

**UNITED STATES
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
(State or other jurisdiction of
incorporation or organization)

34-1818596
(I.R.S. Employer
Identification Number)

108 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

Executive Vice President, Human Resources/Legal and General Counsel
Axcelis Technologies, Inc.
108 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. DALLETT

Edwards Angell 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 this Form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, please check the following box.

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, 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
¾% Convertible Senior Subordinated Notes Due 2009	\$ 75,000,000	\$ 100%(1)	\$ 75,000,000	\$ 8,025.00
Common Stock, \$.001 par value(2)	4,167,188(3)	—	—	\$ 0.00(4)

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

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

(3) Represents the number of shares of common stock that are issuable upon conversion of the notes at a conversion rate equal to the principal amount of the notes plus the applicable premium on such principal amount of notes, divided by \$20.00. This number assumes the maximum applicable premium as set forth in the indenture related to the notes of \$8,343,750. Pursuant to Rule 416, the number of shares of common stock being registered shall include an indeterminate number of shares of common stock that may be issued in the event that the conversion rate is adjusted pursuant to the indenture.

(4) 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 which 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.

The information in this prospectus is not complete and may be changed. The selling stockholders may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This prospectus is not an offer to sell these securities and is not a solicitation of orders to buy these securities in any state where the offer or sale is not permitted.

Subject to Completion and Amendment, dated June 9, 2006

Axcelis Technologies, Inc.

\$75,000,000 Principal Amount of 4¼% Convertible Senior Subordinated Notes Due 2009

4,167,188 Shares of Common Stock

We issued the notes in a private placement in May 2006. This prospectus will be used by the selling securityholder to resell from time to time its notes and the shares of our common stock issuable upon conversion of its notes. We will not receive any of the proceeds from the sale of these notes or these shares.

The notes are unsecured senior subordinated obligations of Axcelis. The notes mature on January 15, 2009 at which time Axcelis is required to repay the outstanding principal of the notes plus a maturity premium of 11.125% of such principal amount, or \$8,343,750 on the original principal amount of \$75,000,000. The maturity premium is designed to return to the holder an effective return of 8% per annum over the period from issuance to maturity. The notes will accrue interest at an annual rate of 4¼%, which is payable on January 15 and July 15 of each year, beginning July 15, 2006.

We may redeem for cash at any time all or part of the notes that have not previously been converted or repurchased at an initial redemption price of 100.85% of their principal amount plus accrued and unpaid interest to, but excluding, the redemption date. The redemption price increases periodically over the term of the notes up to a maximum redemption price of 117.40% at January 14, 2009. If we undergo specific types of fundamental changes that are described in this prospectus, each holder may require us to redeem for cash 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 of each \$1,000 principal amount of notes, together with the applicable premium as of the conversion date as set forth in the indenture, at a conversion 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 Global Market under the trading symbol "ACLS," and on June 7, 2006, its closing price was \$6.16 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 3.

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 , 2006.

Axcelis Technologies, Inc. • 108 Cherry Hill Drive, Beverly, Massachusetts 01915 • (978) 787-4000

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Except for descriptions of the notes, obligations under the indenture and the common stock, unless otherwise indicated, "Axcelis," "we," "us," and "our" refer to Axcelis Technologies, Inc. and its subsidiaries. The notes are obligations and the common stock is capital stock of Axcelis Technologies, Inc. and not any of its subsidiaries. Accordingly, in the descriptions of the notes, obligations under the indenture and the common stock, "Axcelis," "we," "us," and "our" refers to Axcelis Technologies, Inc. alone.

You should rely only on the information contained or incorporated by reference in this prospectus. We have not authorized anyone to provide you with different information. The information contained in this prospectus is accurate only as of the date hereof. You should not assume that the information contained in this prospectus is accurate as of any date other than the date hereof, regardless of the time of delivery of this prospectus or any sale of the

securities described in this prospectus. Neither the delivery of this prospectus nor the sale of securities creates any implication to the contrary. The selling securityholder is not making an offer to sell nor is it seeking an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

PROSPECTUS SUMMARY

This summary provides an overview of selected information and does not contain all the information you should consider. Before making an investment decision, you should carefully read the entire prospectus, including the section titled "Risk Factors," and the documents incorporated by reference into this prospectus.

Axcelis

We are a leading designer, manufacturer and servicer of ion implantation, dry strip, thermal processing and curling equipment used in the fabrication of semiconductor chips. We sell to all of the top 20 semiconductor chip manufacturers worldwide. The ion implantation business comprised approximately 79.8% of our revenues in 2005 with the remaining 20.2% of revenues derived from dry strip, thermal processing and curing businesses. In addition to equipment, we provide extensive aftermarket service and support, including spare parts, equipment upgrades, maintenance services and customer training. We also own 50% of the equity in SEN Corporation, an SHI and Axcelis Company, or SEN, the leading producer of ion implantation equipment in Japan, based on market data reported by Gartner Dataquest. SEN licenses technology from us for ion implantation and has exclusive rights to market these products in the territory of Japan.

Axcelis was incorporated in the state of Delaware in December 1995 and is headquartered in Beverly, Massachusetts. You can find additional information about us in our filings with the SEC. See "Where You Can Find More Information."

The Offering

This prospectus covers the resale of up to \$75,000,000 aggregate principal amount of the notes and the shares of common stock issuable upon conversion of the notes. We issued and sold \$75,000,000 aggregate principal amount of the notes on May 2, 2006 in a private placement to Quantum Partners LDC in exchange for cancellation of \$50,783,000 aggregate principal amount of our 4¼% Convertible Subordinated Notes due 2007 and \$24,217,000 in cash.

The Notes

The following is a brief summary of certain terms of the notes offered for resale in this prospectus. For a more complete description of the terms of the notes, see "Description of Notes" in this prospectus.

Notes	\$75,000,000 million aggregate principal amount of 4¼% convertible senior subordinated notes due 2009.
Maturity Premium	A premium of 11.125% of the principal amount (\$8,343,750, based on \$75,000,000 principal amount) is due on maturity, creating an effective return of 8% per annum from issuance to maturity.
Maturity Date	January 15, 2009, unless previously redeemed, repurchased or converted.
Interest and Payment Dates	4¼% per annum on the principal amount from May 2, 2006, payable semiannually on January 15 and July 15 of each year, beginning July 15, 2006.
Conversion Rights	Holders may surrender their notes for conversion of the principal amount, together with the applicable premium as of the conversion date, at the applicable conversion rate. The conversion rate, which initially is \$20.00 per share, is subject to adjustment as described in "Description of Notes — Conversion of Notes."

Redemption of Notes at Our Option	We may redeem the notes (in principal amounts of \$1,000 and integral multiples thereof) in whole or in part for cash at any time at a redemption price initially equal to 100.85% of the principal amount of the notes plus any accrued and unpaid interest to but not including the redemption date. The redemption price increases over the term of the notes to a maximum of 117.40% of the principal amount of the notes plus accrued and unpaid interest to but not including the redemption date on January 14, 2009, as described in "Description of Notes — Redemption of Notes at our Option."
Redemption of Notes at Option of Holders	If a fundamental change, as defined in the indenture, occurs at any time prior to maturity, holders of notes may require us to redeem their notes (in principal amounts of \$1,000 and integral multiples thereof) in whole or in part for cash at the redemption price described above, as described in "Description of Notes — Redemption of Notes at Option of the Holder."
Ranking	The notes are unsecured senior subordinated obligations of Axcelis and are subordinated to all of our existing and future designated senior debt, which includes indebtedness under our current bank credit facilities, ranks equally with all of our existing and future senior subordinated debt, and ranks senior to our 4¼% convertible subordinated notes due 2007 and any future subordinated debt. The notes are effectively subordinated to any of our existing and future secured debt to the extent of the value of the assets securing such debt.

Certain Covenants	<p>The indenture governing the notes restricts our ability and the ability of our subsidiaries to, among other things:</p> <ul style="list-style-type: none"> · incur additional senior indebtedness or additional senior subordinated indebtedness, subject to exceptions described in the indenture; · incur indebtedness in favor of our subsidiaries; and · permit any of our subsidiaries to incur certain indebtedness unless such subsidiary becomes a guarantor of the notes and such indebtedness is subordinated to the notes. <p>The covenants are subject to important exceptions and qualifications as described in “Description of Notes — Certain Covenants.”</p>
Use of Proceeds	We will not receive any of the proceeds from the resale by the selling securityholder of the notes or the common stock issuable upon conversion of the notes.
Listing and Trading	The notes are not listed on any securities exchange or included in any automated quotation system. Any notes resold by means of this prospectus will no longer be eligible for trading on The PORTAL Market. Our common stock is quoted on the NASDAQ Global Market under the symbol “ACLS.”
Risk Factors	See “Risk Factors” and other information included or incorporated by reference in this prospectus for a discussion of the factors you should carefully consider before deciding to invest in the notes.

RISK FACTORS

You should carefully consider the risks described below before making an investment decision. These are not the only risks 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.

Our revolving 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.

Holders 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 such credit agreement. Until the credit agreement expires in October 2006 (or is earlier amended or terminated), 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 you may not be able to sell the notes at a profit.

