UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-Q

(Mark One)

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

For the quarterly period ended June 30, 2023

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, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

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

If an emerging growth company, indicate by check mark if 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 July 31, 2023, there were 32,817,464 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 June 30,		Six months ended June 30,	
	2023	2022	2023	2022
Revenue:				
Product	$ 265,673	$ 213,926	$ 511,680	$ 410,458
Services	8,297	7,251	16,310	14,314
Total revenue	273,970	221,177	527,990	424,772
Cost of revenue:				
Product	146,741	115,754	289,512	223,395
Services	7,526	6,242	14,756	12,429
Total cost of revenue	154,267	121,996	304,268	235,824
Gross profit	119,703	99,181	223,722	188,948
Operating expenses:				
Research and development	24,130	18,731	47,903	35,704
Sales and marketing	15,537	12,703	29,681	23,994
General and administrative	16,328	13,602	31,073	26,180
Total operating expenses	55,995	45,036	108,657	85,878
Income from operations	63,708	54,145	115,065	103,070
Other income (expense):				
Interest income	4,307	352	8,243	447
Interest expense	(1,349)	(1,250)	(2,702)	(2,768)
Other, net	(2,050)	(5,051)	(3,088)	(6,669)
Total other income (expense)	908	(5,949)	2,453	(8,990)
Income before income taxes	64,616	48,196	117,518	94,080
Income tax provision	3,037	4,007	8,242	8,276
Net income	$ 61,579	$ 44,189	$ 109,276	$ 85,804
Net income per share:				
Basic	$ 1.88	$ 1.34	$ 3.34	$ 2.59
Diluted	$ 1.86	$ 1.32	$ 3.29	$ 2.54
Shares used in computing net income per share:				
Basic weighted average shares of common stock	32,775	33,096	32,759	33,170
Diluted weighted average shares of common stock	33,189	33,562	33,237	33,770

See accompanying Notes to these Consolidated Financial Statements (Unaudited)

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

	Three months ended June 30,		Six months ended June 30,	
	2023	**2022**	**2023**	**2022**
Net income	$ 61,579	$ 44,189	$ 109,276	$ 85,804
Other comprehensive loss:				
Foreign currency translation adjustments	(1,011)	(2,685)	(961)	(3,871)
Amortization of actuarial net gain and other adjustments from pension plan, net of tax	—	8	—	17
Total other comprehensive loss	(1,011)	(2,677)	(961)	(3,854)
Comprehensive income	$ 60,568	$ 41,512	$ 108,315	$ 81,950

See accompanying Notes to these Consolidated Financial Statements (Unaudited)

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

	June 30, 2023	December 31, 2022
ASSETS		
Current assets:		
Cash and cash equivalents	$ 132,504	$ 185,595
Short-term investments	320,360	246,571
Accounts receivable, net	159,199	169,773
Inventories, net	299,841	242,406
Prepaid expenses and other current assets	38,265	33,300
Total current assets	950,169	877,645
Property, plant and equipment, net	43,156	39,664
Operating lease assets	31,998	12,146
Finance lease assets, net	17,305	17,942
Long-term restricted cash	6,652	752
Deferred income taxes	38,944	31,701
Other assets	33,494	33,791
Total assets	$ 1,121,718	$ 1,013,641
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 60,504	$ 62,346
Accrued compensation	17,216	35,540
Warranty	10,867	8,299
Income taxes	6,598	4,304
Deferred revenue	138,890	123,471
Current portion of finance lease obligation	1,367	1,229
Other current liabilities	13,018	12,943
Total current liabilities	248,460	248,132
Long-term finance lease obligation	44,455	45,185
Long-term deferred revenue	43,650	31,306
Other long-term liabilities	41,116	21,762
Total liabilities	377,681	346,385
Commitments and contingencies (Note 16)		
Stockholders' equity:		
Common stock, $0.001 par value, 75,000 shares authorized; 32,836 shares issued and outstanding at June 30, 2023; 32,775 shares issued and outstanding at December 31, 2022	33	33
Additional paid-in capital	540,120	550,299
Retained earnings	206,813	118,892
Accumulated other comprehensive loss	(2,929)	(1,968)
Total stockholders' equity	744,037	667,256
Total liabilities and stockholders' equity	$ 1,121,718	$ 1,013,641

See accompanying Notes to these Consolidated Financial Statements (Unaudited)

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

	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	(Accumulated Deficit) Retained Earnings	Accumulated Other Comprehensive Income	Total Stockholders' Equity
Balance at December 31, 2021	33,240	$ 33	$ 559,883	$ (22,722)	$ 1,765	$ 538,959
Net income	—	—	—	41,614	—	41,614
Foreign currency translation adjustments	—	—	—	—	(1,186)	(1,186)
Change in pension obligation	—	—	—	—	9	9
Exercise of stock options	41	—	491	—	—	491
Issuance of common stock on restricted stock units, net of shares withheld	67	—	(3,315)	—	—	(3,315)
Stock-based compensation expense	—	—	2,701	—	—	2,701
Repurchase of common stock	(284)	—	(5,127)	(14,873)	—	(20,000)
Balance at March 31, 2022	33,064	$ 33	$ 554,633	$ 4,019	$ 588	$ 559,273
Net income	—	—	—	44,189	—	44,189
Foreign currency translation adjustments	—	—	—	—	(2,685)	(2,685)
Change in pension obligation	—	—	—	—	8	8
Exercise of stock options	25	—	298	—	—	298
Issuance of stock under Employee Stock Purchase Plan	15	—	711	—	—	711
Issuance of common stock on restricted stock units, net of shares withheld	205	—	(5,896)	—	—	(5,896)
Stock-based compensation expense	—	—	3,527	—	—	3,527
Repurchase of common stock	(215)	—	(3,872)	(8,626)	—	(12,498)
Balance at June 30, 2022	33,094	$ 33	$ 549,401	$ 39,582	$ (2,089)	$ 586,927

