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 March 31, 2021

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 000-30941

AXCELIS TECHNOLOGIES, INC.
(Exact name of registrant as specified in its charter)

Delaware	**34-1818596**
(State or other jurisdiction of incorporation or organization)	(IRS Employer Identification No.)

108 Cherry Hill Drive
Beverly, Massachusetts 01915
(Address of principal executive offices, including zip code)

(978) 787-4000
(Registrant's telephone number, including area code)

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

Title of each class	Trading symbol	Name of each exchange on which registered
Common Stock, $0.001 par value	ACLS	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 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, 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 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 Exchange Act) Yes ☐ No ☒

As of May 3, 2021 there were 33,599,897 shares of the registrant's common stock outstanding.

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PART 1—FINANCIAL INFORMATION

Item 1. Financial Statements.

Axcelis Technologies, Inc.
Consolidated Statements of Operations
(In thousands, except per share amounts)
(Unaudited)

	Three months ended March 31, 2021	Three months ended March 31, 2020
Revenue:		
Product	$ 126,609	$ 112,133
Services	6,167	6,858
Total revenue	132,776	118,991
Cost of revenue:		
Product	70,334	67,172
Services	6,007	6,270
Total cost of revenue	76,341	73,442
Gross profit	56,435	45,549
Operating expenses:		
Research and development	15,685	14,606
Sales and marketing	10,387	8,204
General and administrative	10,013	9,036
Total operating expenses	36,085	31,846
Income from operations	20,350	13,703
Other (expense) income:		
Interest income	33	482
Interest expense	(1,029)	(1,303)
Other, net	(1,153)	(620)
Total other expense	(2,149)	(1,441)
Income before income taxes	18,201	12,262
Income tax provision	1,721	1,041
Net income	$ 16,480	$ 11,221
Net income per share:		
Basic	$ 0.49	$ 0.34
Diluted	$ 0.48	$ 0.33
Shares used in computing net income per share:		
Basic weighted average common shares	33,715	32,872
Diluted weighted average common shares	34,643	34,057

See accompanying Notes to these Consolidated Financial Statements

Axcelis Technologies, Inc.
Consolidated Statements of Comprehensive Income
(In thousands)
(Unaudited)

	Three months ended March 31,	
	2021	**2020**
Net income	$ 16,480	$ 11,221
Other comprehensive loss:		
Foreign currency translation adjustments	(1,372)	(1,112)
Amortization of actuarial loss and other adjustments from pension plan, net of tax	20	57
Total other comprehensive loss	(1,352)	(1,055)
Comprehensive income	$ 15,128	$ 10,166

See accompanying Notes to these Consolidated Financial Statements

Axcelis Technologies, Inc.
Consolidated Balance Sheets
(In thousands, except per share amounts)
(Unaudited)

	March 31, 2021	December 31, 2020
ASSETS		
Current assets:		
Cash and cash equivalents	$ 206,766	$ 203,479
Accounts receivable, net	75,932	86,865
Inventories, net	174,381	161,076
Prepaid expenses and other current assets	22,513	19,371
Total current assets	479,592	470,791
Property, plant and equipment, net	30,459	29,840
Operating lease assets	4,213	4,542
Finance lease assets, net	20,216	20,544
Long-term restricted cash	753	753
Deferred income taxes	54,936	57,851
Other assets	39,123	40,303
Total assets	$ 629,292	$ 624,624
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 40,476	$ 24,013
Accrued compensation	8,573	24,562
Warranty	4,181	4,280
Income taxes	648	654
Deferred revenue	20,417	21,221
Current portion of finance lease obligation	809	756
Other current liabilities	8,774	8,945
Total current liabilities	83,878	84,431
Long-term finance lease obligation	47,167	47,393
Long-term deferred revenue	1,725	1,837
Other long-term liabilities	8,862	9,361
Total liabilities	141,632	143,022
Commitments and contingencies (Note 16)		
Stockholders' equity:		
Common stock, $0.001 par value, 75,000 shares authorized; 33,679 shares issued and outstanding at March 31, 2021; 33,633 shares issued and outstanding at December 31, 2020	34	34
Additional paid-in capital	567,199	570,102
Accumulated deficit	(81,656)	(91,969)
Accumulated other comprehensive income	2,083	3,435
Total stockholders' equity	487,660	481,602
Total liabilities and stockholders' equity	$ 629,292	$ 624,624

See accompanying Notes to these Consolidated Financial Statements

Axcelis Technologies, Inc.
Consolidated Statements of Stockholders' Equity
(In thousands)
(Unaudited)

	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (Loss)	Total Stockholders' Equity
Balance at December 31, 2019	32,585	$ 33	$ 559,878	$ (140,226)	$ (258)	$ 419,427
Net income	—	—	—	11,221	—	11,221
Foreign currency translation adjustments	—	—	—	—	(1,112)	(1,112)
Change in pension obligation	—	—	—	—	57	57
Exercise of stock options	540	1	4,498	—	—	4,499
Issuance of shares under Employee Stock Purchase Plan	1	—	19	—	—	19
Issuance of restricted common shares, net of shares withheld	69	—	(1,162)	—	—	(1,162)
Stock-based compensation expense	—	—	1,724	—	—	1,724
Repurchase of common stock	(358)	(1)	(5,775)	(1,725)	—	(7,501)
Balance at March 31, 2020	32,837	$ 33	$ 559,182	$ (130,730)	$ (1,313)	$ 427,172

	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (Loss)	Total Stockholders' Equity
Balance at December 31, 2020	33,633	$ 34	$ 570,102	$ (91,969)	$ 3,435	$ 481,602
Net income	—	—	—	16,480	—	16,480
Foreign currency translation adjustments	—	—	—	—	(1,372)	(1,372)
Change in pension obligation	—	—	—	—	20	20
Exercise of stock options	268	—	2,512	—		2,512
Issuance of restricted common shares, net of shares withheld	81	—	(2,354)	—	—	(2,354)
Stock-based compensation expense	—	—	2,407	—	—	2,407
Repurchase of common stock	(303)	—	(5,468)	(6,167)	—	(11,635)
Balance at March 31, 2021	33,679	$ 34	$ 567,199	$ (81,656)	$ 2,083	$ 487,660

See accompanying Notes to these Consolidated Financial Statements

Axcelis Technologies, Inc.
Consolidated Statements of Cash Flows
(In thousands)
(Unaudited)

	Three months ended March 31, 2021	Three months ended March 31, 2020
Cash flows from operating activities		
Net income	$ 16,480	$ 11,221
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	2,645	2,363
Deferred income taxes	1,613	899
Stock-based compensation expense	2,407	1,724
Provision for excess and obsolete inventory	984	802
Changes in operating assets and liabilities:		
Accounts receivable	10,431	19,223
Inventories	(16,503)	1,924
Prepaid expenses and other current assets	(3,325)	(4,435)
Accounts payable and other current liabilities	(1,008)	1,689
Deferred revenue	(909)	4,859
Income taxes	2	53
Other assets and liabilities	2,281	(645)
Net cash provided by operating activities	15,098	39,677
Cash flows from investing activities		
Expenditures for property, plant and equipment and capitalized software	(1,347)	(1,290)
Net cash used in investing activities	(1,347)	(1,290)
Cash flows from financing activities		
Net settlement on restricted stock grants	(2,354)	(1,162)
Repurchase of common stock	(11,635)	(7,501)
Proceeds from Employee Stock Purchase Plan	—	19
Principal payments on finance lease obligation	(175)	—
Proceeds from exercise of stock options	2,512	4,499
Net cash used in financing activities	(11,652)	(4,145)
Effect of exchange rate changes on cash and cash equivalents	1,188	640
Net increase in cash, cash equivalents and restricted cash	3,287	34,882
Cash, cash equivalents and restricted cash at beginning of period	204,232	146,534
Cash, cash equivalents and restricted cash at end of period	$ 207,519	$ 181,416

See accompanying Notes to these Consolidated Financial Statements

Axcelis Technologies, Inc.
Notes to Consolidated Financial Statements (Unaudited)

Note 1. Nature of Business

Axcelis Technologies, Inc. (“Axcelis” or the “Company”) was incorporated in Delaware in 1995, and is a producer of ion implantation equipment used in the fabrication of semiconductor chips in the United States, Europe and Asia. In addition, we provide extensive worldwide aftermarket service and support, including spare parts, equipment upgrades, used equipment and maintenance services to the semiconductor industry.

The accompanying unaudited consolidated financial statements have been prepared in accordance with U.S. generally accepted accounting principles for interim financial information and with the instructions to Form 10-Q and Article 10 of Regulation S-X. Accordingly, they do not include all of the information and footnotes required by generally accepted accounting principles for complete financial statements. In the opinion of management, all adjustments which are of a normal recurring nature and considered necessary for a fair presentation of these financial statements have been included. Operating results for the interim periods presented are not necessarily indicative of the results that may be expected for other interim periods or for the year as a whole.

The balance sheet at December 31, 2020 has been derived from the audited consolidated financial statements at that date but does not include all of the information and footnotes required by generally accepted accounting principles for complete financial statements. For further information, refer to the consolidated financial statements and footnotes thereto included in Axcelis Technologies, Inc.’s Annual Report on Form 10-K for the year ended December 31, 2020.

Note 2. Stock-Based Compensation

We maintain the Axcelis Technologies, Inc. 2012 Equity Incentive Plan, as amended (the “2012 Equity Plan”), which became effective on May 2, 2012, and permits the issuance of options, restricted stock, restricted stock units (“RSUs”) and performance awards to selected employees, directors and consultants of the Company. Our 2000 Stock Plan (the “2000 Stock Plan”) expired on May 1, 2012 and no new grants may be made under that plan after that date. However, unexpired options granted under the 2000 Stock Plan, which have a 10-year term, remain outstanding and subject to the terms of the 2000 Stock Plan. We also maintain the Axcelis Technologies, Inc. 2020 Employee Stock Purchase Plan (the “2020 ESPP”), an Internal Revenue Code Section 423 plan.

The 2012 Equity Plan is more fully described in Note 13 to the consolidated financial statements in our Annual Report on Form 10-K for the year ended December 31, 2020.

We recognized stock-based compensation expense of $2.4 million and $1.7 million for the three-month periods ended March 31, 2021 and 2020, respectively. These amounts include compensation expense related to RSUs and non-qualified stock options.

In the three-month periods ended March 31, 2021 and 2020, we issued 0.3 million and 0.6 million shares of common stock, respectively, upon stock option exercises and vesting of RSUs. In the three-month periods ended March 31, 2021 and 2020, we received proceeds of $2.5 million and $4.5 million, respectively, in connection with the exercise of stock options.

