AXCELIS TECHNOLOGIES INC
Form 10-K
March 04, 2016

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2015

o **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) (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	**Name of each exchange on which registered**
Common Stock, $.001 par value	The Nasdaq Stock Market LLC

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

None

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

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

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 ý No o

Indicate by checkmark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files). Yes ý No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ý

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

Large accelerated filer o	Accelerated filer ý	Non-accelerated filer o (Do not check if a smaller reporting company)	Smaller reporting company o

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

Aggregate market value of the voting stock held by non-affiliates of the registrant as of June 30, 2015: $285,790,269

Number of shares outstanding of the registrant's Common Stock, $0.001 par value, as of March 1, 2016: 116,152,261.

Documents incorporated by reference:

Portions of the definitive Proxy Statement for Axcelis Technologies, Inc.'s Annual Meeting of Stockholders to be held on May 4, 2016 are incorporated by reference into Part III of this Form 10-K.

PART I

Item 1. Business.

Overview of Our Business

Axcelis Technologies, Inc. ("Axcelis," the "Company," "we," "us," or "our") designs, manufactures and services ion implantation and other processing equipment used in the fabrication of semiconductor chips. We believe that our Purion family of products are the most innovative implanters available on the market today. We sell to leading semiconductor chip manufacturers worldwide. The ion implantation business represents 93.7% of our revenue in 2015 with the remaining 6.3% of revenue derived from other legacy processing systems. In addition to equipment, we provide extensive aftermarket lifecycle products and services, including used tools, spare parts, equipment upgrades, maintenance services and customer training.

Axcelis' business commenced in 1978 and its current corporate entity was incorporated in Delaware in 1995, headquartered in Beverly, Massachusetts. We maintain an internet site at www.axcelis.com. On or through our website, investors may access, free of charge, our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the Securities and Exchange Commission. Our website and the information contained therein or connected thereto shall not be deemed to be incorporated into this Form 10-K.

Industry Overview

Semiconductor chips, also known as integrated circuits, are used in personal computers, telecommunication equipment, digital consumer electronics, wireless communication products and other applications. Types of semiconductor chips include memory chips (which store and retrieve information), microprocessors (logic devices which process information) and "system on chip" devices (which have both logic and memory features). Most semiconductor chips are built on a wafer of silicon of either 200mm (8 inches) or 300mm (12 inches) in diameter. Each semiconductor chip is made up of millions of tiny transistors or "switches" to control the functions of the device. Transistors are created in the silicon wafer by introducing various precisely placed impurities into the silicon in specific patterns. The process steps in the formation of transistors are traditionally referred to as "front-end-of-line." The "back-end-of-line" process steps connect the transistors and other components together through several overlapping layers of metal wires, known as interconnect, creating a complete circuit. Each layer of metal interconnect must be separated by a non-conductive or insulating material called inter-level dielectric. Each layer that is added is selectively patterned to all previous layers through a process called photolithography.

Semiconductor chip manufacturers utilize many different types of equipment in the making of integrated circuits. Over 300 process steps utilizing over 50 different types of process tools are required to make a single device like a microprocessor. Semiconductor chip manufacturers seek device performance benefits through new products and technology enhancements and productivity improvements through increased throughput, equipment utilization and higher manufacturing yields.

Capacity is added by increasing the amount of manufacturing equipment in existing fabrication facilities and by constructing new fabrication facilities. Periodically the semiconductor device industry adopts a larger silicon wafer size to achieve lower manufacturing costs. Semiconductor manufacturers can produce more chips on a larger wafer, thus reducing the overall manufacturing cost per chip. For example, the use of 200mm wafers in production began at the end of the 1980s. The migration from 200mm to 300mm began at the end of the 1990s. The majority of wafer fabrication facilities today are using wafers with a diameter of 300mm. In 2015, Axcelis derived 87.0% of total systems revenue (a component of product revenue) from sales of 300mm equipment. In 2011, industry participants began

planning for the next wafer size transition, to 450mm diameter wafers. The schedule for this future transition will vary by customer, but is not anticipated before 2020.

The customer base is also changing. Given the magnitude of the investment needed to build a new wafer fabrication facility (often referred to as a "fab"), which can be over $4.0 billion for a new 300mm fab, many customers are entering into partnerships to offset the cost of technology development and manufacturing. In addition, many chip developers outsource all or part of their chip manufacturing requirements to contract manufacturers, known as foundries. Foundries are significant purchasers of semiconductor manufacturing equipment.

The semiconductor capital equipment industry is highly cyclical, as global chip production capacities successively exceed, then lag behind, global chip demand. When chip demand is high, and inventories low, chip manufacturers add capacity through capital equipment purchases. Given the difficulties of forecasting and calibrating chip demand and production capacity, the industry periodically experiences excess chip inventories and softening chip prices. Device manufacturers react with muted capital spending, lowering the demand for capital equipment. Changes in consumer and business demand for products in which chips are used also affect the industry. A successful semiconductor equipment manufacturer must not only provide some of the most technically complex products manufactured in the world but also must design its business to thrive during the inevitable low points in the cycle.

Our financial results in 2015 reflect our continued investment of a significant portion of our resources in research and development programs related to our leading edge Purion ion implantation platform and the market introduction and sales of Purion H systems. These results also reflect our efforts to maintain tight control of discretionary spending. We expect customer demand for our Purion products to continue to grow.

Axcelis' Strategy

Axcelis' 2016 strategic initiatives are:

- Achieve implant market share goals by further expansion of our Purion customer base across all segments:
  - Capitalize on strength in memory
  - Grow in non-leading edge foundry/logic
  - Leverage technical differentiators in leading edge foundry/logic
- Increase aftermarket revenues by delivering differentiated high value products in each business segment, including upgrades, spares, consumables, service and used tools
- Enhance profitability and cash generation
  - Improve gross margins

We have continued to invest in research and development through the industry cycles to assure our products meet the needs of our customers. We take pride in our scientists and engineers who continue to add to our portfolio of patents and unpatented proprietary technology to ensure that our investment in technology leadership is translated into unique product advantages. We strive for operational excellence by focusing on ways to lower our product, manufacturing and design costs and to improve our delivery times to our customers. We will continue to use our Global Customer Teams and a focused account management structure to maintain and strengthen our customer relationships and increase customer satisfaction. Finally, we will maintain a strong cash balance to insure that we have enough capital to fund a potential ramp in our business.

Ion Implantation Systems

Ion implantation is a principal step in the transistor formation cycle of the semiconductor manufacturing process. An ion implanter is a large, technically advanced system that injects dopants such as arsenic, boron or phosphorus into a wafer. These dopants are ionized and therefore have electric charges. With an electric charge they can be manipulated, moved and accelerated with electric and magnetic fields. Ion implanters use these fields to create a beam of ions with a precisely defined amount of energy (ranging between several hundred and three million electron-volts) and with a precisely defined amount of beam current (ranging from microamps to milliamps). Certain areas of the silicon wafer are blocked off by a polymer material known as photoresist, which acts as a "stencil" to pattern devices so that the dopants will only enter the wafer where needed. The dopants change the electrical properties of the silicon wafer to create the active components of a chip, called the transistors. Typical process flows require twenty implant steps, with the most advanced processes requiring thirty or more. Each implant step is characterized by four key parameters: dopant type, dose (amount of dopant), energy (depth into the silicon) and tilt (angle of wafer relative to the ion beam).

In order to cover the wide range of implant steps, three different types of implanters have been developed, each designed to cover a specific range of applications, primarily defined by dose and energy. The three traditional implanter types are referred to as medium current, high current and high energy:

Medium current implanters are the original model of ion implanter, with mid to low-range energy and dose capability.

