

Mail Stop 6010

May 2, 2006

Douglas J. McCutcheon
Chief Financial Officer
Nanometrics Incorporated
1550 Buckeye Drive
Milpitas, California 95035

**Re: Nanometrics Incorporated
Registration Statement on Form S-4 Filed April 5, 2006
File No. 333-133033**

Dear Mr. McCutcheon:

We have reviewed your filing and have the following 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 on any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

Joint Proxy Statement

1. Please include the summary term sheet required by Item 1001 of Regulation M-A.

Questions and Answers About the Merger, page 1

2. Please provide cross-references to the more detailed discussion of each topic addressed in the Q&A included in the body of the proxy statement. Refer to Item 1001 of Regulation M-A.

What is the proposed transaction?, page 1

3. Quantify here the number of shares that will be escrowed.

4. Revise your disclosure to clarify why you state that “if the Average Closing Price is more than or less than \$15.63, then Nanometrics will, in either case, issue or reserve for issuance fewer of its shares as merger consideration.” Provide examples to illustrate this point.

Why am I receiving this joint proxy statement/prospectus?, page 1

5. Clarify here that approval of the merger by Accent Optical shareholders is assured as a result of the entry into a voting agreement by shareholders who hold more than a majority of the shares.

Can you provide examples of the dollar value of Nanometrics stock . . . , page 3

6. Rather than overstating the value of what Accent Optical stockholders will receive, revise to state what they *actually* will receive, and disclose that they *may* receive additional shares sometime in the future from the escrowed shares that are subject to transaction expenses and potential indemnification claims.

What is the escrow and how does it work?, page 4

7. Please revise here and throughout the filing to quantify the estimated dollar amount, as of a recent date, of the 490,000 shares of Nanometrics common stock to be placed in escrow. Disclose how you decided to escrow 490,000 shares.
8. We note on page 3 that transaction expenses will also reduce the escrow amount. Please revise to so state here, and estimate the amount of transaction expenses.
9. Please revise to disclose how soon after the expiration of the 12-month escrow period distributions to former Accent Optical stockholders will commence. Please also revise to indicate whether the distributions of the escrow shares will include interest accrued over the 12-month period.

Do any of the directors and executive officers of Accent Optical have any special interests in the merger?, page 7

10. Quantify each of the benefits that each of Accent Optical’s directors and executive officers is expected to receive as a result of the merger, including amounts each will receive assuming his employment is terminated..
11. Under a separate heading in the Q&A or Summary, describe Proposal Two – Payments to Executives. Include in your summary the reasons for the option grants, the identities of the recipients, the date of the grants and number, exercise price, vesting schedule and

value of the options in question. Briefly explain who is entitled to vote on the proposal and what vote is required.

Will the shareholders of Nanometrics and the stockholders of Accent Optical have dissenters or appraisal rights in connection with the merger?, page 9

12. Provide the information required by the Instruction to Item 3 of Schedule 14A, along with a cross reference to the more thorough discussion in the proxy statement and Annex H.

Summary, page 11

13. You currently repeat much of the information in both your Q&A section and your summary. The Q&A should not repeat the information that appears in the summary and vice versa. Please revise to eliminate duplicative disclosure.

Proposal 2 for Accent Optical Shareholders

14. Expand the summary to describe proposal 2 in reasonable detail, including vote required and whether or not the vote is assured.

Cautionary Statement Concerning Forward-Looking Statements, page 27

15. Please relocate this disclosure so that your Risk Factors section immediately follows your Summary section.

Risk Factors, page 28

16. Please revise the second paragraph of this section to eliminate the implication that you have not discussed all material risks, and revise as necessary to include a discussion of all material risks in your risk factors section.

Challenges involved in integrating Accent Optical's operations . . . , page 31

17. Expand this risk factor to specifically address the material weakness regarding internal controls identified by Nanometrics Incorporated's management, and how integrating Accent Optical's operations will affect Nanometrics' remediation plan.

The Accent Optical Special Meeting, page 49

Voting Agreements, page 50

18. Disclose why Nanometrics and Alloy Merger Corporation waived the requirement that parties to the voting agreements vote in favor of payments to Accent Optical executive officers.

Proposal One – The Merger, page 53

Background of the Merger, page 53

19. Describe the negotiations that took place regarding arrangements for executive officers and directors of Accent Optical to receive employment, severance or other forms of compensation in addition to the per share amounts to be received by all existing security holders. Explain how the negotiations regarding these arrangements affected negotiations regarding the exchange ratio and other material terms of the proposed merger.

Opinion of Nanometrics' Financial Advisor, page 62

20. Please provide us with the materials that Cowen provided to the Nanometrics board in connection with this transaction.
21. Expand the disclosure on page 67 to quantify the amount paid to Cowen for all services it provided in connection with this transaction, as well as all fees and other payments for services paid by Nanometrics during the preceding two years. Please also apply this comment to the disclosure on page 73 regarding services provided by Merrill Lynch to Accent Optical.

Opinion of Accent Optical's Financial Advisor, page 67

22. Please provide us with the materials that Merrill Lynch provided to the Accent Optical board in connection with this transaction.

Executive Officer Retention and Severance Agreements, page 74

23. Disclose amount of severance Mr. Langrill would receive based on the value of his in-the-money options as of a recent date. Identify the nature of the consulting services that Mr. Langrill has agreed to provide to Nanometrics following his termination, and disclose the value of payments he will receive if he provides those services through March 31, 2007.
24. File the agreements with Mr. Langrill and Mr. Crawford.