Note 3. Leases

We have operating leases for office space, warehouse space, computer and office equipment and vehicles used in our business operations. We have a finance lease as a result of the 2015 sale-leaseback of our corporate headquarters in Beverly, Massachusetts. All new agreements are reviewed to determine if they contain a lease component. A lease is a contract or part of a contract that conveys the right to control the use of identified property, plant or equipment for a period of time in exchange for consideration. We recognize the lease obligation on a discounted basis using the explicit or implicit discount rate stated within the agreement. We recognize a corresponding right-of-use asset, which is initially determined based upon the net present value of the associated liability and is adjusted for deferred costs and possible impairment, if any. For those lease agreements that do not indicate the applicable discount rate, we use our incremental borrowing rate. We have made the following policy elections: (i) operating leases with an initial term of 12 months or less are not recorded on the consolidated balance sheet; (ii) we recognize lease expense for operating leases on a straight-line basis over the lease term; and (iii) we account for lease components and non-lease components that are fixed payments as one component. Some of our operating leases include one or more options to renew, with renewal terms that can extend the respective lease term 1 to 3 years. The exercise of lease renewal options are at our sole discretion. For lease extensions that are reasonably certain to occur, we have included these renewal periods in our calculation of the net present value of the lease obligation and related right-of-use asset. Certain leases also include options to purchase the leased property. The depreciable life of certain assets and leasehold improvements is limited by the expected lease term, unless there is a transfer of title or purchase option reasonably certain of exercise. Our lease agreements do not contain any material residual value guarantees or material restrictive covenants. The amounts of operating and finance lease right-of-use assets and related lease obligations recorded within our consolidated balance sheets are as follows:

Leases	Classification	March 31, 2021	December 31, 2020
Assets		**(in thousands)**	
Operating leases	Operating lease assets	$ 4,213	$ 4,542
Finance lease	Finance lease assets *	20,216	20,544
Total leased assets		$ 24,429	$ 25,086
Liabilities			
Current			
Operating	Other current liabilities	$ 2,387	$ 2,573
Finance	Current portion of finance lease obligation	809	756
Noncurrent			
Operating	Other long-term liabilities	1,812	1,949
Finance	Finance lease obligation	47,167	47,393
Total lease liabilities		$ 52,175	$ 52,671

* Finance lease assets are recorded net of accumulated depreciation of $48.7 million and include $0.7 million of prepaid financing costs as of March 31, 2021. Finance lease assets are recorded net of accumulated depreciation of $48.4 million and include $0.7 million of prepaid financing costs as of December 31, 2020.

All of our operating lease office locations support selling and servicing functions. Operating lease expense, and depreciation and interest expense relating to our finance lease obligation, are recognized within our consolidated statement of operations for the three months ended March 31, 2021 and 2020 as follows:

Lease cost	Classification	Three months ended March 31, 2021	2020
		(in thousands)	
Operating lease cost			
Service	Cost of revenue	$ 639	$ 550
Research and development	Operating expenses	130	81
Sales and marketing*	Operating expenses	378	332
General and administrative*	Operating expenses	260	215
Total operating lease cost		$ 1,407	$ 1,178
Finance lease cost			
Depreciation of leased assets	Cost of revenue, R&D, Sales and marketing and G&A	$ 328	$ 353
Interest on lease liabilities	Interest expense	1,279	1,303
Total finance lease cost		$ 1,607	$ 1,656
Total lease cost		$ 3,014	$ 2,834

* Sales and marketing and general and administrative expense also includes short-term lease and variable lease costs of approximately $0.4 million and $0.2 million for the three months ended March 31, 2021 and 2020, respectively.

Our corporate headquarters, shown below under finance leases, has an original lease term of 22 years. All other locations are treated as operating leases, with lease terms ranging from 1 to 10 years. The tables below reflect the minimum cash outflow regarding our current lease obligations as well as the weighted-average remaining lease term and weighted-average discount rates used in our calculation of our lease obligations and right-of-use assets as of March 31, 2021:

Maturity of Lease Liabilities	Finance Leases	Operating Leases	Total Leases
		(in thousands)	
2021	$ 4,394	$ 2,129	$ 6,523
2022	5,980	1,673	7,653
2023	6,114	534	6,648
2024	6,252	126	6,378
2025	5,930	74	6,004
Thereafter	73,723	145	73,868
Total lease payments	$ 102,393	$ 4,681	$ 107,074
Less interest portion*	(54,417)	(482)	(54,899)
Finance lease and operating lease obligations	$ 47,976	$ 4,199	$ 52,175

* Finance lease interest calculated using the implied interest rate; operating lease interest calculated using estimated corporate borrowing rate.

Lease term and discount rate	March 31, 2021
Weighted-average remaining lease term (years):	
Operating leases	2.3
Finance leases	15.8
Weighted-average discount rate:	
Operating leases	4.5%
Finance leases	10.5%

Our cash outflows from our operating leases include rent expense and other charges associated with these leases. These cash flows are included within the operating activities section of our statement of cash flows. Our cash flows from our finance lease include both an interest component and payment of principal component. The table below shows our cash outflows, by lease type and related section of our statement of cash flows, as well as the non-cash amount capitalized on our balance sheet in relation to our operating lease right-of-use assets for the three months ending March 31, 2021 and 2020, respectively:

Cash paid for amounts included in the measurement of lease liabilities	Three months ended March 31, 2021	Three months ended March 31, 2020
	(in thousands)	
Operating cash outflows from operating leases	$ 1,407	$ 1,178
Operating cash outflows from finance leases	1,279	1,422
Financing cash outflows from finance leases	175	—
Operating lease assets obtained in exchange for operating lease liabilities	791	765
Finance lease assets obtained in exchange for new finance lease liabilities	$ —	$ —

Note 4. Revenue

To reflect the organization of our business operations, we divide revenue into two categories: revenue from sales of new systems and revenue arising from the sale of used systems, parts and labor to customers who own systems, which we refer to as “Aftermarket.”

Revenue by categories used by management are as follows:

	Three months ended March 31, 2021	Three months ended March 31, 2020
	(in thousands)	
Systems	$ 80,991	$ 82,338
Aftermarket	51,785	36,653
Total Revenue	$ 132,776	$ 118,991

We also consider revenue by geography. Revenue is allocated to geographic markets based upon the location to which our products are shipped and in which our services are performed. Revenue in our principal geographic markets is as follows:

	Three months ended March 31, 2021	Three months ended March 31, 2020
	(in thousands)	
North America	$ 9,508	$ 10,661
Asia Pacific	103,391	96,828
Europe	19,877	11,502
Total Revenue	$ 132,776	$ 118,991

Our system sales revenue transactions give rise to contract liabilities (in the case of pre-payments and the fair value of goods and services to be delivered after the system delivery, such as installation and certain warranty obligations).

Contract liabilities are as follows:

	March 31, 2021	December 31, 2020
	(in thousands)	
Contract liabilities	$ 22,142	$ 23,058

Contract liabilities are reflected as deferred revenue on the consolidated balance sheet and relate to payments invoiced or received in advance of completion of performance obligations under a contract. Contract liabilities are recognized as revenue upon the fulfillment of performance obligations.

	Three months ended March 31,	
	2021	2020
	(in thousands)	
Balance, beginning of the period	$ 23,058	$ 29,251
Deferral of revenue	11,264	9,799
Recognition of deferred revenue	(12,180)	(4,944)
Balance, end of the period	$ 22,142	$ 34,106

The majority of our system transactions have payment terms of 90% due upon shipment of the tool and 10% due upon acceptance. Aftermarket transaction payment terms usually provide that payment is due either within 30 or 60 days after the service is provided or parts delivered.

Note 5. Receivables and Allowances for Credit Losses

All trade receivables are reported on the Consolidated Balance Sheets at their amortized cost adjusted for any write-offs and net of allowances for credit losses.

Axcelis maintains an allowance for credit losses, which represent an estimate of expected losses over the remaining contractual life of its receivables considering current market conditions and estimates for supportable forecasts when appropriate. The estimate is a result of the Company's ongoing assessments and evaluations of collectability, historical loss experience, and future expectations in estimating credit losses in its receivable portfolio. Axcelis uses historical loss experience rates and applies them to a related aging analysis while also considering customer and/or economic risk where appropriate. Determination of the proper amount of allowances requires management to exercise judgment about the timing, frequency and severity of credit losses that could materially affect the provision for credit losses and, as a result, net earnings. The allowance takes into consideration numerous quantitative and qualitative factors that include receivable type, historical loss experience, loss migration, delinquency trends, collection experience, current economic conditions, estimates for supportable forecasts, when appropriate, and credit risk characteristics.

Axcelis evaluates the credit risk of the customer when extending credit based on a combination of various financial and qualitative factors that may affect its customers' ability to pay. These factors may include the customer's financial condition, past payment experience, and credit bureau report, as well as the value of the underlying collateral.

Management performs detailed reviews of Axcelis' receivables on a quarterly basis to assess the adequacy of the allowances and to determine if any impairment has occurred. Amounts determined to be uncollectable are charged directly against the allowances, while amounts recovered on previously written-off accounts increase the allowances. Changes to the allowances for credit losses are maintained through adjustments to the provision for credit losses, which are charged to current period earnings.

The following table shows changes of the allowances for credit losses related to trade receivables for the three months ended March 31, 2021 and 2020, respectively:

	Three months ended March 31, 2021	Three months ended March 31, 2020
	(in thousands)	
Balance, beginning of period	$ —	$ 818
Provision for credit losses	—	—
Charge-offs	—	(818)
Recoveries	—	—
Balance, end of period	$ —	$ —

Note 6. Computation of Net Earnings per Share

Basic earnings per share is computed by dividing income available to common stockholders (the numerator) by the weighted-average number of common shares outstanding (the denominator) for the period. The computation of diluted earnings per share is similar to basic earnings per share, except that the denominator is increased by the number of additional common shares that would have been outstanding if the potentially dilutive common shares issuable on exercise of stock options and vesting of RSUs had been issued, calculated using the treasury stock method.

The components of net earnings per share are as follows:

	Three months ended March 31, 2021	Three months ended March 31, 2020
Net income available to common stockholders	$ 16,480	$ 11,221
Weighted average common shares outstanding used in computing basic income per share	33,715	32,872
Incremental options and RSUs	928	1,185
Weighted average common shares used in computing diluted net income per share	34,643	34,057
Net income per share		
Basic	$ 0.49	$ 0.34
Diluted	$ 0.48	$ 0.33

Diluted weighted average common shares outstanding does not include 1,429 and 1,675 common equivalent shares issuable with respect to outstanding equity awards for the three-month periods ended March 31, 2021 and 2020, respectively, as their effect would have been anti-dilutive.