High current implanters were the second type of implanter to emerge, having low energy capability and high dose range.

High energy implanters emerged to address the need for deeper implants with a high energy range and low dose.

The Purion Platform and Family of Ion Implanters

Axcelis offers a complete line of high energy, high current and medium current implanters for all application requirements. Our flagship systems are all based on a common Purion platform which offers purity, precision and productivity by combining a high-speed, state-of-the-art single wafer end station, enabling unmatched throughput (500 wafers per hour), and an advanced spot beam that ensures that all points across the wafer see the same beam at the same beam angle, resulting in exceptional process control and maximum yield.

High Energy Implant. Our Purion XE high energy system, combines Axcelis' production-proven RF Linac high energy, spot beam technology with the Purion platform. Axcelis is a market leader in high energy ion implanters, and we expect to maintain our leadership in the high energy segment through sales of both our multi-wafer legacy high energy systems and the Purion XE. In 2015, we secured three new customers for the Purion XE in six different fabrication facilities. We also introduced the Purion VXE, which offers a higher energy range.

Medium Current Implant. Our Purion M medium current system offers higher productivity and lower cost of ownership than competitive offerings, in addition to other advantages. Four customers, in both the memory and leading edge foundry segments, have the Purion M in production in 2015. We received follow-on orders from existing customers and obtained a new customer Purion M design-win. We also invested in technology that facilitates the manufacture of specialty devices on the Purion M, such as silicon carbide.

High Current Implant. Our Purion H high current system fulfills all traditional high current requirements while extending beyond traditional high current energy and dose ranges. In order to maximize utilization and flexibility, the Purion H can process some traditional mid-current

implants. In addition, the Purion H is extendable into ultra-low energy applications to satisfy future process requirements, including leakage current performance. We currently have four customers using the Purion H in production, and in 2015 we received multiple orders from one leading edge memory customer.

We believe our ion implant products will continue to meet customer demand for advantages in productivity, process performance and technical extendibility. Our goal is to recapture ion implant market share leadership by the end of 2017.

Dry Strip

In December 2012, Lam Research Corporation ("Lam") purchased the intellectual property rights relating to our dry strip systems business. As a result of this transaction, we ceased the sale of 300mm dry strip wafer processing equipment in September 2013. In 2015, we and Lam agreed to extend the period of time in which we could sell dry strip systems for smaller wafers. Under the original agreement, our right to sell these systems ended in December 2015. As amended, we may continue to sell dry strip systems for 200mm and 150mm wafers through December 2017, provided royalties will be due to Lam on sales of 16 or more systems during the two year extension period. We will continue to service and support our dry strip installed base indefinitely.

Aftermarket Support and Services

Through our Global Service Solutions business, we offer our customers extensive aftermarket service and support throughout the lifecycle of the equipment we manufacture as well as equipment we previously manufactured. We believe that approximately 3,000 of our products are in use in 33 countries worldwide. The service and support that we provide includes used tools, spare parts, equipment upgrades, and maintenance services. We provide varying levels of sales, service and applications support out of our field offices to customers located in 33 countries. Revenue generated through our service and support business represented 43.0%, 59.8% and 61.6% of revenue in 2015, 2014 and 2013, respectively.

To support our aftermarket business, we have approximately 200 staff members, including sales and marketing personnel, field service engineers, and spare parts and applications engineers, as well as employees located at our manufacturing facilities who work with our customers to provide customer training and documentation, product, process and applications support. In 2012, Ulvac Techno, an unrelated Japanese company, began providing aftermarket services and support services for our non-implant products in Japan. In September 2015, we elected to terminate this agreement with Ulvac Techno, effective March 31, 2016. After that date, we will offer aftermarket support in Japan directly to customers.

Most of our customers maintain spare parts inventories for our machines. In addition to our web-based spare parts management and replenishment tracking program, we offer a number of Business-to-Business options to support our customers' parts management requirements. Our Axcelis Managed Inventory service offering, a parts consignment arrangement, provides the customer with full spares support, with Axcelis retaining responsibility for the complete supply chain. The expansion of these services provides ease of use alternatives that help us reduce order fulfillment costs and improve cycle time, resulting in an expanded customer base for this service offering.

Sales and Marketing

We primarily sell our equipment and services through our direct sales force. We conduct sales and marketing activities from our sales offices located in the United States, Taiwan, South Korea, China, Germany, Singapore and Italy.

SEN Corporation, or "SEN" (our former Japanese joint venture, which was divested in March 2009), holds a non-exclusive license to use certain patented and unpatented technology associated with legacy products owned by the Company. Axcelis holds a reciprocal license of implant technology from SEN. These royalty-free, perpetual cross licenses do not restrict our ability to sell any of our products in Japan or elsewhere in the world.

Concurrently with the sale of assets to Lam in December 2012, the Company and Lam entered into a Transition Agreement pursuant to which Lam granted us a worldwide, non-exclusive, non-transferable, royalty-free license to use the dry strip intellectual property rights sold by the Company. The license allowed us to make and sell dry strip wafer processing equipment for semiconductor applications for a limited transition period after the closing and to support our installed base of dry strip equipment on a perpetual basis.

International revenue, including export sales from our U.S. manufacturing facilities to foreign customers and sales by foreign subsidiaries and branches, accounted for 85.1%, 80.0% and 76.4% of total revenue in 2015, 2014 and 2013, respectively. Substantially all of our sales are denominated in U.S. dollars. See Note 18 to our Consolidated Financial Statements contained in Item 15 of this Form 10-K for a breakdown of our revenue and long-lived assets in the United States, Europe and Asia.

Customers

In 2015, the top 20 semiconductor manufacturers accounted for approximately 87.7% of total semiconductor industry capital spending, up slightly from 87.5% in 2014. These manufacturers are from the largest semiconductor manufacturing regions in the world: the United States, Asia Pacific (Taiwan, South Korea, Singapore and China), Japan and Europe. The Company serves leading semiconductor manufacturers.

Revenue from our ten largest customers accounted for 76.8%, 68.1% and 69.1%, of revenue in 2015, 2014 and 2013, respectively. We expect that sales of our products to relatively few customers will continue to account for a high percentage of revenue for the foreseeable future. In 2015, two customers accounted for 29.3% and 10.5% of revenue, respectively. In 2014, two customers accounted for 17.4% and 12.3% of revenue, respectively. In 2013, one customer accounted for 15.5% of revenue.

Our Beverly, Massachusetts Advanced Technology Center houses a process development laboratory with 12,500 sq. ft. of class 10/100/1000 clean room for product demonstrations and process development and a 34,000 sq. ft. customer training center. The Advanced Technology Center provides infrastructure and process capabilities that allow customers to test their unique process steps on our systems under conditions that substantially replicate the customers' production environment. This facility also provides significant capability for our research and development efforts.

Research and Development

Our industry continues to experience rapid technological change, requiring us to frequently introduce new products and enhancements. Our ability to remain competitive in this market will depend in part upon our ability to develop new and enhanced systems and to introduce these systems at competitive prices on a timely and cost effective basis.

We devote a significant portion of our personnel and financial resources to research and development programs and seek to maintain close relationships with our customers to remain responsive to their product needs. We have also sought to reduce the development cycle for new products through a collaborative process whereby our engineering, manufacturing and marketing personnel work closely together with one another and with our customers at an earlier stage in the process. We also use 3D, computer-aided design, finite element analysis and other computer-based modeling methods to test new designs.

