

SECURITIES AND EXCHANGE COMMISSION
 Washington, DC 20549

FORM S-3
 REGISTRATION STATEMENT UNDER THE SECURITIES ACT OF 1933

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

Delaware 34-1818596
 (State or other (I.R.S. Employer
 jurisdiction of Identification Number)
 incorporation or
 organization)

55 Cherry Hill Drive, Beverly, Massachusetts 01915 (978) 787-4000
 (Address, including zip code, and telephone number, including area code, of
 registrant's principal executive offices)

LYNNETTE C. FALLON
 Senior Vice President and General Counsel
 Axcelis Technologies, Inc.
 55 Cherry Hill Drive
 Beverly, Massachusetts 01915
 (978) 787-4000

(Name, address, including zip code, and telephone number, including area code,
 of agent for service)

with copies to:
 MATTHEW C. DALLET
 Palmer & Dodge LLP
 111 Huntington Avenue
 Boston, Massachusetts 02199-7613
 (617) 239-0100

Approximate date of commencement of proposed sale to the public: From time
 to time after the effective date of this Registration Statement.

If the only securities being registered on this Form are being offered
 pursuant to dividend or interest reinvestment plans, please check the following
 box.

If any of the securities being registered on this Form are to be offered on
 a delayed or continuous basis pursuant to Rule 415 under the Securities Act of
 1933, other than securities offered only in connection with dividend or
 interest reinvestment plans, check the following box.

If this Form is filed to register additional securities for an offering
 pursuant to Rule 462(b) under the Securities Act, please check the following
 box and list the Securities Act registration statement number of the earlier
 effective registration statement for the same offering.

If this Form is a post-effective amendment filed pursuant to Rule 462(c)
 under the Securities Act, check the following box and list the Securities Act
 registration statement number of the earlier effective registration statement
 for the same offering.

If delivery of the prospectus is expected to be made pursuant to Rule 434,
 please check the following box.

CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered	Amount to be registered	Proposed maximum aggregate offering price per unit	Proposed maximum aggregate offering price	Amount of registration fee
4 1/4% Convertible Subordinated Notes Due January 15, 2007.....	\$125,000,000	\$1,000(1)	\$125,000,000	\$11,500
Common Stock, \$.001 par value (2).....	6,250,000 shares	--	--	\$ 0.00(3)

(1) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(a).

(2) Includes associated purchase rights that are currently evidenced by certificates for shares of common stock and automatically trade with such

shares.

(3) Pursuant to Rule 457(i), there is no filing fee with respect to the shares of common stock because these shares would be issued upon conversion of the Notes and no additional consideration would be received in connection with the exercise of the conversion privilege.

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant shall file a further amendment that specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933 or until the registration statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

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SUBJECT TO COMPLETION, DATED MARCH 29, 2002

[LOGO]
AXCELIS

Axcelis Technologies, Inc.

\$125,000,000 Principal Amount of
4 1/4% Convertible Subordinated Notes Due January 15, 2007

6,250,000 Shares of Common Stock

We issued the notes in a private placement in January 2002. This prospectus will be used by selling securityholders to resell their notes and the shares of our common stock issuable upon conversion of their notes. We will not receive any of the proceeds from the sale of these notes or these shares.

The notes are unsecured subordinated obligations of Axcelis. The notes will accrue interest at an annual rate of 4 1/4%. We will pay interest on the notes on January 15 and July 15 of each year, beginning July 15, 2002. On or after January 19, 2005, we may redeem for cash all or part of the notes that have not previously been converted or repurchased at an initial redemption price of 101.70% of their principal amount plus accrued and unpaid interest. If we undergo specific types of fundamental changes that are described in this prospectus, each holder may require us to redeem all or a portion of such holder's notes. See "Description Of Notes - Redemption at Option of the Holder."

Unless previously redeemed, holders may surrender their notes for conversion into shares of our common stock at the conversion price of 50 shares of common stock per \$1,000 principal amount of notes or an effective price of \$20.00 per share (subject to adjustment).

The notes have been designated for trading in The Portal Market, a subsidiary of The Nasdaq Stock Market, Inc. Any notes that are resold by means of this prospectus will no longer be eligible for trading in The Portal Market. Our common stock is quoted on the Nasdaq National Market under the trading symbol "ACLS," and on March 28, 2002, its closing price was \$14.30 per share.

Investing in the notes and shares of our common stock involves a high degree of risk. You should carefully read and consider the "Risk Factors" beginning on page 5.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is _____, 2002.

Axcelis Technologies, Inc. . 55 Cherry Hill Drive, Beverly, Massachusetts 01915
. (978) 787-4000

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NOTE REGARDING FORWARD-LOOKING STATEMENTS

Statements made throughout this prospectus and the documents incorporated herein by reference about our anticipated financial condition, results of operations and operating efficiencies, our business strategies, objectives and competitive positioning, and the market opportunities for existing or future products are forward-looking statements. You may identify forward-looking statements by terms such as "estimate," "project," "plan," "intend," "expect," "believe," "anticipate," "should," "may," "will" and similar expressions.

These forward-looking statements are based on our current plans and assumptions, speak only as of the date of this prospectus, and are subject to many risks and uncertainties. Important information about factors that could cause our actual results to differ materially from those suggested by the forward-looking statements is included or referred to under the heading "Risk Factors" beginning on page 5, as well as in Exhibit 99 to our 2001 Annual Report on Form 10-K filed with the Securities and Exchange Commission.

Therefore, you should consider any forward-looking statement in light of all of the information included or referred to in this prospectus. You are cautioned not to place undue reliance on any forward-looking statement.

AXCELIS

We are a leading producer of ion implantation, dry strip, photostabilization and rapid thermal processing equipment used in the fabrication of semiconductors in the United States, Europe and Asia Pacific. Semiconductors, or chips, are used in personal computers, telecommunication equipment, digital consumer electronics, wireless communication products and other applications. In addition, we provide extensive aftermarket service and support, including spare parts, equipment upgrades, maintenance services and customer training. We have a 50-50 joint venture with Sumitomo Heavy Industries, Ltd. in Japan, known as Sumitomo Eaton Nova Corporation, or SEN. SEN licenses our ion implant technology, has exclusive rights to the territory of Japan and is the leading producer of ion implantation equipment in Japan.

We, along with SEN, serve all of the 20 largest semiconductor manufacturers. In 2001, the top 20 semiconductor manufacturers accounted for approximately 72.5% of total semiconductor industry capital spending. Semiconductor manufacturing is a global business. The four largest semiconductor manufacturing regions in the world are the United States, Asia Pacific (Taiwan, South Korea and Singapore), Japan and Europe. We believe that more than 3,400 of our products, including products shipped by SEN, are in use worldwide.

We have been at the forefront of technological innovation in the ion implant sector. For example, we developed the first high current ion implantation system of which we are aware in the late 1970s and the first high energy ion implantation system in the 1980s. In 1999, we installed what we believe is the first 300 millimeter high energy ion implantation system, which we expect to be the next generation of ion implant products. In addition, we pioneered the development of photostabilization in 1983, and we have developed the only 300 millimeter production photostabilizer of which we are aware in the industry.

The semiconductor industry has been highly cyclical. During the period of 1989 through 2000, there was significant growth in demand for semiconductors, with worldwide sales growing at an average annual compound rate of approximately 12%, to \$204 billion in 2000 according to World Semiconductor Trade Statistics, an industry trade association. Estimated worldwide sales of wafer fab equipment were \$33.1 billion in 2000. The industry was in a down cycle during 2001, with worldwide sales of wafer fab equipment estimated at \$22.4 billion, and opinions about the timing of a recovery in the sector vary widely.

- . increase ion implantation market penetration;
- . grow our market position in photostabilization, dry strip and rapid thermal processing by leveraging our ion implant position;
- . maintain strong commitment to research and development through the market cycle;
- . provide our customers the lowest cost of ownership;
- . provide our customers superior customer service; and
- . reduce cycle times in our businesses.

RISK FACTORS

You should carefully consider the risks described below before making an investment decision. The risks described below are not the only ones facing our company. Additional risks not presently known to us or that we currently deem immaterial may also impair our business operations.

Our business, financial condition or results of operations could be materially harmed by any of these risks. The trading price of the notes and our common stock could decline due to any of these risks, and you may lose all or part of your investment.

Risks Related to the Notes

The following risk factors should be considered carefully in contemplating an investment in the notes.

The notes are subordinated and contain no financial covenants, so we may be unable to repay them.

The notes are unsecured and subordinated in right of payment to any senior indebtedness. The notes also effectively will be subordinated to all our subsidiaries' indebtedness and other liabilities, including trade payables. We are not prohibited from incurring debt under the indenture and we may incur additional debt, including senior indebtedness.

The indenture does not contain any financial covenants or restrictions on the payment of dividends. The indenture does not restrict the issuance or repurchase of securities by us or our subsidiaries. The indenture contains no covenants or other provisions to afford you protection in the event of a highly leveraged transaction, such as a leveraged recapitalization, that would increase the level of our indebtedness or a change in control except as described under "Description of Notes--Redemption at Option of the Holder." In addition, our credit agreement currently prohibits us from redeeming the notes.

As a result, in the event of our bankruptcy, liquidation or reorganization, the acceleration of the notes because of an event of default or certain other events, our assets will be available to pay obligations on the notes only after all senior indebtedness has been paid in full. Accordingly, we may not have enough assets remaining to repay the notes.

Our credit agreement prohibits us from redeeming the notes, and we may not be able to raise the funds necessary to repay the notes at any time, including at maturity.

Holder of the notes may require us to redeem their notes for cash upon the occurrence of specific kinds of fundamental changes. Our current revolving credit agreement does not permit us to redeem the notes without the consent of the lenders under the credit agreement. Unless we amend or terminate the credit agreement, this provision may prevent us from redeeming the notes upon a fundamental change or otherwise. Future agreements relating to our indebtedness may contain similar limitations on our ability to redeem the notes. In addition, it is possible that we would not have sufficient funds at that time to make the required redemption of notes with cash. See "Description of Notes--Redemption at Option of the Holder." Our failure to redeem notes upon the occurrence of a fundamental change would constitute an event of default under the indenture, which, in turn, might constitute a default under the terms of our other indebtedness. If this were to occur, or if a fundamental change were to constitute an event of default under any senior indebtedness, the indenture's subordination provisions would restrict us from paying you.

