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

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the quarterly period ended June 30, 2020
or
☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the transition period from to

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, Ste 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**

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 is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

As of July 31, 2020, there were 71,316,370 shares of the registrant's common stock, $0.001 par value per share, outstanding.

FLUIDIGM CORPORATION

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PART I. FINANCIAL INFORMATION

Item 1. Financial Statements

FLUIDIGM CORPORATION
CONDENSED CONSOLIDATED BALANCE SHEETS
(In thousands)
(Unaudited)

	June 30, 2020	December 31, 2019
ASSETS		
Current assets:		
Cash and cash equivalents	$ 42,965	$ 21,661
Short-term investments	2,431	36,978
Accounts receivable (net of allowances of $101 and $6, at June 30, 2020 and December 31, 2019, respectively)	9,983	18,981
Inventories	18,900	13,884
Prepaid expenses and other current assets	4,171	4,592
Total current assets	78,450	96,096
Property and equipment, net	7,865	8,056
Operating lease right-of-use asset, net	39,027	4,860
Other non-current assets	5,034	5,492
Developed technology, net	45,644	46,200
Goodwill	106,328	104,108
Total assets	$ 282,348	$ 264,812
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 9,384	$ 6,510
Accrued compensation and related benefits	6,757	5,160
Operating lease liabilities, current	2,170	1,833
Other accrued liabilities	5,758	7,515
Deferred revenue, current	14,279	11,803
Total current liabilities	38,348	32,821
Convertible notes, net	54,013	53,821
Deferred tax liability	9,655	11,494
Operating lease liabilities, non-current	39,139	4,323
Deferred revenue, non-current	7,936	8,168
Other non-current liabilities	538	573
Total liabilities	149,629	111,200
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, $0.001 par value, 10,000 shares authorized, no shares issued and outstanding at either June 30, 2020 or December 31, 2019	—	—
Common stock: $0.001 par value, 200,000 shares authorized at June 30, 2020 and December 31, 2019; 71,283 and 69,956 shares issued and outstanding at June 30, 2020 and December 31, 2019, respectively	71	70
Additional paid-in capital	786,193	777,765
Accumulated other comprehensive loss	(809)	(582)
Accumulated deficit	(652,736)	(623,641)
Total stockholders' equity	132,719	153,612
Total liabilities and stockholders' equity	$ 282,348	$ 264,812

See accompanying notes

FLUIDIGM CORPORATION

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	2019	2020	2019
Revenue:				
Product revenue	$ 17,405	$ 23,235	$ 36,386	$ 48,062
Service revenue	5,140	4,961	10,326	10,245
Development revenue	3,000	—	3,000	—
Other revenue	513	—	3,963	—
Total revenue	26,058	28,196	53,675	58,307
Costs and expenses:				
Cost of product revenue	9,483	11,100	19,123	22,489
Cost of service revenue	1,237	1,733	2,762	3,465
Research and development	8,448	7,865	17,147	16,237
Selling, general and administrative	20,616	22,134	43,311	44,958
Total costs and expenses	39,784	42,832	82,343	87,149
Loss from operations	(13,726)	(14,636)	(28,668)	(28,842)
Interest expense	(897)	(491)	(1,797)	(3,192)
Loss from extinguishment of debt	—	—	—	(9,000)
Other income (expense), net	463	231	(355)	715
Loss before income taxes	(14,160)	(14,896)	(30,820)	(40,319)
Income tax benefit	1,145	1,143	1,825	1,101
Net loss	$ (13,015)	$ (13,753)	$ (28,995)	$ (39,218)
Net loss per share, basic and diluted	$ (0.18)	$ (0.20)	$ (0.41)	$ (0.61)
Shares used in computing net loss per share, basic and diluted	70,916	69,158	70,691	63,923

See accompanying notes

FLUIDIGM CORPORATION

CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	2019	2020	2019
Net loss	$ (13,015)	$ (13,753)	$ (28,995)	$ (39,218)
Other comprehensive income (loss), net of tax				
Foreign currency translation adjustment	109	(9)	(194)	(1)
Net change in unrealized gain (loss) on investments	(33)	63	(33)	65
Other comprehensive income (loss), net of tax	76	54	(227)	64
Comprehensive loss	$ (12,939)	$ (13,699)	$ (29,222)	$ (39,154)

See accompanying notes

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

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance as of December 31, 2019	69,956	$ 70	$ 777,765	$ (582)	$ (623,641)	$ 153,612
Issuance of restricted stock, net of shares withheld for taxes, and other	255	—	(146)	—	—	(146)
Cumulative-effect of new accounting standard for Topic 326 Credit Losses	—	—	—	—	(100)	(100)
Stock-based compensation expense	—	—	2,364	—	—	2,364
Acquisition of InstruNor AS	485	1	2,048	—	—	2,049
Net loss	—	—	—	—	(15,980)	(15,980)
Other comprehensive loss, net of tax	—	—	—	(303)	—	(303)
Balance as of March 31, 2020	70,696	$ 71	$ 782,031	$ (885)	$ (639,721)	$ 141,496
Issuance of restricted stock, net of shares withheld for taxes, and other	286	—	(116)	—	—	(116)
Issuance of common stock under ESPP	301	—	645	—	—	645
Stock-based compensation expense	—	—	3,633	—	—	3,633
Net loss	—	—	—	—	(13,015)	(13,015)
Other comprehensive income, net of tax	—	—	—	76	—	76
Balance as of June 30, 2020	71,283	$ 71	$ 786,193	$ (809)	$ (652,736)	$ 132,719

	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	133,279	—	—	133,298
Issuance of restricted stock, net of shares withheld for taxes, and other	140	1	(177)	—	—	(176)
Issuance of common stock from option exercises	53	—	255	—	—	255
Stock-based compensation expense	—	—	2,207	—	—	2,207
Net loss	—	—	—	—	(25,465)	(25,465)
Other comprehensive income, net of tax	—	—	—	10	—	10
Balance as of March 31, 2019	68,991	$ 69	$ 767,169	$ (677)	$ (584,316)	$ 182,245
Issuance of restricted stock, net of shares withheld for taxes, and other	183	—	(325)	—	—	(325)
Issuance of common stock from option exercises	130	—	793	—	—	793
Issuance of common stock under ESPP	96	—	641	—	—	641
Stock-based compensation expense	—	—	2,985	—	—	2,985
Net loss	—	—	—	—	(13,753)	(13,753)
Other comprehensive income, net of tax	—	—	—	54	—	54
Balance as of June 30, 2019	69,400	$ 69	$ 771,263	$ (623)	$ (598,069)	$ 172,640

See accompanying notes

FLUIDIGM CORPORATION

CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)
(Unaudited)

	Six Months Ended June 30,	
	2020	**2019**
Operating activities		
Net loss	$ (28,995)	$ (39,218)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	2,016	2,351
Stock-based compensation expense	6,000	5,263
Amortization of developed technology	5,936	5,600
Amortization of debt discounts, premiums and issuance costs	275	2,037
Lease amortization	1,331	(250)
Loss on extinguishment of debt	—	9,000
Provision for excess and obsolete inventory	306	555
Loss on disposal of property and equipment	148	29
Other non-cash items	136	162
Changes in assets and liabilities:		
Accounts receivable, net	9,055	(2,420)
Inventories	(4,892)	(2,041)
Prepaid expenses and other assets	(706)	(965)
Accounts payable	3,136	3,439
Deferred revenue	1,965	476
Other liabilities	(2,796)	(9,161)
Net cash used in operating activities	(7,085)	(25,143)
Investing activities		
Acquisition, net of cash acquired	(5,154)	—
Purchases of investments	—	(44,614)
Proceeds from sale of investments	5,011	—
Proceeds from maturities of investments	29,400	—
Purchases of property and equipment	(1,671)	(685)
Net cash provided by (used in) investing activities	27,586	(45,299)
Financing activities		
Payment of debt issuance cost	(375)	(15)
Proceeds from exercise of stock options	—	1,048
Proceeds from stock issuance from ESPP	645	641
Payments for taxes related to net share settlement of equity awards and other	(262)	(487)
Net cash provided by financing activities	8	1,187
Effect of foreign exchange rate fluctuations on cash and cash equivalents	(205)	(25)
Net increase (decrease) in cash, cash equivalents and restricted cash	20,304	(69,280)
Cash, cash equivalents and restricted cash at beginning of period	23,736	95,401
Cash, cash equivalents and restricted cash at end of period	$ 44,040	$ 26,121
Supplemental disclosures of cash flow information		
Cash paid for interest	$ 1,531	$ 2,600
Cash paid for income taxes, net of refunds	$ 194	$ 139
Asset retirement obligations	$ 316	$ 319

See accompanying notes

1. Description of Business

Fluidigm Corporation (the Company, Fluidigm, we, our or us) creates, manufactures, and markets technologies and tools for life sciences research, including preparatory and analytical instruments for Mass Cytometry, PCR, Library Prep, Single Cell Genomics, and consumables, including integrated fluidic circuits (IFC), assays, and reagents. Our focus is on the most pressing needs in translational and clinical research, including infectious disease, cancer, immunology and immunotherapy. We sell our instruments, consumables and services to academic institutions, clinical laboratories, and contract research organizations, as well as biopharmaceutical, biotechnology, and agricultural biotechnology companies. 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 in conformity with U.S. generally accepted accounting principles (U.S. GAAP) and include the accounts of our wholly owned subsidiaries. As of June 30, 2020, we had wholly owned subsidiaries in Singapore, Canada, the Netherlands, Japan, France, 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 condensed consolidated statements of income and condensed consolidated statements of cash flows were reclassified to conform with 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 in the context of information available to us and the unknown impact of COVID-19 as of June 30, 2020. 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. The adjustments resulting from the foreign currency translations are recorded in accumulated other comprehensive loss, a separate component of stockholders' equity. Income and expense accounts are translated at monthly average exchange rates during the year.

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 derived from the sale of instrument service contracts, repairs, installation, training and other specialized product support services. We also generate revenue from

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 condensed consolidated balance sheet as deferred revenue.

Development Revenue

The Company has 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 typically using an input method based on our costs incurred relative to the total expected cost which determines the extent of our progress toward completion. As part of the accounting for these arrangements, we must develop estimates and assumptions that require judgment to determine the transaction price and progress towards completion. We review our estimate of the transaction price and progress toward completion based on the best information available to recognize the cumulative progress toward completion as of the end of each reporting period, and make revisions to such estimates as necessary.

We may also generate revenue from development or collaboration agreements that do not include upfront or milestone-based payments and generally recognize revenue on these types of agreements based on the timing of development activities.

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, in which we received a $3.5 million payment in exchange for a perpetual license under certain Fluidigm intellectual property. The settlement is considered a multiple-element arrangement with each element accounted for individually. 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. Revenue is generally recognized provided that the conditions under which the grants were provided have been met and any remaining performance obligations are perfunctory.

Contract Costs

Incremental sales commission costs incurred to obtain instrument service contracts are capitalized and amortized to selling, general and administrative expense over the life of the contract, which is generally one to three years. As a practical expedient, we expense sales commissions associated with product support services that are delivered in less than one year as they are incurred. Sales commissions associated with the sale of products are expensed as they are incurred. To date, capitalized contract costs have been immaterial.

Product Warranties

We generally provide a one-year warranty on our instruments. We accrue for estimated warranty obligations at the time of product shipment. We periodically review our warranty liability and record adjustments based on the terms of warranties provided to customers, and historical and anticipated warranty claim experience. This expense is recorded as a component of cost of product revenue in the condensed consolidated statements of operations.

Significant Judgments

Applying the revenue recognition practices discussed above often requires significant judgment. Judgment is required when identifying performance obligations, estimating SSP and allocating purchasing consideration in multi-element arrangements, determining the transaction price and progress towards completion on development arrangements and estimating the future amount of our warranty obligations. Moreover, significant judgment is required when interpreting commercial terms and determining when control of goods and services passes to the customer. Any material changes created by errors in judgment could have a material effect on our operating results and overall financial condition.

Accounts Receivable

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. One customer from whom we derived development revenue exceeded 10% of revenue for the three months ended June 30, 2020. No other customer represented more than 10% of total revenue for three and six months ended June 30, 2020 or 2019. Including the development revenue, revenues from our five largest customers were 32% and 30% of total revenue for the three months ended June 30, 2020 and 2019, respectively. Revenues from our five largest customers were 23% and 20% of total revenue for the six months ended June 30, 2020 and 2019, respectively. There was no single customer that represented more than 10% of total accounts receivable at June 30, 2020, or December 31, 2019.

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.

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 and current and non-current operating lease liabilities in our condensed 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.

Goodwill, Intangible Assets and Other Long-Lived Assets

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.

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 any of the periods presented herein.

Convertible Notes

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). As the 2018 Notes were convertible, at our election, into cash, shares of our common stock, or a combination of cash and shares of our common stock, we accounted for the 2018 Notes under the cash conversion guidance in ASC 470, whereby the embedded conversion option in the 2018 Notes was separated and

accounted for in equity. 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. 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 to qualified institutional buyers pursuant to Rule 144A under the Securities Act of $55.0 million aggregate principal amount of our 5.25% Senior Convertible Notes due 2024 (2019 Notes). Most of the issuance proceeds were used to retire approximately $50.2 million of aggregate principal amount of our 2014 Notes, leaving approximately $1.1 million of aggregate principal amount of our 2014 Notes outstanding.

As the 2019 Notes do not provide for a cash conversion feature, the 2019 Notes are recorded for as debt in their entirety in accordance with ASC 470. For the 2014, 2018 and 2019 Notes, offering-related costs, including underwriting costs, 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 7 for a detailed discussion of the accounting treatment of the transactions and additional information.

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 condensed consolidated statements of comprehensive loss.

The components of accumulated other comprehensive loss, net of tax, for the three and six months ended June 30, 2020 is 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)
Other comprehensive income (loss)	(303)	—	(303)
Ending balance at March 31, 2020	(921)	36	(885)
Other comprehensive income (loss)	109	(33)	76
Ending balance at June 30, 2020	$ (812)	$ 3	$ (809)

Immaterial amounts of unrealized gains and losses have been reclassified into the condensed consolidated statement of operations for the three and six months ended June 30, 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):

	Six Months Ended June 30,	
	2020	2019
Stock options, restricted stock units and performance awards	8,237	4,541
2019 Convertible Notes	18,966	—
2019 Convertible Notes potential make-whole shares	2,412	—
2014 Convertible Notes	19	916
Total	29,634	5,457

Recent Accounting Changes and Accounting Pronouncements

Adoption of New Accounting Guidance

In August 2018, the U.S.-based Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2018-15-Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40), which establishes new guidance on the accounting for costs incurred to implement a cloud computing arrangement that is considered a service arrangement. The new guidance requires the capitalization of such costs, aligning it with the accounting for costs associated with developing or obtaining internal-use software. The new guidance is effective for fiscal years beginning after December 15, 2019. The adoption of the new guidance did not have a significant impact on our financial results.

In January 2017, the FASB issued ASU 2017-04, Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. The ASU eliminates the requirement for an entity to calculate the implied fair value of goodwill to measure a goodwill impairment charge. Instead, an entity performs its annual, or interim, goodwill impairment testing by comparing the fair value of a reporting unit with its carrying amount and recording an impairment charge for the amount by which the carrying amount exceeds the fair value. The ASU is effective for annual and interim goodwill impairment testing performed for our fiscal year beginning January 1, 2020. The adoption of the new guidance did not have a significant impact on our financial results.

The FASB issued two ASUs related to financial instruments – credit losses. The ASUs issued were: (1) in June 2016, ASU 2016-13, Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, and (2) in November 2018, ASU 2018-19-Codification Improvements to Topic 326, Financial Instruments-Credit Losses. ASU 2016-13 is intended to improve financial reporting by requiring more timely recording of credit losses on loans and other financial instruments held by financial institutions and other organizations. ASU 2018-19 clarifies that receivables arising from operating leases are not within the scope of the credit losses standard, but rather, should be accounted for in accordance with the leasing standard. These ASUs are effective for fiscal years beginning after December 15, 2019, and interim periods within those years, with early adoption permitted. The modified retrospective method is required upon adoption. The adoption of the new guidance resulted in an adjustment of approximately $0.1 million to reduce the accumulated deficit component of stockholders' equity and decrease current assets by the same amount in our condensed consolidated balance sheet.

Recent Accounting Pronouncements

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. We are currently evaluating the impact of adoption on our condensed 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 value of this technology is reflected in the intangible asset for developed technology. The developed technology was valued using a discounted cash flow model for which the most sensitive assumption was revenue growth rate.

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.

A summary of the net cash flows is summarized below (in thousands):

	January 17, 2020
Cash consideration paid to former equity holders	$ 5,165
Less: cash and cash equivalents acquired	(11)
Acquisition of InstruNor, net of cash acquired	$ 5,154

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. Goodwill of $2.2 million was calculated as the purchase price less the fair value of the net assets acquired as follows (in thousands):

		January 17, 2020
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		566
Fair value of identifiable net assets acquired	$	4,994
Goodwill acquired on acquisition	$	2,220

4. Revenue

Disaggregation of Revenue

The following table presents our revenue for the three and six months ended June 30, 2020 and 2019, respectively, based on geographic area and by source (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	2019	2020	2019
Geographic Markets:				
Americas	$ 13,940	$ 11,120	$ 28,784	$ 24,091
EMEA	6,557	11,217	14,653	19,373
Asia-Pacific	5,561	5,859	10,238	14,843
Total revenue	$ 26,058	$ 28,196	$ 53,675	$ 58,307

	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	2019	2020	2019
Source:				
Instruments	$ 8,577	$ 12,201	$ 18,048	$ 25,041
Consumables	8,828	11,034	18,338	23,021
Product revenue	17,405	23,235	36,386	48,062
Service revenue	5,140	4,961	10,326	10,245
Development revenue	3,000	—	3,000	—
Other revenue				
License and royalty revenue	63	—	3,163	—
Grant revenue	450	—	800	—
Total other revenue	513	—	3,963	—
Total revenue	$ 26,058	$ 28,196	$ 53,675	$ 58,307

Performance Obligations

We reported $20.0 million of deferred revenue in our December 31, 2019 consolidated balance sheet. During the six months ended June 30, 2020, $6.2 million of the opening balance was recognized as revenue and $8.4 million of net additional advance payments were received from customers, primarily associated with instrument service contracts. At June 30, 2020, we reported $22.2 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 June 30, 2020 (in thousands):

Fiscal Year	Expected Revenue [1]
2020 (remainder of the year)	$ 7,401
2021	8,636
2022	4,702
Thereafter	3,164
Total	$ 23,903

(1) Expected revenue includes both billed amounts included in deferred revenue and unbilled amounts that are not reflected in our condensed 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 not to disclose information about unsatisfied performance obligations for service contracts with an expected term of one year or less.

5. Goodwill and Intangible Assets, net

In connection with our acquisition of DVS Sciences, Inc. 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 of goodwill from the InstruNor acquisition and $5.4 million of developed technology (see Note 3). 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, the Company assessed whether the current and potential future impact of the COVID-19 pandemic represented an event which necessitated an impairment review. This assessment included an update of the qualitative and quantitative factors affecting our business. As a result of this assessment, we determined that a triggering event had occurred and a quantitative impairment test was performed. As a result of this quantitative analysis, we determined that the fair values of our goodwill and developed technology intangibles were not less than their carrying values and no impairment was recognized.