	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Retained Earnings	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
Balance at December 31, 2022	32,775	$ 33	$ 550,299	$ 118,892	$ (1,968)	$ 667,256
Net income	—	—	—	47,697	—	47,697
Foreign currency translation adjustments	—	—	—	—	50	50
Exercise of stock options	2	—	25	—		25
Issuance of common stock on restricted stock units, net of shares withheld	56	—	(3,907)	—	—	(3,907)
Stock-based compensation expense	—	—	3,199	—	—	3,199
Repurchase of common stock	(107)	—	(1,924)	(10,575)	—	(12,499)
Balance at March 31, 2023	32,726	$ 33	$ 547,692	$ 156,014	$ (1,918)	$ 701,821
Net income	—	—	—	61,579	—	61,579
Foreign currency translation adjustments	—	—	—	—	(1,011)	(1,011)
Issuance of stock under Employee Stock Purchase Plan	6	—	957	—	—	957
Issuance of common stock on restricted stock units, net of shares withheld	199	—	(11,558)	—	—	(11,558)
Stock-based compensation expense	—	—	4,749		—	4,749
Repurchase of common stock	(95)	—	(1,720)	(10,780)	—	(12,500)
Balance at June 30, 2023	32,836	$ 33	$ 540,120	$ 206,813	$ (2,929)	$ 744,037

See accompanying Notes to these Consolidated Financial Statements (Unaudited)

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

	Six months ended June 30,	
	2023	2022
Cash flows from operating activities		
Net income	$ 109,276	$ 85,804
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	6,258	5,724
Deferred income taxes	(7,413)	3,934
Stock-based compensation expense	7,948	6,228
Provision for excess and obsolete inventory	2,494	2,061
Accretion of discounts and premiums on marketable securities	(5,753)	—
Currency loss on foreign denominated transactions	5,717	—
Changes in operating assets and liabilities:		
Accounts receivable	8,173	(45,783)
Inventories	(63,294)	(27,511)
Prepaid expenses and other current assets	(5,095)	(5,304)
Accounts payable and other current liabilities	(18,266)	1,507
Deferred revenue	28,075	3,290
Income taxes	2,324	(529)
Other assets and liabilities	(3,170)	(199)
Net cash provided by operating activities	67,274	29,222
Cash flows from investing activities		
Expenditures for property, plant and equipment and capitalized software	(5,202)	(3,356)
Purchase of short-term investments	(188,943)	—
Maturities of short-term investments	120,907	—
Net cash used in investing activities	(73,238)	(3,356)
Cash flows from financing activities		
Net settlement on restricted stock grants	(15,465)	(9,211)
Repurchase of common stock	(24,999)	(32,498)
Proceeds from Employee Stock Purchase Plan purchases	957	711
Principal payments on finance lease obligation	(598)	(475)
Proceeds from exercise of stock options	25	789
Net cash used in financing activities	(40,080)	(40,684)
Effect of exchange rate changes on cash and cash equivalents	(1,147)	7,058
Net decrease in cash, cash equivalents and restricted cash	(47,191)	(7,760)
Cash, cash equivalents and restricted cash at beginning of period	186,347	295,680
Cash, cash equivalents and restricted cash at end of period	$ 139,156	$ 287,920

See accompanying Notes to these Consolidated Financial Statements (Unaudited)

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, 2022 has been derived from the audited consolidated financial statements at that date but does not include all the information and footnotes required by generally accepted accounting principles for complete financial statements. As of June 30, 2023, there have been no material changes in the Company's significant accounting policies. For further information, refer to the consolidated financial statements and footnotes thereto included in the Company's Annual Report on Form 10-K for the year ended December 31, 2022.

Note 2. Stock-Based Compensation

We maintain the Axcelis Technologies, Inc. 2012 Equity Incentive Plan, as amended (the "2012 Equity Plan"), an Internal Revenue Code Section 423 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.

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, 2022.

We recognized stock-based compensation expense of $4.7 million and $3.5 million for the three-month periods ended June 30, 2023 and 2022, respectively. We recognized stock-based compensation expense of $7.9 million and $6.2 million for the six-month periods ended June 30, 2023 and 2022, respectively. These amounts include compensation expense related to RSUs, non-qualified stock options and stock to be issued to participants under the 2020 Employee Stock Purchase Plan (the "2020 ESPP").

In the three-month periods ended June 30, 2023 and 2022, we issued 0.2 million and 0.2 million of common stock for purchases under the 2020 ESPP and vesting of RSUs, respectively. In the three-month period ended June 30, 2023, we received proceeds of $1.0 million for purchases under the 2020 ESPP. In the three-month period ended June 30, 2022, we received proceeds of $1.0 million in connection with the exercise of stock options and purchases under the 2020 ESPP.

In the six-month periods ended June 30, 2023 and 2022, we issued 0.3 million and 0.4 million shares of common stock, respectively, upon stock option exercises, purchases under the 2020 ESPP and vesting of RSUs. In the six-month periods ended June 30, 2023 and 2022, we received proceeds of $1.0 million and $1.5 million, respectively, in connection with the exercise of stock options and purchases under the 2020 ESPP.

Note 3. Leases

We have operating leases for manufacturing, office space, warehouse space, computer and office equipment and vehicles used in our business operations. We have a finance lease in relation to the 2015 sale-leaseback of our corporate headquarters in Beverly, Massachusetts. We review all agreements to determine if the agreement contains a lease component. An agreement contains a lease component if it provides for the use of a specific physical space or a specific physical item.