An active trading market for the notes may not develop, so your investment may not be profitable.

An active trading market for the notes may not develop, and any such market may not be liquid or sustainable. Accordingly, holders may not be able to sell the notes at a profit or at all. The future trading prices of

the notes will depend on many factors, including, among other things, prevailing interest rates, our operating results, the market price of our common stock and the market for similar securities.

Our notes may not be rated or may receive a lower rating than anticipated, which would reduce their value.

It is possible that one or more rating agencies may rate the notes. However, our notes may not be rated by all rating agencies. If one or more rating agencies assigns the notes a rating lower than that expected by investors, the market price of the notes and of our common stock could be materially and adversely affected.

Risks Related to Our Business

The following risks affect our business generally.

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

We anticipate that a significant portion of our new orders will depend upon demand from semiconductor manufacturers who build or expand fabrication facilities. If they do not build or expand fabrication facilities as rapidly as we anticipate, demand for our systems will decline, reducing our revenues. This would also hurt our profitability, because 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.

A number of factors may cause semiconductor manufacturers to make reduced capital expenditures, including the following.

Downturns in the semiconductor industry may further reduce demand for our products, harming our sales and profitability.

The semiconductor business is highly cyclical and the industry has been in a severe down cycle since early in 2001, the length of which cannot be predicted. This continues to reduce demand for new or expanded fabrication facilities. Any continuing weakness or future downturns or slowdowns in the industry may adversely affect our financial condition, which could hurt the market for the notes.

Oversupply in the semiconductor industry reduces demand for capital equipment, including our products.

Inventory buildups in the semiconductor industry, resulting in part from the down cycle, have produced a current oversupply of semiconductors. This has caused semiconductor manufacturers to revise capital spending plans, resulting in reduced demand for capital equipment such as our products. If this oversupply is not reduced by increasing demand from the various electronics industries that use semiconductors, which we cannot accurately predict, our sales and profitability will be harmed.

Industry consolidation and outsourcing of semiconductor manufacturing may reduce the number of our potential customers, harming our revenues.

The substantial expense of building, upgrading or expanding a semiconductor fabrication facility is increasingly causing semiconductor companies to contract with foundries to manufacture their semiconductors. In addition, consolidation within the semiconductor manufacturing industry is increasing. These trends could reduce the number of our potential customers, increasing our dependence on our remaining customers and materially and adversely affecting our 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, including products that process 300 millimeter wafers. 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 develop the technical specifications of competitive new systems, or enhancements to our existing systems, and manufacture and ship these systems or enhancements in volume in a timely manner.
- . Due to the risks inherent in transitioning to new products, we will need to accurately forecast demand for new products while managing the transition from older products.
- . We must avoid product reliability or quality problems that would lead to 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.

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 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, smaller companies engaged in semiconductor equipment research and development could develop innovative technology having performance advantages over our systems. Competitors are expected 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. In addition, if competitors enter into strategic relationships with leading semiconductor manufacturers covering products similar to those sold or being developed by us, our ability to sell products to those manufacturers may be adversely affected.

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

Historically, we have sold a significant proportion of our products and services to a limited number of fabricators of semiconductor products. For example, in 2001, our top ten customers accounted for 50.6% of our net sales. 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, including reductions or delays due to customer departures from recent buying patterns, or market, economic or competitive conditions in the semiconductor industry, could adversely affect us. The ongoing consolidation of semiconductor manufacturers may also increase the harmful effect of losing a significant customer.

Our quarterly financial results may fluctuate significantly and may fall short of anticipated levels.

We derive most of our revenues from the sale of a relatively small number of expensive products to a small number of customers. The list prices on these products range from \$150,000 to over \$5.0 million. At our current

sales level, each sale, or failure to make a sale, could have a material effect on us in a particular quarter. Our lengthy sales cycle, coupled with customers' competing capital budget considerations, make the timing of customer orders uneven and difficult to predict. In a given quarter, a number of factors can adversely affect our revenues 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 gross margins also may be affected by the introduction of new products. We typically become more efficient in producing our products as they mature. For example, our gross margins in 2001 were adversely affected in part as a result of the increased proportion of relatively newly developed systems sold to process 300 millimeter wafers. In addition, our backlog at the beginning of a quarter may 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 net sales and operating results for a quarter depend on our shipping orders as scheduled during that quarter as well as obtaining new orders for products to be shipped in that same quarter. Any delay in, or cancellation of, scheduled shipments or in shipments from new orders could materially and adversely affect our financial results, which could cause our stock price to decline significantly. Due to the foregoing factors, we believe that period-to-period comparisons of our operating results should not be relied upon as an indicator of our future performance.

Termination of our Japanese joint venture, or a decline in its fortunes, could hurt our business and profits.

We are dependent upon our Japanese joint venture, SEN, and Sumitomo Heavy Industries Ltd. for access to the Japanese ion implant equipment market, and we receive substantial income from our ion implantation technology license agreement with SEN. The license agreement expires on December 31, 2004 and is automatically renewable for successive five-year periods unless either party has provided one year's prior notice of termination. Termination of this license, or a substantial decline in SEN's sales and income from operations, could have a material adverse effect on our net income.

A decline in sales of our products and services to customers outside the United States would hurt our business and profits.

We are substantially dependent on sales of our products and services to customers outside the United States, which accounted for approximately 53.5%, 69.4% and 62.0% of our net sales in 1999, 2000 and 2001, respectively. We anticipate that international sales will continue to account for a significant portion of our net sales. 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, embargo or export license requirements;
- . difficulties in obtaining required export licenses;
- . volatility in currency exchange rates;
- . political and economic instability, particularly in Asia;
- . difficulties in accounts receivable collections;
- . extended payment terms beyond those customarily offered in the United States;
- . difficulties in managing distributors or representatives outside the United States;
- . difficulties in staffing and managing foreign subsidiary and branch operations; and
- . potentially adverse tax consequences.

Making more sales denominated in foreign currencies to counteract the strong dollar may expose us to additional risks that could hurt our results.

Substantially all of our sales to date have been denominated in U.S. dollars. Our products become less price competitive in countries with currencies that are declining in value in comparison to the dollar. This could cause us to lose sales or force us to lower our prices, which would reduce our gross margins. Our equity income and royalty income from SEN are denominated in Japanese yen, which exposes us to some risk of currency fluctuations. If it becomes necessary for us to make more sales denominated in foreign currencies to counteract the strong dollar, we will become more exposed to these risks.

We may not be able to maintain and expand our business if we are not able to retain, hire and integrate additional 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 areas where we are based, including the Boston metropolitan area and the Rockville, Maryland 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 levels of staffing inadequate to 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 and cause the value of our notes and stock to decline.

Our dependence upon a limited number of suppliers for many components and sub-assemblies could result in increased costs or delays in manufacture and sales 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 either a sole source or a limited group of suppliers. Because of our reliance on outside vendors generally, and on a limited group of suppliers in particular, 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 subassemblies from our suppliers. If our suppliers increase the cost of components or subassemblies, 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.

The manufacture of some of these components and subassemblies 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 subassemblies, 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 historical financial information may not be representative of our results as a separate company.

Our combined financial statements for periods ending on or before June 30, 2000 have been carved out from the consolidated financial statements of Eaton Corporation using the historical bases of assets, liabilities and operating results of the semiconductor equipment operations business of Eaton that we comprised. Accordingly, our historical financial information for those periods does not necessarily reflect what our financial position, operating results and cash flows would have been had we been a separate, stand-alone entity during the periods

presented. Our costs and expenses for those periods were allocated to our business based on Eaton's internal expense allocation methodology, which charges these expenses to operating locations based both on net working capital, excluding short-term investments and short-term debt, and on property, plant and equipment-net. While we believe this allocation methodology is reasonable and allocated costs are representative of the operating expenses that would have been incurred had we operated on a stand-alone basis, such historical financial information is not necessarily indicative of what our financial position, operating results and cash flows will be in the future. We have not made adjustments to this historical financial information to reflect any significant changes that may occur in our cost structure and operations as a result of our separation from Eaton, including increased costs associated with being a publicly traded, stand-alone company.

In certain circumstances, we may need additional capital.

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 available cash, our credit line and our future cash flow from operations will be sufficient to satisfy our working capital, capital expenditure and research and development requirements for the foreseeable future. This, of course, depends on the accuracy of our assumptions about levels of sales and expenses, and a number of factors, including those described in these "Risk Factors," could cause us to require additional capital from external sources. In addition, in the future, we may require or choose to obtain additional debt or equity financing in order to finance acquisitions or other investments in our business. Depending on market conditions, future equity financings may not be possible on attractive terms and would be dilutive to the existing holders of our common stock and the notes. Moreover, until the end of 2002, we are restricted in raising substantial amounts of equity capital under a covenant to Eaton Corporation. Our existing credit agreement contains restrictive covenants and future debt financings could involve restrictive covenants all of which may limit the manner in which we conduct our business.

We may incur costly litigation to protect our proprietary technology, and if unsuccessful, we may lose a valuable asset or experience reduced 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.

On January 8, 2001, we filed a lawsuit against Applied Materials, Inc. ("Applied") in the United States District Court for the District of Massachusetts. The complaint alleges that Applied's medium current/high energy ion implanter machine launched in November 2000 infringes our patent for ion implantation equipment using radio frequency linear accelerator technology. We have also alleged that Applied unlawfully interfered with our existing and future contracts. On January 18, 2001, we filed a motion for a preliminary injunction for the reason, among others, that infringement at the time of industry transition between equipment capable of handling 200 millimeter wafers and equipment capable of handling 300 millimeter wafers would irreparably harm us. Through this motion, we asked the court to stop Applied from manufacturing, selling or offering to sell its medium current/high energy ion implanter machine and to order Applied to remove all our patented technology from implanters that Applied may have placed in chipmakers' plants for process development trials. Applied filed counterclaims of unfair competition, defamation and tortious interference with prospective

economic advantage, all of which, it contends, arise from certain communications we allegedly made about the lawsuit and its claims of infringement.