Note 7. Accumulated Other Comprehensive Income

The following table presents the changes in accumulated other comprehensive income, net of tax, by component, for the three months ended March 31, 2021:

	Foreign currency	Defined benefit pension plan	Total
		(in thousands)	
Balance at December 31, 2020	$ 3,945	$ (510)	$ 3,435
Other comprehensive loss and pension reclassification	(1,372)	20	(1,352)
Balance at March 31, 2021	$ 2,573	$ (490)	$ 2,083

Note 8. Cash, cash equivalents and restricted cash

The following table provides a reconciliation of cash, cash equivalents, and restricted cash reported within the consolidated balance sheets to the total of the amounts shown in the statement of cash flows:

	March 31, 2021	December 31, 2020
	(in thousands)	
Cash and cash equivalents	$ 206,766	$ 203,479
Long-term restricted cash	753	753
Total cash, cash equivalents and restricted cash	$ 207,519	$ 204,232

As of March 31, 2021, we had $0.8 million in restricted cash representing the total of (i) cash collateral for a $0.7 million letter of credit relating to workers' compensation insurance and (ii) a $0.1 million deposit relating to customs activity.

Note 9. Inventories, net

The components of inventories are as follows:

	March 31, 2021	December 31, 2020
	(in thousands)	
Raw materials	$ 100,634	$ 100,254
Work in process	34,283	33,867
Finished goods (completed systems)	39,464	26,955
Inventories, net	$ 174,381	$ 161,076

When recorded, inventory reserves reduce the carrying value of inventories to their net realizable value. We establish inventory reserves when conditions exist that indicate inventory may be in excess of anticipated demand or is obsolete based upon assumptions about future demand for the Company's products or market conditions. We regularly evaluate the ability to realize the value of inventories based on a combination of factors including the following: forecasted sales or usage, estimated product end of life dates, estimated current and future market value and new product introductions. Purchasing and usage alternatives are also explored to mitigate inventory exposure.

Note 10. Product Warranty

We generally offer a one-year warranty for all of our systems, the terms and conditions of which vary depending upon the product sold. For all systems sold, we accrue a liability for the estimated cost of standard warranty at the time of system shipment and defer the portion of systems revenue attributable to the fair value of non-standard warranty. Costs for non-standard warranty are expensed as incurred. Factors that affect our warranty liability include the number of installed units, historical and anticipated product failure rates, material usage and service labor costs. We periodically assess the adequacy of our recorded liability and adjust the amount as necessary.

The changes in our standard product warranty liability are as follows:

	Three months ended March 31, 2021	2020
	(in thousands)	
Balance at January 1 (beginning of year)	$ 4,612	$ 3,244
Warranties issued during the period	1,288	1,385
Settlements made during the period	(968)	(950)
Changes in estimate of liability for pre-existing warranties during the period	(192)	126
Balance at March 31 (end of period)	$ 4,740	$ 3,805
Amount classified as current	$ 4,181	$ 3,431
Amount classified as long-term	559	374
Total warranty liability	$ 4,740	$ 3,805

Note 11. Fair Value Measurements

Certain assets on our balance sheets are reported at their fair value. Fair value is defined as the price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date.

(a) Fair Value Hierarchy

The accounting guidance for fair value measurement requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The standard establishes a fair value hierarchy based on the level of independent, objective evidence surrounding the inputs used to measure fair value. A financial instrument's categorization within the fair value hierarchy is based upon the lowest level of input that is significant to the fair value measurement. The fair value hierarchy is as follows:

Level 1 - applies to assets or liabilities for which there are quoted prices in active markets for identical assets or liabilities.

Level 2 - applies to assets or liabilities for which there are inputs other than quoted prices that are observable for the asset or liability, such as quoted prices for similar assets or liabilities in active markets; quoted prices for identical assets or liabilities in markets with insufficient volume or infrequent transactions (less active markets); or model-derived valuations in which significant inputs are observable or can be derived principally from, or corroborated by, observable market data.

Level 3 - applies to assets or liabilities for which there are unobservable inputs to the valuation methodology that are significant to the measurement of the fair value of the assets or liabilities.

(b) Fair Value Measurements

Our money market funds and short-term investments are included in cash and cash equivalents in the consolidated balance sheets.

The following table sets forth our assets by level within the fair value hierarchy:

	March 31, 2021 Fair Value Measurements			
	Level 1	Level 2	Level 3	Total
	(in thousands)			
Assets				
Cash equivalents:				
Money market funds, U.S. Government Securities and Agency Investments	$ 174,752	$ —	$ —	$ 174,752

	December 31, 2020 Fair Value Measurements			
	Level 1	Level 2	Level 3	Total
	(in thousands)			
Assets				
Cash equivalents:				
Money market funds, U.S. Government Securities and Agency Investments	$ 172,119	$ —	$ —	$ 172,119

(c) Other Financial Instruments

The carrying amounts reflected in the consolidated balance sheets for accounts receivable, prepaid expenses and other current assets and non-current assets, restricted cash, accounts payable and accrued expenses approximate fair value due to their short-term maturities.

Note 12. Financing Arrangements

On January 30, 2015, we sold our corporate headquarters facility in Beverly, Massachusetts for $48.9 million. As part of the sale, we also entered into a 22-year lease agreement of our headquarters facility. This sale-leaseback is accounted for as a financing lease under generally accepted accounting principles and, as such, we have recorded a financing obligation of $48.0 million as of March 31, 2021. The associated lease payments include both an interest component and payment of principal, with the remaining liability being extinguished at the end of the original lease term. We posted a security deposit of $5.9 million in the form of an irrevocable letter of credit at the time of the closing. This letter of credit reduces our availability under our credit facility, as described in the next paragraph.

On July 31, 2020, we entered into a Senior Secured Credit Facilities Credit Agreement (the “Credit Agreement”) with Silicon Valley Bank, in its capacity as administrative agent and collateral agent for itself and as a lender, and such other banks and financial institutions or entities that from time to time join as lenders under the Credit Agreement. The Credit Agreement provides for a revolving credit facility in an aggregate principal amount not to exceed $40.0 million. Our obligations under the Credit Agreement are secured by a security interest, senior to any current and future debts and to any security interest, in all of our rights, title, and interest in, to and under substantially all of our assets, subject to limited exceptions, including permitted liens. The revolving credit facility terminates on July 31, 2023. As of March 31, 2021, we were in compliance with all covenant requirements of the Credit Agreement. As of such date, no borrowings had been made under the Credit Agreement, although a letter of credit for $5.9 million, previously issued by Silicon Valley Bank, had been rolled under the Credit Agreement, reducing the funds available for borrowing under the credit line. We entered into a First Amendment to the Credit Agreement with Silicon Valley Bank in March 2021 to (i) align the covenants with our 2021 stock repurchase program, and (ii) establish terms to transition from a Eurodollar based interest rate option to an interest rate benchmark using a secured overnight financing rate (known as “SOFR”) published by the Federal Reserve Bank of New York.

Note 13. Income Taxes

Income tax expense was $1.7 million for the three months ended March 31, 2021, compared to $1.0 million for the three months ended March 31, 2020. The $0.7 million increase was primarily due to a $6.0 million increase in pretax income partially offset by a tax benefit of $0.2 million due to the expiration of a statute of limitations on an uncertain tax position. The effective tax rate for the three months ended March 31, 2021 and 2020, respectively, was less than the U.S. statutory rate of 21% due to favorable discrete items related to equity compensation in those periods and Federal research and development tax credits that reduce the annual tax rate.

We had $54.9 million and $57.9 million of net deferred tax assets worldwide relating to net operating loss carryforwards, tax credit carryforwards and other temporary differences, as of March 31, 2021 and December 31, 2020, respectively. These deferred tax assets are available to reduce income taxes in future years. We have a $9.1 million valuation allowance in the U.S. against certain tax credits and state net operating losses due to the uncertainty of their realization based on long-term Company forecasts and the expiration dates on these tax assets. If future operating results of the Company within the U.S. or these foreign jurisdictions are significantly less than our expectations, it is reasonably possible that we would be required to record an additional valuation allowance on our deferred tax assets in the future.

Note 14. Concentration of Risk

For the three months ended March 31, 2021, one customer accounted for 29.6% of total revenue. For the three months ended March 31, 2020, four customers accounted for 20.9%, 16.9%, 14.6% and 10.7% of total revenue, respectively.

At March 31, 2021, one customer accounted for 19.8% of accounts receivable. At December 31, 2020, two customers accounted for 23.8% and 11.9% of accounts receivable, respectively.

Note 15. Share Repurchase

In December 2020, our Board of Directors approved stock repurchases of up to $100 million of our common stock through the end of 2021. During the three months ended March 31, 2021, we purchased 0.3 million shares at an average cost of $38.41 per share. The timing and actual number of shares repurchased under this program will depend on various factors including price, corporate and regulatory requirements, alternative investment opportunities and other market conditions.

Shares repurchased by us are accounted for when the transaction is settled. There were 22,160 unsettled share repurchases totaling approximately $0.9 million at March 31, 2021. Shares repurchased and retired are deducted from common stock for par value and from additional paid-in capital for the excess over par value. If additional paid-in capital has been exhausted, the excess over par value is deducted from retained earnings. Direct costs incurred to acquire the shares are included in the total cost of the shares.

Note 16. Contingencies

(a) Litigation

We are from time to time a party to litigation that arises in the normal course of our business operations. We are not presently a party to any litigation that we believe might have a material adverse effect on our business operations.

(b) Indemnifications

Our system sales agreements typically include provisions under which we agree to take certain actions, provide certain remedies and defend our customers against third-party claims of intellectual property infringement under specified conditions and indemnify customers against any damage and costs awarded in connection with such claims. We have not incurred any material costs as a result of such indemnifications and have not accrued any liabilities related to such obligations in the accompanying consolidated financial statements.

Note 17. Recent Accounting Guidance

i. Accounting Standards Update 2019-12 Income Taxes (Topic 740)

We adopted Financial Accounting Standards Board ASU No. 2019-12 “*Income Taxes (Topic 740)*” as of January 1, 2021 on a prospective basis. The amendments in this ASU simplify the accounting for income taxes by removing certain exceptions from the previous standard as well as requiring entities to include franchise tax partially based on income as an income based tax and to account for an enacted change in tax laws or rates in the annual effective tax rate computation in the interim period that includes the enactment date. The guidance in ASU 2019-12 is required for annual reporting periods beginning after December 15, 2020. Adoption of ASU 2019-12 had no material effect on our consolidated financial statements and disclosures.

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

Certain statements within "Management's Discussion and Analysis of Financial Condition and Results of Operations" are forward-looking statements that involve risks and uncertainties. Words such as may, will, should, would, anticipates, expects, intends, plans, believes, seeks, estimates and similar expressions identify such forward-looking statements. The forward-looking statements contained herein are based on current expectations and entail various risks and uncertainties that could cause actual results to differ materially from those expressed in such forward-looking statements. Factors that might cause such a difference include, among other things, those set forth under "Liquidity and Capital Resources" below and under "Risk Factors" in Part I, Item 1A to our annual report on Form 10-K for the year ended December 31, 2020, which discussion is incorporated herein by reference. Readers are cautioned not to place undue reliance on these forward-looking statements, which reflect management's analysis only as of the date hereof. We assume no obligation to update these forward-looking statements to reflect actual results or changes in factors or assumptions affecting forward-looking statements, except as may be required by law.