We recognize operating lease obligations under Accounting Standards Codification Topic 842, *Leases*. The guidance in Topic 842 requires recognition of lease assets and related liabilities 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 by one to three years. The exercise of lease renewal options is at our sole discretion. For lease extensions that are reasonably certain to occur, we have included the 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	June 30, 2023	December 31, 2022
Assets		(in thousands)	
Operating leases	Operating lease assets	$ 31,998	$ 12,146
Finance lease	Finance lease assets*	17,305	17,942
Total leased assets		$ 49,303	$ 30,088
Liabilities			
Current			
Operating	Other current liabilities	$ 5,544	$ 5,367
Finance	Current portion of finance lease obligation	1,367	1,229
Non-current			
Operating	Other long-term liabilities	25,979	6,931
Finance	Finance lease obligation	44,455	45,185
Total lease liabilities		$ 77,345	$ 58,712

*Finance lease assets are recorded net of accumulated depreciation of $46.5 million and include $0.6 million of prepaid financing costs as of June 30, 2023. Finance lease assets are recorded net of accumulated depreciation of $45.9 million and include $0.6 million of prepaid financing costs as of December 31, 2022.

All of our operating lease office locations support selling and servicing functions. Our Axcelis Asia Operations Center facility in South Korea brings production capability closer to our Asia-based customers. Our state-of-the-art 98,500 square foot logistics and flex manufacturing center in Beverly, Massachusetts, which is anticipated to be fully operational in the second half of 2023, commenced during the three-months ended June 30, 2023. As a result, we recorded a right-of-use asset of $21.0 million, which includes approximately $1.0 million of prepaid rent, and a related liability of $20.0 million.

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 and six months ended June 30, 2023 and 2022 as follows:

Lease cost	Classification	Three months ended June 30, 2023	Three months ended June 30, 2022	Six months ended June 30, 2023	Six months ended June 30, 2022
Operating lease cost		(in thousands)			
Product / services*	Cost of revenue	$ 1,821	$ 1,306	$ 3,287	$ 2,516
Research and development	Operating expenses	137	76	243	132
Sales and marketing*	Operating expenses	417	368	813	787
General and administrative*	Operating expenses	239	308	515	520
Total operating lease cost		$ 2,614	$ 2,058	$ 4,858	$ 3,955
Finance lease cost					
Depreciation of leased assets	Cost of revenue, R&D, Sales and marketing and G&A	$ 318	$ 325	$ 637	$ 648
Interest on lease liabilities	Interest expense	1,223	1,274	2,454	2,532
Total finance lease cost		$ 1,541	$ 1,599	$ 3,091	$ 3,180
Total lease cost		$ 4,155	$ 3,657	$ 7,949	$ 7,135

* Product / services, sales and marketing and general and administrative expense also includes short-term lease and variable lease costs of approximately $0.5 million and $1.0 million for the three and six months ended June 30, 2023, respectively, and includes short-term lease and variable lease costs of approximately $0.6 million and $1.0 million for the three and six months ended June 30, 2022, respectively.

The lease of our corporate headquarters, shown below under finance leases, had an original lease term of 22 years, beginning in January 2015 and expiring in January 2037, with renewal options. All other locations are treated as operating leases, with lease terms ranging from one to sixteen 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 June 30, 2023:

Maturity of Lease Liabilities	Finance Leases	Operating Leases	Total Leases
		(in thousands)	
2023	$ 3,063	$ 4,335	$ 7,398
2024	6,252	5,766	12,018
2025	5,930	4,308	10,238
2026	6,008	3,247	9,255
2027	6,128	2,411	8,539
Thereafter	61,586	25,080	86,666
Total lease payments	$ 88,967	$ 45,147	$ 134,114
Less interest portion*	(43,145)	(13,624)	(56,769)
Finance lease and operating lease obligations	$ 45,822	$ 31,523	$ 77,345

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

The table above does not include options to renew lease terms that are not reasonably certain of being exercised.

Lease term and discount rate	June 30, 2023
Weighted-average remaining lease term (years):	
Operating leases	11.7
Finance leases	13.6
Weighted-average discount rate:	
Operating leases	5.4%
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 a 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 six months ended June 30, 2023 and 2022, respectively:

Cash paid for amounts included in the measurement of lease liabilities	Six months ended June 30, 2023	Six months ended June 30, 2022
	(in thousands)	
Operating cash outflows from operating leases	$ 4,858	$ 3,955
Operating cash outflows from finance leases	2,454	2,509
Financing cash outflows from finance leases	598	475
Operating lease assets obtained in exchange for operating lease liabilities	23,289	4,714
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 June 30,		Six months ended June 30,	
	2023	2022	2023	2022
	(in thousands)			
Systems	$ 215,174	$ 165,350	$ 410,372	$ 317,152
Aftermarket	58,796	55,827	117,618	107,620
Total Revenue	$ 273,970	$ 221,177	$ 527,990	$ 424,772

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 June 30,		Six months ended June 30,	
	2023	2022	2023	2022
	(in thousands)			
North America	$ 37,918	$ 34,683	$ 83,084	$ 59,596
Asia Pacific	205,941	168,705	397,044	317,945
Europe	30,111	17,789	47,862	47,231
Total Revenue	$ 273,970	$ 221,177	$ 527,990	$ 424,772

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:

	June 30, 2023	December 31, 2022
	(in thousands)	
Contract liabilities	$ 182,540	$ 154,777

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 June 30,		Six months ended June 30,	
	2023	2022	2023	2022
	(in thousands)			
Balance, beginning of the period	$ 201,725	$ 74,840	$ 154,777	$ 68,436
Deferral of revenue	34,977	28,703	107,556	46,697
Recognition of deferred revenue	(54,162)	(31,994)	(79,793)	(43,584)
Balance, end of the period	$ 182,540	$ 71,549	$ 182,540	$ 71,549

The majority of our system transactions have either (1) payment terms of 90% due upon shipment of the system and 10% due upon acceptance or (2) a deposit with the remaining balance due at shipment and acceptance. Aftermarket transaction payment terms typically 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.