Hearings on summary judgment motions began in December 2001 and are continuing. We believe our claims are meritorious and intend to pursue the matter vigorously. Although there can be no assurance of a favorable outcome and we are incurring significant legal expenses to pursue this litigation, we do not believe that our pursuit of this matter will have a material adverse effect on our financial condition, results of operations or liquidity. In the event that Applied is found not to have infringed, we expect that Applied will continue to sell its medium current/high energy implanter as a new and substantial competitor for sales of high energy/medium current ion implantation equipment.

We 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. 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. Any of these situations could have a material adverse effect on us and cause the value of our common stock to decline.

Our agreements with Eaton Corporation may not have the same terms that such agreements would have if they had been negotiated in an arm's length transaction.

Before our initial public offering, we entered into a number of agreements with Eaton Corporation. These agreements were negotiated at a time when we were a wholly-owned subsidiary of Eaton and therefore may not have the same terms that such agreements would have had if they had been negotiated in an arm's length transaction.

Covenants and payables in favor of Eaton. Our agreements with Eaton restrict our operations and obligate us to make payments to Eaton in certain situations, including:

- . The Tax Sharing and Indemnification Agreement makes us liable to Eaton for our allocable share of taxes arising for all periods beginning after December 31, 1999 through December 29, 2000. If Eaton were audited for this period and additional taxes were due, we would be obligated to indemnify Eaton.
- . Until December 29, 2002, without Eaton's consent, we may not liquidate, merge or consolidate with any person, dispose of or restructure the holding of our assets, or enter into any transaction or make any change in our equity structure that would violate a restrictive covenant designed to protect the tax-free nature of Eaton's distribution of our shares in December 2000.
- . We have agreed not to solicit or recruit employees of Eaton without Eaton's consent until December 29, 2002.

Conflicts under Eaton agreements and otherwise. Conflicts may arise under our agreements with Eaton Corporation and other interests of Axcelis and Eaton may differ from time to time. We have agreed to submit all disputes under the agreements with Eaton to binding arbitration, following nonbinding mediation, unless the failure to initiate litigation would cause serious and irreparable injury to one of us or others. Three of our directors are also directors of Eaton and one, Alexander M. Cutler, is also the Chairman and Chief Executive Officer of Eaton. Our directors who are also directors of Eaton have obligations to both companies and may have conflicts of interest with respect to matters that could have different implications for Eaton and us.

RATIO OF EARNINGS TO FIXED CHARGES

Period -----	Ratio of Earnings to Fixed Charges(A) -----
Fiscal year ended December 31, 2001	(B)
Fiscal year ended December 31, 2000	54.5
Fiscal year ended December 31, 1999	13.7
Fiscal year ended December 31, 1998	(B)
Fiscal year ended December 31, 1997	(B)

(A) The ratio of earnings to fixed charges is calculated by dividing (1) income before income taxes (adjusted for the Company's share of income from of its 50% owned affiliate, Sumitomo Eaton Nova Corporation), plus fixed charges by (2) fixed charges. Fixed charges include the portion of rental expense under operating leases deemed by the Company to be representative of the interest factor in rent expense.

(B) During the fiscal years ended December 31, 1997, 1998 and 2001, there was a deficiency of earnings to cover fixed charges of approximately \$61.4 million, \$133.1 million and \$40.4 million, respectively.

USE OF PROCEEDS

We will not receive any proceeds from the sale of the notes or the shares of common stock offered by this prospectus.

DESCRIPTION OF CREDIT FACILITY

In the fourth quarter of 2001, we established a \$45 million secured, three-year revolving credit facility. The purpose of this facility is to provide funds for working capital and general corporate purposes. Borrowings under this credit arrangement are limited to the lesser of \$45 million or the sum of a percentage of certain eligible domestic accounts receivable and inventory and bear interest at LIBOR plus an applicable spread. The facility contains certain financial and other restrictive covenants including minimum profitability, liquidity and leverage ratios as well as maximum capital expenditure levels. We are currently in compliance with all covenants under this facility. There are no borrowings currently outstanding under this facility, although our availability is reduced by an outstanding letter of credit. Any amounts owed under this credit facility rank senior to the notes offered by this prospectus.

DESCRIPTION OF NOTES

We issued \$125,000,000 aggregate principal amount of notes under an indenture dated as of January 15, 2002 between us and State Street Bank and Trust Company, as trustee. A copy of the indenture may also be obtained from the trustee upon written request.

The following is a summary of the material provisions of the notes and the indenture. It does not purport to be complete. This summary is subject to and is qualified by reference to all the provisions of the indenture, including the definitions of certain terms used in the indenture. Wherever particular provisions or defined terms of the indenture or form of note are referred to, these provisions or defined terms are incorporated in this offering memorandum by reference. The terms of the notes also include those made a part of the indenture by reference to the Trust Indenture Act of 1939, as amended.

As used in this section, references to "Axcelis," "we," "our" or "us" refer solely to Axcelis and not to our subsidiaries.

General

The notes are general unsecured obligations of Axcelis that bear interest at an annual rate of 4 1/4% from January 15, 2002. We will pay interest on January 15 and July 15 of each year, beginning July 15, 2002, to record holders at the close of business on the preceding January 1 and July 1, as the case may be. Interest will be computed on the basis of a 360-day year composed of twelve 30-day months. The notes will mature on January 15, 2007 unless earlier converted, redeemed at our option or redeemed at your option upon a fundamental change. Interest payable upon redemption will be paid to the person to whom principal is payable, unless the redemption date is an interest payment date. The notes are convertible into common stock as described under "Conversion of Notes."

Our payment obligations under the notes are subordinated to our senior indebtedness as described under "Subordination of Notes." Neither we nor any of our subsidiaries are subject to any financial covenants under the indenture. In addition, neither we nor any of our subsidiaries are restricted under the indenture from paying dividends, incurring debt, or issuing or repurchasing our securities. You are not afforded protection under the indenture in the event of a highly leveraged transaction or a change in control of us except to the extent described below under "Redemption at Option of the Holder."

Conversion of Notes

You may convert any of your notes, in whole or in part, into common stock up to and including the final maturity date of the notes, subject to prior redemption of the notes. If we call notes for redemption, you may convert them only until the close of business on the business day before the redemption date unless we fail to pay the redemption price. If you have submitted your notes for redemption upon a fundamental change, you may convert your notes only if you withdraw your redemption election. You may convert a portion of your notes so long as the portion converted is \$1,000 principal amount or a multiple of \$1,000.

The initial conversion rate for the notes is 50 shares of common stock per \$1,000 principal amount of notes, subject to adjustment as described below. If any note is converted during the period after a record date for an interest payment date to but excluding the corresponding interest payment date, then unless that note has been called for redemption on a redemption date that occurs during such period (in which case we will not be required to pay interest on such interest payment date with respect to such note), the note must be accompanied by funds equal to the interest payable on that interest payment date on the principal amount so converted; provided that no such payment need be made to the extent any interest on such note is overdue at the time of conversion. We will not issue fractional shares of common stock upon conversion of notes. Instead, we will pay cash equal to the closing price of the common stock on the trading day before the conversion date. You will not receive any cash payments representing accrued interest or dividends upon conversion unless you convert on an interest payment date. Our delivery to you of the fixed number of shares of common stock into which a note is convertible, together with any cash payment in lieu of any fractional shares, will satisfy our obligation to pay the principal amount of such note and the accrued but unpaid interest through the conversion date. Thus, the accrued but unpaid interest through the conversion date will be deemed to be paid in full rather than cancelled, extinguished or forfeited.

We will adjust the conversion rate if any of the following events occurs:

- (1) we issue common stock as a dividend or distribution on our common stock;
- (2) we issue to all holders of common stock rights or warrants to purchase our common stock;
- (3) we subdivide or combine our common stock;
- (4) we distribute to all holders of our common stock shares of our capital stock, evidences of indebtedness or assets, including securities but excluding:

- . rights or warrants listed in (2) above;
 - . dividends or distributions listed in (1) above; and
 - . cash distributions;
- (5) we distribute cash, excluding any dividend or distribution in connection with our liquidation, dissolution or winding up or any quarterly cash dividend on our common stock to the extent that the aggregate cash dividend per share of common stock in any quarter does not exceed the greater of:
- . the amount per share of common stock of the next preceding quarterly cash dividend on the common stock to the extent that the preceding quarterly dividend did not require an adjustment of the conversion rate pursuant to this clause (5), as adjusted to reflect subdivisions or combinations of the common stock; and
 - . 3.75% of the average of the last reported sale price of the common stock during the ten trading days immediately before the declaration date of the dividend.

If an adjustment is required to be made under this clause (5) as a result of a distribution that is a quarterly dividend, the adjustment would be based upon the amount by which the distribution exceeds the amount of the quarterly cash dividend permitted to be excluded pursuant to this clause (5). If an adjustment is required to be made under this clause (5) as a result of a distribution that is not a quarterly dividend, the adjustment would be based upon the full amount of the distribution;

- (6) we or one of our subsidiaries makes a payment in respect of a tender offer or exchange offer for our common stock to the extent that the cash and value of any other consideration included in the payment per share of common stock exceeds the current market price per share of common stock on the next trading day after the last date on which tenders or exchanges may be made pursuant to such tender or exchange offer; and
- (7) someone other than us or one of our subsidiaries makes a payment in respect of a tender offer or exchange offer in which, as of the closing date of the offer, our board of directors is not recommending rejection of the offer. The adjustment referred to in this clause (7) will only be made if:
- . the tender offer or exchange offer is for an amount that increases the offeror's ownership of common stock to more than 25% of the total shares of common stock outstanding; and
 - . the cash and value of any other consideration included in the payment per share of common stock exceeds the current market price per share of common stock on the next business day after the last date on which tenders or exchanges may be made pursuant to the tender or exchange offer.

However, the adjustment referred to in this clause (7) will generally not be made if as of the closing of the offer, the offering documents disclose a plan or an intention to cause us to engage in a consolidation or merger or a sale of all or substantially all of our assets.