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.

The notes are subordinated so we may be unable to repay them.

The notes are unsecured and subordinated in right of payment to any designated senior indebtedness, which includes indebtedness under our revolving credit and line of credit agreements with ABN AMRO Bank N.V. and our guaranty of certain indebtedness of Axcelis Technologies, GmbH, our wholly owned subsidiary. We may incur additional designated senior indebtedness up to limited amounts set forth in the indenture.

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 designated senior indebtedness has been paid in full. Accordingly, we may not have enough assets remaining to repay the notes.

Risks Related to Our Business

The following risks affect our business generally.

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

Almost all of our new orders will depend upon demand from semiconductor manufacturers who build or expand fabrication facilities. If the rate of construction or expansion of fabrication facilities declines, demand for our systems will decline, reducing our revenues. This would also hurt our profitability, because of our high fixed cost structure and our continued investments in engineering, research and development and marketing necessary to develop new products and to maintain extensive customer service and support capabilities limit our ability to reduce expenses in proportion to declining sales.

Our financial results may fluctuate significantly.

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 \$200,000 to over \$4.0 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. 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. Axcelis' financial results also fluctuate based on gross profit realized on sales. A variety of factors may cause gross profit as a percentage of revenue to vary, including the mix and average selling prices of products sold, costs to manufacture and customize systems and warranty costs. New product introductions may also affect our gross margins. Due to the foregoing factors, we believe that investors should not rely on period-to-period comparisons of our operating results as an indicator of our future performance.

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

Management typically provides financial forecasts for the subsequent quarter in the earnings release for each quarter. These forecasts are based on assumptions believed to be reasonable when made of shipment timing and contract terms. However, in some cases, the final customer terms may not have been agreed and documented at the time the forecast is made, so the level of revenues recognizable in a particular quarter may vary from the forecast. Our lengthy sales cycle, coupled with customers' competing capital budget considerations, make the timing of customer orders uneven and difficult to predict. In addition, our backlog at the beginning of a quarter typically does not include all orders required to achieve our sales objectives for that quarter and is not a reliable indicator of our future sales. As a result, our revenues 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.

The SEC's Staff Accounting Bulletin 104, addressing revenue recognition, has added additional complexity in forecasting quarterly revenues and profitability. Orders for our products usually contain multiple delivery elements that result in revenue deferral under generally accepted accounting principles. Due to the foregoing factors, investors should understand that our actual financial results for a quarter may vary significantly from our forecasts of financial performance for that quarter. Failure to meet forecast financial performance may have an adverse effect on the price of our common stock.

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

The semiconductor business is highly cyclical, experiencing upturns when the demand for our products is high and downturns when our customers are not investing in new or expanded fabrication facilities. Our revenues can vary significantly from one point in the cycle to another, making it difficult to manage the business, both when

revenues are increasing and when they are decreasing. In addition, a substantial portion of our operating expenses are fixed and do not fluctuate with changes in volume. Significant decreases in revenues can therefore have a disproportionate effect on profitability.

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

From time to time, inventory buildups in the semiconductor industry, resulting in part from periodic downturns, produce an oversupply of semiconductors. This will cause semiconductor manufacturers to revise capital spending plans, resulting in reduced demand for capital equipment such as our products. If an oversupply is not reduced by increasing demand from the various electronics industries that use semiconductors, which we cannot accurately predict, our sales and profitability will be harmed.

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

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

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

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, there are smaller, emerging semiconductor equipment companies that provide innovative systems with technology that may have performance advantages over our systems. We expect our competitors to continue to improve the design and performance of their existing products and processes and to introduce new products and processes with improved price and performance characteristics. If we are unable to improve or introduce competing products when demanded by the markets, our business will be harmed. 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. Finally, if we must lower prices to remain competitive without commensurate cost of goods savings, our gross margins and profitability will be adversely affected.

We 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 2005, our customer, Samsung, accounted for 17.5% of our

net sales. Also, in 2005, our top ten customers accounted for 60.2% 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 could adversely affect us. The ongoing consolidation of semiconductor manufacturers may also increase the harmful effect of losing one or more significant customers.

Our inability to control our Japanese joint venture may adversely affect our results.

We own 50% of the equity of a Japanese corporation called SEN Corporation, an SHI and Axcelis Company, or SEN, to which we have granted an exclusive license to manufacture and sell specified multi-wafer and single wafer ion implanters in Japan. Sumitomo Heavy Industries, Ltd., a Japanese manufacturer of industrial machinery and ships, owns the remaining 50% of the equity. Neither Axcelis nor Sumitomo has the right to buy out the other's interest in SEN and the SEN joint venture is perpetual (although SEN's license to use our technology could be terminated by Axcelis or SEN with the approval of Axcelis representatives on the SEN Board, on twelve months notice). Our joint venture agreement with Sumitomo gives both owners veto rights, so that neither of us alone can effectively control SEN. SEN's business is subject to the same risks as our business. As a result of this joint venture structure, we have less control over SEN management than over our own management. In addition, given the equal balance of ownership, it is possible that the SEN Board may be unable to reach consensus from time to time, which could delay important decisions or create a deadlock, which could lead to liquidation of SEN.

Historically, Japan has represented approximately 20% of the annual worldwide market for ion implanters. Royalties and income from SEN have been a substantial contribution to our earnings, and a substantial decline in SEN's sales and net income could have a material adverse effect on our net income.

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

We are substantially dependent on sales of our products and services to customers outside the United States. International sales, including export sales from our U.S. manufacturing facilities to non-U.S. customers and sales by our non-U.S. subsidiaries and branches, accounted for 70.4% of total revenue in 2005, 77.0% in 2004, and 65.3% in 2003. In recent years, the percentage of shipments to Asia has been increasing. System shipments to Asian customers represented 68% of total shipment dollars in 2005 in comparison to 74% of total shipment dollars in 2004. We anticipate that international sales will continue to account for a significant portion of our revenue. Because of our dependence upon international sales, our results and prospects may be adversely affected by a number of factors, including:

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

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

Our business depends on our ability to attract and retain qualified, experienced employees. There is substantial competition for experienced engineering, technical, financial, sales and marketing personnel in our industry. In particular, we must attract and retain highly skilled design and process engineers. Competition for such personnel is intense, particularly in the Boston metropolitan area, as well as in other locations around the world. If we are unable

to retain our existing key personnel, or attract and retain additional qualified personnel, we may from time to time experience 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.

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

We rely to a substantial extent on outside vendors to manufacture many of the components and subassemblies of our products. We obtain many of these components and subassemblies from either a sole source or a limited group of suppliers. Accordingly, we may be unable to obtain an adequate supply of required components on a timely basis, on price and other terms acceptable to us, or at all.

In addition, we often quote prices to our customers and accept customer orders for our products before purchasing components and 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 international operations involve currency risk.

Substantially all of our sales are billed in U.S. dollars, thereby reducing the impact of fluctuations in foreign exchange rates on our results. Operating margins of certain foreign operations can fluctuate with changes in foreign exchange rates to the extent revenues are billed in U.S. dollars and operating expenses are incurred in the local functional currency. During the year ended December 31, 2005, approximately 11% of our revenues were derived from foreign operations with this inherent risk. In addition, at December 31, 2005, our operations outside of the United States accounted for approximately 29% of our total assets, the majority of which was denominated in currencies other than the U.S. dollar. Our investment in SEN and our royalty and equity income from SEN are subject to foreign currency exchange risks. We use forward contracts to hedge the risk of currency fluctuation with respect to SEN royalties for which payment is received in Japanese yen.

We may be unable to obtain needed 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. In addition to the notes covered by this prospectus, we have outstanding convertible debt, originally issued in January 2002, in the principal amount of approximately \$74.2 million, which comes due in January 2007. We believe that our existing cash and cash equivalents and marketable securities will be sufficient to satisfy our anticipated cash 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 debt or equity financings may not be possible on attractive terms or at all. In addition, future debt or equity financings could be dilutive to the existing holders of our common stock and convertible notes. Moreover, our existing credit agreement, which expires in October 2006, contains restrictive covenants limiting our ability to engage in additional debt financings without the permission of the banks.

Our stock price could be volatile and you could lose the value of your investment.

Our stock price has been volatile and has fluctuated significantly to date. The trading price of our stock is likely to continue to be highly volatile and subject to wide fluctuations. Your investment in our securities could lose value. Some of the factors that could significantly affect the market price of our stock include:

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- actual or anticipated variations in results;
 - analyst reports or recommendations;
 - changes in interest rates; and
 - other events and factors, many of which are beyond our control.

The stock market in general and NASDAQ and technology companies in particular have experienced extreme price fluctuations.