We maintain an allowance for credit losses, which represent an estimate of expected losses over the remaining contractual life of our receivables, considering current market conditions and estimates for supportable forecasts when appropriate. The estimate is a result of our ongoing assessments and evaluations of collectability, historical loss experience, and future expectations in estimating credit losses in our receivable portfolio. We use historical loss experience rates and apply 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, trade restrictions, estimates for supportable forecasts, when appropriate, and credit risk characteristics.

We evaluate the credit risk of the customer when extending credit based on a combination of financial and qualitative factors that may affect our 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 our 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. We did not incur any credit losses or recoveries for the three and six-month periods ended June 30, 2023 and 2022, respectively. As of June 30, 2023 and 2022, respectively, we had no provision for credit losses.

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 shares of common stock 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 shares of common stock that would have been outstanding if the potentially dilutive shares of common stock 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 June 30,		Six months ended June 30,	
	2023	2022	2023	2022
	(in thousands, except per share amounts)			
Net income available to common stockholders	$ 61,579	$ 44,189	$ 109,276	$ 85,804
Weighted average shares of common stock outstanding used in computing basic income per share	32,775	33,096	32,759	33,170
Incremental options and RSUs	414	466	478	600
Weighted average shares of common stock used in computing diluted net income per share	33,189	33,562	33,237	33,770
Net income per share				
Basic	$ 1.88	$ 1.34	$ 3.34	$ 2.59
Diluted	$ 1.86	$ 1.32	$ 3.29	$ 2.54

Diluted weighted average shares of common stock outstanding does not include 770 and 15,796 common equivalent shares issuable with respect to outstanding equity awards for the three-month periods ended June 30, 2023 and 2022, respectively, or 387 and 8,255 common equivalent shares issuable with respect to outstanding equity awards for the six-month periods ended June 30, 2023 and 2022, respectively, as their effect would have been anti-dilutive.

Note 7. Accumulated Other Comprehensive Loss

The following table presents the changes in accumulated other comprehensive loss, net of tax, by component, for the six months ended June 30, 2023:

	Foreign currency	Defined benefit pension plan	Total
		(in thousands)	
Balance at December 31, 2022	$ (1,994)	$ 26	$ (1,968)
Other comprehensive loss and pension reclassification	(961)	—	(961)
Balance at June 30, 2023	$ (2,955)	$ 26	$ (2,929)

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:

	June 30, 2023	December 31, 2022
	(in thousands)	
Cash and cash equivalents	$ 132,504	$ 185,595
Long-term restricted cash	6,652	752
Total cash, cash equivalents and restricted cash	$ 139,156	$ 186,347

As of June 30, 2023, we had $6.7 million in restricted cash representing the total of (i) a $5.9 million cash collateral relating to our lease for our headquarters in Beverly, Massachusetts, (ii) a $0.7 million letter of credit relating to workers' compensation insurance and (iii) a $0.1 million deposit relating to customs activity. See Note 12 for further discussion on the $5.9 million cash collateral.

Note 9. Inventories, net

The components of inventories are as follows:

	June 30, 2023	December 31, 2022
	(in thousands)	
Raw materials	$ 213,535	$ 187,313
Work in process	53,693	35,069
Finished goods (completed systems)	32,613	20,024
Inventories, net	$ 299,841	$ 242,406

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:

	Six months ended June 30, 2023	2022
	(in thousands)	
Balance at January 1 (beginning of year)	$ 10,487	$ 6,924
Warranties issued during the period	5,616	4,902
Settlements made during the period	(4,834)	(2,819)
Changes in estimate of liability for pre-existing warranties during the period	1,552	12
Balance at June 30 (end of period)	$ 12,821	$ 9,019
Amount classified as current	$ 10,867	$ 8,348
Amount classified as long-term (within other long-term liabilities)	1,954	671
Total warranty liability	$ 12,821	$ 9,019

Note 11. Fair Value Measurements

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 with initial maturities of three months or less are included in cash and cash equivalents in the consolidated balance sheets. Other investments that have a maturity of greater than three months but less than one year are included within short-term investments in the consolidated balance sheets.

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

	June 30, 2023 Fair Value Measurements			
	Level 1	Level 2	Level 3	Total
	(in thousands)			
Assets				
Cash equivalents and other short-term investments:				
Cash equivalents (money market funds, U.S. Government Securities and Agency Investments)	$ 88,903	$ —	$ —	$ 88,903
Short-term investments (U.S. Government Securities and Agency Investments)	319,587	—	—	319,587
Total	$ 408,490	$ —	$ —	$ 408,490

	December 31, 2022 Fair Value Measurements			
	Level 1	Level 2	Level 3	Total
	(in thousands)			
Assets				
Cash equivalents and other short-term investments:				
Cash equivalents (money market funds, U.S. Government Securities and Agency Investments)	$ 111,771	$ 25,000	$ —	$ 136,771
Short-term investments (U.S. Government Securities and Agency Investments)	245,247	—	—	245,247
Total	$ 357,018	$ 25,000	$ —	$ 382,018

(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 $45.8 million as of June 30, 2023. 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. As of June 30, 2023, we have a security deposit of $5.9 million related to this lease.

On April 5, 2023 we terminated the Senior Secured Credit Facilities Credit Agreement, as amended (the "Credit Agreement"), with Silicon Valley Bank that we entered into on July 31, 2020. The Credit Agreement provided for a revolving credit facility covering borrowings and letters of credit in an aggregate principal amount not to exceed $40.0 million. Our obligations under the Credit Agreement were 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. Upon termination, these liens and all other obligations under the credit agreement, were released. A letter of credit remains at Silicon Valley Bank, a division of First Citizens Bank & Trust Company (successor by purchase to the Federal Deposit Insurance Corporation as Receiver for Silicon Valley Bridge Bank, N.A.) as successor to Silicon Valley Bank, in the amount of $5.9 million, securing our lease on our corporate headquarters. This letter of credit was transitioned to a cash collateral arrangment on March 30, 2023, and is classified as long-term restricted cash on our balance sheet at June 30, 2023.