Our expenses for research and development were $32.6 million, $33.5 million and $34.8 million in 2015, 2014 and 2013, respectively, or 10.8%, 16.5% and 17.8% of revenue, respectively. We expect that research and development expenditures will continue to represent a similar level of investment in future years.

Manufacturing

We manufacture products at our 417,000 sq. ft. ISO 9001:2008, ISO 14001:2004 certified plant in Beverly, Massachusetts. Our facility employs best in class manufacturing techniques, including lean manufacturing, six sigma controls and advanced inventory management, purchasing and quality systems.

Our clean manufacturing process uses class 1,000/10,000 space to facilitate most of our manufacturing requirements.

The Company's core manufacturing competency is built around system assembly and testing which remains an in-house capability due to the high degree of expertise and intellectual property associated with the process and design. Non-core work is sourced to one of several global partners and includes items such as power distribution, vacuum systems, wafer handling and commodity-level components. We continuously pursue outsourcing opportunities where the economics are justified, with a goal of enabling quality and margin improvement. Our supply chain team is globally focused and is located in Beverly and Singapore. Customized and commercially available software solutions drive our planning, purchasing and inventory tracking process.

Our products are designed to be assembled and tested in a modular fashion, which facilitates our industry-recognized "ship-from-cell" process. Specially developed test stands, software and tooling provide the framework for this accelerated delivery process. Customers that choose ship-from-cell substantially improve their delivery times while receiving the same high level of quality provided by more traditional longer cycle integration techniques. Product margins and inventory turns also improve as a result of shorter factory cycle times and increased labor productivity.

Installation of our equipment is provided by factory and field teams. The process includes assembling the equipment at its installation site and after it has been connected, recalibrating it to factory specifications.

Competition

The semiconductor wafer fabrication equipment industry is highly competitive and is characterized by a small number of participants ranging in size. Significant competitive factors in the semiconductor equipment market include price, cost of ownership, equipment performance, customer support, capabilities and breadth of product line.

In ion implantation, we mainly compete against Applied Materials, Inc. The Company and Applied Materials are the only ion implant manufacturers with a full range of implant products, and service and support infrastructures able to service our customers globally. Three other niche players we compete with from time to time include Advanced Ion Beam Technology, Inc., Nissin Ion Implantation Co., Ltd. and SEN.

Intellectual Property

We rely on patent, copyright, trademark and trade secret protection in the United States and in other countries, as well as contractual restrictions, to protect our proprietary rights in our products and our business. As of December 31, 2015, we had 320 active patents issued in the United States and 427 active patents granted in other countries, as well as 205 patent applications (48 in the United States and 157 in other countries) on file with various patent agencies worldwide. Patents are generally in effect for up to 20 years from the filing of the application.

We intend to file additional patent applications and grow our intellectual property portfolio as appropriate. Although patents are important to our business, we do not believe that we are substantially dependent on any single patent or any group of patents.

We have trademarks, both registered and unregistered, that are maintained to provide customer recognition for our products in the marketplace. Trademark registrations generally remain in effect as long as the trademarks are in use. From time to time, we enter into license agreements with third parties under which we obtain or grant rights to patented or proprietary technology. Except for our license agreement with SEN and our license from Lam (described above under "Sales and Marketing"), we do not believe that any of our licenses are currently material to us. We can give no assurance that we, our licensors, licensees, customers or suppliers will not be subject to claims of patent infringement or claims to invalidate our patents, or that any such claims will not be successful, requiring us to pay substantial damages or remove certain features from our products or both.

Backlog

Systems backlog, including deferred systems revenue, was $22.5 million and $37.9 million as of December 31, 2015 and 2014, respectively. We believe it is meaningful to investors to include deferred systems revenue as part of our backlog. Deferred systems revenue represents revenue that will be recognized in future periods based on prior shipments. Our policy is to include in backlog only those system orders for which we have accepted purchase orders and typically are due to ship within six months. All orders are subject to cancellations or rescheduling by customers with limited or no penalties.

Backlog does not include orders received and fulfilled within a quarter. Our backlog at the beginning of a quarter typically does not include all orders required to achieve our sales objectives for that quarter. Backlog is not necessarily an indicator of future business trends because orders for services or parts received during the quarter are generally performed or shipped within the same quarter.

Bookings in the quarter ended December 31, 2015 were $26.1 million compared to $56.1 million in the quarter ended December 31, 2014.

Employees

As of December 31, 2015, we had 774 employees and 34 temporary staff worldwide, of which 585 work in North America, 174 in Asia and 49 in Europe. We consider our relationship with our employees to be good. Our employees are not represented by a labor union and are not subject to a collective bargaining agreement. One of our European locations has formed a work council, which has certain information and discussion rights under applicable law.

Environmental

We are subject to environmental laws and regulations in the countries in which we operate that regulate, among other things: air emissions; water discharges; and the generation, use, storage, transportation, handling and disposal of solid and hazardous wastes produced by our manufacturing, research and development and sales activities. As with other companies engaged in like businesses, the nature of our operations exposes us to the risk of environmental liabilities, claims, penalties and orders.

We are proud of our commitment to improving our environment. We believe that our operations are in substantial compliance with applicable environmental laws and regulations and that there are no pending environmental matters that would have a material impact on our business. We are ISO-14001 certified at our Beverly, MA facility.

Executive Officers of the Registrant

Mary G. Puma, 58, has been our President and Chief Executive Officer since January 2002, having served as Chairman from 2005 to 2015. From May 2000 until January 2002, Ms. Puma was our President and Chief Operating Officer. In 1998, she became General Manager and Vice President of the Implant Systems Division of Eaton Corporation, a global diversified industrial manufacturer. In May 1996, she joined Eaton as General Manager of the Commercial Controls Division. Prior to joining Eaton, Ms. Puma spent 15 years in various marketing and general management positions for General Electric Company. Ms. Puma is a director of Nordson Corporation, North Shore Medical Center and Semiconductor Equipment and Materials International (SEMI).

Kevin J. Brewer, 57, became our Executive Vice President and Chief Financial Officer in September 2013, having served as interim Chief Financial Officer beginning in June 2013. Mr. Brewer also manages our Global Operations. Mr. Brewer had been our Executive Vice President, Global Operations since 2008 and our Senior Vice President, Manufacturing Operations since May 2005, prior to which he had been Vice President of Manufacturing Operations since October 2002 and Director of Operations from 1999 to 2002. Prior to joining Axcelis in 1999, Mr. Brewer was Director of Operations, Business Jets at Raytheon Aircraft Company, a leading manufacturer of business and special mission aircraft owned by Raytheon Company, a manufacturer of defense, government and commercial electronics, as well as aircraft. Prior to that, Mr. Brewer held various management positions in operations and strategic planning in Raytheon Company's Electronic Systems and Missile Systems groups.

Lynnette C. Fallon, 56, is our Executive Vice President, Human Resources/Legal and General Counsel, a position she has held since May 2005. Prior to that, Ms. Fallon was Senior Vice President HR/Legal and General Counsel since 2002, and Senior Vice President and General Counsel since 2001. Ms. Fallon has also been our corporate Secretary since 2001. Before joining Axcelis, Ms. Fallon was a partner in the Boston law firm of Palmer & Dodge LLP since 1992, where she was head of the Business Law Department from 1997 to 2001.

William Bintz, 59, has been our Executive Vice President, Product Development, Engineering and Marketing since 2011. Prior to that, he was our Senior Vice President, Marketing since September 2007, after joining Axcelis in early 2006 as Director of Marketing for curing and cleaning products and shortly thereafter becoming Vice President of Product Marketing. Prior to joining Axcelis, from 2002 Mr. Bintz was Product Director for Medium Current and High Energy Ion Implant System at Varian Semiconductor Equipment Associates, Inc. Before that, he was General Manager of the Materials Delivery Products Group at MKS Instruments, beginning in 1999, and General Manager of the Thermal Processing Systems Division at Eaton Corporation (now Axcelis) beginning in 1995.