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

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

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

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

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

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

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

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

Certain information contained or incorporated by reference in this prospectus is forward-looking in nature. All statements included or incorporated by reference in this prospectus or made by our management, other than statements of historical fact, are forward-looking statements. Examples of forward-looking statements include statements regarding our future financial results, operating results, business strategies, projected costs, product development or future sales, competitive positions and plans and objectives of management for future operations. We use terminology such as "anticipates," "believes," "plans," "expects," "future," "intends," "may," "will," "should," "estimates," "predicts," "potential," "continue," and similar expressions to identify such forward-looking statements. Our actual results could differ materially from the results contemplated by these forward-looking statements due to a number of important factors, including those discussed under the heading "Risk Factors" beginning on page 3, as well as in Item 1A., "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2005, as those risk factors are amended and updated from time to time in our quarterly and annual reports that we file with the SEC. We also incorporate by reference into this prospectus certain forward-looking statements attributed to third parties relating to their estimates regarding the growth of our markets. Forward-looking statements are subject to known and unknown risks, uncertainties, and other factors that may cause our actual results, as well as those of the markets we serve, levels of activity, performance, achievements and prospects to be materially different from those expressed or implied by the forward-looking statements. We have no duty to, and do not intend to, update publicly any forward-looking statements, whether as a result of new information, future events or otherwise, in this prospectus, except as may be required by law.

RATIO OF EARNINGS TO FIXED CHARGES

Period	Ratio of Earnings to Fixed Charges(A)
Three months ended March 31, 2006	(B)
Fiscal year ended December 31, 2005	(B)
Fiscal year ended December 31, 2004	6.00x
Fiscal year ended December 31, 2003	(B)
Fiscal year ended December 31, 2002	(B)
Fiscal year ended December 31, 2001	(B)

- (A) The ratio of earnings to fixed charges is calculated by dividing (1) income from continuing operations before income taxes (adjusted for our share of distributed income from our 50% owned affiliate, SEN, offset by our share of undistributed income from SEN plus fixed charges by (2) fixed charges. Fixed charges include interest expense and the portion of rental expense under operating leases we deem to be representative of the interest factor in rent expense.
- (B) During the fiscal years ended December 31, 2001, 2002, 2003, 2005 and the three months ended March 31, 2006, there was a deficiency of earnings to cover fixed charges of approximately \$52.2 million, \$54.1 million, \$52.8 million, \$17.2 million and \$1.6 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.

The selling securityholder will not cover any of the expenses that are incurred by us in connection with the registration of the notes or common stock issuable upon conversion of the notes, but it will pay any commissions, discounts and other compensation to any broker-dealers through whom it sells any of the notes or common stock issuable upon conversion of the notes.

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CERTAIN OTHER INDEBTEDNESS

Credit Facility

We have a \$50 million revolving credit facility with a maturity of October 2006. The purpose of the facility is to provide funds for working capital and general corporate purposes as required. To the extent that we have borrowings under the agreement, those borrowings would bear interest at the bank's base rate, as defined in the agreement, or LIBOR plus an applicable percentage. We currently have no plans to borrow against the facility but may use the facility to support letters of credit in the future. The credit facility is secured by substantially all of our assets, excluding our investment in SEN, and contains certain financial and other restrictive covenants including restrictions on the payment of dividends, minimum levels of tangible net worth, liquidity and profitability as well as maximum levels of indebtedness and capital spending. At March 31, 2006, we were in compliance with all covenants. Any amounts owed under this facility would rank senior to the notes offered by this prospectus.

2007 Convertible Subordinated Notes

In January 2002, we completed an offering of \$125 million of 4¼% Convertible Subordinated Notes due January 15, 2007, or the 2007 Notes. In May 2006, we exchanged with Quantum Partners LDC approximately \$50.8 million principal amount of 2007 Notes for the same principal amount of the notes offered by this prospectus, leaving approximately \$74.2 million principal amount of the 2007 Notes outstanding. The 2007 Notes are convertible into shares of our common stock at any time prior to the close of business on the maturity date, unless previously redeemed, at a conversion price of \$20.00 per share, subject to certain adjustments. The 2007 Notes are redeemable, in whole or in part, at our option with at least 30 days notice at a redemption price of 100.85% of face value. The 2007 Notes are unsecured and subordinated in right of payment in full to all existing and future senior indebtedness, as defined in the indenture governing the 2007 Notes, including the notes offered by this prospectus.

DESCRIPTION OF NOTES

We issued \$75,000,000 aggregate principal amount of notes under an indenture dated as of May 2, 2006 between us and U.S. Bank National Association, as trustee.

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 notes and the indenture, which are exhibits to the registration statement of which this prospectus forms a part. Wherever particular provisions or defined terms of the notes or the indenture are referred to, these provisions or defined terms are incorporated in this prospectus 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. We will provide copies of the indenture to prospective investors upon request, and they also will be available for inspection at the office of the trustee.

As used in this section, references to "Axcelis," "we," "our" or "us" refer solely to Axcelis Technologies, Inc. and not to its subsidiaries unless we specify otherwise.

General

The notes are unsecured senior subordinated obligations of Axcelis that bear interest at an annual rate of 4¼% from May 2, 2006. We will pay interest on January 15 and July 15 of each year, beginning July 15, 2006, 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, 2009 unless earlier converted, redeemed at our option or redeemed at the option of the holder upon a fundamental change. At maturity, we will pay the outstanding principal amount plus a maturity premium of 11.125% of such principal amount (\$8,343,750, based on \$75,000,000 principal amount). 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 other 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 or issuing or repurchasing our securities. You are not afforded protection under the indenture in the event of a change in control of Axcelis except to the extent described below under “Redemption at Option of the Holder.”

The terms of the indenture restrict our ability to incur any new indebtedness senior or pari passu with the notes, or for any of our subsidiaries to incur any new indebtedness without becoming a guarantor of the notes, in each case subject to a number of exceptions and qualifications.

Conversion of Notes

You may convert the principal amount, plus the applicable premium on the principal amount as of the conversion date, of 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. The applicable premium, as further described below, is initially 0.850% and increases over the term of the notes to 11.125% on the maturity date. 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 applicable premium, expressed as a percentage of the principal amount of the notes, on any conversion date is determined as follows. If the conversion date is one of the premium accrual dates listed below, then the applicable premium is the amount set forth below for that conversion date:

Premium Accrual Date	Applicable Premium
May 2, 2006	0.850%
July 15, 2006	0.850%
January 15, 2007	2.685%
July 15, 2007	4.670%
January 15, 2008	6.750%
July 15, 2008	8.900%
January 15, 2009	11.125%

If the conversion date occurs between two premium accrual dates, then the applicable premium will be the applicable premium for the immediately preceding premium accrual date plus a portion of the difference between the respective applicable premiums for the immediately following and immediately preceding premium accrual dates based on the proportion, calculated using a 360-day year of twelve 30-day months, of time between such dates that has elapsed since the immediately preceding premium accrual date.

The initial conversion rate for the notes is equal to the principal amount of notes plus the applicable premium on such principal amount of notes divided by \$20.00, 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 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 shareholder rights agreement dated as of June 30, 2000 have separated from our common stock in accordance with the provisions of the shareholder 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 shareholder 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 shareholder 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

We may redeem the notes in whole, at any time, or in part, from time to time, at the repurchase value as of the redemption date, expressed as a percentage of the principal amount determined as follows. If the redemption date is one of the specified dates listed below, then the repurchase value is the amount set forth below for that specified date.

Specified Date	Repurchase Value
May 2, 2006	100.85%
July 15, 2006	101.21%
January 15, 2007	104.12%
July 15, 2007	107.20%

January 15, 2008	110.45%
July 15, 2008	113.85%
January 14, 2009	117.40%

If the redemption date occurs between two specified dates, then the repurchase value will be the repurchase value for the immediately preceding specified date plus a portion of the difference between the respective repurchase values for the immediately following and immediately preceding specified dates based on the proportion, calculated using a 360-day year of twelve 30-day months, of the time between such dates that has elapsed since the immediately preceding specified date.

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, the holder of a note may require us to redeem its 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 the repurchase value as of the redemption date, determined as set forth above in “Redemption of Notes at our Option,” 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 Global 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 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 more than approximately \$24 million in principal amount of the notes, subject to increase by the amount of any additional subordinated debt that we may issue in the future; any redemption or repurchase of any notes in excess of this amount 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 designated senior indebtedness, as defined in the indenture. 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, repurchase value, 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 designated senior indebtedness of all designated senior indebtedness. In the event of any acceleration of the notes because of an event of default or if any designated senior indebtedness has matured and all principal of, premium on, and interest on such designated senior indebtedness has not been paid in full in cash, 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 designated 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 designated 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, and the trustee receives a notice of such default (called “payment blockage notice”) from any 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.

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 designated senior indebtedness is paid in full, then such payment or distribution will be held in trust for the benefit of holders of designated senior indebtedness or their representatives to the extent necessary to pay all unpaid designated senior indebtedness in full.

Because of these subordination provisions, in the event of our bankruptcy, dissolution or reorganization, holders of designated 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 “designated senior indebtedness” is defined in the indenture as our revolving credit and line of credit agreements with ABN AMRO Bank N.V., our guaranty of certain indebtedness of our subsidiary, Axcelis Technologies GmbH, and any indebtedness we may incur in the future under refinancings of such indebtedness.

As of the date of this prospectus, we had outstanding designated senior indebtedness aggregating \$17.4 million and our subsidiaries had no significant indebtedness.

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.