Note 13. Income Taxes

Income tax expense was $3.0 million for the three months ended June 30, 2023, compared to $4.0 million for the three months ended June 30, 2022. The $1.0 million decrease was primarily due to a higher stock compensation deduction driven by an increase in stock price offset partially by an increase in pre-tax financial reporting income. Income tax expense was $8.2 million for the six months ended June 30, 2023, compared to $8.3 million for the six months ended June 30, 2022.

The effective tax rate for the three and six months ended June 30, 2023 was less than the U.S. statutory rate of 21% due to a forecasted Foreign Derived Intangible Income deduction, Federal research and development tax credits and a favorable discrete item related to equity compensation that reduces the annual tax rate.

The deferred income taxes of $38.9 million and $31.7 million as of June 30, 2023 and December 31, 2022, respectively, reflect the net tax effect of temporary differences between the carrying amount of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes, as well as the tax effect of carryforwards. As of June 30, 2023, we have recorded a $10.6 million valuation allowance in the U.S. against certain tax credits and state net operating losses due to the uncertainty of their realization. Realization of our net deferred tax assets is dependent on future taxable income. We believe it is more likely than not that such assets will be realized; however, ultimate realization could be impacted by market conditions and other variables not known or anticipated at this time.

Note 14. Concentration of Risk

For the three months ended June 30, 2023, no individual customer accounted for greater than ten percent of revenue. For the three months ended June 30, 2022, two customers accounted for 19.3% and 11.6% of total revenue, respectively.

For the six months ended June 30, 2023, two customers accounted for 11.6% and 11.1% of total revenue, respectively. For the six months ended June 30, 2022, three customers accounted for 15.3%, 10.7% and 10.3% of total revenue, respectively.

At June 30, 2023, two customers accounted for 12.5% and 11.5% of accounts receivable, respectively. At December 31, 2022, two customers accounted for 19.4% and 11.5% of accounts receivable, respectively.

Note 15. Share Repurchase

In February 2022, our Board of Directors approved stock repurchases of up to $100 million of our common stock. During the six months ended June 30, 2023, we repurchased 0.2 million shares at an average cost of $123.80 per share. The timing and actual number of any additional shares to be repurchased under this program will depend on various factors including price, corporate and regulatory requirements, alternative investment opportunities and other market conditions.

Repurchased shares are accounted for when the transaction is settled and returned to the status of authorized but unissued shares. Accordingly, the repurchases 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.

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, 2022, 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 currently occur primarily in the United States and South Korea. 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 57.6% of total revenue for the six months ended June 30, 2023.

The first half of 2023 exhibited continued strong demand for our capital equipment, despite a downturn in the memory segment of our industry that is causing other semiconductor equipment makers to experience lower revenues than the same period in the prior year. Supply chain performance improved, but has not completely recovered from the challenges seen in prior periods. Axcelis' strong results in the first half of 2023 demonstrate our ability to meet demand and manage supply chain difficulties. Our performance is closely related to the growing mature process technology market, with 93% of shipments during the first half of 2023 going to mature foundry/logic customers.

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, 2022 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 Condition and Results of Operations" included in our Annual Report on Form 10-K for the year ended December 31, 2022.

Results of Operations

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

	Three months ended June 30,		Six months ended June 30,	
	2023	2022	2023	2022
Revenue:				
Product	97.0 %	96.7 %	96.9 %	96.6 %
Services	3.0	3.3	3.1	3.4
Total revenue	100.0	100.0	100.0	100.0
Cost of revenue:				
Product	53.6	52.4	54.8	52.6
Services	2.7	2.8	2.8	2.9
Total cost of revenue	56.3	55.2	57.6	55.5
Gross profit	43.7	44.8	42.4	44.5
Operating expenses:				
Research and development	8.8	8.5	9.1	8.4
Sales and marketing	5.7	5.7	5.6	5.6
General and administrative	6.0	6.1	5.9	6.2
Total operating expenses	20.5	20.3	20.6	20.2
Income from operations	23.2	24.5	21.8	24.3
Other income (expense):				
Interest income	1.6	0.2	1.6	0.1
Interest expense	(0.5)	(0.6)	(0.5)	(0.7)
Other, net	(0.7)	(2.3)	(0.6)	(1.6)
Total other income (expense)	0.4	(2.7)	0.5	(2.2)
Income before income taxes	23.6	21.8	22.3	22.1
Income tax provision	1.1	1.8	1.6	1.9
Net income	22.5 %	20.0 %	20.7 %	20.2 %

Revenue

The following table sets forth our product and services revenue:

	Three months ended June 30,		Period-to-Period Change		Six months ended June 30,		Period-to-Period Change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
Revenue:								
Product	$ 265,673	$ 213,926	$ *51,747*	*24.2 %*	$ 511,680	$ 410,458	$ 101,222	*24.7 %*
Percentage of revenue	*97.0 %*	*96.7 %*			*96.9 %*	*96.6 %*		
Services	8,297	7,251	*1,046*	*14.4 %*	16,310	14,314	1,996	*13.9 %*
Percentage of revenue	*3.0 %*	*3.3 %*			*3.1 %*	*3.4 %*		
Total revenue	$ 273,970	$ 221,177	$ 52,793	*23.9 %*	$ 527,990	$ 424,772	$ 103,218	*24.3 %*

Three months ended June 30, 2023 Compared with Three months ended June 30, 2022

Product

Product revenue, which includes systems sales, sales of spare parts, product upgrades and used systems was $265.7 million, or 97.0% of revenue, during the three months ended June 30, 2023, compared with $213.9 million, or 96.7% of revenue, for the three months ended June 30, 2022. The $51.7 million increase in product revenue for the three-month period ended June 30, 2023, in comparison to the same period in 2022, was primarily driven by an increase in the number of systems sold.