If the rights provided for in our rights agreement dated as of June 30, 2000 have separated from our common stock in accordance with the provisions of the rights agreement so that the holders of the notes would not be entitled to receive any rights in respect of the common stock issuable upon conversion of the notes, the conversion rate will be adjusted as provided in clause (4) above, subject to readjustment in the event of the expiration, termination or redemption of the rights. In lieu of any such adjustment, we may amend our rights agreement to provide that upon conversion of the notes the holders will receive, in addition to the common stock issuable upon such conversion, the rights that would have attached to such shares of common stock if the rights had not become separated from the common stock under our rights agreement. To the extent that we adopt any future shareholder rights plan, upon conversion of the notes into common stock, you will receive the rights under the future rights plan in addition to the common stock, whether or not the rights have separated from the

common stock at the time of conversion, and no adjustment to the conversion rate shall be made in accordance with clause (4) above.

In the event of:

- . any reclassification of our common stock;
- . a consolidation, merger or combination involving us; or
- . a sale or conveyance to another person or entity of all or substantially all of our property and assets;

in which holders of our common stock would be entitled to receive stock, other securities, other property, assets or cash for their common stock, you will be entitled upon conversion of your notes to receive the same type of consideration that you would have been entitled to receive if you had converted the notes into our common stock immediately before any of these events.

In certain situations, you may be deemed to have received a distribution subject to United States federal income tax as a dividend in the event of any taxable distribution to holders of common stock or in certain other situations requiring a conversion rate adjustment.

We may, from time to time, increase the conversion rate for a period of at least 20 days if our board of directors has made a determination that this increase would be in our best interests. Any such determination by our board will be conclusive. We would give holders at least 15 days' notice of any increase in the conversion rate. In addition, we may increase the conversion rate if our board of directors deems it advisable to avoid or diminish any income tax to holders of common stock resulting from any stock or rights distribution.

We will not be required to make an adjustment in the conversion rate unless the adjustment would require a change of at least 1% in the conversion rate. However, we will carry forward any adjustments that are less than 1% of the conversion rate. Except as described above in this section, we will not adjust the conversion rate for any issuance of our common stock or convertible or exchangeable securities or rights to purchase our common stock or convertible or exchangeable securities.

Redemption of Notes at our Option

Beginning January 19, 2005, we may redeem the notes in whole or in part at the following prices, expressed as a percentage of the principal amount:

Redemption Period -----	Redemption Price -----
Beginning on January 19, 2005 and ending on January 14, 2006	101.70%
Beginning on January 15, 2006 and ending on January 14, 2007	100.85%

and 100% if redeemed on January 15, 2007. We may not redeem notes if we have failed to pay any interest on the notes and such failure to pay is continuing. We will give notice of redemption by mail to holders not more than 60 but not less than 30 days before the redemption date.

If less than all of the outstanding notes are to be redeemed, the trustee will select the notes to be redeemed in principal amounts of \$1,000 or multiples of \$1,000 by lot, pro rata or by another method the trustee considers fair and appropriate. If a portion of your notes is selected for partial redemption and you convert a portion of your notes, the converted portion will be deemed to be of the portion selected for redemption.

Redemption at Option of the Holder

If a "fundamental change" occurs at any time before the maturity of the notes, you may require us to redeem your notes, in whole or in part, on a redemption date that is 30 days after the date of our notice of the fundamental change. The notes will be redeemable in principal amounts of \$1,000 or multiples of \$1,000.

We will redeem the notes at a price equal to 100% of the principal amount to be redeemed, plus accrued interest to, but excluding, the redemption date. If the redemption date is an interest payment date, we will pay interest to the record holder on the applicable record date.

We will mail to all record holders a notice of a fundamental change within 10 days after it has occurred. We are also required to deliver to the trustee a copy of the fundamental change notice. If you elect to redeem your notes, you must deliver to us or our designated agent, on or before the 30th day after the date of our fundamental change notice, your redemption notice and any notes to be redeemed, duly endorsed for transfer. We will promptly pay the redemption price for notes surrendered for redemption following the redemption date.

A "fundamental change" is any transaction or event (whether by means of an exchange offer, liquidation, tender offer, consolidation, merger, combination, reclassification, recapitalization or otherwise) in connection with which all or substantially all of our common stock is exchanged for, converted into, acquired for or constitutes solely the right to receive, consideration that is not all or substantially all common stock that:

- . is listed on, or immediately after the transaction or event will be listed on, a United States national securities exchange, or
- . is approved, or immediately after the transaction or event will be approved, for quotation on the NASDAQ National Market or any similar United States system of automated dissemination of quotations of securities prices.

We will comply with any applicable provisions of Rule 13e-4 and any other tender offer rules under the Securities Exchange Act of 1934, as amended, in the event of a fundamental change.

These fundamental change redemption rights could discourage a potential acquiror of Axcelis. However, this fundamental change redemption feature is not the result of management's knowledge of any specific effort to obtain control of Axcelis by means of a merger, tender offer or solicitation, or part of a plan by management to adopt a series of anti-takeover provisions.

The term "fundamental change" is limited to specified transactions and may not include other events that might adversely affect our financial condition or business operations. We could in the future enter into certain transactions, including highly leveraged recapitalizations, that would not constitute a fundamental change and would, therefore, not provide the holders with the protection of requiring us to repurchase the notes.

We may be unable to redeem the notes in the event of a fundamental change. If a fundamental change were to occur, we may not have enough funds to pay the redemption price for all tendered notes. We are prohibited by our revolving credit agreement from redeeming the notes, and any redemption or repurchase of any notes would constitute an event of default. In addition, any future credit agreements or other agreements relating to our indebtedness may contain provisions prohibiting redemption of the notes in certain circumstances, or may expressly prohibit our repurchase of the notes upon a fundamental change or may provide that a fundamental change constitutes an event of default under that agreement. If a fundamental change occurs at a time when we are prohibited from purchasing or redeeming notes, we could seek the consent of our lenders to redeem the notes or attempt to refinance this debt. If we do not obtain consent, we would not be permitted to purchase or redeem the notes. Our failure to redeem tendered notes would constitute an event of default under the indenture, which might constitute a default under the terms of our other indebtedness. In these circumstances, the subordination provisions of the indenture would restrict payments to the holders of notes.

Subordination of Notes

Payment on the notes will, to the extent provided in the indenture, be subordinated in right of payment to the prior payment in full of all of our senior indebtedness. The notes also are effectively subordinated to all debt and other liabilities, including trade payables and lease obligations, if any, of our subsidiaries.

Upon any distribution of our assets upon any dissolution, winding up, liquidation or reorganization, the payment of the principal of, or premium, if any, interest, and liquidated damages, if any, on the notes will be subordinated in right of payment to the prior payment in full in cash or other payment satisfactory to the holders of senior indebtedness of all senior indebtedness. In the event of any acceleration of the notes because of an event of default, the holders of any outstanding senior indebtedness would be entitled to payment of such indebtedness in full before the holders of the notes are entitled to receive any payment or distribution. We are required under the indenture to notify holders of senior indebtedness promptly if payment of the notes is accelerated because of an event of default.

We may not make any payment on the notes if:

- . a default in the payment of senior indebtedness occurs and is continuing beyond any applicable period of grace (called a "payment default"); or
- . a default other than a payment default on any designated senior indebtedness occurs and is continuing that permits holders of designated senior indebtedness to accelerate its maturity,
- . or in the case of a lease, a default occurs and is continuing that permits the lessor to either terminate the lease or require us to make an irrevocable offer to terminate the lease following an event of default under the lease, and the trustee receives a notice of such default (called "payment blockage notice") from us or any other person permitted to give such notice under the indenture (called a "non-payment default").

We may resume payments and distributions on the notes:

- . in case of a payment default, upon the date on which such default is cured or waived or ceases to exist; and
- . in case of a non-payment default, the earlier of the date on which such nonpayment default is cured or waived or ceases to exist or 179 days after the date on which the payment blockage notice is received, if the maturity of the designated senior indebtedness has not been accelerated, or in the case of any lease, 179 days after notice is received if we have not received notice that the lessor under such lease has exercised its right to terminate the lease or require us to make an irrevocable offer to terminate the lease following an event of default under the lease.

No new period of payment blockage may be commenced pursuant to a payment blockage notice unless 365 days have elapsed since the initial effectiveness of the immediately prior payment blockage notice. No non-payment default that existed or was continuing on the date of delivery of any payment blockage notice shall be the basis for any later payment blockage notice.

If the trustee or any holder of the notes receives any payment or distribution of our assets in contravention of the subordination provisions on the notes before all senior indebtedness is paid in full, then such payment or distribution will be held in trust for the benefit of holders of senior indebtedness or their representatives to the extent necessary to pay all unpaid senior indebtedness in full.

Because of these subordination provisions, in the event of our bankruptcy, dissolution or reorganization, holders of senior indebtedness may receive more, ratably, and holders of the notes may receive less, ratably, than our other creditors. This subordination will not prevent the occurrence of any event of default under the indenture.

The notes are exclusively obligations of Axcelis. A substantial portion of our operations are conducted through our subsidiaries. As a result, our cash flow and our ability to service our debt, including the notes, is dependent upon the earnings of our subsidiaries and on the distribution of earnings, loans or other payments from our subsidiaries. Any payment of dividends, distributions, loans or advances by our subsidiaries to us could be

subject to statutory or contractual restrictions. Payments to us by our subsidiaries will also be contingent upon our subsidiaries' earnings and business considerations.

Our right to receive any assets of any of our subsidiaries upon their liquidation or reorganization, and therefore the right of the holders to participate in those assets, will be effectively subordinated to the claims of that subsidiary's creditors, including trade creditors. In addition, even if we were a creditor to any of our subsidiaries, our rights as a creditor would be subordinate to any security interest in the assets of our subsidiaries and any indebtedness of our subsidiaries senior to that held by us.

The term "senior indebtedness" is defined in the indenture and includes principal, premium, interest, rent, fees, costs, expenses and other amounts accrued or due on our existing or future indebtedness, as defined below, or any existing or future indebtedness guaranteed or in effect guaranteed by us, subject to certain exceptions. The term does not include:

- . any indebtedness that by its express terms is not senior to the notes or is pari passu or junior to the notes; or
- . any indebtedness we owe to any of our majority-owned subsidiaries; or
- . the notes.