Certain Covenants

The indenture governing the notes restricts our ability and the ability of our subsidiaries to, among other things:

- incur additional senior indebtedness or additional senior subordinated indebtedness, subject to exceptions described in the indenture;
- incur indebtedness in favor of our subsidiaries; and

- permit any of our subsidiaries to incur certain indebtedness unless such subsidiary becomes a guarantor of the notes and such indebtedness is subordinated to the notes.

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.

Exceptions to the restrictions on our and our subsidiaries’ ability to incur additional indebtedness include:

- a refinancing of indebtedness under our revolving credit agreement, subject to a cap of \$50 million;
- a refinancing of indebtedness comprising letters of credit under our line of credit agreement with ABN AMRO Bank N.V., subject to a cap of \$15 million;
- a refinancing of indebtedness relating to our guaranty of certain indebtedness of Axcelis Technologies GmbH, subject to a cap of \$10 million;
- intercompany indebtedness between our subsidiaries;
- up to \$200,000 of purchase money indebtedness and certain capitalized lease obligations; and
- up to \$2 million of indebtedness of our subsidiaries to other persons.

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, premium or repurchase value when due at maturity, upon redemption or otherwise on the notes, whether or not the payment is prohibited by subordination provisions of the indenture;
- we fail to pay any installment of interest 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;
- certain events involving our bankruptcy, insolvency or reorganization; or
- default under any designated senior indebtedness or with respect to any other indebtedness of Axcelis or any of its subsidiaries in an amount in excess of \$5,000,000, in each case if that default results in acceleration of such indebtedness.

The trustee may withhold notice to the holders of the notes of any default, except defaults in payment of principal or repurchase value, as applicable, of, or premium, if any, or interest 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 and the applicable premium (or the repurchase value in the case of any notes being redeemed) and accrued interest on the outstanding notes to be immediately due and payable. In case of certain events of bankruptcy or insolvency involving us, the principal and the applicable premium (or the repurchase value in the case of any notes being redeemed) and accrued interest on the notes will automatically become due and payable. However, if we cure all defaults, except the nonpayment of principal of and the applicable premium (or repurchase value, as applicable) on the notes and any accrued interest 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, applicable premium (or repurchase value, as applicable) or interest on the notes that are not made when due will accrue interest at the annual rate of 4¼% 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 two global notes. The global notes have 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 notes 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 value of the global notes to Cede & Co., as the registered owner of the global notes, 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 notes 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 notes are credited, and only in respect of the principal amount of the notes represented by the global notes 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 U.S. Bank National Association, 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

MATERIAL U.S. FEDERAL INCOME TAX CONSEQUENCES

The following summary describes the material U.S. federal income tax consequences relating to the acquisition, ownership, and disposition, of the notes and the shares of our common stock into which the notes may be converted. This summary is based on the Internal Revenue Code of 1986, as amended, its legislative history, existing and proposed regulations thereunder, published rulings and court decisions, all as currently in effect and all subject to change at any time, possibly with retroactive effect. This summary applies only to persons who will hold the notes and our common stock as capital assets within the meaning of Section 1221 of the Code (that is, for investment purposes). This summary does not discuss all aspects of U.S. federal income taxation that may be relevant to holders in light of their special circumstances or to holders subject to special tax rules. Special rules apply, for example, to financial institutions, insurance companies, tax-exempt organizations, dealers in securities or currencies, persons who hold the notes or shares of our common stock through a partnership or other pass-through entity, persons subject to alternative minimum tax, persons holding the notes or shares of our common stock as a part of a hedge, straddle, conversion, constructive sale or other integrated transaction, persons whose functional currency is not the U.S. dollar or persons who have ceased to be U.S. citizens or to be taxed as resident aliens. This summary also does not discuss any tax consequences arising under the U.S. federal estate and gift tax laws or the laws of any state, local, foreign or other taxing jurisdiction.

THIS SUMMARY IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY, AND DOES NOT CONSTITUTE, AND SHOULD NOT BE CONSIDERED AS, LEGAL OR TAX ADVICE TO PROSPECTIVE PURCHASERS OF THE NOTES. PROSPECTIVE PURCHASERS OF THE NOTES SHOULD CONSULT WITH THEIR OWN TAX ADVISORS CONCERNING THE CONSEQUENCES, IN THEIR PARTICULAR CIRCUMSTANCES, UNDER THE INTERNAL REVENUE CODE AS WELL AS UNDER THE LAWS OF ANY OTHER TAXING JURISDICTION, OF ACQUIRING, OWNING, AND DISPOSING OF THE NOTES AND THE SHARES OF OUR COMMON STOCK INTO WHICH THE NOTES MAY BE CONVERTED.

As used this summary, the term “U.S. holder” means a beneficial owner of a note or common stock into which the notes may be converted that is for U.S. federal income tax purposes (i) an individual who is a citizen or resident of the United States, (ii) a corporation (including an entity treated as a corporation for U.S. federal income tax purposes) created or organized in or under the laws of the United States or of any political subdivision thereof, (iii) an estate the income of which is subject to U.S. federal income tax regardless of its source, or (iv) a trust, if a court within the United States is able to exercise primary supervision over the administration of the trust and one or more United States persons have the authority to control all substantial decisions of the trust or if a valid election is in place to treat the trust as a United States person.

As used in this summary, the term “non-U.S. holder” means a beneficial owner (other than a partnership or an entity treated as a partnership for U.S. federal income tax purposes) of a note or common stock into which the notes may be converted that is not a U.S. holder.

If a partnership (including any entity treated as a partnership for U.S. federal income tax purposes) is a beneficial owner of a note or common stock into which the notes may be converted, the tax treatment of a partner in that partnership will generally depend on the status of the partner and the activities of the partnership. Holders of notes and common stock into which the notes may be converted that are partnerships and partners in those partnerships are urged to consult their tax advisors regarding the U.S. federal income tax consequences of the acquisition, ownership and disposition of the notes and the shares of the common stock into which the notes may be converted.

U.S. Federal Income Tax Consequences to U.S. Holders

Stated Interest

Stated interest on a note will be taxable to a U.S. holder as ordinary income at the time it is received or accrued, depending on the U.S. holder’s method of accounting for U.S. federal income tax purposes.

Original Issue Discount

The notes require us to pay at maturity the outstanding principal of the notes, plus a maturity premium of 11.125% of such principal amount. As a result, the notes were issued with original issue discount or OID for U.S. federal income tax purposes. OID is the excess of (i) the stated redemption price at maturity of a note over (ii) the price at which the notes were originally sold. The stated redemption price at maturity of a note equals the sum of its principal amount plus all other payments scheduled to be made thereunder, other than payments of stated interest. The maturity premium will be included in the stated redemption price at maturity. A U.S. holder is required to include OID in income as ordinary interest as it accrues under a constant yield method in advance of receipt of the cash attributable to such income, regardless of the U.S. holder’s regular method of accounting for U.S. federal income tax purposes.

The amount of OID included in income by a U.S. holder generally is the sum of the daily portions of OID for each day during the taxable year or portion of the taxable year on which the holder held the note, including the purchase date and excluding the disposition date. The daily portion of OID with respect to a note is determined by allocating to each day in any accrual period a ratable portion of the OID allocable to that accrual period. An accrual period may be of any length and the accrual periods may vary in length over the term of the note, provided that each accrual period is no longer than one year and each scheduled payment of principal or interest occurs either on the final day of an accrual period or on the first day of an accrual period.

The amount of OID allocable to an accrual period is generally equal to the difference between (x) the product of the note's adjusted issue price at the beginning of such accrual period and the yield to maturity of the note, compounded at the end of each accrual period, taking into account the length of the particular accrual period and (y) the amount of any stated interest payments allocable to such accrual period. The adjusted issue price of a note at the beginning of any accrual period is the sum of the issue price of the note plus the amount of OID allocable to all prior accrual periods minus the amount of any prior payments on the note that were not stated interest payments. A U.S. holder's basis in the note for U.S. federal income tax purposes will be increased by the amount of OID included in income.

Market Discount

If a U.S. holder purchases a note for an amount that is less than its stated redemption price at maturity, the difference will be treated as "market discount" (unless the difference is less than a statutorily defined *de minimis* amount), and the note will be subject to the market discount rules. The U.S. holder of a note that is subject to the market discount rules will be required to treat any full or partial principal payment or any gain recognized on the maturity, sale or other disposition of the note as ordinary income, to the extent that such gain does not exceed the accrued market discount on the note at the time of such payment or disposition. The amount of market discount treated as having accrued will be determined either:

- on a straight-line basis by multiplying the market discount times a fraction, the numerator of which is the number of days the note was held by the U.S. holder and the denominator of which is the total number of days after the date the U.S. holder acquired the note up to (and including) the note's maturity date, or
- if the U.S. holder so elects, on the basis of a constant rate of compound interest.

The U.S. holder of a note subject to the market discount rules may elect to include market discount in income currently, through the use of either the straight-line inclusion method or the elective constant interest rate method, in lieu of recharacterizing gain upon disposition as ordinary income to the extent of the accrued market discount on the note. Once made, this election will apply to all debt instruments with market discount acquired by the electing U.S. holder on or after the first day of the first taxable year to which the election applies and may not be revoked without the consent of the IRS. If an election is made to include market discount on a debt instrument in income currently, the U.S. holder's basis in the debt instrument for U.S. federal income tax purposes will be increased by the market discount as it is included in income.