Deferred revenue includes payments received in advance of system sales as well as deferral of revenue from systems sales for installation and other future performance obligations. The total amount of deferred revenue at June 30, 2023 and December 31, 2022 was $182.5 million and $154.7 million, respectively. The increase in deferred revenue was primarily due to payments received in advance of sales.

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 $8.3 million, or 3.0% of revenue, for the three months ended June 30, 2023, compared with $7.3 million, or 3.3% of revenue, for the three months ended June 30, 2022. 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.

Six months ended June 30, 2023 Compared with Six months ended June 30, 2022

Product

Product revenue was $511.7 million, or 96.9% of revenue, during the six months ended June 30, 2023, compared with $410.5 million, or 96.6% of revenue, for the six months ended June 30, 2022. The $101.2 million increase in product revenue for the six-month period ended June 30, 2023, in comparison to the same period in 2022, was primarily driven by an increase in the number of systems sold.

Services

Services revenue was $16.3 million, or 3.1% of revenue, for the six months ended June 30, 2023, compared with $14.3 million, or 3.4% of revenue, for the six months ended June 30, 2022.

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:

- 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 process technology and leading edge foundry and logic.

Aftermarket and Systems Revenue

Three months ended June 30, 2023 Compared with Three months ended June 30, 2022

Included in total revenue of $274.0 million during the three months ended June 30, 2023 is revenue from our Aftermarket business of $58.8 million, compared with $55.8 million of Aftermarket revenue for the three months ended June 30, 2022. 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. The remaining $215.2 million of revenue for the three months ended June 30, 2023 was from system sales, compared with $165.4 million of systems revenue for the three months ended June 30, 2022. Systems revenue fluctuates from period to period based on our customers' capital spending.

Six months ended June 30, 2023 Compared with Six months ended June 30, 2022

Included in total revenue of $528.0 million during the six months ended June 30, 2023 is revenue from our Aftermarket business of $117.6 million, compared with $107.6 million of Aftermarket revenue for the six months ended June 30, 2022. The remaining $410.4 million of revenue for the six months ended June 30, 2023 was from system sales, compared with $317.2 million of systems revenue for the six months ended June 30, 2022.

Gross Profit / Gross Margin

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

	Three months ended June 30,		Period-to-Period Change		Six months ended June 30,		Period-to-Period Change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
Gross Profit:								
Product	$ 118,932	$ 98,172	$ 20,760	*21.1 %*	$ 222,168	$ 187,063	$ 35,105	*18.8 %*
Product gross margin	*44.8 %*	*45.9 %*			*43.4 %*	*45.6 %*		
Services	771	1,009	(238)	*(23.6)%*	1,554	1,885	(331)	*(17.6)%*
Services gross margin	*9.3 %*	*13.9 %*			*9.5 %*	*13.2 %*		
Total gross profit	$ 119,703	$ 99,181	$ 20,522	*20.7 %*	$ 223,722	$ 188,948	$ 34,774	*18.4 %*
Gross margin	*43.7 %*	*44.8 %*			*42.4 %*	*44.5 %*		

Three months ended June 30, 2023 Compared with Three months ended June 30, 2022

Product

Gross margin from product revenue was 44.8% for the three months ended June 30, 2023, compared to 45.9% for the three months ended June 30, 2022. The decrease in gross margin primarily resulted from a less favorable mix of system revenue.

Services

Gross margin from services revenue was 9.3% for the three months ended June 30, 2023, compared to 13.9% for the three months ended June 30, 2022. The decrease in gross margin is attributable to changes in the mix of service contracts.

Six months ended June 30, 2023 Compared with Six months ended June 30, 2022

Product

Gross margin from product revenue was 43.4% for the six months ended June 30, 2023, compared to 45.6% for the six months ended June 30, 2022. The decrease in gross margin primarily resulted from a less favorable mix of system revenue.

Services

Gross margin from services revenue was 9.5% for the six months ended June 30, 2023, compared to 13.2% for the six months ended June 30, 2022. 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 June 30,		Period-to-Period Change		Six months ended June 30,		Period-to-Period Change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
Research and development	$ 24,130	$ 18,731	$ 5,399	*28.8 %*	$ 47,903	$ 35,704	$ 12,199	*34.2 %*
Percentage of revenue	*8.8 %*	*8.5 %*			*9.1 %*	*8.4 %*		
Sales and marketing	15,537	12,703	2,834	*22.3 %*	29,681	23,994	5,687	*23.7 %*
Percentage of revenue	*5.7 %*	*5.7 %*			*5.6 %*	*5.6 %*		
General and administrative	16,328	13,602	2,726	*20.0 %*	31,073	26,180	4,893	*18.7 %*
Percentage of revenue	*6.0 %*	*6.1 %*			*5.9 %*	*6.2 %*		
Total operating expenses	$ 55,995	$ 45,036	$ 10,959	*24.3 %*	$ 108,657	$ 85,878	$ 22,779	*26.5 %*
Percentage of revenue	*20.5 %*	*20.3 %*			*20.6 %*	*20.2 %*		

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 $33.8 million, or 60.4%, of our total operating expenses for the three months ended June 30, 2023, compared to $27.4 million, or 60.9%, of our total operating expenses for the three months ended June 30, 2022. Personnel costs were $64.5 million, or 59.3% of our total operating expenses for the six months ended June 30, 2023, compared to $51.6 million, or 60.1% of our total operating expenses for the six months ended June 30, 2022. The higher personnel costs for the three and six months ended June 30, 2023 are primarily due to increases in personnel-related expenses to support growth.