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

	June 30, 2020			
	Gross Amount	Accumulated Amortization	Net	Weighted-Average Amortization Period
Developed technology	$ 117,380	$ (71,736)	$ 45,644	9.9 years
Patents and licenses	$ 11,274	$ (8,802)	$ 2,472	7.8 years

	December 31, 2019			
	Gross Amount	Accumulated Amortization	Net	Weighted-Average Amortization Period
Developed technology	$ 112,000	$ (65,800)	$ 46,200	10.0 years
Patents and licenses	$ 11,274	$ (8,342)	$ 2,932	7.8 years

Total amortization expense for the three months ended June 30, 2020 and 2019 was $3.2 million and $3.1 million, respectively. Amortization of intangibles was $6.4 million and $6.2 million for the six months ended June 30, 2020 and 2019, respectively.

Based on the carrying value of intangible assets, net, as of June 30, 2020, the amortization expense is expected to be as follows (in thousands):

Fiscal Year	Developed Technology Amortization Expense	Patents and Licenses Amortization Expense	Total
2020 (remainder of the year)	$ 5,936	$ 457	$ 6,393
2021	11,873	759	12,632
2022	11,873	676	12,549
2023	11,873	570	12,443
2024	2,073	10	2,083
Thereafter	2,016	—	2,016
Total	$ 45,644	$ 2,472	$ 48,116

6. Balance Sheet Details

Cash, Cash Equivalents and Restricted Cash

Cash, cash equivalents and restricted cash consisted of the following as of June 30, 2020 and December 31, 2019 (in thousands):

	June 30, 2020	December 31, 2019
Cash and cash equivalents	$ 42,965	$ 21,661
Restricted cash	1,075	2,075
Total cash, cash equivalents and restricted cash	$ 44,040	$ 23,736

Short-term restricted cash of approximately $75 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 condensed consolidated balance sheet as of June 30, 2020.

Inventories

Inventories consisted of the following as of June 30, 2020 and December 31, 2019 (in thousands):

	June 30, 2020	December 31, 2019
Raw materials	$ 9,665	$ 6,133
Work-in-process	1,063	659
Finished goods	8,172	7,092
Total inventories	$ 18,900	$ 13,884

Property and Equipment, net

Property and equipment consisted of the following as of June 30, 2020 and December 31, 2019 (in thousands):

	June 30, 2020	December 31, 2019
Computer equipment and software	$ 4,376	$ 3,997
Laboratory and manufacturing equipment	19,652	19,325
Leasehold improvements	7,962	7,788
Office furniture and fixtures	2,076	1,824
Property and equipment, gross	34,066	32,934
Less accumulated depreciation and amortization	(26,309)	(24,954)
Construction-in-progress	108	76
Property and equipment, net	$ 7,865	$ 8,056

Warranties

Activity for our warranty accrual for the six months ended June 30, 2020 and 2019, which are included in other accrued liabilities, is summarized below (in thousands):

	Six Months Ended June 30,	
	2020	2019
Beginning balance	$ 1,390	$ 863
Accrual for current period warranties	419	657
Warranty costs incurred	(277)	(429)
Ending balance	$ 1,532	$ 1,091

7. Convertible Notes and Credit Facility

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 of $6.0 million and the debt issuance costs of $1.1 million were recorded as offsets to the proceeds. 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 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. We have retired the majority of the 2014 Notes through the issuance of the 2018 Notes and 2019 Notes, as discussed below. As of June 30, 2020, there is $1.1 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 the aggregate principal amount of 2014 Notes outstanding. As of the closing of the 2018 Notes on March 12, 2018, the estimated fair value was $145.5 million. The difference between the $150.0 million aggregate principal amount of the 2018 Notes and its fair value was being amortized over the expected term of the 2018 Notes using the effective interest method through the first note holder put date of February 6, 2023.

The 2018 Notes accrued interest at a rate of 2.75% payable semi-annually in arrears on February 1 and August 1 of each year. The 2018 Notes were set to mature on February 1, 2034, unless earlier converted, redeemed, or repurchased in accordance with the terms of the indenture governing the 2018 Notes. The initial conversion rate of the 2018 Notes was 126.9438 shares of our common stock, par value $0.001 per share, per $1,000 principal amount of the 2018 Notes (which is equivalent to an initial conversion price of approximately $7.88 per share). The conversion rate was subject to adjustment upon the occurrence of certain specified events. Those certain specified events included holders who converted their 2018 Notes voluntarily prior to our exercise of the issuer's conversion option described below or in connection with a make-whole fundamental change prior to February 6, 2023, 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 2018 Notes. Any time prior to the maturity of the 2018 Notes, we could convert the 2018 Notes, in whole but not in part, into cash, shares of our common stock, or combination thereof, if the closing price of our common stock equaled or exceeded 110% of the conversion price then in effect for a specified number of days.

Offering-related costs for the 2018 Notes were approximately $2.8 million. Offering-related costs of $2.2 million were capitalized as debt issuance costs, recorded as an offset to the carrying value of the 2018 Notes, and were being amortized over the expected term of the 2018 Notes using the effective interest method through the first note holder put date of February 6, 2023. The effective interest rate on the 2018 Notes was 12.3%. Offering-related costs of $0.6 million were accounted for as equity issuance costs, recorded as an offset to additional paid-in capital, and were not subject to amortization. Offering-related costs were allocated between debt and equity in the same proportion as the allocation of the 2018 Notes between debt and equity.

In the first quarter of 2019, we received notices from holders of the 2018 Notes electing to voluntarily convert approximately $138.1 million in aggregate principal amount of the 2018 Notes. In February 2019, we notified the trustee, U.S. Bank National Association, of our intention to exercise our issuer's conversion option with respect to the remaining approximately $11.9 million in aggregate principal amount of 2018 Notes. In total, $150.0 million of the 2018 Notes were

converted into 19.5 million shares of our common stock and the bonds were retired. We recognized a loss of $9.0 million on the retirement of the 2018 Notes, which represented the difference between the fair value of the bonds retired and their carrying costs. The net impact on equity was $133.3 million and represented the fair value of the bonds retired.

2019 Senior Convertible Notes (2019 Notes)

In November 2019, we issued $55.0 million aggregate principal amount of 2019 Notes. Net proceeds of the offering of the 2019 Notes issuance were $52.7 million, after deductions for commissions and other debt issuance costs of approximately $2.3 million. $51.8 million of the proceeds of the 2019 Notes were used to retire $50.2 million aggregate principal amount of our 2014 Notes, leaving $1.1 million of aggregate principal value of 2014 Notes outstanding. We accounted for the transaction as an extinguishment of debt due to the significance of the change in value of the embedded conversion option, resulting in a $3.0 million loss in the fourth quarter of 2019. 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 in arrears 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 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 being amortized over the expected term of the 2019 Notes using the effective interest method through the maturity date of December 1, 2024. The effective interest rate on the 2019 Notes is 6.2%.

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

	June 30, 2020	December 31, 2019
2.75% 2014 Notes due 2034		
Principal amount	$ 1,079	$ 1,079
Unamortized debt discount	(24)	(18)
Unamortized debt issuance cost	(4)	(4)
	$ 1,051	$ 1,057
5.25% 2019 Notes due 2024		
Principal amount	$ 55,000	$ 55,000
Unamortized debt issuance cost	(2,038)	(2,236)
	$ 52,962	$ 52,764
Net carrying value of all Notes	$ 54,013	$ 53,821

2018 Revolving Credit Facility

In August 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. Subject to the level of this Borrowing Base, we may make and repay borrowings from time to time until the maturity of the Revolving Credit Facility. The Borrowing Base as of June 30, 2020 under the Revolving Credit Facility was $7.3 million. There were no borrowings outstanding under the Revolving Credit Facility at June 30, 2020.

The Revolving Credit Facility is collateralized by substantially all our property, other than intellectual property. Until an amendment in April 2020, the Revolving Credit Facility was set to mature on August 2, 2020. The interest rate on outstanding loans under the Revolving Credit Facility was the greater of (i) prime rate plus 0.50% or (ii) 5.50%. Interest on any outstanding loans is due and payable monthly and the principal balance is due at maturity, though loans can be prepaid at any time without penalty. In addition, we pay a quarterly unused revolving line facility fee of 0.75% per annum on the average unused facility and an annual commitment fee of $112,500.

Effective April 21, 2020, the Revolving Credit Facility was amended to extend the maturity date to August 2, 2022. In addition, the interest rate on outstanding loans under the Revolving Credit Facility was reduced by 0.25%. The quarterly unused line fee, which was previously based on the Maximum Amount, will now be based on the Borrowing Base. The annual commitment fee of $112,500 is unchanged.

The Revolving Credit Facility contains customary affirmative and negative covenants that, 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. The Revolving Credit Facility also contains customary events of default, subject to customary cure periods for certain defaults, that include, among other things, non-payment defaults, covenant defaults, material judgment defaults, bankruptcy and insolvency defaults, cross-defaults to certain other material indebtedness, and defaults due to inaccuracy of representation and warranties. Upon an event of default, the lender may declare all or a portion of the outstanding obligations payable by us to be immediately due and payable and exercise other rights and remedies provided for under the Revolving Credit Facility. During the existence of an event of default, interest on the obligations under the Revolving Credit Facility could be increased to 5.0% above the otherwise applicable rate of interest. We were in compliance with all the terms and conditions of the Revolving Credit Facility at June 30, 2020.

8. Leases

We have operating leases for buildings, equipment and vehicles. Existing leases have remaining terms of less than one year to ten 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 June 30, 2020 and December 31, 2019 (in thousands, except for discount rate and lease term):

	June 30, 2020	December 31, 2019
Operating lease right-of-use buildings	$ 40,618	$ 6,234
Operating lease right-of-use equipment	33	69
Operating lease right-of-use vehicles	452	355
Total operating lease right-of-use assets, gross	41,103	6,658
Accumulated amortization	(2,076)	(1,798)
Total operating lease right-of-use assets, net	$ 39,027	$ 4,860
Operating lease liabilities, current	$ 2,170	$ 1,833
Operating lease liabilities, non-current	39,139	4,323
Total operating lease liabilities	$ 41,309	$ 6,156
Weighted average remaining lease term (in years)	9.1	4.7
Weighted average discount rate per annum	11.9 %	5.0 %

A new operating lease for our corporate headquarters in South San Francisco, California commenced in March 2020. We recorded a ROU asset of $35.7 million at the inception of the lease and an operating lease liability of $35.3 million. The lease term is approximately ten years. Future minimum lease payments over the life of the lease were discounted at a rate of 12.55%, which was our estimated incremental collateralized borrowing rate for the term of the lease at the inception of the lease.

The following table presents the components of lease expense for the three and six months ended June 30, 2020 and 2019, respectively (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	2019	2020	2019
Operating lease cost (including variable costs)	$ 2,312	$ 1,553	$ 4,511	$ 3,056
Variable costs including non-lease component	$ 548	$ 703	$ 1,169	$ 1,303

Supplemental Cash Flow Information:

Cash paid for amounts included in the measurement of operating lease liabilities (included in net cash used in operating activities in thousands):

	Six Months Ended June 30,	
	2020	2019
Operating cash flows from operating leases	$ 1,987	$ 2,061

Future minimum lease payments under commenced non-cancelable operating leases, which are as of June 30, 2020 as follows (in thousands):

Fiscal Year	Minimum Lease Payments for Operating Leases
2020 (remainder of year)	$ 3,214
2021	7,282
2022	6,985
2023	6,907
2024	7,120
Thereafter	39,231
Total future minimum payments	$ 70,739
Less: imputed interest	(29,430)
Total	$ 41,309

9. 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):

	June 30, 2020						
	Amortized Cost	Gross Unrealized Gain	Gross Unrealized Loss	Fair Value	Cash and Cash Equivalents	Short-Term Marketable Securities	Cash-Restricted
Assets:							
Cash-unrestricted	$ 20,196	$ —	$ —	$ 20,196	$ 20,196	$ —	$ —
Cash-restricted	1,075	—	—	1,075	—	—	1,075
Total cash	$ 21,271	$ —	$ —	$ 21,271	$ 20,196	$ —	$ 1,075
Available-for-sale:							
Level I:							
Money market funds	$ 22,769	$ —	$ —	$ 22,769	$ 22,769	$ —	$ —
US treasury securities	2,428	3	—	2,431	—	2,431	—
Subtotal	$ 25,197	$ 3	$ —	$ 25,200	$ 22,769	$ 2,431	$ —
Total	$ 46,468	$ 3	$ —	$ 46,471	$ 42,965	$ 2,431	$ 1,075

	December 31, 2019						
	Amortized Cost	Gross Unrealized Gain	Gross Unrealized Loss	Fair Value	Cash and Cash Equivalents	Short-Term Marketable Securities	Cash-Restricted
Assets:							
Cash-unrestricted	$ 16,614	$ —	$ —	$ 16,614	$ 16,614	$ —	$ —
Cash-restricted	2,075	—	—	2,075	—	—	2,075
Total cash	$ 18,689	$ —	$ —	$ 18,689	$ 16,614	$ —	$ 2,075
Available-for-sale:							
Level I:							
Money market funds	$ 5,047	$ —	$ —	$ 5,047	$ 5,047	$ —	$ —
US treasury securities	36,942	36	—	36,978	—	36,978	—
Subtotal	$ 41,989	$ 36	$ —	$ 42,025	$ 5,047	$ 36,978	$ —
Total	$ 60,678	$ 36	$ —	$ 60,714	$ 21,661	$ 36,978	$ 2,075

There were no transfers between Level I and Level II measurements, and no changes in the valuation techniques used, during the six months ended June 30, 2020.

Based on an evaluation of securities that were in a loss position, we did not recognize any other-than-temporary impairment charges for the six months ended June 30, 2020 and 2019. None of our investments have been in a continuous loss position for more than 12 months. We concluded that the declines in market value of our available-for-sale securities investment portfolio were temporary in nature and did not consider any of our investments to be other-than-temporarily impaired.

Convertible Notes

In 2019, we significantly reduced the amount of our outstanding debt. As a result, these securities are not traded frequently, so it is difficult to estimate a reliable and accurate market price and represent Level III valuations. A fair value for these assets cannot be determined by using readily observable inputs or measures, such as market prices or models. Fair values were estimated using pricing models and risk-adjusted value ranges.

The following table summarizes the par value, carrying value and the estimated fair value of the 2014 and 2019 Notes at June 30, 2020 and December 31, 2019, respectively (in thousands):

	June 30, 2020			December 31, 2019		
	Par Value	Carrying Value	Fair Value	Par Value	Carrying Value	Fair Value
2014 Notes	$ 1,079	$ 1,051	$ 1,122	$ 1,079	$ 1,057	$ 1,122
2019 Notes	55,000	52,962	82,369	55,000	52,764	73,975
Total	$ 56,079	$ 54,013	$ 83,491	$ 56,079	$ 53,821	$ 75,097

10. Shareholders' Equity

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.

Conversion of 2018 Notes

In the first quarter of 2019, we issued 19,460,260 shares of our common stock in connection with the conversion of our 2018 Notes (see Note 7). As a result of this issuance of our common stock, we recorded a total of $133.3 million of equity, which was equivalent to the fair value of the bonds retired.

At June 30, 2020, we had reserved shares of common stock for future issuance under equity compensation plans as follows:

(in 000's)	Securities To Be Issued Upon Exercise Of Options	Securities To Be Issued Upon Release Of Restricted Stock and Performance Share Units	Number Of Remaining Securities Available For Future Issuance
2009 Equity Incentive Plan	19	—	—
2011 Equity Incentive Plan	1,609	6,138	2,823
DVS Sciences Inc. 2010 Equity Incentive Plan	23	—	—
2017 Inducement Award Plan	207	241	—
2017 Employee Stock Purchase Plan	—	—	3,100
	1,858	6,379	5,923

11. 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 equity incentive 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 either 25% on the first anniversary of the grant date and ratably each quarter over the remaining 12 quarters, or ratably each quarter over 16 quarters, subject to the employees' continued employment. In May 2020, we granted 1.8 million retention RSUs that vest over three years, with 50% of the RSUs vesting after one year and 25% of the RSUs vesting each year thereafter.

Incentive stock options and non-statutory stock options granted under our 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. If a participant owns stock representing more than 10% of the voting power of all classes of our stock on the grant date, an incentive stock option awarded to the participant will have a term of no more than five years from the date of grant and an exercise price of at least 110% 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 in the number of shares reserved for issuance under the 2011 Plan of 1.4 million shares.

2009 Equity Incentive Plan and 2017 Inducement Award Plan

Our 2009 Equity Incentive Plan (the 2009 Plan) terminated on the date the 2011 Plan was adopted. Options granted, or shares issued under the 2009 Plan that were outstanding on the date the 2011 Plan became effective, remained subject to the terms of the 2009 Plan.

In January 2017, we adopted the Fluidigm Corporation 2017 Inducement Award Plan (Inducement Plan) and reserved 2 million shares of our common stock for issuance pursuant to equity awards granted under the Inducement Plan. The Inducement Plan provided for the grant of equity-based awards on terms substantially similar to the 2011 Plan. In accordance with Rule 5635(c)(4) of the Nasdaq Listing Rules, awards under the Inducement Plan were only be made to individuals not previously our employees or non-employee members of our board of directors (or following such individual's bona fide period of non-employment), as an inducement material to the individual's entry into employment with us or in connection with a merger or acquisition, to the extent permitted by Rule 5635(c)(3) of the Nasdaq Listing Rules. In June 2019, concurrently with the increase in shares available for grant under the 2011 Plan, the Inducement Plan was terminated such that no further grants could be made thereunder. Options granted and shares issued under the Inducement Plan that were outstanding when the Inducement Plan was terminated remain outstanding subject to their terms and the terms of the Inducement Plan.

Valuation and Expense Information

We use the Black-Scholes option-pricing model to estimate the fair value of stock options granted under our equity incentive plans. We grant stock options at exercise prices not less than the fair value of our common stock at the date of grant. The fair value of RSUs granted to employees was estimated on the date of grant by multiplying the number of shares granted by the fair market value of our common stock on the grant date.

Activity under the 2011 Plan, the 2009 Plan, and the Inducement Plan was as follows:

Restricted Stock Units:

	Number of Units (in 000s)	Weighted-Average Grant Date Fair Value per Unit
Balance at December 31, 2019	2,551	$ 7.43
RSU granted	3,642	$ 3.95
RSU released	(602)	$ 7.72
RSU forfeited	(222)	$ 6.82
Balance as of June 30, 2020	5,369	$ 5.06

As of June 30, 2020, the unrecognized compensation costs related to outstanding unvested RSUs under our equity incentive plans were $24.8 million. We expect to recognize those costs over a weighted average period of 3.0 years.

***Stock Options*:**

	Number of Options (000s)	Weighted-Average Exercise Price per Option	Weighted-Average Remaining Contractual Life (in Years)	Aggregate Intrinsic Value [(1)] in (000s)
Balance at December 31, 2019	2,027	$ 7.78	6.8	$ 81
Options granted	105	$ 3.74		
Options exercised	—	$ —		
Options forfeited	(274)	$ 5.71		
Balance as of June 30, 2020	1,858	$ 7.86	6.1	$ 163
Vested at June 30, 2020	1,372	$ 8.69	5.4	$ 115
Awards expected to vest at June 30, 2020	474	$ 5.50	8.1	$ 48

(1) Aggregate intrinsic value as of June 30, 2020 was calculated as the difference between the closing price per share of our common stock on the last trading day of June 30, 2020, which was $4.01, and the exercise price of the options, multiplied by the number of in-the-money options.