A U.S. holder that does not elect to include the market discount on a note in income currently may be required to defer interest expense deductions for all or a portion of the interest paid or accrued on indebtedness incurred or continued to purchase or carry such note, until (1) the maturity of the note, (2) its earlier disposition in a taxable transaction or (3) if the holder so elects, a subsequent taxable year in which sufficient income exists with respect to the note.

Any accrued market discount not previously included in income as of the date of the conversion of a U.S. holder's notes into shares of our common stock will carry over to the stock received on conversion and will give rise to ordinary income upon the subsequent disposition of that stock.

Acquisition Premium

If a U.S. holder purchases a note at a price in excess of its then adjusted issue price but equal to or below its stated redemption price at maturity, then the U.S. holder will be considered to have purchased the note at an "acquisition premium." Under the acquisition premium rules, the amount of OID that the U.S. holder must include in gross income with respect to the note for any taxable year will be reduced by the portion of the acquisition premium properly allocable to that year.

Amortizable Bond Premium

If a U.S. holder purchases a note for an amount which, when reduced by the value of the conversion feature, is greater than all amounts payable on the note after the purchase date, other than payments of stated interest, the excess will constitute bond premium. The value of the conversion feature may be determined under any reasonable method, including by comparing the note's purchase price to the market price of a similar debt instrument that does not have a conversion feature. A U.S. holder that purchases a note with bond premium will not be required to include any OID in income. The U.S. holder generally may elect to amortize the bond premium on a constant yield method over the remaining term of the note by offsetting stated interest allocable to an accrual period with bond premium allocable to that period when the U.S. holder takes the interest into income under the U.S. holder's regular method of accounting. Under applicable regulations, if the amortizable bond premium allocable to an accrual period exceeds the amount of qualified stated interest allocable to the accrual period, the excess would be allowed as a deduction for the accrual period, but only to the extent of the U.S. holder's prior interest inclusions on the note. Any excess is generally carried forward and allocable to the next accrual period. Because the notes are redeemable at our option (see "Description of Notes—Redemption of Notes at our Option"), a U.S. holder must determine the yield and maturity of a note for purposes of calculating and amortizing bond premium by assuming that we will exercise our option to redeem the U.S. holder's note in a manner that maximizes the U.S. holder's yield. If we do not exercise our option to redeem the note in the manner assumed, then solely for purposes of calculating and amortizing any remaining bond premium, the U.S. holder must treat the note as retired and reissued on the deemed redemption date for its adjusted acquisition price as of that date. The adjusted acquisition price of the note is the U.S. holder's initial investment in the note, decreased by the amount of any payments, other than qualified stated interest payments, received with respect to such note and any bond premium previously amortized by the U.S. holder.

Once made, the election to amortize bond premium on a constant yield method applies to all debt instruments (other than debt instruments the interest on which is excludable from gross income) held or subsequently acquired by the U.S. holder on or after the first day of the first taxable year to which the election applies and may not be revoked without the consent of the IRS.

If the election is not made, a U.S. holder must include the full amount of each interest payment in income as it accrues or is paid, and premium will not be taken into account until principal payments are received on the note or the note is sold or otherwise disposed of.

Constructive Dividends in Respect of the Notes

Under a number of circumstances, described above under “Description of Notes—Conversion of Notes,” the conversion rate of the notes may be adjusted. Section 305 of the Internal Revenue Code may treat some of these

adjustments as constructive distributions of stock taxable as a dividend. If at any time we make a distribution of property to our stockholders and such distribution is taxable to such stockholders as a dividend for U.S. federal income tax purposes, an adjustment to the conversion rate of the notes in respect of such distribution pursuant to the anti-dilution provisions of the indenture may be deemed to be the payment of a taxable dividend to U.S. holders of the notes under Section 305. If the conversion rate of the notes is adjusted at our discretion or in certain other circumstances, such adjustment also may be deemed to be the payment of a taxable dividend to holders of the notes. U.S. holders of the notes could therefore have taxable income as a result of an event pursuant to which they received no cash or property. It is not clear whether a constructive dividend deemed paid to non-corporate holders would be eligible for the preferential rates of U.S. federal income tax applicable in respect of certain dividends or whether corporate holders would be entitled to claim the dividends received deduction with respect to any such constructive dividends, as described below under “—Dividends on Our Common Stock.” U.S. holders should consult their tax advisors concerning the tax treatment of such constructive distributions.

Sale, Exchange or Retirement of the Notes

A U.S. holder generally will recognize gain or loss on the sale, exchange, retirement, or other disposition of a note equal to the difference between the amount realized by the U.S. holder and the U.S. holder’s adjusted tax basis in the note. A U.S. holder’s adjusted tax basis in a note generally will be its cost, increased by any OID and market discount the U.S. holder has previously included in income (including in the year of the disposition) and reduced by the amount of any payments of principal and by any bond premium the U.S. holder has amortized. The amount realized by the U.S. holder will include the amount of any cash and the fair market value of any property received for the note, except to the extent attributable to accrued but unpaid interest not previously included in income by the U.S. holder. The portion of the amount received which is attributable to accrued but unpaid interest not previously included in income will be taxed as ordinary interest income. Subject to the market discount rules described above, the gain or loss recognized by the U.S. holder upon the disposition of a note will be capital gain or loss and will be long-term capital gain or loss if the note has been held for more than one year. For tax years beginning prior to 2011, long-term capital gain of a non-corporate U.S. holder generally is subject to a maximum tax rate of 15%.

Conversion of the Notes

A U.S. holder generally will not recognize any income, gain or loss upon conversion of the principal amount of a note into shares of our common stock. The tax treatment of the conversion of the applicable premium, which is described above under “Description of Notes—Conversion of Notes,” into shares of our common stock is not clear. U.S. holders should consult their tax advisors concerning the tax treatment of such conversion. To the extent that the conversion of the applicable premium is treated as a conversion of a portion of the premium previously included in income as OID, a U.S. holder will not recognize any income, gain or loss upon such conversion. A U.S. holder’s tax basis in the shares of our common stock received on conversion of a note will be the same as such U.S. holder’s adjusted tax basis in the note at the time of conversion, reduced by any basis allocable to a fractional share interest, and the holding period for the shares of our common stock received on conversion will generally include the holding period of the note converted. Cash received in lieu of a fractional share of our common stock upon conversion generally will be treated as a payment in exchange for the fractional share of common stock. Accordingly, the receipt of cash in lieu of a fractional share of common stock generally will result in capital gain or loss, measured by the difference between the cash received for the fractional share and the U.S. holder’s adjusted tax basis in the fractional share.

Dividends on Our Common Stock

The amount of any distribution by us in respect of our common stock will be equal to the amount of cash and the fair market value, on the date of distribution, of any property distributed. Generally, distributions made to U.S. holders will be treated first as a dividend to the extent of our current and accumulated earnings and profits, next as a tax-free return of capital that reduces a U.S. holder’s tax basis in the shares of our common stock until that basis has been reduced to zero, and thereafter as gain from the sale or exchange of the stock.

In general, dividends are subject to tax as ordinary income. For tax years beginning prior to 2011, however, a dividend distribution to a non-corporate U.S. holder is generally taxed as long-term capital gain at a maximum rate of 15%. The lower capital gain rates will not apply to a dividend on the shares of common stock, however, if the individual U.S. holder fails to satisfy certain holding period requirements with respect to the shares or is obligated to make related payments with respect to positions in substantially similar or related property. In addition, the lower capital gain rates will not apply to dividends that the U.S. holder elects to treat as investment income for purposes of an investment interest deduction.

In general, a dividend distribution to a corporate U.S. holder will qualify for the 70% dividends received deduction if the corporate U.S. holder owns less than 20% of the voting power or value of our stock (other than any non-voting, non-convertible, non-participating preferred stock). A corporate U.S. holder that owns 20% or more of the voting power and value of our stock (other than any non-voting, non-convertible, nonparticipating preferred stock) generally will qualify for an 80% dividends received deduction. The dividends received deduction is subject to certain holding period, debt financed portfolio stock and taxable income limitations. In addition, corporate U.S. holders should consider the rules under Section 1059 of the Internal Revenue Code that may reduce their tax basis in the shares of our common stock.

Sale of Our Common Stock

Subject to the market discount rules described above, upon the sale or exchange of shares of our common stock, a U.S. holder generally will recognize capital gain or loss equal to the difference between the amount realized upon the sale or exchange and such U.S. holder’s adjusted tax basis in the shares of

common stock. Such capital gain or loss will be long-term if the U.S. holder's holding period in the shares of common stock is more than one year at the time of the sale or exchange. Long-term capital gain of a non-corporate U.S. holder prior to 2011 is generally subject to a maximum tax rate of 15%.