Overview

We are primarily a producer of ion implantation equipment used in the fabrication of semiconductor chips in the United States, Europe and Asia. In addition, we provide extensive worldwide aftermarket service and support, including spare parts, equipment upgrades and maintenance services to the semiconductor industry. Our product development and manufacturing activities occur primarily in the United States. Our equipment and service products are highly technical and are sold through a direct sales force in the United States, Europe and Asia. Consolidation and partnering within the semiconductor manufacturing industry has resulted in a small number of customers representing a substantial portion of our business. Our ten largest customers accounted for 79.8% of total revenue for the three months ended March 31, 2021.

In the first three months of 2021, we delivered strong financial performance driven by demand for our Purion products and gross margins of 42.5% despite the many difficult logistical challenges brought on by trade tensions between the United States and China and the COVID-19 pandemic. We are continuing to work closely with our customers across market segments, even during this difficult time, to provide them with the best ion implant solutions for their specific manufacturing challenges.

In December 2020, the United States Commerce Department placed one of our major Chinese customers, Semiconductor Manufacturing International Corporation ("SMIC"), on the U.S. export controls Entity List. This same customer was identified by the Commerce Department in September 2020 as subject to a military end use rule that required us to obtain export controls licenses from the Commerce Department to ship high energy systems, but not our high current systems, ordered by this customer. As a result of the Entity List classification, we are required to obtain export controls licenses for all U.S. shipments to this customer. We did not receive any export controls licenses for this customer in the quarter ended March 31, 2021. This situation is currently delaying shipments to this customer.

Critical Accounting Estimates

Management's discussion and analysis of our financial condition and results of operations included herein and in our Annual Report on Form 10-K for the year ended December 31, 2020 are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires management to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates and assumptions. Management's estimates are based on historical experience and on various other assumptions that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

Management has not identified any need to make any material change in, and has not changed, any of our critical accounting estimates and judgments as described in Management's Discussion and Analysis of Financial Conditions and Results of Operations included in our Annual Report on Form 10-K for the year ended December 31, 2020.

Results of Operations

The following table sets forth our results of operations as a percentage of total revenue:

	Three months ended March 31,	
	2021	2020
Revenue:		
Product	95.4 %	94.2 %
Services	4.6	5.8
Total revenue	100.0	100.0
Cost of revenue:		
Product	53.0	56.5
Services	4.5	5.3
Total cost of revenue	57.5	61.8
Gross profit	42.5	38.2
Operating expenses:		
Research and development	11.8	12.3
Sales and marketing	7.8	6.9
General and administrative	7.5	7.6
Total operating expenses	27.1	26.8
Income from operations	15.4	11.4
Other (expense) income:		
Interest income	—	0.4
Interest expense	(0.8)	(1.1)
Other, net	(0.9)	(0.5)
Total other expense	(1.7)	(1.2)
Income before income taxes	13.7	10.2
Income tax provision	1.3	0.9
Net income	12.4 %	9.3 %

Revenue

The following table sets forth our product and services revenue:

	Three months ended March 31,		Period-to-Period Change	
	2021	2020	$	%
Revenue:				
Product	$ 126,609	$ 112,133	$ 14,476	*12.9 %*
Percentage of revenue	*95.4 %*	*94.2 %*		
Services	6,167	6,858	(691)	*(10.1)%*
Percentage of revenue	*4.6 %*	*5.8 %*		
Total revenue	$ 132,776	$ 118,991	$ 13,785	*11.6 %*

Three months ended March 31, 2021 Compared with Three months ended March 31, 2020

Product

Product revenue, which includes systems sales, sales of spare parts, product upgrades and used systems was $126.6 million, or 95.4% of revenue during the three months ended March 31, 2021, compared with $112.1 million, or 94.2% of revenue for the three months ended March 31, 2020. The $14.5 million increase in product revenue for the three month period ending March 31, 2021, in comparison to the same period in 2020, was primarily driven by an increase in sales of spare parts, product upgrades and used systems.

A portion of our revenue from systems sales is deferred until installation and other services related to future performance obligations are performed. The total amount of deferred revenue at March 31, 2021 and December 31, 2020 was $22.1 million and $23.1 million, respectively. The net decrease in deferred revenue was primarily due to the recognition of revenue on tool acceptances.

Services

Services revenue, which includes the labor component of maintenance and service contracts and fees for service hours provided by on-site service personnel, was $6.2 million, or 4.6% of revenue for the three months ended March 31, 2021, compared with $6.9 million, or 5.8% of revenue for the three months ended March 31, 2020. Although services revenue typically increases with the expansion of the installed base of systems, it can fluctuate from period to period based on capacity utilization at customers' manufacturing facilities, which affects the need for equipment service.

Revenue Categories used by Management

In addition to the line item revenue categories discussed above, management also regularly disaggregates revenue in the following categories, which it finds relevant and useful:

- Ion implant revenue separate from revenue from legacy non-ion implant product lines, given that ion implantation systems are the primary driver of our growth and strategic objectives;

- Systems and Aftermarket revenues, in which "Aftermarket" is
    A. the portion of Product revenue relating to spare parts, product upgrades and used equipment combined with
    B. Services revenue, which is the labor component of Aftermarket revenues;

  Aftermarket purchases reflect current fab utilization as opposed to Systems purchases which reflect capital investment decisions by our customers, which have differing economic drivers;

- Revenue by geographic regions, since economic factors impacting customer purchasing decisions may vary by geographic region; and

- Revenue by our customer market segments, since they can be subject to different economic drivers at different periods of time, impacting a customer's likelihood of purchasing capital equipment during any particular period. Currently, management references three customer market segments: memory, mature technology processes and leading edge foundry and logic.

The ion implant and Aftermarket revenue categories for recent periods are discussed below.

Three months ended March 31, 2021 Compared with Three months ended March 31, 2020

Ion Implant

Included in total revenue of $132.8 million during the three months ended March 31, 2021 is revenue from sales of ion implant products and services of $128.8 million, or 97.0% of total revenue, compared with $115.0 million, or 96.7%, of total revenue for the three months ended March 31, 2020. The remaining $4.0 million of revenue for the three months ended March 31, 2021 was non-ion implant parts and services.

Aftermarket

Included in total revenue of $132.8 million during the three months ended March 31, 2021 is revenue from our Aftermarket business of $51.8 million, compared to $36.7 million for the three months ended March 31, 2020. The remaining $81.0 million of revenue for the three months ended March 31, 2021 was from system sales. Aftermarket revenue fluctuates from period to period based on capacity utilization at customers' manufacturing facilities, which affects the sale of spare parts and demand for equipment service. Aftermarket revenue can also fluctuate from period to period based on the demand for system upgrades or used equipment.

Gross Profit / Gross Margin

The following table sets forth our gross profit / gross margin:

	Three months ended March 31, 2021	Three months ended March 31, 2020	Period-to-Period Change $	Period-to-Period Change %
Gross Profit:				
Product	$ 56,275	$ 44,961	$ 11,314	*25.2 %*
Product gross margin	*44.4 %*	*40.1 %*		
Services	160	588	(428)	*(72.8)*%
Services gross margin	*2.6 %*	*8.6 %*		
Total gross profit	$ 56,435	$ 45,549	$ 10,886	*23.9 %*
Gross margin	*42.5 %*	*38.3 %*		

Three months ended March 31, 2021 Compared with Three months ended March 31, 2020

Product

Gross margin from product revenue was 44.4% for the three months ended March 31, 2021, compared to 40.1% for the three months ended March 31, 2020. The increase in gross margin resulted from improved margins on Purion systems.

Services

Gross margin from services revenue was 2.6% for the three-month periods ended March 31, 2021, compared to 8.6% for the three months ended March 31, 2020. The decrease in gross margin is attributable to changes in the mix of service contracts.

Operating Expenses

The following table sets forth our operating expenses:

	Three months ended March 31,		Period-to-Period Change	
	2021	2020	$	%
Research and development	$ 15,685	$ 14,606	$ 1,079	7.4 %
Percentage of revenue	*11.8 %*	*12.3 %*		
Sales and marketing	10,387	8,204	2,183	26.6 %
Percentage of revenue	*7.8 %*	*6.9 %*		
General and administrative	10,013	9,036	977	10.8 %
Percentage of revenue	*7.5 %*	*7.6 %*		
Total operating expenses	$ 36,085	$ 31,846	$ 4,239	13.3 %
Percentage of revenue	*27.1 %*	*26.8 %*		

Our operating expenses consist primarily of personnel costs, including salaries, commissions, incentive based compensation, stock-based compensation and related benefits and taxes; project material costs related to the design and development of new products and enhancement of existing products; and professional fees, travel and depreciation expenses.

Personnel costs are our largest expense, representing $22.0 million or 61.1% of our total operating expenses for the three months ended March 31, 2021, compared to $19.9 million or 62.6% of our total operating expenses for the three months ended March 31, 2020. The higher personnel costs for the three months ended March 31, 2021 is primarily due to an increase in personnel to support growth.

Research and Development

	Three months ended March 31,		Period-to-Period Change	
	2021	2020	$	%
Research and development	$ 15,685	$ 14,606	$ 1,079	7.4 %
Percentage of revenue	*11.8 %*	*12.3 %*		

Our ability to remain competitive depends largely on continuously developing innovative technology, with new and enhanced features and systems and introducing them at competitive prices on a timely basis. Accordingly, based on our strategic plan, we establish annual R&D budgets to fund programs that we expect will solve customers’ high value, high impact, ion implantation challenges.

Three months ended March 31, 2021 Compared with Three months ended March 31, 2020

Research and development expense was $15.7 million during the three months ended March 31, 2021, an increase of $1.1 million, or 7.4%, compared with $14.6 million during the three months ended March 31, 2020. The increase is primarily due to higher supplies and materials costs for ongoing projects, increased depreciation associated with capital additions and an increase in personnel expenses.

Sales and Marketing

	Three months ended March 31,		Period-to-Period Change	
	2021	2020	$	%
Sales and marketing	$ 10,387	$ 8,204	$ 2,183	26.6 %
Percentage of revenue	*7.8 %*	*6.9 %*		

Our sales and marketing expenses result primarily from the sale of our equipment and services through our direct sales force.