As of June 30, 2020, the unrecognized compensation costs related to outstanding unvested options under our equity incentive plans were $1.4 million. We expect to recognize those costs over a weighted average period of 1.5 years.

Performance-based Awards

Performance Stock Units with Market Conditions

We have granted PSU awards to certain executive officers and senior level employees. The number of PSUs 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 PSUs 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. Under FASB ASC Topic 718, the provisions of the PSU awards related to TSR are considered a market condition, and the effects of that market condition are reflected in the grant date fair value of the awards. We used a Monte Carlo simulation pricing model to incorporate the market condition effects at our grant date.

Activity under the TSR-based PSUs is as follows:

	Number of Units (in 000s)	Weighted-Average Grant Date Fair Value per Unit
Balance at December 31, 2019	547	$ 15.09
PSU granted	509	$ 4.82
PSU released	—	$ —
PSU forfeited	(94)	$ 14.26
Balance at June 30, 2020	962	$ 9.74

As of June 30, 2020, the unrecognized compensation costs related to these awards were $5.7 million. We expect to recognize those costs over a weighted average period of 2.0 years.

Performance Stock Units with Performance Conditions

During 2019, we also granted a PSU award under which the number of PSUs that ultimately vest is dependent on achieving certain discrete operational milestones between September 30, 2019 and December 31, 2020. Activity to date under this PSU award is as follows:

	Number of Units (in 000s)	Weighted-Average Grant Date Fair Value per Unit
Balance at December 31, 2019	64	$ 7.05
PSU granted	—	$ —
PSU released	(4)	$ 7.05
PSU forfeited	(12)	$ 7.05
Balance at June 30, 2020	48	$ 7.05

2017 Employee Stock Purchase Plan

In August 2017, our stockholders approved our ESPP at the annual meeting of stockholders. Our ESPP offers U.S. and some non-U.S. employees the right to purchase shares of our common stock. Our first ESPP offering period began on October 1, 2017 with a shorter offering period ending on November 30, 2017.

Prior to June 2019, our ESPP program had 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 were eligible to participate through payroll deductions of up to 10% of their compensation. The purchase price at which shares were sold under the ESPP was 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.

Effective in June 2019, our ESPP program was amended to offer a twelve-month offering period with two six-month purchase periods beginning on each of May 31 and November 30. Employees were eligible under the amended program to participate through payroll deductions of up to 15% of their compensation. Employees may not purchase more than $25 thousand of stock for any calendar year.

Under the updated ESPP program, the purchase price at which shares are sold for the first purchase period is 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 first purchase period. For the second purchase period, the purchase price at which shares are sold is 85% of the lower of the fair market value of the common stock on the first day of the offering period and the last day of the offering period. In the event the fair market value of the common stock at the beginning of the second purchase period is less than the fair market value on the beginning of the offering period, the purchase price for the second offering period is reset to 85% of the lower of the fair value of the common stock at the beginning of the second purchase period and the last day of the offering period.

The offering period of June 1, 2019 to May 31, 2020 had two purchase periods, with one period ending November 30, 2019 and the other period ending May 31, 2020. As the fair market value of the common stock at November 30, 2019 was lower than the fair value of the common stock at the beginning of the offering period, the purchase price for the second purchase period was reset based on the lower of the November 30, 2019 price and the May 31, 2020 price. The resetting of the purchase price is considered to be a modification of the original terms of the award. Under ASC 718, the incremental fair value based on the difference between the fair value of the modified award and the fair value of the original award immediately before it was modified was approximately $0.3 million. This amount was amortized over the remaining offering period which ended May 31, 2020.

In April 2020, our board of directors authorized, and in June 2020, our stockholders approved, an amendment and restatement of the ESPP that increased the number of shares reserved for issuance by an additional 3.0 million shares and made various other changes. Effective June 2020, our ESPP program was amended to offer a six-month offering period, with a new offering and purchase period commencing on the first trading day on or after May 31 and November 30 of each year. Employees are eligible under the amended program 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. The purchase price of the shares sold under the ESPP is 85% of the lower of 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.

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

	Three Months Ended June 30,		Six Months Ended June 30,	
	2020	2019	2020	2019
Restricted Stock Units, Stock Options and Performance Share Units	$ 3,331	$ 2,848	$ 5,443	$ 4,993
Employee Stock Purchase Plan	303	144	557	270
Total Share-based Compensation	$ 3,634	$ 2,992	$ 6,000	$ 5,263

12. Income Taxes

Our quarterly provision for income taxes is based on an estimated effective annual income tax rate. Our quarterly provision for income taxes also includes the tax impact of certain unusual or infrequently occurring items, if any, including changes in judgment about valuation allowances and effects of changes in tax laws or rates, in the interim period in which they occur.

We recorded a tax benefit of $1.1 million for both the three months ended June 30, 2020 and 2019. We recorded a tax benefit of $1.8 million and $1.1 million for the six months ended June 30, 2020 and 2019, respectively. The benefits for all periods were primarily attributable to the tax benefit from the amortization of our acquisition-related deferred tax liabilities partially offset by tax provisions for our foreign operations and state minimum income taxes.

Our tax benefit for income taxes for the periods presented differ from the 21% U.S. Federal statutory rate for the six months ended June 30, 2020 and 2019, respectively, primarily due to maintaining a valuation allowance for most of our deferred tax assets, which primarily consist of net operating loss carryforwards.

Our tax positions are subject to audits by multiple tax jurisdictions. We believe that we have provided adequate reserves for uncertain tax positions for all tax years still open for assessment. For the three and six months ended June 30, 2020, and 2019, respectively, we did not recognize any material interest or penalties related to uncertain tax positions.

Recording 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 deferred tax assets have been offset by valuation allowances. In the future we may release valuation allowances and recognize deferred tax assets in certain of our foreign subsidiaries depending on the achievement of future profitability in the relevant jurisdictions. Any release of valuation allowances could have the effect of decreasing the income tax provision in the period the valuation allowance is released. We continue to monitor the likelihood that we will be able to recover our deferred tax assets, including those for which a valuation allowance is recorded. There can be no assurance that we will generate profits in the future periods enabling us to fully realize our deferred tax assets. The timing of recording a valuation allowance or the reversal of such valuation allowance is subject to objective and subjective factors that cannot be readily predicted in advance.

On March 27, 2020, the Coronavirus Aid, Relief and Economic Security (CARES) Act was signed into law. The CARES Act includes provisions relating to refundable payroll tax credits, net operating loss carryback periods, alternative minimum tax credit refunds, modifications to the net interest deduction limitations and technical corrections to the tax deprecation methods for qualified improvement property. We are currently analyzing the impact of these changes and therefore, an estimate of the impact on income taxes, if any, is not yet available.

13. Information About Geographic Areas

We operate in one reporting segment that develops, manufacturers and commercializes tools for life sciences research. 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 total revenue by geographic areas of our customers and by product and services for the three and six months ended June 30, 2020 and 2019 is included in Note 4 to the condensed consolidated financial statements.

Sales to customers in the United States represented $13.4 million, or 51% of total revenues, and $27.5 million, or 51% of total revenues, for the three and six months ended June 30, 2020, respectively. Sales to customers in the United States

represented $9.9 million, or 35% of total revenues, and $22.4 million, or 38% of total revenues, for the three and six months ended June 30, 2019, respectively.

No foreign country or jurisdiction had sales in excess of 10% of total revenues for the three months ended June 30, 2020 and 2019, except for China, which had sales of $3.5 million, or 13% of total revenues, and $4.0 million, or 14% of total revenues, respectively. There was no foreign country or jurisdiction with sales in excess of 10% of our total revenues for the six months ended June 30, 2020 or 2019, except for China, which had sales of $7.5 million, or 13% of total revenues, for the six months ended June 30, 2019.

14. Development Agreement

Effective March 31, 2020, we signed an OEM Supply and Development Agreement (Development Agreement) with a customer. Under the Development Agreement, Fluidigm will develop products based on our microfluidics technology. The Development Agreement provides up-front and periodic milestone payments of up to $11.7 million during the development stage. The development stage is expected to last approximately one year from the date of the agreement. We recognized $3.0 million of development revenue from this agreement in the three and six months ended June 30, 2020, along with approximately $1.0 million of deferred revenue.

15. Commitments and Contingencies

Indemnification

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

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. 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.

16. Subsequent Events

In July 20, 2020, we entered into a letter contract with the National Institutes of Health (NIH) for a project under the NIH Rapid Acceleration of Diagnostics (RADx) program. The RADx program aims to support a range of new lab-based and point-of-care tests that could significantly increase the number, type and availability of COVID-19 tests. This project, with a total proposed budget of up to $37.0 million, contemplates expanding production capacity and throughput capabilities for COVID-19 testing with Fluidigm microfluidics technology. The letter contract provides Fluidigm with access to up to $12.2 million of initial funding based on completion and delivery of certain validation milestones prior to execution of a definitive contract.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis should be read together with our condensed consolidated financial statements and the notes to those statements included elsewhere in this Form 10-Q. This Form 10-Q 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, or 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 section entitled "Risk Factors" and this 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, expansion of our business, competitive position, industry environment, potential growth opportunities, market growth expectations, and the effects of competition and public health crises (including the COVID-19 pandemic) on our business. 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 Part II, Item 1A, "Risk Factors," elsewhere in this quarterly report on Form 10-Q, and in our annual report on Form 10-K filed with the Securities and Exchange Commission (SEC). Given these uncertainties, you should not place undue reliance on these forward-looking statements. Also, forward-looking statements represent our management's beliefs and assumptions only as of the date of this Form 10-Q.

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-Q completely and with the understanding that our actual future results may be materially different from what we expect.

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

Overview

Fluidigm is a global company that improves life through comprehensive health insight. Our innovative technologies and multi-omic tools are used by researchers to reveal meaningful insights into health and disease, identify biomarkers to inform decisions, and accelerate the development of more effective therapies. We create, manufacture, and market a range of products and services, including instruments, reagents and software that are used by researchers and clinical labs worldwide.

Our focus is on the most pressing needs in translational and clinical research, including infectious disease, cancer, immunology and immunotherapy. We use proprietary CyTOF® and microfluidics technologies to develop innovative end-to-end solutions that have the flexibility required to meet the needs of translational research and the robustness to support high-impact clinical research studies.

We sell our products to leading academic, government, pharmaceutical, biotechnology, clinical, and plant and animal research laboratories worldwide. 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 genomics instruments, which are assembled by our contract manufacturer located within our Singapore facility. All of our microfluidics IFCs are fabricated at our Singapore facility. Our mass cytometry instruments, assays and reagents are manufactured at our facility in Canada. We also use U.S.-based third-party contract manufacturers for reagent manufacturing.

Our total revenue for the six months ended June 30, 2020 was $53.7 million compared to $58.3 million for the six months ended June 30, 2019. Our total revenue was $117.2 million in 2019 and $113.0 million in 2018. We have incurred significant net losses since our inception in 1999 and, as of June 30, 2020, our accumulated deficit was $652.7 million.

Recent Developments

We have been responding to the COVID-19 pandemic by taking steps to protect our employees, support our customers, and manage our liquidity. As Fluidigm is a designated essential business, our employees have been working from home offices or our laboratories and offices, and in some cases, at customer sites. We have implemented health and safety practices in accordance with evolving government and public health agency guidelines in all of our facilities around the world, including maintaining social distancing and enhanced cleaning protocols, facilities modifications, temperature checks in some locations, and usage of face masks and other personal protective equipment where appropriate. Other operational adjustments made in response to COVID-19 include increased raw material stocking and proactive supplier management.

We have activated our business continuity plans as a result of this pandemic, which include steps taken not only to help keep our workforce healthy and safe, but also to ensure a strong data security and internal control environment. Our controls around financial reporting have been modified slightly as needed to reflect the impact of working remotely. To date we have not needed to take advantage of extended SEC filing deadlines.

While Fluidigm is a designated essential business, widespread global adoption of work-from-home and shelter-in-place orders has resulted in a significant slowdown in customer activities. We estimate that 30-40% of our customers are either closed or working at reduced capacity as of the end of June 2020 because of the COVID-19 pandemic, compared to 60-70% in April 2020. These closures and slowdowns have resulted in lower than expected sales of our instrument systems, IFCs, assays, and reagents. Many of our customers have limited abilities to accept, or prepare facilities to accept, non-critical instrumentation or are limited in their ability continue their lab research activities.

We are seeing and expect to continue to see near-term COVID-19-related priorities temporarily displacing longer term projects and research activities. Fluidigm has been working with a growing body of researchers around the world who are aggressively responding to the pandemic. In June 2020, we filed for emergency use authorization (EUA) from the U.S. Food and Drug Administration (FDA) for our saliva-based Advanta Dx SARS-CoV-2 Assay, which is currently pending FDA revniew. In addition, Fluidigm is actively supporting customers who are developing lab-developed tests and/or have filed for EUA from the FDA, as well as customers who are providing COVID-19 diagnostic tests outside of the U.S. Fluidigm’s mass cytometry technology and workflows are also being used in the U.S. and Europe for multi-site COVID-19 patient immune profiling studies. We believe our microfluidics and mass cytometry capabilities can play a significant role in virus detection as well as in immune profiling of patients and populations. Furthermore, we believe our technologies and solutions will be important to the durable response from government and medical institutions to be prepared for future outbreaks. Despite these opportunities, there is still uncertainty regarding the impact of COVID-19 on the global economy, our customers and our business over the near term.

In this period of uncertainty, we are actively managing our operating expenses and cash flows in response to the evolving market conditions. In addition, we have implemented reductions in our operating expense structure including salary reductions and constrained hiring until our business returns to more normal volumes. We have also taken advantage of various government programs available to us. For example, we have applied for or received wage subsidies in certain countries. In the U.S., the Coronavirus Aid, Relief and Economic Security (CARES) Act includes provisions relating to refundable payroll tax credits, deferment of the employer portion of certain payroll taxes, and other tax-related provisions. As a result, we have been preserving cash by deferring payment of U.S. payroll taxes and are currently evaluating the applicability of other provisions in the CARES Act. We have improved the company’s capital structure over the last 18 months by reducing our overall debt levels and extending our remaining debt maturities.

In July 2020, we entered into a letter contract with the National Institutes of Health (NIH) for a project under the NIH Rapid Acceleration of Diagnostics (RADx) program. The RADx program aims to support a range of new lab-based and point-of-care tests that could significantly increase the number, type and availability of COVID-19 tests. This project, with a total proposed budget of up to $37.0 million, contemplates expanding production capacity and throughput capabilities for COVID-19 testing with Fluidigm microfluidics technology. The letter contract provides Fluidigm with access to up to $12.2 million of initial funding based on completion and delivery of certain validation milestones prior to execution of a definitive contract.

We are continuing to assess the potential impact of the COVID-19 pandemic on our business and operations. For additional information on the various risks posed by the pandemic, refer to Part II, Item 1A. Risk Factors of this Form 10 Q.

Critical Accounting Policies, Significant Judgments and Estimates

Our condensed consolidated financial statements and the related notes included elsewhere in this Form 10-Q are prepared in accordance with accounting principles generally accepted in the United States. The preparation of these condensed financial statements requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue, costs and expenses and related disclosures. 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 evaluate our estimates and assumptions on an ongoing basis. To the extent that there are material differences between these estimates and actual results, our future financial statement presentation, financial condition, results of operations, and cash flows will be affected.

We have expanded disclosure of our critical accounting policies and estimates in the preparation of our condensed consolidated financial statements during the three and six months ended June 30, 2020 compared to those disclosed in our annual report on Form 10-K for the year ended December 31, 2019, as filed with the SEC on February 27, 2020, to reflect the impact of a new development agreement (see Note 14).

Recent Accounting Changes and Accounting Pronouncements

Adoption of New Accounting Guidance

In August 2018, the FASB issued ASU 2018-15-Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40) which establishes new guidance on the accounting for costs incurred to implement a cloud computing arrangement that is considered a service arrangement. The new guidance requires the capitalization of such costs, aligning it with the accounting for costs associated with developing or obtaining internal-use software. The new guidance is effective for fiscal years beginning after December 15, 2019. The adoption of the new guidance did not have a significant impact on our financial results.

In January 2017, the FASB issued ASU 2017-04, Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. The ASU eliminates the requirement for an entity to calculate the implied fair value of goodwill to measure a goodwill impairment charge. Instead, an entity performs its annual, or interim, goodwill impairment testing by comparing the fair value of a reporting unit with its carrying amount and recording an impairment charge for the amount by which the carrying amount exceeds the fair value. The ASU is effective for annual and interim goodwill impairment testing performed for our fiscal year beginning January 1, 2020, with early adoption permitted, which we did not exercise. The adoption of the new guidance did not have a significant impact on our financial results.

The FASB issued two ASUs related to financial instruments – credit losses. The ASUs issued were: (i) in June 2016, ASU 2016-13, Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, and (ii) in November 2018, ASU 2018-19-Codification Improvements to Topic 326, Financial Instruments-Credit Losses. ASU 2016-13 is intended to improve financial reporting by requiring more timely recording of credit losses on loans and other financial instruments held by financial institutions and other organizations. ASU 2018-19 clarifies that receivables arising from operating leases are not within the scope of the credit losses standard, but rather, should be accounted for in accordance with the leasing standard. These ASUs are effective for fiscal years beginning after December 15, 2019, and interim periods within those years, with early adoption permitted. The modified retrospective method is required upon adoption. The adoption of the new guidance resulted in an adjustment of $0.1 million to reduce the accumulated deficit component of stockholders' equity and decrease current assets by the same amount in the condensed consolidated balance sheet.

Recent Accounting Pronouncements

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 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. We are currently evaluating the impact of adoption on our condensed consolidated financial statements.

Results of Operations

The following table presents our historical consolidated statements of operations data for the three and six months ended June 30, 2020 and 2019, and as a percentage of total revenue for the respective periods (in thousands):

	Three Months Ended June 30,				Six Months Ended June 30,			
	2020		2019		2020		2019	
Revenue:								
Total revenue	$ 26,058	100 %	$ 28,196	100 %	$ 53,675	100 %	$ 58,307	100 %
Costs and expenses:								
Cost of product revenue	9,483	36	11,100	40	19,123	36	22,489	39
Cost of service revenue	1,237	5	1,733	6	2,762	5	3,465	6
Research and development	8,448	33	7,865	28	17,147	32	16,237	28
Selling, general and administrative	20,616	79	22,134	78	43,311	80	44,958	77
Total costs and expenses	39,784	153	42,832	152	82,343	153	87,149	150
Loss from operations	(13,726)	(53)	(14,636)	(52)	(28,668)	(53)	(28,842)	(50)
Interest expense	(897)	(3)	(491)	(1)	(1,797)	(3)	(3,192)	(5)
Loss from extinguishment of debt	—	—	—	—	—	—	(9,000)	(15)
Other income (expense), net	463	2	231	1	(355)	(1)	715	1
Loss before income taxes	(14,160)	(54)	(14,896)	(52)	(30,820)	(57)	(40,319)	(69)
Income tax benefit	1,145	4	1,143	4	1,825	3	1,101	2
Net loss	$ (13,015)	(50)%	$ (13,753)	(48)%	$ (28,995)	(54)%	$ (39,218)	(67)%

Revenue

We generate revenue primarily from sales of our products and services, and from development agreements, license and royalty agreements, and grants. Our product revenue consists of sales of instruments and consumables. Consumable revenues are 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 our sales of instruments as our service revenue consists of post-warranty service contracts, preventive maintenance plans, instrument parts, installation and training. We sell our products to leading academic, government, pharmaceutical, biotechnology, clinical, plant and animal research laboratories worldwide.