John E. Aldeborgh, 59, has been our Executive Vice President, Customer Operations since February 2013, having joined Axcelis in January 2013 as our Senior Vice President, Customer Operations. Prior to joining Axcelis, Mr. Aldeborgh served as the Chief Executive Officer and President, and as a Director, of innoPad, Inc., a privately held manufacturer of Chemical Mechanical Planarization pads, since 2006. Mr. Aldeborgh served in various marketing and sales position at Varian Semiconductor Equipment Associates Inc. from 2002 to 2005, including Vice President of Sales and Marketing. Prior to Varian, Mr. Aldeborgh served as President and Chief Operating Officer of Ebara Technologies, Inc., from 1998 to 2002. Mr. Aldeborgh also held various positions, at Genus, Inc. from 1989 to 1998, including Executive Vice President and Chief Operating Officer.

Douglas A. Lawson, 55, has been our Executive Vice President, Corporate Marketing and Strategy since November 2013, having joined Axcelis as Vice President Business Development in 2010, and holding the position of Senior Vice President of Strategic Initiatives beginning in 2011. Mr. Lawson also manages our Information Technology function. Prior to joining the company in 2010, he held the position of General Manager of Luminus Devices from 2009 to 2010. He has over 30 years of

experience in the technology industry, and has held numerous executive and technical positions at BTU International, PRI Automation, Digital Equipment and Intel.

Item 1A. Risk Factors.

Risks Related to Our Business and Industry

Set forth below and elsewhere in this Form 10-K and in other documents we file with the SEC are risks and uncertainties that could cause actual results to differ materially from the results contemplated by the forward-looking statements contained in this Form 10-K. We note that factors set forth below, individually or in the aggregate, may cause our actual results to differ materially from expected and historical results. We note these factors for investors as permitted by the Private Securities Litigation Reform Act of 1995. You should understand that it is not possible to predict or identify all such factors. Consequently, you should not consider the following to be a complete discussion of all potential risks or uncertainties.

If semiconductor manufacturers do not make sufficient capital expenditures, our sales and profitability will be harmed.

New systems orders will depend upon demand from semiconductor manufacturers who build or expand fabrication facilities. When the rate of construction or expansion of fabrication facilities declines, demand for our systems will decline, reducing our revenue. Revenue decline also hurts our profitability because our established cost structure and our continued investments in engineering, research and development and marketing necessary to develop new products and to maintain extensive customer service and support capabilities limit our ability to reduce expenses in proportion to declining sales.

If we fail to develop and introduce reliable new or enhanced products and services that meet the needs of semiconductor manufacturers, our results will suffer.

Rapid technological changes in semiconductor manufacturing processes require us to respond quickly to changing customer requirements. Our future success will depend in part upon our ability to develop, manufacture and successfully introduce new systems and product lines with improved capabilities and to continue to enhance existing products. This will depend upon a variety of factors, including new product selection, timely and efficient completion of product design and development and of manufacturing and assembly processes, product performance in the field and effective sales and marketing. In particular:

We must continue to develop competitive technical specifications of new systems, or enhancements to our existing systems, and manufacture and ship these systems or enhancements in volume in a timely manner.

We will need to accurately predict the schedule on which our customers will be ready to transition to new products, in order to accurately forecast demand for new products while managing the transition from older products.

We will need to effectively manage product reliability or quality problems that often exist with new systems, in order to avoid reduced orders, higher manufacturing costs, delays in acceptance and payment and additional service and warranty expenses.

Our new products must be accepted in the marketplace.

Our failure to meet any of these requirements will have a material adverse effect on our operating results and profitability.

A significant portion of our revenue depends on customers electing to buy aftermarket products and services from Axcelis

Historically, a significant portion of our product revenue and all of our service revenue relates to our sale of "aftermarket" products and services, which include parts, consumables, upgrades, service contracts, and time and materials billings. Some of our customers purchase less aftermarket products and services, often training their own staff to maintain and service semiconductor equipment rather than relying on the equipment manufacturer for these services. In addition, we compete against third party parts suppliers for the sale of parts and consumables that are not protected by patents or otherwise proprietary. To the extent our customers purchase parts and services from other vendors or provide their own system maintenance labor, our revenue will be less.

Our financial results may fluctuate significantly.

We derive our new systems revenue from the sale of a relatively small number of expensive products to a small number of customers. The list prices on our ion implant systems range from $1.8 million to $5.5 million. We also sell used equipment in our aftermarket business. At our current sales level, each sale, or failure to make a sale, has a significant effect on us in a particular quarter. In a given quarter, a number of factors can adversely affect our revenue and results, including changes in our product mix, increased fixed expenses per unit due to reductions in the number of products manufactured, and higher fixed costs due to increased levels of research and development and expansion of our worldwide sales and marketing organization. Our financial results also fluctuate based on gross profit realized on sales. A variety of factors may cause gross profit as a percentage of revenue to vary, including the mix and average selling prices of products sold, costs to manufacture and customize systems, warranty costs and impact of changes to inventory reserves. New product introductions may also affect our gross margins. Fluctuations in our financial results may have an adverse effect on the price of our common stock.

Our financial results may fall short of anticipated levels because forecasting revenue and profitability is complex and may be inaccurate.

Management may from time to time provide financial forecasts. These forecasts are based on assumptions which are believed to be reasonable when made, of fab utilization, shipment timing and system acceptance timing. Any of these assumptions can prove erroneous and the level of revenue recognizable in a particular quarter may vary from the forecast. Our lengthy sales cycle, coupled with customers' competing capital budget considerations, make the timing of customer orders difficult to predict. In addition, our backlog at the beginning of a quarter typically does not include all orders required to achieve our sales objectives for that quarter and is not a reliable indicator of our future sales. As a result, our revenue and operating results for a quarter depend on our shipping orders as scheduled during that quarter, receiving customer acceptance of previously shipped products, and obtaining new orders for products to be shipped in that same quarter. Any delay in, or cancellation of, scheduled shipments and customer acceptances or in shipments from new orders could materially affect our financial results.

New accounting rules addressing revenue recognition have added more complexity in forecasting quarterly revenue and profitability. Orders for our products usually contain multiple delivery elements that result in revenue deferral under generally accepted accounting principles. Due to the foregoing factors, investors should understand that our actual financial results for a quarter may vary significantly from our forecasts of financial performance for that quarter. Failure to meet forecasted financial performance may have an adverse effect on the price of our common stock.

We may be unable to obtain needed additional capital to finance our operations.

Our capital requirements may vary widely from quarter to quarter, depending on, among other things, capital expenditures, fluctuations in our operating results, financing activities, acquisitions and investments and inventory and receivables management. We believe that our existing cash and cash equivalents will be sufficient to satisfy our anticipated cash requirements. A number of factors, including those described in these "Risk Factors," could prove our assumptions wrong and cause us to require additional capital from external sources. Depending on market conditions, future debt or equity financings may not be possible on attractive terms or at all. In addition, future debt or equity financings could be dilutive to the existing holders of our common stock.

The semiconductor industry is highly cyclical and we expect that demand for our products will regularly increase and decrease, making it difficult to manage the business and potentially causing harm to our sales and profitability.

