

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
WASHINGTON, DC 20549

FORM S-8
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

AXCELIS TECHNOLOGIES, INC.

(Exact Name of Registrant as Specified in Its Charter)

Delaware
(State or Other Jurisdiction of Incorporation)

34-1818596
(I.R.S. Employer Identification No.)

108 Cherry Hill Drive, Beverly, Massachusetts 01915
(Address of Principal Executive Offices)

2000 STOCK PLAN
(Full Title of the Plan)

LYNNETTE C. FALLON
Axcelis Technologies, Inc.
108 Cherry Hill Drive
Beverly, Massachusetts 01915
(617) 787-4000
(Name, Address and Telephone Number of Agent for Service)

with copies to:

MATTHEW C. DALLETT
Palmer & Dodge LLP
111 Huntington Avenue
Boston, Massachusetts 02199-7613
(617) 239-0100

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Amount To Be Registered	Proposed Maximum Offering Price Per Share	Proposed Maximum Aggregate Offering Price	Amount Of Registration Fee
Axcelis common stock, \$0.001 par value(1)	14,673,367 shares(2)	\$ 6.875(3)\$	100,879,398 \$	12,781.42

- (1) Includes associated purchase rights that currently are evidenced by certificates for shares of Axcelis common stock.
- (2) Plus, pursuant to Rule 416(a) under the Securities Act, such additional number of shares of Axcelis common stock as may be issued upon a stock split, stock dividend, or similar transaction.
- (3) Pursuant to Rules 457(c) and 457(h)(1) under the Securities Act, the proposed maximum offering price per share and the maximum aggregate offering price for the shares have been calculated solely for the purpose of computing the registration fee on the basis of the average of the high and low prices of Axcelis common stock as reported by the Nasdaq National Market System on November 9, 2004, to be \$6.99 and \$6.76, respectively.

Explanatory Note

The Registrant hereby increases the number of shares of its common stock registered for issuance under its 2000 Stock Plan by 14,673,367 shares. Pursuant to Instruction E to Form S-8, the Registrant incorporates by reference into this Registration Statement the entire contents of its Registration

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 for filing on Form S-8 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, on October 28, 2004.

AXCELIS TECHNOLOGIES, INC.

By: /s/ STEPHEN G. BASSETT
 Stephen G. Bassett
 Senior Vice President, Finance and Chief
 Financial Officer

POWER OF ATTORNEY

We the undersigned officers and directors of Axcelis Technologies, Inc., hereby severally constitute and appoint Mary G. Puma, Stephen G. Bassett and Lynnette C. Fallon, 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-8 (including any post-effective amendments thereto) for the registration of 14,673,367 shares, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, with respect to the registration of shares under the Axcelis Technologies, Inc. 2000 Stock Plan, 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 Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ MARY G. PUMA</u> Mary G. Puma	Director and Principal Executive Officer	October 28, 2004
<u>/s/ STEPHEN G. BASSETT</u> Stephen G. Bassett	Principal Accounting and Financial Officer	October 28, 2004
<u>/s/ ALEXANDER M. CUTLER</u> Alexander M. Cutler	Director	October 28, 2004

<u>/s/ R. JOHN FLETCHER</u> R. John Fletcher	Director	October 28, 2004
<u>/s/ STEPHEN R. HARDIS</u> Stephen R. Hardis	Director	October 28, 2004
<u>/s/ WILLIAM C. JENNINGS</u> William C. Jennings	Director	October 28, 2004
<u>Patrick H. Nettles</u>	Director	October 28, 2004
<u>/s/ H. BRIAN THOMPSON</u> H. Brian Thompson	Director	October 28, 2004
<u>/s/ GARY L. TOOKER</u> Gary L. Tooker	Director	October 28, 2004

EXHIBIT INDEX

<u>Exhibit Number</u>	<u>Description</u>
*3.1	Amended and Restated Certificate of Incorporation of the Company. Incorporated by reference from Exhibit 3.1 of the Company's

Registration Statement on Form S-1 (Registration No. 333-36330).

- *3.2 Bylaws of the registrant, as amended as of January 23, 2002. Incorporated by reference from Exhibit 3.2 of the Company's Form 10-K for the year ended December 31, 2001, filed with the Commission on March 12, 2002.
- *3.3 Certificate of Designation of Series A Participating Preferred Stock, filed with the Secretary of State of Delaware on July 5, 2000. Incorporated by reference from Exhibit 3.3 of the Company's Form 10-K for the year ended December 31, 2000, filed with the Commission on March 30, 2001.
- *4.1 Rights Agreement between the Company and EquiServe Trust Company, N.A. Incorporated by reference from Exhibit 4.1 of the Company's Registration Statement on Form S-1 (Registration No. 333-36330).
- *4.2 Indenture between the Company and State Street Bank and Trust Company, as trustee, including the form of note, dated as of January 15, 2002. Incorporated by reference from Exhibit 4.1 to the Company's Report on Form 8-K filed with the Commission on January 15, 2002.
- *4.3 Registration Rights Agreement by and among the Company, Morgan Stanley & Co., Incorporated, Salomon Smith Barney Inc. and SG Cowen Securities Corporation, dated as of January 15, 2002. Incorporated by reference from Exhibit 4.2 to the Company's Report on Form 8-K filed with the Commission on January 15, 2002.
- 5.1 Opinion of Palmer & Dodge LLP. Filed herewith.
- 23.1 Consent of Independent Auditors. Filed herewith.
- 23.2 Consent of Palmer & Dodge LLP (contained in Exhibit 5.1 hereto).

* Indicates exhibit previously filed with the Securities and Exchange Commission and incorporated herein by reference. Exhibits filed with Forms 10-K, 10-Q, 8-K, 8-A, or Schedule 14A of Axcelis Technologies, Inc. were filed under Commission File No. 000-30941.

PALMER & DODGE LLP
111 Huntington Avenue At Prudential Center
Boston, MA 02199-7613

November 9, 2004

Axcelis Technologies, Inc.
108 Cherry Hill Drive
Beverly, MA 01915

Ladies and Gentlemen:

We are rendering this opinion in connection with the Registration Statement on Form S-8 (the "Registration Statement") filed on or about the date hereof with the Securities and Exchange Commission under the Securities Act of 1933, as amended, for the registration of 14,673,367 shares of Common Stock, \$.001 par value per share (the "Shares"), of Axcelis Technologies, Inc., a Delaware corporation (the "Company"), issuable under the Company's 2000 Stock Plan (the "2000 Plan").

We have acted as your counsel in connection with the preparation of the Registration Statement and are familiar with the proceedings taken by the Company in connection with the authorization, issuance and sale of the Shares. We have examined all such documents as we consider necessary to enable us to render this opinion.

Based upon the foregoing, we are of the opinion that, when issued and sold in accordance with the terms of the Plan, the Shares will be validly issued, fully paid and nonassessable.

We hereby consent to the use of our name in the Registration Statement and consent to the filing of this opinion with the Securities and Exchange Commission as an exhibit to the Registration Statement.

Very truly yours,

/s/ Palmer & Dodge LLP

PALMER & DODGE LLP

Main 617.239.0100 Fax 617.227.4420 www.palmerdodge.com

Consent of Independent Auditors

We consent to the incorporation by reference in the Registration Statement (Form S-8) pertaining to the Axcelis Technologies, Inc. 2000 Stock Plan of our report dated January 28, 2004, with respect to the consolidated financial statements and schedule of Axcelis Technologies, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2003, filed with the Securities and Exchange Commission.

Boston, Massachusetts
November 8, 2004