Excluding the impact of the development revenue recognized during the second quarter, no individual customer represented more than 10% of our total revenue for the three and six months ended June 30, 2020 and 2019, respectively. Including the development revenue, revenues from our five largest customers were 32% and 30% of total revenue for the three months ended June 30, 2020 and 2019, respectively. Revenues from our five largest customers were 23% and 20% of total revenue for the six months ended June 30, 2020 and 2019, respectively.

The following table presents our revenue by source for the three and six months ended June 30, 2020 and 2019, and as a percentage of total revenue for the respective period (in thousands):

	Three Months Ended June 30,				Year-over-Year Change	Six Months Ended June 30,				Year-over-Year Change
	2020		2019			2020		2019		
Revenue:										
Instruments	$ 8,577	33 %	$ 12,201	43 %	(30)%	$ 18,048	34 %	$ 25,041	43 %	(28)%
Consumables	8,828	34	11,034	39	(20)%	18,338	34	23,021	39	(20)%
Product revenue	17,405	67	23,235	82	(25)%	36,386	68	48,062	82	(24)%
Service revenue	5,140	20	4,961	18	4 %	10,326	19	10,245	18	1 %
Product and service revenue	22,545	87	28,196	100	(20)%	46,712	87	58,307	100	(20)%
Development revenue	3,000	11	—	—	NA	3,000	6	—	—	NA
Grant revenue	450	2	—	—	NA	800	1	—	—	NA
License revenue	63	—	—	—	NA	3,163	6	—	—	NA
Total revenue	$ 26,058	100 %	$ 28,196	100 %	(8)%	$ 53,675	100 %	$ 58,307	100 %	(8)%

The following table presents our total revenue by geographic area of our customers and as a percentage of total revenue for the three and six months ended June 30, 2020 and 2019 (in thousands):

	Three Months Ended June 30,				Year-over-Year Change	Six Months Ended June 30,				Year-over-Year Change
	2020		2019			2020		2019		
Americas	$ 13,940	54 %	$ 11,120	39 %	25 %	$ 28,784	54 %	$ 24,091	42 %	19 %
EMEA	6,557	25	11,217	40	(42)%	14,653	27	19,373	33	(24)%
Asia-Pacific	5,561	21	5,859	21	(5)%	10,238	19	14,843	25	(31)%
Total revenue	$ 26,058	100 %	$ 28,196	100 %	(8)%	$ 53,675	100 %	$ 58,307	100 %	(8)%

The Americas revenue includes revenue generated in the United States of $13.4 million and $27.5 million for the three and six months ended June 30, 2020, respectively. Sales to customers in the United States represented $9.9 million and $22.4 million for the three and six months ended June 30, 2019, respectively.

No foreign country or jurisdiction had sales in excess of 10% of our total revenues for the three months ended June 30, 2020 and 2019, except for China, which had sales of $3.5 million, or 13%, and $4.0 million, or 14% of total revenues, respectively. There was no foreign country or jurisdiction with sales in excess of 10% of our total revenues for the six months ended June 30, 2020 or 2019, except for China, which had sales of $7.5 million, or 13% of total revenues, for the six months ended June 30, 2019.

Total Revenue

Three Months ended June 30, 2020

Total revenue decreased by $2.1 million or 8%, for the three months ended June 30, 2020 compared to the three months ended June 30, 2019, driven by the COVID-19 pandemic public health crisis and the ensuing shelter-in-place orders that effectively shuttered customer facilities around the world. Lower mass cytometry instruments, mass cytometry consumables and microfluidics consumable revenues were partially offset by higher microfluidics instrument sales, development revenue, grant revenue and license revenue.

Americas revenues increased by $2.8 million, or 25%, driven by higher sales of microfluidics products, development revenue of $3.0 million and grant revenue of $0.5 million, partially offset by lower mass cytometry product revenues for the three months ended June 30, 2020 compared to the three months ended June 30, 2019. EMEA revenues fell $4.7 million or 42%. Lower consumables and mass cytometry instruments sales were partially offset by modest increases in microfluidics instrument revenue and service revenue. Unfavorable foreign exchange rates impacted EMEA revenue by less than 1%. The $0.3 million, or 5%, decrease in Asia-Pacific revenues was broad-based, with declines in both mass cytometry and

microfluidics instrument and consumable revenues, partially offset by higher service revenues. On a company-wide basis, weaker foreign exchange rates had a negligible impact on revenues for the three months ended June 30, 2020 compared to the same period in 2019.

Six Months ended June 30, 2020

Total revenue decreased by $4.6 million or 8%, for the six months ended June 30, 2020 compared to the six months ended June 30, 2019, driven by the COVID-19 pandemic public health crisis and the ensuing shelter-in-place orders that effectively shuttered customer facilities around the world. Lower mass cytometry instruments, mass cytometry consumables, and microfluidics consumable revenues were partially offset by higher microfluidics instrument sales, development revenue, license and grant revenue.

Americas revenues increased by $4.7 million, or 19%, driven by license revenue of $3.1 million, development revenue of $3.0 million and grant revenue of $0.8 million for the six months ended June 30, 2020 compared to the six months ended June 30, 2019. These increases were partially offset by lower product revenues. Lower mass cytometry revenues were partially offset by higher microfluidics revenue for the six months ended June 30, 2020 compared to the six months ended June 30, 2019. EMEA revenues fell $4.7 million or 24%, for the same period, driven by lower instrument and consumable revenues. Unfavorable foreign exchange rates negatively impacted EMEA revenues by approximately 1%. The $4.6 million, or 31%, decrease in Asia-Pacific revenues was driven by declines in both mass cytometry and microfluidics instrument and consumable revenues. On a company-wide basis, weaker foreign exchange rates negatively impacted revenues by less than 1% for the six months ended June 30, 2020 compared to the same period in 2019.

Product Revenue

Product revenue decreased by $5.8 million, or 25%, for the three months ended June 30, 2020 compared to the three months ended June 30, 2019 due to lower sales volumes and lower average selling prices of mass cytometry instruments and consumables and lower sales of microfluidics consumables. Partially offsetting these declines were higher microfluidics instrument revenues, largely driven by higher unit sales of Biomark and Juno instruments reflecting the realization of several early-stage COVID-19 related opportunities.

Product revenue decreased by $11.7 million, or 24%, for the six months ended June 30, 2020 compared to the six months ended June 30, 2019 due to lower sales volumes and lower average selling prices of mass cytometry instruments and consumables, and by lower sales of microfluidics consumables. Partially offsetting these declines were higher revenue from Biomark and Juno instruments, noted above, and, to a lesser extent, new products.

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

Service Revenue

Service revenue increased by $0.2 million, or 4%, for the three months ended June 30, 2020 compared to the three months ended June 30, 2019. Service plan revenues, which are recognized over the life of the service agreement and are not activity-dependent, drove the increase in service revenues. The increase in service plan revenues was partially offset by lower revenues from training and product maintenance activities. These revenues declined due primarily to closed customer facilities.

Service revenue increased by $0.1 million, or 1%, for the six months ended June 30, 2020 compared to the six months ended June 30, 2019. Service plan revenues drove the increase, offset by lower revenues from training and product maintenance activities. Training and product revenues declined due primarily to closed customer facilities.

Development Revenue

Effective March 31, 2020, we signed an OEM Supply and Development Agreement (Development Agreement) with a customer. Under the Development Agreement, Fluidigm will develop products based on our microfluidics technology. The Development Agreement provides up-front and periodic milestone payments of up to $11.7 million during the development stage. The development stage is expected to last approximately one year. We recognized $3.0 million of development revenue from this agreement in the three and six months ended June 30, 2020.

We recognize revenue under the Development Agreement using an input method based on our costs incurred relative to the total expected cost which determines the extent of our progress toward satisfaction of our obligations under the agreement. Costs associated with the Development Agreement are recorded in research and development expense.

Grant Revenue

We receive grants to perform research and development activities over contractually defined periods. Grant revenue in the current quarter is attributable to a grant agreement entered into in the second half of 2019. Costs associated with grant agreements are recorded in research and development expense.

License and Royalty Revenue

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

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 the three and six months ended June 30, 2020 and 2019 (in thousands):

	Three Months Ended June 30,		Year-over-Year Change	Six Months Ended June 30,		Year-over-Year Change
	2020	2019		2020	2019	
Cost of product revenue	$ 9,483	$ 11,100	(15)%	$ 19,123	$ 22,489	(15)%
Cost of service revenue	1,237	1,733	(29)%	2,762	3,465	(20)%
Cost of product and service revenue	$ 10,720	$ 12,833	(16)%	$ 21,885	$ 25,954	(16)%
Product and service gross profit	$ 11,825	$ 15,363	(23)%	$ 24,827	$ 32,353	(23)%
Product and service margin	52.5 %	54.5 %	(2.0) ppts	53.1 %	55.5 %	(2.4) ppts

Product and service margin decreased by 2.0 percentage points for the three months ended June 30, 2020 compared to the three months ended June 30, 2019. Fixed depreciation and amortization costs on a lower revenue base negatively impacted margins by 2.8 percentage points. Lower factory utilization also negatively impacted margins on mass cytometry instruments. This decline was partially offset by lower service costs and improved manufacturing efficiencies across our consumables products.

Product and service margin decreased by 2.4 percentage points for the six months ended June 30, 2020 compared to the six months ended June 30, 2019. Fixed depreciation and amortization costs on a lower revenue base negatively impacted margins by 2.6 percentage points. Lower factory utilization also negatively impacted margins on mass cytometry instruments. This decline was partially offset by lower costs for our microfluidics instruments and mass cytometry consumables and lower service costs.

Operating Expenses

The following table presents our operating expenses for the three and six months ended June 30, 2020 and 2019 (in thousands):

	Three Months Ended June 30,		Year-over-Year Change	Six Months Ended June 30,		Year-over-Year Change
	2020	2019		2020	2019	
Research and development	$ 8,448	$ 7,865	7 %	$ 17,147	$ 16,237	6 %
Selling, general and administrative	20,616	22,134	(7)%	43,311	44,958	(4)%
Total	$ 29,064	$ 29,999	(3)%	$ 60,458	$ 61,195	(1)%

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 $0.6 million, or 7%, for the three months ended June 30, 2020 compared to the three months ended June 30, 2019. Increases were primarily attributable to outside service costs related to various projects and laboratory supplies costs, partially offset by lower compensation costs. The lower compensation costs reflects temporary salary reductions implemented during the second quarter and reduced recruiting costs.

Research and development expense increased by $0.9 million, or 6%, for the six months ended June 30, 2020 compared to the six months ended June 30, 2019. Increases were primarily attributable to outside service costs related to various projects and higher laboratory supplies costs, partially offset by reduced compensation costs.

We believe that our continued investment in research and development is essential to our long-term competitive position and that these expenses may increase in future periods.

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 decreased by $1.5 million, or 7%, for the three months ended June 30, 2020 compared to the three months ended June 30, 2019. Compensation costs fell by $1.0 million compared to the prior year period. The lower compensation costs includes the impact of temporary salary reductions implemented during the second quarter, partially offset by higher stock-based compensation costs. Lower sales resulted in reduced sales commissions while reduced travel due to the pandemic caused travel expense to decline $1.2 million in the three months ended June 30, 2020 compared to the three months ended June 30, 2019. In addition, we received $0.4 million of wage subsidies from the Singapore government during the second quarter which further reduced operating expenses. These items were partially offset by higher facilities costs. Facilities cost increased approximately $1.1 million for the three months ended June 30, 2020 compared to the three months ended June 30, 2019, reflecting lease costs associated with our new corporate headquarters. Foreign exchange rates had a negligible impact on selling, general and administrative expense.

Selling, general and administrative expense decreased by $1.6 million, or 4%, for the six months ended June 30, 2020 compared to the six months ended June 30, 2019. Decreases in the year-to-date period were largely driven by the same factors as the decreases in the second quarter. Compensation costs fell by $0.7 million compared to the prior year period along with lower commissions due to lower revenues, along with $0.4 million of wage subsidies from the Singapore government. Travel

costs fell $1.6 million compared to the prior year period, while costs related to trade shows and other events fell $0.7 million due to the cancellation of these events in light of the COVID-19 pandemic. These items were partially offset by higher facilities costs. Facilities cost increased approximately $2.1 million for six months ended June 30, 2020 compared to the six months ended June 30, 2019, reflecting moving and lease costs associated with our new corporate headquarters. Foreign exchange rates had a negligible impact on selling, general and administrative expense.

Interest Expense, Loss on Extinguishment of Debt and Other Income (Expense), Net

The following table presents these items for the three and six months ended June 30, 2020 and 2019 (in thousands):

	Three Months Ended June 30,		Year-over-Year Change	Six Months Ended June 30,		Year-over-Year Change
	2020	2019		2020	2019	
Interest expense	$ (897)	$ (491)	83 %	$ (1,797)	$ (3,192)	(44)%
Loss from extinguishment of debt	—	—	NA	—	(9,000)	NA
Other income (expense), net	463	231	100 %	(355)	715	(150)%
Total	$ (434)	$ (260)	67 %	$ (2,152)	$ (11,477)	(81)%

In November 2019, we issued $55.0 million aggregate principal amount of our 5.25% Senior Convertible Notes due 2024 (2019 Notes). Net proceeds of the 2019 Notes issuance were used primarily to retire $50.2 million aggregate principal amount of our Senior Convertible Notes due 2034 (2014 Notes). The 2019 Notes have an effective interest rate of 6.2% compared to the 2014 Notes, which have an effective interest rate 3.0%. The increase in interest expense for the three months ended June 30, 2020 compared to the prior year period reflects the impact of the higher effective interest rate on the 2019 Notes.

In February 2014, we closed an underwritten public offering of $201.3 million aggregate principal amount of our 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 Senior Convertible Notes due 2034 (2018 Notes). The 2018 Notes had an effective interest rate of 12.3%. 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 recognized a loss of $9.0 million on the conversion of 2018 Notes, which was included in loss on extinguishment of debt. 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.

Interest expense of $1.8 million for the six months ended June 30, 2020 consists primarily of interest on $55.0 million of 2019 Notes, while interest expense of $3.2 million for the six months ended June 30, 2019 includes both the interest on $51.3 million of 2014 Notes and a partial quarter of interest expense on $150.0 million of 2018 Notes, which accrued at an effective rate of 12.3%. The higher interest expense for the six months ended June 30, 2019 compared to the current year period reflects the impact of higher debt balances and higher interest rates for the first half of 2019 compared to the first half of 2020.

Other income, net of $0.5 million for the three months ended June 30, 2020 is primarily attributable to $42 thousand of interest income, and $0.4 million of foreign exchange gains. Other income, net of $0.2 million for the three months ended June 30, 2019 includes $0.4 million of interest income, partially offset by $0.1 million of foreign exchange losses. The lower interest income in the current year period is attributable to lower market interest rates. The foreign exchange gains in the second quarter reflects a stronger Canadian dollar in the second quarter, compared to the first quarter of 2020.

Other expense, net of $0.4 million for the six months ended June 30, 2020 is primarily attributable to $0.6 million of foreign exchange losses, reflecting the impact of a stronger U.S. dollar, partially offset by $0.2 million of interest income. Other income, net of $0.7 million for the six months ended June 30, 2019 consists primarily of $0.8 million of interest income, offset by $0.1 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 $1.1 million, for an effective tax rate of 8.1%, for the three months ended June 30, 2020. For the three months ended June 30, 2019, we recorded a tax benefit of $1.1 million for an effective tax rate of 7.7%. For the six months ended June 30, 2020, we recorded an income tax benefit of $1.8 million for an effective rate of 5.9%. For the six

months ended June 30, 2019, we recorded a tax benefit of $1.1 million, for an effective tax rate of 2.7%. The benefit for all periods was primarily attributable to the tax benefit from the amortization of our acquisition-related deferred tax liabilities partially offset by a provision from our foreign operation and state minimum income taxes.

Liquidity and Capital Resources

Sources of Liquidity

As of June 30, 2020, our principal sources of liquidity consisted of $43.0 million of cash and cash equivalents, and $2.4 million of short-term investments, as well as $1.1 million of restricted cash and $7.3 million of availability under our Revolving Credit Facility.

The following table presents our cash flow summary for the six months ended June 30, 2020 and 2019 (in thousands):

	Six Months Ended June 30,	
	2020	2019
Cash flow summary:		
Net cash used in operating activities	$ (7,085)	$ (25,143)
Net cash provided by (used in) investing activities	27,586	(45,299)
Net cash provided by financing activities	8	1,187
Effect of foreign exchange rate fluctuations on cash and cash equivalents	(205)	(25)
Net increase (decrease) in cash, cash equivalents and restricted cash	$ 20,304	$ (69,280)

Net Cash Used in Operating Activities

We derive cash flows from operations primarily from cash collected from the sale of our products and services, and 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 our 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 the six months ended June 30, 2020 was $7.1 million and consisted of net loss of $29.0 million, adjusted for non-cash items of $16.1 million, partially offset by a net decrease in assets and liabilities of $5.8 million. Non-cash items primarily included amortization of developed technology of $5.9 million, stock-based compensation expense of $6.0 million, amortization of debt discounts, premiums and issuance costs of $0.3 million, depreciation and amortization of $2.0 million, and other non-cash items of $0.1 million. The net decrease in assets and liabilities was primarily due to a decrease in accounts receivable of $9.1 million, an increase in accounts payable of $3.1 million, and an increase in deferred revenue of $2.0 million, partially offset by an increase of inventories of $4.9 million, a decrease in other liabilities of $2.8 million and an increase in prepaid expenses and other assets of $0.7 million.

Net cash used in operating activities for the six months ended June 30, 2019 was $25.1 million and consisted of net loss of $39.2 million, adjusted for non-cash items of $24.7 million, and an increase in the assets and liabilities of $10.7 million. Non-cash items primarily included a $9.0 million loss on extinguishment of debt, amortization of developed technology of $5.6 million, stock-based compensation expense of $5.3 million, amortization of debt discounts, premiums, and issuance costs of $2.0 million, depreciation and amortization of $2.4 million, and a provision for excess and obsolete inventory of $0.6 million. The net change in assets and liabilities included a decrease in other liabilities of $9.2 million, an increase in accounts receivable of $2.4 million, an increase in inventories of $2.0 million, and an increase in prepaid and other assets of $1.0 million, partially offset by an increase accounts payable of $3.4 million, and an increase in deferred revenue of $0.5 million.