Research and Development

	Three months ended June 30,		Period-to-Period Change		Six months ended June 30,		Period-to-Period Change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
Research and development	$ 24,130	$ 18,731	$ 5,399	*28.8 %*	$ 47,903	$ 35,704	$ 12,199	*34.2 %*
Percentage of revenue	*8.8 %*	*8.5 %*			*9.1 %*	*8.4 %*		

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 research and development budgets to fund programs that we expect will solve customers' high value, high impact, ion implantation challenges.

Three months ended June 30, 2023 Compared with Three months ended June 30, 2022

Research and development expense was $24.1 million during the three months ended June 30, 2023, an increase of $5.4 million, or 28.8%, compared with $18.7 million during the three months ended June 30, 2022. The increase is primarily due to higher personnel expenses as well as an increase in the cost of project materials and related services for ongoing projects.

Six months ended June 30, 2023 Compared with Six months ended June 30, 2022

Research and development expense was $47.9 million during the six months ended June 30, 2023, an increase of $12.2 million, or 34.2%, compared with $35.7 million during the six months ended June 30, 2022. The increase is primarily due to higher personnel expenses as well as an increase in the cost of project materials and related services for ongoing projects.

Sales and Marketing

	Three months ended June 30,		Period-to-Period Change		Six months ended June 30,		Period-to-Period Change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
Sales and marketing	$ 15,537	$ 12,703	$ 2,834	*22.3 %*	$ 29,681	$ 23,994	$ 5,687	*23.7 %*
Percentage of revenue	*5.7 %*	*5.7 %*			*5.6 %*	*5.6 %*		

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

Three months ended June 30, 2023 Compared with Three months ended June 30, 2022

Sales and marketing expense was $15.5 million during the three months ended June 30, 2023, an increase of $2.8 million, or 22.3%, compared with $12.7 million during the three months ended June 30, 2022. The increase is primarily due to higher personnel expenses and travel-related expense.

Six months ended June 30, 2023 Compared with Six months ended June 30, 2022

Sales and marketing expense was $29.7 million during the six months ended June 30, 2023, an increase of $5.7 million, or 23.7%, compared with $24.0 million during the six months ended June 30, 2022. The increase is primarily due to higher personnel expenses and travel-related expense.

General and Administrative

	Three months ended June 30,		Period-to-Period Change		Six months ended June 30,		Period-to-Period Change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
General and administrative	$ 16,328	$ 13,602	$ 2,726	*20.0 %*	$ 31,073	$ 26,180	$ 4,893	*18.7 %*
Percentage of revenue	*6.0 %*	*6.1 %*			*5.9 %*	*6.2 %*		

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 June 30, 2023 Compared with Three months ended June 30, 2022

General and administrative expense was $16.3 million during the three months ended June 30, 2023, an increase of $2.7 million, or 20.0%, compared with $13.6 million during the three months ended June 30, 2022. The increase is primarily due to an increase in personnel expenses and consulting fees.

Six months ended June 30, 2023 Compared with Six months ended June 30, 2022

General and administrative expense was $31.1 million during the six months ended June 30, 2023, an increase of $4.9 million, or 18.7%, compared with $26.2 million during the six months ended June 30, 2022. The increase is primarily due to an increase in personnel expenses and to a lesser extent, consulting fees.

Other Income (Expense)

	Three months ended June 30,		Period-to-period change		Six months ended June 30,		Period-to-period change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
Other income (expense):	$ 908	$ (5,949)	$ (6,857)	*115.3* %	$ 2,453	$ (8,990)	$ (11,443)	*127.3* %
Percentage of revenue	*0.4* %	*(2.7)*%			*0.5* %	*(2.2)*%		

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

Other income was $0.9 million for the three months ended June 30, 2023, compared with other expense of $5.9 million for the three months ended June 30, 2022. The $6.9 million change in other income (expense) compared to the same prior year period was primarily due to an increase in interest income of $4.0 million and a decrease in exchange loss of $2.9 million. Other income was $2.5 million for the six months ended June 30, 2023, compared with other expense of $9.0 million for the six months ended June 30, 2022. The $11.4 million change in other income (expense) compared to the same prior year period was primarily due to an increase in interest income of $7.8 million and a decrease in exchange loss of $3.2 million.

During the six-month periods ended June 30, 2023 and 2022, we had no significant off-balance sheet risk such as exchange contracts, option contracts or other hedging arrangements.

Income Tax Provision

	Three months ended June 30,		Period-to-period change		Six months ended June 30,		Period-to-period change	
	2023	2022	$	%	2023	2022	$	%
	(dollars in thousands)							
Income tax provision	$ 3,037	$ 4,007	$ (970)	*(24.2)*%	$ 8,242	$ 8,276	$ (34)	*(0.4)*%
Percentage of revenue	*1.1* %	*1.8* %			1.6 *%*	1.9 *%*		

Income tax expense was $3.0 million for the three months ended June 30, 2023, compared to $4.0 million for the three months ended June 30, 2022. The $1.0 million decrease was primarily due to a higher stock compensation deduction driven by an increase in stock price offset partially by an increase in pre-tax financial reporting income. Income tax expense was $8.2 million for the six months ended June 30, 2023, compared to $8.3 million for the six months ended June 30, 2022.

The effective tax rate for the three and six months ended June 30, 2023 was less than the U.S. statutory rate of 21% due to a forecasted Foreign Derived Intangible Income deduction, Federal research and development tax credits and a favorable discrete item related to equity compensation that reduces the annual tax rate.

The deferred income taxes of $38.9 million and $31.7 million as of June 30, 2023 and December 31, 2022, respectively, reflect the net tax effect of temporary differences between the carrying amount of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes, as well as the tax effect of carryforwards. As of June 30, 2023, we have recorded a $10.6 million valuation allowance in the U.S. against certain tax credits and state net operating losses due to the uncertainty of their realization. Realization of our net deferred tax assets is dependent on future taxable income. We believe it is more likely than not that such assets will be realized; however, ultimate realization could be impacted by market conditions and other variables not known or anticipated at this time.

