain of our products are marketed for use with products sold by third parties. For example, certain of our systems are marketed as compatible with major NGS instruments. If such third-party products are not produced to specification, are produced in accordance with modified specifications, or are defective, they may not be compatible with our products. In such case, the reliability and performance of our products may be compromised.

The occurrence of any one or more of the foregoing could negatively affect our business, financial condition, and results of operations.

Although the FDA granted Emergency Use Authorization (EUA) for our Advanta Dx SARS-CoV-2 RT-PCR Assay in August 2020 (which was updated for use with the AZOVA COVID-19 Test Collection Kit in February 2021, among other updates) and our Advanta Dx COVID-19 EASE Assay in February 2022, these authorizations are only valid during the COVID-19 public health emergency, and when the federally declared public health emergency ends, we will be required to stop commercial distribution of our assay and the collection kit immediately in the United States unless we comply with FDA requirements, which may include obtaining FDA clearance or approval for our assay under a traditional regulatory pathway for in vitro diagnostics, which is lengthy and expensive.

Under section 564 of the Federal Food, Drug, and Cosmetic Act (FD&C Act), the FDA has authority to allow certain unapproved medical products or unapproved uses of approved medical products to be used during a public health emergency under an EUA. In issuing an EUA, the FDA will consider the totality of scientific evidence available to the FDA regarding safety, efficacy and known and potential risks of such products and availability of alternatives to the emergency use products, among others. EUAs issued by the FDA will specify the scope of authorization and conditions of authorization, including limitations on distribution and conditions related to product advertising and promotion. Once granted, an EUA is effective until the declaration that circumstances exist justifying the authorization of the emergency use is terminated under Section 564(b)(2) of the FD&C Act or the EUA is revoked under Section 564(g) of the FD&C Act, after which the product must be cleared or approved by the FDA under a traditional pathway as defined by the FDA and we must comply with the FDA quality system regulations in order to remain on the market or to continue commercialization of the product.

In August 2020, the FDA granted EUA for our Advanta Dx SARS-CoV-2 RT-PCR Assay for qualitative detection of nucleic acid from SARS-CoV-2 in saliva specimens from individuals suspected by their healthcare providers of having COVID-19, with the use of the assay limited to CLIA high complexity laboratories. Four supplements have been submitted and authorized as follows: S001 for addition of the FDA Reference Panel Results, S002 for software updates and labeling changes, S003 for addition of alternative source of targets and labeling updates, and S004 for addition of AZOVA home collection kit. In February 2021, the FDA updated that EUA for our Advanta Dx SARS-CoV-2 RT-PCR Assay for use with the AZOVA COVID-19 Test Collection Kit, which is authorized for self-collection of saliva specimens at home. In February 2022, we were granted EUA for our the Advanta Dx COVID-19 EASE Assay, which is authorized for the qualitative detection of nucleic acid from SARS-CoV-2 in nasopharyngeal swab, oropharyngeal swab, mid-turbinate nasal swab, and anterior nasal swab specimens from individuals suspected of COVID-19 by their healthcare provider. As set forth in each EUA, we are required to comply with the conditions of authorization, including certain requirements pertaining to FDA notification, distribution, printed materials, advertising and promotion. If we, our distributors, or authorized laboratories do not comply with the EUA requirements, our business, financial condition and results of operations may be adversely impacted, and we may be subject to regulatory or enforcement actions, including recall of our products and the issuance of an untitled letter, a warning letter, penalties, or fines, among other adverse actions.

If the FDA's policies and guidance change unexpectedly and/or materially or if we misinterpret them, potential sales of Advanta Dx SARS-CoV-2 RT-PCR and the AZOVA COVID-19 Test Collection Kit could be adversely impacted. In addition,

the FDA will revoke an EUA where it is determined that the underlying public health emergency no longer exists or warrants such authorization, or if new evidence becomes available that indicates the test does not meet the conditions of authorization or perform as provided in the EUA application. We cannot predict how long this EUA will remain effective. The termination or revocation of the EUA and changing policies and regulatory requirements could adversely impact our business, financial condition and results of operations. The demand for our product and our profitability may decline or be adversely impacted by the federal government's implementation of a national COVID-19 testing strategy. Given the uncertain nature of the COVID-19 pandemic and future legislation and regulation in this space, we can provide no assurance with respect to our ability to achieve or sustain profitability on a quarterly or annual basis.

The healthcare industry is highly regulated and if we fail to comply with applicable healthcare laws and regulations, we could suffer fines and penalties or be required to make significant changes to our operations which could have a significant adverse effect on the results of our business operations.

We compete in markets in which we or our customers must comply with federal, state, local and foreign regulations, such as healthcare fraud and abuse, data privacy and medical product laws and regulations. The healthcare industry is subject to extensive and frequently changing international and United States federal, state and local laws and regulations. In addition, federal and state enforcement agencies have substantial powers and remedies to pursue suspected violations under broad laws and regulations relating to healthcare fraud and abuse, interactions and financial arrangements with healthcare professionals or entities, data privacy and misconduct involving government programs or contracts. If we, our employees, collaborators or contractors fail to comply with applicable laws and regulations, we could suffer civil and criminal damages, fines and penalties, exclusion from participation in governmental healthcare programs, and the loss of various licenses and authorizations necessary to operate our business, as well as incur liabilities from third-party claims, all of which could have a significant adverse effect on our business.

Our contract with the National Institutes of Health (NIH) could expose us to unique risks and costs as an entity contracting with the federal government.

The NIH launched the Rapid Acceleration of Diagnostics (RADx) program to expedite development, commercialization, and implementation of technologies for COVID-19 testing to help increase testing in the United States. In July 2020, we entered into a letter contract with the NIH for a project under the RADx program. The letter contract provided access to approximately $12.2 million of the total proposed funding for the project prior to execution of a further definitive contract for the project. In September 2020, we executed a definitive contract with the NIH as an amendment to the letter contract (collectively, the NIH Contract) to expand production capacity and throughput capabilities for COVID-19 testing with our microfluidics technology. Pursuant to the terms of the NIH Contract, the funding for the project was increased by approximately $22.0 million, for a total contract value of up to approximately $34.0 million. Release of funding under the NIH Contract is based on the achievement of milestones, including expansion of our manufacturing facilities, addition of production lines, and achieving full production capacity. As of December 31, 2021, all milestones have been achieved and accepted by NIH.

We must prioritize among many different opportunities, and we may expend our limited resources on programs that do not yield a successful or profitable product candidate and may forego other more profitable opportunities. Further, the Bayh-Dole Act applies to all NIH research and development funding granted to for-profit organizations, which requires the government to be provided a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world.

The NIH Contract includes certain provisions from the Federal Acquisition Regulations, some of which are customary or legally required, that give the U.S. government substantial rights and remedies, many of which are not typically found in commercial contracts. For example, the NIH Contract contains provisions permitting unilateral termination or modification, in whole or in part, at the convenience of the U.S. government. Under general principles of government contracting law, if the U.S. government terminates a contract for convenience, the government contractor may recover only its incurred or committed costs, settlement expenses and profit on work completed prior to the termination. If the U.S. government terminates a contract for default, the government contractor is entitled to recover costs incurred and associated profits on accepted items only and may be liable for excess costs incurred by the government in procuring undelivered items from another source. In addition, government contracts normally contain additional requirements that may increase our costs of doing business, reduce our profits, and expose us to liability for failure to comply with these terms and conditions. These requirements include, for example, mandatory internal control systems and policies, mandatory socioeconomic compliance requirements, including labor standards, non-discrimination and affirmative action programs and environmental compliance requirements and public disclosures of certain contract information, which may enable competitors to gain insights into our research program. If we fail

to maintain compliance with these requirements, we may be subject to potential contract or False Claims Act liability and to termination of our NIH Contract.

Other examples of rights and remedies under the NIH Contract include provisions that allow NIH to:

- terminate the NIH Contract, in whole or in part, for any reason or no reason;
- unilaterally reduce or modify the U.S. government's obligations under the NIH Contract, without our consent, including by imposing price adjustments;
- claim rights, including intellectual property rights, in or to (i) products, (ii) data, and (iii) facilities, in each case developed under the NIH Contract;
- under certain circumstances involving public health and safety, license inventions made under such agreements to third parties;
- suspend us from receiving new contracts pending resolution of alleged violations of procurement laws or regulations;
- impose U.S. manufacturing requirements for products that embody inventions conceived or first reduced to practice under the NIH Contract;
- suspend or debar us from doing future business with the government;
- change the course of a development program in a manner that differs from the NIH Contract's original terms or from our desired development plan, including decisions regarding our partners in the program;
- pursue civil or criminal remedies under the False Claims Act and False Statements Act; and
- control or prohibit the export of products.

Furthermore, we may be required to enter into agreements and subcontracts with third parties, including suppliers, consultants and other third-party contractors in order to satisfy our contractual obligations pursuant to our agreements with the U.S. government. Negotiating and entering into such arrangements can be time-consuming and we may not be able to reach agreement with such third parties. Any such agreement must also be compliant with the terms of the NIH Contract. Any delay or inability to enter into such arrangements or entering into such arrangements in a manner that is non-compliant with the terms of our contract, may result in violations of our contract.

U.S. government agencies routinely audit and investigate government contractors and recipients of federal grants and contracts (even after performance has been completed). These agencies review a contractor's performance under its contracts, cost structure and compliance with applicable laws, regulations and standards. The audit may also include review of the adequacy of, and a contractor's compliance with, its internal control systems and policies, including the contractor's accounting, purchasing, property, estimating, compensation and management information systems. If an audit uncovers improper or illegal activities, we may be subject to civil and criminal penalties and administrative sanctions. In addition, we could suffer serious reputational harm if allegations of impropriety were made against us, which could cause our stock price to decrease.

To the extent we elect to label and promote any of our non-EUA products as medical devices, we would be required to obtain prior approval or clearance by the FDA or comparable foreign regulatory authority, which could take significant time and expense and could fail to result in a marketing authorization for the intended uses we believe are commercially attractive. Obtaining marketing authorization in one jurisdiction does not mean that we will be successful in obtaining marketing authorization in other jurisdictions where we conduct business.

Except for the Advanta Dx SARS-CoV-2 RT-PCR Assay and the AZOVA COVID-19 Test Collection Kit authorized by the FDA under an EUA granted in August 2020 and updated in February 2021, among other updates, and our Advanta Dx COVID-19 EASE Assay authorized by the FDA under an EUA granted in February 2022, our other products are currently labeled, promoted and sold to academic research institutions, translational research and medicine centers, cancer centers, clinical research laboratories, contract research organizations, and biopharmaceutical, biotechnology, and plant and animal research companies as "research use only" (RUO), and are not designed, or intended to be used, for clinical diagnostic tests or as medical devices as currently marketed. If we elect to label and market our products for use as, or in the performance of, clinical diagnostics in the United States, thereby subjecting them to FDA regulation as medical devices, we would be required to obtain premarket 510(k) clearance or premarket approval from the FDA, unless an exception applies.

We are currently registered with the FDA as a medical device manufacturer, with the reagents for the Advanta Dx SARS-CoV-2 RT-PCR Assay listed as our sole medical device product. As noted in the issued EUA for the Advanta Dx SARS-CoV-2 RT-PCR Assay (including the EUA update for use with the AZOVA COVID-19 Test Collection Kit, among other updates) and the issued EUA for the Advanta Dx COVID-19 EASE Assay, the FDA has waived certain quality system requirements under 21 CFR Part 820 for the duration of each EUA. We may in the future list some of our other products with the FDA pursuant to

an FDA Class I listing for general purpose laboratory equipment if we pursue clinical applications for such equipment. While this regulatory classification is generally exempt from certain FDA requirements, such as the need to submit a premarket notification commonly known as a 510(k), and some of the requirements of the FDA's Quality System Regulations (QSRs), we would be subject to ongoing FDA "general controls," which include compliance with FDA regulations for labeling, inspections by the FDA, complaint evaluation, corrections and removals reporting, promotional restrictions, reporting adverse events or malfunctions for our products, and general prohibitions against misbranding and adulteration. If we do not comply with all the requirements of the EUA or the normal regulatory requirements for any of our medical device products, including additional regulatory requirements that would apply to the Advanta Dx SARS-CoV-2 RT-PCR Assay and the AZOVA COVID-19 Test Collection Kit after the expiration or termination of the EUA, we may be subject to regulatory or enforcement actions, including the issuance of an untitled letter, a warning letter, penalties, or fines, among other adverse actions, any of which may adversely impact our business, financial condition and results of operations. Compliance with additional or changing regulatory requirements can be time-consuming and costly.

In addition, we may in the future submit 510(k) premarket notifications to the FDA to obtain FDA clearance of certain of our products on a selected basis. It is possible, in the event we elect to submit 510(k) applications for certain of our products, that the FDA would take the position that a more burdensome premarket application, such as a premarket approval application or a de novo application is required for some of our products. If such applications were required, greater time and investment would be required to obtain FDA approval. Even if the FDA agreed that a 510(k) was appropriate, FDA clearance can be expensive and time consuming. It generally takes a significant amount of time to prepare a 510(k), including conducting appropriate testing on our products, and several months to years for the FDA to review a submission. Notwithstanding the effort and expense, FDA clearance or approval could be denied for some or all of our products. Even if we were to seek and obtain regulatory approval or clearance, it may not be for the intended uses we believe are important or commercially attractive.

If we sought and received regulatory clearance or approval for certain of our products, we would be subject to ongoing FDA obligations and continued regulatory oversight and review, including the general controls listed above and the FDA's QSRs for our development and manufacturing operations. In addition, we would be required to obtain a new 510(k) clearance before we could introduce subsequent material modifications or improvements to such products. We could also be subject to additional FDA post-marketing obligations for such products, any or all of which would increase our costs and divert resources away from other projects. If we sought and received regulatory clearance or approval and are not able to maintain regulatory compliance with applicable laws, we could be prohibited from marketing our products for use as, or in the performance of, clinical diagnostics and/or could be subject to enforcement actions, including warning letters and adverse publicity, fines, injunctions, and civil penalties; recall or seizure of products; operating restrictions; and criminal prosecution.

In addition, to the extent we decide to seek regulatory marketing authorization for certain of our products in countries outside of the United States, we or our partners, or collaborators, will need to obtain regulatory marketing authorization for our products for the intended use in the jurisdiction where such products will be marketed. Regulatory clearance or approval in one jurisdiction does not mean that we will be successful in obtaining regulatory marketing authorization in other jurisdictions where we conduct business. Sales of such products outside the United States will likely be subject to foreign regulatory requirements, which can vary greatly from country to country. As a result, the time required to obtain clearances or approvals outside the United States may differ from that required to obtain FDA clearance or approval and we may not be able to obtain foreign regulatory approvals on a timely basis or at all. In Europe, we need to comply with the In Vitro Diagnostic Directive 98/79/EC and transition to the In Vitro Diagnostic Regulation 2017/746, which became effective May 26, 2017, with an application date of May 26, 2022. This will increase the difficulty of regulatory approvals in Europe in the future. In addition, the FDA regulates exports of medical devices. Failure to comply with these regulatory requirements or obtain and maintain required approvals, clearances and certifications could impair our ability to commercialize our products for diagnostic use outside of the United States.

In February 2021, we announced a supply and distribution agreement to market our CyTOF technology, panels, and reagents to clinical labs in China. As part of the agreement, we are working to seek National Medical Products Administration (NMPA) approval for our CyTOF instrument for diagnostic use in China. As we increase our operations outside of the United States, our compliance and operational costs will increase, and we will be exposed to greater liability under additional laws and regulations.

Our products could become subject to regulation as medical devices by the FDA or other regulatory agencies even if we do not elect to seek regulatory clearance or approval to market our products for diagnostic purposes, which would adversely impact our ability to market and sell our products and harm our business.

As products that are currently labeled, promoted and intended as RUO, our products are not currently subject to regulation as medical devices by the FDA or comparable agencies of other countries. However, the FDA or comparable agencies of other countries could disagree with our conclusion that our products are currently intended for research use only or deem our current

sales, marketing and promotional efforts as being inconsistent with research use only products. For example, our customers may independently elect to use our research use only labeled products in their own laboratory developed tests (LDTs) for clinical diagnostic use. The FDA has historically exercised enforcement discretion in not enforcing the medical device regulations against laboratories offering LDTs. However, on October 3, 2014, the FDA issued two draft guidance documents that set forth the FDA's proposed risk-based framework for regulating LDTs, which are designed, manufactured, and used within a single laboratory. The draft guidance documents provide the anticipated details through which the FDA would propose to establish an LDT oversight framework, including premarket review for higher-risk LDTs, such as those that have the same intended use as FDA-approved or cleared companion diagnostic tests currently on the market. In January 2017, the FDA announced that it would not issue final guidance on the oversight of LDTs and manufacturers of products used for LDTs, but would seek further public discussion on an appropriate oversight approach, and give Congress an opportunity to develop a legislative solution. More recently, the FDA has issued warning letters to certain genomics labs for illegally marketing genetic tests that claim to predict patients' responses to specific medications, noting that the FDA has not created a legal "carve-out" for LDTs and retains discretion to take action when appropriate, such as when certain genomic tests raise significant public health concerns. As manufacturers develop more complex genetic tests and diagnostic software, the FDA may increase its regulation of LDTs. Any future legislative or administrative rule making or oversight of LDTs, if and when finalized, may impact the sales of our products and how customers use our products, and may require us to change our business model in order to maintain compliance with these laws. We cannot predict how these various efforts will be resolved, how Congress or the FDA will regulate LDTs in the future, or how that regulatory system will impact our business.

Additionally, on November 25, 2013, the FDA issued Final Guidance "Distribution of In Vitro Diagnostic Products Labeled for Research Use Only." The guidance emphasizes that the FDA will review the totality of the circumstances when it comes to evaluating whether equipment and testing components are properly labeled as RUO. The final guidance states that merely including a labeling statement that the product is for research purposes only will not necessarily render the device exempt from the FDA's clearance, approval, and other regulatory requirements if the circumstances surrounding the distribution, marketing and promotional practices indicate that the manufacturer knows its products are, or intends for its products to be, used for clinical diagnostic purposes. These circumstances may include written or verbal sales and marketing claims or links to articles regarding a product's performance in clinical applications and a manufacturer's provision of technical support for clinical applications.

In August 2020, as part of the U.S. government's efforts to combat COVID-19 and consistent with the direction in Executive Orders 13771 and 13924, the Department of Health and Human Services (HHS) announced rescission of guidances and other informal issuances of the FDA regarding premarket review of LDTs absent notice-and-comment rulemaking, stating that, absent notice-and-comment rulemaking, those seeking approval or clearance of, or an emergency use authorization, for an LDT may nonetheless voluntarily submit a premarket approval application, premarket notification or an EUA request, respectively, but are not required to do so. However, laboratories opting to use LDTs without FDA premarket review or authorization would not be eligible for liability protection under the Public Readiness and Emergency Preparedness Act, or the PREP Act. In November 2021, HHS under the Biden administration issued a statement that withdrew the August 2020 policy announcement, stating that HHS does not have a policy on LDTs that is separate from FDA's longstanding approach. The FDA also issued a revised version of its COVID-19 test policy that states the FDA expects newly offered COVID-19 tests, including LDTs, to have an EUA, or traditional marketing authorization such as a granted De Novo or cleared 510(k), prior to clinical use.

Further, in June 2021, Congress introduced an updated legislation called the Verifying Accurate, Leading-edge IVCT Development Act (VALID Act), which, if enacted, will establish a new risk-based regulatory framework for in vitro clinical tests (IVCTs), which include IVDs, LDTs, collection devices, and instruments used with such tests, and a technology certification program, among other proposals. The adoption of new restrictions on IVDs, LDTs, or RUOs, whether by the FDA or Congress, could adversely affect our ability to commercialize our products and the demand for our specialized reagents and instruments. Further, we could be required to obtain premarket clearance or approval from the FDA before we can sell our products to certain customers.

If the FDA determines our products or related applications should be subject to additional regulation as in vitro diagnostic devices based upon customers' use of our products for clinical diagnostic or therapeutic decision-making purposes, our ability to market and sell our products could be impeded and our business, prospects, results of operations and financial condition may be adversely affected. In addition, the FDA could consider our products to be misbranded or adulterated under the Federal Food, Drug, and Cosmetic Act and subject to recall and/or other enforcement action.

Compliance or the failure to comply with current and future regulations affecting our products and business operations worldwide, such as environmental regulations enacted in the European Union, could cause us significant expense and adversely impact our business.

We are subject to many federal, state, local, and foreign regulations relating to various aspects of our business operations. Governmental entities at all levels are continuously enacting new regulations, and it is difficult to identify all applicable regulations and anticipate how such regulations will be implemented and enforced. We continue to evaluate the necessary steps for compliance with applicable regulations. To comply with applicable regulations, we have and will continue to incur significant expense and allocate valuable internal resources to manage compliance-related issues. In addition, such regulations could restrict our ability to expand or equip our facilities, or could require us to acquire costly equipment or to incur other significant expenses to comply with the regulations. For example, the Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Directive (RoHS) and the Waste Electrical and Electronic Equipment Directive (WEEE), both enacted in the European Union, regulate the use of certain hazardous substances in, and require the collection, reuse, and recycling of waste from, products we manufacture. Certain of our products sold in these countries are subject to WEEE and RoHS. These and similar regulations that have been or are in the process of being enacted in other countries may require us to redesign our products, use different types of materials in certain components, or source alternative components to ensure compliance with applicable standards, and may reduce the availability of parts and components used in our products by negatively impacting our suppliers' ability to source parts and components in a timely and cost-effective manner.

The Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation (EC) No. 1907/206 is the European Union's regulation on chemicals and their safe use. The list of chemicals has been updated and some of the updates affect chemicals used in our products. We will request a research exception, but if not granted, we will need to reduce the concentration of some of the chemicals in our products, which will require significant research and development and operations efforts.

Any such redesigns, required use of alternative materials, or limited availability of parts and components used in our products may detrimentally impact the performance of our products, add greater testing lead times for product introductions, reduce our product margins, or limit the markets for our products, and if we fail to comply with any present and future regulations, we could be subject to future fines, penalties, and restrictions, such as the suspension of manufacturing of our products or a prohibition on the sale of products we manufacture. Any of the foregoing could adversely affect our business, financial condition, or results of operations.

RISKS RELATED TO ECONOMIC CONDITIONS AND OPERATING A GLOBAL BUSINESS

We generate a substantial portion of our revenue internationally and our international business exposes us to business, regulatory, political, operational, financial, and economic risks associated with doing business outside of the United States.

During the years 2021, 2020, and 2019, approximately 56%, 54%, and 63% respectively, of our product and service revenue was generated from sales to customers located outside of the United States. We believe that a significant percentage of our future revenue will continue to come from international sources as we expand our international operations and develop opportunities in other countries. Engaging in international business inherently involves a number of difficulties and risks, including:

- required compliance with existing and changing foreign regulatory requirements and laws that are or may be applicable to our business in the future, such as the European Union's General Data Protection Regulation, the California Consumer Privacy Act, and other data privacy requirements, labor and employment regulations, anticompetition regulations, the U.K. Bribery Act of 2010 and other anticorruption laws, and the RoHS and WEEE directives and REACH regulation, which regulate the use and importation of certain hazardous substances in, and require the collection, reuse, and recycling of waste from, products we manufacture;
- required compliance with U.S. laws such as the Foreign Corrupt Practices Act, and other U.S. federal laws and regulations established by the Office of Foreign Assets Control;
- export requirements and import or trade restrictions;
- laws and business practices favoring local companies;
- longer payment cycles and difficulties in enforcing agreements and collecting receivables through certain foreign legal systems;

- changes in social, economic, and political conditions or in laws, regulations and policies governing foreign trade, manufacturing, development, and investment both domestically as well as in the other countries and jurisdictions in which we operate and into which we sell our products, including as a result of the separation of the United Kingdom from the European Union (Brexit) or the Russian invasion of Ukraine;
- business interruptions and travel restrictions resulting from global sociopolitical events, including war and terrorism, public health crises (including the ongoing COVID-19 pandemic), and natural disasters including earthquakes, typhoons, floods and fires;
- potentially adverse tax consequences, tariffs, customs charges, bureaucratic requirements, and other trade barriers;
- difficulties and costs of staffing and managing foreign operations; and
- difficulties protecting or procuring intellectual property rights.

Since the beginning of the COVID-19 pandemic, travel restrictions have caused significant slowdowns in China, Japan, and other parts of the Asia-Pacific region. These slowdowns, in addition to shipment delays in China due to delays in obtaining VAT and import tax exemptions for our products, have caused our financial results to suffer. If these situations continue, or if other risks occur, we could be forced to dedicate significant resources to their resolution, and if we are unsuccessful in finding a solution, our financial condition and results will suffer.

In addition, political instability, civil unrest, the deterioration of the political situation in a country in which we have significant sales or operations, or the breakdown of trade relations between the United States and a foreign country in which we have significant operations, could adversely affect our business, financial condition, and results of operations. For example, a change in trade status between the United States and a foreign country could result in a substantial increase in the import duty of products manufactured in that foreign country and imported into the United States. The United States has commenced certain trade actions, including imposing increased tariffs on certain goods imported into the United States from China, which has resulted in retaliatory tariffs by China. In addition, the United States has commenced certain trade actions as a result of the Russian invasion of Ukraine, which are widely expected to result in retaliatory measures or actions, including tariffs, by Russia. Any increased trade barriers or restrictions on global trade imposed by the United States, or further retaliatory trade measures taken by China, Russia, or other countries in response, could adversely affect our business, financial condition, and results of operations.

Our business is subject to a variety of new U.S. and foreign export controls and economic sanctions regulations that were issued in response to Russia's invasion of Ukraine; our failure to comply with these laws and regulations could harm our business.

Due to recent regulations, U.S. companies can no longer provide or receive services or conduct any business with, including selling, shipping, or otherwise transferring any U.S.-controlled products to, the Donetsk People's Republic (DNR) and Luhansk People's Republic (LNR) regions of Ukraine. Additionally, existing U.S. sanctions continue to extend these prohibitions to the Crimea region of Ukraine. Our business is also subject to the expansion of previously existing sanctions imposed by the Treasury Department's Office of Foreign Assets Controls that now cover a significant number of individuals and entities located in Russia, Belarus, and surrounding regions as well as new U.S. export controls imposed by the U.S. Department of Commerce's Export Administration Regulations on exports to Russia. These laws and regulations cover U.S. persons as well as U.S.-controlled products, software, and technologies wherever located. Failure to comply with U.S. and foreign export control and economic sanctions laws and regulations can result in criminal sanctions, civil fines, debarment from government contracting, the loss of export privileges, and, in some cases, imprisonment.

We are currently implementing new measures to reduce our exposure to this liability. The implementation of these measures may require us to expend substantial resources or to discontinue certain products or services, which would negatively affect our business, financial condition, and operating results. In addition, the increased attention focused upon liability issues as a result of lawsuits, regulatory proceedings, and legislative proposals could damage our brand or otherwise impact the growth of our business. Finally, our ability to receive payment from these regions has been significantly impacted. Any costs incurred or loss of business that occurs as a result of compliance or other liabilities under these laws or regulations could harm our business and operating results.

Adverse conditions in the global economy and disruption of financial markets may significantly harm our revenue, profitability, and results of operations.

Adverse economic conditions in the U.S. and international markets, including the worldwide economic disruption related to the COVID-19 pandemic and related slowdowns in China, Japan, and elsewhere in the Asia-Pacific region, have negatively affected our revenues and operating results and may continue to do so. Even before the current public health crisis took hold,

the global credit and financial markets had been experiencing volatility and disruptions, including diminished liquidity and credit availability, increased concerns about inflation and deflation, and the downgrade of U.S. debt and exposure risks on other sovereign debts, decreased consumer confidence, lower economic growth, volatile energy costs, increased unemployment rates, and uncertainty about economic stability. Geopolitical events including the COVID-19 pandemic, the Russian invasion of Ukraine, including any resulting adoption and expansion of trade restrictions by the United States, Russia, and/or China, and Brexit have caused significant economic, market, political and regulatory uncertainty in some of our markets. Volatility and disruption of financial markets could limit our customers' ability to obtain adequate financing or credit to purchase and pay for our products in a timely manner or to maintain operations, which could result in a decrease in sales volume that could harm our results of operations. General concerns about the fundamental soundness of domestic and international economies may also cause our customers to reduce their purchases. Changes in governmental banking, monetary, and fiscal policies to address liquidity and increase credit availability may not be effective. Significant government investment and allocation of resources to assist the economic recovery of sectors that do not include our customers may reduce the resources available for government grants and related funding for life science, plant and animal research, and clinical research and development. Continuation or further deterioration of these financial and macroeconomic conditions could significantly harm our sales, profitability, and results of operations.

We are subject to fluctuations in the exchange rate of the U.S. dollar and foreign currencies.

A majority of our product sales are currently denominated in U.S. dollars and fluctuations in the value of the U.S. dollar relative to foreign currencies could decrease demand for our products and adversely impact our financial performance. For example, if the value of the U.S. dollar increases relative to foreign currencies, our products could become more costly to the international consumer and therefore less competitive in international markets, or if the value of the U.S. dollar decreases relative to the Singapore dollar or the Canadian dollar, it would become more costly in U.S. dollars for us to manufacture our products in Singapore and/or in Canada. Additionally, our expenses are generally denominated in the currencies of the countries in which our operations are located, which is primarily in the United States, with a portion of expenses incurred in Singapore and Canada where a significant portion of our manufacturing operations are located. Our results of operations and cash flows are, therefore, subject to fluctuations due to changes in foreign currency exchange rates. The volatility of exchange rates depends on many factors that we cannot forecast with reliable accuracy. We have experienced and will continue to experience fluctuations in our net income or loss as a result of transaction gains or losses related to revaluing certain current asset and current liability balances that are denominated in currencies other than the functional currency of the entities in which they are recorded. Fluctuations in currency exchange rates could have an adverse impact on our financial results in the future.

FINANCIAL, TAX, AND ACCOUNTING RISKS

As disclosed in footnote two of our consolidated financial statements, and referenced in our independent registered public accounting firm's report, we believe that our current level of cash and cash equivalents, together with committed financing facilities, are not sufficient to fund ongoing operations for at least the twelve-month period after the financial statements were issued. The existence of these conditions raises substantial doubt about our ability to continue as a "going concern" for at least the twelve-month period following the date the financial statements were issued.

Our current cash position and recurring operating losses have raised substantial doubt about our ability to continue as a going concern for at least the twelve-month period following the date the financial statements were issued. As of December 31, 2021, we had $29.5 million in cash, cash equivalents and restricted cash. Due to an extended strategic review process related to the pending Private Placement Issuance, we were unable in 2021 to implement certain cash management actions, including potential financing and/or cost reduction initiatives. Further, we have incurred, and expect to continue to incur, negative cash flows in pursuit of our business plans for at least the twelve-month period following the date the financial statements were issued. Management's plans to address the doubt regarding our ability to continue as a going concern are discussed under Part II, Item 7, "Management's discussion and analysis of financial condition and results of operations." Our ability to continue as a going concern is dependent upon our success in obtaining additional equity or debt financing, attaining further operating efficiencies, reducing expenditures and ultimately, generating significant revenue growth. Our plans to raise additional capital, including our ability to consummate the Private Placement Issuance, or take other actions to address the doubt regarding our ability to continue as a going concern, may not be successful. There can be no assurance that the Company would be able to obtain additional liquidity when needed or under acceptable terms, if at all. The perception of our ability to continue as a going concern may make it more difficult for us to obtain financing for the continuation of our operations and could result in the loss of confidence by investors, suppliers and employees.

Our future capital needs are uncertain and we may need to raise additional funds in the future, which may cause dilution to stockholders or may be upon terms that are not favorable to us.

We have continued to experience losses and, if that trend continues, we may need to seek additional sources of financing. If our plans to raise capital and to consummate the Private Placement Issuance are not successful, or if such funds are insufficient to meet our cash requirements, we may need to raise substantial capital for various purposes, including:

- funding our operations;
- expanding the commercialization of our products;
- furthering our research and development; and
- acquiring other businesses or assets and licensing technologies.

Our future funding requirements will depend on many factors, including:

- market acceptance of our products;
- the cost of our research and development activities;
- the cost of filing and prosecuting patent applications;
- the cost of defending any litigation including intellectual property, employment, contractual or other litigation;
- the cost and timing of regulatory clearances or approvals, if any;
- the cost and timing of establishing additional sales, marketing, and distribution capabilities;
- the cost and timing of establishing additional technical support capabilities;
- fluctuations in cash demands (e.g., due to interest or principal payments or payouts under existing cash compensation plans);
- variability in sales and timing of related cash collections;
- the effectiveness of our efficiency and cost-savings initiatives;
- the impact of any natural disasters or public health crises (including the COVID-19 pandemic);
- the effect of competing technological and market developments; and
- the extent to which we acquire or invest in businesses, products, and technologies, although we currently have no commitments or agreements relating to any of these types of transactions.

To the extent we draw on our revolving credit facility or otherwise incur additional indebtedness, the risks described above could increase. Further, if we increase our indebtedness, our actual cash requirements in the future may be greater than expected. Our cash flow from operations may not be sufficient to repay all of the outstanding debt as it becomes due, and we cannot assure you that we will be able to obtain additional funds on acceptable terms, or at all. The ongoing COVID-19 pandemic has led to significant disruption and volatility in the global capital markets, increasing the cost of—and adversely impacting access to—capital. We entered into an Open Market Sale Agreement (Sale Agreement) with Jefferies LLC (Jefferies) to sell shares of our common stock having aggregate sales proceeds of up to $50 million, from time to time, through an at-the-market (ATM) equity offering program under which Jefferies acts as sales agent. During the third quarter of 2020, we sold approximately 2.5 million shares of our common stock pursuant to the Sale Agreement, for aggregate gross proceeds of $20.9 million. Our net proceeds were approximately $20.1 million, after deducting related expenses, including commissions of approximately $0.6 million and issuance costs of approximately $0.2 million. If we raise additional funds by issuing equity securities, either under the ATM program or otherwise, our stockholders will experience dilution. Debt financing in addition to our credit facility, if available, may involve covenants restricting our operations or our ability to incur additional debt. Any additional debt or equity financing that we raise may contain terms that are not favorable to us or our stockholders, and our ability to raise additional capital may be adversely impacted by the impact of the COVID-19 pandemic on the economy.

If we raise additional funds through collaboration and licensing arrangements with third parties, it may be necessary to relinquish some rights to our technologies or our products, or grant licenses on terms that are not favorable to us. If we do not have or are unable to raise adequate funds, we may have to liquidate some or all of our assets, delay development or commercialization of our products, or license to third parties the rights to commercialize products or technologies that we would otherwise seek to commercialize. We also may have to reduce marketing, customer support, research and development, or other resources devoted to our products, or cease operations. Any of these factors could harm our operating results.

If we fail to maintain effective internal control over financial reporting in the future, the accuracy and timing of our financial reporting may be impaired, which could adversely affect our business and our stock price.

The Sarbanes-Oxley Act requires, among other things, that we maintain effective internal control over financial reporting and disclosure controls and procedures. In particular, we must perform system and process evaluation and testing of our internal control over financial reporting to allow management to report on the effectiveness of our internal control over financial reporting, as required by Section 404 of the Sarbanes-Oxley Act. Our testing may reveal deficiencies in our internal control over financial reporting that are deemed to be material weaknesses.

Our compliance with Section 404 requires that we incur substantial accounting expense and expend significant management time on compliance-related issues. We currently do not have an internal audit group, and we continue to evaluate our need for additional accounting and financial staff with appropriate public company experience and technical accounting knowledge. Moreover, if we do not comply with the requirements of Section 404, or if we or our independent registered public accounting firm identify deficiencies in our internal control over financial reporting that are deemed to be material weaknesses, the market price of our stock could decline and we could be subject to sanctions or investigations by The Nasdaq Stock Market LLC, the SEC, or other regulatory authorities, which would require additional financial and management resources.

We may not realize the value of our goodwill or other intangible assets, which would be reflected in an impairment charge.

Our business acquisitions typically result in goodwill and other intangible assets, which affect the amount of future period amortization expense and possible impairment expense. We make estimates and assumptions in valuing such intangible assets that affect our consolidated financial statements. As of December 31, 2021, we had approximately $135.6 million of goodwill and net intangible assets, including approximately $106.4 million of goodwill and $29.2 million of net intangible assets. These assets represent a significant portion of the assets recorded on our consolidated balance sheet and relate primarily to our acquisition of DVS Sciences, Inc. (DVS) in February 2014 and InstruNor in 2020. In addition, if in the future we acquire additional businesses, technologies, or other intangible assets, a substantial portion of the value of such assets may be recorded as goodwill or intangible assets.

We assess the realizability of goodwill and indefinite-lived intangible assets annually as well as whenever events or changes in circumstances indicate that these assets may be impaired. We assess the realizability of definite-lived intangible assets whenever events or changes in circumstances indicate that these assets may be impaired. These events or circumstances would generally include operating losses or a significant decline in earnings associated with the acquired business or asset. Our ability to realize the value of the goodwill and intangible assets will depend on the future cash flows of these businesses. These cash flows in turn depend in part on how well we have integrated these businesses. If we are not able to realize the value of the goodwill and intangible assets, we may be required to incur material charges relating to the impairment of those assets.

If we fail to comply with the covenants and other obligations under our debt facilities, the lenders may be able to accelerate amounts owed under the facilities and, in the case of our Credit Facility (as defined below), may foreclose upon the assets securing our obligations.

In August 2021, we amended our Loan and Security Agreement dated as of August 2, 2018, between the Company and Silicon Valley Bank (SVB) (the Credit Agreement), which provides for secured revolving loans in an aggregate amount of up to $15.0 million (the Revolving Credit Facility), to extend the maturity date to August 2, 2023 and to provide for a new $10.0 million term loan facility (the Term Loan Facility and, together with the Revolving Credit Facility, the Credit Facility). The Credit Facility is secured by substantially all of our assets, other than intellectual property. The Credit Facility contains customary affirmative and negative covenants which, unless waived by the bank, limit our ability to, among other things, incur additional indebtedness, grant liens, make investments, repurchase stock, pay dividends, transfer assets, enter into affiliate transactions, undergo a change of control, or engage in merger and acquisition activity, including merging or consolidating with a third party. Additionally, we are required to maintain a minimum Adjusted Quick Ratio (as defined in the amendment) of at least 1.25 to 1.00. If we fail to comply with the covenants and our other obligations under the Credit Facility, the lenders would be able to accelerate the required repayment of amounts due under the Credit Facility and, if they are not repaid, could foreclose upon the assets securing our obligations under the Credit Facility.

In January 2022, we entered into the Bridge Loan Agreements. Each Bridge Loan Agreement provides for a $12.5 million term loan to the Company. Each Bridge Loan Agreement contains customary affirmative and negative covenants which, unless waived by the applicable lenders, limit our ability to, among other things, incur additional indebtedness, grant liens, make investments, repurchase stock, pay dividends, transfer assets, enter into affiliate transactions, undergo a change of control, or engage in merger and acquisition activity, including merging or consolidating with a third party. If we fail to comply with the covenants and our other obligations under the Bridge Loan Agreements, the lenders would, subject to a subordination agreement, be able to accelerate the required repayment of amounts due under the Bridge Loan Agreements.

Our ability to use net operating loss carryforwards to offset future taxable income for U.S. federal income tax purposes and other tax benefits may be limited.

Section 382 of the Internal Revenue Code of 1986, as amended (the Code), imposes an annual limitation on the amount of taxable income that may be offset by net operating loss carryforwards (NOLs) if a corporation experiences an "ownership change." As provided in Section 382 of the Code, an "ownership change" occurs when a company's "five-percent shareholders" collectively increase their ownership in the company by more than 50 percentage points (by value) over a rolling three-year period. Various states also have limitations on the use of state NOLs following an ownership change.

We may experience an ownership change in connection with the Private Placement Issuance. Additionally, any other future changes in our stock ownership, some of which are outside our control, could result in an ownership change under Section 382 of the Code. If we experience an ownership change, our ability to use our NOLs or other tax benefits could be substantially limited, which could significantly impair their value. There is no assurance that we will be able to fully utilize our NOLs or other tax benefits, which could adversely impact our results of operations.

We believe that these tax benefits are a valuable asset for us and we monitor our stock ownership to determine whether our NOLs are at material risk of limitation based on an ownership change pursuant to Section 382. If our board of directors determines a potential risk exists that our NOLs could be limited, it could elect to adopt a tax benefit preservation plan in an effort to protect our tax benefits. Adoption of a tax benefit preservation plan could make it more difficult for a third party to acquire, or could discourage a third party from acquiring, us or a large block of our common stock.

We are subject to risks related to taxation in multiple jurisdictions and our effective income tax rate could be adversely affected and we could have additional tax liability if existing tax laws or regulations change or if taxing authorities disagree with our interpretations of tax laws or regulations.

We are subject to income taxes in both the United States and certain foreign jurisdictions. Significant judgments based on interpretations of existing tax laws or regulations are required in determining the provision for income taxes. For example, we have made certain interpretations of existing tax laws or regulations based upon the operations of our business internationally and we have implemented intercompany agreements based upon these interpretations and related transfer pricing analyses. If the U.S. Internal Revenue Service or other taxing authorities disagree with the positions, our effective income tax rate could be adversely affected and we could have additional tax liability, including interest and penalties. From time to time, we may review our corporate structure and tax positions in the various international jurisdictions in which we operate and such review may result in changes to how we structure our international business operations, which may adversely impact our effective income tax rate. Our effective income tax rate could also be adversely affected by changes in the mix of earnings in tax jurisdictions with different statutory tax rates, changes in the valuation of deferred tax assets and liabilities, changes in existing tax laws or tax rates, changes in the level of non-deductible expenses (including share-based compensation), changes in our future levels of research and development spending, mergers and acquisitions, or the result of examinations by various tax authorities. Payment of additional amounts as a result of changes in applicable tax law or upon final adjudication of any disputes could have a material impact on our results of operations and financial position.

Changes in accounting principles, or interpretations thereof, could have a significant impact on our financial position and results of operations.

We prepare our consolidated financial statements in accordance with accounting principles generally accepted in the United States of America (U.S. GAAP). These principles are subject to interpretation by the SEC and various bodies formed to interpret and create appropriate accounting principles. A change in these principles can have a significant effect on our reported results and may even retroactively affect previously reported transactions. Additionally, the adoption of new or revised accounting principles may require that we make significant changes to our systems, processes and controls.

It is not clear if or when potential changes in accounting principles may become effective, whether we have the proper systems and controls in place to accommodate such changes and the impact that any such changes may have on our financial position and results of operations.

We have a significant amount of outstanding indebtedness, and our financial condition and results of operations could be adversely affected if we do not efficiently manage our liabilities.

We have significant outstanding convertible debt. As of December 31, 2021, we had outstanding $0.6 million aggregate principal amount of our 2.75% Senior Convertible Notes due 2034 (2014 Notes) and $55.0 million aggregate principal amount of our 5.25% convertible senior notes due 2024 (2019 Notes, and collectively with the 2014 Notes, the Convertible Notes). The 2014 Notes will mature on February 1, 2034, unless earlier converted, redeemed, or repurchased in accordance with the terms of the 2014 Notes. Pursuant to the terms of the indenture governing the 2014 Notes (2014 Notes Indenture), holders of the 2014

Notes may require us to repurchase all or a portion of the 2014 Notes at a repurchase price in cash equal to 100% of the principal amount of such 2014 Notes plus accrued and unpaid interest thereon, on each of February 6, 2024 and February 6, 2029. The 2019 Notes will mature on December 1, 2024, unless earlier converted, or repurchased in accordance with the terms of the 2019 Notes.

If we undergo a fundamental change (as defined in the 2014 Notes Indenture or the indenture governing the 2019 Notes, as applicable), holders of the applicable series of Convertible Notes may require us to repurchase such Convertible Notes in whole or in part for cash at a repurchase price equal to 100% of the principal amount of the applicable series of Convertible Notes plus accrued and unpaid interest. If we refinance all or any portion of the Convertible Notes, we may issue additional convertible notes or other debt, which could include additional company obligations and represent more dilution to existing stockholders and noteholders.

This significant amount of debt has important risks to us and our investors, including:

- requiring a portion of our cash flow from operations to make interest payments on this debt;
- increasing our vulnerability to general adverse economic and industry conditions;
- reducing the cash flow available to fund capital expenditures and other corporate purposes and to grow our business;
- limiting our flexibility in planning for, or reacting to, changes in our business and the industry; and
- limiting our ability to borrow additional funds as needed or take advantage of business opportunities as they arise.

In January 2022, we borrowed $25.0 million under the Bridge Loan Agreements in connection with the Private Placement Issuance. In addition, to the extent we draw on our Revolving Credit Facility or otherwise incur additional indebtedness, the risks described above could increase. Further, if we increase our indebtedness, our actual cash requirements in the future may be greater than expected. Our cash flow from operations may not be sufficient to repay all of the outstanding debt as it becomes due, and we may not be able to borrow money, sell assets or otherwise raise funds on acceptable terms, or at all, to refinance our debt.

RISKS RELATED TO INTELLECTUAL PROPERTY

Our ability to protect our intellectual property and proprietary technology through patents and other means is uncertain.

Our commercial success depends in part on our ability to protect our intellectual property and proprietary technologies. We rely on patent protection, where appropriate and available, as well as a combination of copyright, trade secret, and trademark laws, and nondisclosure, confidentiality, and other contractual restrictions to protect our proprietary technology. However, these legal means afford only limited protection and may not adequately protect our rights or permit us to gain or keep any competitive advantage. We apply for patents covering our products and technologies and uses thereof, as we deem appropriate. However, we may fail to apply for patents on important products and technologies in a timely fashion or at all. Our pending U.S. and foreign patent applications may not issue as patents or may not issue in a form that will be sufficient to protect our proprietary technology and gain or keep our competitive advantage. Any patents we have obtained or do obtain may be subject to re-examination, reissue, opposition, or other administrative proceeding, or may be challenged in litigation, and such challenges could result in a determination that the patent is invalid or unenforceable. In addition, competitors may be able to design alternative methods or devices that avoid infringement of our patents. Both the patent application process and the process of managing patent disputes can be time consuming and expensive.