Net Cash Provided by (Used in) Investing Activities

Our primary investing activities consist of purchases, sales, and maturities of our short-term investments and to a much lesser extent, capital expenditures for manufacturing, laboratory, computer equipment and software to support our infrastructure and work force. We expect to continue to incur costs for capital expenditures to improve manufacturing efficiencies and strengthen information technology and network security, as well as capital expenditures incurred in moving our corporate

headquarters in 2020. However, we may choose to decrease or defer certain capital expenditures and development activities, while further optimizing our organization.

Net cash provided by investing activities in the six months ended June 30, 2020 was $27.6 million, which was mainly due to proceeds from maturities of investments of $29.4 million and proceeds from the sale of investments of $5.0 million, partially offset by the acquisition of InstruNor AS, net of cash acquired, of $5.2 million.

Net cash used in investing activities in the six months ended June 30, 2019 was $45.3 million, which consisted of purchases of investments of $44.6 million and capital expenditures of $0.7 million to support our commercial and manufacturing operations.

Net Cash Provided by Financing Activities

We generated cash from financing activities of $8 thousand during the six months ended June 30, 2020, which was primarily due to proceeds from stock issuance from the ESPP of $0.6 million, offset almost entirely by payments of accrued debt issuance costs of $0.4 million from the 2019 Notes offering, and payments for income taxes related to net share settlement of equity awards of $0.3 million.

We generated cash from financing activities of $1.2 million during the six months ended June 30, 2019, which included $1.0 million from exercise of stock options, and $0.6 million of ESPP proceeds, partially offset by $0.5 million for income taxes related to net share settlement of equity awards.

Capital Resources

At June 30, 2020 and December 31, 2019, our working capital, excluding deferred revenues and restricted cash, was $54.3 million and $74.0 million, respectively, including cash and cash equivalents of $43.0 million and $21.7 million, respectively, and short-term investments of $2.4 million and $37.0 million, respectively.

In February 2014, we closed an underwritten public offering of $201.3 million in aggregate principal amount of our 2014 Notes. In March 2018, we entered into privately negotiated transactions with certain holders of our 2014 Notes to exchange $150.0 million in aggregate principal amount of the 2014 Notes for $150.0 million in aggregate principal amount of 2018 Notes.

In the first quarter of 2019, we received notices from holders of the 2018 Notes electing to voluntarily convert $138.1 million in aggregate principal amount of the 2018 Notes. In February 2019, we notified trustee U.S. Bank National Association of our intention to exercise our issuer’s conversion option with respect to the remaining $11.9 million in aggregate principal amount of 2018 Notes. In total, $150.0 million of the 2018 Notes were converted into 19.5 million shares of our common stock and the 2018 Notes were retired.

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. 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 was used to retire $50.2 million aggregate principal amount of our 2014 Notes, leaving $1.1 million of aggregate principal amount of our 2014 Notes outstanding. 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 purchase their 2014 Notes beginning in February 2021. The private placement of the 2019 Notes, and concurrent repurchase of a portion of the 2014 Notes, had the effect of refinancing a portion of the Company’s outstanding debt under the 2014 Notes to December 2024.

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 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, the 2018 Notes, the 2019 Notes and the exchange transactions completed in March 2018 and November 2019 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 $15.0 million revolving senior credit facility (Revolving Credit Facility) with Silicon Valley Bank (SVB), with a maturity date of August 2, 2020. The Revolving Credit Facility is collateralized by substantially all our property, other than intellectual property. Outstanding loans under the Revolving Credit Facility bear interest, at the greater of (i) prime rate plus 0.50% or (ii) 5.50%. Amounts drawn under the Revolving Credit Facility will be used for working capital and general corporate purposes. As of June 30, 2020, total availability under the Revolving Credit Facility was $7.3 million. We currently have no outstanding debt under the Revolving Credit Facility, and we are in compliance with all the terms and conditions of the loan agreement governing the Revolving Credit Facility. See Note 7 to our consolidated financial statements for more information about the Revolving Credit Facility.

On April 21, 2020, we entered into the Third Amendment to Loan and Security Agreement with SVB (the Amendment), which amends the Loan and Security Agreement dated as of August 2, 2018, between the Company and SVB (as amended by the Default Waiver and First Amendment to Loan and Security Agreement dated September 7, 2018, and the Second Amendment to Loan and Security Agreement dated November 20, 2019, the Revolving Credit Agreement). The Amendment extends the maturity date by two years, to August 2, 2022. We also amended the interest rate to be the greater of (i) prime rate (as customarily defined), plus 0.50%, floating, and (ii) 5.25%. Interest on any outstanding loans continues to be due and payable monthly and the principal balance is due at maturity though loans can be prepaid at any time without penalty. Annual administration fees are unchanged. The Amendment also includes various administrative changes.

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 $50,000,000, from time to time, through an "at the market" equity offering program under which Jefferies will act as sales agent. The Sale Agreement allows us to set the parameters for the sale of shares, including the number of shares to be issued, the time period during which sales are requested to be made, limits on the number of shares that may be sold in any one trading day and a minimum price below which sales may not be made. The compensation to Jefferies for sales of the Company's common stock will be an amount equal to 3.0% of the gross proceeds of any shares of common stock sold under the Sale Agreement. The Company and Jefferies may each terminate the Sale Agreement upon prior notice. As of the date of this report, there had been no shares of common stock sold under the Sale Agreement.

We believe our existing cash, cash equivalents, and investments will be sufficient to meet our working capital and capital expenditure needs for at least the next 18 months. However, we may experience lower than expected cash generated from operating activities or greater than expected capital expenditures, cost of revenue, or operating expenses, and we may need to raise additional capital to fund our operations, further our research and development activities, or acquire or invest in a business. 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 associated with litigation or disputes relating to intellectual property rights or otherwise, 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, and the effect of competing technological and market developments. In the future, we may acquire businesses or technologies from third parties, and we may decide to raise additional capital through debt or equity financing to the extent we believe this is necessary to successfully complete these acquisitions.

If we require additional funds in the future, we may not be able to obtain such funds on acceptable terms, or at all, and our ability to raise additional capital may be adversely impacted by potential worsening global economic conditions and the recent disruptions to and volatility in the credit and financial markets in the United States and worldwide resulting from the COVID-19 pandemic. If we raise additional funds by issuing equity securities, our stockholders could experience dilution. Debt financing, 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. If we do not have, or are not able to obtain, sufficient funds, we may have to 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.

Off-Balance Sheet Arrangements

Since our inception, we have not had any off-balance sheet arrangements as defined in Item 303(a)(4) of the SEC's Regulation S-K.

Contractual Obligations and Commitments

Our operating lease obligations relate to leases for our current corporate headquarters and leases for manufacturing and office space for our foreign subsidiaries. Please see Note 8 to our condensed consolidated financial statements for a discussion of our lease obligations.

Other than as disclosed above, there have been no material changes during the six months ended June 30, 2020 to our contractual obligations disclosed in our "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in our annual report on Form 10-K for the year ended December 31, 2019.

Item 3. 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 six months ended June 30, 2020, we had a foreign currency loss of $0.6 million compared to a foreign currency loss of $80 thousand in the prior year for the same period. 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 $43.0 million as of June 30, 2020. These amounts were held primarily in cash on deposit with banks and money market funds which are short-term. We also held $2.4 million of investments in treasury securities at June 30, 2020. 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 4. 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 June 30, 2020. 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 June 30, 2020, 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.

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 June 30, 2020 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

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.

PART II. OTHER INFORMATION

Item 1. Legal Proceedings

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 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 Form 10-Q. 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.

Risks Related to Fluidigm's Business and Strategy

The global COVID-19 pandemic has significantly and adversely affected our business operations, financial position, and cash flows, and we expect it will continue to do so.

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 spread throughout all the countries in which we and our customers, suppliers, and other business partners operate, causing significant disruption and 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, 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 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 our products and services due to the impact of COVID-19 on our customers, particularly in the global academic research community;
- 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 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;
- the negative impact of travel restrictions and social distancing policies on our sales operations, marketing efforts, and customer field support;
- impaired ability to hire and effectively train new personnel due to travel restrictions and physical distancing protocols;
- 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; and

- increased volatility in our stock price due to financial market instability.

The extent to which the COVID-19 pandemic will continue to adversely 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 of the disease, the duration of the public health emergency, and actions taken in the United States and elsewhere to contain the virus and prevent new outbreaks, such as social distancing and quarantines, business closures or business disruptions.

Because the severity, magnitude, and duration of the COVID-19 pandemic and its economic consequences are uncertain and rapidly changing, 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; and the pace of recovery when the COVID-19 pandemic subsides.

As the COVID-19 crisis continues to adversely 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, 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. For example, our revenue declined year-over-year in 2017 compared to 2016, but increased year-over-year in 2018 compared to 2017. Our revenue continued to increase year-over-year in 2019 compared to 2018, but we may not be able to achieve similar revenue growth in future periods. We are also increasingly dependent on our mass cytometry business, which is very capital intensive. Variability in our quarterly or annual results of operations, mix of product revenue, including any decline in our mass cytometry revenue, 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 and capital spending; 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; 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; 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; 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; 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 $64.8 million, $59.0 million, and $60.5 million during the years 2019, 2018, and 2017, respectively. As of June 30, 2020, we had an accumulated deficit of $652.7 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, cell imaging, and additional applications using well established laboratory techniques, as well as newer technologies such as bead encoded arrays, microfluidics, next generation DNA sequencing, 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 Illumina, Inc., 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., and NanoString 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.

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.

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 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 very 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.

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.

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 next-generation DNA sequencing 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.

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 may additionally be impacted by factors such as the COVID-19 pandemic—could 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, 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 may 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, approximately 30% to 40% of which are either closed or working at reduced capacity as of the end of June 2020 because of the COVID-19 pandemic, have resulted in lower than expected sales of our systems, IFCs, assays, and reagents. Similar reductions and delays in customer spending may 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;
- changes in the regulatory environment affecting life science and plant and animal research companies engaged in research and commercial activities;
- differences in budget cycles across various geographies and industries;
- 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, 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 genomics 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 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 2019, 2018, and 2017, approximately 63%, 57%, and 55%, 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 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, which regulate the use 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 Asset 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);
- business interruptions resulting from global sociopolitical events, including war and terrorism, public health crises such as the 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.

If one or more of these risks occurs, it could require us to dedicate significant resources to remedy, and if we are unsuccessful in finding a solution, our financial results will suffer.

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.

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, 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.

We are dependent on single and sole source suppliers for some of the components and materials used in our products, and the loss of any of these suppliers could harm our business.

We rely on single and sole source suppliers for certain components and materials used in our products. 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/Helios systems and certain metal isotopes used with the Hyperion/Helios 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.

We have in the past experienced quality control and supply problems with some of our suppliers, such as manufacturing errors, 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 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.

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.

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 DNA sequencing 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 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 any key member 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, if any, and could have a material adverse effect on 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. In April 2020, we implemented a temporary, enterprise-wide reduction in salaries as part of our efforts to reduce our operating expenses in response to the COVID-19 pandemic. As of the date of this filing, all salaries have been restored to prior levels but 2020 merit-based salary increases are on hold pending a clearer view of our projected revenue for 2020. We cannot predict our employees' willingness to remain with us if raises are delayed indefinitely or if further salary reductions become necessary. We do not maintain fixed term employment contracts or significant key person life insurance with any of our employees.

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, 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.

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; 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.

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, despite our efforts, we are not fully insulated from technology disruptions that could adversely impact us. For example, in March 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 believe we were able to restore their operation without significant loss of business data. Based on the nature of the attack and its impact on our systems, we do not believe confidential data was lost or disclosed. If, however, confidential data is later determined to have been released in the course of this or 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. Although we believe we have contained the disruption from the March 2019 attack, we anticipate additional work and expense in the future as we continue to enhance our security processes and initiatives in response to ever-evolving information security threats.

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 implement security controls 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.

Our efficiency and cost-savings initiatives could be disruptive to our operations and adversely affect our results of operations and financial condition, and we may not realize some or all of the anticipated benefits of these initiatives in the time frame anticipated or at all.

Since 2017, we have implemented efficiency and cost-savings initiatives intended to stabilize our business operations and return to growth. These efficiency initiatives have included targeted workforce reductions, optimizing our facilities, and reducing excess space. In response to the COVID-19 pandemic, we initiated a range of additional actions aimed at temporarily reducing our operating expenses and preserving liquidity. These actions included 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. As of the date of this filing, we have restored all salaries and board member retainers to prior levels, but 2020 merit-based salary increases have been delayed pending a clearer view of our projected revenue for 2020. Further actions such as these may be required on an ongoing basis 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 further 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. In addition, our ability to complete our efficiency and cost-savings initiatives and achieve the anticipated benefits within the expected time frame is subject to estimates and assumptions and may vary materially from our expectations, including as a result of factors that are beyond our control. Furthermore, our efforts to grow our business and become profitable may not be successful.

To use our products, our Biomark, EP1, Helios/CyTOF 2, 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, Helios, 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.

There can be no assurance that the test we have developed to detect the SARS-CoV-2 virus will be granted Emergency Use Authorization (EUA) by the FDA. If the FDA does not grant the EUA for our test or if the FDA revokes or terminates the EUA after issuance, such as when the federally -declared public health emergency ends, we will be required to stop commercial distribution of our test immediately unless we can obtain FDA clearance for our test 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. 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 Act or the EUA is revoked under Section 564(g) of the Act, after which the product must be approved by the FDA under a traditional pathway in order to remain on the market or to continue commercialization of the product.

On June 12, 2020, we announced our submission of an application for an EUA from the FDA for our Advanta™ Dx SARS-CoV-2 RT-PCR assay, an extraction-free saliva-based test to detect the SARS-CoV-2 virus. We have not yet received an EUA. The FDA may require additional data, including additional validation data and clinical performance data, and may not ultimately issue an authorization. Changes in FDA policies, guidance, and requirements for EUA submission may delay FDA authorization of our product. Further, given the high volume of EUA requests received by the FDA and other factors due to the COVID-19 pandemic, including any disruptions in the FDA's normal operations, FDA review of our EUA application may be delayed. We can make no assurance that the FDA will grant an EUA for our product on a timely basis or at all.

If an EUA is granted for our Advanta™ Dx SARS-CoV-2 RT-PCR assay, the distribution and advertising conditions set forth in the EUA may limit our market opportunities or restrict how we can commercialize our product. If the FDA's policies and guidance change unexpectedly and/or materially or if we misinterpret them, potential sales of Advanta™ Dx 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 is not as safe, effective, or reliable as the data provided in the EUA application. If granted, we cannot predict how long an EUA f will remain effective. The termination or revocation of an EUA for our product, if granted, and changing policies and regulatory requirements could adversely impact our business, financial condition and results of operations.

Our letter 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 provides access to up to $12.2 million of the total proposed funding for the project prior to execution of a further definitive contract for the project. Release of the up to $12.2 million of initial funding under the letter contract will be based on the achievement of milestones, including an initial validation assessment followed by deliverables related to the development of our microfluidics technology and expansion of our manufacturing capacity.

There is significant competition among RADx projects, which are evaluated by experts on a rolling basis. Projects with the most potential for success are advanced to the next stage. There is no assurance that we can meet all the milestones in our letter contract with NIH on a timely basis, if at all. If we do not meet all the milestones, we will not be able access all $12 million in funding under the letter contract, and may not be able to execute a further definitive contract. 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. We cannot guarantee that we will be able to access all the available funding under the letter contract in a timely manner, or at all, or execute a further definitive contract with NIH.

Factors that could materially adversely affect our revenue stemming from this letter contract and, if awarded, the further definitive contract include:

- budgetary constraints affecting U.S. government spending generally, or NIH in particular;

- changes in U.S. government or NIH fiscal policies or available funding, including due to Congressional appropriations;
- changes in U.S. government or NIH programs, requirements or priorities;
- adoption of new laws or regulations;
- technological developments;
- U.S. government shutdowns, threatened shutdowns or budget delays;
- competition and consolidation in our industry; and
- general economic conditions.

These or other factors could cause NIH to reduce its funding or future activities under this letter contract and, if awarded, the further definitive contract, or to exercise its right to terminate either contract for convenience, either of which could have a material adverse effect on the revenue generated by this contract.

During the contract definitization process, the government may include certain provisions from the Federal Acquisition Regulations (FAR), 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 contracts with NIH will contain provisions permitting unilateral termination or modification, in whole or in part, at the U.S. government's convenience. 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 contracts:

Other examples of rights and remedies likely to be provided to the government under this contract include provisions that allow NIH to:

- terminate the contract, in whole or in part, for any reason or no reason;
- unilaterally reduce or modify the government's obligations under the contract, without the Company's consent, including by imposing price adjustments;
- claim rights, including intellectual property rights, in products and data developed under contract;
- under certain circumstances involving public health and safety, license inventions made under such agreements to third parties;
- suspend the contractor 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 such contracts;
- suspend or debar the contractor from doing future business with the government;
- claim rights to facilities or to products, including intellectual property, developed under the contract;
- change the course of a development program in a manner that differs from the 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 United States 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 our government 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. 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.

If we elect to label and promote any of our products as medical devices, we would be required to obtain prior approval or clearance by the FDA, which would take significant time and expense and could fail to result in FDA clearance or approval for the intended uses we believe are commercially attractive.

Our 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 may in the future register with the FDA as a medical device manufacturer and list some of our products with the FDA pursuant to an FDA Class I listing for general purpose laboratory equipment. While this regulatory classification is 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.

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 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, we could decide to seek regulatory clearance or approval for certain of our products in countries outside of the United States. 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 would need to comply with the new Medical Device Regulation 2017/745 and In Vitro Diagnostic Regulation 2017/746, which became effective May 26, 2017, with application dates of May 26, 2021 (postponed from 2020) and May 26, 2022 respectively. 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.

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.

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 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.

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.

Impairment of our goodwill or other intangible assets could materially and adversely affect our business, operating results, and financial condition.

As of June 30, 2020, we had approximately $154.4 million of goodwill and net intangible assets, including approximately $106.3 million of goodwill and $48.1 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. 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. In the fourth quarter of 2019, we concluded that certain of our patents and licenses were impaired and reduced the applicable carrying value to zero, recognizing a charge of $0.4 million, which is reflected in accumulated amortization.

The carrying amounts of goodwill and intangible assets are affected whenever events or changes in circumstances indicate that their carrying amounts may not be recoverable. We review goodwill and indefinite lived intangible assets for impairment at least annually and more frequently under certain circumstances. Other intangible assets that are deemed to have finite useful lives will continue to be amortized over their useful lives but must be reviewed for impairment when events or changes in circumstances indicate that 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 declines in our stock price or market capitalization, declines in our market share or revenues, 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. In particular, these or other adverse events or changes in circumstances may affect the estimated

undiscounted future operating cash flows expected to be derived from our goodwill and intangible assets. 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. We cannot provide assurances that we will not in the future be required to recognize impairment charges.

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. In addition, we may need to raise substantial additional capital for various purposes, including:

- expanding the commercialization of our products;
- funding our operations;
- 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, such as 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 have 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 $50,000,000, from time to time, through an “at the market” (ATM) equity offering program under which Jefferies will act as sales agent. As of the date of this report, there had been no shares of common stock sold under the Sale Agreement. If we raise additional funds by issuing equity securities, either under the ATM program or otherwise, our stockholders may experience dilution. Debt financing in addition to the Revolving 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 comply with the covenants and other obligations under our Revolving Credit Facility, the lenders may be able to accelerate amounts owed under the facilities and may foreclose upon the assets securing our obligations.