Three months ended March 31, 2021 Compared with Three months ended March 31, 2020

Sales and marketing expense was $10.4 million during the three months ended March 31, 2021, an increase of $2.2 million, or 26.6%, compared with $8.2 million during the three months ended March 31, 2020. The increase is primarily due to higher freight expense and project material costs as well as higher personnel related expenses.

General and Administrative

	Three months ended March 31,		Period-to-Period Change	
	2021	2020	$	%
General and administrative	$ 10,013	$ 9,036	$ 977	*10.8* %
Percentage of revenue	*7.5 %*	*7.6 %*		

Our general and administrative expenses result primarily from the costs associated with our executive, finance, information technology, legal and human resource functions.

Three months ended March 31, 2021 Compared with Three months ended March 31, 2020

General and administrative expense was $10.0 million during the three months ended March 31, 2021, an increase of $1.0 million, or 10.8%, compared with $9.0 million during the three months ended March 31, 2020. The increase is primarily due to an increase in personnel expenses and incentive based pay expense.

Other (Expense) Income

	Three months ended March 31,		Period-to-period change	
	2021	2020	$	%
Other expense	$ (2,149)	$ (1,441)	$ 708	*49.1* %
Percentage of revenue	*(1.7)%*	*(1.2)%*		

Other (expense) income consists primarily of interest expense relating to the finance lease obligation we incurred in connection with the 2015 sale of our headquarters facility and other financing obligations, foreign exchange gains and losses attributable to fluctuations of the U.S. dollar against local currencies of certain of the countries in which we operate as well as interest earned on our invested cash balances.

Other expense was $2.1 million for the three months ended March 31, 2021, compared with $1.4 million for the three months ended March 31, 2020. This increase was primarily due to an increase in foreign currency exchange losses of $0.5 million as well as a reduction of $0.4 million in interest income when compared to the three month period ended March 31, 2020.

During the three-month periods ended March 31, 2021 and 2020, we had no significant off-balance-sheet risk such as exchange contracts, option contracts or other hedging arrangements.

Income Tax Provision

	Three months ended March 31,		Period-to-period change	
	2021	2020	$	%
Income tax provision	$ 1,721	$ 1,041	$ 680	*65.3 %*
Percentage of revenue	1.3 %	0.9 %		

Income tax expense was $1.7 million for the three months ended March 31, 2021, compared to $1.0 million for the three months ended March 31, 2020. The $0.7 million increase was primarily due to a $6.0 million increase in pretax income partially offset by a tax benefit of $0.2 million due to the expiration of a statute of limitations on an uncertain tax position. The effective tax rate for the three months ended March 31, 2021 and 2020, respectively, was less than the U.S. statutory rate of 21% due to favorable discrete items related to equity compensation in those periods as well as Federal research and development tax credits that reduce the annual tax rate.

We had $54.9 million and $57.9 million of net deferred tax assets worldwide relating to net operating loss carryforwards, tax credit carryforwards and other temporary differences, as of March 31, 2021 and December 31, 2020, respectively. These deferred tax assets are available to reduce income taxes in future years. We have a $9.1 million valuation allowance in the U.S. against certain tax credits and state net operating losses due to the uncertainty of their realization based on long-term Company forecasts and the expiration dates on these tax assets. If future operating results of the Company within the U.S. or these foreign jurisdictions are significantly less than our expectations, it is reasonably possible that we would be required to record an additional valuation allowance on our deferred tax assets in the future.

Liquidity and Capital Resources

We had $206.8 million in unrestricted cash and cash equivalents at March 31, 2021, in addition to $0.7 million in restricted cash. Management believes that maintaining a strong cash balance is necessary to provide funding for potential ramps in our business which can require significant cash investment to meet sudden demand. Additionally, we are considering both organic and inorganic opportunities to drive future growth, for which cash resources will be necessary.

Our liquidity is affected by many factors. Some of these relate specifically to the operations of our business, for example, the rate of sale of our products, and others relate to the uncertainties of global economic conditions, including the availability of credit and the condition of the overall semiconductor equipment industry. Our established cost structure, other than cost of goods sold, does not vary significantly with changes in volume. We experience fluctuations in operating results and cash flows depending on these factors. We may also engage in stock repurchases, as discussed below.

During the three months ended March 31, 2021, we generated $15.1 million of cash related to operating activities. During the three months ended March 31, 2020, we generated $39.7 million of cash related to operating activities.

Investing activities for both three months ended March 31, 2021 and 2020 resulted in cash outflows of $1.3 million, respectively, used for capital expenditures.

Financing activities for the three months ended March 31, 2021 resulted in a cash usage of $11.7 million. During the first three months of 2021, $11.6 million in cash was used to repurchase our common stock and $2.4 million was used for payments to government tax authorities for income tax withholding on employee compensation arising from the vesting of RSUs, where shares are withheld by the Company, as well as $0.2 million relating to the reduction of the liability under the finance lease of our corporate headquarters. These amounts were partially offset by $2.5 million of proceeds from the exercise of stock options during the first three months of 2021. In comparison, financing activities for the three months ended March 31, 2020 resulted in cash usage of $4.1 million, $7.5 million of which related to the repurchase of our common stock and $1.2 million related to payments made to government tax authorities for income tax withholding on employee compensation arising from the vesting of RSUs. These amounts were partially offset by $4.5 million of proceeds related to the exercise of stock options and purchase of shares under our prior employee stock purchase plan during the first three months of 2020.

Under the rules of the U.S. Securities and Exchange Commission (the "SEC"), we qualify as a "well-known seasoned issuer," which allows us to file shelf registration statements to register an unspecified amount of securities that are effective upon filing. On May 29, 2020, we filed such a shelf registration statement with the SEC for the issuance of an unspecified amount of common stock, preferred stock, various series of debt securities and/or warrants to purchase any of such securities, either individually or in units, from time to time at prices and on terms to be determined at the time of any such offering. This registration statement was effective upon filing and will remain in effect for up to three years from filing, prior to which time we may file another shelf registration statement to maintain the availability of this financing option.

On July 31, 2020, we entered into a Senior Secured Credit Facilities Credit Agreement (the "Credit Agreement") with Silicon Valley Bank. The Credit Agreement provides for a revolving credit facility in an aggregate principal amount not to exceed $40.0 million. Our obligations under the Credit Agreement are secured by a security interest, senior to any current and future debts and to any security interest, in all of our rights, title, and interest in, to and under substantially all of our assets, subject to limited exceptions, including permitted liens. The revolving credit facility terminates on July 31, 2023. As of March 31, 2021, we were in compliance with all covenant requirements of the Credit Agreement. As of such date, no borrowings had been made under the Credit Agreement, although a letter of credit for $5.9 million, previously issued by Silicon Valley Bank, had been rolled under the Credit Agreement, reducing the funds available for borrowing under the credit line. We have no immediate plans to borrow under the Credit Agreement, but we will use the facility for letters of credit, for ongoing working capital needs and to fund general corporate purposes, as desired. We entered into a First Amendment to the Credit Agreement with Silicon Valley Bank in March 2021 to (i) align the covenants with our 2021 stock repurchase program, and (ii) establish terms to transition from a Eurodollar based interest rate option to an interest rate benchmark using a secured overnight financing rate (known as "SOFR") published by the Federal Reserve Bank of New York.

We believe that based on our current market, revenue, expense and cash flow forecasts, our existing cash, cash equivalents and equity and debt financing capacity will be sufficient to satisfy our anticipated cash requirements for the short and long-term.

Commitments and Contingencies

Significant commitments and contingencies at March 31, 2021 are consistent with those discussed in Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations," and Note 16 to the consolidated financial statements in our Annual Report on Form 10-K for the fiscal year ended December 31, 2020.

Item 3. Quantitative and Qualitative Disclosures about Market Risk.

As of March 31, 2021, there have been no material changes to the quantitative information about market risk disclosed in Item 7A to our Annual Report on Form 10-K for the year ended December 31, 2020.

Item 4. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our principal executive officer and principal financial officer, has evaluated the effectiveness of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”)) as of the end of the period covered by this report (the “Evaluation Date”). Based on this evaluation, our principal executive officer and principal financial officer concluded that, as of the Evaluation Date, these disclosure controls and procedures are effective.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act) identified in connection with the evaluation of our internal control that occurred during the three months ended March 31, 2021 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II—OTHER INFORMATION

Item 1. Legal Proceedings.

We are, from time to time, a party to litigation that arises in the normal course of our business operations. We are not presently a party to any litigation that we believe might have a material adverse effect on our business operations.

Item 1A. Risk Factors.

As of March 31, 2021, there have been no material changes to the risk factors described in Item 1A to our Annual Report on Form 10-K for the year ended December 31, 2020.

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

In December 2020, our Board of Directors authorized a share repurchase program covering 2021 for up to $100 million of the Company's common stock.

The following table summarizes the stock repurchase activity, based upon settlement date, for the three months ended March 31, 2021 as well as the approximate dollar value of shares that may yet be purchased pursuant to our stock repurchase program:

	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Program	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Program (1)
	(in thousands except per share amounts)			
January 1, 2021 through January 31, 2021	—	N/A	—	$ 100,000
February 1, 2021 through February 28, 2021	—	N/A	—	100,000
March 1, 2021 through March 31, 2021	303	$38.41	303	$ 88,365
Total	303		303	

(1) There were $0.9 million stock repurchases that were pending settlement as of March 31, 2021.

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not Applicable.

Item 5. Other Information.

None.

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Item 6. Exhibits.

The following exhibits are filed herewith:

Exhibit No	Description
3.1	Restated Certificate of Incorporation of the Company filed November 2, 2017. Incorporated by reference to Exhibit 3.1 of the Company’s Form 10-Q filed with the Commission on November 3, 2017.
3.2	Bylaws of the Company, as amended as of May 13, 2014. Incorporated by reference to Exhibit 3.2 of the Company’s Form 8-K filed with the Commission on May 19, 2014.
10.1	First Amendment to Credit Agreement effective as of March 25, 2021, amending the Senior Secured Credit Facilities Credit Agreement dated as of July 31, 2020 among the Company, the several banks and other financial institutions or entities party thereto, and Silicon Valley Bank. Filed herewith.
31.1	Certification of the Principal Executive Officer under Exchange Act Rule 13a-14(a)/15d-14(a) (Section 302 of the Sarbanes-Oxley Act), dated May 6, 2021. Filed herewith.
31.2	Certification of the Principal Financial Officer under Exchange Act Rule 13a-14(a)/15d-14(a) (Section 302 of the Sarbanes-Oxley Act), dated May 6, 2021. Filed herewith.
32.1	Certification of the Principal Executive Officer pursuant to Section 1350 of Chapter 63 of title 18 of the United States Code (Section 906 of the Sarbanes-Oxley Act), dated May 6, 2021. Filed herewith.
32.2	Certification of the Principal Financial Officer pursuant to Section 1350 of Chapter 63 of title 18 of the United States Code (Section 906 of the Sarbanes-Oxley Act), dated May 6, 2021. Filed herewith.
101	The following materials from the Company’s Form 10-Q for the quarter ended March 31, 2021, formatted in inline eXtensible Business Reporting Language (iXBRL): (i) Consolidated Statements of Operations, (ii) Consolidated Statements of Comprehensive Income, (iii) Consolidated Balance Sheets, (iv) Consolidated Statements of Cash Flows and (v) Notes to Consolidated Financial Statements (Unaudited). Filed herewith.
104	Cover Page Interactive Data File (formatted as iXBRL and contained in Exhibit 101).