Unaudited Pro Forma Condensed Combined Financial Statements, page 101

Note 1 – Basis of Pro Forma Presentation, page 105

25. Given the significance of the allocation to intangible assets, please revise your disclosure to provide all significant assumptions for each material component of your identified intangible assets. Also please disclose the specific factors that contributed to a purchase price that will result in the recognition of such a significant amount of goodwill.

Note 2 – Reclassifications, page 108

26. Please refer to adjustments (h) and (i). Given the significance of the direct transaction costs please revise to disclose (or cross reference to such disclosure) the nature and significant components of the direct transactions costs.

The Accent Optical Business, page 112

27. Please provide the duration and effect of each material patent.

Accent Optical Management's Discussion and Analysis . . . , page 120

Results of Operations, page 122

28. We note your discussions of costs of revenues and gross profit, research and development and selling general and administrative expenses. When you cite factors in explaining a change in a financial statement line item, the amounts of the individually significant factors cited, including offsetting factors, should be separately quantified. For example, we note your references to declines in sales of DIVA and RPM, "lower" service revenues and "increased" legal expenses in the second and third paragraphs, respectively, on page 125. Please revise accordingly.

Nanometrics' Principal Shareholders, page 135

29. Please revise to identify the natural persons who beneficially own shares held by the non-public entities named in the table.

Payments Subject to Accent Optical Stockholder Approval, page 156

30. Explain how you calculate the present value of the options.

Vote Required, page 157

31. Quantify the amount of outstanding shares of Accent Optical that is owned, directly or indirectly, by anyone receiving parachute payments. Explain whether the parties to the voting agreement (other than those receiving parachute payments and their affiliates) intend to vote for this proposal. If so, state the total percentage of shares their holdings represent.

Annex A

32. We note your statement that "information concerning the subject matter of the representations and warranties may have changed since the date of the agreement, which subsequent information may or may not be fully reflected in Nanometrics' public disclosures." Please be advised that, notwithstanding the inclusion of a general disclaimer, you are responsible for considering whether additional specific disclosures of material information regarding material contractual provisions are required to make the statements included in the proxy statement/prospectus not misleading.

Item 21. Exhibits and Financial Statement Schedules, page II-1

33. We note your intention to file tax opinions by amendment. Because we may have comments on these opinions, please file the exhibits allowing adequate time for their review.

Item 22. Undertakings, page II-2

34. Include the undertakings required by Item 512(a) of Regulation S-K. See Section II.F of SEC Release 33-6578 (April 23, 1985).

Form 10-K for the year ended December 31, 2005

Item 3. Legal Proceedings, page 31

35. In future filings, identify which of your products KLA-Tencor Corporation claims infringe its patents and, if known, quantify the monetary damages sought by KLA-Tencor.

Item 7. Management's Discussion and Analysis . . . , page 34

Results of Operations, page 38

36. We note your discussions of total net revenues, costs of products, cost of service, research and development, selling and general and administrative expenses presented on pages 39-41. You should identify all material factors that change a financial statement

line item, rather than just identifying the “primary” factor. Also, when you cite factors in explaining a change in a financial statement line item, the amounts of the individually significant factors cited, including offsetting factors, should be separately quantified. Please revise future filings accordingly.

Form 8-K filed March 16, 2006

37. We see that you acquired Soluris Inc. on March 15, 2006 and also see you indicate you will file required financial statements and pro forma financial information for Soluris Inc. no later than 71 days after the date that the Form 8-K was required to be filed. Please provide us with the significance calculations outlined at Rule 1-02(w) of Regulation S-X for this transaction and tell us why you are or are not required to include any Soluris’ historical financial statements and pro forma information for the acquisition in your Form S-4. We may have further comments after reviewing your response.

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As appropriate, please amend your registration statement in response to these comments. You may wish to provide us with marked copies of the amendment to expedite our review. Please furnish a cover letter with your amendment that keys your responses to our comments and provides any requested supplemental information. Detailed cover letters greatly facilitate our review. Please understand that we may have additional comments after reviewing your amendment and responses to our comments.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filings reviewed by the staff to be certain that they have provided all information 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.

Notwithstanding our comments, in the event the company requests acceleration of the effective date of the pending registration statement, it should furnish a letter, at the time of such request, acknowledging that:

- should the Commission or the staff, acting pursuant to delegated authority, declare the filing effective, it does not foreclose the Commission from taking any action with respect to the filing;
- the action of the Commission or the staff, acting pursuant to delegated authority, in declaring the filing effective, does not relieve the company from its full responsibility for the adequacy and accuracy of the disclosure in the filing; and

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Page 8

- the company may not assert staff comments and the declaration of effectiveness 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 connection with our review of your filing or in response to our comments on your filing.

We will consider a written request for acceleration of the effective date of the registration statement as a confirmation of the fact that those requesting acceleration are aware of their respective responsibilities under the Securities Act of 1933 and the Securities Exchange Act of 1934 as they relate to the proposed public offering of the securities specified in the above registration statement. We will act on the request and, pursuant to delegated authority, grant acceleration of the effective date.

We direct your attention to Rules 460 and 461 regarding requesting acceleration of a registration statement. Please allow adequate time after the filing of any amendment for further review before submitting a request for acceleration. Please provide this request at least two business days in advance of the requested effective date.

You may contact Eric Atallah at (202) 551-3663, or Angela Crane, Accounting Branch Chief, at (202) 551-3554 if you have questions regarding comments on the financial statements and related matters. Please contact Donald C. Hunt at (202) 551-3647 or me at (202) 551-3800 with any other questions.

Sincerely,

Peggy A. Fisher
Assistant Director

cc (via fax): Aaron J. Alter, Esq. – Wilson, Sonsini Goodrich & Rosati LLP