In April 2020, we amended our Revolving Credit Facility, which provides for secured revolving loans in an aggregate amount of up to $15.0 million, to extend the maturity date to August 2, 2022. The Revolving Credit Facility is secured by substantially all of our assets, other than intellectual property. The Revolving 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. If we fail to comply with the covenants and our other obligations under the Revolving Credit Facility, the lenders would be able to accelerate the required repayment of amounts due under the Revolving Credit Agreement and, if they are not repaid, could foreclose upon the assets securing our obligations under the Revolving Credit Facility.

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

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.

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.

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.

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, 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 United States government's adoption and expansion of trade restrictions, and the United Kingdom's withdrawal from the European Union 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.

If we are unable to expand our direct sales and marketing force or distribution capabilities to adequately address our customers' needs, our business may 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 develop and substantially expand our direct sales force and to increase the scope of our marketing efforts. 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. We have experienced significant changes in our sales organization in the past year due to reorganizations and changes in leadership. In addition, as part of our cost reduction program to manage the impact of the COVID-19 pandemic, we implemented temporary enterprise-wide salary reductions, including with respect to our sales and marketing employees. Although all salaries have been restored to prior levels as of the date of this filing, 2020 merit-based salary increases have been delayed pending a clearer view of our projected revenue for 2020. Any reinstatement of salary reductions or failure to implement salary increases may negatively impact our ability to maintain the skilled sales and marketing force necessary to support our business activities. As a result, our future success will depend largely on our ability to retain and motivate such personnel. 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.

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 have considered 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.

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 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.

For example, the U.S.-based Financial Accounting Standards Board (FASB) is currently working together with the International Accounting Standards Board (IASB), on several projects to further align accounting principles and facilitate more comparable financial reporting between companies who are required to follow U.S. GAAP under SEC regulations and those who are required to follow International Financial Reporting Standards outside of the United States. These efforts by the FASB and IASB may result in different accounting principles under U.S. GAAP that may result in materially different financial results for us in areas including, but not limited to, principles for recognizing revenue and lease accounting. Additionally, significant changes to U.S. GAAP resulting from the FASB's and IASB's efforts may require that we change how we process, analyze and report financial information and that we change financial reporting controls. Additionally, the FASB issued new guidance (ASU 2014-09) *Revenue from Contracts with Customers (Topic 606)* which supersedes nearly all existing U.S. GAAP revenue recognition guidance. The new guidance was effective for our fiscal year 2018. We adopted ASU 2014-09 in the first quarter of 2018 using the modified retrospective method. Under the modified retrospective method, periods prior to the adoption of ASU 2014-09 are not restated and the cumulative effect of initially applying the new standard is reflected in the opening balance of accumulated deficit as of January 1, 2018. To date, the adoption has not had a material impact on our consolidated financial statements. Additional disclosures are required for significant differences between the reported results under the new standard and those that would have been reported under the legacy standard, which required us to make certain changes to our business processes and controls to support revenue recognition and disclosure under the new standard.

The FASB also issued Accounting Standards Update (ASU) 2016-02, *Leases (Topic 842)* (ASU 2016-02). The core principle is that lessees should recognize the assets and liabilities arising from leases on the balance sheet. Under the new standard, lessees will be required to recognize lease assets and liabilities for all leases, with certain exceptions, on their balance sheets. We adopted ASU 2016-02 as of January 1, 2019. The adoption of this standard had a material impact on our consolidated financial statements. We continue to identify the appropriate changes to our business processes, systems, and controls to support the new lease standard and the required disclosures under the new standard.

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 June 30, 2020, we had outstanding $1.1 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). 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 of the 2014 Notes 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 Notes plus accrued and unpaid interest. 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 terms of the indenture governing either the 2014 Notes or the 2019 Notes (collectively, the Convertible Notes)), 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 the debt owed under the 2014 Notes or 2019 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 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 whom 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 recent 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. We expect the ruling will result in additional litigation in our industry. 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 whom 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 whom 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 whom our employees may have been previously affiliated. Litigation may be necessary to defend against these claims. For example, we were a defendant in litigation brought against us and one of our non-executive employees by Thermo alleging, among other claims, misappropriation of proprietary information and breach of contractual and fiduciary obligations. While we resolved our dispute with Thermo in July 2017, if we fail in defending against similar claims brought in the future, we could be subject to injunctive relief against us. A 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 similar claims brought in the future, 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., or Fluidigm Canada, an Ontario corporation and wholly owned subsidiary of Fluidigm Sciences, was party to an interim license agreement, now expired, with Nodality, Inc., or 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 may fluctuate significantly, particularly if holders of substantial amounts of our stock attempt to sell, and holders may have difficulty selling their shares based on current trading volumes of our stock. In addition, numerous other factors could result in substantial volatility in the trading price of our stock.

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, 2019, we had 69,956.397 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 46.3% of such shares and one stockholder beneficially owned approximately 9.8% of our outstanding common stock. Sales of large numbers of shares by any of our large stockholders 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 46.3% held by our top six stockholders) means that a relatively small number of stockholders have significant control over the outcomes of stockholder voting.

In addition, the trading price of our common stock may be highly volatile and could be 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;
- 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;

- any future sales of our common stock or other securities in connection with raising additional capital or otherwise;
- any major change to the composition of our board of directors or management; 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. If any of our stockholders were to bring a lawsuit against us, the defense and disposition of the lawsuit could be costly and divert the time and attention of our management and harm our operating results.

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. Although we expect to use the net proceeds from our ATM equity offering program for general corporate purposes, we have not allocated these net proceeds for specific purposes. 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 our business 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, which limits the ability of stockholders owning in excess of 15% of our outstanding voting stock to merge or combine with us.

We have never paid cash dividends on our capital stock, and we do not anticipate paying any cash dividends in the foreseeable future.

We have paid no cash dividends on any of our classes of capital stock to date and currently intend to retain our future earnings to fund the development and growth of our business. In addition, we cannot pay any cash dividends on any of our classes of common stock without approval from the lender under our Revolving Credit Facility, and may become subject to covenants under future debt arrangements that place restrictions on our ability to pay dividends. As a result, capital appreciation, if any, of our common stock will be stockholders' sole source of gain for the foreseeable future.

Any conversions of the 2014 Notes or 2019 Notes 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 or 2019 Notes 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 or 2019 Notes 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 or 2019 Notes could depress the market price of our common stock and impair our ability to raise capital through the sale of additional equity securities.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

None.

Item 5. Other Information

The information set forth below below and in Exhibit 10.5 of this quarterly report on Form 10-Q is provided in accordance with and in satisfaction of the requirement of Item 5.02 "Departure of Directors or Certain Officers; Election of Directors; Appointment of Certain Officers; Compensatory Arrangements of Certain Officers" of Form 8-K.

On August 4, 2020, the compensation committee of our board of directors approved the Fluidigm Corporation 2020 Change of Control and Severance Plan (the Severance Plan), under which our executive officers are eligible to receive severance benefits. The Severance Plan replaces the Company's existing Change of Control and Severance Plan, which expires according to its terms on August 21, 2020 (the Prior Plan).

Under the Severance Plan, if any executive officer's employment is terminated outside of the period beginning three months before a Change of Control (as defined in the Severance Plan) or the signing of a definitive agreement for a Change of Control and ending 12 months after a Change of Control (the Change of Control Period) for a reason other than Cause or the executive officer's death or Disability (as such terms are defined in the Severance Plan) (an Involuntary Termination), then the executive officer will be entitled to receive the following:

- 75% of the executive officer's annual base salary in effect as of the date of termination, paid in equal installments (less applicable withholding) over nine months (or, in the case of Stephen Christopher Linthwaite, our President and CEO, 200% of his annual base salary paid over a period of 24 months) following termination,
- payment of continued health coverage for the executive officer, his or her spouse and/or dependents, if applicable (such coverage, COBRA Coverage), for a period of up to nine months (or, in Mr. Linthwaite's case, 12 months) following termination, and
- reasonable outplacement services in accordance with the Severance Plan.

Under the Severance Plan, if any executive officer's employment is terminated within the Change of Control Period either (i) by us in an Involuntary Termination or (ii) by the executive officer for Good Reason (as defined in the executive officer's participation agreement under the Severance Plan), then the executive officer will be entitled to receive the following:

- a lump-sum payment (less applicable withholding) totaling 150% (or, in Mr. Linthwaite's case, 250%) of the sum of (x) his or her annual base salary (as in effect immediately before termination or immediately before the Change of Control, whichever is higher) plus (y) the greater of (A) his or her annual target bonus (as in effect immediately before termination or immediately before the Change of Control, whichever is higher) or (B) the average of the annual bonuses actually paid to him or her for the three fiscal years preceding the year in which the termination occurs,
- a lump-sum amount (less applicable withholding) totaling his or her annual target bonus (as in effect immediately before termination or immediately before the Change of Control, whichever is higher) prorated to reflect the number of days worked during the year in which the termination occurs,
- payment of costs of COBRA Coverage, for a period of up to 18 months (or, in Mr. Linthwaite's case, 30 months) following termination,
- 100% vesting acceleration of his or her then-outstanding and unvested equity awards, with any equity awards subject to outstanding performance-based vesting criteria vesting as to 100% of the baseline number of shares (or 100% at target achievement), and
- reasonable outplacement services in accordance with the Severance Plan.

Upon any termination of Mr. Linthwaite's employment for a reason other than Cause or death or Disability, the Company will assign to Mr. Linthwaite the life insurance policy insuring his life and reimburse him for payment of premiums on such policy for up to 30 months following his termination of employment.

Upon execution of participation agreements, the Severance Plan will supersede the severance benefits provided to the executive officers under the Prior Plan. To receive Severance Plan benefits, an executive officer would also be required sign and not revoke a separation and release of claims agreement in a form reasonably satisfactory to us within the period specified in the Severance Plan, and comply with any confidentiality, proprietary information and inventions assignment agreement and any other appropriate agreement with us.

If any of the severance and other benefits provided for in the Severance Plan or otherwise payable to an executive officer constitute "parachute payments" within the meaning of Section 280G of the Internal Revenue Code (the Code) and could be subject to excise tax under Section 4999 of the Code, then the benefits will be delivered in full or delivered as to such lesser extent that would result in no portion of such benefits being subject to excise tax, whichever results in the greater amount of after-tax benefits to such executive officer. The Severance Plan does not require us to provide any tax gross-up payment to any executive officer participating in the Severance Plan.

The Severance Plan will have a term of three years commencing on August 4, 2021 and expiring on the third anniversary of that date, and will thereafter automatically renew for successive one-year periods unless the Company notifies participants of the Severance Plan's nonrenewal at least 12 months prior to the commencement of such Renewal Term. If a Change of Control occurs, the term of the Severance Plan will extend automatically through the date that is 12 months following the effective date of the Change of Control, subject to continuation with respect to benefits to which a participant is entitled. The Severance Plan allows our management team to designate employees for participation who are not executive officers.

The above description of the Severance Plan is not complete and is qualified in its entirety by reference to the full text of the Severance Plan, which is attached hereto as Exhibit 10.5 and incorporated herein by reference.

Item 6. Exhibits

The documents listed in the Exhibit List, which follows below, are incorporated by reference or are filed with this quarterly report on Form 10-Q, in each case as indicated therein (numbered in accordance with Item 601 of Regulation S-K).

EXHIBIT LIST

Exhibit Number	Description	Incorporated by Reference From Form	Incorporated by Reference From Exhibit Number	Date Filed
10.1	Open Market Sale Agreement℠, dated as of March 4, 2020, between Fluidigm Corporation and Jefferies LLC.	8-K	1.1	3/5/2020
10.2	Fluidigm Corporation 2017 Employee Stock Purchase Plan, as amended and restated effective June 23, 2020.	8-K	10.1	6/24/2020
10.3	Fluidigm Corporation 2011 Equity Incentive Plan, as amended effective June 23, 2020.	8-K	10.2	6/24/2020
10.4	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
10.5*	Fluidigm Corporation 2020 Change of Control and Severance Plan.	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(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(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		
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		

(1) 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-Q 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 the registrant specifically incorporates it by reference.

* Indicates a management contract or compensatory plan.

SIGNATURES

Pursuant to the requirements 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: August 7, 2020

By: /s/ Stephen Christopher Linthwaite

Stephen Christopher Linthwaite

President and Chief Executive Officer

Dated: August 7, 2020

By: /s/ Vikram Jog

Vikram Jog

Chief Financial Officer

Exhibit 10.5

FLUIDIGM CORPORATION
2020 CHANGE OF CONTROL AND SEVERANCE PLAN
AND SUMMARY PLAN DESCRIPTION

Adopted as of August 4, 2020

1. **Introduction**. The purpose of this Fluidigm Corporation 2020 Change of Control and Severance Plan, or Plan (as defined in Section 2 below), is to provide assurances of specified benefits to certain employees of the Company whose employment is subject to being involuntarily terminated other than for death, Disability, or Cause or voluntarily terminated for Good Reason under the circumstances described herein. This Plan is an "employee welfare benefit plan," as defined in Section 3(1) of the U.S. Employee Retirement Income Security Act of 1974, as amended ("***ERISA***"). This document constitutes both the written instrument under which the Plan is maintained and the required summary plan description for the Plan. This Plan is a replacement for that certain Fluidigm Corporation Change of Control and Severance Plan and Summary Plan Description adopted by the Compensation Committee of Fluidigm Corporation on August 21, 2017 (the "***Prior Plan***"). The Prior Plan expires according to its terms and will not be renewed. By becoming a Participant under this Plan (and immediately upon execution of the Participation Agreement), the Participant expressly acknowledges that Participant will cease being a participant under or entitled to any benefits under the Prior Plan.

2. **Important Terms**. The following words and phrases, when the initial letter of the term is capitalized, will have the meanings set forth in this Section 2, unless a different meaning is plainly required by the context:

2.1 "***Administrator***" means the Company, acting through the Compensation Committee or another duly constituted committee of members of the Board, or any person to whom the Administrator has delegated any authority or responsibility with respect to the Plan pursuant to Section 12, but only to the extent of such delegation.

2.2 "***Board***" means the Board of Directors of the Company.

2.3. "***Cause***" exists upon (i) a Participant's conviction of, or plea of guilty or nolo contendere to, any crime involving dishonesty or moral turpitude or any felony; or (ii) a Participant's (a) engagement in material dishonesty, willful misconduct, or gross negligence—in each case in connection with the Participant's position at the Company; (b) breach of any confidentiality, invention assignment, non-disclosure, or non-solicitation agreement entered into between the Company and the Participant; (c) material violation of a written Company policy or procedure that has been provided to the Participant, which violation causes substantial injury to the Company; or (d) willful refusal to perform the Participant's assigned duties to the Company, following written notice of such refusal by the Company and a period of fifteen (15) days to cure the same and the Participant's failure to cure during such time period. No act or omission shall be considered "willful" if such act or omission was done, or not done, in the reasonable, good-faith belief that such act or omission was in the best interests of the Company or upon the advice of counsel to the Company.

2.4. **"*Change of Control*"** means the occurrence of any of the following events:

2.4.1 **Change in Ownership of the Company**. A change in the ownership of the Company that occurs on the date that any one person, or more than one person acting as a group ("***Person***"), acquires ownership of the stock of the Company that, together with the stock held by such Person, constitutes more than fifty percent (50%) of the total voting power of the stock of the Company; *provided*, *however*, that for purposes of this subsection, the acquisition of additional stock by any one Person considered to own more than fifty percent (50%) of the total voting power of the stock of the Company will not be considered a Change in Control. Further, if the stockholders of the Company immediately before such change in ownership continue to retain immediately after the change in ownership direct or indirect beneficial ownership of fifty percent (50%) or more of the total voting power of the stock of the Company or of the ultimate parent entity of the Company in substantially the same proportions as their ownership of the Company's voting stock immediately prior to the change in ownership, such event shall not be considered a Change in Control under this subsection. For this purpose, indirect beneficial ownership shall include, without limitation, an interest resulting from ownership of the voting securities of one or more corporations or other business entities that own the Company, as the case may be, either directly or through one or more subsidiary corporations or other business entities.

2.4.2. **Change in Effective Control of the Company**. A change in the effective control of the Company that occurs on the date that a majority of members of the Board is replaced during any twenty-four (24) month period with individuals whose appointment or election to the Board is not endorsed by a majority of the members of the Board prior to the date of the appointment or election. For purposes of this subsection (b), if any Person is considered to be in effective control of the Company, the acquisition of additional control of the Company by the same Person will not be considered a Change in Control; or

2.4.3 **Change in Ownership of a Substantial Portion of the Company's Assets**. A change in the ownership of a substantial portion of the Company's assets that occurs on the date that any Person acquires (or has acquired during the twelve (12) month period ending on the date of the most recent acquisition by such Person) assets from the Company that have a total gross fair market value equal to or more than fifty percent (50%) of the total gross fair market value of all of the assets of the Company immediately prior to such acquisition or acquisitions; *provided*, *however*, that for purposes of this subsection 2.4.3, the following will not constitute a change in the ownership of a substantial portion of the Company's assets: (a) a transfer to an entity that is controlled by the Company's stockholders immediately after the transfer; or (b) a transfer of assets by the Company to (i) a stockholder of the Company (immediately before the asset transfer) in exchange for or with respect to the Company's stock; (ii) an entity as to which fifty percent (50%) or more of the total value or voting power is owned, directly or indirectly, by the Company; (iii) a Person that owns, directly or indirectly, fifty percent (50%) or more of the total value or voting power of all the outstanding stock of the Company; or (iv) an entity as to which at least fifty percent (50%) of the total value or voting power is owned, directly or indirectly, by a Person described in 2.4.3(b)(iii). For purposes of this subsection 2.4.3, "gross fair market value" means the value of the assets of the Company, or

the value of the assets being disposed of, determined without regard to any liabilities associated with such assets.

For purposes of this Section 2.4, persons will be considered to be acting as a group if they are owners of a corporation that enters into a merger, consolidation, purchase or acquisition of stock, or similar business transaction with the Company.

Notwithstanding any of the foregoing, however, in any circumstance or transaction in which compensation or benefits paid under this Plan would result in imposition of an additional tax under Section 409A of the Code (as defined below) if the foregoing definition of "Change of Control" were to apply, but would not result in the imposition of any additional tax if the term "Change of Control" were defined herein to mean a "change in control event" within the meaning of Treasury Regulation Section 1.409A-3(i)(5), then "Change of Control" shall mean a "change in control event" within the meaning of Treasury Regulation Section 1.409A-3(i)(5), but only to the extent necessary to prevent such compensation from becoming subject to an additional tax under Section 409A.

Further and for the avoidance of doubt, a transaction will not constitute a Change in Control if: (i) its primary purpose is to change the jurisdiction of the Company's incorporation, or (ii) its primary purpose is to create a holding company that will be owned in substantially the same proportions by the persons who held the Company's securities immediately before such transaction.

2.5. "***Change of Control Period***" means the time period beginning three (3) months prior to a Change of Control (or three months prior to signing of a definitive agreement to consummate a Change of Control if the Company enters into such an agreement) and ending on the date that is twelve (12) months following the Change of Control.