The semiconductor business is highly cyclical, experiencing upturns when the demand for our products is high and downturns when our customers are not investing in new or expanded fabrication facilities. From time to time, inventory buildups in the semiconductor industry, resulting in part from periodic downturns, produce an oversupply of semiconductors. This can cause semiconductor manufacturers to revise capital spending plans, resulting in reduced demand for capital equipment such as our products. If an oversupply is not reduced by increasing demand from the various industries that use semiconductors, which we cannot accurately predict, our sales and profitability will be harmed. Our revenue can vary significantly from one point in the cycle to another, making it difficult to manage the business, both when revenue is increasing and when it is decreasing. In addition, a substantial portion of our operating expenses do not fluctuate with changes in volume. Significant decreases in revenue can therefore have a disproportionate effect on profitability.

If we fail to compete successfully in the highly competitive semiconductor equipment industry, our sales and profitability will decline.

The market for semiconductor manufacturing equipment is highly competitive and includes some companies with substantially greater financial, engineering, manufacturing, marketing and customer service and support resources than we have that may be better positioned to compete successfully in the industry. In addition, there are smaller, emerging semiconductor equipment companies that could provide innovative systems with technology that may have performance advantages over our systems. We expect our competitors to continue to improve the design and performance of their existing products and processes and to introduce new products and processes with improved price and performance characteristics. If we are unable to improve or introduce competing products when demanded by the markets, our business will be harmed. Finally, if we must lower prices to remain competitive without commensurate cost of goods savings, our gross margins and profitability will be adversely affected.

We are dependent on sales to a limited number of large customers; the loss of a significant customer or any reduction in orders from them could materially affect our sales.

Historically, we have sold a significant portion of our products and services to a limited number of fabricators of semiconductor products. For example, in 2015, our top ten customers accounted for 76.8% of our net sales, in comparison to 68.1% and 89.1% in 2014 and 2013, respectively. None of our customers has entered into a long-term agreement requiring it to purchase our products. Although the composition of the group comprising our largest customers has varied from year to year, the loss of a significant customer or any reduction or delays in orders from any significant customer could adversely affect us. The ongoing consolidation of semiconductor manufacturers may also increase the harmful effect of losing one or more significant customers.

Axcelis is subject to the risks of operating internationally and we derive a substantial portion of our revenue from outside the United States, especially from Asia.

We are substantially dependent on sales of our products and services to customers outside the United States. International sales, including export sales from our U.S. manufacturing facilities to non-U.S. customers and sales by our non-U.S. subsidiaries and branches, accounted for 84.8% of total revenue in 2015 in comparison to 80.0% of total revenue in 2014 and 76.4% in 2013. Ion Implanter system shipments to Asian customers represented 78.9% of total shipment dollars in 2015 in comparison to 78.3% in 2014 and 77.8% in 2013. We anticipate that international sales will continue to account for a significant portion of our revenue. Because of our dependence upon international sales, our results and prospects may be adversely affected by a number of factors, including:

unexpected changes in laws or regulations resulting in more burdensome governmental controls, tariffs, restrictions, embargoes or export license requirements;

volatility in currency exchange rates;

political and economic instability;

difficulties in accounts receivable collections;

extended payment terms beyond those customarily offered in the United States;

difficulties in managing suppliers, service providers or representatives outside the United States;

difficulties in staffing and managing foreign subsidiary and branch operations; and

potentially adverse tax consequences.

We may not be able to maintain and expand our business if we are not able to hire, retain and integrate qualified personnel.

Our business depends on our ability to attract and retain qualified, experienced employees. There is substantial competition for experienced engineering, technical, financial, sales and marketing personnel in our industry. In particular, we must attract and retain highly skilled design and process engineers. Competition for such personnel is intense, particularly in the Boston metropolitan area, as well as in other locations around the world. If we are unable to retain our existing key personnel, or attract and retain additional qualified personnel, we may from time to time experience insufficient levels of staffing to fully develop, manufacture and market our products and perform services for our customers. As a result, our growth could be limited or we could fail to meet our delivery commitments or experience deterioration in service levels or decreased customer satisfaction, all of which could adversely affect our financial results.

Our dependence upon a limited number of suppliers for many components and sub-assemblies could result in increased costs or delays in the manufacture and sale of our products.

We rely to a substantial extent on outside vendors to manufacture many of the components and sub-assemblies of our products. We obtain many of these components and sub-assemblies from a limited group of suppliers. Accordingly, we may be unable to obtain an adequate supply of required components on a timely basis, on price and other terms acceptable to us, or at all. In addition, we often quote prices to our customers and accept customer orders for our products before purchasing components and sub-assemblies from our suppliers. If our suppliers increase the cost of components or sub-assemblies, we may not have alternative sources of supply and may not be able to raise the price of our products to cover all or part of the increased cost of components, negatively impacting our gross margins.

The manufacture of some of these components and sub-assemblies is an extremely complex process and requires long lead times. As a result, we have in the past, and may in the future, experience delays or shortages. If we are unable to obtain adequate and timely deliveries of our required components or sub-assemblies, we may have to seek alternative sources of supply or manufacture these components internally. This could delay our ability to manufacture or to ship our systems on a timely basis, causing us to lose sales, incur additional costs, delay new product introductions and suffer harm to our reputation.

Our international operations involve currency risk.

Substantially all of our sales are billed in U.S. dollars, thereby reducing the impact of fluctuations in foreign exchange rates on our results. Operating margins of our foreign operations can fluctuate with changes in foreign exchange rates to the extent revenue is billed in U.S. dollars and operating expenses are incurred in the local functional currency. During the year ended December 31, 2015, approximately 24.7% of our revenue was derived from foreign operations with this inherent risk. In addition, at December 31, 2015, our operations outside of the United States accounted for approximately 20.7% of our total assets, the majority of which was denominated in currencies other than the U.S. dollar.

We are subject to cyber security risks, which could adversely affect our business.

We and certain of our third-party vendors receive and store personal information in connection with our human resources operations and other aspects of our business. Despite our implementation of security measures, our IT systems, like any system, are vulnerable to damages from computer viruses, natural disasters, unauthorized access, cyber-attack and other similar disruptions. Any system failure, accident or security breach could result in disruptions to our operations. A material network breach in the security of our IT systems could include the theft of our intellectual property or trade secrets. To the extent that any disruptions or security breach results in a loss or damage to our data, or in inappropriate disclosure of confidential information, it could cause significant damage to our reputation, affect our relationships with our customers, lead to claims against us and ultimately harm our business. In addition, we may be required to incur significant costs to protect against damage caused by these disruptions or security breaches in the future.

Our proprietary technology may be vulnerable to efforts by competitors to challenge or design around, potentially reducing our market share.

We rely on a combination of patents, copyrights, trademark and trade secret laws, non-disclosure agreements and other intellectual property protection methods to protect our proprietary technology. Despite our efforts to protect our intellectual property, our competitors may be able to legitimately ascertain the non-patented proprietary technology embedded in our systems. If this occurs, we may not be able to prevent their use of this technology. Our means of protecting our proprietary rights may not be adequate and our patents may not be sufficiently broad to prevent others from using technology that is similar to or the same as our technology. In addition, patents issued to us have been, or might be challenged, and might be invalidated or circumvented and any rights granted under our patents may not provide adequate protection to us. Our competitors may independently develop similar technology, duplicate features of our products or design around patents that may be issued to us. As a result of these threats to our proprietary technology, we may have to resort to costly litigation to enforce or defend our intellectual property rights. Finally, all patents expire after a period of time (in the U.S., patents expire 20 years from the date of filing of the patent application). Our market share could be negatively impacted by the expiration of a patent which had created a barrier for our competitors.