Information Reporting and Backup Withholding

In general, certain information is required to be reported by the payor to the Internal Revenue Service with respect to payments made to certain non-corporate U.S. holders of principal and interest on a note, dividends on shares of our common stock, the proceeds of the sale of a note and the proceeds of the sale of shares of our common stock. A U.S. holder of a note may be subject to "backup withholding" with respect to certain of such "reportable payments." In general, these backup withholding rules apply if such U.S. holder, among other things, (1) fails to furnish a taxpayer identification number (or TIN) to the payor or establish an exemption from backup withholding, (2) furnishes an incorrect TIN, (3) fails to report properly certain interest or dividend income or (4) under certain circumstances, fails to certify under the penalty of perjury that the TIN furnished is the correct number and that such U.S. holder is not subject to backup withholding under the Internal Revenue Code. Any amounts withheld under the backup withholding rules from payments to a U.S. holder will be allowed as a credit against such U.S. holder's U.S. federal income tax liability and may entitle the U.S. holder to a refund, provided that the required information is furnished to the Internal Revenue Service. Backup withholding will not apply, however, with respect to payments made to certain U.S. holders of the notes, generally including corporations, provided that their exemption from backup withholding is properly established.

U.S. holders should consult with their tax advisors regarding the application of information reporting and backup withholding in their particular situations, the availability of exemptions and the procedures for obtaining those exemptions, if available.

U.S. Federal Income Tax Consequences to Non-U.S. Holders

The following discussion applies only to non-U.S. holders. This discussion does not address all aspects of U.S. federal income taxation that may be relevant to such non-U.S. holders in light of their special circumstances. For example, special rules may apply to a non-U.S. holder that is a "controlled foreign corporation," a "passive foreign investment company," a person eligible for benefits under an income tax convention to which the United States is a party or a U.S. expatriate, and such non-U.S. holders should consult their own tax advisors to determine the U.S. federal, state, local and other tax consequences that may be relevant to them.

Interest Payments on the Notes

Subject to the discussion below concerning effectively connected income, interest payments (including OID) on the notes will not be subject to the 30% U.S. federal withholding tax provided that:

- the non-U.S. holder does not own actually or constructively 10% or more of the total combined voting power of all classes of our stock entitled to vote;
- the non-U.S. holder is not a "controlled foreign corporation" (as defined for U.S. federal income tax purposes) related to us through actual or constructive stock ownership;
- the non-U.S. holder is not a bank whose receipt of interest on the notes is described in Section 881(c)(3)(A) of the Internal Revenue Code; and
- either (i) the non-U.S. holder provides its name and address to us or our paying agent on an IRS Form W-8BEN (or other applicable form) and certifies under penalty of perjury that the non-U.S. holder is not a United States person, or (ii) a financial institution holding the notes on the non-U.S. holder's behalf certifies to us or our paying agent under penalty of perjury that it has received an IRS Form W-8BEN (or other applicable form) from the beneficial owner and provides a copy or, in the case of certain foreign intermediaries, satisfies other certification requirements under the applicable U.S. Treasury regulations.

Special certification requirements apply to non-U.S. holders that are pass-through entities rather than corporations or individuals. Non-U.S. holders should consult their tax advisors regarding the certification requirements applicable to them.

If a non-U.S. holder cannot satisfy the requirements described above, payments of interest (including OID) to the non-U.S. holder will be subject to the 30% U.S. federal withholding tax, unless the non-U.S. holder qualifies for a reduced rate of withholding under a tax treaty or the payments are exempt from withholding because they are effectively connected with the non-U.S. holder's conduct of a trade or business in the United States and, where a tax treaty applies, are attributable to a U.S. permanent establishment maintained by the non-U.S. holder. In order to claim a reduction in or exemption from the 30% withholding tax under an applicable tax treaty, a non-U.S. holder must provide a properly executed IRS Form W-8BEN (or a suitable substitute form). In order to claim that interest payments are exempt from the withholding tax because they are effectively connected with the non-U.S. holder's conduct of a trade or business in the United States, the non-U.S. holder must provide a properly executed IRS Form W-8ECI (or a suitable substitute form).

A non-U.S. holder eligible for a reduced rate of U.S. withholding tax pursuant to an income tax treaty may obtain a refund of any excess amounts withheld by filing an appropriate claim for refund with the IRS.

Constructive Dividends in Respect of the Notes

Certain adjustments in the conversion rate of the notes may be treated as a taxable dividend to a non-U.S. holder of the notes. See "Tax Consequences to U.S. Holders—Constructive Dividends in Respect of the Notes" above and "—Dividends on Our Common Stock" below.

Conversion of the Notes

A non-U.S. holder's conversion of the principal amount of a note into shares of our common stock generally will not be a taxable event. The tax treatment of the conversion of the applicable premium into shares of our common stock is not clear. Non-U.S. holders should consult their tax advisors concerning the tax treatment of such conversion. To the extent that the conversion of the applicable premium is treated as a conversion of a portion of the maturity premium previously accrued as OID, the shares received upon such conversion will be taxed as described above under "—Interest Payments on the

Dividends on Our Common Stock

Distributions made to a non-U.S. holder with respect to our common stock that are treated as dividends paid, as described above under “Tax Consequences to U.S. Holders—Dividends on Our Common Stock,” and any deemed dividends resulting from adjustments to the conversion ratio of the notes will be subject to U.S. federal withholding tax at a 30% rate, unless (1) the non-U.S. holder qualifies for a reduced rate of withholding under a tax treaty or (2) the payments are exempt from withholding because they are effectively connected with the non-U.S. holder’s conduct of a trade or business in the United States and, where a tax treaty applies, are attributable to a U.S. permanent establishment maintained by the non-U.S. holder. In order to claim a reduction in or exemption from the 30% withholding tax under an applicable tax treaty, a non-U.S. holder must provide a properly executed IRS Form W-8BEN (or a suitable substitute form). In order to claim that dividend payments are exempt from the withholding tax because they are effectively connected with the non-U.S. holder’s conduct of a trade or business in the United States, the non-U.S. holder must provide a properly executed IRS Form W-8ECI (or a suitable substitute form).

Sale, Exchange or Retirement of the Notes and Sale or Exchange of Our Common Stock

A non-U.S. holder generally will not be subject to U.S. federal income tax or withholding tax on any gain realized on the sale, exchange or retirement of a note or a sale or exchange of our common stock unless:

- the gain is effectively connected with a trade or business of the non-U.S. holder in the United States and, where a tax treaty applies, is attributable to a U.S. permanent establishment maintained by the non-U.S. holder;
- the non-U.S. holder is an individual who is present in the U.S. for at least 183 days during the year of disposition of the note or shares and other conditions are satisfied; or
- we are or have been a U.S. real property holding corporation for U.S. federal income tax purposes at any time during the shorter of the five-year period ending on the date of disposition or the period that the non-U.S. holder held our common stock.

We do not believe that we are currently, and do not anticipate becoming, a U.S. real property holding corporation. Even if we were, or were to become, a U.S. real property holding corporation, no adverse tax consequences would apply to a non-U.S. holder that held, directly and indirectly, at all times during the applicable period, five percent or less of our common stock, provided that our common stock was regularly traded on an established securities market.

Effectively Connected Income and Gain

If a non-U.S. holder is engaged in a trade or business in the United States and the non-U.S. holder’s investment in a note or our common stock is effectively connected with such trade or business, the non-U.S. holder will be subject to regular U.S. federal income tax on a net income basis on any payments of interest or dividends and any gain recognized upon a sale of the notes or the common stock in the same manner as if the non-U.S. holder were a U.S. holder. In addition, if the non-U.S. holder is a foreign corporation, the non-U.S. holder may be subject to a branch profits tax of 30% (or the lower rate provided by an applicable income tax treaty) of the non-U.S. holder’s earnings and profits for the taxable year that are effectively connected with the non-U.S. holder’s conduct of a trade or business in the United States. If a non-U.S. holder is eligible for the benefits of a tax treaty, any effectively connected income or gain generally will be subject to U.S. federal income tax only if it is also attributable to a permanent establishment maintained by the non-U.S. holder in the United States.

Information Reporting and Backup Withholding

We must report annually to the IRS the amount of interest, dividends or other distributions we pay to non-U.S. holders and the amount of tax we withhold on these payments, regardless of whether withholding is required. The

IRS may make copies of the information returns reporting those dividends and amounts withheld available to the tax authorities in the country of residence of the non-U.S. holder pursuant to the provisions of an applicable income tax or exchange of information treaty.

The United States imposes a backup withholding tax on interest, dividends and certain other types of payments to U.S. persons. A non-U.S. holder will not be subject to backup withholding tax on such payments if the non-U.S. holder provides proper certification, usually on an IRS Form W-8BEN, of the holder’s status as a non-U.S. person and we do not have actual knowledge or reason to know that such non-U.S. holder is a U.S. person.

In general, a non-U.S. holder will not be subject to backup withholding or information reporting with respect to the proceeds of the sale of a note or a share of our common stock within the U.S. or conducted through certain U.S.-related financial intermediaries if the payor receives the certification of the non-U.S. holder’s status as a non-U.S. person described above and does not have actual knowledge or reason to know that such non-U.S. holder is a U.S. person.