Furthermore, the laws of some foreign countries may not protect our intellectual property rights to the same extent as do the laws of the United States, and many companies have encountered significant problems in protecting and defending such rights in foreign jurisdictions. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business. Changes in either the patent laws or in interpretations of patent laws in the United States or other countries may diminish the value of our intellectual property. We cannot predict the breadth of claims that may be allowed or enforced in our patents or in third-party patents. For example:

- we might not have been the first to make the inventions covered by each of our pending patent applications;
- we might not have been the first to file patent applications for these inventions;
- the patents of others may have an adverse effect on our business; and
- others may independently develop similar or alternative products and technologies or duplicate any of our products and technologies.

To the extent our intellectual property, including licensed intellectual property, offers inadequate protection, or is found to be invalid or unenforceable, our competitive position and our business could be adversely affected.

We may be involved in lawsuits to protect or enforce our patents and proprietary rights, to determine the scope, coverage and validity of others' proprietary rights, or to defend against third-party claims of intellectual property infringement, any of which could be time-intensive and costly and may adversely impact our business or stock price.

Litigation may be necessary for us to enforce our patent and proprietary rights, determine the scope, coverage, and validity of others' proprietary rights, and/or defend against third-party claims of intellectual property infringement against us as well as against our suppliers, distributors, customers, and other entities with which we do business. Litigation could result in substantial legal fees and could adversely affect the scope of our patent protection. The outcome of any litigation or other proceeding is inherently uncertain and might not be favorable to us, and we might not be able to obtain licenses to technology that we require. Even if such licenses are obtainable, they may not be available at a reasonable cost. We could therefore incur substantial costs related to royalty payments for licenses obtained from third parties, which could negatively affect our product margins or financial position. Further, we could encounter delays in product introductions, or interruptions in product sales, as we develop alternative methods or products.

As we move into new markets and applications for our products, incumbent participants in such markets may assert their patents and other proprietary rights against us as a means of impeding our entry into such markets or as a means to extract substantial license and royalty payments from us. Our commercial success may depend in part on our non-infringement of the patents or proprietary rights of third parties. Numerous significant intellectual property issues have been litigated, and will likely continue to be litigated, between existing and new participants in our existing and targeted markets. For example, some of our products provide for the testing and analysis of genetic material, and patent rights relating to genetic materials remain a developing area of patent law. A 2013 U.S. Supreme Court decision held, among other things, that claims to isolated genomic DNA occurring in nature are not patent eligible, while claims relating to synthetic DNA may be patent eligible. In addition, third parties may assert that we are employing their proprietary technology without authorization, and if they are successful in making such claims, we may be forced to enter into license agreements, pay additional royalties or license fees, or enter into settlements that include monetary obligations or restrictions on our business.

Our customers have been sued for various claims of intellectual property infringement in the past, and we expect that our customers will be involved in additional litigation in the future. In particular, our customers may become subject to lawsuits claiming that their use of our products infringes third-party patent rights, and we could become subject to claims that we contributed to or induced our customer's infringement. In addition, our agreements with some of our suppliers, distributors, customers, and other entities with which we do business may require us to defend or indemnify these parties to the extent they become involved in infringement claims against us, including the claims described above. We could also voluntarily agree to defend or indemnify third parties in instances where we are not obligated to do so if we determine it would be important to our business relationships. If we are required or agree to defend or indemnify any of these third parties in connection with any infringement claims, we could incur significant costs and expenses that could adversely affect our business, operating results, or financial condition.

We may be subject to damages resulting from claims that we or our employees have wrongfully used or disclosed alleged trade secrets of our employees' former employers or other institutions or third parties with which such employees may have been previously affiliated.

Many of our employees were previously employed at universities or other life science or plant and animal research companies, including our competitors or potential competitors. In the future, we may become subject to claims that our employees, or we, have inadvertently or otherwise used or disclosed trade secrets or other proprietary information of their former employers or other third parties or institutions with which our employees may have been previously affiliated. Litigation may be necessary to defend against these claims. A resulting loss of key research personnel work product could hamper or prevent our ability to commercialize certain potential products or a loss of or inability to hire key marketing, sales or research and development personnel could adversely affect our future product development, sales and revenues, any of which could severely harm our business. Even if we are successful in defending against any such claims, litigation could result in substantial costs and be a distraction to management.

We depend on certain technologies that are licensed to us. We do not control these technologies and any loss of our rights to them could prevent us from selling our products, which would have an adverse effect on our business.

We rely on licenses in order to be able to use various proprietary technologies that are material to our business, including our core IFC, multi-layer soft lithography, and mass cytometry technologies. In some cases, we do not control the prosecution, maintenance, or filing of the patents to which we hold licenses, or the enforcement of these patents against third parties.

Additionally, our business and product development plans anticipate and may substantially depend on future in-license agreements with additional third parties, some of which are currently in the early discussion phase. For example, Fluidigm Canada Inc. (Fluidigm Canada), an Ontario corporation and wholly owned subsidiary of Fluidigm Sciences, was party to an interim license agreement, now expired, with Nodality, Inc. (Nodality) under which Nodality granted Fluidigm Canada a worldwide, non-exclusive, research use only, royalty bearing license to certain cytometric reagents, instruments, and other products. While we were able to secure a license under a new license agreement with Nodality, we cannot provide assurances that we will always be able to obtain suitable license rights to technologies or intellectual property of other third parties on acceptable terms, if at all.

In-licensed intellectual property rights that are fundamental to our business being operated present numerous risks and limitations. For example, all or a portion of the license rights granted may be limited for research use only, and in the event we attempt to expand into diagnostic applications, we would be required to negotiate additional rights, which may not be available to us on commercially reasonable terms, if at all.

Our rights to use the technology we license are also subject to the negotiation and continuation of those licenses. Certain of our licenses contain provisions that allow the licensor to terminate the license upon specific conditions. Our rights under the licenses are subject to our continued compliance with the terms of the license, including the payment of royalties due under the license. Because of the complexity of our products and the patents we have licensed, determining the scope of the license and related royalty obligation can be difficult and can lead to disputes between us and the licensor. An unfavorable resolution of such a dispute could lead to an increase in the royalties payable pursuant to the license. If a licensor believed we were not paying the royalties due under the license or were otherwise not in compliance with the terms of the license, the licensor might attempt to revoke the license. If such an attempt were successful and the license is terminated, we might be barred from marketing, producing, and selling some or all of our products, which would have an adverse effect on our business. Potential disputes between us and one of our existing licensors concerning the terms or conditions of the applicable license agreement could result, among other risks, in substantial management distraction; increased expenses associated with litigation or efforts to resolve disputes; substantial customer uncertainty concerning the direction of our product lines; potential infringement claims against us and/or our customers, which could include efforts by a licensor to enjoin sales of our products; customer requests for indemnification by us; and, in the event of an adverse determination, our inability to operate our business as currently operated. Termination of material license agreements could prevent us from manufacturing and selling our products unless we can negotiate new license terms or develop or acquire alternative intellectual property rights that cover or enable similar functionality. Any of these factors would be expected to have a material adverse effect on our business, operating results, and financial condition and could result in a substantial decline in our stock price.

We are subject to certain manufacturing restrictions related to licensed technologies that were developed with the financial assistance of U.S. governmental grants.

We are subject to certain U.S. government regulations because we have licensed technologies that were developed with U.S. government grants. In accordance with these regulations, these licenses provide that products embodying the technologies are subject to domestic manufacturing requirements. If this domestic manufacturing requirement is not met, the government agency that funded the relevant grant is entitled to exercise specified rights, referred to as “march-in rights,” which if exercised would allow the government agency to require the licensors or us to grant a non-exclusive, partially exclusive, or exclusive license in any field of use to a third party designated by such agency. All of our microfluidic systems revenue is dependent upon the availability of our IFCs, which incorporate technology developed with U.S. government grants. Our genomics instruments, including microfluidic systems and IFCs, are manufactured at our facility in Singapore. The federal regulations allow the funding government agency to grant, at the request of the licensors of such technology, a waiver of the domestic manufacturing requirement. Waivers may be requested prior to any government notification. We have assisted the licensors of these technologies with the analysis of the domestic manufacturing requirement, and, in December 2008, the sole licensor subject to the requirement applied for a waiver of the domestic manufacturing requirement with respect to the relevant patents licensed to us by this licensor. In July 2009, the funding government agency granted the requested waiver of the domestic manufacturing requirement for a three-year period commencing in July 2009. In June 2012, the licensor requested a continued waiver of the domestic manufacturing requirement with respect to the relevant patents, but the government agency has not yet taken any action in response to this request. If the government agency does not grant the requested waiver or the government fails to grant additional waivers of such requirement that may be sought in the future, then the U.S. government could exercise its march-in rights with respect to the relevant patents licensed to us. In addition, the license agreement under which the relevant patents are licensed to us contains provisions that obligate us to comply with this domestic manufacturing requirement. We are not currently manufacturing instruments and IFCs in the United States that incorporate the relevant licensed technology. If our lack of compliance with this provision constituted a material breach of the license agreement, the license of the relevant patents could be terminated or we could be compelled to relocate our manufacturing of microfluidic systems and IFCs to the United States to avoid or cure a material breach of the license agreement. Any of the exercise of march-in rights, the

termination of our license of the relevant patents or the relocation of our manufacturing of microfluidic systems and IFCs to the United States could materially adversely affect our business, operations and financial condition.

We are subject to certain obligations and restrictions relating to technologies developed in cooperation with Canadian government agencies.

Some of our Canadian research and development is funded in part through government grants and by government agencies. The intellectual property developed through these projects is subject to rights and restrictions in favor of government agencies and Canadians generally. In most cases the government agency retains the right to use intellectual property developed through the project for non-commercial purposes and to publish the results of research conducted in connection with the project. This may increase the risk of public disclosure of information relating to our intellectual property, including confidential information, and may reduce its competitive advantage in commercializing intellectual property developed through these projects. In certain projects, we have also agreed to use commercially reasonable efforts to commercialize intellectual property in Canada, or more specifically in the province of Ontario, for the economic benefit of Canada and the province of Ontario. These restrictions will limit our choice of business and manufacturing locations, business partners and corporate structure and may, in certain circumstances, restrict our ability to achieve maximum profitability and cost efficiency from the intellectual property generated by these projects. In one instance, a dispute with the applicable government funded entity may require mediation, which could lead to unanticipated delays in our commercialization efforts to that project. One of our Canadian government funded projects is also subject to certain limited “march-in” rights in favor of the government of the Province of Ontario, under which we may be required to grant a license to our intellectual property, including background intellectual property developed outside the scope of the project, to a responsible applicant on reasonable terms in circumstances where the government determines that such a license is necessary in order to alleviate emergency or extraordinary health or safety needs or for public use. In addition, we must provide reasonable assistance to the government in obtaining similar licenses from third parties required in connection with the use of its intellectual property. Instances in which the government of the Province of Ontario has exercised similar “march-in” rights are rare; however, the exercise of such rights could materially adversely affect our business, operations and financial condition.

RISKS RELATED TO OUR COMMON STOCK

Our stock price is volatile.

Our stock is currently traded on the Nasdaq Global Select Market (Nasdaq), but we can provide no assurance that we will be able to maintain an active trading market on Nasdaq or any other exchange in the future. The trading volume of our stock tends to be low relative to our total outstanding shares, and we have several stockholders who hold substantial blocks of our stock. As of December 31, 2021, we had 76,919,287 shares of common stock outstanding, and stockholders holding at least 5% of our stock, individually or with affiliated persons or entities, collectively beneficially owned or controlled approximately 51% of such shares. Sales of large numbers of shares by any of our large stockholders, including in connection with the Private Placement Issuance, could adversely affect our trading price, particularly given our relatively small historic trading volumes. If stockholders holding shares of our common stock sell, indicate an intention to sell, or if it is perceived that they will sell, substantial amounts of their common stock in the public market, the trading price of our common stock could decline. Moreover, if there is no active trading market or if the volume of trading is limited, holders of our common stock may have difficulty selling their shares. In addition, the concentration of ownership of our outstanding common stock (approximately 51% held by our top seven stockholders as of December 31, 2021) means that a relatively small number of stockholders have significant control over the outcomes of stockholder voting.

The trading price of our common stock is highly volatile and subject to wide fluctuations in response to various factors, some of which are beyond our control. These factors include:

- the impact of public health crises, including the COVID-19 pandemic, on global financial markets;
- actual or anticipated quarterly variation in our results of operations or the results of our competitors;
- our failure to achieve performance consistent with our financial guidance and/or market expectations;
- announcements or communications by us or our competitors relating to, among other things, new commercial products, technological advances, significant contracts, commercial relationships, capital commitments, acquisitions or sales of businesses, and/or misperceptions in or speculation by the market regarding such announcements or communications;
- issuance of new or changed securities analysts’ reports or recommendations for our stock;
- developments or disputes concerning our intellectual property or other proprietary rights;
- commencement of, or our involvement in, litigation;

- market conditions in the life science, plant and animal research, and contract research organization sectors;
- failure to complete significant sales;
- manufacturing disruptions that could occur if we are unable to successfully expand our production in our current or an alternative facility;
- supply chain disruptions;
- any future sales of our common stock or other securities in connection with raising additional capital or otherwise, including the Private Placement Issuance;
- any major change to the composition of our board of directors or management;
- general market conditions and other factors unrelated to our operating performance or the operating performance of our competitors, including deteriorating market conditions due to investor concerns regarding inflation and hostilities between Russia and Ukraine; and
- general economic conditions and slow or negative growth of our markets.

The stock market in general, and market prices for the securities of technology-based companies like ours in particular, have from time to time experienced volatility that often has been unrelated to the operating performance of the underlying companies. These broad market and industry fluctuations may adversely affect the market price of our common stock regardless of our operating performance.

In several recent situations where the market price of a stock has been volatile, holders of that stock have instituted securities class action litigation against the company that issued the stock. As discussed in Part I Item 3 (Legal Proceedings) of this Annual Report on Form 10-K, a class action securities lawsuit against us is currently pending. While we are continuing to defend such action vigorously, the defense of this action and any additional actions can be costly, divert the time and attention of our management, and harm our operating results, and any judgment against us or any future stockholder litigation could result in substantial costs.

Future sales of our common stock in the public market could cause our stock price to fall.

Our stock price could decline as a result of sales of a large number of shares of our common stock or the perception that these sales could occur. These sales, or the possibility that these sales may occur, also might make it more difficult for us to sell equity securities in the future at a time and at a price that we deem appropriate.

In addition, in the future, we may issue additional shares of common stock or other equity or debt securities convertible into common stock in connection with a financing, acquisition, litigation settlement, employee arrangements or otherwise. Any such future issuance, including any issuances pursuant to our ATM equity offering program under our Sale Agreement with Jefferies, could result in substantial dilution to our existing stockholders and could cause our stock price to decline.

We will have broad discretion over the use of the proceeds to us from our ATM equity offering program and may apply the proceeds to uses that do not improve our operating results or the value of your securities.

We will have broad discretion to use the net proceeds to us from our ATM equity offering program, and investors will be relying solely on the judgment of our board of directors and management regarding the application of these proceeds. Investors will not have the opportunity, as part of their investment decision, to assess whether the proceeds are being used appropriately. Our use of the proceeds may not improve our operating results or increase the value of the securities offered pursuant to the ATM equity offering program.

If securities or industry analysts publish unfavorable research about us or cease to cover our business, our stock price and/or trading volume could decline.

The trading market for our common stock may rely, in part, on the research and reports that equity research analysts publish about us and our business. We do not have any control of the analysts or the content and opinions included in their reports. The price of our stock could decline if one or more equity research analysts downgrade our stock or issue other unfavorable commentary or research. If one or more equity research analysts ceases coverage of our company or fails to publish reports on us regularly, demand for our stock could decrease, which in turn could cause our stock price or trading volume to decline.

Anti-takeover provisions in our charter documents and under Delaware law could make an acquisition of us, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management and limit the market price of our common stock.

Provisions in our certificate of incorporation and bylaws may have the effect of delaying or preventing a change of control or changes in our management, including provisions that:

- authorize our board of directors to issue, without further action by the stockholders, up to 10,000,000 shares of undesignated preferred stock;
- require that any action to be taken by our stockholders be effected at a duly called annual or special meeting and not by written consent;
- specify that special meetings of our stockholders can be called only by our board of directors, the chairman of the board, the chief executive officer or the president;
- establish an advance notice procedure for stockholder approvals to be brought before an annual meeting of our stockholders, including proposed nominations of persons for election to our board of directors;
- establish that our board of directors is divided into three classes, Class I, Class II, and Class III, with each class serving staggered three-year terms;
- provide that our directors may be removed only for cause;
- provide that vacancies on our board of directors may be filled only by a majority of directors then in office, even though less than a quorum;
- specify that no stockholder is permitted to cumulate votes at any election of directors; and
- require a super-majority of votes to amend certain of the above-mentioned provisions.

These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management. In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law (DGCL), which limits the ability of stockholders owning in excess of 15% of our outstanding voting stock to merge or combine with us.

The forum selection provision in our bylaws could limit the ability of our stockholders to bring a claim in a judicial forum viewed by the stockholders as more favorable for disputes with us or our directors, officers or other employees.

Our bylaws provide that the Court of Chancery of the State of Delaware (or, if the Court of Chancery does not have jurisdiction, another State court in Delaware or the federal district court for the District of Delaware) is the exclusive forum for the following (except for any claim as to which such court determines that there is an indispensable party not subject to the jurisdiction of such court (and the indispensable party does not consent to the personal jurisdiction of such court within 10 days following such determination), which is vested in the exclusive jurisdiction of a court or forum other than such court or for which such court does not have subject matter jurisdiction):

- any derivative action or proceeding brought on our behalf;
- any action asserting a claim of breach of fiduciary duty;
- any action asserting a claim against us arising under the DGCL, our certificate of incorporation or our bylaws; and
- any action asserting a claim against us that is governed by the internal-affairs doctrine.

This provision does not apply to suits brought to enforce a duty or liability created by the Exchange Act or any other claim for which the U.S. federal courts have exclusive jurisdiction.

Our bylaws further provide that the federal district courts of the United States of America will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act.

These exclusive-forum provisions may limit a stockholder’s ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage lawsuits against us and our directors, officers and other employees. Any person or entity purchasing or otherwise acquiring any interest in any of our securities shall be deemed to have notice of and consented to these provisions. There is uncertainty as to whether a court would enforce such provisions, and the enforceability of similar choice of forum provisions in other companies’ charter documents has been challenged in legal proceedings.

It is possible that a court could find these types of provisions to be inapplicable or unenforceable, and if a court were to find either exclusive-forum provision in our bylaws to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving the dispute in other jurisdictions, which could seriously harm our business.

Any conversions of the 2014 Notes, the 2019 Notes, or the Bridge Loans will dilute the ownership interest of our existing stockholders and may otherwise depress the price of our common stock.

Any conversion of some or all of the 2014 Notes, 2019 Notes, or Bridge Loans will dilute the ownership interests of our existing stockholders. Any sales in the public market of our common stock issuable upon such conversion could also adversely affect prevailing market prices of our common stock. In addition, holders of the 2014 Notes, 2019 Notes, or Bridge Loans may hedge their position in such convertible notes by entering into short positions with respect to the underlying common stock. As a result, any anticipated conversion of the 2014 Notes, 2019 Notes, or Bridge Loans could depress the market price of our common stock and impair our ability to raise capital through the sale of additional equity securities.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We lease approximately 78,000 square feet of office and laboratory space at our headquarters in South San Francisco, California under a lease that commenced in March 2020 for a lease term of approximately 10 years. Additionally, we lease office, laboratory, and manufacturing space in Singapore consisting of approximately 40,000 square feet expiring in June 2027, and approximately 5,000 square feet expiring in March 2023. In Ontario, Canada, we have leased two properties, comprising approximately 44,500 square feet expiring in March 2026 and approximately 19,000 square feet expiring in March 2027. As of December 31, 2021, we also leased office space in Japan, China, and France, with various expiration dates through February 2026. We believe that our properties are in good condition and are adequate and suitable for their purposes. Refer to Note 10 of our consolidated financial statements for additional information about leased properties in this Form 10-K.

ITEM 3. LEGAL PROCEEDINGS

In September 2020, a putative class action complaint alleging violations of the federal securities laws was filed against the Company (also naming our Chief Executive Officer and Chief Financial Officer as defendants) in the U.S. District Court for the Northern District of California (Reena Saintjermain, et al. v. Fluidigm Corporation, et al). The Court appointed a lead plaintiff and lead counsel in December 2020, and an amended complaint was filed on February 19, 2021. The complaint, as amended, seeks unspecified damages on behalf of a purported class of persons and entities who acquired our common stock between February 7, 2019 and November 5, 2019 and alleges securities laws violations based on statements and alleged omissions made by the Company during such period. The Company filed a motion to dismiss the complaint on April 5, 2021 and, on August 4, 2021, the Court granted defendants' motion to dismiss with leave to amend. A second amended complaint was filed on September 14, 2021. The Company filed a motion to dismiss the second amended complaint on October 29, 2021 and, on February 14, 2022, the Court granted defendants' motion and dismissed the second amended complaint with prejudice. The plaintiff has 30 days following the Court's entry of judgment to file an appeal. We believe the claims alleged in the complaint lack merit and, should an appeal be filed, we intend to defend this action vigorously.

In the normal course of business, we are from time to time involved in legal proceedings or potential legal proceedings, including matters involving employment, intellectual property, or others. Although the results of litigation and claims cannot be predicted with certainty, we currently believe that the final outcome of any currently pending matters would not have a material adverse effect on our business, operating results, financial condition, or cash flows. Regardless of the outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management resources, and other factors.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market for Our Common Stock; Dividends

Our common stock began trading on the Nasdaq Global Select Market under the symbol "FLDM" on February 10, 2011.

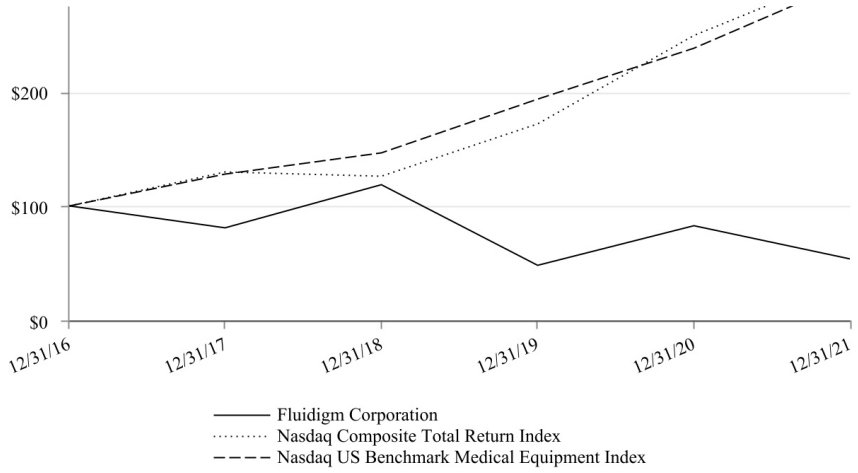
We had 82 stockholders of record as of January 31, 2022; however, because many of our outstanding shares are held by brokers or other institutions on behalf of stockholders, we are unable to estimate the total number of beneficial owners represented by the holders of record.

We have never declared or paid cash dividends on our common stock and do not expect to pay dividends on our common stock for the foreseeable future. Instead, we anticipate that all of our earnings in the foreseeable future will be used for the operation and growth of our business.

Stock Performance Graph

The following performance graph shall not be deemed "soliciting material" or to be "filed" with the SEC for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any filing of Fluidigm Corporation under the Securities Act or the Exchange Act.

The following graph compares, from December 31, 2016 through December 31, 2021, the cumulative total return for our common stock, the Nasdaq Composite Total Return Index, and the Nasdaq US Benchmark Medical Equipment Index, assuming in each case an initial investment of $100 and reinvestment of all dividends. Such returns are based on historical results and are not intended to suggest future performance.



Sales of Unregistered Securities

None.

Issuer Purchases of Equity Securities

We did not repurchase any shares of our common stock during the year ended December 31, 2021.

ITEM 6. RESERVED

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) is intended to help the reader understand the results of operations and financial condition of Fluidigm. MD&A is provided as a supplement to, and should be read together with our consolidated financial statements and the notes to those statements included elsewhere in this Form 10-K. This discussion contains forward-looking statements based on our current expectations, assumptions, estimates and projections about Fluidigm and our industry. These forward-looking statements involve risks and uncertainties. Our actual results could differ materially from those indicated in these forward-looking statements as a result of certain factors, as more fully described in "Risk factors" in Item 1A of this Form 10-K, in this Item 7, and elsewhere in this Form 10-K. Except as may be required by law, we undertake no obligation to update publicly any forward-looking statements for any reason, even if new information becomes available or other events occur in the future.

Overview

Fluidigm improves life by driving meaningful insights in health and disease. Our innovative technologies explore the biological complexities of disease to advance human health through research, diagnostics and clinical applications. We create, manufacture, and market a range of products and services, including instruments, consumables, reagents and software that are used by researchers and clinical labs worldwide. Our customers are leading academic and government laboratories, as well as pharmaceutical, biotechnology, plant and animal research organizations, and clinical laboratories worldwide. Together with our customers, we strive to increase the quality of life for all.

We distribute our systems through our direct sales force and support organizations located in North America, Europe, and Asia-Pacific, and through distributors or sales agents in several European, Latin American, Middle Eastern, and Asia-Pacific countries. Our manufacturing operations are located in Singapore and Canada. Our facility in Singapore manufactures our integrated fluidic circuits (IFCs) as well as our microfluidics instruments, which are assembled by our contract manufacturer located within our Singapore facility. Our mass cytometry instruments, assays and reagents are manufactured at our facility in Canada. In 2021, we manufactured microfluidics reagents in our facilities in Canada and South San Francisco as well as through U.S.-based third-party contract manufacturers for reagent manufacturing.

Our total revenue was $130.6 million in 2021 compared to $138.1 million and $117.2 million in 2020 and 2019, respectively. Product and service revenue was $126.3 million in 2021 compared to $122.5 million and $116.7 million in 2020 and 2019, respectively. We have incurred significant net losses since our inception in 1999 and, as of December 31, 2021, our accumulated deficit was $736.0 million.

Recent Developments

In 2020, we were awarded the NIH Contract under the RADx program to support the expansion of our production capacity and throughput capabilities for COVID-19 testing with our microfluidics technology. As of December 31, 2021, we have achieved the required milestones and have received the total NIH Contract value of $34.0 million. Proceeds from the NIH Contract have been primarily used for capital expenditures to expand production capacity and, to a lesser extent, to offset applicable operating costs. With the funding from the NIH Contract, IFC manufacturing capacity increased from 12,000 IFCs per month to 36,000 IFCs per month in our Singapore facility.

As vaccines and alternative testing options for the coronavirus have become more available and the perceived threat of the pandemic began to recede in 2021, the demand for our COVID-19 testing products slowed, resulting in a corresponding decline in COVID-19 testing revenue in 2021, compared to the third and fourth quarters of 2020. The pandemic also negatively impacted our base business revenue, which excludes COVID-19 related revenue. It is difficult to predict the impact of new strains of the coronavirus on our business or the impact they may have on the research priorities of our customers. For additional information on the various risks posed by the pandemic, refer to Part I, Item 1A- Risk Factors of this Form 10-K.

Global logistics and supply chain disruptions resulted in component delays and supply constraints with some of our suppliers. While some of these issues have been resolved, shortages of certain components have resulted in longer component order lead times to meet future demand. We expect to be able to meet product demand in 2022, but continued supply disruptions of components or materials or our inability to obtain components, materials, or assembly services from alternate sources could impact our ability to meet the ongoing demand of our customers.

On August 2, 2021, the Company amended its Loan and Security Agreement dated as of August 2, 2018, between the Company and Silicon Valley Bank (SVB) (the Amendment). The Amendment extends the maturity date of our $15.0 million revolving credit facility (Revolving Credit Facility) by one year, to August 2, 2023, and also provides for a term loan facility in an aggregate principal amount of $10.0 million (the Term Loan Facility). The stated maturity date of the Term Loan Facility is July 1, 2025, however if, as of June 1, 2024, the principal amount of our convertible debt exceeds $0.6 million or if the maturity date of our 2019 Notes has not been extended beyond January 1, 2026, then the maturity date of the Term Loan Facility will be

on June 1, 2024. There were $6.8 million of advances outstanding under the Revolving Credit Facility at December 31, 2021. The Term Loan Facility was fully drawn as of December 31, 2021.

Strategic Investment Transaction

On January 23, 2022, the Company entered into (i) a Loan Agreement (the Casdin Loan Agreement) with Casdin Private Growth Equity Fund II, L.P. and Casdin Partners Master Fund, L.P. (collectively, Casdin) and (ii) a Loan Agreement (the Viking Loan Agreement, and together with the Casdin Loan Agreement, the Bridge Loan Agreements) with Viking Global Opportunities Illiquid Investments Sub-Master LP and Viking Global Opportunities Drawdown (Aggregator) LP (collectively, Viking and, together with Casdin, the Purchasers and each, a Purchaser). Each Bridge Loan Agreement provides for a $12.5 million term loan to the Company (each, a Bridge Loan and collectively, the Bridge Loans). Subject to approval by the Company's stockholders, upon the issuance of the shares of Series B Preferred Stock (as defined below) pursuant to the Purchase Agreements (as defined below), the Bridge Loans will be automatically converted into a number of shares of Series B-1 Preferred Stock (as defined below) or Series B-2 Preferred Stock (as defined below), as applicable, in accordance with the terms of the Bridge Loan Agreements. The Bridge Loans were fully drawn on January 24, 2022. The proceeds of the Bridge Loans may be used for working capital and general corporate purposes.

Also on January 23, 2022, the Company entered into separate Series B Convertible Preferred Stock Purchase Agreements (the Purchase Agreements) with each of the Purchasers pursuant to which, among other things, at the closing of the transactions contemplated thereby, and on the terms and subject to the conditions set forth therein, including the approval of the Company's stockholders, the Company will issue and sell an aggregate of $225 million of convertible preferred stock, consisting of: (i) 112,500 shares of the Company's Series B-1 Convertible Preferred Stock, par value $0.001 per share (the Series B-1 Preferred Stock), at a purchase price of $1,000.00 per share to Casdin, and (ii) 112,500 shares of the Company's Series B-2 Convertible Preferred Stock, par value $0.001 per share (the Series B-2 Preferred Stock, and together with the Series B-1 Preferred Stock, the Series B Preferred Stock) at a purchase price of $1,000.00 per share to Viking (clauses (i) and (ii), the Preferred Equity Financing, and together with the issuance of shares of Series B Preferred Stock in connection with the conversion of the Bridge Loans, the Private Placement Issuance). The Series B Preferred Stock to be purchased by Casdin and Viking pursuant to the Purchase Agreements is in addition to any Series B Preferred Stock to be issued upon conversion of outstanding amounts under the Bridge Loan Agreements. The proceeds of the Preferred Equity Transactions will be used by the Company for expenses related to the Preferred Equity Transactions, as well as working capital, general corporate purposes and merger and acquisition opportunities that the Company may identify from time to time.

In connection with the Private Placement Issuance, the Company will change its name to "Standard BioTools Inc." and Dr. Michael Egholm will be appointed as the Company's President and Chief Executive Officer and as a member of our Board of Directors (the Board), each occurring upon the closing of the transactions contemplated by the Purchase Agreements (Closing). Dr. Egholm will succeed Chris Linthwaite, who will continue as the Company's Chief Executive Officer until the earlier of the Closing or May 15, 2022.

The Closing is subject to customary closing conditions for a transaction of this nature, including approval by the Company's stockholders of the issuance of the Series B Preferred Stock in connection with the Private Placement Issuance. Each Private Placement Issuance is also conditioned on the substantially contemporaneous consummation of the other Private Placement Issuance.

The Company's Board has called a special meeting to be held on March 25, 2022 (the Special Meeting) to ask the Company's stockholders to consider, vote upon and approve (i) a proposal to amend the Company's Eighth Amended and Restated Certificate of Incorporation (the Charter) to, among other things, increase the number of shares of common stock, par value $0.001 per share, of the Company (Common Stock) that the Company is authorized to issue from two hundred million (200,000,000) shares to four hundred million (400,000,000) shares and to change the Company's name to Standard BioTools Inc. (together, the Charter Amendment Proposal); and (ii) to approve the issuance of (A) the Series B-1 Preferred Stock and the Series B-2 Preferred Stock pursuant to the Purchase Agreements, (B) the Series B-1 Preferred Stock and the Series B-2 Preferred Stock issuable pursuant to the terms of the Bridge Loan Agreements and (C) the Common Stock issuable upon the conversion of the Series B Preferred Stock (clauses (A) through (C), the Private Placement Issuance Proposal). The Private Placement Issuance Proposal is conditioned on the approval of the Charter Amendment Proposal. The Charter Amendment Proposal is conditioned on the approval of the Private Placement Issuance Proposal. If both proposals do not receive the requisite vote for approval, neither the Charter Amendment Proposal nor the Private Placement Issuance Proposal will take effect. The parties have agreed that they will not be obligated to close the Private Placement Issuance if the Charter Amendment Proposal has not been approved at the Special Meeting.

If the Charter Amendment Proposal and the Private Placement Issuance Proposal are not approved by the Company's stockholders at the Special Meeting or the Purchase Agreements otherwise terminated, then the Bridge Loans will become

convertible, at each lender's option, into Common Stock at an initial conversion rate of 352.1126 shares of Common Stock per $1,000 of conversion amount, subject to the cap set forth in the Bridge Loan Agreements. The conversion rate is subject to customary adjustments as set forth in the Bridge Loan Agreements. The Bridge Loans bear interest (i) from and including the effective date of the Bridge Loan Agreements to but excluding March 1, 2022, at 10%, (ii) from and including March 1, 2022 to but excluding June 1, 2022, at 12%, (iii) from and including June 1, 2022 to but excluding September 1, 2022, at 14%, and (iv) from and including September 1, 2022 and thereafter, at 16%. Interest accrues daily and is payable in kind by adding the accrued interest to the outstanding principal amount on the last date of each month. The Bridge Loans mature on the 91st calendar day after the latest maturity date of the loans borrowed under the Company's Loan and Security Agreement, dated as of August 2, 2018, with Silicon Valley Bank, and the principal, together with accrued and unpaid interest, is due on the maturity date.

Going Concern

For this annual report, we performed an assessment to determine whether there are conditions or events, considered in the aggregate, that raise substantial doubt about our ability to continue as a going concern for at least the twelve-month period following the date the financial statements were issued. As of December 31, 2021, we had $29.5 million in cash, cash equivalents and restricted cash. Due to an extended strategic review process related to the pending Private Placement Issuance, we were unable in 2021 to implement certain cash management actions, including potential financing and/or cost reduction initiatives. Further, we have incurred, and expect to continue to incur, negative cash flows in pursuit of our business plans for at least the twelve-month period following the date the financial statements were issued. As a result, we believe that our current level of cash and cash equivalents, together with committed financing facilities, are not sufficient to fund ongoing operations for at least the twelve-month period following the date the financial statements were issued. The existence of these conditions raises substantial doubt about our ability to continue as a going concern for the twelve-month period following the date the financial statements were issued.

Our ability to continue as a going concern is dependent upon our success in obtaining additional equity or debt financing, attaining further operating efficiencies, reducing expenditures and ultimately, generating significant revenue growth. We are evaluating strategies to obtain the required additional funding for future operations including the potential consummation of the $225 million Private Placement Issuance, which is contingent on stockholder approval and satisfaction of customary closing conditions. In the event the proposed investment does not occur, we would need to obtain the required additional funding for future operations from alternative sources. These sources may include, but are not limited to, equity financing, debt or other financing arrangements, and restructuring of operations to grow revenues and decrease expenses. Our plans to raise additional capital, including our ability to consummate the Private Placement Issuance, or take the other actions to address the doubt regarding our ability to continue as a going concern, may not be successful. There can be no assurance that we would be able to obtain additional liquidity when needed or under acceptable terms, if at all. Our financial results discussed below do not include any adjustments related to the recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might be necessary should we be unable to continue as a going concern.

Critical Accounting Policies, Significant Judgments and Estimates

Our consolidated financial statements and the related notes included elsewhere in this Form 10-K are prepared in accordance with accounting principles generally accepted in the United States. The preparation of financial statements in accordance with U.S. GAAP requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions believed to be reasonable, which together form the basis for making judgments about the carrying values of assets and liabilities. We assessed certain accounting matters that generally require consideration of forecasted financial information, including the unknown impact of COVID-19 pandemic. These accounting matters included, but were not limited to, our inventory and related reserves, and the carrying value of goodwill and other long-lived assets. Actual results could differ materially from these estimates and could have a material adverse effect on our consolidated financial statements. The full extent to which the COVID-19 pandemic impacts our business, results of operations and financial condition will depend on numerous evolving factors including, but not limited to, the magnitude and duration of the pandemic, the extent to which it will impact worldwide macroeconomic conditions, including the speed of recovery, and governmental and business reactions to the pandemic.

We believe that the following critical accounting policies involve a greater degree of judgment and complexity than our other accounting policies. Accordingly, these are the policies we believe are the most critical to understanding and evaluating our audited 2021 consolidated financial statements.

Revenue Recognition

We generate revenue primarily from the sale of our products and services. Product revenue is derived from the sale of instruments and consumables, including IFCs, assays and reagents. Service revenue is primarily derived from the sale of instrument service contracts, repairs, installation, training and other specialized product support services. We also generate revenue from product development agreements, license and royalty agreements and grants. Revenue is reported net of any sales, use and value-added taxes we collect from customers as required by government authorities. Research and development cost includes costs associated with development and grant revenue.

We recognize revenue based on the amount of consideration we expect to receive in exchange for the goods and services we transfer to the customer. Our commercial arrangements typically include multiple distinct products and services, and we allocate revenue to these performance obligations based on their relative standalone selling prices. Standalone selling prices (SSP) are generally determined using observable data from recent transactions. In cases where sufficient data is not available, we estimate a product's SSP using a cost plus a margin approach or by applying a discount to the product's list price.

Product Revenue

We recognize product revenue at the point in time when control of the goods passes to the customer and we have an enforceable right to payment. This generally occurs either when the product is shipped from one of our facilities or when it arrives at the customer's facility, based on the contractual terms. Customers generally do not have a unilateral right to return products after delivery. Invoices are generally issued at shipment and generally become due in 30 to 60 days.

Service Revenue

We recognize revenue from repairs, maintenance, installation, training and other specialized product support services at the point in time the work is completed. Installation and training services are generally billed in advance of service. Repairs and other services are generally billed at the point the work is completed.

Revenue associated with instrument service contracts is recognized on a straight-line basis over the life of the agreement, which is generally one to three years. We believe this time-elapsed approach is appropriate for service contracts because we provide services on demand throughout the term of the agreement. Invoices are generally issued in advance of service on a monthly, quarterly, annual or multi-year basis. Payments made in advance of service are reported on our consolidated balance sheet as deferred revenue.

Development Revenue

We have entered and may continue to enter into development agreements with third parties that provide for up-front and periodic milestone payments. Our development agreements may include more than one performance obligation. At the inception of the contract, we assess whether each obligation represents a separate performance obligation or whether such obligations should be combined as a single performance obligation. The transaction price for each development agreement is determined based on the amount of consideration we expect to be entitled to for satisfying all performance obligations within the agreement.

We assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue. In arrangements where we satisfy performance obligation(s) over time, we recognize development revenue using an input method that determines the extent of our progress toward completion by comparing the actual costs incurred to the total expected cost. As part of the accounting for these arrangements, we develop estimates and assumptions that require judgment to determine the transaction price and progress towards completion. We review these estimates at the end of each reporting period using the best available information, revise the estimates as necessary, and recognize revenue commensurate with our progress toward completion.

We may also generate revenue from development or collaboration agreements that do not include upfront or milestone-based payments. For these types of arrangements, we generally recognize revenue over time as the development services are provided.

Other Revenue

Other revenue consists of license revenue, royalty revenue, and grant revenue. We recognize revenue from license agreements when the license is transferred to the customer and the customer is able to use and benefit from the license. For contracts that include sales-based royalties, we recognize revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied.

We receive grants from various entities to perform research and development activities over contractually defined periods. Grant revenue is not accounted for under ASC 606 Revenue from Contracts with Customers, as the grant agreement is not with a customer. As there is no authoritative U.S. GAAP guidance for grants awarded to for-profit entities, we have applied the guidance in ASC 958 Not-for-Profit Entities by analogy. Revenue is generally recognized provided that the conditions under which the grants were provided have been met and any remaining performance obligations are perfunctory.

Product Warranties

We generally provide a one-year warranty on our instruments and establish a liability for the estimated cost of the obligation at the time the product is shipped. We periodically review our warranty liability and record adjustments based on specific terms provided to customers and our overall historical experience with usage. This expense is recorded as a component of cost of product revenue in the consolidated statements of operations.

Significant Judgments

Applying the revenue recognition practices discussed above often requires significant judgment. Significant judgment is required when interpreting commercial terms in sales agreements and determining when control of goods and services passes to the customer. Judgment is also required when identifying performance obligations, estimating SSP and allocating purchase consideration in agreements that include multiple performance obligations. Any material changes created by errors in judgment could have a material effect on our operating results and overall financial condition.

Accounts Receivable, net

Trade accounts receivable are recorded at net invoice value. We review our exposure to accounts receivable and provide allowances of specific amounts if collectability is no longer reasonably assured based on historical experience and specific customer collection issues. We evaluate such allowances on a regular basis and adjust them as needed. Judgment is required in determining the amounts of any such allowances.

Inventories, net

Inventories are stated at the lower of cost (on a first-in, first-out basis) or net realizable value. Inventory costs include direct materials, direct labor, and normal manufacturing overhead. We regularly review inventory for excess and obsolete products and components. Significant judgment is required in determining provisions for slow-moving, excess, and obsolete inventories which are recorded when required to reduce inventory values to their estimated net realizable values based on product life cycle, development plans, product expiration, and quality issues.

Leases

We determine if an arrangement is a lease, or contains a lease, at inception. Operating leases are included in operating lease right-of-use (ROU) assets, net and current and non-current operating lease liabilities in our consolidated balance sheets. ROU assets represent our right-to-use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease ROU assets and liabilities are recognized at the commencement date based on the present value of lease payments over the lease term. As most of our leases do not provide an implicit rate, we generally use our incremental borrowing rate based on the estimated rate of interest for collateralized borrowing over a similar term of the lease payments at commencement date. Significant judgment is required in determining the incremental collateralized borrowing rate. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

We elected the short-term lease recognition exemption for all leases that qualify. For those leases that qualify, we will not recognize ROU assets or lease liabilities for leases with an initial lease term of one year or less. We also elected not to separate lease and nonlease components for our building leases. The nonlease components are generally variable in nature and are expected to represent most of our variable lease costs. Variable costs are expensed as incurred. We have taken a portfolio approach for our vehicle leases by country.

Business Combinations, Goodwill, Intangible Assets and Other Long-Lived Assets

We have completed acquisitions of businesses in the past and may acquire additional businesses or technologies in the future. The results of businesses acquired in a business combination are included in our consolidated financial statements from the date of acquisition. We allocate the purchase price, which is the sum of the consideration provided in a business combination, to the identifiable assets and liabilities of the acquired business at their acquisition date fair values. Determining the fair value of assets acquired and liabilities assumed requires management to use significant judgment and estimates, including the selection of valuation methodologies and estimates of future revenue.

Goodwill, which has an indefinite useful life, represents the excess of cost over fair value of net assets acquired. Our intangible assets include developed technology, patents and licenses. The cost of identifiable intangible assets with finite lives is generally amortized on a straight-line basis over the assets' respective estimated useful lives. Judgment is needed to assess the factors that could indicate an impairment of our intangible assets.

Goodwill and intangible assets with indefinite lives are not subject to amortization but are tested for impairment on an annual basis during the fourth quarter or whenever events or changes in circumstances indicate the carrying amount of these assets may not be recoverable. Events or changes in circumstances that could affect the likelihood that we will be required to recognize an impairment charge include, but are not limited to, declines in our stock price or market capitalization, economic downturns and other macroeconomic events, including the current COVID-19 pandemic, declines in our market share or revenues, and an increase in our losses, rapid changes in technology, failure to achieve the benefits of capacity increases and utilization, significant litigation arising out of an acquisition, or other matters. Any impairment charges could have a material adverse effect on our operating results and net asset value in the quarter in which we recognize the impairment charge.

In evaluating our goodwill and intangible assets with indefinite lives for indications of impairment, we first conduct an assessment of qualitative factors to determine whether it is more likely than not that the fair value of our reporting unit is less than its carrying amount. If we determine that it is more likely than not that the fair value of our reporting unit is less than its carrying amount, we compare the fair value of our reporting unit to its carrying value. If the fair value of our reporting unit exceeds its carrying value, goodwill is not considered impaired and no further analysis is required. If the carrying value of the reporting unit exceeds its fair value, then an impairment loss equal to the difference would be recorded to goodwill. We did not recognize any impairment of goodwill for any of the periods presented herein.

We evaluate our long-lived assets, including finite-lived intangibles, for indicators of possible impairment when events or changes in circumstances indicate the carrying amount of an asset may not be recoverable. If any indicator of impairment exists, we assess the recoverability of the affected long-lived assets by determining whether the carrying value of the asset can be recovered through undiscounted future operating cash flows. If impairment is indicated, we estimate the asset's fair value using future discounted cash flows associated with the use of the asset and adjust the carrying value of the asset accordingly. We did not recognize any impairment of intangibles for 2021 or 2020. In 2019, we recognized an impairment charge of $0.4 million on patents and licenses that were not used in the current products and were not expected to be used in future product offerings.