2.6. "***Code***" means the Internal Revenue Code of 1986, as amended. Reference to a specific section of the Code or regulation thereunder shall include such section or regulation, any valid regulation promulgated under such section, and any comparable provision of any future legislation or regulation amending, supplementing or superseding such section or regulation.

2.7. "***Company***" means Fluidigm Corporation and any successor that assumes the obligations of the Company under the Plan by way of merger, acquisition, consolidation or other transaction.

2.8. "***Disability***" means that Participant has been unable to perform his or her Company duties as the result of Participant's incapacity due to physical or mental illness, and such inability, at least twenty-six (26) weeks after its commencement, is determined to be total and permanent by a physician selected by the Company or its insurers and acceptable to Participant or Participant's legal representative (such agreement as to acceptability not to be unreasonably withheld). Termination resulting from Disability may only be effected after at least 30 days' written notice by the Company of its intention to terminate Participant's employment. In the event that Participant resumes the performance of substantially all of his or her duties hereunder before the termination of employment becomes effective, the notice of intent to terminate will automatically be deemed to have been revoked.

2.9. "***Effective Date***" means August 4, 2020, which is the date the Plan was adopted by the Compensation Committee of the Board.

2.10. "***Exchange Act***" means the U.S. Securities Exchange Act of 1934, as amended.

2.11. "***Equity Awards***" means a Participant's outstanding stock options, stock appreciation rights, restricted stock, restricted stock units, performance shares, performance stock units, and any other Company equity compensation awards.

2.12. "***Good Reason***" has the meaning set forth in the Participant's Participation Agreement.

2.13. "***Involuntary Termination***" means a Non-COC Involuntary Termination or a COC Involuntary Termination, in each case, under the circumstances described in Section 4 or Section 5, as applicable.

2.14. "***Participant***" means an employee of the Company or of any parent or subsidiary of the Company who (a) has been designated by the Administrator to participate in the Plan and (b) has timely and properly executed and delivered a Participation Agreement to the Company.

2.15. "***Participation Agreement***" means the individual agreement (as will be provided in separate cover as Appendix A) provided by the Administrator to a Participant under the Plan, which has been signed and accepted by the Participant.

2.16. "***Plan***" means the Fluidigm Corporation 2020 Change of Control and Severance Plan as set forth in this document and as hereafter amended from time to time.

2.17. "***Section 409A***" means Section 409A of the Code and the final regulations and any guidance promulgated thereunder.

2.18. "***Section 409A Limit***" means two (2) times the lesser of: (i) the Participant's annualized compensation based upon the annual rate of pay paid to the Participant during the taxable year preceding the taxable year of the Participant's termination of employment as determined under, and with such adjustments as are set forth in, Treasury Regulation 1.409A-1(b)(9)(iii)(A)(1) and any Internal Revenue Service guidance issued with respect thereto; or (ii) the maximum amount that may be taken into account under a qualified plan pursuant to Section 401(a)(17) of the Code for the year in which the Participant's employment is terminated.

2.19. "***Severance Benefits***" means the compensation and other benefits that the Participant will be provided in the circumstances described in Section 4 or Section 5 of the Plan, as applicable.

3. **Eligibility for Severance Benefits**. An individual is eligible for Severance Benefits under the Plan, as described in Section 4 or Section 5, as applicable, only if he or she experiences an Involuntary Termination.

4. **Involuntary Termination Outside the Change of Control Period**. If, outside of the Change of Control Period, the Company (or any parent or subsidiary of the Company) terminates the Participant's employment for a reason other than for Cause, the Participant's

death or Disability (a "***Non-COC Involuntary Termination***"), subject to the Participant's compliance with Section 7, the Participant will receive the following Severance Benefits:

4.1. **Cash Severance Benefits**. Continued payments of cash severance for the period set forth in the Participant's Participation Agreement;

4.2. **Continued Medical Benefits**. If the Participant and any spouse and/or other dependents of the Participant ("***Family Members***") have coverage on the date of the Participant's Involuntary Termination under a group health plan sponsored by the Company, the Company will pay on behalf of Participant the total applicable premium cost for continued group health plan coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended ("***COBRA***") during the period of time following the Participant's employment termination, as set forth in the Participant's Participation Agreement, provided that the Participant validly elects and is eligible to continue coverage under COBRA for the Participant and any such Family Members; and

4.3. **Outplacement Services**. Reasonable outplacement services in accordance with any applicable Company policy in effect as of the Participant's Non-COC Involuntary Termination (or if no such policy is in effect, as determined by the Company, in its sole discretion).

5. **Involuntary Termination During the Change of Control Period**. If, during the Change of Control Period, (i) a Participant terminates his or her employment with the Company (or any parent or subsidiary of the Company) for Good Reason, or (ii) the Company (or any parent or subsidiary of the Company) terminates the Participant's employment for a reason other than Cause or the Participant's death or Disability (a "***COC Involuntary Termination***"), then, in each case, subject to the Participant's compliance with Section 7, the Participant will receive the following Severance Benefits:

5.1. **Cash Severance Benefits**. A lump-sum payment of cash severance and/or bonus equal to the amount set forth in the Participant's Participation Agreement;

5.2. **Equity Award Vesting Acceleration Benefit**. The Participant's Equity Awards will accelerate and vest to the amount set forth in the Participant's Participation Agreement, as applicable;

5.3. **Continued Medical Benefits**. If the Participant, and any Family Member(s) has/have coverage on the date of the Participant's Involuntary Termination under a group health plan sponsored by the Company, the Company will pay on behalf of Participant the total applicable premium cost for continued group health plan coverage under the COBRA during the period of time following the Participant's employment termination, as set forth in the Participant's Participation Agreement, provided that the Participant validly elects and is eligible to continue coverage under COBRA for the Participant and his or her Family Members; and

5.4. **Outplacement Services**. Reasonable outplacement services in accordance with any applicable Company policy in effect as of the Participant's COC Involuntary Termination (or if no such policy is in effect, as determined by the Company, in its sole discretion); provided, however, that such outplacement services shall be in no case less than

the outplacement services provided under any applicable Company policy in effect immediately prior to the applicable Change of Control.

6. **Limitation on Payments**. In the event that the severance and other benefits provided for in this Plan or otherwise ("***280G Payments***") payable to a Participant (i) constitute "parachute payments" within the meaning of Section 280G of the Code, and (ii) but for this Section 6, would be subject to the excise tax imposed by Section 4999 of the Code, then the 280G Payments will be either:

6.1. delivered in full, or

6.2. delivered as to such lesser extent as would result in no portion of such benefits being subject to excise tax under Section 4999 of the Code, whichever of the foregoing amounts, taking into account the applicable federal, state and local income taxes and the excise tax imposed by Section 4999, results in the receipt by the Participant on an after-tax basis, of the greatest amount of benefits, notwithstanding that all or some portion of such benefits may be taxable under Section 4999. If a reduction in severance and other benefits constituting "parachute payments" is necessary so that benefits are delivered to a lesser extent, reduction will occur in the following order: (a) cancellation of awards granted "contingent on a change in ownership or control" (within the meaning of Code Section 280G); (b) a pro rata reduction of (i) cash payments that are subject to Section 409A as deferred compensation and (ii) cash payments not subject to Section 409A; (c) a pro rata reduction of (i) employee benefits that are subject to Section 409A as deferred compensation and (ii) employee benefits not subject to Section 409A; and (d) a pro rata cancellation of (i) accelerated vesting equity awards that are subject to Section 409A as deferred compensation and (ii) equity awards not subject to Section 409A. In the event that acceleration of vesting of equity awards is to be cancelled, such acceleration of vesting will be cancelled in the reverse order of the date of grant of the Participant's equity awards. Notwithstanding the foregoing, to the extent the Company submits any payment or benefit payable to the Participant under this Plan or otherwise to the Company's stockholders for approval in accordance with Treasury Regulation Section 1.280G-1 Q&A 7, the foregoing provisions shall not apply following such submission and such payments and benefits will be treated in accordance with the results of such vote, except that any reduction in, or waiver of, such payments or benefits required by such vote will be applied without any application of discretion by the Participant and in the order prescribed by this Section 6.

Unless the Participant and the Company otherwise agree in writing, any determination required under this Section 6 will be made in writing by the Company's independent public accountants immediately prior to the Change of Control or such other person or entity to which the parties mutually agree (the "***Firm***"), whose determination will be conclusive and binding upon the Participant and the Company. For purposes of making the calculations required by this Section 6 the Firm may make reasonable assumptions and approximations concerning applicable taxes and may rely on reasonable, good faith interpretations concerning the application of Sections 280G and 4999 of the Code. The Participant and the Company will furnish to the Firm such information and documents as the Firm may reasonably request in order to make a determination under this Section 6. The Company will bear all costs the Firm may incur in connection with any calculations contemplated by this Section 6.

7. **Conditions to Receipt of Severance**.

7.1. **Release Agreement**. As a condition to receiving the Severance Benefits under this Plan, each Participant will be required to sign and not revoke a separation and release of claims agreement in substantially the form attached this Plan as Appendix B (the "***Release***"). In all cases, the Release must become effective and irrevocable no later than the 60th day following the Participant's Involuntary Termination (the "***Release Deadline Date***"). If the Release does not become effective and irrevocable by the Release Deadline Date, the Participant will forfeit any right to the Severance Benefits. In no event will the Severance Benefits be paid or provided until the Release becomes effective and irrevocable.

7.2. **Other Requirements**. A Participant's receipt of Severance Benefits will be subject to the Participant continuing to comply with the provisions of this Section 7 and the terms of any confidentiality, proprietary information and inventions agreement and such other appropriate agreement between the Participant and the Company. Severance Benefits under this Plan will terminate immediately for a Participant if the Participant, at any time, violates any such agreement and/or the provisions of this Section 7.

8. **Timing of Severance Benefits**. Provided that the Release becomes effective and irrevocable by the Release Deadline Date and subject to Section 10, the Severance Benefits will be paid (or in the case of Severance Benefits scheduled to be paid installments, will commence) on the first Company payroll date following the Release Deadline Date (such payment date, the "***Severance Start Date***"), and any severance payments or benefits otherwise payable to the Participant during the period immediately following the Participant's termination of employment with the Company through the Severance Start Date will be paid in a lump sum to the Participant on the Severance Start Date, with any remaining payments to be made as provided in this Plan.

9. **Exclusive Benefit**. The benefits provided under this Plan shall be the exclusive benefit for a Participant related to termination of employment and/or change in control and shall supersede and replace any severance and/or change in control benefits set forth in any offer letter, employment agreement and/or severance agreement, including without limitation the Prior Plan. For the avoidance of doubt, if a Participant was otherwise eligible to participate in any other Company severance plan (whether or not subject to ERISA), then participation in this Plan will supersede and replace eligibility in such other plan.

10. **Section 409A**.

10.1. Notwithstanding anything to the contrary in this Plan, no severance payments or benefits to be paid or provided to a Participant, if any, under this Plan that, when considered together with any other severance payments or separation benefits, are considered deferred compensation under Section 409A (together, the "***Deferred Payments***") will be paid or provided until the Participant has a "separation from service" within the meaning of Section 409A. Similarly, no severance payable to a Participant, if any, under this Plan that otherwise would be exempt from Section 409A pursuant to Treasury Regulation Section 1.409A 1(b)(9) will be payable until the Participant has a "separation from service" within the meaning of Section 409A.

10.2. It is intended that none of the severance payments or benefits under this Plan will constitute Deferred Payments but rather will be exempt from Section 409A as a payment that would fall within the "short-term deferral period" as described in Section 10.3 below or resulting from an involuntary separation from service as described in Section 10.4 below. In no event will a Participant have discretion to determine the taxable year of payment of any Deferred Payment.

10.3. Notwithstanding anything to the contrary in this Plan or in any Participation Agreement, if a Participant is a "specified employee" within the meaning of Section 409A at the time of the Participant's separation from service (other than due to death), then the Deferred Payments, if any, that are payable within the first six (6) months following the Participant's separation from service, will become payable on the date six (6) months and one (1) day following the date of the Participant's separation from service. All subsequent Deferred Payments, if any, will be payable in accordance with the payment schedule applicable to each payment or benefit. Notwithstanding anything herein to the contrary, in the event of the Participant's death following the Participant's separation from service, but before the six-month anniversary of the separation from service, then any payments delayed in accordance with this paragraph will be payable in a lump sum as soon as administratively practicable after the date of the Participant's death and all other Deferred Payments will be payable in accordance with the payment schedule applicable to each payment or benefit. Each payment and benefit payable under this Plan is intended to constitute a separate payment under Section 1.409A-2(b)(2) of the Treasury Regulations.

10.4. Any amount paid under this Plan that satisfies the requirements of the "short-term deferral" rule set forth in Section 1.409A-1(b)(4) of the Treasury Regulations will not constitute Deferred Payments for purposes of Section 10 above.

10.5. Any amount paid under this Plan that qualifies as a payment made as a result of an involuntary separation from service pursuant to Section 1.409A-1(b)(9)(iii) of the Treasury Regulations that does not exceed the Section 409A Limit will not constitute Deferred Payments for purposes of Section 10 above.

10.6. The foregoing provisions are intended to comply with or be exempt from the requirements of Section 409A so that none of the payments and benefits to be provided under the Plan will be subject to the additional tax imposed under Section 409A, and any ambiguities herein will be interpreted to so comply or be exempt. Notwithstanding anything to the contrary in the Plan, including but not limited to Sections 12 and 15, the Company reserves the right to amend the Plan as it deems necessary or advisable, in its sole discretion and without the consent of the Participants, to comply with Section 409A or to avoid income recognition under Section 409A prior to the actual payment of benefits under the Plan or imposition of any additional tax. In no event will the Company reimburse a Participant for any taxes that may be imposed on the Participant as result of Section 409A.

11. **Withholdings**. The Company will withhold from any payments or benefits under the Plan all applicable U.S. federal, state, local and non-U.S. taxes required to be withheld and any other required payroll deductions.

12. **Administration**. The Company is the administrator of the Plan (within the meaning of section 3(16)(A) of ERISA). The Plan will be administered and interpreted by the Administrator (in its sole discretion). The Administrator is the "named fiduciary" of the Plan for purposes of ERISA and will be subject to the fiduciary standards of ERISA when acting in such capacity. Any decision made or other action taken by the Administrator with respect to the Plan, and any interpretation by the Administrator of any term or condition of the Plan, or any related document, will be conclusive and binding on all persons and be given the maximum possible deference allowed by law. In accordance with Section 2.1, the Administrator (a) may, in its sole discretion and on such terms and conditions as it may provide, delegate in writing to one or more officers of the Company all or any portion of its authority or responsibility with respect to the Plan, and (b) has the authority to act for the Company (in a non-fiduciary capacity) as to any matter pertaining to the Plan; *provided, however*, that any Plan amendment or termination or any other action that reasonably could be expected to increase materially the cost of the Plan must be approved by the Board.

13. **Eligibility to Participate**. To the extent that the Administrator has delegated administrative authority or responsibility to one or more officers of the Company in accordance with Sections 2.1 and 12, each such officer will not be excluded from participating in the Plan if otherwise eligible, but he or she is not entitled to act upon or make determinations regarding any matters pertaining specifically to his or her own benefit or eligibility under the Plan. The Administrator will act upon and make determinations regarding any matters pertaining specifically to the benefit or eligibility of each such officer under the Plan.

14. **Term**. This Plan will have a term of three years commencing on the Effective Date and expiring on the third anniversary of the Effective Date (the "***Initial Term***") and shall, thereafter, automatically renew for successive one-year periods (each a "***Renewal Term***" and, collectively with the Initial Term, the "***Term***") unless, upon the decision of the Administrator, the Company notifies the Participants who remain eligible for benefits under this Plan of the Plan's nonrenewal at least twelve (12) months prior to the commencement of such Renewal Term, in which case such Renewal Term will be canceled and the Plan will expire on the anniversary of Initial Term or the relevant Renewal Term, as applicable. If a Change of Control occurs, the Term will extend automatically through the date that is twelve (12) months following the effective date of the Change of Control. If a Participant becomes entitled to benefits during the Term, the Plan will not terminate with respect to such Participant until all of the obligations of the Company and such Participant with respect to this Plan have been satisfied.

15. **Amendment or Termination**. The Company, by action of the Administrator, reserves the right to amend or terminate the Plan at any time, without advance notice to any Participant and without regard to the effect of the amendment or termination on any Participant or on any other individual. Any amendment or termination of the Plan will be in writing. In addition, notwithstanding the preceding, during the Term, the Company may not, without a Participant's written consent, amend or terminate the Plan in any way, nor take any other action, that (i) prevents that Participant from becoming eligible for the Severance Benefits under the Plan, or (ii) reduces or alters to the detriment of the Participant the Severance Benefits payable, or potentially payable, to a Participant under the Plan (including,

without limitation, imposing additional conditions). Any action of the Company in amending or terminating the Plan will be taken in a non-fiduciary capacity.

16. **Claims and Appeals**.

16.1**. Claims Procedure**. Any employee or other person who believes he or she is entitled to any payment under the Plan may submit a claim in writing to the Administrator within 90 days of the earlier of (i) the date the claimant learned the amount of his or her benefits under the Plan or (ii) the date the claimant learned that he or she will not be entitled to any benefits under the Plan. If the claim is denied (in full or in part), the claimant will be provided a written notice explaining the specific reasons for the denial and referring to the provisions of the Plan on which the denial is based. The notice also will describe any additional information needed to support the claim and the Plan's procedures for appealing the denial. The denial notice will be provided within 90 days after the claim is received. If special circumstances require an extension of time (up to 90 days), written notice of the extension will be given within the initial 90-day period. This notice of extension will indicate the special circumstances requiring the extension of time and the date by which the Administrator expects to render its decision on the claim.

16.2**. Appeal Procedure**. If the claimant's claim is denied, the claimant (or his or her authorized representative) may apply in writing to the Administrator for a review of the decision denying the claim. Review must be requested within 60 days following the date the claimant received the written notice of their claim denial or else the claimant loses the right to review. The claimant (or representative) then has the right to review and obtain copies of all documents and other information relevant to the claim, upon request and at no charge, and to submit issues and comments in writing. The Administrator will provide written notice of its decision on review within 60 days after it receives a review request. If additional time (up to 60 days) is needed to review the request, the claimant (or representative) will be given written notice of the reason for the delay. This notice of extension will indicate the special circumstances requiring the extension of time and the date by which the Administrator expects to render its decision. If the claim is denied (in full or in part), the claimant will be provided a written notice explaining the specific reasons for the denial and referring to the provisions of the Plan on which the denial is based. The notice also will include a statement that the claimant will be provided, upon request and free of charge, reasonable access to, and copies of, all documents and other information relevant to the claim and a statement regarding the claimant's right to bring an action under Section 502(a) of ERISA.

17. **Attorneys' Fees**. The parties shall each bear their own expenses, legal fees and other fees incurred in connection with this Plan.

18. **Source of Payments**. All payments under the Plan will be paid from the general funds of the Company; no separate fund will be established under the Plan, and the Plan will have no assets. No right of any person to receive any payment under the Plan will be any greater than the right of any other general unsecured creditor of the Company.

19. **Inalienability**. In no event may any current or former employee of the Company or any of its subsidiaries or affiliates sell, transfer, anticipate, assign or otherwise dispose of any

right or interest under the Plan. At no time will any such right or interest be subject to the claims of creditors nor liable to attachment, execution or other legal process.