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.

	AXCELIS TECHNOLOGIES, INC.
DATED: May 6, 2021	By: /s/ KEVIN J. BREWER
	Kevin J. Brewer *Executive Vice President and Chief Financial Officer* *Duly Authorized Officer and Principal Financial Officer*

FIRST AMENDMENT TO CREDIT AGREEMENT

This First Amendment to Credit Agreement (this "***Amendment***") dated and effective as of March 25, 2021 (the "***First Amendment Effective Date***") by and among **AXCELIS TECHNOLOGIES, INC.**, a Delaware corporation (the "***Borrower***"), the several banks and other financial institutions or entities party hereto (the "***Lenders***") and **SILICON VALLEY BANK** ("***SVB***"), as the administrative agent and collateral agent (SVB, in such capacities, the "***Administrative Agent***"), and as the Issuing Lender and the Swingline Lender.

W I T N E S S E T H:

WHEREAS, the Borrower, the Administrative Agent, the Issuing Lender and the Swingline Lender are parties to that certain Credit Agreement dated as of July 31, 2020 (as amended, modified, supplemented or restated and in effect from time to time, the "***Credit Agreement***"); and

WHEREAS, the Borrower has requested that the Lenders and the Administrative Agent agree to modify and amend certain terms and conditions of the Credit Agreement, subject to the terms and conditions contained herein.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Capitalized Terms. All capitalized terms used herein and not otherwise defined shall have the same meaning herein as in the Credit Agreement or in the other Loan Documents, as applicable.

2. Amendments to the Credit Agreement.

(a) Section 1.1 of the Credit Agreement is hereby amended by adding in the following new definitions in the appropriate alphabetical order:

""***Available Tenor***": as of any date of determination and with respect to the then-current Benchmark, as applicable, any tenor for such Benchmark or payment period for interest calculated with reference to such Benchmark, as applicable, that is or may be used for determining the length of an Interest Period pursuant to this Agreement as of such date and not including, for the avoidance of doubt, any tenor for such Benchmark that is then-removed from the definition of Interest Period pursuant to Section 2.17(b)(iv)."

""***Benchmark***": initially, the Eurodollar Rate; provided that if a Benchmark Transition Event, a Term SOFR Transition Event, or an Early Opt-in Election, as applicable, and its related Benchmark Replacement Date have occurred with respect to the Eurodollar Rate or the then-current Benchmark, then "Benchmark" means the applicable Benchmark Replacement to the extent that such Benchmark Replacement has replaced such prior benchmark rate pursuant to Section 2.17(b)(i)."

""***Benchmark Replacement***": (a) for any Available Tenor, the first alternative set forth in the order below that can be determined by the Administrative Agent for the applicable Benchmark Replacement Date:

(i) the sum of: (A) Term SOFR and (B) the related Benchmark Replacement Adjustment;

(ii) the sum of: (A) Daily Simple SOFR and (B) the related Benchmark Replacement Adjustment;

(iii) the sum of: (A) the alternate benchmark rate that has been selected by the Administrative Agent and the Borrower as the replacement for the then-current Benchmark for the applicable Corresponding Tenor giving due consideration to (x) any selection or recommendation of a replacement benchmark rate or the mechanism for determining such a rate by the Relevant Governmental Body or (y) any evolving or then-prevailing market convention for determining a benchmark rate as a replacement for the then-current Benchmark for Dollar-denominated syndicated credit facilities at such time and (B) the related Benchmark Replacement Adjustment;

provided that, in the case of clause (i), such Unadjusted Benchmark Replacement is displayed on a screen or other information service that publishes such rate from time to time as selected by the Administrative Agent in its reasonable discretion.

(b) With respect to any Term SOFR Transition Event, the sum of: (i) Term SOFR and (ii) the related Benchmark Replacement Adjustment. If the Benchmark Replacement as determined pursuant to clause (a) or (b) above would be less than the Floor, the Benchmark Replacement will be deemed to be the Floor for the purposes of this Agreement and the other Loan Documents."

""***Benchmark Replacement Adjustment***": with respect to any replacement of the then current Benchmark with an Unadjusted Benchmark Replacement for any applicable Interest Period and Available Tenor for any setting of such Unadjusted Benchmark Replacement:

(a) for purposes of clauses (a)(i) and (ii) or (b) of the definition of "Benchmark Replacement," the first alternative set forth in the order below that can be determined by the Administrative Agent:

(i) the spread adjustment, or method for calculating or determining such spread adjustment, (which may be a positive or negative value or zero) as of the Reference Time such Benchmark Replacement is first set for such Interest Period that has been selected or recommended by the Relevant Governmental Body for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement for the applicable Corresponding Tenor;

(ii) the spread adjustment (which may be a positive or negative value or zero) as of the Reference Time such Benchmark Replacement is first set for such Interest Period that would apply to the fallback rate for a derivative transaction referencing the ISDA Definitions to be effective upon an index cessation event with respect to such Benchmark for the applicable Corresponding Tenor; and

(b) for purposes of clause (a)(iii) of the definition of "Benchmark Replacement," the spread adjustment, or method for calculating or determining such spread adjustment, (which may be a positive or negative value or zero) that has been selected by the Administrative Agent and the Borrower for the applicable Corresponding Tenor giving due consideration to (i) any selection or recommendation of a spread adjustment, or method for calculating or determining such spread adjustment, for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement by the Relevant Governmental Body on the applicable Benchmark Replacement Date or (ii) any evolving or then-prevailing market convention for determining a spread adjustment, or method for calculating or determining such spread adjustment, for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement for Dollar denominated syndicated credit facilities;

provided that, in the case of clause (a) above, such adjustment is displayed on a screen or other information service that publishes such Benchmark Replacement Adjustment from time to time as selected by the Administrative Agent in its reasonable discretion."

""***Benchmark Replacement Conforming Changes***": with respect to any Benchmark Replacement, any technical, administrative or operational changes (including changes to the definition of "ABR," the definition of "Business Day," the definition of "Interest Period," timing and frequency of determining rates and making payments of interest, timing of borrowing requests or prepayment, conversion or continuation notices, length of lookback periods, the applicability of breakage provisions, and other technical, administrative or operational matters) that the Administrative Agent decides may be appropriate to reflect the adoption and implementation of such Benchmark Replacement and to permit the administration thereof by the Administrative Agent in a manner substantially consistent with market practice (or, if the Administrative Agent decides that adoption of any portion of such market practice is not administratively feasible or if the Administrative Agent determines that no market practice for the administration of such Benchmark Replacement exists, in such other manner of administration as the Administrative Agent decides is reasonably necessary in connection with the administration of this Agreement and the other Loan Documents)."

""***Benchmark Replacement Date***": the earliest to occur of the following events with respect to the then-current Benchmark:

(a) in the case of clause (a) or (b) of the definition of "Benchmark Transition Event," the later of (i) the date of the public statement or publication of information referenced therein and (ii) the date on which the administrator of such Benchmark (or the published component used in the calculation thereof) permanently or indefinitely ceases to provide all Available Tenors of such Benchmark (or such component thereof);

(b) in the case of clause (c) of the definition of "Benchmark Transition Event," the date of the public statement or publication of information referenced therein;

(c) in the case of a Term SOFR Transition Event, the date that is thirty (30) days after the Administrative Agent has provided the Term SOFR Notice to the Lenders and the Borrower pursuant to Section 2.17(b)(i)(B); or

(d) in the case of an Early Opt-in Election, the sixth (6th) Business Day after the date notice of such Early Opt-in Election is provided to the Lenders, so long as the Administrative Agent has not received, by 5:00 p.m. (New York City time) on the fifth (5th) Business Day after the date notice of such Early Opt-in Election is provided to the Lenders, written notice of objection to such Early Opt-in Election from Lenders comprising the Required Lenders.

For the avoidance of doubt, (i) if the event giving rise to the Benchmark Replacement Date occurs on the same day as, but earlier than, the Reference Time in respect of any determination, the Benchmark Replacement Date will be deemed to have occurred prior to the Reference Time for such determination and (ii) the Benchmark Replacement Date will be deemed to have occurred in the case of clause (a) or (b) with respect to any Benchmark upon the occurrence of the applicable event or events set forth therein with respect to all then-current Available Tenors of such Benchmark (or the published component used in the calculation thereof)."

""***Benchmark Transition Event***": the occurrence of one or more of the following events with respect to the then-current Benchmark:

(a) a public statement or publication of information by or on behalf of the administrator of such Benchmark (or the published component used in the calculation thereof) announcing that such administrator has ceased or will cease to provide all Available Tenors of such Benchmark (or such component thereof), permanently or indefinitely; provided that, at the time of such statement or publication, there is no successor administrator that will continue to provide any Available Tenor of such Benchmark (or such component thereof);

(b) a public statement or publication of information by the regulatory supervisor for the administrator of such Benchmark (or the published component used in the calculation thereof), the Board of Governors of the Federal Reserve System, the Federal Reserve Bank of New York, an insolvency official with jurisdiction over the administrator for such Benchmark (or such component), a resolution authority with jurisdiction over the administrator for such Benchmark (or such component) or a court or an entity with similar insolvency or resolution authority over the administrator for such Benchmark (or such component), which states that the administrator of such Benchmark (or such component) has ceased or will cease to provide all Available Tenors of such Benchmark (or such component thereof) permanently or indefinitely; provided that, at the time of such statement or publication, there is no successor administrator that will continue to provide any Available Tenor of such Benchmark (or such component thereof); or

(c) a public statement or publication of information by the regulatory supervisor for the administrator of such Benchmark (or the published component used in the calculation thereof) announcing that all Available Tenors of such Benchmark (or such component thereof) are no longer representative.

For the avoidance of doubt, a Benchmark Transition Event will be deemed to have occurred with respect to any Benchmark if a public statement or publication of information set forth above has occurred with respect to each then-current Available Tenor of such Benchmark (or the published component used in the calculation thereof)."

““***Benchmark Unavailability Period***”: the period (if any) (x) beginning at the time that a Benchmark Replacement Date pursuant to clauses (a) or (b) of that definition has occurred if, at such time, no Benchmark Replacement has replaced the then-current Benchmark for all purposes hereunder and under any Loan Document in accordance with this Section titled “Benchmark Replacement Setting” and (y) ending at the time that a Benchmark Replacement has replaced the then-current Benchmark for all purposes hereunder and under any Loan Document in accordance with Section 2.17(b).”