Axcelis also has agreements with third parties for licensing of patented or proprietary technology with Axcelis as the licensor or the licensee. Termination of license agreements could have an adverse impact on our financial performance or ability to ship products with existing configurations.

We (or customers that we indemnify) might face intellectual property infringement claims or patent disputes that may be costly to resolve and, if resolved against us, could be very costly to us and prevent us from making and selling our systems.

From time to time, claims and proceedings have been or may be asserted against us relative to patent validity or infringement matters. We typically agree to indemnify our customers from liability to third parties for intellectual property infringement arising from the use of our products in their intended manner. Therefore, we occasionally receive notification from customers who believe that we owe them indemnification or other obligations related to infringement claims made against the customers by third parties. Our involvement in any patent dispute or other intellectual property dispute or action to protect trade secrets, even if the claims are without merit, could be very expensive to defend and could divert the attention of our management. Adverse determinations in any litigation could subject us to significant liabilities to third parties, require us to seek costly licenses from third parties and prevent us from manufacturing and selling our systems. In addition, infringement indemnification clauses in system sale agreements may require us to take other actions or require us to provide certain remedies to customers who are exposed to indemnified liabilities. Any of these situations could have a material adverse effect on our business results.

If operations were disrupted at Axcelis' primary manufacturing facility and warehouse it would have a negative impact on our business.

We have one primary manufacturing facility and warehouse, located in Massachusetts. Its operations could be subject to disruption for a variety of reasons, including, but not limited to natural disasters, work stoppages, operational facility constraints and terrorism. Such disruption could cause delays in shipments of products to our customers and could result in cancellation of orders or loss of customers, which could seriously harm our business.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

We lease our principal facility in Beverly, Massachusetts, which comprises 417,000 square feet. The facility is principally used for manufacturing, research and development, sales/marketing, customer support, advanced process development, product demonstration, customer-training center and corporate headquarters. We believe that our manufacturing facilities and equipment generally are well maintained, in good operating condition, suitable for our purposes, and adequate for our present operations. See the discussion of the sale and leaseback of our principal facility in Note 3 to the financial statements included in Part IV of this Form 10-K.

We own 23 acres of undeveloped property in Beverly, Massachusetts, adjacent to our headquarters.

As of December 31, 2015, the Company also leased 36 other properties, of which 11 are located in the United States and the remainder are located in Asia and Europe, including offices in Taiwan, Singapore, South Korea, China, Malaysia, Italy and Germany. These properties are used for sales and service offices and warehousing.

Our Beverly, Massachusetts facility is ISO 9001:2008 and ISO 14001:2004 and our European office is ISO 9001:2008 certified.

Item 3. Legal Proceedings.

The Company is not presently a party to any litigation that it believes might have a material adverse effect on its business operations. The Company is, from time to time, a party to litigation that arises in the normal course of its business operations.

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Our common stock trades on the Nasdaq Global Select Market under the symbol ACLS. The following table sets forth the high and low closing sale prices as reported on the Nasdaq Global Select Market during each of the quarters for the two most recent years. As of March 4, 2016, we had approximately 4,000 stockholders of record. We have never paid any cash dividends to our shareholders and do not anticipate paying cash dividends in the foreseeable future.

	Common Stock Price	
	High	**Low**
2014		
First Quarter	$ 2.51	$ 2.11
Second Quarter	$ 2.25	$ 1.54
Third Quarter	$ 2.12	$ 1.71
Fourth Quarter	$ 2.56	$ 1.80
2015		
First Quarter	$ 2.88	$ 2.35
Second Quarter	$ 3.24	$ 2.49
Third Quarter	$ 3.41	$ 2.39
Fourth Quarter	$ 3.06	$ 2.34

Item 6. Selected Financial Data.

The following selected consolidated statements of operations data for each of the three years ended December 31, 2015, 2014 and 2013 and the consolidated balance sheets data as of December 31, 2015 and 2014 have been derived from the audited consolidated financial statements contained in Item 15 of Part IV of this Form 10-K. The selected consolidated balance sheets data as of December 31, 2013 and 2012, and the statements of operations data for the years ended December 31, 2012 and 2011, have been derived from the audited financial statements contained in our Form 10-K filed on March 11, 2014. The consolidated balance sheets data as of December 31, 2011 has been derived from the audited financial statements contained in our Form 10-K filed on March 1, 2013.

The historical financial information set forth below may not be indicative of our future performance and should be read together with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our historical consolidated financial statements and notes to those statements included in Item 7 of Part II and Item 15 of Part IV, respectively, of this Form 10-K.

	Years ended December 31,				
	2015	2014	2013	2012	2011
	(In thousands, except per share amounts)				
Consolidated statements of operations data:					
Revenue	$ 301,495	$ 203,051	$ 195,632	$ 203,385	$ 319,416
Gross profit	101,706	70,164	67,935	58,171	114,737
Income (loss) from operations	20,718	(10,661)	(14,618)	(30,938)	7,132
Income (loss) before income taxes	15,205	(10,167)	(16,104)	(32,388)	7,471
Net income (loss)	14,678	(11,266)	(17,144)	(34,034)	5,077
Net income (loss) per share:					
Basic	$ 0.13	$ (0.10)	$ (0.16)	$ (0.32)	$ 0.05
Diluted	$ 0.12	$ (0.10)	$ (0.16)	$ (0.32)	$ 0.05
Shares used in computing basic and diluted per share amounts:					
Basic	114,378	111,450	108,869	107,619	106,234
Diluted	120,916	111,450	108,869	107,619	109,098
Consolidated balance sheets data:					
Cash and cash equivalents	$ 78,889	$ 30,753	$ 46,290	$ 44,986	$ 46,877
Working capital	192,085	133,037	149,448	145,443	164,561
Total assets	288,280	227,654	233,549	222,158	269,245
Long-term liabilities	53,652	7,204	22,087	6,300	7,218
Stockholders' equity	190,260	168,352	176,002	186,076	214,555

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

Certain statements in "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" and "Risk Factors" and others discussed elsewhere in this Form 10-K. 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

The semiconductor capital equipment industry is subject to significant cyclical swings in capital spending by semiconductor manufacturers. Capital spending is influenced by demand for semiconductors and the products using them, the utilization rate and capacity of existing semiconductor manufacturing facilities and changes in semiconductor technology, all of which are outside of our control. As a result, our revenue and gross margins fluctuate from year to year and period to period. Our established cost structure does not vary significantly with changes in volume. We may experience fluctuations in operating results and cash flows depending on our revenue as driven by the level of capital expenditures by semiconductor manufacturers.

A successful semiconductor equipment manufacturer must not only provide some of the most technically complex products manufactured in the world but also must design its business to thrive during the inevitable low points in the cycle. Our financial results in 2015 reflect our investment of a significant portion of our resources in research and development programs related to our Purion ion implantation platform and the market introduction and initial sales of Purion systems. These results also reflect our efforts to maintain control of discretionary spending.

In 2014, we introduced the Purion H high current system. This system is critically important to the Company since it addresses the largest segment of the ion implant market, which represents 60% of the total $800 million to $1 billion ion implant market. We shipped seventeen Purion H high current ion implanters in 2015. We expect customer demands for our products to increase through 2016. Throughout 2016, we expect to continue to grow Purion system sales and improve gross margins while maintaining tight control of our cost structure, which we expect will yield improved financial results throughout 2016.

Consolidation and partnering within the semiconductor manufacturing industry has resulted in a smaller number of customers representing a substantial portion of our business. Our net revenue from our ten largest customers accounted for 76.8% of total revenue for the year ended December 31, 2015 compared to 68.1% and 69.1% of revenue for the years ended December 31, 2014 and 2013, respectively. For the year ended December 31, 2015, the Company had two customers representing 29.3% and 10.5% of total revenue, respectively.