20. **No Enlargement of Employment Rights**. Neither the establishment or maintenance or amendment of the Plan, nor the making of any benefit payment hereunder, will be construed to confer upon any individual any right to continue to be an employee of the Company. The Company expressly reserves the right to discharge any of its employees at any time, with or without cause. However, as described in the Plan, a Participant may be entitled to benefits under the Plan depending upon the circumstances of his or her termination of employment.

21. **Successors**. Any successor to the Company of all or substantially all of the Company's business and/or assets (whether direct or indirect and whether by purchase, merger, consolidation, liquidation or other transaction) will assume the obligations under the Plan and agree expressly to perform the obligations under the Plan in the same manner and to the same extent as the Company would be required to perform such obligations in the absence of a succession. For all purposes under the Plan, the term "Company" will include any successor to the Company's business and/or assets which become bound by the terms of the Plan by operation of law, or otherwise.

22. **Applicable Law**. The provisions of the Plan will be construed, administered and enforced in accordance with ERISA and, to the extent applicable, the internal substantive laws of the state of California (but not its conflict of laws provisions).

23. **Severability**. If any provision of the Plan is held invalid or unenforceable, its invalidity or unenforceability will not affect any other provision of the Plan, and the Plan will be construed and enforced as if such provision had not been included.

24. **Headings**. Headings in this Plan document are for purposes of reference only and will not limit or otherwise affect the meaning hereof.

25. **Indemnification**. The Company hereby agrees to indemnify and hold harmless the officers and employees of the Company, and the members of its Board, from all losses, claims, costs or other liabilities arising from their acts or omissions in connection with the administration, amendment or termination of the Plan, to the maximum extent permitted by applicable law. This indemnity will cover all such liabilities, including judgments, settlements and costs of defense. The Company will provide this indemnity from its own funds to the extent that insurance does not cover such liabilities. This indemnity is in addition to and not in lieu of any other indemnity provided to such person by the Company.

26. **Additional Information**.

Plan Name: Fluidigm Corporation 2020 Change of Control and Severance Plan

Plan Sponsor: Fluidigm Corporation
c/o General Counsel
2 Tower Place, Suite 2000
South San Francisco, CA 94080

Identification Numbers: **EIN**: 77-0513190
PLAN: 502

Plan Year: Company's fiscal year

Plan Administrator: Fluidigm Corporation
Attention: Administrator of the Fluidigm Corporation 2020 Change of Control and Severance Plan
2 Tower Place, Suite 2000
South San Francisco, CA 94080
650-266-6000

Agent for Service of Legal Process: Fluidigm Corporation
Attention: General Counsel
2020 Change of Control and Severance Plan
2 Tower Place, Suite 2000
South San Francisco, CA 94080
650-266-6000
Service of process also may be made upon the Administrator.

Type of Plan: Severance Plan/Employee Welfare Benefit Plan

Plan Costs: The cost of the Plan is paid by the Employer.

27. **Statement of ERISA Rights**.

As a Participant under the Plan, you have certain rights and protections under ERISA:

- You may examine (without charge) all Plan documents, including any amendments and copies of all documents filed with the U.S. Department of Labor. These documents are available for your review in the Company's Human Resources Department.

- You may obtain copies of all Plan documents and other Plan information upon written request to the Administrator. A reasonable charge may be made for such copies.

In addition to creating rights for Participants, ERISA imposes duties upon the people who are responsible for the operation of the Plan. The people who operate the Plan (called "***fiduciaries***") have a duty to do so prudently and in the interests of you and the other Participants. No one, including the Company or any other person, may fire you or otherwise discriminate against you in any way to prevent you from obtaining a benefit under the Plan or exercising your rights under ERISA. If your claim for payments or benefits under the Plan is denied, in whole or in part, you must receive a written explanation of the reason for the denial. You have the right to have the denial of your claim reviewed. (The claim review procedure is explained in Section 16 above.)

Under ERISA, there are steps you can take to enforce the above rights. For example, if you request materials and do not receive them within 30 days, you may file suit in a federal court. In such a case, the court may require the Administrator to provide the materials and to pay you up

to $110 a day until you receive the materials, unless the materials were not sent due to reasons beyond the control of the Administrator. If you have a claim which is denied or ignored, in whole or in part, you may file suit in a federal court. If it should happen that you are discriminated against for asserting your rights, you may seek assistance from the U.S. Department of Labor, or you may file suit in a federal court.

In any case, the court will decide who will pay court costs and legal fees. If you are successful, the court may order the person you have sued to pay these costs and fees. If you lose, the court may order you to pay these costs and fees, for example, if it finds that your claim is frivolous.

If you have any questions regarding the Plan, please contact the Administrator. If you have any questions about this statement or about your rights under ERISA, you may contact the nearest area office of the Employee Benefits Security Administration (formerly the Pension and Welfare Benefits Administration), U.S. Department of Labor, listed in your telephone directory, or the Division of Technical Assistance and Inquiries, Employee Benefits Security Administration, U.S. Department of Labor, 200 Constitution Avenue, N.W. Washington, D.C. 20210. You also may obtain certain publications about your rights and responsibilities under ERISA by calling the publications hotline of the Employee Benefits Security Administration.

Appendix A

Fluidigm Corporation 2020 Change of Control and Severance Plan
Participation Agreement

Fluidigm Corporation (the "***Company***") is pleased to inform you, S. Christopher Linthwaite, that you have been selected to participate in the Company's 2020 Change of Control and Severance Plan (the "***Plan***") as a Participant.

A copy of the Plan was delivered to you with this Participation Agreement. Your participation in the Plan is subject to all of the terms and conditions of the Plan. The capitalized terms used but not defined herein will have the meanings ascribed to them in the Plan.

In order to actually become a participant in the Plan, you must complete and sign this Participation Agreement.

Definition of "Good Reason"

"***Good Reason***" means the occurrence of one or more of the following events effected without your prior consent, provided you terminate your employment with the Company within one (1) year following the initial existence of the "Good Reason" condition (discussed below): (i) the assignment to you of any duties or the reduction of your then-current duties, either of which results in a material diminution in your then-current position or responsibilities with the Company, including a requirement that you are required to report to a corporate officer or employee instead of reporting directly to the board of directors of the Company or, if the Company becomes a subsidiary of another corporation, the board of directors of the Company's parent company; (ii) a material reduction by the Company in your then-current base salary; (iii) a material change in the geographic location at which you must perform services (for purposes of this Participation Agreement, your relocation to a facility or a location less than 25 miles from your then-present location shall not be considered a material change in geographic location); or (iv) any material breach by the Company of any material provision of this Participation Agreement. You will not resign for Good Reason without first providing the Company with written notice of the acts or omissions constituting the grounds for "Good Reason" within 90 days of the initial existence of the grounds for "Good Reason" and a reasonable cure period of not less than 30 days following the date of such notice.

Non-COC Involuntary Termination

If, outside of the Change of Control Period, you incur a Non-COC Involuntary Termination, then subject to the terms and conditions of the Plan, you will receive:

1. **Cash Severance Benefits**. An aggregate amount equal to 200% of your annual base salary in effect as of the date of your Non-COC Involuntary Termination paid in equal installments over a period of 24 months following your termination date.

2. **Continued Medical Benefits**. Payment by the Company of continued health coverage under COBRA for a period of 12 months following your termination of employment.

3. **Outplacement Services**. Outplacement services as described in Section 4.3 of the Plan.

COC Involuntary Termination

If, during the Change of Control Period, you incur a COC Involuntary Termination, then subject to the terms and conditions of the Plan, you will receive:

1. **Cash Severance Benefits**.

    a. A lump-sum payment equal to 250% of the sum of (x) your annual base salary (as in effect immediately prior to the Change of Control or your COC Involuntary Termination, whichever is greater), plus (y) the greater of (A) your annual target bonus (as in effect immediately prior to the Change of Control or your COC Involuntary Termination, whichever is greater) or (B) the average of the annual bonuses actually paid to you for the three (3) fiscal years preceding the year in which your COC Involuntary Termination occurs. For the avoidance of doubt, if you incurred a termination prior to a Change of Control that qualifies as a COC Involuntary Termination, then you will be entitled to a lump-sum payment of the amount calculated under the preceding sentence, less amounts already paid as cash Severance Benefits for a Non-COC Involuntary Termination.

    b. A lump sum amount equal to (i) your annual target bonus (as in effect immediately prior to the Change of Control or your COC Involuntary Termination, whichever is greater), multiplied by (ii) a fraction, the numerator of which is the number of days worked by you during the year in which the COC Involuntary Termination occurs and the denominator of which is 365.

2. Continued Medical Benefits. Payment by the Company of continued health coverage under COBRA (or, for any period after expiration of COBRA eligibility, reimbursement of health insurance monthly costs up the amount of the COBRA premium that would be payable if COBRA were available at such time) for a period of 30 months following your termination of employment.

3. Equity Award Vesting Acceleration. 100% of your then-outstanding and unvested Equity Awards will become vested in full. If, however, an outstanding Equity Award is to vest and/or the amount of the award to vest is to be determined based on the achievement of performance criteria, then, unless expressly otherwise provided in the applicable Equity Award agreement, the Equity Award will vest as to 100% of the “Baseline Number of Restricted Stock Units” or “Baseline Number of Performance Units” (as defined in the Company’s grant agreements) or the equivalent measure of the number of units or shares that vest at 100% of target levels of achievement under the relevant Equity Award. Except otherwise provided in the applicable Equity Award agreement, shares owed upon such vesting (and exercise if applicable) of Equity Awards will issued to you as promptly as practicable and no more than 30 days after they become issuable (whether through the vesting acceleration alone or upon an exercise of options following such vesting acceleration). Notwithstanding the foregoing, to the extent that the payment or settlement of an Equity Award is subject to Section 409A, the Equity Award will be paid or settled in a manner that will meet the requirements of Section 409A such that the payment or settlement will not be subject to the additional tax or interest applicable under Section 409A.

4. Outplacement Services. Outplacement services as described in Section 5.4 of the Plan.

Additional Benefits

In addition to the foregoing benefits, in addition to the Plan benefits described above, if, during the Change of Control Period, you incur a COC Involuntary Termination, then subject to the terms and conditions of the Plan, the Company will reimburse your reasonable attorneys' fees incurred in connection with the review of the Release and any related separation agreements and documents, up to $8,000.

Furthermore, if you incur a Non-COC Involuntary Termination or a COC Involuntary Termination, the Company will assign to you and reimburse you for payment of premiums paid by you to maintain the life insurance policy insuring your life (as referenced in your Endorsement Split-Dollar Life Insurance Agreement, dated as of September 9, 2017, with the Company) for up to 30 months following your termination of employment.

General Provisions

For clarity, any severance payments provided for herein that are based on annual base salary (and any reduction to base salary constituting "Good Reason") shall be calculated without giving effect to any temporary reduction in base salary imposed by the Company or agreed to by you in connection with any global pandemic or comparable global or U.S. emergency that threatens the Company's economic position.

In order to receive any Severance Benefits for which you otherwise become eligible under the Plan, you must sign and deliver to the Company the Release, which must have become effective and irrevocable within the requisite period set forth in the Plan.

[Remainder of This Page Intentionally Left Blank]

By your signature below, you and the Company agree that your participation in the Plan is governed by this Participation Agreement and the provisions of the Plan. Your signature below confirms that: (1) you have received a copy of the 2020 Change of Control and Severance Plan and Summary Plan Description; (2) you have carefully read this Participation Agreement and the 2020 Change of Control and Severance Plan and Summary Plan Description; (3) decisions and determinations by the Administrator under the Plan will be final and binding on you and your successors; and (4) participation in the Plan and this Participation Agreement replaces in its entirety any severance and/or change of control provisions set forth in any offer letter, employment agreement and/or Equity Award agreement, including, but not limited to, the Prior Plan and your Employment and Severance Agreement with the Company dated August 1, 2016.

FLUIDIGM CORPORATION	**PARTICIPANT**
_____	_____
Signature	Signature
_____	_____
Name	Name
_____	_____
Title	Date

Attachment: Fluidigm Corporation 2020 Change of Control and Severance Plan and Summary Plan Description

[Signature Page to the Participation Agreement]

Executive Leadership Team Members

Appendix A

Fluidigm Corporation 2020 Change of Control and Severance Plan
Participation Agreement

Fluidigm Corporation (the "***Company***") is pleased to inform you that you have been selected to participate in the Company's 2020 Change of Control and Severance Plan (the "***Plan***") as a Participant.

A copy of the Plan was delivered to you with this Participation Agreement. Your participation in the Plan is subject to all of the terms and conditions of the Plan. The capitalized terms used but not defined herein will have the meanings ascribed to them in the Plan.

In order to actually become a participant in the Plan, you must complete and sign this Participation Agreement.

Definition of "Good Reason"

"***Good Reason***" means the occurrence of one or more of the following events effected without your prior consent, provided you terminate your employment with the Company within one (1) year following the initial existence of the "Good Reason" condition (discussed below): (i) the assignment to you of any duties or the reduction of your then-current duties, either of which results in a material diminution in your then-current position or responsibilities with the Company including, without limitation, any negative change in reporting hierarchy involving you or the person to whom you directly report; (ii) a material reduction by the Company in your then-current base salary; (iii) a material change in the geographic location at which you must perform services (for purposes of this Participation Agreement, your relocation to a facility or a location less than 25 miles from your then-present location shall not be considered a material change in geographic location); or (iv) any material breach by the Company of any material provision of this Participation Agreement. You will not resign for Good Reason without first providing the Company with written notice of the acts or omissions constituting the grounds for "Good Reason" within 90 days of the initial existence of the grounds for "Good Reason" and a reasonable cure period of not less than 30 days following the date of such notice.

Non-COC Involuntary Termination

If, outside of the Change of Control Period, you incur a Non-COC Involuntary Termination, then subject to the terms and conditions of the Plan, you will receive:

1. Cash Severance Benefits. An aggregate amount equal to 75% of your annual base salary in effect as of the date of your Non-COC Involuntary Termination paid in equal installments over a period of nine (9) months following your termination date.

2. Continued Medical Benefits. Payment by the Company of continued health coverage under COBRA for a period of nine (9) months following your termination of employment. Notwithstanding the foregoing, if you are not employed in the United States, the benefit under this paragraph will be a regional equivalent to COBRA determined by the Administrator in its sole discretion.

3. **Outplacement Services**. Outplacement services as described in Section 4.3 of the Plan.

COC Involuntary Termination

If, during the Change of Control Period, you incur a COC Involuntary Termination, then subject to the terms and conditions of the Plan, you will receive:

1. **Cash Severance Benefits**.

   a. A lump-sum payment equal to 150% of the sum of (x) your annual base salary (as in effect immediately prior to the Change of Control or your COC Involuntary Termination, whichever is greater), plus (y) the greater of (A) your annual target bonus (as in effect immediately prior to the Change of Control or your COC Involuntary Termination, whichever is greater) or (B) the average of the annual bonuses actually paid to you for the three (3) fiscal years preceding the year in which your COC Involuntary Termination occurs. For the avoidance of doubt, if you incurred a termination prior to a Change of Control that qualifies as a COC Involuntary Termination, then you will be entitled to a lump-sum payment of the amount calculated under the preceding sentence, less amounts already paid as cash Severance Benefits for a Non-COC Involuntary Termination.

   b. A lump sum amount equal to (i) your annual target bonus (as in effect immediately prior to the Change of Control or your COC Involuntary Termination, whichever is greater), multiplied by (ii) a fraction, the numerator of which is the number of days worked by you during the year in which the COC Involuntary Termination occurs and the denominator of which is 365.

2. **Continued Medical Benefits**. Payment by the Company of continued health coverage under COBRA for a period of 18 months following your termination of employment. Notwithstanding the foregoing, if you are not employed in the United States, the benefit under this paragraph will be a regional equivalent to COBRA determined by the Administrator in its sole discretion.

3. **Equity Award Vesting Acceleration**. 100% of your then-outstanding and unvested Equity Awards will become vested in full. If, however, an outstanding Equity Award is to vest and/or the amount of the award to vest is to be determined based on the achievement of performance criteria, then, unless expressly otherwise provided in the applicable Equity Award agreement, the Equity Award will vest as to 100% of the "Baseline Number of Restricted Stock Units" or "Baseline Number of Performance Units" (as defined in the Company's grant agreements) or the equivalent measure of the number of units or shares that vest at 100% of target levels of achievement under the relevant Equity Award. Except otherwise provided in the applicable Equity Award agreement, shares owed upon such vesting (and exercise if applicable) of Equity Awards will issued to you as promptly as practicable and no more than 30 days after they become issuable (whether through the vesting acceleration alone or upon an exercise of options following such vesting acceleration). Notwithstanding the foregoing, to the extent that the payment or settlement of an Equity Award is subject to Section 409A, the Equity Award will be paid or settled in a manner that will meet the requirements of Section 409A such that the payment or settlement will not be subject to the additional tax or interest applicable under Section 409A.

4. **Outplacement Services**. Outplacement services as described in Section 5.4 of the Plan.

Additional Benefits

In addition to the foregoing benefits, in addition to the Plan benefits described above, if, during the Change of Control Period, you incur a COC Involuntary Termination, then subject to the terms and conditions of the Plan, the Company will reimburse your reasonable attorneys' fees incurred in connection with the review of the Release and any related separation agreements and documents, up to $5,000.

General Provisions

For clarity, any severance payments provided for herein that are based on annual base salary (and any reduction to base salary constituting "Good Reason") shall be calculated without giving effect to any temporary reduction in base salary imposed by the Company or agreed to by you in connection with any global pandemic or comparable global or U.S. emergency that threatens the Company's economic position.

In order to receive any Severance Benefits for which you otherwise become eligible under the Plan, you must sign and deliver to the Company the Release, which must have become effective and irrevocable within the requisite period set forth in the Plan.

[Remainder of This Page Intentionally Left Blank]

By your signature below, you and the Company agree that your participation in the Plan is governed by this Participation Agreement and the provisions of the Plan. Your signature below confirms that: (1) you have received a copy of the 2020 Change of Control and Severance Plan and Summary Plan Description; (2) you have carefully read this Participation Agreement and the 2020 Change of Control and Severance Plan and Summary Plan Description; (3) decisions and determinations by the Administrator under the Plan will be final and binding on you and your successors; and (4) participation in the Plan and this Participation Agreement replaces in its entirety any severance and/or change of control provisions set forth in any offer letter, employment agreement and/or Equity Award agreement, including, but not limited to, the Prior Plan.

FLUIDIGM CORPORATION	**PARTICIPANT**
_____	_____
Signature	Signature
_____	_____
Name	Name
_____	_____
Title	Date

Attachment: Fluidigm Corporation 2020 Change of Control and Severance Plan and Summary Plan Description

[Signature Page to the Participation Agreement]

Appendix B

Fluidigm Corporation 2020 Change of Control and Severance Plan
Form of Release

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 quarterly report on Form 10-Q 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: August 7, 2020

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 quarterly report on Form 10-Q 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: August 7, 2020

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 Quarterly Report on Form 10-Q for the quarter ended June 30, 2020 (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: August 7, 2020

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 Quarterly Report on Form 10-Q for the quarter year ended June 30, 2020 (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: August 7, 2020

By: /s/ Vikram Jog
Vikram Jog
Chief Financial Officer