Backup withholding is not an additional tax, and amounts withheld as backup withholding will be allowed as a refund or credit against a non-U.S. holder’s U.S. federal income tax liability, provided that the required information is furnished to the IRS.

SELLING SECURITYHOLDER

We originally issued the notes in a private placement in May 2006. The notes may be resold by the initial purchaser to persons it reasonably believes to be qualified institutional buyers under Rule 144A under the Securities Act. The selling securityholder listed below and, to the extent permitted, its transferees, pledgees, donees, assignees, successors, partnership distributees and others who later hold any of the selling securityholder's interest, 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 the 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 the selling securityholder. To our knowledge, neither the 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 securityholder identified below will sell all or any of these securities. In addition, the selling securityholder may have sold, transferred or disposed of all or a portion of its notes since the date on which it provided the information regarding its holdings in transactions exempt from the registration requirements of the Securities Act.

Name	Principal Amount of Notes Beneficially Owned Before the Offering That May be Sold	Number of Shares of Common Stock Issuable Upon Conversion That May be Sold(1)	Number of Shares of Common Stock Beneficially Owned Before Offering(1)	Number of Shares of Common Stock Beneficially Owned After Offering(2)
Quantum Partners LDC(3)	\$ 75,000,000	4,167,188	4,393,188	226,000

- (1) Assumes conversion of the full amount of notes held by the selling securityholder at the initial rate equal to the principal amount of the notes plus the maximum applicable premium of 11.125% at maturity (\$8,343,750 for the full principal amount owned before this offering) divided by \$20.00. 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.
- (2) 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 and represents additional shares of common stock beneficially owned before the offering. Also assumes that future transferees, pledgees, donees, assignees, successors or partnership distributees of or from the selling securityholder do not and will not beneficially own any common stock other than the common stock issuable upon conversion of the notes. This amount is less than 1% of our outstanding common stock as of June 7, 2006.
- (3) The securities listed herein are held for the account of Quantum Partners LDC, a Cayman Islands exempted limited duration company ("Quantum Partners"). SFM LLC serves as principal investment manager to Quantum Partners. As such, SFM LLC has been granted investment discretion over portfolio investments, including such securities, held for the account of Quantum Partners. Mr. George Soros, as Chairman of SFM LLC, has the ability to direct the investment decisions of SFM LLC and as such may be deemed to have investment discretion over the securities held for the account of Quantum Partners.

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. The aggregate proceeds to the selling securityholders from the sale of the notes or underlying common stock will be the sale price of the notes or common stock less discounts and commissions, if any. The selling securityholders reserve the right to accept and, together with their agents from time to time, to reject, in whole or in part, any proposed sale of notes or underlying common stock to be made directly or through agents. We will not receive any of the proceeds from the offering of the notes or the underlying shares of common stock by the selling securityholders.

The selling securityholders, or, to the extent permitted, their transferees, pledgees, donees, assignees, successors, partnership distributees and others who later hold any of the selling securityholders' interest, may sell all or a portion of the notes and the underlying shares of common stock from time to time to purchasers directly or through 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 will act independently of us in making decisions with respect to the timing, manner and size of each sale.

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. Selling holders who are “underwriters” within the meaning of the Securities Act are subject to the prospectus delivery requirements of the Securities Act. The selling securityholders have acknowledged their obligation to comply with the provisions of the Exchange Act and the rules thereunder relating to stock manipulation, particularly Regulation M.

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 Global 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;
- through the writing of options; or
- through the distribution of the securities by any selling securityholder to its partners, members or stockholders.

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.

Our common stock is quoted on the NASDAQ Global 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 a 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.

Under a registration rights agreement for the benefit of the holders of the notes, we agreed to register the notes and underlying shares of common stock under the Securities Act under specific circumstances and at specific times. The registration rights agreement provides for cross-indemnification of the holders and us and their and our respective directors, officers and controlling persons against specific liabilities in connection with the offer and sale of the notes and the underlying shares of common stock, including some liabilities under the Securities Act. We have agreed to pay substantially all the expenses incidental to the registration, offering and sale of the notes and the underlying shares of our common stock to the public other than commissions, fees and discounts of underwriters, broker-dealers and agents. Our obligation to keep the registration statement of which this prospectus is a part effective is subject to exceptions. In certain cases, we may temporarily prohibit offers and sales of the notes and the underlying shares of our common stock pursuant to such registration statement.

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, Edwards Angell Palmer & Dodge LLP, Boston, Massachusetts.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements and schedule included in our Annual Report on Form 10-K for the year ended December 31, 2005, and management's assessment of the effectiveness of our internal control over financial reporting as of December 31, 2005 as set forth in their reports, which are incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements and schedule and management's assessment are incorporated by reference in reliance on Ernst & Young LLP's reports, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC. You may read and copy any documents that we file with the SEC at the SEC's Public Reference Room at 100 F Street, N.E., Room 1580, 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 website 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 One Liberty Plaza, 165 Broadway, New York, NY 10006, or on our website at <http://www.axcelis.com>. Our website is not part of this prospectus.

INCORPORATION BY REFERENCE

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:

- Our Annual Report on Form 10-K for the year ended December 31, 2005, filed on March 14, 2006;
- Our Quarterly Report on Form 10-Q for the quarter ended March 31, 2006, filed on May 10, 2006.
- Our Current Reports on Form 8-K filed on February 6, 2006, February 8, 2006, March 3, 2006 and May 4, 2006.
- The Proxy Statement on Schedule 14A for our 2006 Annual Meeting of Stockholders filed on March 31, 2006; and
- 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 after the date of the initial registration statement and prior to the effectiveness of the registration statement and after the date of the prospectus and prior to the termination of the offering; *provided, however*, that we are not incorporating any information furnished under Item 2.02 or Item 7.01 of any Current Report on Form 8-K.

You may obtain documents incorporated by reference in this prospectus, free of charge, on our website at <http://www.axcelis.com> or by requesting them in writing or by telephone from us at the following address and telephone number: Heather Carberry, Director, Investor Relations, Axcelis Technologies, Inc., 108 Cherry Hill Drive, Beverly, Massachusetts 01915; (978) 787-4000.

Any statement contained in a document incorporated by reference, or deemed to be incorporated by reference, in this prospectus shall be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained herein or in any other subsequently filed document which also is incorporated by reference in this prospectus modifies or supersedes such statement. Any such statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus. Statements contained in this prospectus as to the contents of any contract or other document referred to in this prospectus do not purport to be complete, and, where reference is made to such contract or other documents, such statements are qualified in all respects by reference to such contract or other document.

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	\$ 8,025
Printing and engraving expenses	\$ 2,500

Accounting fees and expenses	\$ 15,000
Legal fees and expenses	\$ 28,000
Miscellaneous expenses	\$ 15,000
Total	<u>\$ 68,525</u>

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.

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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), (a)(1)(ii) and (a)(1)(iii) do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission 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, or is contained in a form of prospectus filed pursuant to Rule 424(b) of the Securities Act of 1933 that is part of 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.

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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 June 7, 2006.

AXCELIS TECHNOLOGIES, INC.

By: /s/ Mary G. Puma
 Mary G. Puma
 Chairman, Chief Executive Officer and President

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 Stephen G. Bassett, 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
<u>/s/ Mary G. Puma</u> Mary G. Puma	Chairman, Chief Executive Officer and President (Principal Executive Officer)	*
<u>/s/ Stephen G. Bassett</u> Stephen G. Bassett	Executive Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	*
<u>/s/ R. John Fletcher</u> R. John Fletcher	Director	*
<u>/s/ Stephen R. Hardis</u> Stephen R. Hardis	Director	*
<u>/s/ William C. Jennings</u> William C. Jennings	Director	*
<u>/s/ Michio Naruto</u> Michio Naruto	Director	*
<u>/s/ Patrick H. Nettles</u> Patrick H. Nettles	Director	*
<u>/s/ H. Brian Thompson</u> H. Brian Thompson	Director	*

* June 7, 2006

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EXHIBIT INDEX

<u>No.</u>	<u>Description</u>
4.1	Amended and Restated Certificate of Incorporation of the Company. Incorporated by reference to Exhibit 3.1 of the Company's Registration Statement on Form S-1 (Registration No. 333-36330).
4.2	Bylaws of the Company, as amended as of January 23, 2002. Incorporated by reference to Exhibit 3.2 of the Company's Annual Report on Form 10-K for the year ended December 31, 2001, filed with the Commission on March 12, 2002 (File No. 000-30941).
4.3	Certificate of Designation of Series A Participating Preferred Stock, filed with the Secretary of State of Delaware on July 5, 2000. Incorporated by reference to Exhibit 3.3 of the Company's Annual Report on Form 10-K for the year ended December 31, 2000 filed with the Commission on March 30, 2001.
4.4	Specimen stock certificate. Incorporated by reference to Exhibit 4.1 of the Company's Registration Statement on Form S-1 (File No. 333-36330).
4.5	Rights Agreement between the Company and EquiServe Trust Company, N.A. Incorporated by reference to Exhibit 4.1 of the Company's Registration Statement on Form S-1 (File No. 333-36330).
4.6	Indenture between the Company and U.S. Bank National Association, as Trustee, including the form of note, dated as of May 2, 2006. Incorporated by reference to Exhibit 4.1 of the Company's Current Report on Form 8-K filed with the Commission on May 4, 2006 (File No. 000-30941).
4.7	Registration Rights Agreement by and between the Company and Quantum Partners LDC, dated as of May 2, 2006. Incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K filed with the Commission on May 4, 2006 (File No. 000-30941).
5	Opinion of Edwards Angell Palmer & Dodge LLP. Filed herewith.
12	Statement regarding Computation of Ratio of Earnings to Fixed Charges. Filed herewith.
23.1	Consent of Ernst & Young LLP, independent registered public accounting firm. Filed herewith.
23.2	Consent of Edwards Angell 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 U.S. Bank National Association. Filed herewith.