““***Corresponding Tenor***”: with respect to any Available Tenor means, as applicable, either a tenor (including overnight) or an interest payment period having approximately the same length (disregarding business day adjustment) as such Available Tenor.”

““***Daily Simple SOFR***”: for any day, SOFR, with the conventions for this rate (which will include a lookback) being established by the Administrative Agent in accordance with the conventions for this rate selected or recommended by the Relevant Governmental Body for determining “Daily Simple SOFR” for syndicated business loans; provided, that if the Administrative Agent decides that any such convention is not administratively feasible for the Administrative Agent, then the Administrative Agent may establish another convention in its reasonable discretion.”

““***Early Opt-in Election***”: if the then-current Benchmark is the Eurodollar Rate, the occurrence of:

(a) a notification by the Administrative Agent to (or the request by the Borrower to the Administrative Agent to notify) each of the other parties hereto that at least five currently outstanding Dollar denominated syndicated credit facilities at such time contain (as a result of amendment or as originally executed) a SOFR-based rate (including SOFR, Term SOFR or any other rate based upon SOFR) as a benchmark rate (and such syndicated credit facilities are identified in such notice and are publicly available for review), and

(b) the joint election by the Administrative Agent and the Borrower to trigger a fallback from the Eurodollar Rate and the provision by the Administrative Agent of written notice of such election to the Lenders.”

““***First Amendment Fee Letter***”: the fee letter agreement dated as of the First Amendment Effective Date, between the Borrower and the Administrative Agent.”

““***Floor***”: the benchmark rate floor, if any, provided in this Agreement initially (as of the execution of this Agreement, the modification, amendment or renewal of this Agreement or otherwise) with respect to the Eurodollar Rate.”

““***ISDA Definitions***”: the 2006 ISDA Definitions published by the International Swaps and Derivatives Association, Inc. or any successor thereto, as amended or supplemented from time to time, or any successor definitional booklet for interest rate derivatives published from time to time by the International Swaps and Derivatives Association, Inc. or such successor thereto.”

““***Liquidity***”: at any date of determination, the sum of the unrestricted cash and Cash Equivalents of the Loan Parties subject to a perfected first priority Lien in favor of the Administrative Agent.”

““***Reference Time***”: with respect to any setting of the then-current Benchmark means (i) if such Benchmark is the Eurodollar Rate, 11:00 a.m. (London time) on the day that is two London banking days preceding the date of such setting, and (ii) if such Benchmark is not the Eurodollar Rate, the time determined by the Administrative Agent in its reasonable discretion.”

““***Relevant Governmental Body***”: the Board of Governors of the Federal Reserve System or the Federal Reserve Bank of New York, or a committee officially endorsed or convened by the Board of Governors of the Federal Reserve System or the Federal Reserve Bank of New York, or any successor thereto.”

““***SOFR***”: with respect to any Business Day, a rate per annum equal to the secured overnight financing rate for such Business Day published by the SOFR Administrator on the SOFR Administrator’s Website on the immediately succeeding Business Day.”

““***SOFR Administrator***”: the Federal Reserve Bank of New York (or a successor administrator of the secured overnight financing rate).”

““***SOFR Administrator’s Website***”: the website of the Federal Reserve Bank of New York, currently at http://www.newyorkfed.org, or any successor source for the secured overnight financing rate identified as such by the SOFR Administrator from time to time.”

““***Term SOFR***”: for the applicable Corresponding Tenor as of the applicable Reference Time, the forward-looking term rate based on SOFR that has been selected or recommended by the Relevant Governmental Body.”

““***Term SOFR Notice***”: a notification by the Administrative Agent to the Lenders and the Borrower of the occurrence of a Term SOFR Transition Event.”

““***Term SOFR Transition Event***”: the determination by the Administrative Agent that (a) Term SOFR has been recommended for use by the Relevant Governmental Body, and is determinable for each Available Tenor, (b) the administration of Term SOFR is administratively feasible for the Administrative Agent and (c) a Benchmark Transition Event or an Early Opt-in Election, as applicable, has previously occurred resulting in a Benchmark Replacement that is not Term SOFR.”

““***Unadjusted Benchmark Replacement***”: the applicable Benchmark Replacement excluding the related Benchmark Replacement Adjustment.”

(b) Section 2.17(b) of the Credit Agreement is hereby amended and restated in its entirety as follows:

“(b) Benchmark Replacement Setting.

(i) Benchmark Replacement.

(A) Notwithstanding anything to the contrary herein or in any other Loan Document (and any Swap Agreement shall be deemed not to be a "Loan Document" for purposes of this Section titled "Benchmark Replacement Setting"), if a Benchmark Transition Event or an Early Opt-in Election, as applicable, and its related Benchmark Replacement Date have occurred prior to the Reference Time in respect of any setting of the then-current Benchmark, then (1) if a Benchmark Replacement is determined in accordance with clause (a)(i) or (a)(ii) of the definition of "Benchmark Replacement" for such Benchmark Replacement Date, such Benchmark Replacement will replace such Benchmark for all purposes hereunder and under any Loan Document in respect of such Benchmark setting and subsequent Benchmark settings without any amendment to, or further action or consent of any other party to, this Agreement or any other Loan Document and (2) if a Benchmark Replacement is determined in accordance with clause (a)(iii) of the definition of "Benchmark Replacement" for such Benchmark Replacement Date, such Benchmark Replacement will replace such Benchmark for all purposes hereunder and under any Loan Document in respect of any Benchmark setting at or after 5:00 p.m. (New York City time) on the fifth (5th) Business Day after the date notice of such Benchmark Replacement is provided to the Lenders without any amendment to, or further action or consent of any other party to, this Agreement or any other Loan Document so long as the Administrative Agent has not received, by such time, written notice of objection to such Benchmark Replacement from Lenders comprising the Required Lenders.

(B) Notwithstanding anything to the contrary herein or in any other Loan Document and subject to the proviso below in this paragraph, if a Term SOFR Transition Event and its related Benchmark Replacement Date have occurred prior to the Reference Time in respect of any setting of the then-current Benchmark, then the applicable Benchmark Replacement will replace the then-current Benchmark for all purposes hereunder or under any Loan Document in respect of such Benchmark setting and subsequent Benchmark settings, without any amendment to, or further action or consent of any other party to, this Agreement or any other Loan Document; provided that this clause (B) shall not be effective unless the Administrative Agent has delivered to the Lenders and the Borrower a Term SOFR Notice. For the avoidance of doubt, the Administrative Agent shall not be required to deliver a Term SOFR Notice after a Term SOFR Transition Event and may do so in its sole discretion.

(ii) <u>Benchmark Replacement Conforming Changes</u>. In connection with the implementation of a Benchmark Replacement, the Administrative Agent will have the right to make Benchmark Replacement Conforming Changes from time to time and, notwithstanding anything to the contrary herein or in any other Loan Document, any amendments implementing such Benchmark Replacement Conforming Changes will become effective without any further action or consent of any other party to this Agreement or any other Loan Document.

(iii) Notices; Standards for Decisions and Determinations. The Administrative Agent will promptly notify the Borrower and the Lenders of (A) any occurrence of a Benchmark Transition Event, a Term SOFR Transition Event, or an Early Opt-in Election, as applicable, and its related Benchmark Replacement Date, (B) the implementation of any Benchmark Replacement, (C) the effectiveness of any Benchmark Replacement Conforming Changes, (D) the removal or reinstatement of any tenor of a Benchmark pursuant to clause (iv) below, and (E) the commencement or conclusion of any Benchmark Unavailability Period. Any determination, decision or election that may be made by the Administrative Agent or, if applicable, any Lender (or group of Lenders) pursuant to this Section 2.17(b) including any determination with respect to a tenor, rate or adjustment or of the occurrence or non-occurrence of an event, circumstance or date and any decision to take or refrain from taking any action or any selection, will be conclusive and binding absent manifest error and may be made in its or their sole discretion and without consent from any other party to this Agreement or any other Loan Document, except, in each case, as expressly required pursuant to this Section 2.17(b).

(iv) Unavailability of Tenor of Benchmark. Notwithstanding anything to the contrary herein or in any other Loan Document, at any time (including in connection with the implementation of a Benchmark Replacement), (A) if the then-current Benchmark is a term rate (including Term SOFR or the Eurodollar Rate) and either (1) any tenor for such Benchmark is not displayed on a screen or other information service that publishes such rate from time to time as selected by the Administrative Agent in its reasonable discretion or (2) the regulatory supervisor for the administrator of such Benchmark has provided a public statement or publication of information announcing that any tenor for such Benchmark is or will be no longer representative, then the Administrative Agent may modify the definition of “Interest Period” for any Benchmark settings at or after such time to remove such unavailable or non-representative tenor and (B) if a tenor that was removed pursuant to clause (A) above either (1) is subsequently displayed on a screen or information service for a Benchmark (including a Benchmark Replacement) or (2) is not, or is no longer, subject to an announcement that it is or will no longer be representative for a Benchmark (including a Benchmark Replacement), then the Administrative Agent may modify the definition of “Interest Period” for all Benchmark settings at or after such time to reinstate such previously removed tenor.

(v) Benchmark Unavailability Period. Upon the Borrower’s receipt of notice of the commencement of a Benchmark Unavailability Period, the Borrower may revoke any request for a Eurodollar Loan of, conversion to or continuation of Eurodollar Loans to be made, converted or continued during any Benchmark Unavailability Period and, failing that, the Borrower will be deemed to have converted any such request into a request for a borrowing of or conversion to ABR Loans.”

(c) Section 6.2(a) of the Credit Agreement is hereby amended and restated in its entirety as follows:

“(a) within 45 days after the end of each fiscal quarter of the Borrower, a certificate (which certification may be included in the Compliance Certificate for the fiscal quarters ending March 31, June 30 and September 30 of any fiscal year) of a Responsible Officer of the Borrower stating that all Restricted Payments made during such fiscal quarter pursuant to Section 7.6(c) satisfied the conditions set forth in Section 7.6(c) herein with respect to each such Restricted Payments and listing the amount and settlement date of each such Restricted Payment;"

(d) Section 6.2(b) of the Credit Agreement is hereby amended by deleting "(including for the avoidance of doubt compliance with Section 7.6(c) for the prior period)."