Deferred Grant Income

In September 2020, we executed a definitive contract with the National Institutes of Health (NIH) for a project under the NIH Rapid Acceleration of Diagnostics (RADx) program. The definitive contract, which amended the letter contract we entered into with NIH in July 2020 (collectively the NIH Contract), has a total value of up to $34.0 million upon the achievement of certain milestones, which were achieved and accepted by the NIH as of December 31, 2021. Proceeds from the NIH Contract have been and will be used primarily to expand production capacity and throughput capabilities.

Accounting for the NIH Contract does not fall under ASC 606, Revenue from Contracts with Customers, as the NIH will not benefit directly from our expansion or product development. As there is no authoritative guidance under U.S. GAAP on accounting for government assistance to for-profit business entities, we applied International Accounting Standards (IAS) 20, Accounting for Government Grants and Disclosure of Government Assistance, by analogy when accounting for the NIH Contract payments to Fluidigm.

The NIH Contract proceeds used for production capacity expansion meet the definition of grants related to assets as the primary purpose for the payments is to fund the purchase and construction of capital assets to scale up production capacity. Under IAS 20, government grants related to assets are presented in the statement of financial position either by setting up the grant as deferred income or by deducting the grant in arriving at the carrying amount of the asset. Either of these two methods of presentation of grants related to assets in financial statements are regarded as acceptable alternatives under IAS 20. We have elected to record the grants received as deferred income using the first method.

Under IAS 20, grant proceeds are recognized when there is reasonable assurance the conditions of the grant will be met and the grant will be received. With the NIH Contract, this occurred when either each milestone was accepted by NIH or management concluded the conditions of the grant were substantially met. Deferred grant income related to production capacity expansion is being amortized over the period of depreciation for the related assets as a reduction of depreciation expense. Grant income related to reimbursement of operating costs is recorded as a reduction of those expenses incurred to date. Grant proceeds that exceed the cost of the capital expenditures and expenses expected to be incurred are recorded in other non-operating income.

Term Loan, net

On August 2, 2021, we entered into a Fourth Agreement to our Loan and Security Agreement (the Amendment) with Silicon Valley Bank. The Amendment extended the maturity date of our $15.0 million Revolving Credit Facility by one year, to August 2, 2023, and provided for a term loan facility in an aggregate principal amount up to $10.0 million (Term Loan Facility). As of December 31, 2021, the Term Loan Facility was fully drawn. Interest is payable monthly and principal balances are required to be repaid in 24 equal monthly installments beginning on August 1, 2023. In addition, a final payment equal to 6.5% of the original principal amount of each advance is due on the earlier of the maturity date or the date the advance is repaid. The final payment is being accreted to the carrying value of the term loan through the expected maturity of July 1, 2025 using the effective interest method. Debt issuance costs were recorded as an offset to the carrying value of the loan and are amortized over the expected term using the effective interest method. The carrying value of the term loan includes the outstanding principal amount and the cumulative accreted final payment, less unamortized debt issuance costs. Amortization of the debt issuance costs and accretion of the final payment are reflected in interest expense.

Convertible Notes, net

In February 2014, we closed an underwritten public offering of $201.3 million aggregate principal amount of our 2.75% Senior Convertible Notes due 2034 (2014 Notes). In March 2018, we entered into separate privately negotiated transactions with certain holders of our 2014 Notes to exchange $150.0 million in aggregate principal amount of the 2014 Notes for our 2.75% Exchange Convertible Senior Notes due 2034 (2018 Notes). In the first quarter of 2019, the 2018 Notes were converted into 19.5 million shares of our common stock and the 2018 Notes were retired. We recorded a loss of $9.0 million on the retirement of the 2018 Notes at conversion in the first quarter of 2019. We determined the fair value of the 2018 Notes using valuation techniques that required us to make assumptions related to the implied discount rate.

In November 2019, we closed a private placement for $55.0 million aggregate principal amount of our 5.25% Senior Convertible Notes due 2024 (2019 Notes). The majority of the issuance proceeds were used to retire approximately $50.2 million of aggregate principal amount of our 2014 Notes. We recorded a loss of $3.0 million on the extinguishment of the 2014 Notes in the fourth quarter of 2019. This amount represented the difference between the fair value of the 2019 Notes used to extinguish the debt and the carrying value of the 2014 Notes, including unamortized debt issuance costs.

As provided by the indenture governing the 2014 Notes, in February 2021, holders of $0.5 million of the 2014 Notes required us to repurchase their notes at 100% of the principal amount plus accrued and unpaid interest. We recorded a loss of $9 thousand on the extinguishment of those notes, representing the difference between the price paid to extinguish the 2014 Notes and their carrying value, including unamortized debt issuance costs.

Offering-related costs, including underwriting costs, on the 2014 Notes and 2019 Notes were capitalized as debt issuance costs, recorded as an offset to the carrying value of the related Notes, and are amortized over the expected term of the related Notes using the effective interest method.

Stock-Based Compensation

Our board of directors sets the terms, conditions, and restrictions related to our Employee Stock Purchase Plan (ESPP) and the grant of stock options, restricted share units (RSUs) and performance-based awards (PSUs) under our various stock-based plans. Our board of directors determines the number of awards to grant and sets the vesting criteria. For PSUs, our board of directors sets the performance objectives and other vesting provisions in determining the number of shares or value of performance units and performance shares that will be paid out. Such payout will be a function of the extent to which performance objectives or other vesting provisions have been achieved.

We recognize compensation costs for all stock-based awards, including stock options, RSUs, PSUs and stock purchased under our ESPP, based on the grant date fair value of the award. We recognize stock-based compensation expense on a straight-line basis over the requisite service periods for non-performance-based awards. For RSUs, fair value is measured based on the closing fair market value of our common stock on the date of grant. For PSUs with a market condition, we use a Monte Carlo simulation pricing model to incorporate the market condition effects at our grant date. The Monte Carlo pricing model requires inputs which are subjective and generally requires judgment by us. For PSUs with performance conditions, stock-based compensation expense is recognized over the requisite service period when the achievement of each individual performance goal becomes probable.

The fair value of options and stock purchases under ESPP on the grant date is estimated using the Black-Scholes option-pricing model, which requires the use of certain subjective assumptions, including expected term, volatility, risk-free interest rate and the fair value of our common stock. These assumptions generally require judgment. We determine the expected volatility based on our historical stock price volatility generally commensurate with the estimated expected term of the stock awards. The expected term of an award is based on historical forfeiture experience, exercise activity, and the terms and

conditions of the stock awards. The risk-free interest rate is based on the U.S. Treasury yield in effect at the time of grant for zero coupon U.S. Treasury notes with maturities approximately equal to each grant's expected term. We account for forfeitures as they occur.

Income Taxes

We use the asset and liability method to account for income taxes. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to temporary differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. Valuation allowances are provided when the expected realization of deferred tax assets does not meet a "more likely than not" criterion. We make estimates and judgments about our future taxable income that are based on assumptions that are consistent with our plans and estimates. Should the actual amounts differ from our estimates, the amount of our valuation allowance could be materially impacted. Changes in these estimates may result in significant increases or decreases to our tax provision in a period in which such estimates are changed, which in turn would affect net income or loss.

We recognize the financial statement effects of a tax position when it is more likely than not, based on the technical merits, that the position will be sustained upon examination. Any interest and penalties related to uncertain tax positions are reflected in the income tax provision.

Recent Accounting Changes and Accounting Pronouncements

Adoption of New Accounting Guidance

In November 2019, the FASB issued ASU 2019-12-Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes. The amendments in this update improve consistent application of and simplify U.S. GAAP for Topic 740 by clarifying and amending existing guidance for, among other items, intra-period allocation, reporting tax law changes and losses in interim periods, state and local taxes not fully based on income and recognition of deferred tax liability related to certain transactions. There is also new guidance related to consolidated group reporting and tax impacts resulting from business combinations. The new guidance is effective for fiscal years beginning after December 15, 2020. The adoption of the new guidance did not have a significant impact on our financial results.

Recent Accounting Pronouncements

In August 2020, the FASB issued ASU 2020-06 Debt-Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging-Contracts in Entity's Own Equity (Subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity's Own Equity. The amendments in this update reduce the number of accounting models for convertible instruments and allows more contracts to qualify for equity classification, which is expected to result in more convertible instruments being accounted for as a single unit, rather than being bifurcated between debt and equity. The new guidance is effective for fiscal years beginning after December 15, 2021. The adoption of the new guidance is not expected to have a significant impact on our financial results.

In November 2021, the FASB issued ASU 2021-10-Government Assistance (Topic 832): Disclosures by Business Entities about Government Assistance. The amendment is effective for annual periods beginning after December 15, 2021. The amendment establishes financial disclosure requirements for business entities that receive government assistance that they account for by analogizing to a grant or contribution model because there is no specific authoritative guidance under U.S. GAAP that applies to the transaction. Entities that receive this type of assistance should include the following information in their annual report: (1) the nature of the transaction, (2) the significant terms and conditions, (3) the accounting treatment, (4) the line items on the balance sheet and income statement that are affected along with (5) the respective amounts that have been recorded. We are currently evaluating the impact the new standard will have on the disclosures included in our consolidated financial statements.

Results of Operations

The following table presents our historical consolidated statements of operations data for the years ended December 31, 2021, 2020, and 2019, and as a percentage of total revenue for the respective years (in thousands):

	Year Ended December 31,					
	2021		2020		2019	
Revenue:						
Total revenue	$ 130,581	100 %	$ 138,144	100 %	$ 117,243	100
Costs and expenses:						
Cost of product revenue	53,315	41	47,527	34	45,461	39
Cost of service revenue	7,893	6	7,291	5	7,503	6
Research and development	37,944	29	36,461	26	31,640	27
Selling, general and administrative	98,888	76	97,901	71	84,478	72
Total costs and expenses	198,040	152	189,180	136	169,082	144
Loss from operations	(67,459)	(52)	(51,036)	(36)	(51,839)	(44)
Interest expense	(3,823)	(3)	(3,572)	(3)	(4,279)	(4)
Surplus funding from NIH Contract	7,140	7	—	—	—	—
Loss from extinguishment of debt	(9)	—	—	—	(12,020)	(10)
Other income, net	491	—	507	—	1,433	1
Loss before income taxes	(63,660)	(48)	(54,101)	(39)	(66,705)	(57)
Income tax benefit	4,423	3	1,081	1	1,915	2
Net loss	$ (59,237)	(45) %	$ (53,020)	(38) %	$ (64,790)	(55)

Revenue

We generate revenue primarily from the sale of our products and services and by entering into product development agreements, license and royalty agreements, and grants. Our product revenue consists of sales of instruments and consumables. Consumables revenue is largely driven by the size of our installed base of instruments and the annual level of pull-through per instrument. Service revenue is linked to the sales and active installed base of our instruments as our service revenue primarily consists of post-warranty service contracts, preventive maintenance plans, instrument parts, installation and training. We sell our products to leading academic and government laboratories, as well as pharmaceutical, biotechnology, clinical, plant and animal research organizations and clinical laboratories worldwide.

Development Revenue. Effective March 31, 2020, we signed an OEM Supply and Development Agreement (Development Agreement) with a customer. Under the Development Agreement, Fluidigm developed products based on its microfluidics technology. The Development Agreement provided up-front and periodic milestone payments during the development stage, which was completed in the third quarter of 2021, and on-going annual payments of $0.4 million for sustaining efforts. We recognized $2.6 million and $8.8 million of development revenue from the agreement for the years ended December 31, 2021 and 2020, respectively. Costs associated with the Development Agreement were recorded in research and development expense in the consolidated statement of operations.

Grant Revenue. We receive grants to perform research and development activities over contractually defined periods. Grant revenue is attributable to a grant agreement entered into in the second half of 2019, which was completed in the third quarter of 2021. Costs associated with the arrangement were recorded in research and development expense in the consolidated statement of operations.

License Revenue. In March 2020, we entered into an agreement to settle intellectual property infringement claims and received a $3.5 million payment in exchange for a perpetual license to certain of our intellectual property. The settlement was accounted for as a multi-element arrangement. Accordingly, $3.1 million of the proceeds was recognized in 2020 as license revenue and $0.4 million was offset against legal costs.

No single customer represented more than 10% of our total revenue for 2021 and 2020. Revenue from our five largest customers was 23% for both the years ended December 31, 2021 and 2020, respectively.

The following table presents our revenue by source for the years ended December 31, 2021, 2020, and 2019, and as a percentage of total revenue for the respective years (in thousands):

	Year Ended December 31,									Change		
	2021			2020			2019			2021		2020
Revenue:												
Instruments	$ 42,498	33	%	$ 45,536	33	%	$ 50,004	43	%	(7)	%	(9)
Consumables	57,878	44		54,408	39		45,412	39		6	%	20
Product revenue	100,376	77		99,944	72		95,416	82		—	%	5
Service revenue	25,917	20		22,579	16		21,277	18		15	%	6
Product and service revenue	126,293	97		122,523	88		116,693	100		3	%	5
Development revenue	2,559	2		8,865	6		—	—		(71)	%	N
Grant revenue	1,582	1		3,593	3		550	—		(56)	%	553
License revenue	147	—		3,163	3		—	—		(95)	%	N
Total revenue	$ 130,581	100	%	$ 138,144	100	%	$ 117,243	100	%	(5)	%	18

The following table presents our total revenue by geographic area of our customers and as a percentage of total revenue for each year presented (in thousands):

	Year Ended December 31,						Change	
	2021		2020		2019		2021	2020
Americas	$ 63,877	49 %	$ 74,586	54 %	$ 47,016	40 %	(14)%	59 %
EMEA	42,722	33	37,776	27	40,024	34	13 %	(6)%
Asia-Pacific	23,982	18	25,782	19	30,203	26	(7)%	(15)%
Total revenue	$ 130,581	100 %	$138,144	100 %	$117,243	100 %	(5)%	18 %

The Americas revenue includes revenue generated in the United States of $60.2 million, $72.0 million, and $43.4 million for 2021, 2020 and 2019, respectively. Asia-Pacific revenue includes sales to customers in China of $12.5 million, $11.1 million and $15.4 million for 2021, 2020 and 2019, respectively. There was no foreign country or jurisdiction with sales in excess of 10% of total revenue in 2021, 2020, and 2019, except for China in 2019.

The following section includes management discussion and analysis for the fiscal year ended December 31, 2021. Refer to Part I Item 7 of the Annual Report on Form 10-K for the fiscal year ended December 31, 2020 filed with the SEC on February 25, 2021, for a discussion of the comparative results for 2020 and 2019, which discussion of comparative results is incorporated by reference into this Form 10-K.

Total Revenue. Total revenue decreased by $7.6 million, or 5%, for the twelve months ended December 31, 2021, compared to the twelve months ended December 31, 2020, driven primarily by lower development, grant and license revenue, partially offset by higher service revenue. Product revenue was essentially unchanged year over year.

Americas revenue declined by $10.7 million, or 14%, for the twelve months ended December 31, 2021, compared to the twelve months ended December 31, 2020, driven by lower development, grant and license revenue, and lower unit sales of instruments, partially offset by higher consumables and service revenue. The decline in instrument revenue in 2021 is attributable to reduced demand for the analytical test instruments used in COVID-19 test applications following the initial wave of investments by testing laboratories in 2020. The reduction in development revenue and grant revenue reflects the completion of the underlying contracts in 2021 and the associated deceleration of project activity. The reduction in license revenue is attributable to the non-recurring nature of the 2020 settlement agreement discussed above. In Asia-Pacific, revenue decreased by $1.8 million, or 7%, primarily due to lower unit sales of mass cytometry instruments, partially offset by increased microfluidics consumable revenues. EMEA revenue increased by $4.9 million, or 13%, primarily driven by higher unit sales of mass cytometry instruments. A weaker U.S. dollar contributed 2.6 percentage points of the 13 percentage point increase in EMEA revenue in 2021. Changes in foreign exchange rates increased total company revenues by 0.7 percentage points for the year ended December 31, 2021, compared to the year ended December 31, 2020.

Product and Service Revenue

The following tables present the split of product and service revenue between mass cytometry and microfluidic product categories and as a percentage of the respective category's total product and service revenue for each year presented (in thousands):

	Year Ended December 31,						Change	
	2021		2020		2019		2021	2020
Mass cytometry:								
Instruments	$ 29,964	44 %	$ 28,484	46 %	$ 41,575	57 %	5 %	(31) %
Consumables	18,960	28	18,023	29	17,850	24	5 %	1 %
Total product revenue	48,924	72	46,507	75	59,425	81	5 %	(22) %
Service revenue	18,733	28	15,625	25	13,895	19	20 %	12 %
Total product and service revenue	$ 67,657	100 %	$ 62,132	100 %	$ 73,320	100 %	9 %	(15) %

	Year Ended December 31,						Change	
	2021		2020		2019		2021	2020
Microfluidics:								
Instruments	$ 12,534	21 %	$ 17,053	28 %	$ 8,429	19 %	(26) %	102 %
Consumables	38,918	67	36,384	60	27,562	64	7 %	32 %
Total product revenue	51,452	88	53,437	88	35,991	83	(4) %	48 %
Service revenue	7,184	12	6,954	12	7,382	17	3 %	(6) %
Total product and service revenue	$ 58,636	100 %	$ 60,391	100 %	$ 43,373	100 %	(3) %	39 %

Mass cytometry product and service revenue increased $5.5 million, or 9%, for the twelve months ended December 31, 2021, compared to the twelve months ended December 31, 2020. Product revenue increased $2.4 million, or 5%, primarily due to sales of the new CyTOF XT system, which was launched in May 2021, along with growth in our imaging platforms, partially offset by lower Helios sales. Lower average unit selling prices partially offset the increased unit volume of mass cytometry instruments by $4.3 million. Service revenue increased $3.1 million, or 20%, year over year, driven by the growing number of service contracts and mass cytometry instrument installations.

Microfluidics product and service revenue decreased $1.8 million, or 3%, during the twelve months ended December 31, 2021 compared to the twelve months ended December 31, 2020. The decline in 2021 is attributable to lower COVID-19 testing revenue, primarily lower instrument revenue. Excluding COVID-19 related revenue, base microfluidics product and service revenue increased $6.7 million, or 18%, due to the launch of our OEM instrument and higher consumables revenue.

We expect the average selling prices of our products to fluctuate over time based on market conditions, product mix, and currency fluctuations.

Product and Service Cost, Product and Service Gross Profit, and Product and Service Margin

Cost of product revenue includes manufacturing costs incurred in the production process, including component materials, labor and overhead, installation, packaging, and delivery costs. In addition, cost of product revenue includes amortization of developed technology and intangibles, royalty costs for licensed technologies included in our products, warranty, provisions for slow-moving and obsolete inventory, and stock-based compensation expense. Our cost of product revenue and related product margin may fluctuate depending on the capacity utilization of our manufacturing facilities in response to market conditions and the demand for our products.

Cost of service revenue includes direct labor hours, overhead, and instrument parts. Our cost of service revenue and related service margin may fluctuate depending on the variability in material and labor costs of servicing instruments.

The following table presents our product and service cost, product and service gross profit, and product and service margin for each year presented (in thousands):

	Year Ended December 31,			Change	Change
	2021	2020	2019	2021	2020
Cost of product revenue	$ 53,315	$ 47,527	$ 45,461	12 %	5 %
Cost of service revenue	7,893	7,291	7,503	8 %	(3)%
Cost of product and service revenue	$ 61,208	$ 54,818	$ 52,964	12 %	4 %
Product and service gross profit	$ 65,085	$ 67,705	$ 63,729	(4)%	6 %
Product and service margin	51.5 %	55.3 %	54.6 %	(3.8) ppts.	0.7 ppts.

Product and service margin decreased by 3.8 percentage points for the year ended December 31, 2021 compared to the year ended December 31, 2020. Product and service margins were impacted by lower average selling prices for mass cytometry instruments, unfavorable product mix from sales of our OEM instrument and lower COVID-19 consumables sales, and the absence of COVID-19 related government subsidies.

Operating Expenses

The following table presents our operating expenses for each year presented (in thousands):

	Year Ended December 31,			Change	
	2021	2020	2019	2021	2020
Research and development	$ 37,944	$ 36,461	$ 31,640	4 %	15
Selling, general and administrative	98,888	97,901	84,478	1 %	16
Total operating expenses	$ 136,832	$ 134,362	$ 116,118	2 %	16

Research and Development

Research and development expense consists primarily of compensation-related costs, product development and material expenses, and other allocated facilities and information technology expenses. Our research and development efforts have focused primarily on enhancing our technologies and supporting development and commercialization of new and existing products and services. Research and development expense also includes costs incurred in conjunction with research grants and development arrangements. We have made substantial investments in research and development since our inception and expect to continue to do so.

Research and development expense increased by $1.5 million, or 4%, to $37.9 million for 2021 compared to $36.5 million for 2020. Salaries and benefit costs increased primarily due to the absence of 2020 temporary salary reductions and COVID-19 related government subsidies, as well as higher headcount and merit increases, partially offset by lower variable employee compensation. Consulting costs increased by $0.8 million due to projects related to development agreements and grants.

Selling, General and Administrative

Selling, general and administrative expense consists primarily of personnel costs for our sales and marketing, business development, finance, legal, human resources, information technology, and general management, as well as professional services, such as legal and accounting services.

Selling, general and administrative expense increased by $1.0 million, or 1%, to $98.9 million for 2021 compared to $97.9 million for 2020. Marketing expenses increased $2.8 million primarily due to marketing campaigns and market research to support new product launches. Sales expenses increased $1.9 million driven by higher compensation and benefits as well as higher travel as we returned to more normal pre-COVID-19 pandemic spending levels. Partially offsetting these increases were lower general and administrative costs. General and administrative expenses fell primarily due to lower variable compensation and lower litigation costs.

Interest Expense and Other Non-Operating Items

The following table presents these items for each year presented (in thousands):

	Year Ended December 31,			Change	
	2021	2020	2019	2021	2020
Interest expense	$ (3,823)	$ (3,572)	$ (4,279)	(7)%	17 %
Surplus funding from NIH Contract	7,140	—	—	NA	NA
Loss from extinguishment of debt	(9)	—	(12,020)	NA	(100)%
Other income, net	491	507	1,433	3 %	65 %
Total	$ 3,799	$ (3,065)	$ (14,866)	224 %	79 %

The increase in interest expense for the twelve months ended December 31, 2021 compared to the twelve months ended December 31, 2020 is due to the $10.0 million Term Loans which commenced in August 2021.

In 2021, we recognized $7.1 million of proceeds under the NIH Contract in excess of amounts expected to be spent for capital expenditures and operating expenses.

In February 2021, as provided by the indenture governing the 2014 Notes, holders of $0.5 million of the 2014 Notes required us to repurchase their notes at 100% of the principal amount plus accrued and unpaid interest. We recorded a loss of $9 thousand on the extinguishment of those notes, representing the difference between the price paid to extinguish the 2014 Notes and their carrying value, including unamortized debt issuance costs.

Other income, net primarily consists of interest income and gains or losses on foreign exchange. Other income, net, of $0.5 million for 2021 is primarily attributable to the settlement of claims, partially offset by $0.2 million of foreign exchange losses.

Income Tax Benefit

Our tax provision is generally driven by three components: (i) tax provision from our foreign operations, (ii) tax benefits from the amortization of acquisition-related intangible assets, and (iii) discrete items, such as changes in valuation allowances or adjustments upon finalization of tax returns. Depending on the relative value of these components, we can have either a tax benefit or expense for any given period.

We recorded a tax benefit of $4.4 million, or an effective tax rate benefit of 6.9%, for the year ended December 31, 2021 compared to a tax benefit of $1.1 million, or an effective tax rate benefit of 2.0%, for the year ended December 31, 2020. The tax benefit in both years was principally due to the tax benefit from the amortization of our acquisition-related deferred tax liabilities of $3.1 million. The increased benefit in 2021 compared to 2020 was due to lower current year profits and increased tax benefits on capital expenditures and research activities in certain of our foreign operations, as well as adjustments related to the finalization of 2020 tax returns.

Liquidity, Capital Resources and Going Concern

Sources of Liquidity

As of December 31, 2021, our principal sources of liquidity consisted of $28.5 million of cash and cash equivalents, as well as $1.0 million of restricted cash. The borrowing base under our Revolving Credit Facility was $9.4 million. With advances outstanding of $6.8 million, availability under the Revolving Credit Facility was $2.5 million as of December 31, 2021.

Purchase obligations consist of contractual and legally binding commitments to purchase goods and services. The majority of our contracts are cancellable with little or no notice or penalty. However, once a vendor has incurred costs to fulfill a contract with us, and which costs cannot be otherwise deployed, we are liable for those costs upon cancellation. For example, if a supplier has purchased raw materials to produce a good for us, and those goods cannot be returned or otherwise used by our vendor, we are obligated to reimburse them for the costs they incurred. These include purchase commitments with our contract manufacturers and suppliers. As of December 31, 2021, these purchase commitments totaled $20.4 million. In addition, we have certain non-cancellable commitments with service providers that are not material in the aggregate. As of December 31, 2021, we had contractual purchase commitments for capital expenditures of $1.6 million for 2022, and we expect our total capital expenditures to be above that amount.

We have additional obligations as part of our ordinary course of business, beyond those committed for capital expenditures and other purchase obligations and commitments for purchases of goods and services. For example, see Note 9 Debt within our

consolidated financial statements for information about our short-term and long-term debt obligations and see Note 10 Leases within our consolidated financial statements for information about our lease obligations. Note 17 Commitments and Contingencies within our consolidated financial statements included elsewhere in this Annual Report contains information about our various contractual and legally binding purchase commitments to purchase goods and services discussed above. The expected timing of payments of our obligations is estimated based on current information. Timing of payments and actual amounts paid may be different, depending on the timing of receipt of goods or services, or changes to agreed-upon amounts for some obligations. In addition, some of our future purchasing needs are not current contractual obligations and are therefore not included in the amounts above. For example, some of these requirements are not handled through binding contracts or are fulfilled by vendors on a purchase order basis within short time horizons.

We have entered into several license and patent agreements. Under these agreements, we pay annual license maintenance fees, non-refundable license issuance fees, and royalties as a percentage of net sales for the sale or sublicense of products using the licensed technology. Future payments related to these license agreements have not been included in the contractual obligations table above as the period of time over which the future license payments will be required to be made, and the amount of such payments, are indeterminable. We do not expect the license payments to be material in any particular year.

The following table presents our cash flow summary for each year presented (in thousands):

	Year Ended December 31,		
	2021	2020	2019
Cash flow summary:			
Net cash used in operating activities	$ (44,061)	$ (15,417)	$ (35,210)
Net cash provided by (used in) investing activities	(11,946)	39,975	(39,301)
Net cash provided by financing activities	15,959	20,857	2,790
Effect of foreign exchange rate fluctuations on cash and cash equivalents	(21)	385	56
Net increase (decrease) in cash, cash equivalents and restricted cash	$ (40,069)	$ 45,800	$ (71,665)

Net Cash Used in Operating Activities. We derive cash flows from operations primarily from cash collected from the sale of our products and services, license agreements and grants. Our cash flows from operating activities are also significantly influenced by our use of cash for operating expenses and working capital to support the business. We have historically experienced negative cash flows from operating activities as we have expanded our business and built our infrastructure domestically and internationally.

Net cash used in operating activities in 2021 was $44.1 million and consisted of net loss of $59.2 million, less non-cash items of $35.1 million and cash used in assets and liabilities, net, of $19.9 million. Non-cash items included stock-based compensation expense and depreciation and amortization. The cash used in assets and liabilities, net was primarily attributable to a reduction of accrued compensation and liabilities of $8.7 million from bonus payments made in the first quarter of 2021, and an increase in inventories, net of $4.8 million.

Net cash used in operating activities in 2020 was $15.4 million and consisted of net loss of $53.0 million less non-cash adjustments of $35.2 million, and a net cash provided by assets and liabilities of $2.4 million. Increases in inventories, net and accounts receivable, net balances represent working capital increases due to higher revenues were more than offset by higher incentive compensation and other accruals.

Net cash used in operating activities in 2019 was $35.2 million and consisted of net loss of $64.8 million less non-cash adjustments of $43.2 million, and a net cash used in assets and liabilities of $13.6 million. Non-cash items primarily included a loss from extinguishment of debt of $12.0 million as well as stock-based compensation and depreciation and amortization. The net increase in assets and liabilities was primarily due to lower accrued liabilities for retention bonuses and other variable compensation.

Net Cash Provided by (Used in) Investing Activities. Our primary investing activities consist of purchases, sales, and maturities of our short-term investments and capital expenditures for manufacturing, laboratory, computer equipment and software to support our infrastructure and workforce. We expect to continue to incur costs for capital expenditures to improve manufacturing efficiencies and strengthen information technology and network security. However, we may choose to decrease or defer certain capital expenditures and development activities, while further optimizing our organization.

Net cash used in investing activities in 2021 was $11.9 million. Capital expenditures of $13.3 million were incurred primarily to expand our microfluidics IFC production capacity in Singapore related to the NIH Contract. Total proceeds from the NIH Contract were $8.6 million in 2021, of which $1.3 million is expected to be used for the Singapore facility expansion.

Net cash provided by investing activities in 2020 was $40.0 million and includes $36.8 million of proceeds from the sales and maturities of investments as well as $21.0 million of proceeds from the NIH Contract, reflecting the portion of the proceeds from the NIH Contract attributable to the capacity expansion. These inflows were partially offset by capital expenditures of $12.7 million, including $10.2 million of capital expenditures funded by the NIH Contract to expand our Singapore manufacturing facility, and $5.2 million of net cash paid for the InstruNor acquisition. Total proceeds from the NIH Contract received were $25.4 million in 2020.

Net cash used in investing activities in 2019 was $39.3 million, which included purchases of investments of $62.4 million and capital expenditures of $2.5 million to support our commercial and manufacturing operations, partially offset by proceeds from maturities of investments of $25.6 million.

Net Cash Provided by Financing Activities. Net cash provided by financing activities totaled $16.0 million in 2021. The principal sources of cash were $10.0 million of advances drawn against our new Term Loan Facility with Silicon Valley Bank, advances under the revolving credit agreement of $6.8 million, and $1.3 million of ESPP proceeds. Partially offsetting these sources was $1.8 million of withholding tax payments related to net share settlement of equity awards and the $0.5 million repurchase of 2014 Notes in February 2021.

We generated cash from financing activities of $20.9 million during 2020. Proceeds from our ATM equity offering were $20.1 million, net of commissions and offering costs. Proceeds from our ESPP program and stock options exercises were largely offset by payments of debt issuance costs and income tax withholding related to net share settlement of equity awards.

We generated cash from financing activities of $2.8 million during 2019. $51.8 million of proceeds from a new $55.0 million debt issuance were used to retire 2014 Notes, as discussed below in more detail. Payments of debt and equity issuance costs of $1.9 million were partially offset by cash inflows from equity programs.

Capital Resources and Going Concern

At December 31, 2021 and December 31, 2020, our working capital, excluding deferred revenues, current, and deferred grant income, current and restricted cash, was $38.0 million and $79.8 million, respectively, including cash and cash equivalents of $28.5 million and $68.5 million, respectively. We had no short-term investments at December 31, 2021 and December 31, 2020.

In February 2014, we closed an underwritten public offering of our 2014 Notes. Pursuant to the Indenture governing the 2014 Notes, holders of the 2014 Notes have the right, subject to certain conditions specified in such indenture, to require the Company to repurchase all or a portion of their 2014 Notes on each of February 6, 2021, February 6, 2024, and February 6, 2029, at a repurchase price in cash equal to 100% of the principal amount of the 2014 Notes plus accrued and unpaid interest. On February 6, 2021, holders of $0.5 million of the 2014 Notes caused us to repurchase their notes in accordance with this provision leaving $0.6 million of 2014 Notes outstanding at December 31, 2021.

In November 2019, we closed a private placement to qualified institutional buyers pursuant to Rule 144A under the Securities Act of $55.0 million aggregate principal amount of our 2019 Notes. The 2019 Notes bear interest at 5.25% per annum, payable semiannually on June 1 and December 1 of each year, beginning on June 1, 2020. The Notes will mature on December 1, 2024, unless earlier repurchased or converted pursuant to their terms. The 2019 Notes will be convertible at the option of the holder at any point prior to close of business on the second scheduled trading day preceding the maturity date. The initial conversion rate of the 2019 Notes is 344.8276 shares of the Company’s common stock per $1,000 principal amount of 2019 Notes (which is equivalent to an initial conversion price of $2.90 per share). The conversion rate will be subject to adjustment upon the occurrence of certain specified events but will not be adjusted for any accrued and unpaid interest.

The 2019 Notes will also be convertible at our option upon certain conditions in accordance with the terms of the indenture governing the 2019 Notes. On or after December 1, 2021 to December 1, 2022, if the price of the Company’s common stock has equaled or exceeded 150% of the Conversion Price (as defined in the indenture, currently $2.90, subject to adjustment) for a specified number of days (Issuer’s Conversion Option), we may, at our option, elect to convert the 2019 Notes in whole but not in part into shares of the Company, determined in accordance with the terms of the indenture. On or after December 1, 2022, if the price of the Company’s common stock has equaled or exceeded 130% of the Conversion Price then in effect for a specified number of days, we may, at our option, elect to convert the 2019 Notes in whole but not in part into shares of the Company, determined in accordance with the terms of the indenture.

The foregoing summaries of the 2014 Notes and the 2019 Notes are not complete and are qualified in their entirety by the applicable indentures, forms of global notes, and other agreements and documents filed with the SEC.

On August 2, 2018, we entered into a Loan and Security Agreement with SVB (the Credit Agreement) for our Revolving Credit Facility, which provides for secured revolving loans in an aggregate amount of up to $15.0 million. In August 2021, we

amended our Revolving Credit Facility to extend the maturity date to August 2, 2023 and to provide for a new $10.0 million Term Loan Facility (the Term Loan Facility and, together with the Revolving Credit Facility, the Credit Facility). The Credit Facility is collateralized by substantially all our property, other than intellectual property. The maturity date of the Term Loan Facility is July 1, 2025, subject to the following condition: in the event the principal amount of our convertible debt exceeds $0.6 million as of June 1, 2024 or if the maturity date of our 2019 Notes has not been extended beyond January 1, 2026 by that date, then the maturity date of the Term Loan Facility will be June 1, 2024.

As of December 31, 2021, the Term Loan Facility was fully drawn. Interest on the term loan accrues on the outstanding principal amount thereof at the greater of (i) a floating per annum rate equal to three quarters of one percentage point (0.75%) above the prime rate (as customarily defined), or 4% with a final payment equal to 6.5% of the aggregate original principal amounts of each term loan advance due on the earlier of the maturity date of the Term Loan Facility, the acceleration of the term loan advances or any prepayment of a term loan advance. Interest is payable monthly. The principal amount of the term loan advances is repayable beginning on August 1, 2023, in twenty-four equal monthly installments of principal plus monthly payments of accrued interest. The Amendment also added a financial covenant to the Credit Facility, requiring us to maintain a minimum Adjusted Quick Ratio (as defined in the Amendment) of at least 1.25 to 1.00.

As of December 31, 2021, the total borrowing base under the Revolving Credit Facility was $9.4 million. We had $6.8 million drawn, leaving $2.5 million available. We were in compliance with all the terms and conditions of the Revolving Credit Agreement governing the Revolving Credit Facility as of December 31, 2021, except in one instance where non-compliance was subsequently waived. See Note 9 to our consolidated financial statements for more information about the Revolving Credit Facility.

Since our inception, we have financed our negative cash flow from operations primarily through equity offerings and the issuance of debt instruments. For this annual report, we performed an assessment to determine whether there are conditions or events, considered in the aggregate, that raise substantial doubt about our ability to continue as a going concern for at least the twelve-month period following the date the financial statements were issued. As of December 31, 2021, we had $29.5 million in cash, cash equivalents and restricted cash. Due to an extended strategic review process related to the pending Private Placement Issuance, we were unable in 2021 to implement certain cash management actions, including potential financing and/or cost reduction initiatives. Further, we have incurred, and expect to continue to incur, significant costs in pursuit of our business plans. As a result, we believe that our current level of cash and cash equivalents, together with committed financing facilities, are not sufficient to fund ongoing operations for at least the twelve-month period after the financial statements were issued. The existence of these conditions raises substantial doubt about our ability to continue as a going concern for at least the twelve-month period following the date the financial statements were issued.

Our ability to continue as a going concern is dependent upon our ability to obtain additional equity or debt financing, attain further operating efficiencies, reduce expenditures and ultimately, generate significant revenue growth. Our plans to raise additional capital, including our ability to consummate the Private Placement Issuance, or take other actions to address the doubt regarding our ability to continue as a going concern, may not be successful. There can be no assurance that the Company would be able to obtain additional liquidity when needed or under acceptable terms, if at all. Refer to “Risk Factors – As disclosed in footnote two of our consolidated financial statements, and referenced in our independent registered public accounting firm’s report, we believe that our current level of cash and cash equivalents, together with committed financing facilities, are not sufficient to fund ongoing operations for at least the twelve-month period after the financial statements were issued. The existence of these conditions raises substantial doubt about our ability to continue as a “going concern” for at least the twelve-month period following the date the financial statements were issued..’”

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. Our market risk exposure is primarily a result of fluctuations in foreign currency exchange rates and interest rates. We do not hold or issue financial instruments for trading purposes.

Foreign Currency Exchange Risk

As we expand internationally our results of operations and cash flows will become increasingly subject to fluctuations due to changes in foreign currency exchange rates. Our revenue is generally denominated in the local currency of the contracting party. Historically, the majority of our revenue has been denominated in U.S. dollars. Our expenses are generally denominated in the currencies in which our operations are located, which is primarily in the United States, with a portion of expenses incurred in Singapore and Canada where our manufacturing facilities are located. Our results of operations and cash flows are, therefore, subject to fluctuations due to changes in foreign currency exchange rates. The volatility of exchange rates depends on many factors that we cannot forecast with reliable accuracy. We have experienced and will continue to experience fluctuations

in our net income or loss as a result of transaction gains or losses related to revaluing certain current asset and current liability balances that are denominated in currencies other than the functional currency of the entities in which they are recorded. For the year ended December 31, 2021, we had a foreign currency loss of $0.2 million compared to a foreign currency gain of $0.1 million in the prior year. To date, we have not entered into any foreign currency hedging contracts although we may do so in the future. As our international operations grow, we will continue to reassess our approach to manage our risk relating to fluctuations in currency rates. If foreign currency exchange rates had changed by 10% during the periods presented, it would not have had a material impact on our financial position or results of operations.

Interest Rate Sensitivity

We had cash and cash equivalents of $28.5 million as of December 31, 2021 These amounts were held primarily in cash on deposit with banks and money market funds which are short-term. Cash, cash equivalents and investments are held for working capital purposes. We believe that we do not have any material exposure to changes in the fair value of our money market portfolio as a result of changes in interest rates. Declines in interest rates, however, will reduce future investment income. If overall interest rates had decreased by 10% during the periods presented, our interest income would not have been materially affected.

Fair Value of Financial Instruments

We do not have material exposure to market risk with respect to investments. We do not use derivative financial instruments for speculative or trading purposes. We may adopt specific hedging strategies in the future.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Fluidigm Corporation

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the consolidated financial statements, including the related notes and financial statement schedule, of Fluidigm Corporation and its subsidiaries (the “Company”) as listed in the accompanying index (collectively referred to as the “consolidated financial statements”). We also have audited the Company's internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2021 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Substantial Doubt about the Company’s Ability to Continue as a Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 2 to the consolidated financial statements, the Company has incurred significant losses in each fiscal year since its inception and has an accumulated deficit that raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 2. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management’s Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

National Institutes of Health (NIH) Contract Accounting

As described in Notes 2 and 4 to the consolidated financial statements, in September 2020, the Company executed a definitive contract with the National Institutes of Health (NIH) for a project under the NIH Rapid Acceleration of Diagnostics (RADx) program, which has a total value of up to $34.0 million upon the achievement of certain milestones which were achieved and accepted by December 31, 2021. As there is no authoritative guidance under U.S. GAAP on accounting for government assistance to for-profit business entities, management applied International Accounting Standards (IAS) 20, Accounting for Government Grants and Disclosure of Government Assistance by analogy when accounting for the NIH contract payments to the Company. Management has elected to record the grants received as deferred income with grant proceeds recognized when there is reasonable assurance the conditions of the grant will be met and the grant will be received. With the NIH contract, this occurred when either each milestone was accepted by NIH or management concluded the conditions of the grant were substantially met. Grant proceeds that exceed the cost of the capital expenditures and expenses expected to be incurred are recorded in other non-operating income. As of December 31, 2021, a total of $21.7 million has been recorded as deferred grant income, and during 2021 $7.1 million in other income associated with grant milestone receipts in excess of expected total costs under the grant was recorded.

The principal considerations for our determination that performing procedures relating to the NIH contract accounting is a critical audit matter are (i) the significant judgment by management when determining the applicable accounting model and milestone achievement; and (ii) the significant audit effort and subjectivity in performing procedures and evaluating audit evidence related to the accounting policy selection, application, classification and recognition of excess grant proceeds recorded in other non-operating income.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the NIH contract, including controls over the determination of the appropriate accounting model, which grant milestones are met, and classification of costs and other non-operating income associated with the NIH contract. These procedures also included, among others (i) reading the executed agreement and correspondence with NIH, (ii) evaluating compliance with the contract requirements related to milestone

achievement, (iii) evaluating management's accounting analysis, and (iv) testing the accuracy and evaluating the classification of costs and other non-operating income associated with the NIH contract.

/s/ PricewaterhouseCoopers LLP

San Jose, California
March 7, 2022

We have served as the Company's auditor since 2015.