The term "indebtedness" is also defined in the indenture and includes our liabilities in respect of borrowed money, notes, bonds, debentures, letters of credit, bank guarantees, bankers' acceptances, capital and certain other leases, interest rate and foreign currency derivative contracts or similar arrangements, guarantees and certain other obligations described in the indenture, subject to certain exceptions. The term does not include any account payable or other accrued current liability or obligation incurred in the ordinary course of business in connection with the obtaining of materials or services.

The term "designated senior indebtedness" is defined in the indenture and includes any senior indebtedness that by its terms expressly provides that it is "designated senior indebtedness" for purposes of the indenture. Designated senior indebtedness includes any indebtedness we may incur in the future under our existing \$45 million revolving line of credit.

As of the date of this prospectus, we had no senior indebtedness outstanding and our subsidiaries had no significant indebtedness. Neither we nor our subsidiaries are prohibited from incurring debt, including senior indebtedness, under the indenture. We may from time to time incur additional debt, including senior indebtedness. Our subsidiaries may also from time to time incur additional debt and liabilities.

We are obligated to pay reasonable compensation to the trustee and to indemnify the trustee against certain losses, liabilities or expenses incurred by the trustee in connection with its duties relating to the notes. The trustee's claims for these payments will generally be senior to those of noteholders in respect of all funds collected or held by the trustee.

Merger and Sale of Assets by Us

The indenture provides that we may not consolidate with or merge with or into any other person or convey, transfer or lease its properties and assets substantially as an entirety to another person, unless among other items:

- . we are the surviving person, or the resulting, surviving or transferee person, if other than us, is organized and existing under the laws of the United States, any state thereof or the District of Columbia;
- . the successor person assumes all our obligations under the notes and the indenture; and
- . we or such successor person will not be in default under the indenture immediately after the transaction.

When such a person assumes our obligations in such circumstances, subject to certain exceptions, we shall be discharged from all obligations under the notes and the indenture.

Events of Default; Notice and Waiver

The following will be events of default under the indenture:

- . we fail to pay principal or premium, if any, when due upon redemption or otherwise on the notes, whether or not the payment is prohibited by subordination provisions;
- . we fail to pay any interest and liquidated damages, if any, on the notes, when due and such failure continues for a period of 30 days, whether or not the payment is prohibited by subordination provisions of the indenture;
- . we fail to perform or observe any of the covenants in the indenture for 60 days after notice; or
- . certain events involving our bankruptcy, insolvency or reorganization.

The trustee may withhold notice to the holders of the notes of any default, except defaults in payment of principal, premium, interest or liquidated damages, if any, on the notes. However, the trustee must consider it to be in the interest of the holders of the notes to withhold this notice.

If an event of default occurs and continues, the trustee or the holders of at least 25% in principal amount of the outstanding notes may declare the principal, premium, if any, and accrued interest and liquidated damages, if any, on the outstanding notes to be immediately due and payable. In case of certain events of bankruptcy or insolvency involving us, the principal, premium, if any, and accrued interest and liquidated damages, if any, on the notes will automatically become due and payable. However, if we cure all defaults, except the nonpayment of principal, premium, if any, interest or liquidated damages, if any, that became due as a result of the acceleration, and meet certain other conditions, with certain exceptions, this declaration may be cancelled and the holders of a majority of the principal amount of outstanding notes may waive these past defaults.

Payments of principal, premium, if any, or interest on the notes that are not made when due will accrue interest at the annual rate of 4 1/4% from the required payment date.

The holders of a majority of outstanding notes will have the right to direct the time, method and place of any proceedings for any remedy available to the trustee, subject to limitations specified in the indenture.

No holder of the notes may pursue any remedy under the indenture, except in the case of a default in the payment of principal, premium, if any, or interest on the notes, unless:

- . the holder has given the trustee written notice of an event of default;
- . the holders of at least 25% in principal amount of outstanding notes make a written request, and offer reasonable indemnity, to the trustee to pursue the remedy;
- . the trustee does not receive an inconsistent direction from the holders of a majority in principal amount of the notes; and
- . the trustee fails to comply with the request within 60 days after receipt.

Modification and Waiver

Subject to certain exceptions, the consent of the holders of a majority in aggregate principal amount of the outstanding notes is required to modify or amend the indenture. However, a modification or amendment requires the consent of the holder of each outstanding note if it would:

- . extend the fixed maturity of any note;
- . reduce the rate or extend the time for payment of interest of any note;

- . reduce the principal amount or premium of any note;
- . reduce any amount payable upon redemption or repurchase of any note;
- . adversely change our obligation to redeem any note upon a fundamental change;
- . impair the right of a holder to institute suit for payment on any note;
- . change the currency in which any note is payable;
- . impair the right of a holder to convert any note;
- . adversely modify, in any material respect, the subordination provisions of the indenture;
- . reduce the quorum or voting requirements under the indenture; or
- . reduce the percentage of notes required for consent to any modification of the indenture.

Global Note, Book-Entry Form

We have issued the notes in the form of a global note. The global note has been deposited with the trustee as custodian for DTC and registered in the name of Cede & Co. as DTC's nominee. Except as set forth below, the global note may be transferred, in whole or in part, only to another nominee of DTC or to a successor of DTC or its nominee.

Beneficial holders of the notes may hold their interests in the notes directly through DTC if such holder is a participant in DTC, or indirectly through organizations that are participants in DTC (called "participants"). Transfers between participants will be effected in the ordinary way in accordance with DTC rules and will be settled in clearing house funds. The laws of some states require that certain persons take physical delivery of securities in definitive form. As a result, the ability to transfer beneficial interests in the global note to such persons may be limited.

Beneficial holders who are not participants may beneficially own interests in a global note held by DTC only through participants, or banks, brokers, dealers, trust companies and other parties that clear through or maintain a custodial relationship with a participant, either directly or indirectly (called "indirect participants"). So long as Cede & Co., as the nominee of DTC, is the registered owner of a global note, Cede & Co. for all purposes will be considered the sole holder of such global note. Except as provided below, owners of beneficial interests in a global note will:

- . not be entitled to have certificates registered in their names;
- . not receive physical delivery of certificates in definitive registered form; and
- . not be considered holders of the global note.

We will pay interest on and the redemption price of a global note to Cede & Co., as the registered owner of the global note, by wire transfer of immediately available funds on each interest payment date or the redemption or repurchase date, as the case may be. Neither we, the trustee nor any paying agent will be responsible or liable:

- . for the records relating to, or payments made on account of, beneficial ownership interests in a global note; or
- . for maintaining, supervising or reviewing any records relating to the beneficial ownership interests.

We have been informed that DTC's practice is to credit participants' accounts on that payment date with payments in amounts proportionate to their respective beneficial interests in the principal amount represented by a global note as shown in the records of DTC, unless DTC has reason to believe that it will not receive payment on that payment date. Payments by participants to owners of beneficial interests in the principal amount

represented by a global note held through participants will be the responsibility of the participants, as is now the case with securities held for the accounts of customers registered in "street name."

Because DTC can only act on behalf of participants, who in turn act on behalf of indirect participants, the ability of a person having a beneficial interest in the principal amount represented by the global note to pledge such interest to persons or entities that do not participate in the DTC system, or otherwise take actions in respect of such interest, may be affected by the lack of a physical certificate evidencing its interest.

Neither we, the trustee, registrar, paying agent nor conversion agent will have any responsibility for the performance by DTC or its participants or indirect participants of their respective obligations under the rules and procedures governing their operations. DTC has advised us that it will take any action permitted to be taken by a holder of notes, including the presentation of notes for exchange, only at the direction of one or more participants to whose account with DTC interests in the global note are credited, and only in respect of the principal amount of the notes represented by the global note as to which the participant or participants has or have given such direction.

DTC has advised us that it is:

- . a limited purpose trust company organized under the laws of the State of New York, and a member of the Federal Reserve System;
- . a "clearing corporation" within the meaning of the Uniform Commercial Code; and
- . a "clearing agency" registered pursuant to the provisions of Section 17A of the Exchange Act.

DTC was created to hold securities for its participants and to facilitate the clearance and settlement of securities transactions between participants through electronic book-entry changes to the accounts of its participants. Participants include securities brokers, dealers, banks, trust companies and clearing corporations and other organizations. Some of the participants or their representatives, together with other entities, own DTC. Indirect access to the DTC system is available to others such as banks, brokers, dealers and trust companies that clear through or maintain a custodial relationship with a participant, either directly or indirectly.

DTC has agreed to the foregoing procedures to facilitate transfers of interests in a global note among participants. However, DTC is under no obligation to perform or continue to perform these procedures, and may discontinue these procedures at any time. If DTC is at any time unwilling or unable to continue as depository and a successor depository is not appointed by us within 90 days, we will issue notes in certificated form in exchange for global notes.

Information Concerning the Trustee

We have appointed State Street Bank and Trust Company, the trustee under the indenture, as paying agent, conversion agent, note registrar and custodian for the notes. The trustee or its affiliates may provide banking and other services to us in the ordinary course of their business.

The indenture contains limitations on the rights of the trustee, if it or any of its affiliates is then our creditor, to obtain payment of claims in certain cases or to realize on certain property received on any claim as security or otherwise. The trustee and its affiliates will be permitted to engage in other transactions with us. However, if the trustee or any affiliate continues to have any conflicting interest and a default occurs with respect to the notes, the trustee must eliminate such conflict or resign.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is EquiServe Trust Company, N.A., 150 Royall Street, Canton, Massachusetts 02021.

SELLING SECURITYHOLDERS

We originally issued the notes in a private placement in January 2002. The notes were resold by the initial purchasers to persons they reasonably believed to be qualified institutional buyers under Rule 144A under the Securities Act. Selling securityholders may use this prospectus to offer and sell the notes and the shares of common stock issuable upon conversion of the notes.