Operating results for the years presented are not necessarily indicative of the results that may be expected for future interim periods or years as a whole.

Critical Accounting Estimates

Management's discussion and analysis of our financial condition and results of operations are based upon Axcelis' 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, revenue and expenses, and related disclosure of contingent assets and liabilities. On an on-going 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.

We believe the following accounting policies are critical in the portrayal of our financial condition and results of operations and require management's most significant judgments and estimates in the preparation of our consolidated financial statements. For additional accounting policies see Notes to Consolidated Financial Statements Note 2. Summary of Significant Accounting Policies.

Revenue Recognition

Our revenue recognition policy involves significant judgment by management. As described below, we consider a broad array of facts and circumstances in determining when to recognize revenue, including contractual service obligations to the customer, the complexity of the customer's post-delivery acceptance provisions, payment history, customer creditworthiness and the installation process. In the future, if the post-delivery acceptance provisions and installation process become more complex or result in a materially lower rate of acceptance, we may have to revise our revenue recognition policy, which could delay the timing of revenue recognition.

Our system sales transactions are made up of multiple elements, including the system itself and elements that are not delivered simultaneously with the system. These undelivered elements might include a combination of installation services, extended warranty and support and spare parts, all of which are generally covered by a single sales price.

Our system revenue arrangements with multiple elements are divided into separate units of accounting if specified criteria are met, including whether the delivered element has stand-alone value to the customer. If the criteria are met, then the consideration received is allocated among the separate units based on their relative selling price, and the revenue is recognized separately for each of the separate units.

We determine selling price for each unit of accounting (element) using vendor specific objective evidence ("VSOE") or third-party evidence ("TPE"), if they exist, otherwise, we use best estimated selling price ("BESP"). We generally expect that we will not be able to establish TPE due to the nature of our products, and, as such, we typically will determine selling price using VSOE or BESP.

Where required, we determine BESP for an individual element based on consideration of both market and Company-specific factors, including the selling price and profit margin for similar products, the cost to produce the deliverable and the anticipated margin on that deliverable and the characteristics of the varying markets in which the deliverable is sold.

Systems are not sold separately and VSOE or TPE is not available for the systems element. Therefore the selling price associated with systems is based on BESP. The allocated value for installation in the arrangement includes the greater of (i) the relative selling price of the installation or (ii) the portion of the sales price that will not be received until the installation is completed (the "retention"). The selling price of elements such as extended warranty for support, spare parts and support labor is also based on BESP. For the majority of regions, the selling price of installation is based upon the fair value of the service performed, including labor, which is based upon the estimated time to complete the installation at hourly rates, and material components, both of which are sold separately, or VSOE. In regions where VSOE does not exist the Company uses BESP.

Product revenue for products which have demonstrated market acceptance, is generally recognized upon shipment provided title and risk of loss has passed to the customer, evidence of an arrangement exists, prices are contractually fixed or determinable, collection is reasonably assured through historical collection results and regular credit evaluations, and there are no uncertainties regarding customer acceptance. Revenue from installation services is recognized at the time acceptance has occurred, as defined in the sales documentation, or, for certain customers, when both the acceptance has occurred and retention payment has been received. Revenue for other elements is recognized at the time products are shipped or the related services are performed.

We generally recognize product revenue for systems which have demonstrated market acceptance at the time of shipment because the customer's post-delivery acceptance provisions and installation process have been established to be routine, commercially inconsequential and perfunctory. We believe the risk of failure to complete a system installation is remote.

For initial shipments of systems with new technologies or in the small number of instances where we are unsure of meeting the customer's specifications or obtaining customer acceptance upon shipment of the system, we will defer the recognition of systems revenue and related costs until written customer acceptance of the system is obtained. This deferral period is generally within twelve months of shipment.

Impairment of Long-Lived Assets

We record impairment losses on long-lived assets when events and circumstances indicate that these assets might not be recoverable. Recoverability is measured by a comparison of the assets' carrying amount to their expected future undiscounted net cash flows. If such assets are considered to be impaired, the impairment is measured based on the amount by which the carrying value exceeds its fair value.

Future actual performance could be materially different from our current forecasts, which could impact future estimates of undiscounted cash flows and may result in the impairment of the carrying amount of the long-lived assets in the future. This could be caused by strategic decisions made in response to economic and competitive conditions, the impact of the economic environment on our customer base or a material adverse change in our relationships with significant customers.

We did not record an impairment charge for the years ended December 31, 2015, 2014 or 2013.

Accounts Receivable Allowance for Doubtful Accounts

We record an allowance for doubtful accounts for estimated losses resulting from the inability of our customers to make required payments. Our allowance for doubtful accounts is established based on a specific assessment of collectability of our customer accounts. If the financial condition of our customers were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances may be necessary.

Inventory Allowance for Excess and Obsolescence and Lower of Cost or Market

We record an allowance for estimated excess and obsolete inventory and lower of cost or market. The allowance is determined using management's assumptions of materials usage, based on estimates of forecasted and historical demand and market conditions. If actual market conditions become less favorable than those projected by management, additional inventory write-downs may be required.

Although we make every effort to ensure the accuracy of our forecasts or product demand and pricing assumptions, any significant unanticipated changes in demand, pricing, or technical developments would significantly impact the value of our inventory and our reported operating results. In the future, if we determine that inventory needs to be written down, the Company will recognize

such costs in our cost of revenue at the time of such determination. If we subsequently sell product that has previously been written down, our gross margin in that period will be favorably impacted.

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 relative 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.

Share-Based Compensation

Stock-based compensation expense with time-based conditions is estimated as of the grant date based on the fair value of the award and is recognized as expense over the requisite service period, which generally equals the vesting period, based on the number of awards that are expected to vest. Estimating the fair value for stock options requires judgment, including the expected term of our stock options, volatility of our stock, expected dividends, risk-free interest rates over the expected term of the options and the expected forfeiture rate.

We are responsible for estimating volatility and have considered a number of factors when estimating volatility. Our method of estimating expected volatility for all stock options granted relies on a combination of historical and implied volatility. We believe that this blended volatility results in a more accurate estimate of the grant-date fair value of employee stock options because it more appropriately reflects the market's current expectations of future volatility.

In limited circumstances, we also issue stock option grants with vesting based on performance or market conditions, such as the price of our common stock, or, a combination of time or market conditions. The fair values and derived service periods for all grants that have vesting based on market conditions are estimated using the Monte Carlo valuation method. For each stock option grant with vesting based on a combination of time or market conditions, where vesting will occur if either condition is met, the related compensation costs are recognized over the shorter of the explicit service period or the derived service period.

We use the straight-line attribution method to recognize expense for stock-based awards such that the expense associated with awards is evenly recognized throughout the period.

The amount of stock-based compensation recognized is based on the value of the portion of the awards that are ultimately expected to vest. We estimate forfeitures at the time of grant and revise them, if necessary, in subsequent periods if actual forfeitures differ from those estimates. The term "forfeitures" is distinct from "cancellations" or "expirations" and represents only the unvested portion of the surrendered stock-based award.

The benefits of tax deductions in excess of recognized compensation cost is reported as a financing cash flow, rather than as an operating cash flow. Because the Company does not recognize the benefit of tax deductions in excess of recognized compensation cost due to its cumulative net operating loss position, this had no impact on the Company's consolidated statement of cash flows for the years ended December 31, 2015, 2014 and 2013.