Liquidity and Capital Resources

At June 30, 2023, we had $132.5 million in unrestricted cash and cash equivalents and $320.4 million in short-term investments, in addition to $6.7 million in restricted cash. Management believes that maintaining a strong cash balance is necessary to fund a continuing ramp in our business which can require significant cash investment to meet sudden demand. Additionally, we are using cash to repurchase shares as part of our stock repurchase program and 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 sales 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 industry requires ongoing investments in operations and research and development that are not easily adjusted to reflect changes in revenue. As a result, profitability and cash flows can fluctuate more widely than revenue. Stock repurchases, as discussed below, also reduce our cash balances.

During the six months ended June 30, 2023 and 2022, we generated $67.3 million and $29.2 million, respectively, of cash related to operating activities.

Investing activities for the six months ended June 30, 2023 resulted in cash outflows of $73.2 million, $5.2 million of which was used for capital expenditures and $188.9 million of which was used to purchase short-term investments, offset by $120.9 million related to maturities of short-term investments. Investing activities for the six months ended June 30, 2022 resulted in cash outflows of $3.4 million used for capital expenditures.

Financing activities for the six months ended June 30, 2023 resulted in a cash usage of $40.1 million. During the first six months of 2023, $25.0 million in cash was used to repurchase our common stock and $15.5 million was used for payments to government tax authorities for income tax withholding on employee compensation arising from the vesting of RSUs, where units are withheld by the Company to cover taxes, as well as $0.6 million relating to the reduction of the liability under the finance lease of our corporate headquarters. These amounts were partially offset by $1.0 million of proceeds related to the purchase of shares under our 2020 ESPP and exercise of stock options during the first six months of 2023. In comparison, financing activities for the six months ended June 30, 2022 resulted in cash usage of $40.7 million, $32.5 million of which related to the repurchase of our common stock and $9.2 million of which related to payments made to government tax authorities for income tax withholding on employee compensation arising from the vesting of RSUs, as well as $0.5 million relating to the reduction of our financing lease liability. These amounts were partially offset by $1.5 million of proceeds related to the purchase of shares under our ESPP and exercise of stock options during the first six months of 2022.

On April 5, 2023, we terminated the Senior Secured Credit Facilities Credit Agreement, as amended (the “Credit Agreement”), with Silicon Valley Bank that we entered into on July 31, 2020. The Credit Agreement provided for a revolving credit facility covering borrowings and letters of credit in an aggregate principal amount not to exceed $40.0 million. Our obligations under the Credit Agreement were 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. Upon termination, these liens and all other obligations under the credit agreement, were released. A letter of credit remains at Silicon Valley Bank, a division of First Citizens Bank & Trust Company (successor by purchase to the Federal Deposit Insurance Corporation as Receiver for Silicon Valley Bridge Bank, N.A.) as successor to Silicon Valley Bank, in the amount of $5.9 million, securing our lease on our corporate headquarters. This letter of credit was transitioned to a cash collateral arrangment on March 30, 2023, and is classified as long-term restricted cash on our balance sheet at June 30, 2023.

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

Commitments and Contingencies

Significant commitments and contingencies at June 30, 2023 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 included in our Annual Report on Form 10-K for the fiscal year ended December 31, 2022.

Item 3. Quantitative and Qualitative Disclosures about Market Risk.

As of June 30, 2023, there have been no material changes to the quantitative information about market risk disclosed in Item 7A, “Quantitative and Qualitative Disclosures about Market Risk” included in our Annual Report on Form 10-K for the year ended December 31, 2022.

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 June 30, 2023 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 June 30, 2023, there have been no material changes to the risk factors described in Item 1A, "Risk Factors" included in our Annual Report on Form 10-K for the year ended December 31, 2022.

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

In February 2022, our Board of Directors authorized a share repurchase program 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 June 30, 2023 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
	(in thousands except per share amounts)			
April 1 through April 30	27	$126.06	27	26,665
May 1 through May 31	56	$126.51	56	19,581
June 1 through June 30	12	$161.88	12	17,506
Total	95		95	

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not Applicable.

Item 5. Other Information.

During the quarter ended June 30, 2023, no director or officer adopted or terminated any contract, instrument or written plan for the purchase or sale of Axcelis securities intended to satisfy the affirmative defense conditions of Rule 10b5-1(c) under the Exchange Act or any non-Rule 10b5-1 trading arrangement as defined in Item 408(c) of Regulation S-K.

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 11, 2022. Incorporated by reference to Exhibit 3.2 of the Company's Form 8-K filed with the SEC on May 11, 2022.
10.1	Employment Agreement between Axcelis Technologies, Inc. and Russell J. Low dated as of May 11, 2023. Incorporated by reference to Exhibit 10.1 of the Company's Form 8-K filed with the SEC on May 12, 2023.
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 August 3, 2023.
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 August 3, 2023.
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 August 3, 2023.
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 August 3, 2023.
101*	The following materials from the Company's Form 10-Q for the quarter ended June 30, 2023, 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).

* Filed herewith
** This exhibit is being furnished rather than filed, and shall not be deemed incorporated by reference into any filing, in accordance with Item 601 of Regulation S-K.

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: August 3, 2023	By: /s/ KEVIN J. BREWER
	Kevin J. Brewer *Executive Vice President and Chief Financial Officer* *Duly Authorized Officer and Principal Financial Officer*

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, Russell J. Low, 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: August 3, 2023

/s/ RUSSELL J. LOW

Russell J. Low,
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: August 3, 2023

/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 August 3, 2023.

/s/ RUSSELL J. LOW

Russell J. Low
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 August 3, 2023.

/s/ KEVIN J. BREWER

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