FLUIDIGM CORPORATION
CONSOLIDATED BALANCE SHEETS
(In thousands, except per share amounts)

	December 31,	
	2021	**2020**
ASSETS		
Current assets:		
Cash and cash equivalents	$ 28,451	$ 68,520
Accounts receivable (net of allowances of $356 at each of December 31, 2021 and 2020, respectively)	18,320	25,423
Inventories, net	20,825	19,689
Prepaid expenses and other current assets	4,470	4,031
Total current assets	72,066	117,663
Property and equipment, net	28,034	17,531
Operating lease right-of-use asset, net	37,119	38,114
Other non-current assets	3,689	4,680
Developed technology, net	27,927	40,206
Goodwill	106,379	106,563
Total assets	$ 275,214	$ 324,757
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 10,602	$ 9,220
Accrued compensation and related benefits	4,920	13,787
Operating lease liabilities, current	3,053	2,973
Deferred revenue, current	11,947	13,475
Deferred grant income, current	3,535	2,912
Other accrued liabilities	8,673	11,882
Advances under revolving credit agreement, current	6,838	—
Total current liabilities	49,568	54,249
Term loan, net	10,049	—
Convertible notes, net	54,160	54,224
Deferred tax liability	4,329	8,697
Operating lease liabilities, non-current	37,548	38,178
Deferred revenue, non-current	5,966	7,990
Deferred grant income, non-current	18,116	21,036
Other non-current liabilities	882	1,333
Total liabilities	180,618	185,707
Commitments and contingencies (Note 17)		
Stockholders' equity:		
Preferred stock, $0.001 par value, 10,000 shares authorized, no shares issued and outstanding at either December 31, 2021 or 2020	—	—
Common stock: $0.001 par value, 200,000 shares authorized at December 31, 2021 and 2020; 76,919 and 74,543 shares issued and outstanding at December 31, 2021 and 2020, respectively	77	75
Additional paid-in capital	831,424	815,624
Accumulated other comprehensive loss	(907)	112
Accumulated deficit	(735,998)	(676,761)
Total stockholders' equity	94,596	139,050
Total liabilities and stockholders' equity	$ 275,214	$ 324,757

See accompanying notes

FLUIDIGM CORPORATION

CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share amounts)

	Year Ended December 31,		
	2021	2020	2019
Revenue:			
Product revenue	$ 100,376	$ 99,944	$ 95,416
Service revenue	25,917	22,579	21,277
Development revenue	2,559	8,865	—
Other revenue	1,729	6,756	550
Total revenue	130,581	138,144	117,243
Costs and expenses:			
Cost of product revenue	53,315	47,527	45,461
Cost of service revenue	7,893	7,291	7,503
Research and development	37,944	36,461	31,640
Selling, general and administrative	98,888	97,901	84,478
Total costs and expenses	198,040	189,180	169,082
Loss from operations	(67,459)	(51,036)	(51,839)
Interest expense	(3,823)	(3,572)	(4,279)
Surplus funding from NIH Contract	7,140	—	—
Loss from extinguishment of debt	(9)	—	(12,020)
Other income, net	491	507	1,433
Loss before income taxes	(63,660)	(54,101)	(66,705)
Income tax benefit	4,423	1,081	1,915
Net loss	$ (59,237)	$ (53,020)	$ (64,790)
Net loss per share, basic and diluted	$ (0.78)	$ (0.74)	$ (0.97)
Shares used in computing net loss per share, basic and diluted	75,786	72,044	66,779

See accompanying notes

FLUIDIGM CORPORATION

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands)

	Year Ended December 31,		
	2021	2020	2019
Net loss	$ (59,237)	$ (53,020)	$ (64,790)
Other comprehensive income (loss), net of tax			
Foreign currency translation adjustment	(1,019)	730	69
Net change in unrealized gain (loss) on investments	—	(36)	36
Other comprehensive income (loss), net of tax	(1,019)	694	105
Comprehensive loss	$ (60,256)	$ (52,326)	$ (64,685)

See accompanying notes

FLUIDIGM CORPORATION
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands)

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance as of December 31, 2018	49,338	$ 49	$ 631,605	$ (687)	$ (558,851)	$ 72,116
Issuance of common stock on bond conversion	19,460	19	133,280	—	—	133,299
Issuance of restricted stock, net of shares withheld for taxes, and other	666	1	(601)	—	—	(600)
Issuance of common stock from option exercises	195	—	1,058	—	—	1,058
Issuance of common stock under ESPP	297	1	1,074	—	—	1,075
Stock-based compensation expense	—	—	11,349	—	—	11,349
Net loss	—	—	—	—	(64,790)	(64,790)
Other comprehensive income (loss), net of taxes	—	—	—	105	—	105
Balance as of December 31, 2019	69,956	70	777,765	(582)	(623,641)	153,612
Issuance of common stock from at-the-market offering, net of commissions	2,480	2	20,224	—	—	20,226
Issuance of restricted stock, net of shares withheld for taxes, and other	1,050	1	(460)	—	—	(459)
Issuance of common stock under ESPP	476	1	1,322	—	—	1,323
Issuance of common stock from stock option exercises	96	—	451	—	—	451
Equity issuance costs	—	—	(176)	—	—	(176)
Cumulative effect of new accounting standard for Topic 326 Credit Losses	—	—	—	—	(100)	(100)
Stock-based compensation expense	—	—	14,450	—	—	14,450
Acquisition of InstruNor AS	485	1	2,048	—	—	2,049
Net loss	—	—	—	—	(53,020)	(53,020)
Other comprehensive income (loss), net of taxes	—	—	—	694	—	694
Balance as of December 31, 2020	74,543	75	815,624	112	(676,761)	139,050
Issuance of restricted stock, net of shares withheld for taxes, and other	2,047	2	(1,795)	—	—	(1,793)
Issuance of common stock under ESPP	292	—	1,285	—	—	1,285
Issuance of common stock from option exercises	37	—	209	—	—	209
Stock-based compensation expense	—	—	16,101	—	—	16,101
Net loss	—	—	—	—	(59,237)	(59,237)
Other comprehensive income (loss), net of taxes	—	—	—	(1,019)	—	(1,019)
Balance as of December 31, 2021	76,919	$ 77	$ 831,424	$ (907)	$ (735,998)	$ 94,596

See accompanying notes

FLUIDIGM CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS (In thousands)

	Year Ended December 31,		
	2021	**2020**	**2019**
Operating activities			
Net loss	$ (59,237)	$ (53,020)	$ (64,790)
Adjustments to reconcile net loss to net cash used in operating activities:			
Stock-based compensation expense	16,101	14,451	11,393
Amortization of developed technology	11,918	11,910	11,200
Depreciation and amortization	3,653	4,014	4,605
Provision for excess and obsolete inventory	2,293	1,614	1,807
Lease amortization	497	2,017	(516)
Amortization of debt discounts, premiums and issuance costs	624	545	1,936
Impairment of intangible asset	—	—	443
Loss from extinguishment of debt	9	—	12,020
Loss on disposal of property and equipment	12	212	89
Other non-cash items	2	426	200
Changes in assets and liabilities:			
Accounts receivable, net	6,729	(7,628)	(2,075)
Inventories, net	(4,782)	(8,636)	(3,047)
Prepaid expenses and other assets	(436)	(877)	(1,400)
Accounts payable	1,281	3,356	787
Accrued compensation and related benefits	(8,721)	8,627	(9,310)
Deferred revenue	(3,208)	2,111	2,129
Other liabilities	(10,796)	5,461	(681)
Net cash used in operating activities	(44,061)	(15,417)	(35,210)
Investing activities			
Proceeds from NIH Contract	1,318	21,036	—
Acquisition, net of cash acquired	—	(5,154)	—
Purchases of investments	—	—	(62,370)
Proceeds from sale of investments	—	5,010	—
Proceeds from maturities of investments	—	31,800	25,600
Purchases of property and equipment, net	(13,264)	(12,717)	(2,531)
Net cash provided by (used in) investing activities	(11,946)	39,975	(39,301)
Financing activities			
Proceeds from term loan	10,000	—	—
Proceeds from advances under revolving credit agreement	6,838	—	—
Proceeds from issuance of common stock, net of commissions	—	20,226	—
Proceeds from 2019 Notes issuance	—	—	55,000
Repayment of long-term debt	(501)	—	(51,826)
Payments of debt and equity issuance costs	(79)	(684)	(1,888)
Proceeds from exercise of stock options	209	451	1,058
Proceeds from stock issuance from ESPP	1,285	1,323	1,075
Payments for taxes related to net share settlement of equity awards and other	(1,793)	(459)	(629)
Net cash provided by financing activities	15,959	20,857	2,790
Effect of foreign exchange rate fluctuations on cash and cash equivalents	(21)	385	56
Net increase (decrease) in cash, cash equivalents and restricted cash	(40,069)	45,800	(71,665)
Cash and cash equivalents and restricted cash at beginning of period	69,536	23,736	95,401
Cash and cash equivalents and restricted cash at end of period	$ 29,467	$ 69,536	$ 23,736
Supplemental disclosures of cash flow information			
Cash paid for interest	$ 3,149	$ 3,089	$ 3,542
Cash paid for income taxes, net of refunds	$ 2,085	$ 521	$ 205
Non-cash right-of-use assets and lease liabilities	$ (2,435)	$ 36,225	$ 10,402
Unpaid debt and equity issuance costs	$ —	$ —	$ 534
Asset retirement obligations	$ 710	$ 325	$ 312

See accompanying notes

1. Description of Business

Fluidigm Corporation (the Company, Fluidigm, we, our or us) improves life by driving meaningful insights in health and disease. Our innovative technologies explore the biological complexities of disease to advance human health through research, diagnostics and clinical applications. We create, manufacture, and market a range of products and services, including instruments, consumables, reagents and software that are used by researchers and clinical labs worldwide. Our customers are leading academic and government laboratories, as well as pharmaceutical, biotechnology, plant and animal research organizations, and clinical laboratories worldwide. The Company was formerly known as Mycometrix Corporation and changed its name to Fluidigm Corporation in April 2001. Fluidigm Corporation was founded in 1999 and is headquartered in South San Francisco, California.

2. Summary of Significant Accounting Policies

Basis of Presentation and Consolidation

The accompanying consolidated financial statements have been prepared assuming the Company will continue to operate as a going concern and meet its obligations when they become due over the twelve-month period subsequent to the date the financial statements were issued. The going concern assumption contemplates the realization of assets and satisfaction of liabilities in the normal course of business. The consolidated financial statements do not include any adjustments to the carrying amounts and classification of assets, liabilities and reported expenses that may be necessary if we were unable to continue as a going concern.

For this annual report, we performed an assessment to determine whether there are conditions or events, considered in the aggregate, that raise substantial doubt about our ability to continue as a going concern for at least the twelve-month period following the date the financial statements were issued. Since our inception, we have incurred significant operating losses and generated negative cash flows from operations. We have historically funded our operations primarily through the issuance of common stock and debt. We believe that our current level of cash and cash equivalents, together with committed financing facilities, are not sufficient to fund ongoing operations for at least the twelve-month period after the financial statements were issued. The existence of these conditions raises substantial doubt about the Company's ability to continue as a going concern for the twelve-month period following the date the financial statements were issued.

Our ability to continue as a going concern is dependent upon our success in obtaining additional equity or debt financing, attaining further operating efficiencies, reducing expenditures and ultimately, generating significant revenue growth. We are evaluating strategies to obtain the required additional funding for future operations, including the potential consummation of the $225 million investment in Fluidigm disclosed in Note 18 Subsequent Events (the Private Placement Issuance), which is contingent on stockholder approval and satisfaction of customary closing conditions. In the event the proposed investment does not occur, we would need to obtain the required additional funding for future operations from alternative sources. These sources may include, but are not limited to, equity financing, debt or other financing arrangements, and restructuring of operations to grow revenues and decrease expenses. Our plans to raise additional capital, including our ability to consummate the Private Placement Issuance, or take the other actions to address the doubt regarding our ability to continue as a going concern, may not be successful. There can be no assurance that we would be able to obtain additional liquidity when needed or under acceptable terms, if at all. The accompanying financial statements do not include any adjustments related to the recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might be necessary should we be unable to continue as a going concern.

The consolidated financial statements include the accounts of our wholly owned subsidiaries. As of December 31, 2021, we had wholly owned subsidiaries in Singapore, Canada, the Netherlands, Japan, France, Italy, the United Kingdom, China, Germany and Norway. All subsidiaries, except for Singapore, use their local currency as their functional currency. The Singapore subsidiary uses the U.S. dollar as its functional currency. All intercompany transactions and balances have been eliminated in consolidation.

Certain prior period amounts in the consolidated balance sheet and statements of cash flows were reclassified to conform to the current period presentation. These reclassifications were immaterial and did not affect prior period total assets, total liabilities, stockholders' equity, total revenue, total costs and expenses, loss from operations or net loss.

Use of Estimates

The preparation of financial statements in accordance with U.S. GAAP requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions believed to be reasonable, which together form the basis for making judgments about the carrying values of assets and liabilities. The full extent to which the COVID-19 pandemic impacts our business, results of operations and financial condition will depend on numerous evolving factors including, but not limited to, the magnitude and duration of the pandemic, the extent to which it will impact worldwide macroeconomic conditions, including the speed of recovery, and governmental and business reactions to the pandemic. We assessed certain accounting matters that generally require consideration of forecasted financial information, including the unknown impact of COVID-19 pandemic. These accounting matters included, but were not limited to, our allowance for doubtful accounts and credit losses, inventory and related reserves and the carrying value of goodwill and other long-lived assets. Actual results could differ materially from these estimates and could have a material adverse effect on our consolidated financial statements.

Foreign Currency

Assets and liabilities of non-U.S. subsidiaries that use the local currency as their functional currency are translated into U.S. dollars at exchange rates in effect on the balance sheet date. Income and expense accounts are translated at monthly average exchange rates during the year. The adjustments resulting from the foreign currency translations are recorded in accumulated other comprehensive loss, a separate component of stockholders' equity.

Revenue Recognition

We generate revenue primarily from the sale of our products and services. Product revenue is derived from the sale of instruments and consumables, including IFCs, assays and reagents. Service revenue is primarily derived from the sale of instrument service contracts, repairs, installation, training and other specialized product support services. We also generate revenue from product development agreements, license and royalty agreements and grants. Revenue is reported net of any sales, use and value-added taxes we collect from customers as required by government authorities. Research and development cost includes costs associated with development and grant revenue.

We recognize revenue based on the amount of consideration we expect to receive in exchange for the goods and services we transfer to the customer. Our commercial arrangements typically include multiple distinct products and services, and we allocate revenue to these performance obligations based on their relative standalone selling prices. Standalone selling prices (SSP) are generally determined using observable data from recent transactions. In cases where sufficient data is not available, we estimate a product's SSP using a cost plus a margin approach or by applying a discount to the product's list price.

Product Revenue

We recognize product revenue at the point in time when control of the goods passes to the customer and we have an enforceable right to payment. This generally occurs either when the product is shipped from one of our facilities or when it arrives at the customer's facility, based on the contractual terms. Customers generally do not have a unilateral right to return products after delivery. Invoices are generally issued at shipment and generally become due in 30 to 60 days.

We sometimes perform shipping and handling activities after control of the product passes to the customer. We have made an accounting policy election to account for these activities as product fulfillment activities rather than as separate performance obligations.

Service Revenue

We recognize revenue from repairs, maintenance, installation, training and other specialized product support services at the point in time the work is completed. Installation and training services are generally billed in advance of service. Repairs and other services are generally billed at the point the work is completed.

Revenue associated with instrument service contracts is recognized on a straight-line basis over the life of the agreement, which is generally one to three years. We believe this time-elapsed approach is appropriate for service contracts because we provide services on demand throughout the term of the agreement. Invoices are generally issued in advance of service on a monthly, quarterly, annual or multi-year basis. Payments made in advance of service are reported on our consolidated balance sheet as deferred revenue.

Development Revenue

We have entered and may continue to enter into development agreements with third parties that provide for up-front and periodic milestone payments. Our development agreements may include more than one performance obligation. At the inception of the contract, we assess whether each obligation represents a separate performance obligation or whether such obligations should be combined as a single performance obligation. The transaction price for each development agreement is determined based on the amount of consideration we expect to be entitled to for satisfying all performance obligations within the agreement.

We assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue. In arrangements where we satisfy performance obligation(s) over time, we recognize development revenue using an input method that determines the extent of our progress toward completion by comparing the actual costs incurred to the total expected cost. As part of the accounting for these arrangements, we develop estimates and assumptions that require judgment to determine the transaction price and progress towards completion. We review these estimates at the end of each reporting period using the best available information, revise the estimates as necessary, and recognize revenue commensurate with our progress toward completion.

We may also generate revenue from development or collaboration agreements that do not include upfront or milestone-based payments. For these type of arrangements, we generally recognize revenue over time as the development services are provided.

Other Revenue

Other revenue consists of license and royalty revenue and grant revenue. We recognize revenue from license agreements when the license is transferred to the customer and the customer is able to use and benefit from the license. For contracts that include sales-based royalties, we recognize revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied.

In March 2020, we entered into an agreement to settle intellectual property infringement claims, under which we received a $3.5 million payment in exchange for a perpetual license to certain Fluidigm intellectual property. The settlement was accounted for as a multiple-element arrangement. Accordingly, $3.1 million of the proceeds was recognized as license revenue and $0.4 million was offset against legal costs.

We receive grants from various entities to perform research and development activities over contractually defined periods. Grant revenue is not accounted for under ASC 606 Revenue from Contracts with Customers, as the grant agreement is not with a customer. As there is no authoritative U.S. GAAP guidance for grants awarded to for-profit entities, we have applied the guidance in ASC 958 Not-for-Profit Entities by analogy. Revenue is generally recognized provided that the conditions under which the grants were provided have been met and any remaining performance obligations are perfunctory.

Product Warranties

We generally provide a one-year warranty on our instruments and establish a liability for the estimated cost of the obligation at the time the product is shipped. We periodically review our warranty liability and record adjustments based on specific terms provided to customers and our overall historical experience with usage. This expense is recorded as a component of cost of product revenue in the consolidated statements of operations.

Significant Judgments

Applying the revenue recognition practices discussed above often requires significant judgment. Significant judgment is required when interpreting commercial terms in sales agreements and determining when control of goods and services passes to the customer. Judgment is also required when identifying performance obligations, estimating SSP and allocating purchase consideration in agreements that include multiple performance obligations. Any material changes created by errors in judgment could have a material effect on our operating results and overall financial condition.

Cash and Cash Equivalents

We consider all highly liquid financial instruments with maturities at the time of purchase of three months or less to be cash equivalents. Cash and cash equivalents may consist of cash on deposit with banks, money market funds, and notes from government-sponsored agencies.

Investments

Short-term investments are comprised of notes from government-sponsored agencies that mature within one year. All investments are recorded at estimated fair value. Any unrealized gains and losses from investments are reported in accumulated other comprehensive loss, a separate component of stockholders' equity. We evaluate our investments to assess whether investments with unrealized loss positions are other-than-temporarily impaired. An investment is considered to be other-than-temporarily impaired if the impairment is related to deterioration in credit risk or if it is likely that we will sell the securities before the recovery of their cost basis. No investment has been assessed as other than temporarily impaired, and realized gains and losses were immaterial during the years presented. The cost of securities sold, or the amount reclassified out of accumulated other comprehensive income into earnings is based on the specific-identification method.

Accounts Receivable, net

Trade accounts receivable are recorded at net invoice value. We review our exposure to accounts receivable and provide allowances of specific amounts if collectability is no longer reasonably assured based on historical experience and specific customer collection issues. We evaluate such allowances on a regular basis and adjust them as needed.

Concentrations of Business and Credit Risk

Financial instruments that potentially subject us to credit risk consist of cash, cash equivalents, investments, and accounts receivable. Our cash, cash equivalents, and investments may consist of deposits held with banks, money market funds, and other highly liquid investments that may at times exceed federally insured limits. Cash equivalents and investments are financial instruments that potentially subject us to concentrations of risk. Under our investment policy, we invest primarily in securities issued by the U.S. government. The goals of our investment policy, in order of priority, are as follows: preserve capital, meet liquidity needs, and optimize returns.

We generally do not require collateral to support credit sales. To reduce credit risk, we perform credit evaluations of our customers. No customer represented more than 10% of total revenue for 2021, 2020, or 2019, and no customer had an outstanding trade receivable balance that represented more than 10% of total billed accounts receivables at December 31, 2021, or 2020.

Our products include components that are currently procured from a single source or a limited number of sources. We believe that other vendors would be able to provide similar components; however, the qualification of such vendors may require start-up time. In order to mitigate any adverse impacts from a disruption of supply, we attempt to maintain an adequate supply of critical limited-source components.

Inventories, net

Inventories are stated at the lower of cost (on a first-in, first-out basis) or net realizable value. Inventory costs include direct materials, direct labor, and normal manufacturing overhead. We regularly review inventory for excess and obsolete products and components. Significant judgment is required in determining provisions for slow-moving, excess, and obsolete inventories which are recorded when required to reduce inventory values to their estimated net realizable values based on product life cycle, development plans, product expiration, and quality issues

Property and Equipment, net

Property and equipment, including leasehold improvements, are stated at cost less accumulated depreciation. Accumulated depreciation is calculated using the straight-line method over the estimated useful lives of the assets. Leasehold improvements are amortized over the estimated useful lives of the assets or the remaining term of the lease, whichever is shorter. The estimated useful lives of our property and equipment are generally as follows: computer equipment and software, three to four years; laboratory and manufacturing equipment, two to seven years; and office furniture and fixtures, five years.

Depreciation expense for the years ended December 31, 2021, 2020, and 2019 was $2.8 million, $3.1 million, and $3.6 million, respectively.

Leases

We determine if an arrangement is a lease, or contains a lease, at the inception of the arrangement. Operating leases are included in operating lease right-of-use (ROU) assets and operating lease liabilities in our consolidated balance sheets. ROU

assets represent our right-to-use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease ROU assets and liabilities are recognized at the commencement date based on the present value of lease payments over the lease term. As most of our leases do not provide an implicit rate, we generally use our incremental borrowing rate based on the estimated rate of interest for collateralized borrowing over a term similar to the lease arrangement at the commencement date. Significant judgment is required in determining the incremental collateralized borrowing rate. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

We elected the short-term lease recognition exemption for all leases that qualify. For those leases that qualify, we will not recognize ROU assets or lease liabilities for leases with an initial lease term of one year or less. We also elected not to separate lease and nonlease components for our building leases. The nonlease components are generally variable in nature and are expected to represent most of our variable lease costs. Variable costs are expensed as incurred. We have taken a portfolio approach for our vehicle leases by country.

Business Combinations, Goodwill, Intangible Assets and Other Long-Lived Assets

We have completed acquisitions of businesses in the past and may acquire additional businesses or technologies in the future. The results of businesses acquired in a business combination are included in our consolidated financial statements from the date of acquisition. We allocated the purchase price, which is the sum of the consideration provided in a business combination, to the identifiable assets and liabilities of the acquired business at their acquisition date fair values. Determining the fair value of assets acquired and liabilities assumed requires management to use significant judgment and estimates, including the selection of valuation methodologies and estimates of future revenue.

Goodwill, which has an indefinite useful life, represents the excess of cost over fair value of net assets acquired. Our intangible assets include developed technology, patents and licenses. The cost of identifiable intangible assets with finite lives is generally amortized on a straight-line basis over the assets' respective estimated useful lives. Judgment is needed to assess the factors that could indicate an impairment of intangible assets.

Goodwill and intangible assets with indefinite lives are not subject to amortization but are tested for impairment on an annual basis during the fourth quarter or whenever events or changes in circumstances indicate the carrying amount of these assets may not be recoverable. Events or changes in circumstances that could affect the likelihood that we will be required to recognize an impairment charge include, but are not limited to, declines in our stock price or market capitalization, economic downturns and other macroeconomic events, including the current COVID-19 pandemic, declines in our market share or revenues, and an increase in our losses, rapid changes in technology, failure to achieve the benefits of capacity increases and utilization, significant litigation arising out of an acquisition, or other matters. Any impairment charges could have a material adverse effect on our operating results and net asset value in the quarter in which we recognize the impairment charge.

In evaluating our goodwill and intangible assets with indefinite lives for indications of impairment, we first conduct an assessment of qualitative factors to determine whether it is more likely than not that the fair value of our reporting unit is less than its carrying amount. If we determine that it is more likely than not that the fair value of our reporting unit is less than its carrying amount, we compare the fair value of our reporting unit to its carrying value. If the fair value of our reporting unit exceeds its carrying value, goodwill is not considered impaired and no further analysis is required. If the carrying value of the reporting unit exceeds its fair value, then an impairment loss equal to the difference would be recorded to goodwill. We did not recognize any impairment of goodwill for any of the periods presented herein.

We evaluate our long-lived assets, including finite-lived intangibles, for indicators of possible impairment when events or changes in circumstances indicate the carrying amount of an asset may not be recoverable. If any indicator of impairment exists, we assess the recoverability of the affected long-lived assets by determining whether the carrying value of the asset can be recovered through undiscounted future operating cash flows. If impairment is indicated, we estimate the asset's fair value using future discounted cash flows associated with the use of the asset and adjust the carrying value of the asset accordingly. We did not recognize any impairment of intangibles for 2021 or 2020. In 2019, we recognized an impairment charge of $0.4 million on patents and licenses that were not used in the current products and were not expected to be used in future product offerings.

Deferred Grant Income

In September 2020, we executed a definitive contract with the National Institutes of Health (NIH) for a project under the NIH Rapid Acceleration of Diagnostics (RADx) program. The definitive contract, which amended the letter contract we entered into with NIH in July 2020 (collectively, the NIH Contract), has a total value of up to $34.0 million upon the achievement of certain milestones which were achieved and accepted by the NIH as of December 31, 2021. Proceeds from the NIH Contract have been and will be used primarily to expand production capacity and throughput capabilities.

Accounting for the NIH Contract does not fall under ASC 606, Revenue from Contracts with Customers, as NIH will not benefit directly from our expansion or product development. As there is no authoritative guidance under U.S. GAAP on accounting for government assistance to for-profit business entities, we applied International Accounting Standards (IAS) 20, Accounting for Government Grants and Disclosure of Government Assistance, by analogy when accounting for the NIH Contract payments to Fluidigm.

The NIH Contract proceeds used for production capacity expansion meet the definition of grants related to assets as the primary purpose for the payments is to fund the purchase and construction of capital assets to scale up production capacity. Under IAS 20, government grants related to assets are presented in the statement of financial position either by setting up the grant as deferred income or by deducting the grant in arriving at the carrying amount of the asset. Either of these two methods of presentation of grants related to assets in financial statements are regarded as acceptable alternatives under IAS 20. We have elected to record the grants received as deferred income using the first method.

Under IAS 20, grant proceeds are recognized when there is reasonable assurance the conditions of the grant will be met and the grant will be received. With the NIH Contract, this occurred when either each milestone was accepted by NIH or management concluded the conditions of the grant were substantially met. Deferred grant income related to production capacity expansion is being amortized over the period of depreciation for the related assets as a reduction of depreciation expense. Grant income related to reimbursement of operating costs is recorded as a reduction of those expenses incurred to date. Grant proceeds that exceed the cost of the capital expenditures and expenses expected to be incurred are recorded in other non-operating income.

Term Loan, net

On August 2, 2021, we entered into a Fourth Agreement to our Loan and Security Agreement (the Amendment) with Silicon Valley Bank. The Amendment extended the maturity date of our $15.0 million Revolving Credit Facility by one year, to August 2, 2023, and provided for a term loan facility in an aggregate principal amount of up to $10.0 million (Term Loan Facility). As of December 31, 2021, the Term Loan Facility was fully drawn. Interest is payable monthly and principal balances are required to be repaid in 24 equal monthly installments beginning on August 1, 2023. In addition, a final payment equal to 6.5% of the original principal amount of each advance is due on the earlier of the maturity date or the date the advance is repaid. The final payment is being accreted to the carrying value of the term loan through the expected maturity of July 1, 2025 using the effective interest method. Debt issuance costs were recorded as an offset to the carrying value of the loan and are amortized over the expected term using the effective interest method. The carrying value of the term loan includes the outstanding principal amount and the cumulative accreted final payment, less unamortized debt issuance costs. Amortization of the debt issuance costs and accretion of the final payment are reflected in interest expense.

Convertible Notes, net

In February 2014, we closed an underwritten public offering of $201.3 million aggregate principal amount of our 2.75% Senior Convertible Notes due 2034 (2014 Notes). In March 2018, we entered into separate privately negotiated transactions with certain holders of our 2014 Notes to exchange $150.0 million in aggregate principal amount of the 2014 Notes for our 2.75% Exchange Convertible Senior Notes due 2034 (2018 Notes). In the first quarter of 2019, the 2018 Notes were converted into 19.5 million shares of our common stock and the 2018 Notes were retired. We recorded a loss of $9.0 million on the retirement of the 2018 Notes at conversion in the first quarter of 2019. We determined the fair value of the 2018 Notes using valuation techniques that required us to make assumptions related to the implied discount rate.

In November 2019, we closed a private placement for $55.0 million aggregate principal amount of our 5.25% Senior Convertible Notes due 2024 (2019 Notes). The majority of the issuance proceeds were used to retire approximately $50.2 million of aggregate principal amount of our 2014 Notes. We recorded a loss of $3.0 million on the extinguishment of the 2014 Notes in the fourth quarter of 2019. This amount represented the difference between the fair value of the 2019 Notes used to extinguish the debt and the carrying value of the 2014 Notes, including unamortized debt issuance costs.

As provided by the indenture governing the 2014 Notes, in February 2021, holders of $0.5 million of the 2014 Notes required us to repurchase their notes at 100% of the principal amount plus accrued and unpaid interest. We recorded a loss of $9 thousand on the extinguishment of those notes, representing the difference between the price paid to extinguish the 2014 Notes and their carrying value, including unamortized debt issuance costs.

Offering-related costs, including underwriting costs, on the 2014 Notes and 2019 Notes were capitalized as debt issuance costs, recorded as an offset to the carrying value of the related Notes, and are amortized over the expected term of the related Notes using the effective interest method.

See Note 9 for a detailed discussion of the accounting treatment of the transactions and additional information.

Fair Value of Financial Instruments

Our financial instruments consist primarily of cash and cash equivalents, restricted cash, investments, accounts receivable, accounts payable, advances on our revolving credit agreement, a term loan and convertible notes. Our cash equivalents, restricted cash, accounts receivable, accounts payable and advances under our revolving credit agreement generally have short maturity or payment periods. Accordingly, their carrying values approximated their fair values at December 31, 2021 and 2020. The convertible notes are presented at their carrying value, with fair value disclosures made in Note 11. As a basis for considering fair value, we follow a three-tier value hierarchy, which prioritizes the inputs used in measuring fair value as follows:

Level I: observable inputs such as quoted prices in active markets;

Level II: inputs other than quoted prices in active markets that are observable either directly or indirectly; and

Level III: unobservable inputs for which there is little or no market data, which requires us to develop our own assumptions.

This hierarchy requires us to use observable market data, when available, and to minimize the use of unobservable inputs when determining fair value. Our cash equivalents, which include money market funds are classified as Level I because they are valued using quoted market prices. Our term loan and our convertible notes, which are not regularly traded, are both classified as Level III since their values cannot be determined by using readily observable inputs or measures, such as market prices. Significant judgment is needed in valuing Level III items. Fair value of the term loan was estimated using a discounted cash flow approach and current market interest rate data for similar loans and fair values of the convertible debt were estimated using pricing models and risk-adjusted value ranges for the convertible notes.

Research and Development

We recognize research and development expenses in the period incurred. Research and development expenses consist of personnel costs, independent contractor costs, prototype and materials expenses, allocated facilities and information technology expenses, and related overhead expenses.

Advertising Costs

We expense advertising costs as incurred. We incurred advertising costs of $3.4 million, $1.6 million and $3.4 million during 2021, 2020, and 2019, respectively.

Stock-Based Compensation

We recognize compensation costs for all stock-based awards, including stock options, RSUs, PSUs and stock purchased under our ESPP, based on the grant date fair value of the award. We recognize stock-based compensation expense on a straight-line basis over the requisite service periods for non-performance-based awards. For RSUs, fair value is measured based on the closing fair market value of our common stock on the date of grant. For PSUs with a market condition, we use a Monte Carlo simulation pricing model to incorporate the market condition effects at our grant date. The Monte Carlo pricing model requires inputs which are subjective and generally requires judgment by us. For PSUs with performance conditions, stock-based compensation expense is recognized over the requisite service period when the achievement of each individual performance goal becomes probable.

The fair value of options and stock purchases under ESPP on the grant date is estimated using the Black-Scholes option-pricing model, which requires the use of certain subjective assumptions, including expected term, volatility, risk-free interest rate and the fair value of our common stock. These assumptions generally require judgment. We determine the expected volatility based on our historical stock price volatility generally commensurate with the estimated expected term of the stock awards. The expected term of an award is based on historical forfeiture experience, exercise activity, and the terms and conditions of the stock awards. The risk-free interest rate is based on the U.S. Treasury yield in effect at the time of grant for

zero coupon U.S. Treasury notes with maturities approximately equal to each grant's expected term. We account for forfeitures as they occur.

Income Taxes

We use the asset and liability method to account for income taxes. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to temporary differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. Valuation allowances are provided when the expected realization of deferred tax assets does not meet a "more likely than not" criterion. We make estimates and judgments about our future taxable income that are based on assumptions that are consistent with our plans and estimates. Should the actual amounts differ from our estimates, the amount of our valuation allowance could be materially impacted. Changes in these estimates may result in significant increases or decreases to our tax provision in a period in which such estimates are changed, which in turn would affect net income or loss.

We recognize the financial statement effects of a tax position when it is more likely than not, based on the technical merits, that the position will be sustained upon examination. Any interest and penalties related to uncertain tax positions are reflected in the income tax provision.

Comprehensive Loss

Comprehensive loss is comprised of net loss and other comprehensive income (loss). Other comprehensive income (loss) consists of unrealized gains and losses on our investments and foreign currency translation adjustments. Total comprehensive loss for all periods presented has been disclosed in the consolidated statements of comprehensive loss.

The components of accumulated other comprehensive loss, net of tax, for the years ended December 31, 2021, 2020, and 2019 are as follows (in thousands):

	Foreign Currency Translation Adjustment	Unrealized Gain (Loss) on Investments	Accumulated Other Comprehensive Income (Loss)
Ending balance at December 31, 2019	$ (618)	$ 36	$ (582)
Change during the year	730	(36)	694
Ending balance at December 31, 2020	112	—	112
Change during the year	(1,019)	—	(1,019)
Ending balance at December 31, 2021	(907)	$ —	$ (907)

Immaterial amounts of unrealized gains and losses have been reclassified into the consolidated statement of operations for the years ended December 31, 2021, 2020 and 2019.

Net Loss per Share

Our basic and diluted net loss per share is calculated by dividing net loss by the weighted-average number of shares of common stock outstanding for the period. Restricted stock units, performance share units, and stock options to purchase our common stock are considered to be potentially dilutive common shares but have been excluded from the calculation of diluted net loss per share as their effect is anti-dilutive for all periods presented.

The following potentially dilutive common shares were excluded from the computations of diluted net loss per share for the periods presented because including them would have been anti-dilutive (in thousands):

	December 31,		
	2021	2020	2019
Stock options, restricted stock units and performance stock awards	7,975	7,507	5,
2019 Convertible Notes	18,966	18,966	18,
2019 Convertible Notes potential make-whole shares	1,337	837	3,
2014 Convertible Notes	10	19	
Total	28,288	27,329	27,

Recent Accounting Changes and Accounting Pronouncements

Adoption of New Accounting Guidance

In November 2019, the FASB issued ASU 2019-12-Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes. The amendments in this update improve consistent application of and simplify U.S. GAAP for Topic 740 by clarifying and amending existing guidance for, among other items, intra-period allocation, reporting tax law changes and losses in interim periods, state and local taxes not fully based on income and recognition of deferred tax liability related to certain transactions. There is also new guidance related to consolidated group reporting and tax impacts resulting from business combinations. The new guidance is effective for fiscal years beginning after December 15, 2020. The adoption of the new guidance did not have a significant impact on our financial results.

Recent Accounting Pronouncements

In August 2020, the FASB issued ASU 2020-06 Debt-Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging-Contracts in Entity's Own Equity (Subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity's Own Equity. The amendments in this update reduce the number of accounting models for convertible instruments and allows more contracts to qualify for equity classification, which is expected to result in more convertible instruments being accounted for as a single unit, rather than being bifurcated between debt and equity. The new guidance is effective for fiscal years beginning after December 15, 2021. The adoption of the new guidance is not expected to have a significant impact on our financial results.

In November 2021, the FASB issued ASU 2021-10 Government Assistance (Topic 832): Disclosures by Business Entities about Government Assistance. The amendment is effective for annual periods beginning after December 15, 2021.

The amendment establishes financial disclosure requirements for business entities that receive government assistance that they account for by analogizing to a grant or contribution model because there is no specific authoritative guidance under U.S.GAAP that applies to the transaction. Entities that receive this type of assistance should include the following information in their annual report: (1) the nature of the transaction, (2) the significant terms and conditions, (3) the accounting treatment, (4) the line items on the balance sheet and income statement that are affected along with (5) the respective amounts that have been recorded. We are currently evaluating the impact the new standard will have on the disclosures included in our consolidated financial statements.

3. Business Combination

On January 17, 2020, we completed the acquisition of all of the outstanding shares of InstruNor AS, a privately held Norwegian company (InstruNor). InstruNor is a provider of the only fully integrated sample preparation system for flow and mass cytometry. The acquisition of InstruNor supports our entry into the sample preparation market for cytometry analysis and expands our capabilities to include fully automated sample preparation for flow and mass cytometry. The purchase price of $7.2 million included approximately $5.2 million in cash and 485,451 shares of our common stock valued at the closing price on the effective date of $4.22.

The acquisition was accounted for in accordance with ASC 805, Business Combinations. The assets acquired and liabilities assumed were recorded at their estimated fair values at the InstruNor acquisition date. Developed technology was valued using a discounted cash flow model for which the most sensitive assumption was revenue growth rate. There were no measurement period adjustments recognized since the acquisition date. Non-tax deductible goodwill of $2.2 million was calculated as the purchase price less the fair value of the net assets acquired as follows (in thousands):

Purchase price:		
Cash consideration paid on closing to former equity holders	$	5,165
Non-cash consideration common shares		2,049
Total purchase price	$	7,214
Assets acquired:		
Cash and cash equivalents	$	11
Accounts receivable		32
Other receivables		13
Inventories, net		153
Developed technology		5,380
Liabilities assumed:		
Accounts payable		14
Other current liabilities		15
Deferred tax liability, net		566
Fair value of identifiable net assets acquired	$	4,994
Goodwill acquired on acquisition	$	2,220

4. NIH Contract

In 2020, we were awarded the NIH Contract under the RADx program to support the expansion of our production capacity and throughput capabilities for COVID-19 testing with our microfluidics technology. As of December 31, 2021, we have achieved the required milestones and have received the total NIH Contract value of $34.0 million. Proceeds from the NIH Contract have been and will be used primarily for capital expenditures to expand production capacity and, to a lesser extent, to offset applicable operating costs. Grant proceeds that exceed the cost of the capital expenditures and expenses expected to be incurred are recorded in other non-operating income.

The following tables summarize the activity under the NIH Contract through December 31, 2021 and 2020 (in thousands):

	Year Ended December 31,	
	2021	2020
Cumulative cash receipts from milestones achieved	$ 34,016	$ 25,436
Cumulative amounts applied against operating costs (excluding depreciation)	(4,522)	(1,488)
Cumulative amounts applied against depreciation expense for assets placed in service	(703)	—
Cumulative amounts recognized as non-operating income	(7,140)	—
Total deferred grant income	$ 21,651	$ 23,948
Assets placed in service, gross	$ 16,890	$ —
Construction-in-progress	3,909	9,652
Cumulative amounts applied against depreciation expense	(703)	—
Carrying value of property and equipment, net	20,096	9,652
Estimated future operating costs, excluding depreciation	—	2,912
Estimated future capital expenditures	1,555	11,384
Total deferred grant income	$ 21,651	$ 23,948
Deferred grant income, current	$ 3,535	$ 2,912
Deferred grant income, non-current	18,116	21,036
Total deferred grant income	$ 21,651	$ 23,948

Deferred grant income, current is included in other accrued liabilities on the balance sheets at December 31, 2021 and 2020 and represents amounts expected to be applied against costs over the next twelve months. Deferred grant, non-current includes depreciation expense on capital expenditure amounts which will be amortized in later periods. At December 31, 2020, deferred grant income included amounts expected to be applied against 2021 operating costs as well as future depreciation. At December 31, 2021, deferred grant income includes amounts related to future depreciation on capital expenditures placed or to be placed in service.

We expect to spend $22.4 million on capital expenditures associated with the NIH Contract. We have incurred $20.8 million of capital expenditures through December 31, 2021, of which assets valued at $16.9 million have been placed in service, while the remaining $3.9 million is included in construction-in-progress (See Note 8). We expect to place the remaining equipment in service in the first half of 2022.

5. Development Agreement

Effective March 31, 2020, we signed an OEM Supply and Development Agreement (Development Agreement) with a customer. Under the Development Agreement, Fluidigm developed products based on its microfluidics technology. The Development Agreement provided for up-front and periodic milestone payments during the development stage, which was completed in the third quarter of 2021, and on-going annual payments of $0.4 million for sustaining efforts. We recognized $2.4 million and $8.8 million of development revenue from this agreement for the years ended December 31, 2021 and 2020, respectively.

6. Revenue

Disaggregation of Revenue

The following table presents our revenue for the year ended December 31, 2021, 2020, and 2019, respectively, based on geographic area and by source (in thousands):

	Year Ended December 31,		
	2021	2020	2019
Geographic Markets:			
Americas	$ 63,877	$ 74,586	$ 47,016
EMEA	42,722	37,776	40,024
Asia-Pacific	23,982	25,782	30,203
Total	$ 130,581	$ 138,144	$ 117,243

	Year Ended December 31,		
	2021	2020	2019
Source:			
Instruments	$ 42,498	$ 45,536	$ 50,004
Consumables	57,878	54,408	45,412
Product revenue	100,376	99,944	95,416
Service revenue	25,917	22,579	21,277
Development revenue	2,559	8,865	—
Other revenue:			
License and royalty revenue	147	3,163	—
Grant revenue	1,582	3,593	550
Total other revenue	1,729	6,756	550
Total	$ 130,581	$ 138,144	$ 117,243

Unfulfilled Performance Obligations

We reported $21.5 million of deferred revenue on our December 31, 2020 consolidated balance sheet. During the twelve months ended December 31, 2021, $11.9 million of the opening balance was recognized as revenue and $8.3 million of net additional advance payments were received from customers, primarily associated with instrument service contracts. At December 31, 2021, we reported $17.9 million of deferred revenue.

The following table summarizes the expected timing of revenue recognition for unfulfilled performance obligations associated with instrument service contracts that were partially completed at December 31, 2021 (in thousands):

Fiscal Year	Expected Revenue [1]
2022	$ 12,774
2023	6,735
2024	3,307
Thereafter	1,658
Total	$ 24,474

(1) Expected revenue includes both billed amounts included in deferred revenue and unbilled amounts that are not reflected in our consolidated financial statements and are subject to change if our customers decide to cancel or modify their contracts. Purchase orders for instrument service contracts can generally be canceled before the service period begins without penalty.

We apply the practical expedient that permits us to not disclose information about unsatisfied performance obligations for service contracts with an expected term of one year or less.

7. Goodwill and Intangible Assets, net

In connection with our acquisition of DVS in February 2014, we recognized goodwill of $104.1 million and $112.0 million of developed technology. In the first quarter of 2020, we recognized $2.2 million (Euro 2.0 million) of goodwill from the InstruNor acquisition and $5.4 million (Euro 4.9 million) of developed technology (see Note 3). As the goodwill and developed technology from the InstruNor acquisition are recorded in the functional currency of our European operations, which is the Euro, these balances are revalued each period and the U.S. dollar value of these assets will fluctuate as foreign exchange rates change. We are amortizing InstruNor developed technology over 8.0 years.

Goodwill and intangible assets with indefinite lives are not subject to amortization but are tested for impairment on an annual basis during the fourth quarter or whenever events or changes in circumstances indicate the carrying amount of these assets may not be recoverable. Qualitative assessment includes assessing significant events and circumstances such as our current results, assumptions regarding future performance, strategic initiatives and overall economic factors, including the ongoing global COVID-19 pandemic and macroeconomic developments to determine the existence of potential indicators of impairment and assess if it is more likely than not that the fair value of our reporting unit or intangible assets is less than their carrying value. If indicators of impairment are identified, a quantitative impairment test is performed.

During the first quarter of fiscal 2020, we assessed whether the current and potential future impact of the COVID-19 pandemic represented an event which necessitated an impairment review. No impairment was recorded as a result of the quantitative assessment performed. In addition, the Company performed its annual impairment assessment as of December 31, 2021 and 2020 and there were no indicators of impairment identified.

Intangible assets also include other patents and licenses, which are included in other non-current assets. Intangible assets, net, were as follows (in thousands):

	December 31, 2021			
	Gross Amount	Accumulated Amortization	Net	Weighted-Average Amortization Period
Developed technology	$ 117,503	$ (89,576)	$ 27,927	9.9 years
Patents and licenses	$ 11,257	$ (10,000)	$ 1,257	7.0 years

	December 31, 2020			
	Gross Amount	Accumulated Amortization	Net	Weighted-Average Amortization Period
Developed technology	$ 117,658	$ (77,452)	$ 40,206	9.9 years
Patents and licenses	$ 11,256	$ (9,238)	$ 2,018	7.5 years

Total amortization expense for the years ended December 31, 2021, December 31, 2020, and December 31, 2019 was $12.7 million, $12.8 million and $12.2 million, respectively.

Based on the carrying value of intangible assets, net, as of December 31, 2021, the annual amortization expense is expected to be as follows (in thousands):

Fiscal Year	Developed Technology Amortization Expense	Patents and Licenses Amortization Expense	Total
2022	$ 11,888	$ 678	$ 12,566
2023	11,888	572	12,460
2024	2,088	7	2,095
2025	688	—	688
2026	688	—	688
Thereafter	687	—	687
Total	$ 27,927	$ 1,257	$ 29,184

8. Balance Sheet Details

Cash, Cash Equivalents and Restricted Cash

Cash, cash equivalents and restricted cash consisted of the following as of December 31, 2021 and 2020 (in thousands):

	December 31,	
	2021	2020
Cash and cash equivalents	$ 28,451	$ 68,520
Restricted cash	1,016	1,016
Total cash, cash equivalents, and restricted cash	$ 29,467	$ 69,536

Short-term restricted cash of approximately $16 thousand is included in prepaid expenses and other current assets, and $1.0 million of non-current restricted cash is included in other non-current assets in the consolidated balance sheets as of December 31, 2021 and 2020.

Inventories, net

Inventories, net consisted of the following as of December 31, 2021 and 2020 (in thousands):

	December 31,	
	2021	2020
Raw materials	$ 9,345	$ 8,292
Work-in-process	867	1,214
Finished goods	10,613	10,183
Total inventories, net	$ 20,825	$ 19,689

Property and Equipment, net

Property and equipment, net consisted of the following as of December 31, 2021 and 2020 (in thousands):

	December 31,	
	2021	2020
Computer equipment and software	$ 5,759	$ 4,240
Laboratory and manufacturing equipment	30,260	18,107
Leasehold improvements	12,095	7,203
Office, furniture and fixtures	2,074	1,994
Property and equipment, gross	50,188	31,544
Less accumulated depreciation and amortization	(26,703)	(23,989)
Construction-in-progress	4,549	9,976
Property and equipment, net	$ 28,034	$ 17,531

The majority of the amounts included in construction-in-progress are related to the NIH Contract (see Note 4).

Accrued Compensation and Related Benefits

Accrued compensation and related benefits consisted of the following as of December 31, 2021 and 2020 (in thousands):

	Year Ended December 31,	
	2021	2020
Accrued incentive compensation	$ 40	$ 7,842
Accrued vacation	3,388	3,367
Accrued payroll taxes and other	1,492	2,578
Accrued compensation and related benefits	$ 4,920	$ 13,787

Warranties

Activity for our warranty accrual for the years ended December 31, 2021 and 2020, which is included in other accrued liabilities, is summarized below (in thousands):

	Year Ended December 31,	
	2021	2020
Beginning balance	$ 1,663	$ 1,390
Accrual for current period warranties	418	1,028
Warranty costs incurred	(911)	(755)
Ending balance	$ 1,170	$ 1,663

9. Debt

2014 Senior Convertible Notes (2014 Notes)

In February 2014, we closed an underwritten public offering of $201.3 million aggregate principal amount of our 2014 Notes. We received $195.2 million, net of underwriting discounts, from the issuance of the 2014 Notes and incurred approximately $1.1 million in offering-related expenses. The underwriting discount and offering-related expenses are being amortized to interest expense using the effective-interest rate method. The effective interest rate on the 2014 Notes, reflecting the impact of debt discounts and issuance costs, is approximately 3.0%. The 2014 Notes will mature on February 1, 2034, unless earlier converted, redeemed, or repurchased in accordance with the terms of the 2014 Notes. Holders may require us to repurchase all or a portion of their 2014 Notes on each of February 6, 2021, February 6, 2024, and February 6, 2029, at a repurchase price in cash equal to 100% of the principal amount of the 2014 Notes plus accrued and unpaid interest.

We have retired the majority of the 2014 Notes through the issuance of the 2018 Notes and 2019 Notes, as discussed below. As provided by the indenture governing the 2014 Notes, in February 2021, holders of $0.5 million of the 2014 Notes required us to repurchase their notes at 100% of the principal amount plus accrued and unpaid interest. We recorded a loss of $9 thousand on the extinguishment of those notes, representing the difference between the price paid to extinguish the 2014 Notes and their carrying value, including unamortized debt issuance costs. As of December 31, 2021, there was $0.6 million aggregate principal of the 2014 Notes outstanding.