Income Taxes

We record income taxes using the asset and liability method. Deferred income tax assets and liabilities are recognized for the future tax consequences attributable to differences between the

financial statement carrying amounts of existing assets and liabilities and their respective income tax basis, and net operating loss and tax credit carryforwards.

Our consolidated financial statements contain certain deferred tax assets which have arisen primarily as a result of operating losses, as well as other temporary differences between financial and income tax accounting.

We establish a valuation allowance when it is more likely than not that some portion or all of the deferred tax assets will not be realized. Significant management judgment is required in determining our provision for income taxes, the deferred tax assets and liabilities and any valuation allowance recorded against those net deferred tax assets.

We evaluate the weight of all available evidence such as historical losses, projected future taxable income and the expected timing of the reversals of existing temporary differences to determine whether it is more likely than not that some portion or all of the net deferred income tax assets will not be realized.

Based on our level of deferred tax assets as of December 31, 2015 and our level of historical U.S. losses, we have determined that the current uncertainty regarding the realization of these assets is sufficient to warrant the need for a full valuation allowance against our U.S. net deferred tax assets. We have also determined that a valuation allowance is required on a portion of our foreign deferred tax assets.

Our income tax expense includes the largest amount of tax benefit for an uncertain tax position that is more likely than not to be sustained upon audit based on the technical merits of the tax position. Settlements with tax authorities, the expiration of statutes of limitations for particular tax positions, or obtaining new information on particular tax positions may cause a change to the effective tax rate. The Company recognizes accrued interest related to unrecognized tax benefits as interest expense and penalties as operating expense.

Results of Operations

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

	Years Ended December 31,		
	2015	2014	2013
Revenue:			
Product	92.5%	88.3%	86.7%
Services	7.5	11.7	13.3
Total revenue	100.0	100.0	100.0
Cost of revenue:			
Product	60.1	55.8	54.5
Services	6.2	9.7	10.8
Total cost of revenue	66.3	65.5	65.3
Gross profit	33.7	34.5	34.7
Operating expenses:			
Research and development	10.8	16.5	17.8
Sales and marketing	7.7	10.2	10.8
General and administrative	8.3	11.8	13.0
Gain on sale of dry strip systems assets and intellectual property			(0.6)
Restructuring charges		1.3	1.2
Total operating expenses	26.8	39.8	42.2
Income (loss) from operations:	6.9	(5.3)	(7.5)
Other income (expense):			
Interest income			
Interest expense	(1.7)	(0.5)	(0.3)
Other, net	(0.2)	0.8	(0.5)
Total other income (expense)	(1.9)	0.3	(0.8)
Income (loss) before income taxes	5.0	(5.0)	(8.3)
Income tax provision	0.1	0.5	0.5
Net income (loss)	4.9%	(5.5)%	(8.8)%

Revenue

The following table sets forth our revenue:

	Years ended December 31,		Period-to-Period Change		Years ended December 31,		Period-to-Period Change	
	2015	2014	$	%	2014	2013	$	%
	(dollars in thousands)							
Revenue:								
Product	$ 278,875	$ 179,246	$ 99,629	*55.6%*	$ 179,246	$ 169,587	$ 9,659	*5.7%*
Percentage of revenue	*92.5%*	*88.3%*			*88.3%*	*86.7%*		
Services	22,620	23,805	(1,185)	*(5.0)%*	23,805	26,045	(2,240)	*(8.6)%*
Percentage of revenue	*7.5%*	*11.7%*			*11.7%*	*13.3%*		

Total revenue	$ 301,495	$ 203,051	$ 98,444	48.5%	$ 203,051	$ 195,632	$ 7,419	3.8%		

2015 Compared with 2014

Product

Product revenue which includes new system sales, sales of spare parts, product upgrades and used system sales was $278.9 million or 92.5% of revenue in 2015, compared with $179.2 million, or 88.3% of revenue in 2014. The increase in product revenue in 2015 was primarily driven by an increase in the number of Purion systems sold.

Approximately 13.0% of systems revenue in 2015 was from sales of 200mm products and 87.0% was from sales of 300mm products, compared with 18.1% and 81.9% for sales of 200mm products and 300mm products in 2014, respectively.

A portion of our revenue from system sales is deferred until installation and other services related to future deliverables are performed. The total amount of deferred revenue at December 31, 2015 and 2014 was $8.5 million and $7.2 million, respectively. The increase was mainly due to the increase in systems sales in 2015 and the timing of acceptance of deferred system 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 $22.6 million, or 7.5% of revenue for 2015, compared with $23.8 million, or 11.7% of revenue for 2014. Although services revenue should increase 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.

2014 Compared with 2013

Product

Product revenue was $179.2 million or 88.3% of revenue in 2014, compared with $169.6 million, or 86.7% of revenue in 2013. The increase in product revenue in 2014 is attributable to increased spending by semiconductor manufacturers in 2014 compared to 2013.

Approximately 18.1% of systems revenue in 2014 was from sales of 200mm products and 81.9% was from sales of 300mm products, compared with 23.1% and 76.9% for sales of 200mm products and 300mm products in 2013, respectively.

The total amount of deferred revenue at December 31, 2014 and 2013 was $7.2 million and $4.7 million, respectively. The increase was mainly due to the increase in systems sales in 2014 and the timing of acceptance of deferred system sales.

Services

Services revenue was $23.8 million, or 11.7% of revenue for 2014, compared with $26.0 million, or 13.3% of revenue for 2013. The decrease during 2014 was primarily due to a decrease in fabrication utilization in the semiconductor industry during a portion of 2014.

Revenue Categories used by Management

In addition to the line item revenue categories discussed above, management also uses revenue categorizations which look at revenue by product line (the most significant of which is ion implant) and by aftermarket, as described below.

2015 Compared with 2014

Ion Implant

Included in total revenue of $301.5 million in 2015 is revenue from sales of ion implantation products and related service of $282.6 million, or 93.7% of total revenue, compared with $183.1 million, or 90.2%, of total revenue of $203.1 million in 2014. The increase in ion implant's share of total revenue for 2015 reflects a continuing reduction in dry strip revenue following the sale of assets relating to the dry strip product line in December 2012. Total revenue in ion implant increased as our market share increased in 2015 due to our Purion products.

Aftermarket

We refer to the business of selling spare parts, product upgrades, and used systems, combined with the sale of maintenance labor and service contracts and service hours, as the "aftermarket" business. Included in total revenue of $301.5 million in 2015 is revenue from our aftermarket business of $129.6 million, which increased moderately compared to $121.4 million for 2014. Aftermarket revenue generally increases with the expansion of the installed base of systems but can fluctuate from period to period based on capacity utilization at customers' manufacturing facilities which affects the sale of spare parts and demand for equipment service.

2014 Compared with 2013

Ion Implant

Included in total revenue of $203.1 million in 2014 is revenue from sales of ion implantation products and related service of $183.1 million, or 90.2% of total revenue, compared with $164.0 million, or 83.8%, of total revenue in 2013. The increase in ion implant's share of total revenue for 2014 reflects a reduction in dry strip revenue following the sale of assets relating to the dry strip product line in December 2012. Total revenue in ion implant increased as the market for our new Purion products improved in 2014.

Aftermarket

Included in total revenue of $203.1 million in 2014 is revenue from our aftermarket business of $121.4 million, which was relatively stable compared to $120.6 million for 2013.

Gross Profit / Gross Margin

The following table sets forth our gross profit:

	Years ended December 31,		Period-to-Period Change		Years ended December 31,		Period-to-Period Change	
	2015	2014	$	%	2014	2013	$	%
	(dollars in thousands)							
Gross Profit:								