(e) Section 7.6(c) of the Credit Agreement is hereby amended and restated in its entirety as follows:

"(c) any Group Member may make Restricted Payments so long as (i) the aggregate amount of (A) all such Restricted Payments made in any fiscal year of the Group Members plus (B) the aggregate consideration (excluding Capital Stock of the Borrower that is not Disqualified Stock, but including earn-out payments, seller debt payments or deferred purchase price payments unless repayable with Capital Stock of the Borrower that is not Disqualified Stock) paid for all Permitted Acquisitions in any fiscal year of the Group Members, shall not exceed (X) $25,000,000 if the Consolidated Senior Leverage is greater than or equal to 2.00:1.00, (Y) $50,000,000 if the Consolidated Senior Leverage is less than 2.00:1.00 and Liquidity immediately after giving effect to such Restricted Payment is less than or equal to $75,000,000 and (Z) $100,000,000 if the Consolidated Senior Leverage is less than 2.00:1.00 and Liquidity immediately after giving effect to such Restricted Payment is greater than $75,000,000, with the Consolidated Senior Leverage Ratio in each case of the foregoing items (X), (Y) and (Z), calculated on a pro forma basis after giving effect to such Permitted Acquisition or Restricted Payment, as applicable, as for the most recent determination period for which financial statements are internally available and have been delivered to the Administrative Agent and (ii) the Borrower is in pro forma compliance with the financial covenants set forth in Section 7.1 as for the most recent determination period for which financial statements are internally available and have been delivered to the Administrative Agent after giving effect to such payment;"

(f) Section 7.8(n)(x) of the Credit Agreement is hereby amended and restated in its entirety as follows:

"(x) (A) the aggregate amount of the consideration (excluding Capital Stock of the Borrower that is not Disqualified Stock, but including earn-out payments, seller debt payments or deferred purchase price payments unless repayable with Capital Stock of the Borrower that is not Disqualified Stock) paid by such Group Member in connection with (x) all Permitted Acquisitions consummated from and after the Closing Date plus (y) all Restricted Payments permitted to be made pursuant to Section 7.6(c) from and after the Closing Date, shall not exceed (1) $25,000,000 in any fiscal year of the Group Members if the Consolidated Senior Leverage Ratio is greater than or equal to 2.00:1.00, (2) $50,000,000 in any fiscal year of the Group Members if the Consolidated Senior Leverage Ratio is less than or equal to 2.00:1.00 and Liquidity immediately after giving effect such purchase or acquisition is less than or equal to $75,000,000, and (3) $100,0000,000 in any fiscal year if the Consolidated Senior Leverage is less than or equal to 2.00:1.00 and Liquidity immediately after giving effect such purchase or acquisition is greater than $75,000,000, with the Consolidated Senior Leverage Ratio in each case of the foregoing items (1), (2) and (3), subject to Section 1.4, calculated on a pro forma basis after giving effect to such purchase or acquisition or Restricted Payment, as applicable, as for the most recent determination period for which financial statements are internally available and have been delivered to the Administrative Agent;"

3. Conditions Precedent to Effectiveness. This Amendment shall not be effective until each of the following conditions precedent have been fulfilled to the satisfaction of the Administrative Agent:

(a) This Amendment and the First Amendment Fee Letter shall have been duly executed and delivered by the respective parties hereto. The Administrative Agent shall have received a fully executed copy of this Amendment and the First Amendment Fee Letter.

(b) All necessary consents and approvals to this Amendment shall have been obtained.

(c) Immediately, after giving effect to this Amendment, no Default or Event of Default shall have occurred and be continuing.

(d) Immediately after giving effect to this Amendment, the representations and warranties set forth in this Amendment, the Credit Agreement and the other Loan Documents, as amended by this Amendment, to which it is a party (i) that is qualified by materiality shall be true and correct, and (ii) that is not qualified by materiality, shall be true and correct in all material respects, in each case, on and as of such date as if made on and as of such date, except to the extent any such representation and warranty expressly relates to an earlier date, in which case such representation and warranty shall have been true and correct in all material respects (or all respects, as applicable) as of such earlier date.

(e) The Lenders and the Administrative Agent shall have received all fees required to be paid (including for the avoidance of doubt the fees specified in the First Amendment Fee Letter), and all expenses for which invoices have been presented (including the reasonable fees and expenses of legal counsel required to be paid hereunder or under any other Loan Document), on or before the First Amendment Effective Date.

4. Representations and Warranties. Each Loan Party hereby represents and warrants to the Administrative Agent and the Lenders as follows:

(a) This Amendment is, and each other Loan Document to which it is or will be a party, when executed and delivered by each Loan Party that is a party thereto, will be the legally valid and binding obligation of such Loan Party, enforceable against such Loan Party in accordance with its respective terms, except as enforcement may be limited by equitable principles or by bankruptcy, insolvency, reorganization, moratorium or similar laws relating to or limiting creditors' rights generally.

(b) Immediately after giving effect to this Amendment, the representations and warranties set forth in this Amendment, the Credit Agreement and the other Loan Documents, as amended by this Amendment, to which it is a party (i) that is qualified by materiality shall be true and correct, and (ii) that is not qualified by materiality, shall be true and correct in all material respects, in each case, on and as of such date as if made on and as of such date, except to the extent any such representation and warranty expressly relates to an earlier date, in which case such representation and warranty shall have been true and correct in all material respects (or all respects, as applicable) as of such earlier date.

5. Payment of Costs and Fees. The Borrower shall pay to the Administrative Agent for the benefit of the Administrative Agent, all reasonable costs, out-of-pocket expenses, and fees and charges of every kind in connection with the preparation, negotiation, execution and delivery of this Amendment and any documents and instruments relating hereto (which costs include, without limitation, the reasonable fees and expenses of any attorneys retained by the Administrative Agent) to the extent provided in Section 10.5 of the Credit Agreement. All fees payable hereunder will be paid in immediately available funds and shall not be subject to reduction by way of setoff or counterclaim.

6. Choice of Law. This Amendment and the rights of the parties hereunder, shall be determined under, governed by, and construed in accordance with the laws of the New York. Section 10.14 of the Credit Agreement is hereby incorporated by reference.

7. Counterpart Execution. This Amendment may be executed in any number of counterparts, all of which when taken together shall constitute one and the same instrument, and any of the parties hereto may execute this Amendment by signing any such counterpart. Delivery of an executed counterpart of this Amendment by telefacsimile or other electronic method of transmission shall be equally as effective as delivery of an original executed counterpart of this Amendment.

8. Effect on Loan Documents.

(a) The Credit Agreement, as amended hereby, and each of the other Loan Documents, as amended hereby, shall be and remain in full force and effect in accordance with their respective terms and hereby are ratified and confirmed in all respects. The execution, delivery, and performance of this Amendment shall not operate as a modification or waiver of any right, power, or remedy of the Administrative Agent or any Lender under the Credit Agreement or any other Loan Document except as expressly set forth herein. The modifications and other agreements herein are limited to the specifics hereof (including facts or occurrences on which the same are based), shall not apply with respect to any facts or occurrences other than those on which the same are based, shall not excuse any non-compliance with the Loan Documents, and shall not operate as a consent or waiver to any matter under the Loan Documents. To the extent any terms or provisions of this Amendment conflict with those of the Credit Agreement or other Loan Documents, the terms and provisions of this Amendment shall control.

(b) To the extent that any terms and conditions in any of the Loan Documents shall contradict or be in conflict with any terms or conditions of the Credit Agreement, after giving effect to this Amendment, such terms and conditions are hereby deemed modified or amended accordingly to reflect the terms and conditions of the Credit Agreement as modified or amended hereby.

(c) This Amendment is a Loan Document.

9. Entire Agreement. This Amendment, and terms and provisions hereof, the Credit Agreement and the other Loan Documents constitute the entire understanding and agreement between the parties hereto with respect to the subject matter hereof and supersedes any and all prior or contemporaneous amendments or understandings with respect to the subject matter hereof, whether express or implied, oral or written.

10. Severability. In case any provision in this Amendment shall be invalid, illegal or unenforceable, such provision shall be severable from the remainder of this Amendment and the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby.

[*Signature pages follow*]

In Witness Whereof, the parties hereto have caused this Amendment to be duly executed and delivered by their proper and duly authorized officers as of the day and year first above written.

BORROWER:

AXCELIS TECHNOLOGIES, INC.

By: /s/ Mary G. Puma
Name: Mary G. Puma
Title: President and CEO

ADMINISTRATIVE AGENT AND LENDER:

SILICON VALLEY BANK

By: /s/ Francis Ceroccia
Name: Francis Ceroccia
Title: Director

Exhibit 31.1

CERTIFICATION
of the Principal Executive Officer
Pursuant to Rule 13a-14(a)/15d-14(a) (implementing Section 302 of the Sarbanes-Oxley Act)

I, Mary G. Puma, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Axcelis Technologies, Inc.;

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(s) 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(s) 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: May 6, 2021

/s/ MARY G. PUMA

Mary G. Puma,
President and Chief Executive Officer

Exhibit 31.2

CERTIFICATION
of the Principal Financial Officer
Pursuant to Rule 13a-14(a)/15d-14(a) (implementing Section 302 of the Sarbanes-Oxley Act)

I, Kevin J. Brewer, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Axcelis Technologies, Inc.;

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(s) 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(s) 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: May 6, 2021

/s/ KEVIN J. BREWER

Kevin J. Brewer,
Executive Vice President and Chief Financial Officer

EXHIBIT 32.1

AXCELIS TECHNOLOGIES, INC.
Certification of the Principal Executive Officer
Pursuant to Section 1350 of Chapter 63 of title 18 of the United States Code

The undersigned Chief Executive Officer of Axcelis Technologies, Inc., a Delaware corporation, hereby certifies, for the purposes of Section 1350 of Chapter 63 of title 18 of the United States Code (as implemented by Section 906 of the Sarbanes-Oxley Act of 2002) as follows:

This Form 10-Q quarterly report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m or 78o(d)) and the information contained herein fairly presents, in all material respects, the financial condition and results of operations of the Company.

IN WITNESS WHEREOF, the undersigned has executed this Certification as of May 6, 2021.

/s/ MARY G. PUMA

Mary G. Puma
President and Chief Executive Officer of Axcelis Technologies, Inc.

EXHIBIT 32.2

AXCELIS TECHNOLOGIES, INC.
Certification of the Principal Financial Officer
Pursuant to Section 1350 of Chapter 63 of title 18 of the United States Code

The undersigned Chief Financial Officer of Axcelis Technologies, Inc., a Delaware corporation, hereby certifies, for the purposes of Section 1350 of Chapter 63 of title 18 of the United States Code (as implemented by Section 906 of the Sarbanes-Oxley Act of 2002) as follows:

This Form 10-Q quarterly report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m or 78o(d)) and the information contained herein fairly presents, in all material respects, the financial condition and results of operations of the Company.

IN WITNESS WHEREOF, the undersigned has executed this Certification as of May 6, 2021.

/s/ KEVIN J. BREWER

Kevin J. Brewer
Executive Vice President and Chief Financial Officer of
Axcelis Technologies, Inc.