2018 Senior Convertible Notes (2018 Notes)

In March 2018, we entered into separate privately negotiated transactions with certain holders of our 2014 Notes to exchange $150.0 million in aggregate principal amount of the 2014 Notes for 2018 Notes, leaving $51.3 million of aggregate principal amount of 2014 Notes outstanding. The 2018 Notes accrued interest at a rate of 2.75%, payable semi-annually. The 2018 Notes were scheduled to mature on February 1, 2034, unless earlier converted, redeemed, or repurchased in accordance with the terms of the indenture governing the 2018 Notes. In the first quarter of 2019, $150.0 million of the 2018 Notes were converted into 19.5 million shares of our common stock and the notes were retired. We recognized a loss of $9.0 million on the conversion of 2018 Notes, which was included in loss on extinguishment of debt in 2019. This amount represents the difference between the fair value of the bonds converted and the carrying value of the bonds at the time of conversion.

2019 Senior Convertible Notes (2019 Notes)

In November 2019, we issued $55.0 million aggregate principal amount of 2019 Notes. Net proceeds of the 2019 Notes issuance were $52.7 million, after deductions for commissions and other debt issuance costs. $51.8 million of the proceeds of the 2019 Notes were used to retire $50.2 million aggregate principal amount of our 2014 Notes. We recognized a loss of $3.0 million on the exchange of the 2014 Notes for the 2019 Notes. The loss on extinguishment of debt was calculated as the difference between the reacquisition price (i.e., the fair value of the principal amount of 2019 Notes) and the net carrying value of the 2014 Notes exchanged.

The 2019 Notes bear interest at 5.25% per annum, payable semiannually on June 1 and December 1 of each year, beginning on June 1, 2020. The 2019 Notes will mature on December 1, 2024, unless earlier repurchased or converted pursuant to their terms. The 2019 Notes will be convertible at the option of the holder at any point prior to the close of business on the second scheduled trading day preceding the maturity date. The initial conversion rate of the Notes is 344.8276 shares of the Company’s common stock per $1,000 principal amount of 2019 Notes (which is equivalent to an initial conversion price of approximately $2.90 per share). The conversion rate is subject to adjustment upon the occurrence of certain specified events.

Those certain specified events include voluntary conversion of the 2019 Notes prior to our exercise of the Issuer's Conversion Option or in connection with a make-whole fundamental change, entitling the holders, under certain circumstances, to a make-whole premium in the form of an increase in the conversion rate determined by reference to a make-whole table set forth in the indenture governing the 2019 Notes. The conversion rate will not be adjusted for any accrued and unpaid interest.

The 2019 Notes will also be convertible at our option upon certain conditions in accordance with the terms of the indenture governing the 2019 Notes. On or after December 1, 2021 to December 1, 2022, if the price of the Company's common stock has equaled or exceeded 150% of the Conversion Price then in effect for a specified number of days (Issuer's Conversion Option), we may, at our option, elect to convert the 2019 Notes in whole but not in part into shares of the Company, determined in accordance with the terms of the indenture. On or after December 1, 2022, if the price of the Company's common stock has equaled or exceeded 130% of the Conversion Price then in effect for a specified number of days, we may, at our option, elect to convert the 2019 Notes in whole but not in part into shares of the Company, determined in accordance with the terms of the indenture.

Offering-related costs for the 2019 Notes were capitalized as debt issuance costs and are recorded as an offset to the carrying value of the 2019 Notes. The debt issuance costs are amortized over the expected term of the 2019 Notes using the effective interest method through the maturity date of December 1, 2024. The effective rate on the 2019 Notes is 6.2%.

The carrying values of the components of the 2014 Notes and 2019 Notes are as follows (in thousands):

	December 31,	
	2021	2020
2.75% 2014 Notes due 2034		
Principal amount	$ 578	$ 1,079
Unamortized debt discount	(8)	(16)
Unamortized debt issuance cost	(2)	(4)
Net carrying value of 2014 Notes	$ 568	$ 1,059
5.25% 2019 Notes due 2024		
Principal amount	$ 55,000	$ 55,000
Unamortized debt issuance cost	(1,408)	(1,835)
Net carrying value of 2019 Notes	$ 53,592	$ 53,165
Net carrying value of all Notes	$ 54,160	$ 54,224

Revolving Credit Facility and Term Loan, net

On August 2, 2018, we entered into a revolving credit facility with Silicon Valley Bank (as amended, the Revolving Credit Facility) in an aggregate principal amount of up to the lesser of (i) $15.0 million (Maximum Amount) or (ii) the sum of (a) 85% of our eligible receivables and (b) 50% of our eligible inventory, in each case, subject to certain limitations (Borrowing Base), provided that the amount of eligible inventory that may be counted towards the Borrowing Base shall be subject to a cap as set forth in the Revolving Credit Facility.

On August 2, 2021, we amended our Revolving Credit Facility to extend the maturity date to August 2, 2023 and to provide for a new $10.0 million Term Loan Facility (the Term Loan Facility and, together with the Revolving Credit Facility, the Credit Facility). The stated maturity of the Term Loan Facility is July 1, 2025. However, if the principal amount of our convertible debt exceeds $0.6 million as of June 1, 2024 or if the maturity date of our 2019 Notes has not been extended beyond January 1, 2026 by June 1, 2024, then the maturity of the Term Loan Facility will be June 1, 2024. The Credit Facility is collateralized by substantially all our property, other than intellectual property. The Credit Facility also includes a financial covenant that requires us to maintain a minimum Adjusted Quick Ratio, as defined in the agreement, of at least 1.25 to 1.00.

The interest rate on advances made under the Revolving Credit Facility is the greater of (i) prime rate plus 0.50% or (ii) 5.25%. Interest on any outstanding advances is due and payable monthly and the principal balance is due at maturity though loans can be prepaid at any time without penalty. Fees for Revolving Credit Facility include an annual commitment fee of $112,500 and a quarterly unused line fee based on the Borrowing Base. As of December 31, 2021, the Borrowing Base of the Revolving Credit Facility was $9.4 million, of which we had borrowed $6.8 million, leaving $2.5 million available.

As of December 31, 2021 the Term Loan Facility was fully drawn. The interest rate on the Term Loan Facility is the greater of 4% or a floating per annum rate equal to three quarters of one percentage points (0.75%) above the prime rate. Interest on any outstanding term loan advances is due and payable monthly. In addition to the monthly interest payments, a final payment equal to 6.5% of the original principal amount of each advance is due on the earlier of the maturity date or the date the advance is repaid. Principal balances are required to be repaid in twenty-four equal installments beginning on August 1, 2023. The effective interest rate on the Term Loan Facility, reflecting the impact of debt issuance costs, the end-of-term fee and expected timing of principal repayment was 6.3% as of December 31, 2021.

The carrying values of our term loan and advances under the Credit Facility, and the maximum amount available under the Credit Facility are as follows (in thousands):

	December 31,	
	2021	2020
Term Loan		
Principal amount	$ 10,000	$ —
End of term fee accretion	79	—
Unamortized debt issuance cost	(30)	—
Net carrying value of term loan	$ 10,049	$ —
Credit Facility		
Borrowing Base	$9,368	$ 15,000
Carrying value of advances under revolving credit agreement	$ 6,838	$ —

10. Leases

We have operating leases for buildings, equipment and vehicles. Existing leases have remaining terms of less than one year to eight years. Some leases contain options to extend the lease, usually for up to five years, and termination options.

Supplemental balance sheet information related to leases was as follows as of December 31, 2021 and 2020 (in thousands, except for discount rate and lease term):

	December 31, 2021	December 31, 2020
Operating lease right-of-use buildings	$ 43,457	$ 41,13
Operating lease right-of-use equipment	84	8
Operating lease right-of-use vehicles	676	67
Total operating lease right-of-use assets, gross	44,217	41,90
Accumulated amortization	(7,098)	(3,786
Total operating lease right-of-use assets, net	$ 37,119	$ 38,11
Operating lease liabilities, current	$ 3,053	$ 2,97
Operating lease liabilities, non-current	37,548	38,17
Total operating lease liabilities	$ 40,601	$ 41,15
Weighted average remaining lease term (in years)	7.7 years	8.6 ye
Weighted average discount rate per annum	11.7 %	11.9

The following table presents the components of lease expense for the year-ended December 31, 2021 and 2020, respectively (in thousands):

(in thousands)	Twelve months ended December 31, 2021	Twelve months ende December 31, 2020
Operating lease cost (including variable costs)	$ 10,918	$ 9,6
Variable costs including non-lease component	$ 2,853	$ 2,3
Supplemental information:		
Cash paid for amounts included in the measurement of operating lease liabilities (included in net cash used in operating activities)		
Operating cash flows from operating leases	$ 7,568	$ 5,2

Future minimum lease payments under commenced non-cancelable operating leases are as of December 31, 2021 as follows (in thousands):

Fiscal Year	Minimum Lease Payments for Operating Leases
2022	$ 7,480
2023	7,644
2024	7,721
2025	7,932
2026	7,704
Thereafter	24,948
Total future minimum payments	$ 63,429
Less: imputed interest	(22,828)
Total	$ 40,601

11. Fair Value of Financial Instruments

The following tables summarize our cash and available-for-sale securities that were measured at fair value by significant investment category within the fair value hierarchy (in thousands):

	December 31, 2021					
	Amortized Cost	Gross Unrealized Gain	Gross Unrealized Loss	Fair Value	Cash and Cash Equivalents	Cash- Restricted
Assets:						
Cash and money market funds	$ 28,451	$ —	$ —	$ 28,451	$ 28,451	$ —
Cash-restricted	1,016	—	—	1,016	—	1,016
Total cash, cash equivalents and restricted cash	$ 29,467	$ —	$ —	$ 29,467	$ 28,451	$ 1,016

	December 31, 2020					
	Amortized Cost	Gross Unrealized Gain	Gross Unrealized Loss	Fair Value	Cash and Cash Equivalents	Cash-Restricted
Assets:						
Cash and money market funds	$ 68,520	$ —	$ —	$ 68,520	$ 68,520	$ —
Cash-restricted	1,016	—	—	1,016	—	1,016
Total cash, cash equivalents and restricted cash	$ 69,536	$ —	$ —	$ 69,536	$ 68,520	$ 1,016

Cash and cash equivalents are Level I measurements. There were no transfers between Level I and Level II measurements, and no changes in the valuation techniques used during the years ended December 31, 2021, and 2020.

Debt

Our convertible notes are not regularly traded. The estimated fair values for these securities represent Level III valuations since a fair value for these securities cannot be determined by using readily observable inputs or measures, such as market prices. Fair values were estimated using pricing models and risk-adjusted value ranges.

The estimated fair value of our term loan also represents a Level III valuation since the value cannot be determined by using readily observable inputs or measures, such as a market prices. The fair value of our term loan was estimated using a discounted cash flows approach and current market interest rate data for similar loans.

The following table summarizes the par value, carrying value and the estimated fair value of our debt at December 31, 2021 and 2020, respectively (in thousands):

	December 31, 2021			December 31, 2020		
	Par Value	Carrying Value	Fair Value	Par Value	Carrying Value	Fair Value
2014 Notes	$ 578	$ 568	$ 601	$ 1,079	$ 1,059	$ 1,122
2019 Notes	55,000	53,592	81,880	55,000	53,165	117,899
Total Notes	$ 55,578	$ 54,160	$ 82,481	$ 56,079	$ 54,224	$ 119,021
Term loan, net	$ 10,000	$ 10,049	$ 10,113	$ —	$ —	$ —
Advances under revolving credit agreement	$ 6,838	$ 6,838	$ 6,838	$ —	$ —	$ —

12. Shareholders' Equity

2020 At-the-Market Offering

In March 2020, we entered into an Open Market Sale Agreement (Sale Agreement) with Jefferies LLC (Jefferies) to sell shares of our common stock having aggregate sales proceeds of up to $50.0 million, from time to time, through an "at-the-market" equity offering program under which Jefferies acts as sales agent. During the third quarter of 2020, we sold 2.5 million shares of our common stock pursuant to the Sale Agreement, for aggregate gross proceeds of $20.9 million. Our net proceeds from the sale of such shares of common stock were approximately $20.1 million, after deducting related expenses, including commissions of approximately $0.6 million and issuance costs of approximately $0.2 million.

InstruNor Acquisition

In January 2020, we completed the acquisition of all of the outstanding shares of InstruNor (see Note 3). The purchase price was approximately $7.2 million, consisting of $5.2 million in cash and 485,451 shares of our common stock. No adjustments were made to the initial purchase price allocation.

Common Shares Reserved

At December 31, 2021, we had reserved shares of common stock for future issuance under equity compensation plans as follows:

In thousands:	Securities To Be Issued Upon Exercise Of Options	Securities To Be Issued Upon Release Of Restricted Stock and Performance Share Units at Maximum	Number Of Remai Securities Available Fo Future Issuance
2011 Equity Incentive Plan	1,429	7,512	3,5
DVS Sciences Inc. 2010 Equity Incentive Plan	9	—	
2017 Inducement Award Plan	159	76	
2017 Employee Stock Purchase Plan	—	—	2,6
	1,597	7,588	6,1

Included in the securities to be issued upon release of RSUs and PSUs are the maximum number of shares that could be issued for performance share unit awards, which can vest at 0%-200% of the number of awards granted. The number of shares available for future issuance also reflects PSU awards granted at the maximum number of shares that could be issued under these awards.

13. Stock-Based Plans

Our board of directors sets the terms, conditions, and restrictions related to our 2017 Employee Stock Purchase Plan (ESPP) and the grant of stock options, restricted stock units (RSUs) and performance-based awards under our stock-based plans. Our board of directors determines the number of awards to grant and also sets vesting criteria.

In general, RSUs vest on a quarterly basis over a period of four years from the date of grant at a rate of 25% on the first anniversary of the grant date and ratably each quarter over the remaining 12 quarters, or ratably over 16 quarters, subject to the employees' continued employment. We may grant RSUs with different vesting terms from time to time.

Incentive stock options and non-statutory stock options granted under the 2011 Equity Incentive Plan (2011 Plan) have a term of no more than ten years from the date of grant and an exercise price of at least 100% of the fair market value of the underlying common stock on the date of grant. Generally, options vest at a rate of either 25% on the first anniversary of the option grant date and ratably each month over the remaining period of 36 months, or ratably each month over 48 months. We may grant options with different vesting terms from time to time.

For performance-based share awards, our board of directors sets the performance objectives and other vesting provisions in determining the number of shares or value of performance units and performance shares that will be paid out. Such payout will be a function of the extent to which performance objectives or other vesting provisions have been achieved.

2011 Equity Incentive Plan

In January 2011, our board of directors adopted the 2011 Plan under which incentive stock options, non-statutory stock options, RSUs, stock appreciation rights, performance stock units (PSUs), and performance shares may be granted to our employees, directors, and consultants. In April 2019, our board of directors authorized, and in June 2019, our stockholders approved, an amendment and restatement of the 2011 Plan to make various changes, including increasing the number of shares reserved for issuance by approximately 5.0 million shares and extending the term of the 2011 Plan until April 2029. In May 2020, our board of directors authorized, and in June 2020, our stockholders approved, an increase of 1.4 million in the number of shares reserved for issuance under the 2011 Plan. In April 2021, our board of directors authorized, and in May 2021, our stockholders approved, an additional increase of 4.1 million in the number of shares reserved for issuance under the 2011 Plan.

Valuation and Expense Information

The weighted average assumptions used to estimate the fair value of options granted were as follows:

	Year Ended December 31,		
	2021	2020	2019
Stock options			
Weighted average expected volatility	94.0 %	79.0 %	69.5 %
Weighted average expected term	4.2 years	3.8 years	4.3 years
Weighted average risk-free interest rate	0.6 %	2.6 %	1.9 %
Dividend yield	—	—	—
Weighted-average fair value per share	$ 3.73	$ 2.60	$ 7.17

Activity under the various plans was as follows:

Restricted Stock Units:

	Number of Units (in 000s)	Weighted-Average Grant Date Fair Value per Unit
Balance at December 31, 2018	1,812	$ 7.09
RSU granted	1,808	$ 8.08
RSU released	(730)	$ 8.06
RSU forfeited	(339)	$ 7.80
Balance at December 31, 2019	2,551	$ 7.43
RSU granted	3,788	$ 4.06
RSU released	(1,139)	$ 7.04
RSU forfeited	(338)	$ 6.24
Balance at December 31, 2020	4,862	$ 4.98
RSU granted	3,295	$ 5.23
RSU released	(2,225)	$ 5.02
RSU forfeited	(791)	$ 4.66
Balance at December 31, 2021	5,141	$ 5.18

The total intrinsic value of RSUs vested and released during the year ended December 31, 2021, 2020 and 2019 were approximately $11.2 million, $8.0 million and $5.8 million, respectively. The intrinsic value of vested and released RSUs is calculated by multiplying the fair market value of our common stock on the vesting date by the number of shares vested. As of

December 31, 2021, the unrecognized compensation costs related to outstanding unvested RSUs under our equity incentive plans were $22.5 million. We expect to recognize those costs over a weighted average period of 2.5 years.

***Stock Options*:**

	Number of Options (in 000s)	Weighted-Average Exercise Price per Option	Weighted-Average Remaining Contractual Life (in Years)	Aggregate Intrinsic Value(1) in (000s)
Balance at December 31, 2018	2,385	$ 7.56	7.8	
Options granted	50	$ 13.08		
Options exercised	(197)	$ 5.43		$ 1,198
Options forfeited	(211)	$ 8.73		
Balance at December 31, 2019	2,027	$ 7.78	6.8	
Options granted	117	$ 4.05		
Options exercised	(100)	$ 4.84		$ 359
Option forfeited	(409)	$ 9.22		
Balance at December 31, 2020	1,635	$ 7.33	6.2	$ 834
Options granted	92	$ 5.56		
Options exercised	(37)	$ 5.62		$ 25
Options forfeited	(93)	$ 10.49		
Balance at December 31, 2021	1,597	$ 7.08	5.6	$ 82
Vested at December 31, 2021	1,503	$ 7.13	5.5	$ 82
Unvested awards at December 31, 2021	94	$ 6.30	8.0	$ —

(1) Aggregate intrinsic value as of December 31, 2021 was calculated as the difference between the closing price per share of our common stock on the last trading day of 2021, which was $3.92, and the exercise price of the options, multiplied by the number of in-the-money options.

As of December 31, 2021, the unrecognized compensation costs related to outstanding unvested options under our equity incentive plans were $0.3 million. We expect to recognize those costs over a weighted average period of 0.8 years.

Performance-based Awards

Performance Stock Units with Market Condition

We have granted performance stock units to certain executive officers and senior level employees. The number of performance stock units ultimately earned under these awards is calculated based on the Total Shareholder Return (TSR) of our common stock as compared to the TSR of a defined group of peer companies during the applicable three-year performance period. The percentage of performance stock units that vest will depend on our relative position at the end of the performance period and can range from 0% to 200% of the number of units granted.

Based on the performance of our stock relative to our defined group of peer companies for the period 2018 to 2020, PSUs awarded in 2018 vested in 2021 at a rate of 118.6% of the target. The performance adjustment in the table below reflects the impact of the above-target performance.

	Number of Units (in 000s)	Weighted-Average Grant Date Fair Value per Un
Balance at December 31, 2018	155	$ 10.0
PSU granted	401	$ 16.9
PSU released	—	-
PSU forfeited	(9)	$ 10.0
Balance at December 31, 2019	547	$ 15.0
PSU granted	509	$ 4.8
PSU released	—	-
PSU forfeited	(94)	$ 14.2
Balance at December 31, 2020	962	$ 9.1
PSU granted	396	$ 9.0
Performance adjustment for 2018 awards	21	$ 10.0
PSU released	(133)	$ 10.0
PSU forfeited	(36)	$ 4.8
Balance at December 31, 2021	1,210	$ 10.1

As of December 31, 2021, the unrecognized compensation costs related to these awards were $3.8 million. We expect to recognize those costs over a weighted average period of 1.8 years.

The PSU awards above include 0.3 million of PSUs awarded in 2019. Based on the performance of our stock relative to our defined group of peer companies for the period 2019 to 2021, these awards did not meet the minimum target and the shares returned to the 2011 Equity Plan pool in early 2022.

Performance Stock Units with Performance Conditions

During 2019, we granted performance stock units to a certain employee. The number of performance stock units that ultimately vest under these awards is dependent on the employee achieving certain discrete operational milestones on or before predetermined measurement dates, the latest of which was December 31, 2021. As of December 31, 2021, there were approximately 29 thousand units of these awards outstanding with a weighted-average grant date fair value of $6.46 per unit. The operational milestones were not met and the awards were cancelled in early 2022.

2017 Employee Stock Purchase Plan (ESPP)

Our ESPP offers U.S. and some non-U.S. employees the right to purchase shares of our common stock. Our ESPP program has a six-month offering period, with a new period commencing on the first trading day on or after May 31 and November 30 of each year. Employees are eligible to participate through payroll deductions of up to 10% of their compensation. Employees may not purchase more than $25 thousand of stock for any calendar year. Shares are sold to employees under the ESPP for 85% of the lower of the fair market value of a share of our common stock on the first day of the offering period or the last day of the offering period.

Stock-based Compensation Expense

Total stock-based compensation expense recognized was as follows (in thousands):

	For the Year Ended December 31,		
	2021	2020	2019
Restricted stock units, stock options and performance share units	$ 15,470	$ 13,428	$ 10,555
Employee stock purchase plan	631	1,023	838
Total stock-based compensation	$ 16,101	$ 14,451	$ 11,393

14. Income Taxes

Our loss before income taxes consists of the following (in thousands):

	Year Ended December 31,		
	2021	2020	2019
Domestic	$ (56,291)	$ (46,277)	$ (59,900)
International	(7,369)	(7,824)	(6,805)
Loss before income taxes	$ (63,660)	$ (54,101)	$ (66,705)

Significant components of our benefit for income taxes are as follows (in thousands):

	Year Ended December 31,		
	2021	2020	2019
Current:			
Federal	$ —	$ —	$ —
State	(63)	(31)	(31)
Foreign	167	(2,314)	(568)
Total current tax (expense) benefit	104	(2,345)	(599)
Deferred:			
State	—	—	—
Foreign	4,319	3,426	2,514
Total deferred benefit	4,319	3,426	2,514
Total benefit for income taxes	$ 4,423	$ 1,081	$ 1,915

Reconciliation of income taxes at the statutory rate to the benefit from income taxes recorded in the statements of operations is as follows:

	Year Ended December 31,		
	2021	2020	2019
Tax benefit at federal statutory rate	21.0 %	21.0 %	21.0 %
State tax expense, net of federal benefit	2.8	1.7	0.9
Foreign tax benefit (expense)	4.7	(0.9)	(0.1)
Change in valuation allowance	(15.5)	(11.4)	(6.0)
Federal research and development credit	0.7	1.1	0.7
Unrecognized tax benefit	(0.1)	(0.1)	(0.1)
Non-deductible interest/premium	(1.0)	(1.1)	(7.9)
Global Intangible Low-Tax Income (GILTI)	—	(3.9)	(5.6)
Net operating loss expiration	(2.9)	(3.3)	—
Executive stock-based compensation	(1.3)	—	—
Other, net	(1.5)	(1.1)	—
Effective tax rate	6.9 %	2.0 %	2.9 %

At December 31, 2017, we changed our permanent reinvestment assertion and will not permanently reinvest our foreign earnings outside the United States. The cash generated from some of our foreign subsidiaries may be used domestically to fund operations. Any domestic, foreign withholding tax and state taxes that may be due upon future repatriation of earnings is not expected to be significant.

Significant components of our deferred tax assets and liabilities are as follows (in thousands):

	December 31,	
	2021	2020
Deferred tax assets:		
Net operating loss carryforwards	$ 115,739	$ 104,78
Reserves and accruals	3,473	5,24
Depreciation and amortization	1,931	2,81
Tax credit carryforwards	20,480	18,26
Stock-based compensation	2,871	3,16
Right-of-use lease liability	9,322	9,45
Total gross deferred tax assets	153,816	143,73
Valuation allowance on deferred tax assets	(141,087)	(131,23
Total deferred tax assets, net of valuation allowance	12,729	12,50
Deferred tax liabilities:		
Fixed assets and intangibles	(8,416)	(12,27
Right-of-use asset	(8,459)	(8,69
Total deferred tax liabilities	(16,875)	(20,96
Net deferred tax liability	$ (4,146)	$ (8,46
Deferred tax liability per balance sheet	$ (4,329)	$ (8,69
less deferred tax assets included in other long-term assets	183	23
Net deferred tax liability	$ (4,146)	$ (8,46

We evaluate a number of factors to determine the realizability of our deferred tax assets. Recognition of deferred tax assets is appropriate when realization of these assets is more likely than not. Assessing the realizability of deferred tax assets is dependent upon several factors including historical financial results. The net deferred tax assets have been partially offset by a valuation allowance because we have incurred losses in the U.S. since our inception. The valuation allowance increased by $9.9

million during 2021 and $1.1 million during 2020. The changes in valuation allowance during 2021 and 2020 are mainly due to taxable losses and an increase in tax attributes.

The valuation allowances of $141.1 million and $131.2 million as of December 31, 2021 and 2020, respectively, primarily relate to temporary tax differences, net operating losses and research and development credits generated in the current and prior years. We believe it is more likely than not that U.S. federal and state deferred tax assets relating to temporary differences, net operating losses and research and development credits are not realizable. As such, full valuation allowances have been applied against U.S. federal and state deferred tax assets.

A reconciliation of the beginning and ending amount of the valuation allowance for the years ended December 31, 2021, 2020, and 2019 is as follows (in thousands):

	Valuation Allowance
December 31, 2018	$ 126,108
Charges to earnings	—
Charges to other accounts	3,976
December 31, 2019	130,084
Charges to earnings	—
Charges to other accounts	1,142
December 31, 2020	$ 131,226
Charges to earnings	—
Charges to other accounts	9,861
December 31, 2021	$ 141,087

As of December 31, 2021, we had net operating loss carryforwards for U.S. federal income tax purposes of $508.2 million, of which $1.7 million expire in 2022, and U.S. federal research and development tax credits of $10.0 million, of which $0.4 million expire in 2022 and the rest through 2041. As of December 31, 2021, we had net operating loss carryforwards for state income tax purposes of $196.6 million, of which $0.4 million expire in 2022 and the rest through 2041, and California research and development tax credits of $13.3 million, which do not expire. As of December 31, 2021, we had foreign net loss carryforwards of $3.4 million which can mostly be carried forward indefinitely.

Utilization of the net operating loss carryforwards and credits may be subject to a substantial annual limitation due to the ownership change limitations provided by Section 382 of the Internal Revenue Code of 1986, as amended, and similar state provisions. The annual limitation may result in the expiration of net operating losses and credits before utilization. In 2021, we continued the Section 382 analysis as historically performed through December 31, 2021 and, based on the information that was available to us, we do not believe that an ownership change occurred during the current year.

The aggregate changes in the balance of our gross unrecognized tax benefits during 2021, 2020, and 2019 were as follows (in thousands):

December 31, 2018	$	7,344
Increases in balances related to tax positions during a prior period		155
Increases in balances related to tax positions taken during current period		354
Decreases in balances related to tax positions taken during prior period		(20)
December 31, 2019		7,833
Increases in balances related to tax positions during a prior period		756
Increases in balances related to tax positions taken during current period		441
Decreases in balances related to tax positions taken during prior period		(144)
December 31, 2020	$	8,886
Increases in balances related to tax positions during a prior period		25
Increases in balances related to tax positions taken during current period		325
Decreases in balances related to tax positions taken during prior period		(721)
December 31, 2021	$	8,515

Accrued interest and penalties related to unrecognized tax benefits were included in the income tax provision and are immaterial as of December 31, 2021 and 2020. The uncertain taxes payable are recorded as a long-term liability on the balance sheet. During 2021, we decreased our balances related to tax positions in the prior period to reflect a payment of $0.7 million related to our uncertain tax position in Singapore. We received a final determination from the tax authorities in October 2021 and paid the amounts accrued.

As of December 31, 2021, there were $0.2 million of unrecognized tax benefits that, if recognized, would affect our effective tax rate. We do not anticipate that our existing unrecognized tax benefits will significantly increase or decrease within the next 12 months.

In accordance with U.S. GAAP, the Company is allowed to make an accounting policy choice of either (1) treating taxes related to GILTI as a current period expense when incurred, or (2) factoring such amounts into the measurement of deferred taxes. The Company has treated GILTI related taxes as a current period expense when incurred in the consolidated financial statements.

We file income tax returns in the United States, various states, and certain foreign jurisdictions. As a result of net operating loss carryforwards, all of our tax years are open to federal and state examination in the United States. Tax years from 2012 are open to examination in various foreign countries.

15. Employee Benefit Plans

We sponsor a 401(k) savings plan for our employees in the United States that stipulates that eligible employees may elect to contribute to the plan, subject to certain limitations, up to the lesser of 90% of eligible compensation or the maximum amount allowed by the U.S. Internal Revenue Service. In 2015, we implemented a match formula of 100% up to $2,000 annually, following a 4-year vesting schedule. In 2019, the match was increased to up to $3,000 annually. Employer matching contributions to the 401(k) plan were $0.6 million for the years ended December 31, 2021, 2020, and 2019.

16. Information About Geographic Areas

We operate in one reporting segment that creates, manufactures, and markets a range of products and services, including instruments, consumables, reagents and software that are used by researchers and clinical labs worldwide. Our chief executive officer manages our operations and evaluates our financial performance on a consolidated basis. For purposes of allocating resources and evaluating regional financial performance, our chief executive officer reviews separate sales information for the different regions of the world. Our general and administrative expenses and our research and development expenses are not allocated to any specific region. Most of our principal operations, other than manufacturing, and our decision-making functions are located at our corporate headquarters in the United States.

A summary table of our revenue by geographic areas of our customers and by product and services for the years ended December 31, 2021, 2020 and 2019 is included in Note 6 to the consolidated financial statements.

Revenue from customers in the United States represented $60.2 million, or 46%, of total revenues for the year ended December 31, 2021. Revenue from domestic customers represented $72.0 million, or 52%, of total revenues for the year ended December 31, 2020 and $43.4 million, or 37%, for the year ended December 31, 2019.

Revenue from customers in China were less than 10% of total revenues for the year ended December 31, 2021 and 2020. Revenue from customers in China represented $15.4 million, or 13%, of total revenues for the year ended December 31, 2019. With the exception of China, no other foreign country or jurisdiction had revenue in excess of 10% of our total revenue during the years 2021, 2020 and 2019.

No individual customer represented more than 10% of our total revenues for the fiscal years ended December 31, 2021, 2020, and 2019. Revenues from our five largest customers were 23% for the both the years ended December 31, 2021 and 2020, and 17% for 2019.

We had long-lived assets consisting of property and equipment, net of accumulated depreciation, and operating lease ROU assets, net of accumulated amortization, in the following geographic areas for each year presented (in thousands):

	December 31,	
	2021	2020
United States	$ 34,497	$ 35,188
Singapore	23,732	12,195
Canada	5,597	6,456
Asia-Pacific	804	1,048
EMEA	523	758
Total	$ 65,153	$ 55,645

The increase in long-lived assets in Singapore is attributable to capital expenditures funded by the NIH Contract (see Note 4).

17. Commitments and Contingencies

Commitments

In the normal course of business, we enter into various contractual and legally binding purchase commitments. As of December 31, 2021, these commitments were approximately $22.0 million.

We have entered into several license and patent agreements. Under these agreements, we pay annual license maintenance fees, non-refundable license issuance fees, and royalties as a percentage of net sales for the sale or sublicense of products using the licensed technology. Future payments related to these license agreements have not been included in the contractual obligations table above as the period of time over which the future license payments will be required to be made, and the amount of such payments, are indeterminable. We do not expect the license payments to be material in any particular year.

Indemnifications

From time to time, we have entered into indemnification provisions under certain of our agreements in the ordinary course of business, typically with business partners, customers, and suppliers. Pursuant to these agreements, we may indemnify, hold harmless, and agree to reimburse the indemnified parties on a case-by-case basis for losses suffered or incurred by the indemnified parties in connection with any patent or other intellectual property infringement claim by any third party with respect to our products. The term of these indemnification provisions is generally perpetual from the time of the execution of the agreement. The maximum potential amount of future payments we could be required to make under these indemnification provisions is typically not limited to a specific amount. In addition, we have entered into indemnification agreements with our officers, directors, and certain other employees. With certain exceptions, these agreements provide for indemnification for related expenses including, among others, attorneys' fees, judgments, fines and settlement amounts incurred by any of these individuals in any action or proceeding.

Contingencies

In September 2020, a putative class action complaint alleging violations of the federal securities laws was filed against the Company (also naming our Chief Executive Officer and Chief Financial Officer as defendants) in the U.S. District Court for the Northern District of California (Reena Saintjermain, et al. v. Fluidigm Corporation, et al). The Court appointed a lead plaintiff and lead counsel in December 2020, and an amended complaint was filed on February 19, 2021. The complaint, as amended, seeks unspecified damages on behalf of a purported class of persons and entities who acquired our common stock between February 7, 2019 and November 5, 2019 and alleges securities laws violations based on statements and alleged omissions made by the Company during such period. The Company filed a motion to dismiss the complaint on April 5, 2021 and, on August 4, 2021, the Court granted defendants' motion to dismiss with leave to amend. A second amended complaint was filed on September 14, 2021. The Company filed a motion to dismiss the second amended complaint on October 29, 2021 and, on February 14, 2022, the Court granted defendants' motion and dismissed the second amended complaint with prejudice. The plaintiff has 30 days following the Court's entry of judgment to file an appeal. We believe the claims alleged in the complaint lack merit and, should an appeal be filed, we intend to defend this action vigorously.

From time to time, we may be subject to various legal proceedings and claims arising in the ordinary course of business. These include disputes and lawsuits related to intellectual property, mergers and acquisitions, licensing, contract law, tax, regulatory, distribution arrangements, employee relations and other matters. Periodically, we review the status of each matter and assess its potential financial exposure. If the potential loss from any claim or legal proceeding is considered probable and a range of possible losses can be estimated, we accrue a liability for the estimated loss. We have not recorded any such liabilities. Legal proceedings are subject to uncertainties, and the outcomes are difficult to predict. Because of such uncertainties, accruals are based only on the best information available at the time. As additional information becomes available, we continue to reassess the potential liability related to pending claims and litigation and may revise estimates.

18. Subsequent Event

On January 23, 2022, we entered into (i) a Loan Agreement (the Casdin Loan Agreement) with Casdin Private Growth Equity Fund II, L.P. and Casdin Partners Master Fund, L.P. (collectively, Casdin) and (ii) a Loan Agreement (the Viking Loan Agreement, and together with the Casdin Loan Agreement, the Bridge Loan Agreements) with Viking Global Opportunities Illiquid Investments Sub-Master LP and Viking Global Opportunities Drawdown (Aggregator) LP (collectively, Viking and, together with Casdin, the Purchasers and each, a Purchaser). Each Bridge Loan Agreement provides for a $12.5 million term loan to us (each, a Bridge Loan and collectively, the Bridge Loans). Subject to approval by our stockholders, upon the issuance of the shares of Series B Preferred Stock (as defined below) pursuant to the Purchase Agreements (as defined below), the Bridge Loans will be automatically converted into shares of Series B-1 Preferred Stock (as defined below) or Series B-2 Preferred Stock (as defined below), as applicable, in accordance with the terms of the Bridge Loan Agreements. The Bridge Loans were fully drawn on January 24, 2022. The proceeds of the Bridge Loans may be used for working capital and general corporate purposes.

Also on January 23, 2022, we entered into separate Series B Convertible Preferred Stock Purchase Agreements (the Purchase Agreements) with each of the Purchasers pursuant to which, among other things, at the closing of the transactions contemplated thereby, and on the terms and subject to the conditions set forth therein, including the approval of our stockholders, we will issue and sell an aggregate of $225 million of convertible preferred stock, consisting of: (i) 112,500 shares of our Series B-1 Convertible Preferred Stock, par value $0.001 per share (the Series B-1 Preferred Stock), at a purchase price of $1,000.00 per share to Casdin, and (ii) 112,500 shares of our Series B-2 Convertible Preferred Stock, par value $0.001 per share (the Series B-2 Preferred Stock, and together with the Series B-1 Preferred Stock, the Series B Preferred Stock) at a purchase price of $1,000.00 per share to Viking (clauses (i) and (ii), the Preferred Equity Financing, and together with the issuance of shares of Series B Preferred Stock in connection with the conversion of the Bridge Loans, the Private Placement Issuance). The Series B Preferred Stock to be purchased by Casdin and Viking pursuant to the Purchase Agreements is in addition to any Series B Preferred Stock to be issued upon conversion of outstanding amounts under the Bridge Loan Agreements. The proceeds of the Preferred Equity Transactions will be used by us for expenses related to the Preferred Equity Transactions, as well as working capital, general corporate purposes and merger and acquisition opportunities that we may identify from time to time.

In connection with the Private Placement Issuance, we will change our name to "Standard BioTools Inc." and Dr. Michael Egholm will be appointed as the Company's President and Chief Executive Officer and as a member of our Board of Directors (the Board), each occurring upon the closing of the transactions contemplated by the Purchase Agreements (Closing). Dr. Egholm will succeed Chris Linthwaite, who will continue as our Chief Executive Officer until the earlier of the Closing or May 15, 2022.

The Closing is subject to customary closing conditions for a transaction of this nature, including approval by our stockholders of the issuance of the Series B Preferred Stock in connection with the Private Placement Issuance. Each Private Placement Issuance is also conditioned on the substantially contemporaneous consummation of the other Private Placement Issuance.

Our Board has called a special meeting to be held on March 25, 2022 (the Special Meeting) to ask our stockholders to consider, vote upon and approve (i) a proposal to amend our Eighth Amended and Restated Certificate of Incorporation (the Charter) to, among other things, increase the number of shares of common stock, par value $0.001 per share, (the Common Stock) that we are authorized to issue from two hundred million (200,000,000) shares to four hundred million (400,000,000) shares and to change our name to Standard BioTools Inc. (together, the Charter Amendment Proposal); and (ii) to approve the issuance of (A) the Series B-1 Preferred Stock and the Series B-2 Preferred Stock pursuant to the Purchase Agreements, (B) the Series B-1 Preferred Stock and the Series B-2 Preferred Stock issuable pursuant to the terms of the Bridge Loan Agreements and (C) the Common Stock issuable upon the conversion of the Series B Preferred Stock (clauses (A) through (C), the Private Placement Issuance Proposal). The Private Placement Issuance Proposal is conditioned on the approval of the Charter Amendment Proposal. The Charter Amendment Proposal is conditioned on the approval of the Private Placement Issuance Proposal. If both proposals do not receive the requisite vote for approval, neither the Charter Amendment Proposal nor the Private Placement Issuance Proposal will take effect. The parties have agreed that they will not be obligated to close the Private Placement Issuance if the Charter Amendment Proposal has not been approved at the Special Meeting.

If the Charter Amendment Proposal and the Private Placement Issuance Proposal are not approved by our stockholders at the Special Meeting or the Purchase Agreements are otherwise terminated, then the Bridge Loans will become convertible, at each lender's option, into Common Stock at an initial conversion rate of 352.1126 shares of Common Stock per $1,000 of conversion amount, subject to the cap set forth in the Bridge Loan Agreements. The conversion rate is subject to customary adjustments as set forth in the Bridge Loan Agreements. The Bridge Loans bear interest (i) from and including the effective date of the Bridge Loan Agreements to but excluding March 1, 2022, at 10%, (ii) from and including March 1, 2022 to but excluding June 1, 2022, at 12%, (iii) from and including June 1, 2022 to but excluding September 1, 2022, at 14%, and (iv) from and including September 1, 2022 and thereafter, at 16%. Interest accrues daily and is payable in kind by adding the accrued interest to the outstanding principal amount on the last date of each month. The Bridge Loans mature on the 91st calendar day after the latest maturity date of the loans borrowed under our Loan and Security Agreement, dated as of August 2, 2018, with Silicon Valley Bank, and the principal, together with accrued and unpaid interest, is due on the maturity date.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and our Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2021. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of December 31, 2021, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as such term is defined in Exchange Act Rule 13a-15(f) to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Management assessed our internal control over financial reporting as of December 31, 2021. Management based its assessment on criteria established in *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 Framework). Based on that evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2021.

The effectiveness of our internal control over financial reporting as of December 31, 2021 has been audited by PricewaterhouseCoopers, LLP, an independent registered public accounting firm, as stated in their report included in this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting that occurred during the three months ended December 31, 2021 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on the Effectiveness of Controls

Control systems, no matter how well conceived and operated, are designed to provide a reasonable, but not an absolute, level of assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, have been detected. Because of the inherent limitations in any control system, misstatements due to error or fraud may occur and not be detected.

ITEM 9B. OTHER INFORMATION

None.

ITEM 9C. DISCLOSURES REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS

None.

SCHEDULE II—VALUATION AND QUALIFYING ACCOUNTS AND RESERVES

	In thousands			
	Balance at Beginning of Period	Additions/ Charged to Expense	Deductions	Balance at End of Period
Year ended December 31, 2021				
Accounts receivable allowance	$ 356	$ —	$ —	$ 356
Year ended December 31, 2020				
Accounts receivable allowance	$ 6	$ 356	$ (6)	$ 356
Year ended December 31, 2019				
Accounts receivable allowance	$ 126	$ 179	$ (299)	$ 6

	In thousands			
	Balance at Beginning of Period	Additions/ Charged to Expense	Deductions	Balance at End of Period
Year ended December 31, 2021				
Warranty allowance	$ 1,663	$ 418	$ (911)	$ 1,170
Year ended December 31, 2020				
Warranty allowance	$ 1,390	$ 1,028	$ (755)	$ 1,663
Year ended December 31, 2019				
Warranty allowance	$ 863	$ 1,386	$ (859)	$ 1,390

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information called for by this item will be set forth in our Proxy Statement for the Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2021 and is incorporated herein by reference.

Our board of directors has adopted a Code of Ethics and Conduct that applies to all of our employees, officers and directors, including our Chief Executive Officer, Chief Financial Officer and other executive and senior financial officers. The full text of our code of business conduct and ethics is posted on the investor relations page on our website which is located at www.fluidigm.com. We will post any amendments to our code of business conduct and ethics, or waivers of its requirements, on our website.

ITEM 11. EXECUTIVE COMPENSATION

The information called for by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information, if any, required by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information, if any, required by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

1. **Financial Statements.** See "Index to Consolidated Financial Statements" in Part II, Item 8 of this Form 10-K.

2. **Financial Statement schedule.** See "Index to Consolidated Financial Statements" in Part II, Item 8 of this Form 10-K.

3. **Exhibits.** The exhibits listed in the accompanying Index to Exhibits are filed herewith or are incorporated by reference to exhibits previously filed with the U.S. Securities and Exchange Commission.

ITEM 16. FORM 10-K SUMMARY

None.