The table below sets forth information about the beneficial ownership of the notes and shares of common stock by each selling securityholder who has timely provided us with a completed and executed notice and questionnaire stating its intent to use this prospectus to sell or otherwise dispose of notes and/or shares of common stock issuable upon conversion of the notes.

We have prepared this table using information furnished to us by DTC and/or by or on behalf of the selling securityholders. To our knowledge, no selling securityholder nor any of its affiliates has held any position or office with, been employed by or otherwise has had any material relationship with us or our affiliates during the three years before the date of this prospectus.

Our registration of the notes and the shares of common stock issuable upon conversion of the notes does not mean that the selling securityholders identified below will sell all or any of these securities. In addition, the selling securityholders may have sold, transferred or disposed of all or a portion of their notes since the date on which they provided the information regarding their holdings in transactions exempt from the registration requirements of the Securities Act.

Name (1)	Principal Amount of Notes Beneficially Owned That May be Sold	Number of Shares of Common Stock Issuable Upon Conversion That May be Sold (2)	Number of Shares of Common Stock Beneficially Owned Before Offering (3)	Number of Shares of Common Stock Beneficially Owned After Offering (4)
[Names of Selling Securityholders will be provided in a pre-effective amendment to this registration statement.].....	\$			
Unnamed holders of notes or future transferees, pledgees, donees or successors of or from such unnamed holders(5).....				

(1) Individuals and entities who receive shares of Common Stock covered by this prospectus from a selling securityholder as a gift or in connection with a pledge may sell up to 500 of those shares using this prospectus.

(2) Assumes conversion of the full amount of notes held by the selling securityholder at the initial rate of approximately 50 shares of common stock per \$1,000 in principal amount of the notes. The conversion rate and the number of shares of common stock issuable upon conversion of the notes may adjust under circumstances described under "Description Of Notes--Conversion of Notes." Accordingly, the number of shares of common stock issuable upon conversion of the notes may increase or decrease from time to time. Under the terms of the notes, cash will be paid instead of issuing any fractional shares. As a result, the total number of shares of common stock listed in this column (____) is less than the number of shares of common stock initially issuable upon conversion of the notes (____).

(3) Includes shares of common stock issuable upon conversion of the notes beneficially owned by the selling securityholder.

- (4) Assumes that the selling securityholder has sold all the shares of common stock shown as being issuable upon the assumed conversion of notes listed next to its name. Percentage of outstanding stock is based upon _____ shares of common stock outstanding as of _____, 2002, treating as outstanding the number of shares of common stock shown as being issuable upon the assumed conversion of the notes listed next to a named selling securityholder but not assuming the conversion of any of the other notes.
- (5) Assumes that the unnamed holders of the notes or future transferees, pledgees, donees or successors of or from any such unnamed holders do not beneficially own any common stock other than the common stock issuable upon conversion of the notes. No unnamed holder may use this prospectus to offer or sell notes or shares of common stock until such unnamed holder is identified as a selling securityholder in a supplement to this prospectus.

PLAN OF DISTRIBUTION

We are registering the notes and the shares of common stock issuable upon conversion of the notes for resale by the selling securityholders listed in this prospectus or in a supplement to this prospectus. These notes and these shares of common stock may be sold from time to time to purchasers:

- . directly by the selling securityholders; or
- . through underwriters, broker-dealers or agents who may receive compensation in the form of discounts, concessions or commissions from the selling securityholders or the purchasers of the notes and the underlying common stock.

The selling securityholders and any such broker-dealers or agents who participate in the distribution of the notes and the underlying common stock may be deemed to be "underwriters" (as this term is defined in the Securities Act). As a result, any profits on the sale of the notes and the underlying common stock by selling securityholders and any discounts, commissions or concessions received by any such broker-dealers or agents might be deemed to be underwriting discounts and commissions under the Securities Act. If the selling securityholders were deemed to be underwriters, the selling securityholders may be subject to statutory liabilities as underwriters under the Securities Act.

If the notes and the underlying common stock are sold through underwriters or broker-dealers, the selling securityholders will be responsible for underwriting discounts or commissions or agent's commissions.

The notes and the underlying common stock may be sold in one or more transactions at:

- . fixed prices;
- . prevailing market prices at the time of sale;
- . varying prices determined at the time of sale; or
- . negotiated prices.

These sales may be effected in transactions:

- . on any national securities exchange or quotation service on which the notes and underlying common stock may be listed or quoted at the time of the sale, including the Nasdaq National Market in the case of the common stock;
- . in the over-the-counter market;
- . in transactions otherwise than on such exchanges or services or in the over-the-counter market; or
- . through the writing of options.

These transactions may include block transactions or crosses. Crosses are transactions in which the same broker acts as an agent on both sides of the trade.

In connection with the sales of the notes and the underlying common stock or otherwise, the selling securityholders may enter into hedging transactions with broker-dealers. These broker-dealers may in turn engage in short sales of the notes and the underlying common stock in the course of hedging their positions. The selling securityholders may also sell the notes and the underlying common stock short and deliver notes and the underlying common stock to close out short positions, or loan or pledge notes and the underlying common stock to broker-dealers that in turn may sell the notes and the underlying common stock.

To our knowledge, there are currently no plans, arrangements or understandings between any selling securityholders and any underwriter, broker-dealer or agent regarding the sale of the notes and the underlying

common stock by the selling securityholders. Selling securityholders may refrain from selling any or all of the notes and the underlying common stock offered by them pursuant to this prospectus. In addition, any such selling securityholder may transfer, devise or gift the notes and the underlying common stock by other means not described in this prospectus. To the extent required, we will amend or supplement this prospectus to disclose material arrangements regarding the plan of distribution.

Our common stock is quoted on the Nasdaq National Market under the symbol "ACLS." The notes have been designated for trading in The Portal Market, a subsidiary of The Nasdaq Stock Market, Inc. Any notes that are resold by means of this prospectus will no longer be eligible for trading in The Portal Market. We do not intend to apply for listing of the notes on any securities exchange or for quotation through Nasdaq. Accordingly, no assurance can be given as to the development of liquidity or any trading market for the notes.

There can be no assurance that any selling securityholder will sell any or all of the notes or the underlying common stock by this prospectus. In addition, any notes or shares of underlying common stock covered by this prospectus that qualify for sale pursuant to Rule 144 or Rule 144A of the Securities Act may be sold under Rule 144 or Rule 144A rather than pursuant to this prospectus. The selling securityholders and any other person participating in such distribution will be subject to the Exchange Act. The Exchange Act rules include, without limitation, Regulation M, which may limit the timing of purchases and sales of any of the notes and the underlying common stock by the selling securityholders and any such other person. In addition, Regulation M of the Exchange Act may restrict the ability of any person engaged in the distribution of the notes and the underlying common stock being distributed for a period of up to five business days before the commencement of such distribution. This may affect the marketability of the notes and the underlying common stock and the ability of any person or entity to engage in market-making activities with respect to the notes and the underlying common stock.

We have agreed to indemnify the selling securityholders against some liabilities, including some liabilities under the Securities Act. We have agreed to pay substantially all of the expenses incidental to the registration, offering and sale of the notes and the underlying common stock to the public other than commissions, fees and discounts of underwriters, broker-dealers and agents.

LEGAL MATTERS

The validity of the notes and the common stock issuable upon conversion of the notes will be passed upon for us by our counsel, Palmer & Dodge LLP, Boston, Massachusetts.

EXPERTS

Ernst & Young LLP, independent auditors, have audited our consolidated financial statements and schedule included in our Annual Report on Form 10-K for the year ended December 31, 2001, as set forth in their report, which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements and schedule are incorporated by reference in reliance on Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

You may read and copy any reports, statements or other information that we file with the SEC at the SEC's Public Reference Room at 450 Fifth Street, N.W., Washington, D.C. 20549.

Please call the SEC at 1-800-SEC-0330 for further information on the Public Reference Room. These SEC filings are also available to the public from commercial document retrieval services and at the Internet world wide web site maintained by the SEC at "<http://www.sec.gov>." Reports, proxy statements and other information concerning us may also be inspected at the offices of The Nasdaq Stock Market, which is located at 1735 K Street, N.W., Washington, D.C. 20006.

The SEC allows us to "incorporate by reference" information into this prospectus, which means that we can disclose important information to you by referring you to other documents filed separately with the SEC. The information incorporated by reference is considered part of this prospectus, except for any information superseded by information contained directly in this prospectus or in later-filed documents incorporated by reference in this prospectus.

The following documents that we filed with the SEC are incorporated by reference into this prospectus:

1. Our Annual Report on Form 10-K for the year ended December 31, 2001, filed on March 12, 2002;
2. The Proxy Statement on Schedule 14A for our 2002 Annual Meeting of Stockholders filed on March 20, 2002; and
3. The description of the common stock contained in our Amended and Restated Certificate of Incorporation filed with our Registration Statement on Form S-1 (Registration No. 333-36330), including any further amendment or report filed hereafter for the purpose of updating such description.

We also incorporate by reference additional documents that we may file with the SEC under Section 13(a), 13(c), 14 or 15(d) of the Exchange Act between the date of this prospectus and the date that we terminate this offering. These include periodic reports, such as Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, as well as proxy statements.

Documents incorporated by reference are available from us without charge. You may obtain documents incorporated by reference in this prospectus by requesting them in writing or by telephone from us at the following address and telephone number: Mark Namaroff, Director, Investor Relations, Axcelis Technologies, Inc., 55 Cherry Hill Drive, Beverly, Massachusetts 01915; (978) 787-4000.

You should rely only on the information contained or incorporated by reference in this prospectus. We have not authorized anyone to provide you with information that is different from what is contained in this prospectus. This prospectus is dated , 2002. You should not assume that the information contained in this prospectus is accurate as of any date other than that date. Neither the delivery of this prospectus nor the sale of securities creates any implication to the contrary.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

ITEM 14. OTHER EXPENSES OF ISSUANCE AND DISTRIBUTION

The expenses to be borne by Axcelis in connection with the registration of the notes and common stock are estimated as follows:

SEC Registration Fee.....	\$11,500
Printing and engraving expenses	\$25,000
Accounting fees and expenses...	\$15,000
Legal fees and expenses.....	\$30,000
Miscellaneous expenses.....	\$15,000

Total.....	\$96,500
	=====

All of the above figures, except the SEC registration fee, are estimates. The selling securityholders listed in the prospectus or any related prospectus supplement will not bear any of the expenses listed above.

