

Mail Stop 6010

July 20, 2007

VIA U.S. MAIL and FACSIMILE

Stephen G. Bassett
Chief Financial Officer
Axcelis Technologies, Inc.
108 Cherry Hill Drive
Beverly, Massachusetts 01915

**RE: Axcelis Technologies, Inc.
Form 10-K for the fiscal year ended December 31, 2006
Filed March 15, 2007
Form 10-Q for the quarterly period ended March 31, 2007
File No. 000-30941**

Dear Mr. Bassett:

We have reviewed your filing and have the following comments. We have limited our review of your filing to those issues we have addressed in our comments. Where indicated, we think you should revise your document in response to these comments. If you disagree, we will consider your explanation as to why our comment is inapplicable or a revision is unnecessary. Please be as detailed as necessary in your explanation. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure. After reviewing this information, we may raise additional comments.

Please understand that the purpose of our review process is to assist you in your compliance with the applicable disclosure requirements and to enhance the overall disclosure in your filing. We look forward to working with you in these respects. We welcome any questions you may have about our comments or any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

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Form 10-K for the fiscal year ended December 31, 2006

Consolidated Statements of Operations, page F-2

1. We see that you separately disclose revenue generated from sales of systems, services and royalties. In future filings, please revise your income statement to also separately disclose the related costs of generating those revenues. Refer to Article 5-03(b)(1) and (2) of Regulation S-X. As a related matter, the gross profit for systems, services and royalties should be separately discussed in the results of operations section of MD&A.

Consolidated Balance Sheets, page F-3

2. In future filings, please revise to clearly label your long term debt as “convertible subordinated debt,” as described in the footnotes to your financial statements.

Notes to Consolidated Financial Statements

Note 2. Significant Accounting Policies, page F-6

Revenue Recognition, page F-8

3. Please tell us and revise future filings to clearly disclose your accounting policy for recognizing revenue from royalty arrangements. Please note that it should be evident from your disclosure that the royalty revenue is from a related party.

Form 10-Q for the quarterly period ended March 31, 2007

Consolidated Statement of Cash Flows, page 5

4. We see that you currently present the cash dividend from SEN within operating activities in your consolidated statement of cash flows. Please tell us why you should not record the dividend as a component of net cash provided by investing activities. We reference paragraph 16(b) of SFAS 95 which states that returns of investment in equity instruments are generally recorded as investing activities.

As appropriate, please respond to these comments within 10 business days or tell us when you will provide us with a response. Please furnish a cover letter with your response that keys your responses to our comments and provides any requested information. Detailed cover letters greatly facilitate our review. Please understand that we may have additional comments after reviewing your responses to our comments.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filing to be certain that the filing includes all information required under the Securities Exchange Act of 1934 and that they have provided all information

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investors require for an informed decision. Since the company and its management are in possession of all facts relating to a company's disclosure, they are responsible for the accuracy and adequacy of the disclosures they have made.

In connection with responding to our comments, please provide, in writing, a statement from the company acknowledging that:

- the company is responsible for the adequacy and accuracy of the disclosure in the filing;
- staff comments or changes to disclosure in response to staff comments do not foreclose the Commission from taking any action with respect to the filing; and
- the company may not assert staff comments as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

In addition, please be advised that the Division of Enforcement has access to all information you provide to the staff of the Division of Corporation Finance in our review of your filing or in response to our comments on your filing.

You may contact Kristin Lochhead at (202) 551-3664 or me at (202) 551-3676 if you have questions. In this regard, please do not hesitate to contact Martin James, Senior Assistant Chief Accountant, at (202) 551-3671 with any other questions.

Sincerely,

Brian Cascio
Accounting Branch Chief