INDEX TO EXHIBITS

Exhibit Number	Description	Incorporated by Reference From Form	Incorporated by Reference From Exhibit Number	Date Filed
2.1	Agreement and Plan of Merger dated January 28, 2014 by and among Fluidigm Corporation, DVS Sciences, Inc., Dawid Merger Sub, Inc. and Shareholder Representative Services LLC.	8-K	2.1	1/29/2014
3.1	Eighth Amended and Restated Certificate of Incorporation of Fluidigm Corporation filed on February 15, 2011.	10-K	3.1	3/28/2011
3.2	Amended and Restated Bylaws of Fluidigm Corporation effective as of April 24, 2021.	8-K	3.1	4/29/2021
3.3	Certificate of Designation of Rights, Preferences and Privileges of Series A Participating Preferred Stock.	8-K	3.1	11/22/2016
3.4	Certificate of Elimination of Series A Participating Preferred Stock of Fluidigm Corporation.	8-K	3.1	8/2/2017
4.1	Specimen Common Stock Certificate of Fluidigm Corporation.	S-8	4.1	8/3/2017
4.2	Description of Securities.	10-K	4.2	2/25/2021
4.3	Indenture, dated February 4, 2014, by and between Fluidigm Corporation and U.S. Bank National Association.	8-K	4.1	2/4/2014
4.4	First Supplemental Indenture, dated February 4, 2014, by and between Fluidigm Corporation and U.S. Bank National Association.	8-K	4.2	2/4/2014
4.5	Form of Global Note (included in Exhibit 4.4).	8-K	4.3	2/4/2014
4.6	Indenture, dated November 22, 2019, by and between Fluidigm Corporation and U.S. Bank National Association.	8-K	4.1	11/22/2019
4.7	Form of 5.25% Convertible Senior Note due 2024 (included in Exhibit 4.6).	8-K	4.2	11/22/2019
10.1	Form of Indemnification Agreement between Fluidigm Corporation and its directors and officers.	S-1/A	10.1	1/28/2011
10.2	Lease between AP3-SF3 CT North, LLC and Fluidigm Corporation, dated March 20, 2019.	10-Q	10.1	5/7/2019
10.2A	First Amendment to Lease between AP3-SF3 CT North, LLC and Fluidigm Corporation, dated April 26, 2019.	10-Q	10.2	5/7/2019
10.2B	Second Amendment to Lease between AP3-SF3 CT North, LLC and Fluidigm Corporation, dated February 25, 2020.	10-K	10.2B	2/25/2021
10.3†	Office Lease by and among Rodick Equities Inc., Fluidigm Canada Inc., and Fluidigm Corporation, dated August 17, 2015.	10-Q	10.1	11/9/2015
10.4	Tenancy for Flatted Factory Space in Singapore between JTC Corporation and Fluidigm Corporation dated July 27, 2005, as amended August 12, 2008 and May 31, 2010.	S-1	10.20	12/3/2010
10.5	Offer of Tenancy for Facility Lease between Fluidigm Singapore Pte. Ltd. and SBC Institutional Trust Services (Singapore) Limited, as trustee of Ascendas Real Estate Investment Trust dated October 14, 2013.	10-K	10.21	3/12/2014
10.5A	Offer of Tenancy for Lease of Additional Space at Singapore Facility between Fluidigm Singapore Pte. Ltd. and HSBC Institutional Trust Services (Singapore) Limited, as trustee of Ascendas Real Estate Investment Trust, dated April 2, 2015.	10-Q	10.1	8/10/2015

Exhibit Number	Description	Incorporated by Reference From Form	Incorporated by Reference From Exhibit Number	Date Filed
10.5B	Lease Agreement dated November 19, 2020 between Fluidigm Singapore Pte. Ltd. and HSBC Institutional Trust Services (Singapore) Limited as Trustee of Ascendas Real Estate Investment Trust.	10-Q	10.2	8/6/2021
10.5C	Lease Agreement dated June 8, 2021 between Fluidigm Singapore Pte. Ltd. and HSBC Institutional Trust Services (Singapore) Limited as Trustee of Ascendas Real Estate Investment Trust.	10-Q	10.3	8/6/2021
10.5D	Lease Agreement dated December 13, 2021 between Fluidigm Singapore Pte. Ltd. and HSBC Institutional Trust Services (Singapore) Limited as Trustee of Ascendas Real Estate Investment Trust.	Filed herewith		
10.6	Reserved.			
10.7#	2009 Equity Incentive Plan of Fluidigm Corporation, as amended.	S-1	10.3	12/3/2010
10.7A#	Forms of agreements under the 2009 Equity Incentive Plan.	S-1	10.3A	12/3/2010
10.8#	Fluidigm Corporation 2011 Equity Incentive Plan, as amended effective May 25, 2021.	8-K	10.1	5/25/2021
10.8A#	Forms of agreements under the 2011 Equity Incentive Plan.	S-1/A	10.4A	1/28/2011
10.8B#	Amendments to the Fluidigm Corporation 2011 Equity Incentive Plan and 2009 Equity Incentive Plan and the DVS Sciences, Inc. 2010 Equity Incentive Plan.	8-K	10.2	8/2/2017
10.8C#	Forms of U.S. agreements under the 2011 Equity Incentive Plan.	SC TO-I	(d)(2)	8/23/2017
10.8D	Rules of the Fluidigm Corporation 2011 Equity Incentive Plan for Restricted Stock Unit Awards Granted to French Participants.	SC TO-I	(d)(3)	8/23/2017
10.8E	Rules of the Fluidigm Corporation 2011 Equity Incentive Plan for Options Granted to French Participants.	SC TO-I	(d)(4)	8/23/2017
10.8F	UK Sub-plan to the Fluidigm Corporation 2011 Equity Incentive Plan.	SC TO-I	(d)(5)	8/23/2017
10.8G#	Form of Restricted Stock Unit Agreement-Non-U.S. under the 2011 Equity Incentive Plan.	SC TO-I	(d)(6)	8/23/2017
10.8H#	Form of Stock Option Agreement-Non-U.S. under the 2011 Equity Incentive Plan.	SC TO-I	(d)(7)	8/23/2017
10.9#	Fluidigm Corporation 2017 Inducement Award Plan and related form agreements.	8-K	10.1	1/11/2017
10.10#	Fluidigm Corporation 2017 Employee Stock Purchase Plan, as amended and restated effective June 23, 2020.	8-K	10.1	6/24/2020
10.11#	Executive Bonus Plan.	10-K	10.25	3/28/2011
10.12†	Second Amended and Restated License Agreement between California Institute of Technology and the registrant, effective as of May 1, 2004.	10-Q	10.2	11/9/2020
10.12A†	First Addendum, effective as of March 29, 2007, to Second Amended and Restated License Agreement between California Institute of Technology and the registrant effective as of May 1, 2004.	10-Q	10.2A	11/9/2020
10.13†	Co-Exclusive License Agreement between President and Fellows of Harvard College and the registrant effective as of October 15, 2000.	10-Q	10.3	11/9/2020

Exhibit Number	Description	Incorporated by Reference From Form	Incorporated by Reference From Exhibit Number	Date Filed
10.13A†	First Amendment to Co-Exclusive License Agreement between President and Fellows of Harvard College and the registrant effective as of October 15, 2000.	10-Q	10.3A	11/9/2020
10.14†	Co-Exclusive License Agreement between President and Fellows of Harvard College and the registrant effective as of October 15, 2000.	10-Q	10.4	11/9/2020
10.15†	Co-Exclusive License Agreement between President and Fellows of Harvard College and the registrant effective as of October 15, 2000.	10-Q	10.5	11/9/2020
10.16†	Letter Agreement between President and Fellows of Harvard College and the registrant dated December 22, 2004.	10-Q	10.6	11/9/2020
10.17†	License Agreement between MDS Analytical Technologies, a business unit of MDS INC., and DVS Sciences Inc., dated July 17, 2008.	10-Q/A	10.3	9/15/2014
10.18†	Sublicense Agreement between DVS Sciences Inc. and Fluidigm Corporation, dated January 28, 2014.	10-Q/A	10.4	9/15/2014
10.19	Loan and Security Agreement, dated as of August 2, 2018 by and between Fluidigm Corporation and Silicon Valley Bank.	8-K	10.1	8/2/2018
10.19A	Default Waiver and First Amendment to Loan and Security Agreement, dated September 1, 2018, between the Company and Silicon Valley Bank.	10-K	10.13A	2/27/2020
10.19B	Second Amendment to Loan and Security Agreement, dated November 20, 2019, between the Company and Silicon Valley Bank.	8-K	10.2	11/22/2019
10.19C	Third Amendment to Loan and Security Agreement, dated April 21, 2020, between the Company and Silicon Valley Bank.	8-K	10.1	4/22/2020
10.19D	Fourth Amendment to Loan and Security Agreement, dated August 2, 2021, between the Company and Silicon Valley Bank.	8-K	10.1	8/5/2021
10.19E	Fifth Amendment to Loan and Security Agreement, dated December 27, 2021, between the Company and Silicon Valley Bank.	Filed herewith		
10.19F	Default Waiver and Consent to Loan and Security Agreement, dated March 4, 2022, between the Company and Silicon Valley Bank.	Filed herewith		
10.20	Purchase Agreement, dated November 20, 2019, between Fluidigm Corporation and Barclays Capital Inc., as representative of the several initial purchasers named in Schedule I thereto.	8-K	10.1	11/22/2019
10.21	Open Market Sale Agreement, dated as of March 4, 2020, between Fluidigm Corporation and Jefferies LLC.	8-K	1.1	3/5/2020
10.22†	Contract by and between the National Institutes of Health and the registrant effective as of July 30, 2020, as amended September 28, 2020.	10-Q	10.1	11/9/2020
10.22A†	Amendment dated May 10, 2021 to Contract by and between the National Institutes of Health and the registrant effective as of July 30, 2020, as amended September 29, 2020 and February 18, 2021.	10-Q	10.1	8/6/2021

Exhibit Number	Description	Incorporated by Reference From Form	Incorporated by Reference From Exhibit Number	Date Filed
10.22B†	Amendment dated September 29, 2021 to Contract by and between the National Institutes of Health and the registrant effective as of July 30, 2020, as amended September 29, 2020 and February 18, 2021, and May 10, 2021.	10-Q	10.1	11/9/2021
10.23#	Form of Amended and Restated Employment and Severance Agreement between Fluidigm Corporation and each of its executive officers.	8-K	10.14	12/11/2012
10.24#	Fluidigm Corporation 2020 Change of Control and Severance Plan.	10-Q	10.5	8/7/2020
10.25#	Endorsement Split-Dollar Life Insurance Agreement.	10-Q	10.5	11/7/2017
10.26#	Offer Letter to Stephen Christopher Linthwaite, dated July 14, 2016.	10-Q	10.1	5/8/2018
10.27#	Employment and Severance Agreement, effective as of August 1, 2016, by and between Fluidigm Corporation and Stephen Christopher Linthwaite.	10-Q	10.2	11/9/2016
10.28#	Offer Letter to Vikram Jog dated January 29, 2008.	S-1	10.17	12/3/2010
10.29#	Offer Letter to Bradley A. Kreger dated February 13, 2018.	10-K	10.18	3/18/2019
10.30#	Offer Letter to Colin McCracken dated April 12, 2019.	10-K	10.30	2/25/2021
10.31#	Offer Letter to Nick Khadder dated April 6, 2020.	10-K	10.31	2/25/2021
10.32#	Repatriation Agreement with Colin McCracken dated June 16, 2021.	10-Q	10.4	8/6/2021
10.33#	Terms and Conditions of Employment for Colin McCracken, effective June 26, 2021.	10-Q	10.5	8/6/2021
10.34	Reserved.			
10.35	Series B-1 Loan Agreement, dated as of January 23, 2022, by and among Fluidigm Corporation, Casdin Partners Master Fund, L.P., and Casdin Private Growth Equity Fund II, L.P.	8-K/A	10.1	2/11/2022
10.35A	Series B-2 Loan Agreement, dated as of January 23, 2022, by and among Fluidigm Corporation, Viking Global Opportunities Illiquid Investments Sub-Master LP, and Viking Global Opportunities Drawdown (Aggregator) LP.	8-K	10.2	1/24/2022
10.36	Series B-1 Convertible Preferred Stock Purchase Agreement, dated as of January 23, 2022, by and among Fluidigm Corporation, Casdin Private Growth Equity Fund II, L.P., and Casdin Partners Master Fund, L.P.	DEF 14A	Anx. B	2/24/2022
10.36A	Series B-2 Convertible Preferred Stock Purchase Agreement, dated as of January 23, 2022, by and among Fluidigm Corporation, Viking Global Opportunities Illiquid Investments Sub-Master LP, and Viking Global Opportunities Drawdown (Aggregator) LP.	DEF 14A	Anx. C	2/24/2022
10.37	Registration Rights Agreement, dated as of January 23, 2022, by and between Fluidigm Corporation, Casdin Private Growth Equity Fund II, L.P., Casdin Partners Master Fund, L.P., Viking Global Opportunities Illiquid Investments Sub-Master LP, and Viking Global Opportunities Drawdown (Aggregator) LP.	8-K	10.5	1/24/2022
10.38#	Stephen Christopher Linthwaite Transition Agreement and Release.	8-K	10.6	1/24/2022
10.39#	Michael Egholm Offer Letter.	8-K	10.7	1/24/2022

Exhibit Number	Description	Incorporated by Reference From Form	Incorporated by Reference From Exhibit Number	Date Filed
10.40#	Indemnification Agreement, dated January 23, 2022, by and between Fluidigm Corporation and Michael Egholm.	8-K	10.8	1/24/2022
10.41#	Hanjoon Alex Kim Offer Letter.	8-K	10.9	1/24/2022
10.42#	Form of Retention Letter.	8-K	10.10	1/24/2022
21.1	Subsidiaries of Fluidigm Corporation.	Filed herewith		
23.1	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm.	Filed herewith		
24.1	Power of Attorney (contained in the signature page to this Form 10-K).	Filed herewith		
31.1	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 of Chief Executive Officer.	Filed herewith		
31.2	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 of Chief Financial Officer.	Filed herewith		
32.1~	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 of Chief Executive Officer.	Filed herewith		
32.2~	Certification Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 of Chief Financial Officer.	Filed herewith		
101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.	Filed herewith		
101.SCH	XBRL Taxonomy Extension Schema Document	Filed herewith		
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document	Filed herewith		
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document	Filed herewith		
101.LAB	XBRL Taxonomy Extension Label Document	Filed herewith		
101.PRE	XBRL Taxonomy Extension Presentation Document	Filed herewith		

Management contracts or compensation plans or arrangements in which directors or executive officers are eligible to participate.

† Portions of this exhibit have been redacted in compliance with Regulation S-K Item 601(b)(10)(iv) or pursuant to an order granted by the Securities and Exchange Commission for confidential treatment.

~ In accordance with Item 601(b)(32)(ii) of Regulation S-K and SEC Release No. 33-8238 and 34-47986, Final Rule: Management's Reports on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports, the certifications furnished in Exhibits 32.1 and 32.2 hereto are deemed to accompany this Form 10-K and will not be deemed "filed" for purposes of Section 18 of the Exchange Act. Such certifications will not be deemed to be incorporated by reference into any filings under the Securities Act or the Exchange Act, except to the extent that Fluidigm Corporation specifically incorporates it by reference.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

FLUIDIGM CORPORATION

Dated: March 7, 2022

By: /s/ Stephen Christopher Linthwaite
Stephen Christopher Linthwaite
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Stephen Christopher Linthwaite and Vikram Jog, jointly and severally, as his or her true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign this Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises hereby ratifying and confirming all that said attorneys-in-fact and agents, or his or their substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Stephen Christopher Linthwaite **Stephen Christopher Linthwaite**	President and Chief Executive Officer (Principal Executive Officer); Director	March 7, 2022
/s/ Vikram Jog **Vikram Jog**	Chief Financial Officer (Principal Financial and Accounting Officer)	March 7, 2022
/s/ Carlos V. Paya **Carlos V. Paya**	Chairman of the Board of Directors	March 7, 2022
/s/ Nicolas M. Barthelemy **Nicolas M. Barthelemy**	Director	March 7, 2022
/s/ Gerhard F. Burbach **Gerhard F. Burbach**	Director	March 7, 2022
/s/ Laura M. Clague **Laura M. Clague**	Director	March 7, 2022
/s/ Bill W. Colston **Bill W. Colston**	Director	March 7, 2022
/s/ Ana K. Stankovic **Ana K. Stankovic**	Director	March 7, 2022

Lease reference number: T0029436

Date: ____

HSBC INSTITUTIONAL TRUST SERVICES (SINGAPORE) LIMITED
AS TRUSTEE OF ASCENDAS REAL ESTATE INVESTMENT TRUST

and

FLUIDIGM SINGAPORE PTE. LTD.

Lease for

BLOCK 5008 ANG MO KIO AVENUE 5
#07-11 & **#07-15 TECHPLACE** II
SINGAPORE 569874

SCHEDULE 1
DETAILS OF LEASE

Item 1: Landlord (we, us, our) : HSBC INSTITUTIONAL TRUST SERVICES (SINGAPORE) LIMITED
AS TRUSTEE OF ASCENDAS REAL ESTATE INVESTMENT TRUST

Item 2: Tenant (you, your) : FLUIDIGM SINGAPORE PTE. LTD.

Item 3: Premises

(a) Unit numbers : Block 5008 #07-11 & #07-15

(b) Building : Block 5008 Ang Mo Kio Avenue 5 TECHplace II Singapore 569874

(c) Boundary : (for identification only) edged in red in the attached plan (or plans) marked as schedule 5

Item 4: Floor Area :

Unit numbers	Floor Area (square metre)
Block 5008 #07-11 & #07-15	460.00
Total Floor Area	460.00

Item 5: Possession Date : N.A.

Item 6: Start Date : 01 February 2022

Item 7: Term : 14 months beginning from the Start Date

Item 8: Permitted Use : R&D and manufacturing of fluidic chips and microfluidic system only

Item 9: Rent :

(a) The Gross Rent, Net Rent and Service Charge are as follows.

Unit	Net Rent Rate (per square metre)	Service Charge Rate (per square metre)	Gross Rent Rate (per square metre)	Net Rent	Service Charge	Gross Rent	Period such rent or charge applies for
Block 5008 #07-11 & #07-15	$12.45	$2.62	$15.07	$5,727.00	$1,205.20	$6,932.20	01 February 2022 to 31 March 2023

(b) The charges shown above do not include goods and services tax (GST) and other Taxes you must pay under this Lease.

Item 10: Fitting Out Rent-free Period (if any) : N.A.

Item 11: Term Rent-free Period (if any) : N.A.

Item 12: **Security Deposit** : $20,796.60, being 3 months' Gross Rent

Item 13: **Tenant's Works Deposit** : $4,600.00 (based on the rate of $10.00 per square metre of the Floor Area of the Premises (a minimum of $2,000.00 applies))

Item 14: **Public liability insurance amount** : $3 million

Item 15: **Electricity Supply Deposit (initial** : N.A.

Item 16: **Floor loading limit** :

Storey	Floor Loading (kN per square metre)
1	12.5
4 to 8	7.5
Canteen	5

Item 17: **Car-park passes (if any)** : 2

SCHEDULE 2 SPECIAL COVENANTS

(By way of note, the Plain English Campaign's Crystal Mark will not apply to this section.)

Any commercial terms and amendments to the Standard Covenants or Tenants' Guide will be set out in this schedule.

"NIL"

SCHEDULE 3 BUILDING COVENANTS

(By way of note, the Plain English Campaign's Crystal Mark will not apply to this section.) Any Building Covenants specific to the Building will be set out in this schedule.

In addition to the provisions set out in the Special Covenants, both you and us must keep to and be bound by the following terms, covenants and conditions:-

A) REDEVELOPMENT

Without being affected by anything else in this Lease, if at any time during the Term we decide that:-

(i) the Building is to be demolished for redevelopment; or

(ii) the Building or any part of the Building is to be renovated, retrofitted, refurbished or altered, and this will affect the Premises,

we may end this Lease by giving you 06 months' notice in writing.

When this Lease ends, you must deliver vacant possession of the Premises to us in line with the terms of this Lease, and you will have no claim (including right of compensation) against us for ending this Lease.

To avoid any doubt, this will not affect any rights and remedies that we may have against you in respect of any of your failure to keep to the terms and conditions of this Lease which occurred before the ending of this Lease. We may also offer you alternative space if available which you may relocate to within such time as we notify you and on such rent, lease term and other terms and conditions as we may decide. Whether or not you accept the offer, this will not affect your obligation to deliver vacant possession of the Premises on the date set out in the notice.

B) GREEN LEASE CERTIFIED/GOLD REQUIREMENTS

As the Building is presently or intended to be Green Mark certified, you must keep to our following requirements during the Term:

1. You must use energy-saving light bulbs for lighting and the overall lighting power density for office area together with laboratories shall not exceed 10 watts per square metre. If you use fluorescent light fittings, you must install it with electronics ballast. You may also use LED lights for as long as such lights do not exceed 8 watts per square metre. You must submit the lighting technical specifications, lighting schedules (showing the quantity, types of lightings and location), lighting layout plans, and the lighting power budget to us for approval before installation.
2. The overall lighting power density for retail and food & beverage areas shall not exceed 20 watts per square metre and 10 watts per square metre respectively. You must submit the lighting technical specifications, lighting schedules (showing the quantity, types of lightings and location), lighting layout plans, and the lighting power budget to us for approval before installation.
3. You must not use halogen light fittings in the Building.
4. You must ensure that if an area is not used frequently or only used occasionally, it must have provision of occupancy sensor to switch off the light when there is no occupant in the area.
5. You must not remove occupancy sensors installed in the toilets under any circumstance.
6. If you need to replace any light fittings in the toilets, the overall lighting power density for each toilet must not exceed 10 watts per square metre and such replacement will be subject to our prior approval.

7. You must ensure that the design or installation for lighting installation in the Premises must have proper zoning together with switch control to switch on and off the zone.

8. You must provide separate sub-meters for server rooms and data centres to monitor your energy consumption. You must provide such data to us annually for Green Mark verification and auditing. These sub-meters must be linked to our building automation system for recording of your energy consumption and for Green Mark verification purposes.

9. If you require any stand-alone air-cooled air-conditioning system for the Premises, you must first discuss with our agent, Ascendas Services Pte Ltd to explore the feasibility of tapping the Building's chilled water and confirm if it is more energy efficient to do so than installing stand-alone air-cooled air-conditioning system.Only air-cooled air-conditioning system with minimum coefficient of performance ("COP") of 3.78 or more is allowed to be installed and you must submit the system's efficiency computation, technical specifications and evidence of achieving the targeted COP to us for approval before installation.

10. You must ensure that all air-conditioning systems installed are designed to allow for cooling load variations due to fluctuations in ambient temperature to ensure consistent indoor conditions for thermal comfort. As required by the relevant codes of practices, the indoor temperature shall be between 230C to 250C with relative humidity less than 65 percent.

11. You must only use paints with low volatile organic compound ("VOC") and adhesives with low emission formaldehyde certified by recognised Green Certification bodies such as Singapore Green Labeling Scheme("SGLS") or Singapore Green Building Product Scheme ("SGBP"). You must submit the relevant Green Certification bodies certification, layout plans showing the area of coverage and catalogues or technical specifications of the products to us for approval before installation.

12. You must promote the use of appropriate environmentally friendly products that are certified by recognized Green Certification bodies such as SGLS or SGBP in your fit-out works. You must submit the relevant Green Certification bodies certification and layout plans showing the area of coverage and catalogue/ technical specifications of the products to us for approval before installation.

13. If any water fittings in the toilets are to be installed or replaced, you must only use the Public Utilities Board Water Efficiency Labelling Scheme ("PUB WELS") certified 3-tick water fittings and such installations will be subjected to our prior approval.

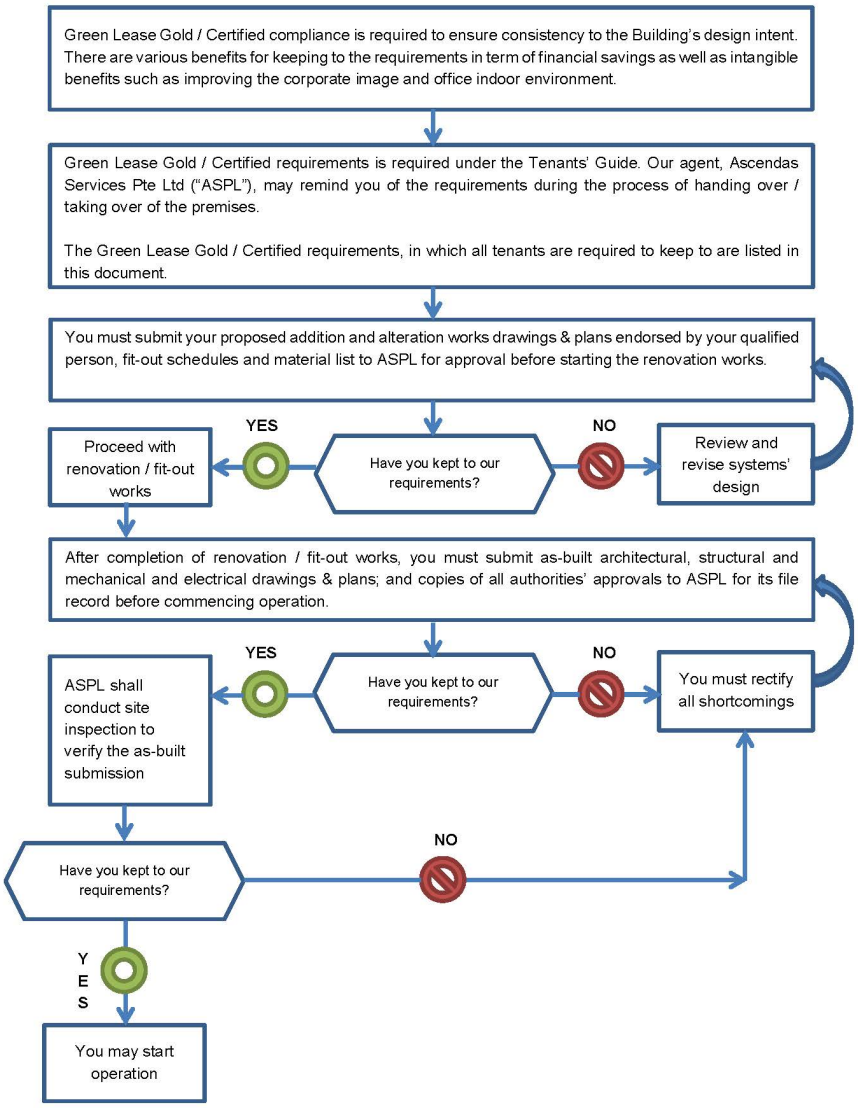
14. You are encouraged to promote and implement sustainability policies such as recycling program, provide recycle bins for the collection and storage of different recyclable waste, tracking the amount of waste recycled and energy-savings programs to conserve energy.

15. You must keep in line with the steps set out in the flowchart in Annex 1 and fill in the form set out in Annex 2 below.

16. To avoid any doubt, you must keep to any changes to the latest relevant Green Lease requirements which may apply from time to time as required by the Authorities or us so that you do not affect our application for Green Mark certification or re-certification for the Building or Park. You may obtain a copy of the latest Green Lease requirements from the management office of the Building.

ANNEX 1

GREEN LEASE GOLD / CERTIFIED COMPLIANCE PROCESS FLOW CHART



ANNEX 2

TENANT'S FIT-OUT INFORMATION FORM

Lighting System

Type of Fitting	Type of Ballast	Location and Coverage Area (square metre)	Quantity	Unit Power with Ballast (Watt)	Total Installed Power (Watt)	Lighting Density (Watt per square metre)

Air-conditioning System

Model and Brand of AHU / FCU	Design Air Flow (CMH)	Design Chilled Water Temperatures (°C)	Quantity	Unit Power (Watt)	Total Installed Power (Watt)	Performance (Watt per CMH)

Model and Brand of Unitary Cooling Equipment	Capacity (kilo-watt)	Quantity	Unit Power (Watt)	Total Installed Power (Watt)	Number of Ticks	Performance (COP)

Water Fittings

Water Fitting Type	Quantity				Total No. of Fitting
	Excellent	Very Good	Good	No Tick	

Please attached WELS certificate for the fitting used.

In-door Air Quality Management

Brand of Low VOC Paint or Low Formaldehyde Adhesive	Area of Application	Certification by

Recycling Management

Adoption of Recycling (Yes/No)	Type of Recycling (Paper/Plastic/Can)	No. of Recycling Bin

Submitted By

Date

SCHEDULE 4 STATEMENT OF ACCOUNTS

	Amount	GST (7%)
NET RENT:	$5,727.00	$400.89
$12.45 per square metre per month on 460.00 square metres for a period of 14 months beginning from 1 February 2022		
SERVICE CHARGE:	$1,205.20	$84.36
$2.62 per square metre per month on 460.00 square metres for a period of 14 months beginning from 1 February 2022		
GROSS RENT:	$6,932.20	$485.25
$15.07 per square metre per month on 460.00 square metres for a period of 14 months beginning from 01 December 2020		
Legal Fees	$800.00	$56.00
Security Deposit in Cash	$20,796.60	
Subtotal	$28,528.80	$541.25
Less Security Deposit in Cash from Current Lease	($20,796.60)	
GST	$541.25	
Total amount (including GST) [payable to "HTSG A/C ASCENDAS REIT"]	$8,273.45	
Stamp Duty [payable to 'Infinitus Law Corporation']	$388.00	

Tenant's Works Deposit $4,600.00
(You are required to pay tenant's works deposit if any renovation works are to be carried out)

*As a show of goodwill, we allow you to pay the advance gross rental of $7,417.45 (including 7% GST) when it is due in February 2022. As such, please give us a cheque payable to "HTSG a/c Ascendas REIT" for the amount of $856.00 instead of $8,273.45 and another cheque payable to "Infinitus Law Corporation" for the amount of $388.00.

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STANDARD COVENANTS

1 INTERPRETATION

1.1 Definitions

In this Lease, the following terms have the meanings as set out below.

1.1.1 **'Additional Property Tax'** means the increase in property tax relating to the Premises for the Rent-free Period (if any) and the Term, due to:

(a) an increase in the annual value (as defined in the Property Tax Act (Chapter 254)) in respect of the Premises which is more than the yearly Net Rent; or

(b) an increase in the rate of property tax in respect of the Premises which is more than the rate of property tax that applies on the Possession Date.

1.1.2 **'Capitaland Business Park & Industrial Tenant Portal'** means the tenant service portal which you can access at http://bpi-tenanLcapitaland.com or such other website address we may give you.

1.1.3 **'Authorities'** means all relevant government bodies, statutory bodies and other authorities.

1.1.4 **'Building'** means the land and the buildings which the Premises form part of (including car-parks, service, loading and any other areas for the use and enjoyment of the building, whether or not these are within the structure of the building).

1.1.5 **'Building Covenants'** means any terms, covenants and conditions as set out in schedule 3 which are specific to the Building.

1.1.6 **'Car-park Charges'** means the charges you must pay to use the car-parks at the Building.

1.1.7 **'Circumstances Beyond Our Control'** means any circumstances we have no control over, and which directly or indirectly prevent or delay us from carrying out our obligations under this Lease, including natural disasters, flooding, haze, national emergency, war, insurgency, labour disputes, civil commotion or riots.

1.1.8 **'Common Area'** means the parts of the Building (whether or not within the structure of the Building) which (a) are for shared use by us, you, other tenants and occupiers of the Building, and anyone who is properly authorised to use those areas, and (b) would be considered as 'common areas' or 'common parts' of the Building for shared use, enjoyment or benefit if the Building had been subdivided and registered under the Land Titles (Strata) Act (Chapter 158). Common Area does not include areas which are inside the Premises or which serve the Premises only.

1.1.9 **'Conducting Media'** means any drains, sewers, conduits, flues, risers, gutters, gullies, channels, ducts, shafts, watercourses, pipes, cables, wires and mains in, on or under the Building, including any that are installed in the future.

1.1.10 **'Electricity Charges'** means the charges for electricity as used at the Premises.

1.1.11 **'Electricity Supply Deposit'** means the electricity-supply deposit amount, being an amount equal to 1.5 times' the expected monthly Electricity Charges, which we will estimate and notify you from time to time. The initial amount of the Electricity Supply Deposit is set out in schedule 1.

1.1.12 **'Fire-safety Approval'** means the approval (including fire-safety certificates or notices of approval) issued by the Singapore Civil Defence Force under the Fire Safety Act (Chapter 109A) or such other authority.

1.1.13 **'Fitting Out Rent-free Period'** means the period where the Tenant's Works relating to the fitting out of the Premises are carried out as set out in schedule 1.

1.1.14 **'Floor Area'** means the floor area of the Premises set out in schedule 1.

1.1.15 **'Gross Rent'** means the Net Rent and the Service Charge as set out in schedule 1.

1.1.16 **'Gross Rent Rate'** means the Gross Rent per square metre for each month under the Term as set out in schedule 1.

1.1.17 **'Head Landlord'** means the landlord under the Head Lease (whether immediate or not).

1.1.18 **'Head Lease'** means the lease under which we hold our interest in the Building and includes any superior lease (that is, a lease under which our landlord or any other landlord above holds its interest in the Building) and all documents that apply to it.

1.1.19 **'Infectious Disease'** means the diseases defined in the Infectious Diseases Act (Chapter 137).

1.1.20 **'Interest'** means interest at the rate of 10% per year calculated on a daily basis and based on the actual number of days in the year (both before and after any judgment), or any other rate as we may notify from time to time.

1.1.21 **'JTC'** means the Jurong Town Corporation.

1.1.22 **'Law'** includes any present or future laws (including regulations, codes and guidelines) by statute, common law and/or equity.

1.1.23 **'Lease'** means this lease of the Premises between you and us, made up of (i) the Standard Covenants, (ii) the Tenants' Guide, and (iii) all schedules (including the Special Covenants and Building Covenants), attachments, appendices, annexes and side letters to each of such documents mentioned.

1.1.24 **'Losses'** means damages, compensation, losses, costs and expenses, claims, notices and proceedings, of any nature, including, where the context allows, any costs and expenses of making good any losses or damage.

1.1.25 **'Net Rent'** means the rent (not including Service Charge and other amounts due) for each month of the Term calculated at the monthly Net Rent Rate on the Floor Area, as set out in schedule 1.

1.1.26 **'Net Rent Rate'** means the Net Rent per square metre for each month of the Term as set out in schedule 1.

1.1.27 **'Original Condition'** means the original state and condition of the Premises on the date you first took possession of the Premises under this Lease as shown in the plans and drawings we have given or will give you, but not including the Tenant's Works or any works that previous tenants have carried out.

1.1.28 **'Our Authorised People'** means our employees, agents, independent consultants or contractors, people we allow to be in the Building or Park, visitors, licensees and other people under our control, or who we are responsible for or who claim rights under this Lease through, under or in trust for us.

1.1.29 **'Park'** means (where it applies), the science, business or industrial park or such wider area or vicinity where the Building is located.

1.1.30 **'Payment Date'** means the first day of a month or such relevant date as we may notify you in our invoice to make any payment as required under this Lease.

1.1.31 **'Permitted Use'** means the use allowed for the Premises as set out in schedule 1 and approved by the Head Landlord and the Authorities.

1.1.32 **'Possession Date'** means the possession date (if this applies) as set out in schedule 1 or any other date we may notify you.

1.1.33 **'Premises'** means the part or parts of the Building which will be leased to you as set out in schedule 1, including improvements and additions made to the Premises, and the fixtures and fittings (whether they belong to you or us) in the Premises, but not including (i) structural parts located outside the Premises, (ii) the loadbearing framework, (iii) the roof, (iv) foundations, (v) joists (that is, a long, thick piece of wood, metal, or concrete, used in buildings to support a floor or ceiling), (vi) Conducting Media which serve only spaces other than the Premises that you do not access, (vii) our machinery and plant which are in the Premises but which serve only other spaces besides the Premises that you do not access, (ix) the faces of boundary walls that are outside the Premises; and (x) the faces of external walls outside the Premises (unless these are glass walls).

1.1.34 **'Reinstatement Works'** means the reinstatement works to restore the Premises to their Original Condition (except for fair wear and tear) in line with the Tenants' Guide, Law and any other requirements that we may have.

1.1.35 **'Rent-free Period'** means the Fitting Out Rent-free Period and the Term Rent-free Period.

1.1.36 **'Security Deposit'** means the security deposit amount as set out in schedule 1.

1.1.37 **'Service Charge'** means the charge for your share of the Total Outgoings as we may decide for each month calculated at the Service Charge Rate on the Floor Area as set out in schedule 1.

1.1.38 **'Service Charge Rate'** means the Service Charge per square metre for each month as set out in schedule 1.

1.1.39 **'Side Letters'** means further terms, covenants and conditions to this Lease made between you and us at any time to add to, amend or vary this Lease.

1.1.40 **'Special Covenants'** means such further terms, covenants and conditions as set out in schedule 2 as commercially agreed to vary or add to the Lease.

1.1.41 **'Standard Covenants'** means these standard terms, covenants and conditions.

1.1.42 **'Start Date'** means the date on which the Term begins as set out in schedule 1.

1.1.43 **'Taxes'** means any goods and services tax, duty or charge which may be imposed at any time by the Authorities.

1.1.44 **'Tenants' Guide'** means the further standard terms, covenants and conditions relating to safety or actions in the Building or Premises, or the use, maintenance, renovation or management of the Building or Premises.

1.1.45 **'Tenant's Works'** means any fitting-out work or any other renovation, alterations, additions, interior layout work, interior design, installations, internal fittings, wiring, plumbing, reinstatement or other work you carry out to the **Premises.**

1.1.46 **'Tenant's Works Deposit'** means the deposit you must pay for the Tenant's Works (if any) as required under this Lease, and which we may collect from you from time to time to cover any Tenant's Works. The initial amount of the Tenant's Works Deposit is set out in schedule 1.

1.1.47 **'Term'** means the term of this Lease as set out in schedule 1.

1.1.48 **'Term Rent-free Period'** means the rent-free period during the Term (if any) as set out in schedule 1.

1.1.49 **'Total Outgoings'** means all outgoings, costs and expenses (including capital expenditure and loss in value over time) which we have to pay for providing, controlling, managing, maintaining and replacing any services or parts of the **Building** (including fixtures and fittings).

1.1.50 **'Utilities'** means electricity, water, sewerage, tele-communications and, if it applies, gas, air conditioning and chilled water.

1.1.51 **'Utilities Charges'** means the charges for the Utilities as used at the Premises.

1.1.52 **'We', 'us', or 'our'** (whether capitalised or not) means us as the landlord as set out in schedule 1 and includes our successors (a person who takes over our rights and obligations) and assigns (a person who takes over our rights).

1.1.53 **'You', or 'your'** (whether capitalised or not) means you as the tenant as set out in schedule 1 and includes your successors (a person who takes over your rights and obligations) and assigns (a person who takes over your rights, only after we have approved the transfer).

1.1.54 **'Your Authorised People'** means your employees, agents, independent contractors, people you allow to be in the Premises, visitors, licensees, anyone under your control, and anyone you are responsible for or who claims rights under this Lease through, under or in trust for you.

1.2 General rules of interpretation

The following rules apply when interpreting this Lease, unless the context requires otherwise.

1.2.1 While we have made efforts to express this Lease in plain English, any wording used may not be completely sufficient to describe its meaning, and you must read all words in line with their usual legal meaning.

1.2.2 Headings are for convenience only and must not be used to limit or interpret any covenant, condition or clause.

1.2.3 Any reference to the singular includes the plural, and vice versa.

1.2.4 Any reference to a person or people includes any individual or any corporate entity.

1.2.5 Any reference to the whole includes all or any part of the same.

1.2.6 Each word or term does not limit the effect of another word or term.

1.2.7 Any reference to 'including', 'include' or 'includes' means including without limitation or affecting the generality of any description, definition, term or phrase coming before that word.

1.2.8 Any reference to 'responsible' means, where the context allows, being liable for any Losses.

1.2.9 You must, unless set out otherwise, pay all fees, charges, costs and expenses arising out of or relating to any obligations you have under this Lease, including if it applies, Interest, on any outstanding payments you owe and any fees or expenses due to the relevant Authorities. We can claim these payments as if they are rent arrears and may deduct such payments from any deposits you have paid under this Lease. You may not withhold or delay any payment, and you must pay all amounts you owe under this Lease even if this Lease has come to an end.

1.2.10 You must, at your own cost and expense, keep to (and make sure that each of Your Authorised People keep to) every obligation you have and restriction that applies under this Lease. If this Lease states that you will not have any claim against us for any Losses, Your Authorised People will also not have any claim against us for such Losses.

1.2.11 If, under this Lease, you need our permission or approval for any action, you must get this in writing from us before taking that action. We will decide if, and on what terms, to give or withhold permission or approval. Even if we give our permission or approval, you will remain responsible for these permitted or approved matters or actions. This clause 1.2.11 also applies if the Head Landlord or any of the Authorities require any permission or approval. In addition, any right given to us under this Lease is also given to the Head Landlord and any Authorities and any person authorised by us, the Head Landlord and the Authorities.

1.2.12 If we carry out any action or exercise any right or remedy under any clause in this Lease, this will not affect our other rights or remedies under that clause or the rest of this Lease.

1.2.13 Each schedule of, attachment, appendix and annexure to this Lease forms part of this Lease. If there are any inconsistencies between the different parts of this Lease, priority will be given in the following order from first to last: (1) Side Letters (if any), (2) Special Covenants, (3) Building Covenants, (4) Standard Covenants, and (5) Tenants' Guide.

2 GRANT OF LEASE

2.1 Lease

We agree to lease the Premises to you for the Term in return for you paying the Gross Rent and keeping to the terms, covenants and conditions as set out in this Lease (including the Special Covenants, Building Covenants and the Tenants' Guide).

2.2. Permitted Use

2.2.1 You must use the Premises only for the Permitted Use. If you want to change the Permitted Use, you must first get approval from us and the Authorities. You must also get, maintain and keep to all necessary approvals which you need by Law to carry out your business at the Premises. To avoid any doubt, you must also carry out your own checks on the Premises as we will not be responsible for making sure the Premises are suitable for the Permitted Use.

2.2.2 If the Premises are a property where the Urban Redevelopment Authority's 60:40 rules apply, you must make sure that at least 60% of the Floor Area is used for industrial activity, and no more than 40% of the Floor Area is used for such ancillary (that is, supporting) purposes to the Permitted Use as we, the Urban Redevelopment Authority or any other relevant Authority may approve. You must also provide us with the filled-in and signed declaration form as set out in schedule 6 upon signing this Lease. If you fail to do so, we may give you two weeks' notice to submit such form. If you have still not provided the filled-in and signed declaration form by the end of the two weeks' notice, we may immediately end this Lease and, if you have taken possession of the Premises, you must carry out the Reinstatement Works to keep to clause 4.3.1. You will forfeit (that is, give up the right to claim) any money or deposits you have paid to us under this Lease, you must pay us any costs and expenses we have to pay, and you will not have any claim against us for any Losses which you may suffer due to us ending this Lease.

2.3 Head Landlord's and Authorities' approvals

2.3.1 If the Premises are a property under the control of JTC, you must:

(a) first get the relevant approvals (including any anchor tenant approval) from JTC and the Authorities to use the Premises before we give the lease of the Premises to you; and

(b) give us any relevant information and documents we ask for, including the items set out in schedule 7, at least 14 days before the Possession Date or Start Date, whichever is earlier. To avoid any doubt, you must pay any costs that apply, including any subletting fees or other fees we must pay or have paid to the Head Landlord or Authorities. You must also pay any fees and other charges charged by the Head Landlord or Authorities for not meeting this condition due to your delay or failure to give us any relevant information or documents.

2.3.2 If you do not have all the approvals as required under clause 2.3.1, we may give you notice that this Lease will be considered as null and void (that is, in a state as if this Lease never existed), except that you must reinstate the Premises in line with this Lease and you must pay all Gross Rent, Utilities Charges and other charges due from the Possession Date or Start Date, whicheveris earlier, until the day you return the Premises to us (both dates included). You will not have any claim against us for any losses you suffer due to this Lease being considered as null and void. Within 30 days after we have confirmed that there are no outstanding obligations under this Lease, and as long as you did not cause such failure to get such approvals, we will refund:

(a) all deposits you have paid (without Interest and after deducting necessary amounts if you have not kept to any other terms of this Lease or for damage you have caused to the Premises or the Building); and

(b) all legal fees and stamp duties you have paid if they have not been charged by our lawyers or the Authorities.

2.4 Compliance regulations

You must keep to, and make sure that each of Your Authorised People keep to, the relevant anti-money- laundering, anti-bribery, anti-corruption, and anti-financing of terrorism Laws and/or our policies. If you fail to do so, we may give you notice upon which this Lease will be considered as null and void (that is, as if this Lease had never existed), except that you must still (i) reinstate the Premises in line with this Lease, (ii) pay all Gross Rent, Utilities and other charges due from the Possession Date or Start Date, whichever is earlier, until the day you return the Premises to us (both dates included), and all other Losses which we may suffer arising out of or relating to you not keeping to this clause 2.4, including the loss of Gross Rent which we could have collected for the Term and the Rent-free Period (if any), and any costs and expenses of re-letting or trying to re-let the Premises. We will also not refund any deposits or money you have paid to us, and you will not have any claim against us for any Losses which you may suffer due to this Lease being considered as null and void (that is, as if this Lease had never existed).

2.5 Rights and exceptions

2.5.1 The Premises are leased to you with:

(a) the right to use the Common Area to pass to and from the Premises; and

(b) the right to use the designated toilet facilities, lifts, staircases and driveways in the Common Area.

2.5.2 Under this Lease, we have:

(a) the right to free and uninterrupted passage and running of Utilities and other services through the Conducting Media in the Premises;

(b) the right to enter the Premises as allowed under this Lease, except that we will use reasonable efforts to minimise any disturbance to you;

(c) the right of light, air, support, shelter, easements (that is, a right enjoyed by one person over another's land for a specific purpose such as a right of way) and all other rights belonging to or enjoyed by other parts of the Building;

(d) the right to put up scaffolding for carrying out repairs, renovations, alterations, additions, cleaning, painting or other work to the Building, and to build on, alter, rebuild, develop or use the land next to the Building or in the Park, even if (i) access to, use or enjoyment of the Premises may be temporarily restricted, (ii) any light and air coming into the Premises is affected or (iii) any nuisance, damage, or inconvenience is caused to you or any of your occupiers, except that we will use reasonable efforts to minimise any disturbance to you;and

(e) the right to carry out any power shutdown in the Building as may be required by us or the Authorities, by providing notice to you (except in cases of emergency), and without us having to provide any emergency power or back-up supply of electricity, except that we will use reasonable efforts to minimise any disturbance to you.

2.5.3 Any person you authorise to use or enjoy the Premises in line with this Lease will also have the rights under clause 2.5.1, and (i) we, (ii) the Head Landlord, and (iii) any person authorised by us or the Head Landlord will also have the rights under clause 2.5.2.

3 TAKING POSSESSION

3.1 You will take possession of the Premises on the Possession Date. If you delay taking possession of the Premises, we will not postpone the Fitting Out Works Rent-free Period (if any) and/or the Term.

3.2 You agree to take the Premises on an 'as is, where is' basis and not to object to the state and condition of the Premises (including the structural, mechanical and electrical specifications) on the date you first take possession of the Premises.

3.3 You agree that the Floor Area of the Premises are as set out in schedule 1. If we appoint a surveyor registered under the Land Surveyors Act (Chapter 156) to survey the Floor Area, the surveyor's findings will be final and binding (unless there is a clear and obvious mistake), and the Gross Rent, Service Charge and other payments due under this Lease (including the Security Deposit) will be adjusted as a result of any difference in floor area of more than 3%.

3.4 You must not load any part of the floors of the Building with more than the weight set out in schedule 1 or such other weight limit as we may notify.

4 YOUR OBLIGATIONS/ INVOLVEMENT

4.1 **General obligations relating to payments**

4.1.1 Gross Rent and other payments

4.1.1.1 Upon signing this Lease, you must pay the Gross Rent for the period of one month from the Start Date. The Gross Rent for any period less than one month will be pro-rated (based on the actual number of days in that month). You must then pay us monthly in advance on each Payment Date the:

(a) Net Rent, calculated at the Net Rent Rate on the Floor Area; and

(b) Service Charge, calculated at the Service Charge Rate on the Floor Area.

4.1.1.2 You must pay us all amounts due under this Lease promptly when they are due on the Payment Date (except that you must pay the amounts in the statement of accounts set out in schedule 4 upon signing this Lease), without us having to ask or remind you, and without making any withholding, deduction, set-off or counterclaim.

4.1.1.3 Other than the first initial payment as set out under schedule 4, you must make all payments by standing order automated electronic payment (GIRO) to our account or in any other way we notify you.

4.1.1.4 We may increase the Service Charge if there is any increase in the Total Outgoings. If we do so, we will notify you of the amount and effective date of increase in the Service Charge (per square metre). Such notice will be final and binding (unless there is a clear and obvious mistake) and you must pay the increased Service Charge from the date of the increase as set out in our notice until the end of the Term.