ITEM 15. INDEMNIFICATION OF DIRECTORS AND OFFICERS

We are incorporated under the laws of the State of Delaware. Section 145 ("Section 145") of the General Corporation Law of the State of Delaware, as the same exists or may hereafter be amended (the "General Corporation Law"), inter alia, provides that a Delaware corporation may indemnify any persons who were, are or are threatened to be made, parties to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of such corporation), by reason of the fact that any such person is or was an officer, director, employee or agent of such corporation, or is or was serving at the request of such corporation as a director, officer, employee or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit or proceeding, provided such person acted in good faith and in a manner he reasonably believed to be in or not opposed to the corporation's best interests and, with respect to any criminal action or proceeding, had no reasonable cause to believe that his conduct was illegal.

Section 145 further authorizes a corporation to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation or enterprise, against any liability asserted against him and incurred by him in any such capacity, arising out of his status as such, whether or not the corporation would otherwise have the power to indemnify him under Section 145.

Our Amended and Restated Certificate of Incorporation and Bylaws, as amended, provide for the indemnification of officers and directors to the fullest extent permitted by the General Corporation Law.

All of our directors and officers will be covered by insurance policies maintained by us against specified liabilities for actions taken in their capacities as such, including liabilities under the Securities Act of 1933, as amended. In addition, we have entered into indemnity agreements with our directors and executive officers that obligate us to indemnify such directors and executive officers to the fullest extent permitted by the General Corporation Law.

ITEM 16. EXHIBITS

The exhibits listed in the Exhibit Index immediately following the signature page are filed with this registration statement.

ITEM 17. UNDERTAKINGS

(a) The undersigned Registrant hereby undertakes:

- (1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:
 - (i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;
 - (ii) To reflect in the prospectus any facts or events arising after the effective date of this registration statement (or the most recent post-effective amendment thereof) that, individually or in the aggregate, represent a fundamental change in the information set forth in this registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement;
 - (iii) To include any material information with respect to the plan of distribution not previously disclosed in this registration statement or any material change to such information in this registration statement;

provided, however, that paragraphs (a)(1)(i) and (a)(1)(ii) do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in periodic reports filed by the Registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in this registration statement.

- (2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.
- (3) To remove from registration by means of a post-effective amendment any of the securities being registered that remain unsold at the termination of the offering.

(b) The undersigned Registrant hereby undertakes that, for purposes of determining any liability under the Securities Act of 1933, each filing of the Registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934 that is incorporated by reference in this registration statement shall be deemed to be a new registration statement relating to the securities offered herein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(c) Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the Registrant pursuant to the provisions referred to in Item 15 hereof or otherwise, the Registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant certifies that it has reasonable grounds to believe that it meets all of the requirements of filing on Form S-3 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Beverly, Commonwealth of Massachusetts, as of March 26, 2002.

AXCELIS TECHNOLOGIES, INC.

By:

/s/ MARY G. PUMA

 Mary G. Puma
 President and Chief Executive
 Officer

POWER OF ATTORNEY

We, the undersigned officers and directors of Axcelis Technologies, Inc., hereby severally constitute and appoint Mary G. Puma, Lynnette C. Fallon and Cornelius F. Moses III, and each of them singly, our true and lawful attorneys-in-fact, with full power to them in any and all capacities, to sign any and all amendments to this registration statement on Form S-3 (including any post-effective amendments thereto), and any related Rule 462(b) registration statement or amendment thereto, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed below by the following persons in the capacities and on the dates indicated:

Signature -----	Title -----	Date ----
/s/ STEPHEN R. HARDIS ----- Stephen R. Hardis	Chairman of the Board	*
/s/ MARY G. PUMA ----- Mary G. Puma	President and Chief Executive Officer (Principal Executive Officer)	*
/s/ CORNELIUS F. MOSES, III ----- Cornelius F. Moses, III	Executive Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	*
/s/ ALEXANDER M. CUTLER ----- Alexander M. Cutler	Director	*
/s/ GARY L. TOOKER ----- Gary L. Tooker	Director	*
/s/ NED C. LAUTENBACH ----- Ned C. Lautenbach	Director	*

Signature -----	Title -----	Date -----
/s/ PHILIP S. PAUL ----- Philip S. Paul	Director	*
/s/ PATRICK H. NETTLES ----- Patrick H. Nettles	Director	*
/s/ NAOKI TAKAHASHI ----- Naoki Takahashi	Director	*
/s/ H. BRIAN THOMPSON ----- H. Brian Thompson	Director	*

* March 26, 2002

EXHIBIT INDEX

No.	Description
4.1	Specimen stock certificate. Incorporated by reference from Exhibit 4.1 of the Company's Registration Statement on Form S-1 (File No. 333-36330).
4.2	Rights Agreement between the Company and EquiServe Trust Company, N.A. Incorporated by reference from Exhibit 4.1 of the Company's Registration Statement on Form S-1 (File No. 333-36330).
4.3	Indenture between the Company and State Street Bank and Trust Company, as Trustee, including the form of note, dated as of January 15, 2002. Incorporated by reference from Exhibit 4.1 of the Company's Current Report on Form 8-K filed January 15, 2002 (File No. 000-30941).
4.4	Registration Rights Agreement by and among the Company, Morgan Stanley & Incorporated, Salomon Smith Barney Inc. and SG Cowen Securities Corporation, dated as of January 15, 2002. Incorporated by reference from Exhibit 4.2 of the Company's Current Report on Form 8-K filed January 15, 2002 (File No. 000-30941).
5	Opinion of Palmer & Dodge LLP. Filed herewith.
12	Statements regarding Computation of Ratio of Earnings to Fixed Charges. Filed herewith.
23.1	Consent of Ernst & Young LLP, independent auditors to the Company. Filed herewith.
23.2	Consent of Palmer & Dodge LLP (contained in Exhibit 5 hereto).
24	Power of Attorney (included on signature page to this registration statement).
25	Statement of Eligibility and Qualification under the Trust Indenture Act of 1939, as amended, on Form T-1 of State Street Bank and Trust Company. Filed herewith.

March 29, 2002

Axcelis Technologies, Inc.
55 Cherry Hill Drive
Beverly, Massachusetts 01915

We are rendering this opinion in connection with the Registration Statement on Form S-3 (the "Registration Statement") filed by Axcelis Technologies, Inc. (the "Company") with the Securities and Exchange Commission under the Securities Act of 1933, as amended, on or about the date hereof. The Registration Statement relates to the registration of up to \$125,000,000 in aggregate principal amount of 4 1/4% Convertible Subordinated Notes Due 2007 (the "Notes") and the shares of Axcelis Technologies, Inc. common stock, \$0.001 par value per share, issuable upon conversion of the Notes (the "Conversion Shares"). The Notes were issued by the Company pursuant to an Indenture dated as of January 15, 2002 (the "Indenture") between the Company and State Street Bank and Trust Company, as trustee. We understand that the Notes and Conversion Shares are to be offered and sold from time to time by the holders named in the prospectus forming part of the Registration Statement (the "Prospectus") in the manner described in the Prospectus.

We have acted as the Company's counsel in connection with the preparation of the Registration Statement and are familiar with the actions taken by the Company in connection with the initial sale of the Notes. We have examined such documents as we consider necessary to render this opinion.

The Indenture and the Notes are governed by the law of the State of New York and, therefore, in rendering our opinion as to the validity and binding effect of the Indenture and the Notes, we have relied on an opinion of New York counsel with respect to matters of New York law. Except to the extent of such reliance, the opinions rendered herein are limited to the Delaware General Corporation Law, including applicable provisions of the Delaware Constitution and reported judicial decisions interpreting these laws, and the Federal law of the United States.

Based upon and subject to the foregoing, we are of the opinion that:

1. The Notes are, and when sold pursuant to the Prospectus will be, valid and binding obligations of the Company, subject to applicable bankruptcy, insolvency or similar laws affecting creditors' rights generally and general principles of equity.

2. The 6,250,000 Conversion Shares being registered have been duly authorized and, when issued and delivered upon conversion of the Notes in accordance with the terms of the Indenture, will be validly issued, fully paid and nonassessable.

We hereby consent to the filing of this opinion as an exhibit to the Registration Statement and to the reference to our firm under the caption "Legal Matters" in the Prospectus.

Very truly yours,

/s/ PALMER & DODGE LLP

Axcelis Technologies, Inc.

Computation of Ratio of Earnings to Fixed Charges
(Dollars in Thousands)

	Year Ended December 31				
	1997	1998	1999	2000	2001
	-----	-----	-----	-----	-----
Income (loss) before income taxes	\$ (61,364)	\$(133,137)	\$19,553	\$144,272	\$(40,401)
Share of undistributed income of 50% owned affiliate	-	-	(1,338)	(19,570)	-
Share of distributed income of 50% owned affiliate	-	-	-	375	-
Interest portion of rental expense	-	-	1,430	2,340	-
Earnings	----- \$(61,364) =====	----- \$(133,137) =====	----- \$19,645 =====	----- \$127,417 =====	----- \$(40,401) =====
Interest portion of rental expense	-	-	1,430	2,340	-
Fixed charges	----- - =====	----- - =====	----- \$ 1,430 =====	----- \$ 2,340 =====	----- - =====
Ratio of earnings to fixed charges (A)	----- (B) =====	----- (B) =====	----- 13.7 =====	----- 54.5 =====	----- (B) =====

(A) For purposes of calculating the ratio of earnings to fixed charges, earnings consist of the sum of income before income taxes, fixed charges and the Company's share of distributed income from a 50% owned affiliate offset by the Company's share of undistributed income from a 50% owned affiliate. Fixed charges include the portion of rental expense under operating leases deemed by the Company to be representative of the interest factor in rent expense.

(B) During the fiscal years ended December 31, 1997, 1998 and 2001, there was a deficiency of earnings to cover fixed charges of approximately \$61.4 million, \$133.1 million and \$40.4 million, respectively.