EDWARDS ANGELL PALMER & DODGE LLP

June 8, 2006

Axcelis Technologies, Inc.
108 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 \$75,000,000 in aggregate principal amount of 4 1/4% Convertible Senior Subordinated Notes Due 2009 (the "Notes") and up to 4,167,188 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 May 2, 2006 (the "Indenture") between the Company and U.S. Bank National Association, as trustee. We understand that the Notes and Conversion Shares are to be offered and sold from time to time by the holder named in the prospectus forming part of the Registration Statement (the "Prospectus") in the manner described in the Prospectus.

We have acted as your 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. We have relied as to certain matters on information obtained from public officials, officers of the Company and other sources believed by us to be responsible.

The opinions rendered herein are limited to New York law, the Delaware General Corporation Law, including applicable provisions of the Delaware Constitution and reported judicial decisions interpreting these laws, and the federal laws of the United States.

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

1. The Notes have been duly authorized and are, and when sold pursuant to the Prospectus will be, valid and binding obligations of the Company, subject to (i) bankruptcy, insolvency, reorganization, moratorium and other similar laws of general application affecting the rights and remedies of creditors, and (ii) general principles of equity, regardless of whether applied in proceedings in equity or at law.

Axcelis Technologies, Inc.
June 8, 2006
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2. The Conversion Shares 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/ EDWARDS ANGELL PALMER & DODGE LLP

Axcelis Technologies, Inc.
Computation of Ratio of Earnings to Fixed Charges
(Dollars in Thousands)

	Year Ended December 31,					Three Months Ended March 31, 2006
	2001	2002	2003	2004	2005	
Income (loss) before income taxes	\$ (40,401)	\$ (49,743)	\$ (44,341)	\$ 75,139	\$ (1,982)	\$ 634
Share of undistributed income of 50% owned affiliate	(12,205)	(4,806)	(8,954)	(30,531)	(15,751)	(2,216)
Share of distributed income of 50% owned affiliate	444	464	456	—	538	—
Interest expense	—	5,803	6,229	6,673	6,634	1,641
Interest portion of rental expense	2,646	2,746	2,535	2,313	2,106	425
Earnings	\$ (49,516)	\$ (45,536)	\$ (44,075)	\$ 53,594	\$ (8,455)	\$ 484
Interest expense	\$ —	\$ 5,803	\$ 6,229	\$ 6,673	\$ 6,634	\$ 1,641
Interest portion of rental expense	2,646	2,746	2,535	2,313	2,106	425
Fixed charges	\$ 2,646	\$ 8,549	\$ 8,764	\$ 8,986	\$ 8,740	\$ 2,066
Ratio of earnings to fixed charges	(A)	(B)	(B)	6.00	(B)	(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 interest expense and 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, 2001, 2002, 2003 and 2005 and the three months ended March 31, 2006, there was a deficiency of earnings to cover fixed charges of approximately \$52.2 million, \$54.1 million, \$52.8 million, \$17.2 million and \$1.6 million, respectively.

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption "Experts" in the Registration Statement (Form S-3) and related Prospectus of Axcelis Technologies, Inc. for the registration of \$75,000,000 4¼% Convertible Senior Subordinated Notes Due 2009 and the registration of 4,167,188 shares of common stock and to the incorporation by reference therein of our reports dated March 8, 2006, with respect to the consolidated financial statements and schedule of Axcelis Technologies, Inc., Axcelis Technologies, Inc. management's assessment of the effectiveness of internal control over financial reporting, and the effectiveness of internal control over financial reporting of Axcelis Technologies, Inc, included in its Annual Report (Form 10-K) for the year ended December 31, 2005, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts

June 7, 2006

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**Check if an Application to Determine Eligibility of
a Trustee Pursuant to Section 305(b)(2)**U.S. BANK NATIONAL ASSOCIATION**

(Exact name of Trustee as specified in its charter)

31-0841368

I.R.S. Employer Identification No.

**800 Nicollet Mall
Minneapolis, Minnesota**
(Address of principal executive offices)**55402**
(Zip Code)**John A. Brennan**
U.S. Bank National Association
One Federal Street
Boston, MA 02110
(617) 603-6576
(Name, address and telephone number of agent for service)**AXCELIS TECHNOLOGIES, INC.**

(Issuer with respect to the Securities)

Delaware
(State or other jurisdiction of incorporation or organization)**34-1818596**
(I.R.S. Employer Identification No.)**108 Cherry Hill Drive**
Beverly, Massachusetts
(Address of Principal Executive Offices)**01915**
(Zip Code)**4.25% Convertible Senior Subordinated Notes due January 15, 2009**
(Title of the Indenture Securities)**FORM T-1****Item 1. GENERAL INFORMATION.** Furnish the following information as to the Trustee.

- a)
- Name and address of each examining or supervising authority to which it is subject.*

Comptroller of the Currency
Washington, D.C.

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

Yes

Item 2. AFFILIATIONS WITH OBLIGOR. *If the obligor is an affiliate of the Trustee, describe each such affiliation.*

None

Items 3-15 *Items 3-15 are not applicable because to the best of the Trustee's knowledge, the obligor is not in default under any Indenture for which the Trustee acts as Trustee.*

Item 16. LIST OF EXHIBITS: *List below all exhibits filed as a part of this statement of eligibility and qualification.*

1. A copy of the Articles of Association of the Trustee.*
2. A copy of the certificate of authority of the Trustee to commence business.*
3. A copy of the certificate of authority of the Trustee to exercise corporate trust powers.*
4. A copy of the existing bylaws of the Trustee.*
5. A copy of each Indenture referred to in Item 4. Not applicable.
6. The consent of the Trustee required by Section 321(b) of the Trust Indenture Act of 1939, attached as Exhibit 6.
7. Report of Condition of the Trustee as of December 31, 2005 published pursuant to law or the requirements of its supervising or examining authority, attached as Exhibit 7.

* Incorporated by reference to Exhibit 25.1 to Amendment No. 2 to registration statement on S-4, Registration Number 333-128217 filed on November 15, 2005.

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SIGNATURE

Pursuant to the requirements of the Trust Indenture Act of 1939, as amended, the Trustee, U.S. BANK NATIONAL ASSOCIATION, a national banking association organized and existing under the laws of the United States of America, 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, Commonwealth of Massachusetts on the 2nd of June, 2006.

U.S. BANK NATIONAL ASSOCIATION

By: /s/ John A. Brennan
John A. Brennan
Officer

By: /s/ Todd R. DiNezza
Todd R. DiNezza
Assistant Vice President

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Exhibit 6

CONSENT

In accordance with Section 321(b) of the Trust Indenture Act of 1939, the undersigned, U.S. BANK NATIONAL ASSOCIATION hereby consents that reports of examination of the undersigned by Federal, State, Territorial or District authorities may be furnished by such authorities to the Securities and Exchange Commission upon its request therefor.

Dated: June 7, 2006

U.S. BANK NATIONAL ASSOCIATION

By: /s/ John A. Brennan
John A. Brennan
Officer

By: /s/ Todd R. DiNezza
Todd R. DiNezza
Assistant Vice President

-

Exhibit 7

U.S. Bank National Association
Statement of Financial Condition
As of 3/31/2006

(\$000's)

	<u>3/31/2006</u>
Assets	
Cash and Due From Depository Institutions	\$ 7,050,967
Securities	39,215,391
Federal Funds	3,114,744
Loans & Lease Financing Receivables	135,184,791
Fixed Assets	1,737,385
Intangible Assets	11,754,046
Other Assets	10,882,988
Total Assets	\$ 208,940,312
Liabilities	
Deposits	\$ 132,810,195
Fed Funds	12,304,517
Treasury Demand Notes	0
Trading Liabilities	252,318
Other Borrowed Money	28,673,468
Acceptances	0
Subordinated Notes and Debentures	6,432,494
Other Liabilities	6,859,284
Total Liabilities	\$ 187,332,276
Equity	
Minority Interest in Subsidiaries	\$ 1,029,155
Common and Preferred Stock	18,200
Surplus	11,804,040
Undivided Profits	8,756,641
Total Equity Capital	\$ 21,608,036
Total Liabilities and Equity Capital	\$ 208,940,312

To the best of the undersigned's determination, as of the date hereof, the above financial information is true and correct.

U.S. Bank National Association

By: John A. Brennan

 John A. Brennan, Officer

Date: June 7, 2006