4.1.1.5 You must not use the Common Area or any space outside the Premises in connection with your Permitted Use. If we agree to your use of any part of the Common Area or any space outside the Premises in connection with your Permitted Use, we may set charges and terms for this, and may ask you to sign a separate agreement relating to that space.

4.1.2 Rent-free Period (If any)

As a show of goodwill, we will grant you the Rent-free Period (if any). During any Rent-free Period, you do not have to pay the Gross Rent but you must continue to comply with all other terms of the Lease. However, if you carry out your business during any Rent-free Period, we may collect Service Charge from you from the date your business is started. In addition, if this Lease is brought to an end early, you must pay us the Gross Rent for the entire Rent-free Period immediately when we notify you.

4.1.3 Interest

If you fail to pay the Gross Rent or any other amounts due to us under this Lease on the due date (for any reason, and whether or not we send you a formal notice), you must pay us when we notify you Interest on the amount you owe from the date the amount is due (or if we have to pay costs for any work or measures we have carried out on your behalf, from the date we pay for those costs) until the date you pay the amount that is due.

4.1.4 Utilities

You must pay us (or the relevant supplier if this applies) the Utilities Charges for the Utilities supplied to the Premises during the Rent-free Period (if any) and the Term of this Lease. The Utilities Charges will be calculated at the rate we notify you in our invoice and you must pay us such Utilities Charges on the Payment Date. The amount as set out in our invoice will be final and binding (unless there is a clear and obvious mistake).

4.1.5 Electricity supply

4.1.5.1 If we do not arrange for the supply of electricity to the Premises, you must make arrangements with a supplier or retailer, as the case may be, for supplying electricity to the Premises. You must also:

(a) first get our approval of the supplier or retailer before you arrange for them to supply electricity to the Premises; and

(b) pay all charges directly to the supplier or retailer (including any connection charges or deposit) for supplying electricity to the Premises.

4.1.5.2 If we arrange for the supply of electricity to the Premises by bulk or block purchase or otherwise, you must pay us:

(a) Electricity Charges for electricity supplied to the Premises each month. The Electricity Charges will be calculated at the rate we notify you in an invoice;

(b) all other charges relating to supplying electricity to the Premises (including connection and administrative charges) as we notify you in an invoice; and

(c) the Electricity Supply Deposit. We will notify you of the amount of the Electricity Supply Deposit that you must pay from time to time during the Term. If the Electricity Supply Deposit you have paid to us is less than the amount we have told you to pay, you must pay the difference to us. We will keep the Electricity Supply Deposit for the whole of the Term and we may use all or part of it to indemnify us (that is, to pay all our losses in full without dispute or claim that we should have minimised such losses) against you failing to keep to clauses 4.1.5.2(a) and 4.1.5.2(b) above. We will refund the Electricity Supply Deposit without interest and after making any deductions that are allowed under this Lease, within 30 days after we have confirmed that there are no outstanding obligations under this Lease, including that you have paid all amounts that you owe us. To avoid any doubt, such refund will not affect any other rights we may have if we find you still owe us money or have not kept to the terms of this Lease after we return the Electricity Supply Deposit to you.

4.1.5.3 The amount as set out in our invoices in clause 4.1.5.2 above will be final and binding (unless there is a clear and obvious mistake) and you must pay such amounts to us on the Payment Date. If there are any clear and obvious mistakes in the amounts as set out in our invoices, we will notify you and you must pay the difference on the Payment Date from the date of such notice. Any retailer or supplier we appoint to provide electricity to the Premises will also have the same rights as us under this clause 4.1.5.

4.1.5.4 If we make or intend to make a bulk or block purchase to supply electricity to the whole Building or the Park, you will be considered to have given your permission for the purchase. You must also, if we ask you to, sign an authorisation in such format as we may inform. If we decide to change the retailer or supplier during the Term, we may transfer the Electricity Supply Deposit at any time to any supplier or retailer.

4.1.6 Taxes

Without affecting our obligations under clause 5.2, you must pay us immediately when we notify you any Taxes charged on the amounts you must pay under this Lease.

4.1.7 Additional Property Tax

Once you have signed this Lease, you must pay us any Additional Property Tax that we notify you is due for the Premises, the Rent-free Period (if any) and the Term of this Lease. We will decide whether to object to or appeal against any assessment of annual value or any property tax that is charged on the Premises.

4.1.8 Security Deposit

4.1.8.1 Upon signing this Lease, you must pay and maintain with us the Security Deposit during the Term, as security for you keeping to the terms of this Lease and to indemnify us (that is, to pay all our losses in full without dispute or claim that we should have minimised such losses) against any Losses we may suffer against you or any of Your Authorised People in relation to any matter arising out of or relating to the Premises or this Lease, including any amount you owe us during any holdover period or future lease of the Premises.

4.1.8.2 If you do not keep to the terms of this Lease, we may use the Security Deposit to make good to our satisfaction any losses we have suffered, and you must pay us an amount equal to the amount of the Security Deposit we use, within seven days of us notifying you.

4.1.8.3 If the Gross Rent is increased under this Lease, the Security Deposit will also be increased and you must pay the increased amount to us on the date we notify you.

4.1.8.4. You must not set off (that is, treat it as payment of) any part of the Security Deposit against any Gross Rent or other amounts you owe us.

4.3.8.5 We will refund the Security Deposit to you, without interest and after making any deductions that are allowed under this Lease, within 30 days after we have confirmed that there are no outstanding obligations under this Lease, including that you have paid all amounts that you owe us. To avoid any doubt, such refund will not affect any other rights we may have if we find you still owe us money or have not kept to the terms of this Lease after we return the Security Deposit to you.

4.1.9 Car-park passes

4.1.9.1 As a show of goodwill, we will provide car-park passes, as set out in schedule 1, as long as:

(a) you pay the Car-park Charges at such rates that apply from time to time and as we notify you in our invoice. Such amount as set out in the invoice will be final and binding (unless there is a clear and obvious mistake), and you must pay us such Car-park Charges on the Payment Date;

(b) you keep to all relevant Laws;

(c) our policies that apply from time to time allow for our provision of car-park passes to you; and

(d) we have passes available.

4.1.9.2 If required by Law or under our policies, we may give you notice at any time to change or cancel the number of car-park passes we allocate to you or to revise our Car-park Charges.

4.1.10 Insurance during the Lease

4.1.10.1 From the Possession Date or Start Date, whichever is earlier, until the end of the Term or any period of holding over (as described in clause 4.3.2), including while the Tenant's Works are being carried out, you must arrange and maintain the following insurance policies:

(a) an insurance policy in your name:

(i) covering you against all risks of theft, physical loss or damage (including risks of fire) in respect of your property (including personal property), goods and stock-in-trade (including all plate glass and tempered glass, glass frontage and plant and machinery, if any) in the Premises;

(ii) up to the full replacement value of your property, goods and stock-in-trade in the Premises; and

(iii) which includes a waiver of subrogation clause (that is, a clause which disallows the insurer from stepping into the insured party's shoes and making a claim against us to recover any money that the insurer has had to pay).

(b) a public liability insurance policy in your name, with us named as an insured party:

(i) protecting against claims arising out of or relating to your operations or anything that you, or Your Authorised People have done in or from the Premises or assumed under this Lease, which will be extended to include any of the insured parties' legal liability for loss of or damage to the Premises (including all fixtures and fittings) and all of our property;

(ii) for at least the amount set out in schedule 1 or any higher amount as we may require; and

(iii) which includes a cross-liability clause (that is, a clause which allows an insured party from claiming against another insured party if they are both covered by the same insurance policy).

4.1.10.2 You must take out the insurance policies with a reputable insurance company as we may approve.

4.1.10.3 If we request, you must give us copies of the insurance policies and the receipt for the fast premiums you have paid for the policies. We will not be considered to have approved the insurance policies just because we have seen copies of your insurance policies and you will remain responsible for your obligations under this Lease, including having to take out the necessary insurance policies as required under this clause 4.1.10.

4.1.11 Not to affect our insurance

You must not do anything that makes any of the insurance policies void or voidable (that is, in a state as if the insurance policies never existed or potentially never existed), invalid or cancelled, or leads to an increase in the premium for the insurance policies. If you fail to keep to this clause 4.1.11, you must not claim against us for any claim which is actually covered or which would have been covered had you maintained the insurance policies. You must also make good any damage or losses we suffer, including paying any increased premium, costs and expenses for restoring or renewing the insurance policies.

4.2 General obligations during the Lease

4.2.1 Tenant's Works

4.2.1.1 You must get our approval before carrying out any Tenant's Works. If we give our approval, you must carry out and complete the Tenant's Works in line with the Lease, including the Tenants' Guide and any of our other requirements in respect of such Tenant's Works.

4.2.1.2 You must get and maintain all necessary approvals that are required by Law (including the Fire-safety Approval, if it applies) for carrying out the Tenant's Works.

4.2.2 Tenant's Works Deposit

4.2.2.1 If we ask you to, you must pay us a Tenant's Works Deposit for carrying out any Tenant's Works. You must do this by the date we notify you. You must pay to us, the initial Tenant's Works Deposit, as set out in **Schedule 1,** upon signing this Lease.

4.2.2.2 The Tenant's Works Deposit is security to make sure that you:

(a) comply with clause 4.2.1; and

(b) make good, to our satisfaction, any damage to the Premises, Building and Park resulting from the Tenant's Works.

4.2.2.3 If you do not comply with clause 4.2.2.2, we may carry out the necessary works and use the Tenant's Works Deposit to pay the costs and expenses of that work. If the Tenant's Works Deposit is not enough to cover the cost of the work, you must pay us immediately, when we notify you, the difference between the costs and expenses of the work and the Tenant's Works Deposit.

4.2.2.4 You must give us (i) the relevant plans, (ii) appropriate architect, engineer, qualified person or consultant certificates to confirm that the work has been carried out to the necessary standards, and (iii) the Fire Safety Approval, before you start operations at the Premises. If you fail to do this, you will forfeit (that is, give up the right to claim) the Tenant's Works Deposit. This will not affect any of our rights or remedies against you, including our right to charge you for any penalty fees imposed by the Authorities and our right to terminate this Lease for such breach.

4.2.2.5 We will refund the Tenant's Works Deposit to you, without interest, within 30 days after:

(a) the Tenant's Works have been completed in accordance with this Lease, including that you have submitted the relevant plans, certificates and Fire Safety Approval required in accordance with clause 4.2.2.4;

(b) you have complied with all our requirements in respect of the Tenant's Works;

(c) you have made good any damage to the Premises, Building and Park, to our satisfaction; and

(d) we have deducted any amounts owing under clause 4.2.2.3.

To avoid any doubt, such refund will not affect any other rights we may have if we find you still owe us money or have not kept to the terms of this Lease after we return the Tenant's Works Deposit to you.

4.2.3 Insurance while carrying out Tenant's Works

4.2.3.1 Before starting any Tenant's Works, you must take out and maintain (i) an all-risks policy and (ii) a comprehensive public liability insurance policy against claims for personal injury, death or property damage or Losses arising out of or relating to the Tenant's Works. Each insurance policy must provide coverage of at least S$2,000,000.00 (or such higher amount we tell you) for any one occurrence and it must be effective for the entire period of the Tenant's Works.

4.2.3.2 You must take out and maintain such insurance policies mentioned in clause 4.2.3.1 in the joint names of us and your contractors as co-insured parties for our and their respective rights and interests. You must use a reputable insurance company, and such insurance policies must each include a cross-liability clause (that is, a clause which allows an insured party from claiming against another insured party if they are both covered by the same insurance policy).

4.2.3.3 You must give us copies of such insurance policies mentioned in clause 4.2.3.1 if we ask for one. However, giving us such copies will not be considered to be constructive notice of any terms of such insurance policies nor, and will not in any way reduce or affect your obligations under this Lease, including clause 4.2.3.

4.2.4 Maintain and repair

4.2.4.1 You must:

(a) keep the Premises in a clean and tidy condition to keep to what we require under this Lease (including the Tenants'Guide);

(b) keep the Premises (including all fixtures and fittings, mechanical and electrical equipment and Conducting Media in and serving the Premises, whether these belong to you or us) in good and tenantable repair and condition (that is, in a state and condition safe and suitable for use and in which you have carried out all necessary repairs for), except for fair wear and tear; and

(c) immediately make good, to our satisfaction, any damage you cause to the Premises (including our fixtures and fittings in them), or to any other part of the Building or Park.

4.2.5 Permitting us to inspect the Premises and carry out repairs

You must allow us and Our Authorised People to enter the Premises with advance notice (except in cases of emergency) and at no cost to us, so that we may:

(a) check if you are keeping to the terms of this Lease;

(b) carry out spot checks and inspect the condition of the Premises;

(c) take a schedule of fixtures and fittings;

(d) investigate the cause of any interference or disturbance to other tenants and occupants;

(e) gain access to parts of the Building, mechanical and electrical equipment and/or Conducting Media (or both) which can only be accessed through or in the Premises;

(f) carry out any work relating to the mechanical and electrical equipment or Conducting Media and to install extra mechanical and electrical equipment or Conducting Media *or* to repair or replace any fixtures or fittings which belong to us;

(g) enforce any right or to meet any obligation we have under this Lease or the Head Lease or any obligation we have to any third party who has legal rights over the Premises, the Building or Park or whose Conducting Media passes through the Premises;

(h) build, alter, repair or maintain the Premises, the Building or Park (including cleaning the windows on the outside of the Building or anything serving the rest of the Building and Park as well as anything running through the Premises); and

(i) carry out any work which we need or want to carry out to any part of the Building or Park (including the services and facilities in it), including the right to build onto any boundary wall of the Premises.

4.2.5.1 If we find that you have not kept to all the terms of this Lease, you must carry out the necessary work promptly and within the time period as set out in the notice we give you and to our satisfaction.

4.2.5.2 If you do not carry out and complete the necessary work in time, we may enter the Premises to do the necessary work, and you must pay the costs and expenses for any such work. You must also, if we notify you to, do the following:

(a) remove your installations, machinery, partitions or any other item so that we can carry out the work. If you fail to do this, we may remove them and you will have to pay the costs and expenses immediately when we notify you. You will not have any claim against us for any Losses you suffer due to us removing these items; and

(b) stop your activities to the extent and during the hours as set out in the notice we give you so we can carry out the work (including any investigations relating to the work).

4.2.5.3 While we will use reasonable efforts to minimise any disturbance to your business operations at the Premises, we will not be responsible to you for any Losses you suffer or inconvenience caused while we are inspecting the Premises or carrying out such works or repairs under this clause 4.2.5.

4.3 General Obligations Relating to Moving out of the Premises

4.3.1 Moving out of the Premises

4.3.1.1 When this Lease ends, you must have completed the Reinstatement Works in line with this Lease (including the Tenants' Guide), and return the Premises and all keys (including mailbox keys) to us.

4.3.1.2 If you fail to keep to clause 4.3.1.1, we may carry out the Reinstatement Works. If we do this, you must pay us immediately:

(a) all our costs and expenses, and

(b) an amount equal to double the amount of Gross Rent due for the period it takes us to carry out and complete the Reinstatement Works.

4.3.1.3 If we agree that you do not need to carry out the Reinstatement Works, we may require you to pay a reinstatement amount, which we will estimate based on the costs and expenses that we may need to pay to carry out and complete the Reinstatement Works. After making this payment, you will be considered to have transferred all such fixtures and fittings to us and we may remove, dispose or deal with them as we see fit, and you may not claim for any money left over after our removing, disposing or dealing with such fixtures and fittings.

4.3.1.4 Any invoice we give you of the amounts you must pay to us under clauses 4.3.1.2 and 4.3.1.3 above is final and binding (unless there is a clear and obvious mistake) and you must pay us such amounts on the Payment Date.

4.3.2 Holding over

If you do not provide us with vacant possession of the Premises when this Lease ends or continue to occupy the Premises after this Lease ends, you will be considered to be holding over and must pay us an amount equal to double the amount of Gross Rent or the market rent for the Premises that is current at that time as we may inform you (whichever is higher) for every day of the holding-over period, within seven days of our notice to you. Such holding over will not be considered as a renewal of this Lease. This clause 4.3.2 will not be affected by, and will survive, the Term coming to an end or this Lease being brought to an end early.

4.3.3 Viewing

During the six months before the end of this Lease, you must, if we give you notice, allow us, our agents and anyone else we authorise to view the Premises for the purpose of re-letting them.

4.4 **Other terms**

4.4.1 Assigning and subletting

4.4.1.1 You must not novate (that is, transfer all or some of your rights and obligations), assign (that is, transfer all or some of your rights), sublet, license, part with or share possession or occupation, mortgage or create a charge over, or grant anyone else any rights in respect of, this Lease or the Premises without our approval.

4.4.1.2 If you are a company, and there is a change in your management control or majority shareholders and you did not get our approval before making the change, this will be considered as an assignment of this Lease. For the purposes of this clause 4.4.1.2, 'majority shareholder' means a person who:

(a) controls the structure of your board of directors;

(b) controls more than 50% of your issued share capital; or

(c) controls more than 50% of your voting power.

4.4.1.3 Without affecting clause 4.4.1.1, if you are a sole proprietor or a partnership made up of partners carrying out a business under a business name registered under the Business Registration Act (Chapter 32) or any other Law, and there is a change in the constitution or membership of the sole-proprietorship or partnership and you did not get our approval before making the change, this will be considered as an assignment of this Lease.

4.4.1.4 If we give any approval under this clause 4.4.1, we may set any terms, including charging fees, and section 17 of the Conveyancing and Law of Property Act (Chapter 61) will not apply.

4.4.2 No lodging of caveat, registering this Lease or subdividing the Building

4.4.2.1 You must not (i) lodge a caveat relating to this Lease, nor (ii) register this Lease at the Singapore Land Registry and you must immediately withdraw any caveats which are lodged in spite of this clause 4.4.2.1.

4.4.2.2 You must not ask us to subdivide the Building or do anything which could mean that we have to subdivide the Building.

4.4.2.3 This Lease does not operate as a Lease capable of registration under the Land Titles Act (Chapter 157) or any other Law.

4.4.3 Keeping to the Law

4.4.3.1 You must keep to the Law and all requirements of the Authorities relating to:

(a) the Premises and using or occupying the Premises; and

(b) your obligations under this Lease.

4.4.3.2 You must immediately notify us of:

(a) any notice or order you receive from any Authority in relation to the Premises or this Lease;

(b) any defect in the Premises which may cause us to have any Losses or duty; and

(c) any damage that may happen to the Premises.

4.4.3.3 Without affecting clause 4.4.3.1, you must not allow the Premises to be used as a place where any person is employed in a way that is not allowed under section 57(1)(e) of the Immigration Act (Chapter 133), section 5 of the Employment of Foreign Manpower Act (Chapter 91a) or any other Law.

4.4.4 Head Lease

You must keep to the conditions (if any) that the Head Landlord sets when approving this Lease, including in particular, any conditions that relate to the Premises, Building and Park.

4.4.5 Tenants' Guide

You confirm that you have read and received a copy of the Tenants' Guide and you agree that you must keep to the Tenants' Guide and any other rules that we set, including paying any fees, charges, costs and expenses arising out of or relating to, or as a result of you failing to keep to your obligations under the Tenants' Guide. You must also make sure that Your Authorised People keep to the Tenants' Guide. We may add to or vary the Tenants' Guide at any time by making such revised Tenant's Guide available on the Capitaland Business Park & Industrial Tenant Portal.

4.4.6 Confidentiality of information

4.4.6.1 In order to protect and maintain the confidentiality of this Lease and any information relating to this Lease, and to prevent any unauthorised access to such information, you must not reveal to any third party (other than your professional advisors), this Lease or any information or any correspondence relating to this Lease, unless such disclosure is required under any Law or you get our approval beforehand. If you are allowed to reveal information to any third party, you must make sure that they keep to the terms of this clause 4.4.6.1 and such other terms as we may notify you.

4.4.6.2 Without affecting anything else in this Lease, if you do not keep to clause 4.4.6.1 we may withdraw any special concessions we have granted you under this Lease. This includes but is not limited to:

(a) the Rent-free period (if any), meaning that you must pay us the Gross Rent for the entire Rent-free Period;

(b) any special rental rates, meaning that you must pay us a revised gross rent for the entire Term based on the market rent that applies at that time; and

(c) all other special concessions we grant to you.

4.4.6.3 This clause 4.4.6 will not be affected by, and will survive, the Term coming to an end or this Lease being brought to an end early.

4.4.7 Indemnity by you

4.4.7.1 You must indemnify us (that is, to pay all our losses in full without dispute or claim that we should have minimised such losses) against all Losses which we may suffer or have to pay arising out of or relating to death, injury, loss or damage caused, directly or indirectly, by:

(a) anything that happens in the Premises or the use or occupation of the Premises;

(b) you or Your Authorised People to the Premises, Building or any property in them, including if caused by using, misusing, wasting or abusing the Utilities or faulty fittings or fixtures or in respect of the condition of any part of the Premises; and

(c) you failing to keep to the terms of this Lease.

4.4.7.2 This clause 4.4.7 will not be affected by, and will survive, the Term coming to an end or this Lease being brought to an end early.

5 OUR OBLIGATIONS/ INVOLVEMENT

5.1 Quiet enjoyment

5.2 If you pay the Gross Rent and other amounts due under this Lease and keep to the terms of this Lease, you may occupy and use the Premises during the Term without any disturbance from us, except as allowed under this Lease.

5.3 Property Tax

We will pay the property tax charges for the Premises for the Term based on the Gross Rent payable by you under this Lease and the property tax rate applicable on the date of this Lease. To avoid any doubt, this does not include any Additional Property Tax, which you must pay.

5.3 Managing the Building We will:

(a) keep the exterior of the Building, the Common Areas and the amenities and facilities in the Building which are for common use in good repair, and keep the mechanical and electrical services in working order and condition (except for fair wear and tear);

(b) provide lift services during such hours as we may notify to you, electricity for lighting the Common Areas and water for the toilet facilities (if any) in the Common Areas;

(c) keep the Common Areas adequately clean and lit; and

(d) insure the Building (not including your fixtures and fittings) against damage by fire and any other risks as we may decide.

5.4 No claim against us

5.4.1 Without being affected by anything else in this Lease, we are not responsible to you, and you must not claim against us, for any death, injury, or Losses which you or Your Authorised People may suffer (whether caused by negligence or otherwise) in connection with the following circumstances

(a) any interruption in any of the services mentioned in clause 5.3 due to the state and condition or any repair, maintenance, damage or destruction of any installations or equipment or any mechanical, electrical, electronic, microprocessor or software defect, malfunction or breakdown that occurs;

(b) any act, failure to act, negligence or misconduct of:

(i) any of our employees or agents in relation to the Premises or the Building;

(ii) Our Authorised People carrying out any duty relating to the services mentioned in clause 5.3;

(iii) any contractor or consultant we have nominated or approved under this Lease; or

(iv) any other person in the Building;

(c) any other tenants, Your Authorised People and other people in the Building not keeping to the Tenants' Guide;

(c) any accidents, injuries, loss or damage to property or people in the Premises, Building or Park;

(d) the use of the car-parks in the Building;

(e) any failure, inability or defect in the supply or character of electricity, water (including chilled water) or, if it applies, gas supplied to the Premises by any service provider;

(f) leaks or defects in the piping, wiring and sprinkler system, or defects in the structure of the Building;

(g) any failure or delay by us to carry out measures to prevent any outbreak or spread of any Infectious Disease in the Building;

(h) any terrorist act regardless of any other cause or event contributing to the loss (including any action taken to control, prevent or otherwise deal with any terrorist act); and

(i) any Circumstances Beyond Our Control.

5.4.2. This clause 5.4 will not be affected by, and will survive, the Term coming to an end or this Lease being brought to an end early.

5.5 Limits to trustee's liability

5.5.1 If we are an entity listed on the stock exchange, the following clause will apply to this Lease:

Without being affected by anything else in this Lease, you agree that we are entering into this Lease only in our capacity as trustee of Ascendas Real Estate Investment Trust (the 'REIT') and not in our personal capacity. As such, any liability or indemnity we give or will give, and any power and right we grant to any receiver, attorney, agent or delegate of the trustee of the REIT will be limited to the assets of the REIT over which, as trustee of the REIT, we have legal rights, and will not extend to any of our personal assets or any assets we hold in our capacity as trustee of any other trust. This clause still applies even if this Lease ends, is brought to an end early or is cancelled. This clause will apply, with the necessary amendments and without affecting the meaning of this clause, to any notice, certificate or other document we issue under this Lease, as if it were set out in the notice, certificate or document.

5.5.2 If we are an entity not listed on the stock exchange, the following clause will apply to this Lease:

If the Building is sold to the trustee of Ascendas Real Estate Investment Trust ('A-REIT'), you agree that the following clause (or a variation of the following clause) will be included in this Lease.

'Limits to trustee's liability

Without being affected by anything else in this Lease, you agree that we are entering into this Lease only in our capacity as trustee of A-REIT and not in our personal capacity. As such, any liability or indemnity we give or will give, and any power and right we grant to any receiver, attorney, agent or delegate of the trustee of A-REIT will be limited to the assets of A-REIT over which the trustee of A-REIT has legal rights, and will not extend to any of our personal assets or any assets that the trustee of A-REIT holds in our capacity as trustee of any other trust. This clause still applies even if this Lease ends, is brought to an end early or is cancelled. This clause will apply, with the necessary amendments and without affecting the meaning of this clause, to any notice, certificate or other document we issue under this Lease, as if it were set out in the notice, certificate or document.'

6. OUR GENERAL RIGHTS AND REMEDIES

6.1 Cost and expenses

If we give you notice, you must pay immediately our full costs and expenses (including legal fees, administrative charges and stamp duty), relating to:

(a) preparing, negotiating and completing this Lease (including any Side Letters);

(b) considering your request for our permission or approval (including our professional advisor's fees for advising us); and

(c) you not keeping to the terms of this Lease.

You must pay such costs and expenses on an indemnity basis (that is, to pay for all our costs and expenses and not dispute or claim that we should have minimised such costs and expenses).

6.2 Set-off and forfeiture of deposits

Without being affected by anything else in this Lease, we may deduct any payments you owe us from any deposits you have paid under this Lease. If we have deducted money from a deposit in this way, you must pay us an amount equal to the amount we have deducted within seven days of us notifying you. When this Lease ends, you must collect any deposits you have paid under this Lease within one year from such date as we have first tried to return you such deposit. If you don't, you will forfeit (that is, give up the right to claim) these deposits.

6.3. Remedial measures

If you fail to keep to the terms of this Lease, we may take action to deal with the situation (including issuing a stop order relating to any offending activity or stepping in to do any repair or remedial works). You must pay all our costs and expenses for us taking the actions under this clause 6.3. You will not have any claim against us for any Losses or inconvenience you may suffer due to us carrying out the actions. To avoid any doubt, we do not need to exercise this right under this clause 6.3 before we exercise our other rights.

6.4. Re-entry

You will have failed to keep to the terms of this Lease if:

(a) you fail to pay the Gross Rent or any other amounts you must pay under this Lease within 14 days after the due date;

(b) you do not keep to, and where possible, fail to correct your actions to keep to, the terms of this Lease (other than under clause 6.4.1(a)) within 14 days of our notice or such longer period as we may notify you (except in cases of emergency);

(c) another creditor or person enforces a writ of execution (that is, a court order which permits a transfer of assets, money or property belonging to a debtor to pay off a legal judgment) or levies distress (that is, the forcible taking of a tenant's property by a landlord to pay off any overdue or unpaid rent or other money owed under a lease) on your property; or

(d) you become or are reasonably likely to become insolvent (that is, when you are unable or likely unable to pay any debts as and when they are due).

6.4.2 If any of the circumstances in clause 6.4.1 happens, we may re-enter and take possession of all or any part of the Premises at any time, including during the Rent-free Period, and even if we have previously chosen not to enforce our right of re-entry, and the Term and this Lease will then end on the date of such re-entry or notice. To avoid any doubt, if you return any keys to us, this does not mean that we have accepted the surrender of the Premises, unless we confirm this in writing.

6.4.3 If any of the circumstances in clause 6.4.1 happens, we may notify you to novate (that is, transfer all or some of your rights and obligations) or assign (that is, transfer all or some of your rights) your sub-leases to us, including all rent and any security deposits relating to such sub-tenancies. Upon receiving such notice, you must immediately sign such novation or will be considered to have agreed to such assignment, and must make sure all sub-tenants sign such novation or agree to such assignment, including paying all rent received from such sub-tenancies, directly to us.

6.4.4 If any of the circumstances in clause 6.4.1 happens, you must, if we give you notice, leave on the Premises any of your property that we may require as set out in such notice.

6.4.5 If we end this Lease in line with clause 6.4.2:

(a) your interest in and the rights to the Premises will end;

(b) you must move out of the Premises immediately, except that you must still carry out the Reinstatement Works in line with clause 4.3 unless we notify you otherwise;

(c) you will forfeit (that is, give up the right to claim) any money or deposits you have paid to us;

(d) you must indemnify us (that is, pay all our losses in full without dispute or claim that we should have minimised such losses) from and against all Losses we suffer as a result of re-entering the Premises, including Gross Rent for the Rent-free Period, any Gross Rent which you would have paid if the Term had been completed, and all our costs and expenses of re-letting or trying to re-let the Premises); and

(e) you will not have any claim against us for any Losses you suffer due to us ending this Lease.

6.5. Removing your property

6.5.1 If you leave any of your property at the Premises when this Lease ends, we have the right to dispose of it in whatever way we consider appropriate, and you must pay any costs involved. You will not have any claim against us for any Losses which you may suffer due to us removing any property from the Premises under this clause 6.5.

6.5.2 If we sell your property under clause 6.5.1 above, we may use the proceeds from the sale to pay our costs, expenses, Interest and any other money you owe us under this Lease. If there is any money left over, we will return such monies to you.

6.5.3 You must indemnify us (that is, pay all our losses in full without dispute or claim that we should have minimised such losses) against any Losses we have to any third party whose property we deal with or dispose of because we mistakenly believe it is yours.

6.5.4 This clause 6.5 will not be affected by, and will survive, the Term coming to an end or this Lease being brought to an end early.

6.6 Government takeover under the Land Acquisition Act (Chapter 152)

If any Authority compulsorily takes over the Building or any part of it, or issues any notice, order or gazette notification to take over the Building or any part of it, we may give you notice and end this Lease without compensation. To avoid any doubt, this will not affect any rights or remedies we have relating to you not keeping to the terms of this Lease.

6.7 We may transfer this Lease

We may novate (that is, transfer all or some of our rights and obligations) or assign (that is, transfer all or some of our rights) under this Lease to another party without your permission. Following such transfer, you:

(a) will be considered as having agreed to such transfer and having accepted the new landlord;

(b) must release us from all our obligations under this Lease (including our obligation to refund the Security Deposit and any other amounts under this Lease;

(c) sign the novation agreement or the acknowledgement to the notice of assignment of this Lease, which we will prepare at our cost; and

(d) get a replacement bank guarantee for the new landlord, if we request this, to replace any bank guarantee you have given us.

7 OTHER TERMS

7.1 Notices

7.1.1 All notices relating to this Lease must be in writing.

7.1.2 Any notice we give you is only valid if we post it on the Capitaland Business Park & Industrial Tenant Portal, give it by hand or send it by post to the Premises or to your registered office or business address.

7.1.3 Any notice you give to us is only valid if you send it by registered post to our registered office.

7.1.4 Any notice will be considered as served:

(a) (for a notice given by hand) immediately on the day it is sent; and

(b) (for notice sent by registered post) 24 hours after it is posted as long as the sender can show that the envelope containing the notice was addressed, stamped and posted.

7.2. Process of serving documents in line with the Law

7.2.1. Any legal process will be considered as served if it is sent to:

(a) us by registered post to our business address;

(b) you by registered post to or by leaving it at your business address or the Premises; or

(c) your or our solicitor by registered post to or by leaving it at their business address.

7.2.2 If you are a company that is not incorporated or registered in Singapore:

(a) you must deliver to us, within seven days of appointing the process agent, a copy of the letter (in a form we approve) issued by the process agent to us, agreeing (in a way that cannot be changed) to act as your process agent (that is, once they have agreed to act as your process agent, you or they cannot withdraw this agreement);

(b) serving documents on your process agent at their last known address will be considered as satisfactorily serving documents under the Law on you; and

(c) clauses 7.2.2(a) and 7.2.2(b) will not affect our right to serve process in any other manner allowed by Law.

7.3 No waiver

7.3.1 If we give you permission not to keep to any of the terms of this Lease, or if we choose not to take action even if you are not keeping to any of the terms, this decision is only effective if we confirm it in writing. If we know about you not keeping to any of the terms of this Lease, or we accept the Gross Rent or any amount due under this Lease, this does not mean that we do not require you to keep to the terms of this Lease or that we have chosen not to take action.

7.3.2 If we give written permission or confirmation as set out in clause 7.3.1 above, this does not mean that we have also given permission or agreed not to take action if you:

(a) do not keep to the same term of this Lease again; or

(b) do not keep to another term of this Lease.

7.4 Entire Agreement

7.4.1 This Lease forms the entire agreement between you and us for this lease of the Premises.

7.4.2 We are not bound by any statement, conduct or promises (whether written or spoken, express or implied by common law, statute, custom or in any other way) relating to the Premises, Building or Park if they are not set out in this Lease.

7.4.3 You confirm that you have not agreed to or signed this Lease as a result of relying on any statement, conduct or promise we have made (or which someone else has made on our behalf), which is not as set out in this Lease.

7.4.4 You and we each state, guarantee, confirm and agree that each has full power and authority to enter into and carry out the obligations contained within this Lease, and this Lease is valid and binding.

7.5 Severability

If any part of this Lease cannot be enforced or if all or part of any clause in this Lease is illegal or invalid or cannot be enforced by Law, this will not affect the legality, validity or enforceability of any other clause in this Lease.

7.6 Governing Law and jurisdiction

7.6.1 This Lease is governed by Singapore Law.

7.6.2. You and we agree that the appropriate legal forum for any disputes relating to this Lease will be the courts of Singapore.

7.7 Contracts (Rights of Third Parties) Act (Chapter 53 B)

Apart from (i) the Head Landlord, (ii) any Authorities and (iii) any people authorised by us, the Head Landlord and/or the Authorities, no person who is not a party to this Lease has any right under the Contracts (Rights of Third Parties) Act (Chapter 53 B) to enforce or enjoy the benefit of any term of this Lease.

7.8 Electronic Signatures

The Parties acknowledge and agree that we are authorised to rely upon and accept as an original for all purposes, this Lease, any other transaction document or other communication delivered by you or its solicitor by facsimile, telegraphic, .pdf, e-mail or other electronic transmission (each, a "Communication") which we or our solicitor in good faith believes has been signed by you, including by electronic signature, and which has been so delivered to us or our solicitor. Such Communication shall have the same force and effect as an original signature. Without limitation, "electronic signature" will include versions of an original signature on a document electronically scanned and transmitted versions (e.g., via pdf) of an original signature; it shall also include eSignatures included on documents accessed from electronic and/or mobile devices via eSignature Services such as Docusign and AdobeSign. Notwithstanding the foregoing, we will in any instance require that an original document be submitted to us in lieu of, or in addition to, any such Communication.

Counterparts

This Lease may be executed in two or more counterparts, each of which shall be deemed an original, but all of which shall constitute the same agreement. One or more counterparts of this Lease may be delivered by facsimile or pdf electronic transmission, with the intention that they shall have the same effect as an original counterpart.

8 SUPPRESSION OF CORRUPT PRACTICE

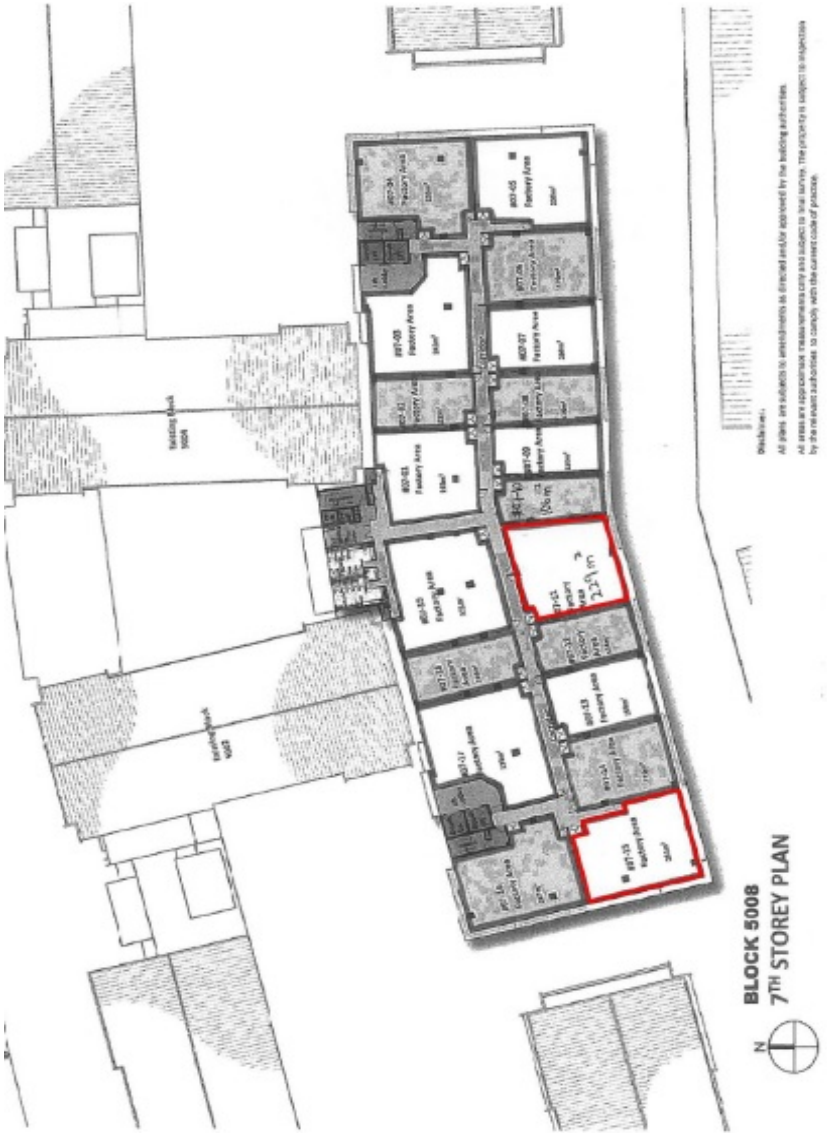
8.1 The group of which we form part is committed to conducting its business in an ethical manner and expects all its employees and parties with which it has a contractual relationship to conduct themselves with high ethical standards and to comply with applicable laws for the suppression of corrupt practices **("Anti-Corruption Laws").**

8.2 You represent and warrant that, to the best of your knowledge, neither you nor any person who (by reference to all relevant circumstances) performs services or acts for or on behalf of you in any capacity (including, without limitation, employees, agents, related corporations and subcontractors) **("Representatives")** has contravened, or procured or encouraged third parties (including, to avoid any doubt, the employees of or any person acting on our behalf) to contravene, any Anti-Corruption Laws in connection with this Lease and/or any arrangements under this Lease.

8.3 You must immediately notify us if any person employed by us or acting on our behalf or any of your Representatives, has contravened or attempted to contravene any Anti-Corruption Laws in connection with this Lease and/or any arrangements under this Lease, and must take adequate steps to protect the interests of both you and us. All such notices to us should be sent to the Chairman of the Audit Committee ("AC") C/O Head of Group Internal Audit of CapitaLand Limited at the following email address:
Whistleblowing.ACChair@capitaland.com.

8.4 We may terminate this Lease and all arrangements under this Lease forthwith if you or any of your Representatives has contravened or attempted to contravene any Anti-Corruption Laws, whether in connection with this Lease and/or any arrangements under this Lease or otherwise. Such termination shall not affect our other rights and remedies whether under this Lease or otherwise.

SCHEDULE 5
PLAN OF THE PREMISES


BLOCK 5008
7TH STOREY PLAN
N

SCHEDULE 6 DECLARATION FORM

1. Details (see note below)

Name of company or firm (as in ACRA): **FLUIDIGM SINGAPORE PTE. LTD.**	
Premises: **Block 5008 Ang Mo Kio Avenue 5 #07-11 & #07-15 TECHplace II Singapore 569874**	
Company's mailing address:	**Block 5008 Ang Mo Kio Avenue 5 #08-08 TECHplace II Singapore 569874**
Phone: +65 6320 1610	Email address: Cheng-Han.Phoa@Fluidigm.com
Company registration number: 200311994M	Country where the company is incorporated: Singapore
Company's principal activity: Research and experimental development on biotechnology, life and medical science with manufacture and repair of and scientific instruments.	

Note: If you are a foreign firm or new company in the process of being set up, please provide a local contact address and phone number, where possible.

2. Using the Premises

R&D and manufacturing of fluidic chips and microfluidic system

2.1 Urban Redevelopment Agency's 60:40 requirements

Do your activities in the Premises meet the Urban Redevelopment Authority's (URA) 60:40 requirements (set out below) for use of space? Yes ☒ No ☐

Industrial

URA's 60:40 requirements: You must make sure that at least 60% of the Floor Area is used for industrial activities (that is, manufacturing, assembly, research and development, storage and warehouse). Only the other 40% of the Floor Area can be used as offices, showrooms, circulation space (for example, shared passageways or staircases) and shared facilities and other areas approved in writing by the relevant Authorities.

2.2 Application to the Central Building Plan Department of the National Environment Agency (NEA) relating to the use of the Premises

Do you intend to change the use of the Premises that is to be renewed? Yes ☐ No ☒

If 'yes', you will need to submit your application online at https://e-services.nea.gov.sg/ias/. You must state in the application that the Premises are used for the purposes as set out in paragraph 2 of this declaration form. You must let us have a copy of the acknowledgement that your application has been accepted. When you receive the NEA's clearance letter, please let us have a copy of the letter allowing you to use the Premises for your operations.

2.3 Applying for drinkable water or non-drinkable water

You must apply to the Authorities for drinkable or non-drinkable water if you use more than 500 cubic metres of water per month.

Declaration

I declare that all the information and details I have provided on this form are true, correct and complete, and that we will not change the activities to be carried out in the Premises without first getting your approval.

Phoa Cheng Han Managing Director	/s/ Phoa Cheng Han
Name and job title	Signature
	13-Dec-21
Company stamp	Date

SCHEDULE 7
JTC SUBLETTING APPLICATION DOCUMENTS

This schedule does not apply to this Lease.

This page is intentionally left blank.

We and you confirm our entry into this Lease, as signed and witnessed below.

Landlord (us)

Signed
for and on behalf of us
HSBC Institutional Trust Services (Singapore) Limited
(in its capacity as trustee of Ascendas Real Estate Investment Trust), in line with the power of attorney dated 3 June 2013

/s/ Felicia Koh
Name of authorised signatory: Felicia KOH Name of authorised signatory:
Designation: Senior Executive Designation:
Lease Management

Tenant (you)

Signed by
for and on behalf of you
FLUIDIGM SINGAPORE PTE. LTD.

/s/ Phoa Cheng Han
Name: Phoa Cheng Han
Title: Managing Director
Company Stamp

As witnessed in the presence of:

/s/ Herry Effendi
Witness
Name: Herry Effendi
Title: Senior Supply Chain Manager
Address: 5008, Ang Mo Kio Avenue 5
#08-08, Techplace II
Singapore 569874

FIFTH AMENDMENT
TO
LOAN AND SECURITY AGREEMENT

This Fifth Amendment to Loan and Security Agreement (this "**Amendment**") is entered into this 27th day of December, 2021, by and among **SILICON VALLEY BANK** ("**Bank**"), and **FLUIDIGM CORPORATION**, a Delaware corporation ("**Borrower**").

Recitals

A. Bank and Borrower have entered into that certain Loan and Security Agreement dated as of August 2, 2018 (as may from time to time be further amended, modified, supplemented or restated, including, without limitation, by that certain Default Waiver and First Amendment to Loan and Security Agreement dated as of September 7, 2018, that certain Second Amendment to Loan and Security Agreement dated as of November 20, 2019, that certain Third Amendment to Loan and Security Agreement dated as of April 21, 2020, and that certain Fourth Amendment to Loan and Security Agreement dated as of August 2, 2021, collectively, the "**Loan Agreement**").

B. Bank has extended credit to Borrower for the purposes permitted in the Loan Agreement.

C. Borrower has requested that Bank amend the Loan Agreement to make certain revisions to the Loan Agreement as more fully set forth herein.

D. Bank has agreed to so amend certain provisions of the Loan Agreement, but only to the extent, in accordance with the terms, subject to the conditions and in reliance upon the representations and warranties set forth below.

Agreement

Now, Therefore, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. Capitalized terms used but not defined in this Amendment shall have the meanings given to them in the Loan Agreement.

2. Amendments to Loan Agreement.

2.1 Section 2.2.1 (Revolving Line). Section 2.2.1(a) of the Loan Agreement is hereby amended and restated to read as follows:

"(a) Availability. Subject to the terms and conditions of this Agreement and to deduction of Reserves, Bank shall make Advances not exceeding the Availability Amount. Amounts borrowed under the Revolving Line may be repaid and, prior to the Revolving Line Maturity Date, reborrowed, subject to the applicable terms and conditions precedent herein."

2.2 Section 2.5 (Fees). Section 2.5 of the Loan Agreement hereby is amended by (i) amending and restating clauses (g) and (h), and (ii) adding new clauses (i) and (j) to read as follows:

"(g) Fifth Amendment Fee. A fully earned, non-refundable fee in an amount equal to Twenty-Five Thousand Dollars ($25,000), due on the Fifth Amendment Effective Date.

(h) Success Fee. The Success Fee due on the earliest to occur of (i) the Financing Milestone, (ii) February 28, 2022 or (iii) the earlier date all Obligations are repaid in full.