CONSENT OF ERNST & YOUNG LLP, INDEPENDENT AUDITORS

We consent to the reference to our firm under the caption "Experts" in the Registration Statement on Form S-3 and related Prospectus of Axcelis Technologies, Inc. for the registration of \$125,000,000 principal amount of Axcelis Technologies, Inc.'s 4 1/4% Convertible Subordinated Notes Due January 15, 2007 and 6,250,000 shares of Axcelis Technologies, Inc. common stock and to the incorporation by reference therein of our report dated January 22, 2002, with respect to the consolidated financial statements and schedule of Axcelis Technologies, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2001, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts
March 26, 2002

SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM T-1

STATEMENT OF ELIGIBILITY UNDER THE
TRUST INDENTURE ACT OF 1939 OF A
CORPORATION DESIGNATED TO ACT AS TRUSTEE

[X] Check if an Application to Determine Eligibility
of a Trustee Pursuant to Section 305(b)(2)

STATE STREET BANK AND TRUST COMPANY
(Exact name of trustee as specified in its charter)

Massachusetts

(Jurisdiction of Incorporation or
organization if not a U.S. national bank)

04-1867445

(I.R.S. Employer
Identification No.)

225 Franklin Street, Boston, Massachusetts 02110
(Address of principal executive offices) (Zip Code)

Maureen Scannell Bateman, Esq. Executive Vice President and General Counsel

225 Franklin Street, Boston, Massachusetts 02110
(617) 654-3253

(Name, address and telephone number of agent for service)

Axcelis Technologies, Inc.

(Exact name of obligor as specified in its charter)

Delaware

(State or other jurisdiction of
incorporation or organization)

34-1818596

(I.R.S. Employer
Identification No.)

55 Cherry Hill Drive
Beverly, Massachusetts 01915
(978) 787-4000

(Address of principal executive offices) (Zip Code)

Convertible Subordinated Notes
(Title of indenture securities)

GENERAL

Item 1. General Information.

Furnish the following information as to the trustee:

(a) Name and address of each examining or supervisory authority to which it is subject.

Department of Banking and Insurance of The Commonwealth of Massachusetts, 100 Cambridge Street, Boston, Massachusetts.

Board of Governors of the Federal Reserve System, Washington, D.C., Federal Deposit Insurance Corporation, Washington, DC

(b) Whether it is authorized to exercise corporate trust powers.

Trustee is authorized to exercise corporate trust powers.

Item 2. Affiliations with Obligor.

If the Obligor is an affiliate of the trustee, describe each such affiliation.

The obligor is not an affiliate of the trustee or of its parent, State Street Corporation.

(See note on page 2.)

Item 3. through Item 15. Not applicable.

Item 16. List of Exhibits.

List below all exhibits filed as part of this statement of eligibility.

1. A copy of the articles of association of the trustee as now in effect.

A copy of the Articles of Association of the trustee, as now in effect, is on file with the Securities and Exchange Commission as Exhibit 1 to Amendment No. 1 to the Statement of Eligibility and Qualification of Trustee (Form T-1) filed with the Registration Statement of Morse Shoe, Inc. (File No. 22-17940) and is incorporated herein by reference thereto.

2. A copy of the certificate of authority of the trustee to commence business, if not contained in the articles of association.

A copy of a Statement from the Commissioner of Banks of Massachusetts that no certificate of authority for the trustee to commence business was necessary or issued is on file with the Securities and Exchange Commission as Exhibit 2 to Amendment No. 1 to the Statement of Eligibility and Qualification of Trustee (Form T-1) filed with the Registration Statement of Morse Shoe, Inc. (File No. 22-17940) and is incorporated herein by reference thereto.

3. A copy of the authorization of the trustee to exercise corporate trust powers, if such authorization is not contained in the documents specified in paragraph (1) or (2), above.

A copy of the authorization of the trustee to exercise corporate trust powers is on file with the Securities and Exchange Commission as Exhibit 3 to Amendment No. 1 to the Statement of Eligibility and Qualification of Trustee (Form T-1) filed with the Registration Statement of Morse Shoe, Inc. (File No. 22-17940) and is incorporated herein by reference thereto.

4. A copy of the existing by-laws of the trustee, or instruments corresponding thereto.

A copy of the by-laws of the trustee, as now in effect, is on file with the Securities and Exchange Commission as Exhibit 4 to the Statement of Eligibility and Qualification of Trustee (Form T-1) filed with the Registration Statement of the Senior Housing Properties Trust (File No. 333-60392) and is incorporated herein by reference thereto.

5. A copy of each indenture referred to in Item 4. if the obligor is in default.

Not applicable.

6. The consents of United States institutional trustees required by Section 321(b) of the Act.

The consent of the trustee required by Section 321(b) of the Act is annexed hereto as Exhibit 6 and made a part hereof.

7. A copy of the latest report of condition of the trustee published pursuant to law or the requirements of its supervising or examining authority.

A copy of the latest report of condition of the trustee published pursuant to law or the requirements of its supervising or examining authority is annexed hereto as Exhibit 7 and made a part hereof.

NOTES

In answering any item of this Statement of Eligibility which relates to matters peculiarly within the knowledge of the obligor or any underwriter for the obligor, the trustee has relied upon information furnished to it by the obligor and the underwriters, and the trustee disclaims responsibility for the accuracy or completeness of such information.

The answer furnished to Item 2. of this statement will be amended, if necessary, to reflect any facts which differ from those stated and which would have been required to be stated if known at the date hereof.

SIGNATURE

Pursuant to the requirements of the Trust Indenture Act of 1939, as amended, the trustee, State Street Bank and Trust Company, a corporation organized and existing under the laws of The Commonwealth of Massachusetts, has duly caused this statement of eligibility to be signed on its behalf by the undersigned, thereunto duly authorized, all in the City of Boston and The Commonwealth of Massachusetts, on the 28th of March, 2002.

STATE STREET BANK AND TRUST COMPANY

BY: /s/ John A. Brennan

NAME: John A. Brennan
TITLE: Officer

CONSENT OF THE TRUSTEE

Pursuant to the requirements of Section 321(b) of the Trust Indenture Act of 1939, as amended, in connection with the proposed issuance by Axcelis Technologies, Inc. of its Convertible Subordinated Notes, we hereby consent that reports of examination by Federal, State, Territorial or District authorities may be furnished by such authorities to the Securities and Exchange Commission upon request therefor.

STATE STREET BANK AND TRUST COMPANY

BY: /s/ John A. Brennan

NAME: John A. Brennan

TITLE: Officer

Dated: March 28, 2002

EXHIBIT 7

Consolidated Report of Condition of State Street Bank and Trust Company, Massachusetts and foreign and domestic subsidiaries, a state banking institution organized and operating under the banking laws of this commonwealth and a member of the Federal Reserve System, at the close of business September 30, 2001 published in accordance with a call made by the Federal Reserve Bank of this District pursuant to the provisions of the Federal Reserve Act and in accordance with a call made by the Commissioner of Banks under General Laws, Chapter 172, Section 22(a).

ASSETS	Thousands of Dollars
Cash and balances due from depository institutions:	
Noninterest-bearing balances and currency and coin	\$ 2,078,210.00
Interest-bearing balances	\$20,877,735.00
Securities	\$17,960,077.00
Federal funds sold and securities purchased under agreements to resell in domestic offices of the bank and its Edge subsidiary	\$15,596,333.00
Loans and lease financing receivables:	
Loans and leases, net of unearned income	\$6,658,140.00
Allowance for loan and lease losses	\$ 55,243.00
Allocated transfer risk reserve	\$ 0.00
Loans and leases, net of unearned income and allowances	\$ 6,602,897.00
Assets held in trading accounts	\$ 1,893,178.00
Premises and fixed assets	\$ 583,130.00
Other real estate owned	\$ 0.00
Investments in unconsolidated subsidiaries	\$ 34,144.00
Customers' liability to this bank on acceptances outstanding	\$ 103,216.00
Intangible assets	\$ 487,816.00
Other assets	\$ 1,860,949.00
Total assets	\$68,077,685.00
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LIABILITIES	
Deposits:	
In domestic offices	\$17,285,276.00
Noninterest-bearing	\$12,321,416.00
Interest-bearing	\$ 4,963,860.00
In foreign offices and Edge subsidiary	\$26,950,782.00
Noninterest-bearing	\$ 46,386.00
Interest-bearing	\$26,904,396.00
Federal funds purchased and securities sold under agreements to repurchase in domestic offices of the bank and of its Edge subsidiary	\$14,765,194.00
Demand notes issued to the U.S. Treasury	\$ 0.00
Trading liabilities	\$ 1,216,739.00
Other borrowed money	\$ 911,701.00
Subordinated Notes and Debentures	\$ 0.00
Bank's liability on acceptances executed and outstanding	\$ 103,216.00
Other liabilities	\$2,605,447.00
Total liabilities	\$63,838,355.00
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Minority interest in consolidated subsidiaries	\$ 48,495.00
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EQUITY CAPITAL	
Perpetual preferred stock and related surplus	\$ 0.00
Common stock	\$ 29,931.00
Surplus	\$ 577,219.00
Retained Earnings	\$ 3,490,205.00
Accumulated other comprehensive income	\$ 93,480.00
Other equity capital components	\$ 0.00
Undivided profits and capital reserves/Net unrealized holding gains (losses)	\$ 0.00
Net unrealized holding gains (losses) on available-for-sale securities	\$ 0.00
Cumulative foreign currency translation adjustments	\$ 0.00
Total equity capital	\$ 4,190,835.00
Total liabilities, minority interest and equity capital	\$68,077,685.00
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I, Frederick P. Baughman, Senior Vice President and Comptroller of the above named bank do hereby declare that this Report of Condition has been prepared in conformance with the instructions issued by the Board of Governors of the Federal Reserve System and is true to the best of my knowledge and belief.

Frederick P. Baughman

We, the undersigned directors, attest to the correctness of this Report of Condition and declare that it has been examined by us and to the best of our knowledge and belief has been prepared in conformance with the instructions issued by the Board of Governors of the Federal Reserve System and is true and correct.

Ronald E. Logue
David A. Spina
Truman S. Casner

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