(i) Bank Expenses. All Bank Expenses (including reasonable attorneys' fees and expenses for documentation and negotiation of this Agreement) incurred through and after the Fifth Amendment Effective Date, when due (or, if no stated due date, upon demand by Bank).

(j) Fees Fully Earned. Unless otherwise provided in this Agreement or in a separate writing by Bank, Borrower shall not be entitled to any credit, rebate, or repayment of any fees earned by Bank pursuant to this Agreement notwithstanding any termination of this Agreement or the suspension or termination of Bank's obligation to make loans and advances hereunder. Bank may deduct amounts owing by Borrower under the clauses of this Section 2.5 pursuant to the terms of Section 2.6(c). Bank shall provide Borrower written notice of deductions made from the Designated Deposit Account pursuant to the terms of the clauses of this Section 2.5."

2.3 Section 3.1 (Conditions Precedent to Initial Credit Extension). Section 3.1(h) of the Loan Agreement hereby is amended and restated to read as follows:

"(h) Reserved;"

2.4 Section 6.2 (Financial Statements, Reports, Certificates). Section 6.2 of the Loan Agreement hereby is amended by (i) amending and restating clauses (i) and (j), and (ii) adding new clause (k) to read as follows:

"(i) within seven (7) days of the end of each month, bank statements for Borrower's (i) Bank of America Lockbox Accounts, (ii) Bank of America Deposit Accounts and (iii) Bank of America Payroll Account (the "**Bank of America Bank Statements**");

(j) prompt written notice of any changes to the beneficial ownership information set out in Section 13 to the Perfection Certificate. Borrower understands and acknowledges that Bank relies on such true, accurate and up-to-date beneficial ownership information to meet Bank's regulatory obligations to obtain, verify and record information about the beneficial owners of its legal entity customers; and

(k) promptly, from time to time, such other information regarding Borrower or compliance with the terms of any Loan Documents as reasonably requested by Bank."

2.5 Section 13 (Definitions). The following terms and their respective definitions set forth in Section 13.1 of the Loan Agreement hereby are added or amended and restated in their entirety, as appropriate, as follows:

"**Adjusted Quick Ratio**" means a ratio of (a) the sum of (i) Borrower's unrestricted cash and Cash Equivalents held at Bank and Bank Affiliates subject to a Control Agreement, ***plus*** (ii) unrestricted and unencumbered cash in Deposit Accounts maintained outside of Bank but subject to a Control Agreement in favor of Bank, ***plus*** (iii) Borrower's net Accounts receivable, ***divided by*** (b) the difference of (i) Borrower's Current Liabilities, ***minus***, without duplication, (ii) the current portion of Borrower's Deferred Revenue; provided however for the period of time from the Fifth Amendment Effective Date through the earlier to occur of (i) the Financing Milestone or (ii) February 28, 2022, Indebtedness under the Revolving Line shall be excluded from the calculation of Current Liabilities.

"**Bank of America Bank Statements**" is defined in Section 6.2(i) of this Agreement.

"**Borrowing Base**" is (A) commencing on the Fifth Amendment Effective Date until Bank's satisfactory completion of the Initial Audit, seventy-five percent (75%) of Eligible Accounts as determined by Bank from Borrower's most recent Borrowing Base Statement (and as may subsequently be updated by Bank based upon information received by Bank including, without limitation, Accounts that are paid and/or billed following the date of the Borrowing Base Statement); and (B) upon Bank's satisfactory completion of the Initial Audit, eighty-five percent (85%) of Eligible Accounts plus the least of (i) fifty percent (50%) of Eligible Inventory (valued at the lower of cost or wholesale fair market value), (ii) Five Million Dollars ($5,000,000) or (iii) an amount that would represent twenty-five percent (25%) of the total Availability Amount, all as determined by Bank from Borrower's most recent Borrowing Base Statement (and as may subsequently be updated by Bank based upon information received by Bank including, without limitation, Accounts that are paid and/or billed following the date of the Borrowing Base Statement); provided, however, that Bank has the right to decrease the foregoing amounts and percentages in its good faith business judgment to mitigate the impact of events, conditions, contingencies, or risks which may materially and adversely affect the Collateral or its value. Bank shall use commercially reasonable efforts to notify Borrower of any such decrease.

"**Fifth Amendment Effective Date**" is December 27, 2021.

"**Financing Milestone**" means the receipt by Borrower of at least Twenty-Five Million Dollars ($25,000,000) from the proceeds of the issuance of equity securities or Subordinated Debt into Borrower's accounts at Bank after the Fifth Amendment Effective Date but on or prior to February 28, 2022.

"**Streamline Period**" is, after the completion of the Initial Audit and upon the earlier to occur of (i) the Financing Milestone or (ii) February 28, 2022, provided no Event of Default has occurred and is continuing, the period (a) commencing on the first day of the month following the day that Borrower provides to Bank evidence, satisfactory to Bank in its sole discretion, confirming that Borrower has maintained Liquidity of greater than Twenty Million Dollars ($20,000,000) at all times during the prior month (the "**Streamline Balance**"); and (b) terminating on the earlier to occur of (i) the occurrence of an Event of Default, and (ii) the first day of the first month following any month in which Borrower

fails to maintain the Streamline Balance, as determined by Bank in its discretion. Upon the termination of a Streamline Period, Borrower must maintain the Streamline Balance as of the last day of each calendar month for one (1) fiscal quarter prior to entering into a subsequent Streamline Period. Borrower shall give Bank prior written notice of Borrower's election to enter into any such Streamline Period, and each such Streamline Period shall commence on the first day of the monthly period following the date Bank determines, in its reasonable discretion, that the Streamline Balance has been achieved.

"**Success Fee**" is a fully earned, non-refundable fee in an amount equal to One Hundred Twenty-Five Thousand Dollars ($125,000).

2.6 **Section 13 (Definitions)**. Subsection (x) of the defined term "Eligible Accounts" set forth in Section 13.1 of the Loan Agreement hereby is amended and restated in its entirety as follows:

"(x) Intentionally Omitted."

2.7 Exhibit B of the Loan Agreement hereby is replaced with Exhibit B (including Schedule 1) attached hereto.

2.8 Borrower hereby agrees that the Initial Audit must be completed no later than sixty (60) days after the Fifth Amendment Effective Date.

3. Limitation of Amendment.

3.1 This Amendment is effective for the purposes set forth herein and shall be limited precisely as written and shall not be deemed to (a) be a consent to any amendment, waiver or modification of any other term or condition of any Loan Document, or (b) otherwise prejudice any right or remedy which Bank may now have or may have in the future under or in connection with any Loan Document.

3.2 This Amendment shall be construed in connection with and as part of the Loan Documents, and all terms, conditions, representations, warranties, covenants and agreements set forth in the Loan Documents are hereby ratified and confirmed and shall remain in full force and effect.

4. Representations and Warranties. Borrower represents and warrants to Bank as follows:

4.1 (a) the representations and warranties contained in the Loan Documents are true, accurate and complete in all material respects as of the date hereof (except to the extent such representations and warranties relate to an earlier date, in which case they are true and correct as of such date), and (b) no Event of Default has occurred and is continuing;

4.2 Borrower has the power and authority to execute and deliver this Amendment and to perform its obligations under the Loan Agreement;

4.3 The organizational documents of Borrower delivered to Bank on the Effective Date remain true, accurate and complete and have not been amended, supplemented or restated and are and continue to be in full force and effect;

4.4 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement have been duly authorized by all necessary action on the part of Borrower;

4.5 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement do not and will not contravene (a) any law or regulation binding on or affecting Borrower, (b) any contractual restriction with a Person binding on Borrower, (c) any order, judgment or decree of any court or other governmental or public body or authority, or subdivision thereof, binding on Borrower, or (d) the organizational documents of Borrower;

4.6 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement do not require any order, consent, approval, license, authorization or validation of, or filing, recording or registration with, or exemption by any governmental or public body or authority, or subdivision thereof, binding on either Borrower, except as already has been obtained or made; and

4.7 This Amendment has been duly executed and delivered by Borrower and is the binding obligation of Borrower, enforceable against Borrower in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization, liquidation, moratorium or other similar laws of general application and equitable principles relating to or affecting creditors' rights.

5. Ratification of Perfection Certificate. Borrower hereby ratifies, confirms and reaffirms, all and singular, the terms and disclosures contained in a certain Perfection Certificate dated on or prior to the Effective Date, as supplemented by a First Supplement, dated as of July 25, 2018, a Second Supplement, dated as of July 25, 2018 a Third Supplement, dated as of August 28, 2019, a Fourth Supplement, dated as of April 21, 2020, and a Fifth Supplement, dated as of July 20, 2021 and as supplemented by all other notices to the Bank under the Loan Agreement changing any such information previously provided, and acknowledges, confirms and agrees that the disclosures and information Borrower provided to Bank in such Perfection Certificate, as supplemented, have not changed, as of the date hereof, in any material respect except for (i) average monthly bank balances which change from time to time, and (ii) changes in litigation set forth in Borrower's periodic filings with the Securities and Exchange Commission from time to time.

6. Integration. This Amendment and the Loan Documents represent the entire agreement about this subject matter and supersede prior negotiations or agreements. All prior agreements, understandings, representations, warranties, and negotiations between the parties about the subject matter of this Amendment and the Loan Documents merge into this Amendment and the Loan Documents.

7. Counterparts. This Amendment may be executed in any number of counterparts and all of such counterparts taken together shall be deemed to constitute one and the same instrument.

8. Conditions to Effectiveness. The parties agree that this amendment shall be effective upon (a) the due execution and delivery to Bank of this Amendment by each party hereto, (b) an updated Corporate Borrowing Certificate, and (c) Borrower's payment of all Bank Expenses due and owing as of the date hereof, which may be debited from any of Borrower's accounts at Bank.

9. Miscellaneous.

9.1 This Amendment shall constitute a Loan Document under the Loan Agreement; the failure to comply with the covenants contained herein shall constitute an Event of Default under the Loan Agreement; and all obligations included in this Amendment (including, without limitation, all obligations for the payment of principal, interest, fees, and other amounts and expenses) shall constitute obligations under the Loan Agreement and secured by the Collateral.

9.2 Each provision of this Amendment is severable from every other provision in determining the enforceability of any provision.

10. Governing Law. This Amendment and the rights and obligations of the parties hereto shall be governed by and construed in accordance with the laws of the State of California.

[*Balance of Page Intentionally Left Blank*]

In Witness Whereof, the parties hereto have caused this Amendment to be duly executed and delivered as of the date first written above.

BANK	**BORROWER**
SILICON VALLEY BANK	**FLUIDIGM CORPORATION**
By: /s/ Kristina Peralta	By: /s/ Vikram Jog
Name: Kristina Peralta	Name: Vikram Jog
Title: Vice President	Title: Chief Financial Officer

[*Signature Page to Fifth Amendment to Loan and Security Agreement*]

EXHIBIT B

COMPLIANCE STATEMENT

TO: SILICON VALLEY BANK Date: _____
FROM: FLUIDIGM CORPORATION

Under the terms and conditions of the Loan and Security Agreement between Borrower and Bank (the "Agreement"): Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below. Attached are the required documents evidencing such compliance, setting forth calculations prepared in accordance with GAAP consistently applied from one period to the next except as explained in an accompanying letter or footnotes. Capitalized terms used but not otherwise defined herein shall have the meanings given them in the Agreement.

Please indicate compliance status by circling Yes/No under "Complies" column.

Reporting Covenants	Required	Complies
Quarterly Financial Statements*	Within 45 days after the end of each fiscal quarter	Yes No
Compliance Statement	(i) within 45 days after the end of each fiscal quarter when the principal amount outstanding under the Revolving Line = $0.00 at all times during such fiscal quarter, and (ii) within 30 days after the end of each month when the principal amount outstanding under the Revolving Line is > $0.00 at any time during such calendar month	Yes No
10-Q, 10-K and 8-K	Within 5 days	Yes No
A/R & A/P Agings and Monthly Perpetual Inventory Reports	(i) within 30 days after the end of each fiscal quarter when the principal amount outstanding under the Revolving Line = $0.00 at all times during such fiscal quarter, and (ii) within 30 days after the end of each month when the principal amount outstanding under the Revolving Line is > $0.00 at any time during such calendar month	Yes No
Borrowing Base Statement	(i) no later than Friday of each week when a Streamline Period is not in effect and the principal amount outstanding under the Revolving Line is > $0.00, (ii) within 7 days after the end of each month (provided however that if such seventh day is not a Business Day, then such Borrowing Base Statement shall be delivered on next Business Day) when a Streamline Period is in effect and when the principal amount outstanding under the Revolving Line is > $0.00 at any time during such calendar month, and (iii) within 7 days after the end of each fiscal quarter when the principal amount outstanding under the Revolving Line = $0.00 at all times during such fiscal quarter	Yes No
Board Approved Projections	Within 30 days of each fiscal year of Borrower, and within 7 days of any updates/amendments	Yes No
Field Exams	Annually, provided that the Initial Audit is to occur within 60 days of the Fifth Amendment Effective Date	Yes No
Bank of America Bank Statements	Within 7 days after the end of each month	Yes No
**Provided, however, notwithstanding the foregoing, the Quarterly Financial Statements for Borrower's fourth (4th) quarter of each fiscal year, shall be due within ninety (90) days of such fiscal quarter.*		

Financial Covenant	Required	Actual	Complies
Maintain as indicated:			
Minimum Adjusted Quick Ratio	≥1.25:1.00	$_____	Yes No

Streamline	Required	Actual	Applies
Maintain as indicated:			
Liquidity	**> $20,000,000**	**$_____**	**Yes No**

Schedule 1 to Compliance Statement

In the event of a conflict between this Schedule and the Agreement, the terms of the Agreement shall govern.

Dated: _____

11. Minimum Adjusted Quick Ratio (Section 6.9)

Required: ≥1.25 to 1.00

Aggregate value of Borrower's unrestricted cash and Cash Equivalents held at Bank and Bank Affiliates subject to a Control Agreement.	$_____
Aggregate value of the unrestricted and unencumbered cash of Borrower in Deposit Accounts maintained outside of Bank but subject to a Control Agreement in favor of Bank	$_____
Aggregate value of Borrower's net Accounts receivable	$_____
Quick Assets (the sum of lines A, B and C)	$_____
Aggregate value of Obligations owing from Borrower to Bank (provided however for the period of time from the Fifth Amendment Effective Date through the earlier to occur of (i) the Financing Milestone or (ii) February 28, 2022, Indebtedness under the Revolving Line shall be excluded from the calculation of Current Liabilities)	$_____
Aggregate value of liabilities of Borrower that mature within one (1) year (without duplication with line E above)	$_____
Current Liabilities (the sum of lines E and F)	$_____
Current portion of Borrower's Deferred Revenue	$_____
Adjusted Quick Ratio (line D divided by the difference of line G, minus line H)	

Actual:

Is line I greater than or equal to 1.25 to 1:00?

__ No, not in compliance __ Yes, in compliance

I. **Liquidity** (*Streamline Calculation*)

Required: Liquidity > $20,000,000

Actual:

Aggregate value of Borrower's unrestricted cash and Cash Equivalents held at Bank	$_____
Aggregate value of Borrower's unrestricted and unencumbered cash in Deposit Accounts maintained outside of Bank but subject to a Control Agreement in favor of Bank	$_____
Availability Amount	$_____
Liquidity (the sum of lines A, B, and C)	$_____

Is line D greater than $20,000,000?

_____ No (Streamline does NOT apply) __ Yes (Streamline does apply)

DEFAULT WAIVER AND CONSENT
TO
LOAN AND SECURITY AGREEMENT

This Default Waiver and Consent to Loan and Security Agreement (this "**Default Waiver and Consent**") is entered into this 4th day of March, 2022, by and among **SILICON VALLEY BANK** ("**Bank**"), and **FLUIDIGM CORPORATION**, a Delaware corporation ("**Borrower**").

Recitals

A. Bank and Borrower have entered into that certain Loan and Security Agreement dated as of August 2, 2018 (as may from time to time be further amended, modified, supplemented or restated, including, without limitation, by that certain Default Waiver and First Amendment to Loan and Security Agreement dated as of September 7, 2018, that certain Second Amendment to Loan and Security Agreement dated as of November 20, 2019, that certain Third Amendment to Loan and Security Agreement dated as of April 21, 2020, that certain Fourth Amendment to Loan and Security Agreement dated as of August 2, 2021, and that certain Fifth Amendment to Loan and Security Agreement dated as of December 27, 2021 collectively, the "**Loan Agreement**").

B. Borrower acknowledges it is currently in default of Sections 7.4 and 7.7 of the Loan Agreement for entering into that certain promissory note between Borrower and its wholly owned Subsidiary, Fluidigm Singapore Pte. Ltd. ("**Fluidigm Singapore**") dated as of December 30, 2021 and attached hereto as Annex I (the "**2021 Promissory Note**"), pursuant to which Borrower has lent to Fluidigm Singapore a total amount not to exceed Ten Million Dollars ($10,000,000), and for entering into a predecessor promissory note, dated as of September 1, 2020 (collectively, the "**Waived Default**").

C. Borrower has requested that Bank waive its rights and remedies against Borrower, limited specifically to the Waived Default. Although Bank is under no obligation to do so, Bank is willing to not exercise its rights and remedies against Borrower related to the specific Waived Default on the terms and conditions set forth in this Default Waiver and Consent, so long as Borrower complies with the terms, covenants and conditions set forth in this Default Waiver and Consent.

D. Finally, Borrower has requested that Bank consent to Borrower's entry into and the existence of the 2021 Promissory Note. Bank has agreed to so consent to the 2021 Promissory Note, but only to the extent, in accordance with the terms, subject to the conditions and in reliance upon the representations and warranties set forth below.

Agreement

Now, Therefore, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. Capitalized terms used but not defined in this Default Waiver and Consent shall have the meanings given to them in the Loan Agreement.

2. Waiver of Default. Bank hereby waives filing any legal action or instituting or enforcing any rights and remedies it may have against Borrower with respect to the Waived Default. Bank's waiver of Borrower's compliance with Sections 7.4 and 7.7 of the Loan Agreement shall apply only with respect to the Waived Default. Accordingly, hereinafter, Borrower shall be in compliance with such sections. Bank's agreement to waive the Waived Default (a) in no way shall be deemed an agreement by Bank to waive Borrower's compliance with the above-referenced sections as of all other dates after the date hereof, and (b) shall not limit or impair the Bank's right to demand strict performance of such sections as of all other dates after the date hereof.

3. Consent. Subject to the terms of Section 9 below, Bank hereby consents to Borrower's entry into and the existence of the 2021 Promissory Note and agrees that the 2021 Promissory Note constitutes Permitted Indebtedness under Section 7.4 and a Permitted Investment under Section 7.7.

4. Limitation of Default Waiver and Consent.

4.1 This Default Waiver and Consent is effective for the purposes set forth herein and shall be limited precisely as written and shall not be deemed to (a) be a consent to any amendment, waiver or modification of any other term or condition of any Loan Document, or (b) otherwise prejudice any right or remedy which Bank may now have or may have in the future under or in connection with any Loan Document.

4.2 This Default Waiver and Consent shall be construed in connection with and as part of the Loan Documents, and all terms, conditions, representations, warranties, covenants and agreements set forth in the Loan Documents are hereby ratified and confirmed and shall remain in full force and effect.

5. Representations and Warranties. Borrower represents and warrants to Bank as follows:

5.1 (a) the representations and warranties contained in the Loan Documents are true, accurate and complete in all material respects as of the date hereof (except to the extent such representations and warranties relate to an earlier date, in which case they are true and correct as of such date), and (b) no Event of Default other than the Waived Default has occurred and is continuing;

5.2 Borrower has the power and authority to execute and deliver this Default Waiver and Consent and to perform its obligations under the Loan Agreement;

5.3 The organizational documents of Borrower delivered to Bank on or prior to the date hereof remain true, accurate and complete and have not been amended, supplemented or restated and are and continue to be in full force and effect;

5.4 The execution and delivery by Borrower of this Default Waiver and Consent and the performance by Borrower of its obligations under the Loan Agreement have been duly authorized by all necessary action on the part of Borrower;

5.5 The execution and delivery by Borrower of this Default Waiver and Consent and the performance by Borrower of its obligations under the Loan Agreement do not and will not contravene (a) any law or regulation binding on or affecting Borrower, (b) any contractual restriction with a Person binding on Borrower, (c) any order, judgment or decree of any court or other governmental or public body or authority, or subdivision thereof, binding on Borrower, or (d) the organizational documents of Borrower;

5.6 The execution and delivery by Borrower of this Default Waiver and Consent and the performance by Borrower of its obligations under the Loan Agreement do not require any order, consent, approval, license, authorization or validation of, or filing, recording or registration with, or exemption by any governmental or public body or authority, or subdivision thereof, binding on either Borrower, except as already has been obtained or made; and

5.7 This Default Waiver and Consent has been duly executed and delivered by Borrower and is the binding obligation of Borrower, enforceable against Borrower in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization, liquidation, moratorium or other similar laws of general application and equitable principles relating to or affecting creditors' rights.

6. Ratification of Perfection Certificate. Borrower hereby ratifies, confirms and reaffirms, all and singular, the terms and disclosures contained in a certain Perfection Certificate dated on or prior to the Effective Date, as supplemented by a First Supplement, dated as of July 25, 2018, a Second Supplement, dated as of July 25, 2018 a Third Supplement, dated as of August 28, 2019, a Fourth Supplement, dated as of April 21, 2020, and a Fifth Supplement, dated as of July 20, 2021 and as supplemented by all other notices to the Bank under the Loan Agreement changing any such information previously provided, and acknowledges, confirms and agrees that the disclosures and information

Borrower provided to Bank in such Perfection Certificate, as supplemented, have not changed, as of the date hereof, in any material respect except for (i) average monthly bank balances which change from time to time, and (ii) changes in litigation set forth in Borrower's periodic filings with the Securities and Exchange Commission from time to time.

7. Integration. This Default Waiver and Consent and the Loan Documents represent the entire agreement about this subject matter and supersede prior negotiations or agreements. All prior agreements, understandings, representations, warranties, and negotiations between the parties about the subject matter of this Default Waiver and Consent and the Loan Documents merge into this Default Waiver and Consent and the Loan Documents.

8. Counterparts. This Default Waiver and Consent may be executed in any number of counterparts and all of such counterparts taken together shall be deemed to constitute one and the same instrument.

9. Conditions to Effectiveness. The parties agree that this Default Waiver and Consent shall be effective upon (a) the due execution and delivery to Bank of this Default Waiver and Consent by each party hereto and (b) Borrower's payment of all Bank Expenses due and owing as of the date hereof, which may be debited from any of Borrower's accounts at Bank.

10. Miscellaneous.

10.1 This Default Waiver and Consent shall constitute a Loan Document under the Loan Agreement; the failure to comply with the covenants contained herein shall constitute an Event of Default under the Loan Agreement; and all obligations included in this Default Waiver and Consent (including, without limitation, all obligations for the payment of principal, interest, fees, and other amounts and expenses) shall constitute obligations under the Loan Agreement and secured by the Collateral.

10.2 Each provision of this Default Waiver and Consent is severable from every other provision in determining the enforceability of any provision.

10.3 This Default Waiver and Consent shall serve as notice to any holders of Subordinated Debt that the Waived Default has been waived by Bank.

11. Governing Law. This Default Waiver and Consent and the rights and obligations of the parties hereto shall be governed by and construed in accordance with the laws of the State of California.

[*Balance of Page Intentionally Left Blank*]

In Witness Whereof, the parties hereto have caused this Default Waiver and Consent to be duly executed and delivered as of the date first written above.

BANK	**BORROWER**
SILICON VALLEY BANK	**FLUIDIGM CORPORATION**
By: /s/ Kristina Peralta	By: /s/ Vikram Jog
Name: Kristina Peralta	Name: Vikram Jog
Title: Vice President	Title: Chief Financial Officer

ANNEX I

2021 PROMISSORY NOTE

December __, 2021

Board of Directors
Fluidigm Corporation

Board of Directors
Fluidigm Singapore Pte Ltd

Dear Sirs/Madam

Promissory Note between Fluidigm Corporation and Fluidigm Singapore Pte Ltd

1. Fluidigm Corporation and Fluidigm Singapore Pte Ltd are parties to a promissory note with effective date 1 September 2020 ("**2020 Note**") pursuant to which Fluidigm Corporation agreed to lend Fluidigm Singapore Pte Ltd a total amount not exceeding US$32,000,000.

2. We agree that the outstanding principal of the 2020 Note and all unpaid interest accrued under the 2020 Note are as set out below (collectively, the "**Debt**"):

   (a) outstanding principal amount of the 2020 Note: US$22,400.000.00

   (b) current interest payable: US$31,774.95

3. We further agree that:

   (a) Fluidigm Singapore Pte Ltd will utilise the amount of US$12,431,774.95, being part of the receivables amounting to US$14,000,000.00 and owing by Fluidigm Corporation to the Company, to offset part of the Debt;

   (b) the outstanding balance, amounting to US$10,000,000.00, of the Debt ("**Outstanding Balance**") will be settled in full by:

      (i) Fluidigm Singapore Pte Ltd issuing a new promissory note effective from 30 December 2021, in the form attached in Annex 1, to Fluidigm Corporation pursuant to which Fluidigm Corporation agrees to lend the Company a total amount not exceeding US$10,000,000.00 upon the terms and conditions as set out in the 2021 Note; and

      (ii) Fluidigm Corporation utilising the amount of US$10,000,000.00 under the 2021 Note to offset the Outstanding Balance; and

   (c) the 2020 Note shall be terminated immediately upon the satisfaction of the Debt in accordance with the foregoing.

Signed for and on behalf of:

Fluidigm Corporation

/s/ Nicholas S. Khadder

Nicholas S. Khadder
Senior Vice President

Signed for and on behalf of:

Fluidigm Singapore Pte Ltd

/s/ Vikram Jog

Vikram Jog
Director

ANNEX 1

New Promissory Note

PROMISSORY NOTE

Amount: $10,000,000.00 USD Commencement Date: December 30, 2021

FOR VALUE RECEIVED, **Fluidigm Singapore Pte. Ltd.,** a company incorporated in the Republic of Singapore ("Borrower"), **Fluidigm Corporation,** a company organized and existing under the laws of Delaware ("Lender"), or its successors and assigns, the principal sum, not exceeding $10,000,000.00 together with interest, as provided in this Promissory Note (this "Note").

1. DEFINITIONS. As used in this Note, capitalized terms have the respective meanings set forth below or set forth in the Section defining such terms:

"Affiliate" with respect to any person or entity shall mean any entity or association directly or indirectly controlled by, controlling, or under common control with such first person or entity. For purposes of this definition, the term "control" shall mean ownership of at least fifty percent (50%) of the voting or equity interests in any entity or association.

"Business Day" shall mean a day other than Saturday, Sunday or a day on which banking institutions in San Mateo County, California are authorized or obligated by law, governmental order or regulation to close.

"Event of Default" shall have the meaning specified in Section 6 hereof.

"Maturity Date" shall mean December 31, 2022.

"Notice" shall have the meaning specified in Section 8.6 hereof.

"Principal Amount" shall mean an amount agreed between the parties, not to exceed $10,000,000.000.

2. PAYMENT OF PRINCIPAL AND INTEREST.

2.1 Procedure for Borrowing Funds. Each borrowing of funds hereunder shall be made upon the Borrower's delivery to the Lender of a notice of borrowing (a "Borrowing Notice") pertaining thereto not later than the first Business Day before the date requested for borrowing such funds. Such Borrowing Notice shall specify (i) the principal amount of the funds requested, which, together with any principal amounts outstanding under this Note, must not exceed the maximum Principal Amount and (ii) the requested date of its borrowing, which must be a Business Day before the Maturity Date.

2.2 Principal and Maturity. Upon Borrower's delivery of a Borrowing Notice pursuant to Section 2.1, Lender shall provide the funds requested in the Borrowing Notice. Without prejudice to Section 2.4 hereof, the outstanding principal of this Note and all unpaid interest accrued thereon shall be due and payable in full by Borrower on the Maturity Date or on such earlier date following the occurrence of an Event of Default as provided in Section 6 hereof.

2.3 Payments. All payments by Borrower under this Note shall be made in U.S. dollars to a bank account of Lender as Lender may from time to time specify by notice to Borrower.

2.4 Prepayment. Borrower, at its option, may prepay the outstanding principal amount of this Note, in whole or in part, together with all unpaid interest on the amount of principal so prepaid accrued to but excluding the date of such prepayment, without premium or penalty.

2.5 Interest. This Note shall bear interest accruing from and including the date hereof to but excluding the date on which this Note shall have been paid in full at a rate per annum of 0.44%, the applicable Federal Short-Term Rate as of January 2022. Interest payable hereunder accrued for any period shall be computed on the principal amount of this Note outstanding from time to time from and including the first day of such period to but excluding the last day of such period for the actual number of days elapsed in such period on the basis of a 360-day year. All accrued and unpaid interest on this Note shall be due and payable in full by Borrower on the Maturity Date or on such earlier date following the occurrence of an Event of Default as provided in Section 6 hereof. Upon prepayment of any portion of the principal of this Note pursuant to Section 2.4 hereof, Borrower shall pay unpaid interest accrued on the amount of such principal so prepaid to but excluding the date of such prepayment.

2.6 Payment Falling Due on Non-Business Day. If any payment of an amount under this Note becomes due on a date that is not a Business Day, such payment shall be made on the next succeeding Business Day and the period from and including such due date to but excluding such next succeeding Business Day shall be included in the period for computing any interest payable hereunder as or in conjunction with such amount.

3. COVENANTS.

3.1 No Fundamental Changes. Borrower shall not directly or indirectly merge, consolidate, amalgamate or liquidate with or into any person or entity without the written consent of Lender. Borrower shall not directly or indirectly convey, sell, lease, transfer or otherwise dispose of, in one transaction or a series of transactions, all or a substantial part of its business assets to any person or entity without the written consent of Lender.

3.2 Transactions with Affiliates. Transactions between Borrower and its Affiliates must be arm’s-length, as determined in good faith by the officers and directors of Borrower.

4. EVIDENCE OF OBLIGATIONS. In addition to being evidenced by this Note, the obligations from time to time outstanding under this Note, including the principal amount hereof outstanding and amounts of interest accruing and accrued from time to time hereunder and all amounts of the principal hereof and of interest paid by Borrower to Lender pursuant to this Note and any amount that Borrower has failed to pay when due hereunder, shall be evidenced by recordation by Lender in its records in accordance with its usual business practices. Any such recordation shall be rebuttable presumptive evidence of the accuracy of the information so recorded. Any failure so to record or any error in doing so shall not, however, limit or otherwise affect the obligations of Borrower under this Note to pay any amount owing hereunder.

5. REPRESENTATIONS AND WARRANTIES. Borrower represents and warrants to Lender as follows:

5.1 Information Furnished to Lender as to Ability to Meet Obligations. Borrower acknowledges that Lender’s extension of credit to Borrower evidenced by this Note has been supported by an evaluation by Lender of Borrower’s current and projected financial condition and of Borrower’s ability to meet and pay in full its obligations under this Note on the terms hereof, and that such evaluation has been based on, among other things, Lender’s review of certain financial statements of and other information about Borrower and its current and projected financial condition provided by Borrower to

Lender. All such financial statements and other information when so provided, except in the case of information comprising projections of future financial condition, were complete and correct and fairly presented the financial condition of Borrower as at the times and for the periods covered thereby and, in the case of information comprising projections of future financial condition, were based on a reasonable and good faith assessment by Borrower's senior management of Borrower's projected financial performance.

5.2 Binding Obligations. This Note constitutes the legal, valid, binding and unconditional obligation of Borrower, enforceable against Borrower in accordance with its terms.

6. EVENTS OF DEFAULT. Lender may by Notice to Borrower and without incurring any liability to Borrower declare an Event of Default hereunder at any time and with immediate effect upon effectiveness as provided in Section 8.6 hereof of such Notice, whereupon the outstanding principal amount of this Note and all accrued and unpaid interest thereon shall become immediately due and payable, if any of the following events (each an "Event of Default") shall occur:

(a) Borrower shall cease or fail to be solvent, shall admit in writing its inability to, or shall fail generally or be generally unable to, pay its debts (including its payrolls) as such debts become due;

(b) (i) Borrower shall be liquidated, wound up or dissolved, (ii) Borrower shall suspend its operations other than in the ordinary course of business, (iii) Borrower shall be declared by a competent authority to be bankrupt or to be liquidated, wound up or dissolved, (iv) Borrower shall make a general assignment for the benefit of creditors or shall seek the appointment of a receiver, trustee, custodian, sequestrator, conservator or similar official for Borrower or its assets, (v) Borrower shall seek relief under any federal, state or other governmental division bankruptcy, insolvency, receivership, reorganization or similar law now or hereafter in effect or (v) any corporate action shall be taken by or on behalf of Borrower authorizing any of the foregoing in this subsection (b)

(c) (i) an involuntary proceeding shall be commenced or an involuntary petition shall be filed seeking (A) liquidation, reorganization or other relief in respect of Borrower or its debts, or of a substantial part of its assets, under any federal, state or other governmental division bankruptcy, insolvency, receivership, reorganization or similar law now or hereafter in effect or (B) the appointment of a receiver, trustee, custodian, sequestrator, conservator or similar official for Borrower or for a substantial part of its assets or (ii) an order or decree approving or ordering any of the foregoing in this subsection (c) shall be entered;

(d) Borrower shall have failed to pay any amount due by it under this Note on the dates and in the manner provided herein and shall have not remedied such failure for a period of forty-five (45) days after the effective date of Notice of such failure given by Lender to Borrower;

(e) it shall become unlawful to maintain the indebtedness evidenced by this Note or for Borrower to perform any of its obligations hereunder, or this Note shall cease to be effective and enforceable in accordance with its terms;

(f) Lender shall determine that any representation or warranty of Borrower made herein, other than a representation or warranty that speaks only as of a particular time, is untrue

or, in the case of such a representation or warranty that speaks only as of a particular time, that such representation or warranty was untrue as of such time; or

(g) Borrower shall materially breach a covenant contained in Section 3 hereof.

Notwithstanding the lead-in paragraph of this Section 6, if an Event of Default specified in subsection (b) or (c) of this Section 6 occurs, the outstanding principal amount of this Note and all accrued and unpaid interest thereon shall upon such occurrence automatically become immediately due and payable without any requirement of notice or other action by Lender or otherwise.

7. WAIVERS; ACKNOWLEDGMENTS; RESERVATION OF RIGHTS AND REMEDIES UNDER APPLICABLE LAW. Borrower waives presentment and notice of dishonor. Borrower acknowledges and agrees as follows:

(a) All rights and remedies available to Lender under applicable law in respect of any default by Borrower in the performance of its obligations under this Note or otherwise in respect of enforcement of this Note are reserved by Lender.

(b) Without limitation, the rights reserved hereunder include all rights of Lender to receive, before the holders of shares or other interests in the equity of Borrower, for application toward satisfaction in part or in whole of Borrower's obligations under this Note, assets, or the value thereof, of Borrower upon the dissolution of Borrower or otherwise as may exist or arise under applicable law, including without limitation the law of the jurisdiction of Borrower's organization or conduct of business and any federal, state or other governmental division bankruptcy, insolvency, receivership or similar law now or hereafter in effect. Without limiting the effect of the preceding sentence, it is the intention of Borrower and Lender that Lender shall have the right to receive indefeasible payment in full of all obligations of Borrower under or arising from this Note before the holders of shares or other interests in the equity of Borrower are entitled to receive any assets, or the value thereof, of Borrower upon the dissolution of Borrower. Further, for the avoidance of doubt, it is intended that the indebtedness and claims arising under this Note rank at least pari passu with Borrower's other unsubordinated indebtedness and claims arising therefrom, other than to the extent that other indebtedness and claims arising therefrom are preferred by applicable law.

8. MISCELLANEOUS PROVISIONS.

8.1 Taxes. All payments due under this Note shall be made free and clear of, and without deduction or withholding for or on account of, any present or future income, stamp or other taxes, levies, imposts, duties, charges, fees, deductions, or withholdings, now or hereafter imposed, levied, collected, withheld, or assessed by any governmental authority, excluding net income taxes and franchise taxes (imposed in lieu of net income taxes) imposed on Lender as a result of a present or former connection between Lender and the jurisdiction of the governmental authority imposing such tax or any political subdivision or taxing authority thereof (other than any such connection arising solely from Lender having accepted, executed, received a payment under, or enforced this Note or any other agreement or document connected to a transaction to which this Note is connected). If any such non-excluded taxes, levies, imposts, duties, charges, fees, deductions or withholdings ("Non-Excluded Taxes") are required to be withheld from any amounts payable to Lender hereunder, the amounts so payable shall be increased to the extent necessary to yield to Lender (after payment of all Non-Excluded Taxes) such amounts payable hereunder at the rates and in the amounts specified in this Note. If any Non-Excluded Taxes are payable by Borrower, as promptly as possible thereafter Borrower shall send to Lender a certified copy of an original official receipt received by Borrower showing payment thereof. If Borrower fails to pay any Non-Excluded Taxes when due to the appropriate taxing authority or fails to remit to Lender the required

receipts or other required documentary evidence, Borrower shall indemnify Lender for any incremental taxes and any liability (including interest, penalties, and expenses) that may become payable by Lender as a result of any such failure.

Notwithstanding the foregoing, Borrower shall not be required to make any increase in or payment of any increased amount payable to Lender under this Note pursuant to this Section 8.1 unless, at least five Business Days before the date such increased amount becomes payable to Lender (an "Increased Payment Date"), Lender (including any assignee or successor of the initial holder of this Note or any assignee or successor thereof as Lender hereunder), if required by law and/or if requested, shall have delivered to Borrower (i) a duly completed Internal Revenue Service Form W-9, W-8BEN, W-8BEN-E, W-8ECI, or W-8IMY, or successor applicable form, as the case may be, certifying that it is entitled to receive payments by Borrower under this Note without deduction or withholding of any United States federal taxes (an "Exemption Certificate"); and (ii) a further completed and effective Exemption Certificate, if any Exemption Certificate earlier delivered to Borrower has expired or become obsolete or will expire or become obsolete on or before such Increased Payment Date or if any event (other than a Change in Law, as defined below) requiring a change in any Exemption Certificate earlier delivered to Borrower has occurred or will occur on or before such Increased Payment Date; unless, in either case, any change in treaty, law, or regulation or the interpretation or application thereof by a government authority (any such change being a "Change in Law") has occurred both (x) after the date of this Note or, if Lender is an assignee or successor of the initial holder of this Note or any assignee or successor thereof, the date on which Lender became such assignee or successor, and (y) prior to the date on which any such delivery would otherwise be required, which Change in Law renders all such forms inapplicable or prevents Lender from being able duly to complete and deliver any such form with respect to it and Lender has so advised Borrower.

8.2 Transferability. This Note shall not be sold, transferred, assigned or pledged, in whole or in part, by Lender except with the prior written approval of Borrower; provided, however, that Lender may transfer this Note in whole or in part to an Affiliate by a written endorsement hereof or written instrument separate from this Note specifying such Affiliate to which this Note or a portion thereof is being transferred. Borrower may not delegate or assign its obligations under this Note, in whole or in part, except with the prior written approval of Lender; provided, however, that this sentence shall not prohibit payments under this Note being made on behalf of and for the benefit of Borrower by any Affiliate of Borrower.

8.3 Set-Off. To the extent permitted by law, Borrower shall have the right, without prior notice to Lender, to set off any amount owed by Lender to Borrower against any amount owed by Borrower to Lender hereunder. Borrower will promptly notify Lender after any set-off, but the failure to give notice will not affect the validity of the set-off.

8.4 No Waiver; Remedies Not Cumulative. Any forbearance or failure or delay by Lender in exercising any right, power or remedy hereunder shall not be deemed a waiver thereof and any single or partial exercise of any right, power or remedy shall not preclude the further exercise thereof. No waiver shall be effective unless it is in writing and signed by an authorized officer of Lender. The rights and remedies provided in this Note are cumulative and not exclusive of any rights or remedies provided by law.

8.5 No Usury. Notwithstanding any other provision of this Note, no interest owing under this Note shall exceed the maximum rate permitted by applicable law. If any amount paid as interest under this Note is above the maximum rate permitted by applicable law, such excess amount shall not constitute interest but shall constitute a payment towards the principal amount due.

8.6 Notices. Any demand or other communication ("Notice") to be given by Borrower or Lender to the other under, or in connection with, this Note shall be in writing and signed by or on behalf of Borrower or Lender, as the case may be, and shall be delivered to Borrower or Lender, as the case may be, at its address specified to the other, at the time of execution and delivery of this Note, for delivery of Notices hereunder, or to such other address for such purpose as it may from time to time specify to the other in a Notice delivered in compliance with this Section 8.6. Any Notice shall be delivered by sending it by recognized overnight courier or electronic mail, or by delivering it by hand, and in each case marked for the attention of the officer identified by Borrower or Lender, as the case may be, in its address for Notices specified as provided above. Any Notice so delivered shall be deemed to have been duly given or made and be effective (a) if delivered by overnight courier, when received, (b) if delivered by electronic mail, at the time of transmission, or (c) if delivered by hand, when received, provided that in each case where delivery to a recipient by electronic mail or receipt by a recipient in delivery by overnight courier or by hand occurs after 6 p.m. on a Business Day or on a day which is not a Business Day, delivery shall be deemed to occur at 9 a.m. on the next following Business Day. References to time in this Section 8.6 in respect of a Notice are to local time in the location of the business address of the officer addressee of such Notice. In proving delivery of a Notice it shall be sufficient to prove that the envelope containing such Notice was properly addressed and delivered as specified herein.

8.7 Severability. Whenever possible, each provision of this Note shall be interpreted in such manner as to be effective and valid under all applicable laws and regulations. If, however, any provision of this Note shall be prohibited by or invalid under any such applicable law or regulation in any jurisdiction, it shall, as to such jurisdiction, be deemed modified to conform to the minimum requirements of such law or regulation, or, if for any reason it is not deemed so modified, it shall be ineffective and invalid only to the extent of such prohibition or invalidity without affecting the remaining provisions of this Note, or the validity or effectiveness of such provision in any other jurisdiction.

8.8 Governing Law. This Note and the rights and obligations arising hereunder shall be governed by and construed in accordance with the laws of the State of California, United States of America. Borrower hereby (i) submits to the nonexclusive jurisdiction of the courts of the State of California and the Federal courts of the United States of America sitting in San Mateo County, California for the purpose of any action or proceeding arising out of or relating to this Note, (ii) agrees that all claims in respect of any such action or proceeding may be heard and determined in such courts, (iii) irrevocably waives (to the extent permitted by applicable law) any objection which it now or hereafter may have to the laying of venue of any such action or proceeding brought in any of the foregoing courts in and of the State of California, and any objection on the ground that any such action or proceeding in any such court has been brought in an inconvenient forum, and (iv) agrees that a final judgment in any such action or proceeding shall be conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner permitted by law.

[*Signature page follows*]

Fluidigm Singapore Pte. Ltd.

By: /s/ Vikram Jog

Name: Vikram Jog

Title: Director

Fluidigm Corporation

By: /s/ Nicholas S. Khadder

Name: Nicholas S. Khadder

Title: Senior Vice President

Exhibit 21.1

SUBSIDIARIES OF FLUIDIGM CORPORATION

Subsidiaries of Fluidigm Corporation (Delaware):

Fluidigm Sciences Inc. (Delaware)

Fluidigm (Shanghai) Instrument Technology Company Limited (China)

Fluidigm K.K. (Japan)

Fluidigm Europe B.V. (Netherlands)

Fluidigm Singapore Pte. Ltd. (Singapore)

Subsidiaries of Fluidigm Europe B.V. (Netherlands):

Fluidigm France SARL (France)

Fluidigm GmbH (Germany)

Fluidigm Italy S.r.l. (Italy)

InstruNor AS (Norway)

Fluidigm UK Limited (United Kingdom)

Subsidiaries of Fluidigm Sciences Inc. (Delaware):

Fluidigm Canada Inc. (Ontario, Canada)

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-3 (No. 333-230383), Form S-8 (Nos. 333-256617, 333-172206, 333-180363, 333-187204, 333-202325, 333-209904, 333-215555, 333-219667, 333-222561, 333-229214, 333-232441, 333-239810) and Form S-8/S-3 (No.333-194084) of Fluidigm Corporation of our report dated March 4, 2022 relating to the financial statements and financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
San Jose, California
March 7, 2022

Exhibit 31.1

CERTIFICATION OF THE PRESIDENT AND CHIEF EXECUTIVE OFFICER
PURSUANT TO SECURITIES EXCHANGE ACT RULES 13a-14(a) AND 15d-14(a),
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Stephen Christopher Linthwaite, certify that:

1. I have reviewed this annual report on Form 10-K of Fluidigm Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 7, 2022

By: /s/ Stephen Christopher Linthwaite
Stephen Christopher Linthwaite
President and Chief Executive Officer

Exhibit 31.2

CERTIFICATION OF THE CHIEF FINANCIAL OFFICER
PURSUANT TO SECURITIES EXCHANGE ACT RULES 13a-14(a) AND 15d-14(a),
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Vikram Jog, certify that:

1. I have reviewed this annual report on Form 10-K of Fluidigm Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 7, 2022

By: /s/ Vikram Jog
Vikram Jog
Chief Financial Officer

Exhibit 32.1

CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002

I, Stephen Christopher Linthwaite, the chief executive officer of Fluidigm Corporation (the "Company"), certify for the purposes of 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge,

1. the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2021 (the "Report"), fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 7, 2022

By: /s/ Stephen Christopher Linthwaite
Stephen Christopher Linthwaite
President and Chief Executive Officer

Exhibit 32.2

CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002

I, Vikram Jog, the chief financial officer of Fluidigm Corporation (the "Company"), certify for the purposes of 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge,

1. the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2021 (the "Report"), fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 7, 2022

By: /s/ Vikram Jog
Vikram Jog
Chief Financial Officer