UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

DIVISION OF
CORPORATION FINANCE

December 30, 2010

Gajus V. Worthington
President and Chief Executive Officer
Fluidigm Corporation
7000 Shoreline Court, Suite 100
South San Francisco, California 94080

Re: Fluidigm Corporation
Registration Statement on Form S-1
Filed December 3, 2010
File No. 333-170965

Dear Mr. Worthington:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. Where you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Prospectus

1. Please confirm that any preliminary prospectus you circulate will include all non-Rule 430A information. This includes the price range and related information based on a bona fide estimate of the public offering price within that range, and other information that was left blank throughout the document. Please note that we may have additional comments after you file this information.

Summary, page 1

2. Please present in a balanced manner the disclosure in your summary. For example, we note the disclosure in the third paragraph about your revenue and product margin growth in the last three completed fiscal years and the nine month period ended September 30,

2010; however, you do not disclose that you had net losses in each of those periods and an accumulated deficit of $196.2 million at September 30, 2010.

3. Briefly explain the basis for your statement in the first paragraph that your technology enables genetic analysis that was previously impracticable, as well as the basis for your belief stated in the third paragraph that your Access Array system "resolves a critical workflow bottleneck that exists in all commercial next generation DNA sequencing platforms."

Molecular Diagnostics, page 3

4. Given the development status of your products intended to address the molecular diagnostic market and the related risk factor disclosure on pages 13 and 20, please tell us why you believe it is appropriate to highlight this market in your summary.

The Fluidigm Solution, page 3

5. We note your statement that you believe there are "significant growth opportunities" in "additional markets." Please revise to clarify the additional markets to which you refer, and briefly describe the basis for your belief that there are "significant growth opportunities" in those markets.

Products, page 4

6. This section of your prospectus contains a number of undefined technical terms, including, without limitation, "Real-time PCR instrument," "SNP Genotyping," "matrix architecture," and "Copy Number Variation." Please revise to explain these terms in concrete everyday language so that investors who do not work in your industry can understand your disclosure.

We may be involved in lawsuits…, page 25

7. Please tell us how the final paragraph of this risk factor relates to the risk identified in the heading as well as in the preceding paragraphs.

We are subject to certain manufacturing restrictions…, page 27

8. With a view toward disclosure, please tell us which of your products rely on technology subject to the waiver obtained in July 2009, and the portion of your revenues attributable to these products. Please also tell us whether the waiver imposes any conditions or limitations that impact your business.

9. We refer to page 21 of your Form S-1 filed on September 17, 2008 where you disclosed that multiple licensors were analyzing the need to obtain government waivers. With a

view toward disclosure, please tell us about the technologies licensed, the extent of your products that are based on these technologies. Also tell us whether, and if so how, you have concluded that waivers are not required.

Special Note Regarding Forward-Looking Statements, page 32

10. Please tell us whether all industry data you cite in your document is publicly available. Also tell us whether:
    - you commissioned the industry reports;
    - the industry reports were prepared for use in your registration statement;
    - you are affiliated with the sources of the industry reports; and
    - the sources of the reports consented to your use of their data in this registration statement.

Collaboration Revenue, page 49

11. Please disclose the amount of the up-front fee as well as the periodic milestones and fees associated with the milestones.

Capital Resources, page 60

12. Please revise to disclose your estimated working capital and capital expenditure needs over the next year.

Life Science Research, page 64

13. Please revise to explain the term "mid-multiplex scale." For instance, please briefly describe this segment of the market and explain how you compete in this market.

The Fluidigm Solution, page 67

14. Please provide objective, independent support for the performance data contained in:
    - the first and second bullet points on page 67;
    - the third and fifth full paragraphs on page 70;
    - the final bullet on page 71; and
    - the fourth paragraph of page 77.

Co-Marketing Agreements for Next Generation Sequencing, page 79

15. Please revise to describe the material terms of your agreements with 454 Life Sciences and the other manufacturer indicated in the final sentence of this section. Please also revise to identify the other manufacturer, and tell us why you believe neither of these agreements is required to be filed as an exhibit pursuant to Item 601(b)(10) of Regulation S-K.

Customers, page 80

16. Please tell us the criteria used to determine that the identified customers are objectively representative of your customer base. Also, please tell us whether you identified all customers that satisfy those criteria.

New Product and Application Development, page 81

17. Please revise to disclose the amount of the grant from the California Institute of Regenerative Medicine.

Intellectual Property Strategy and Position, page 84

18. Please expand your disclosure to describe the material terms of the licenses referenced in this section and those that have been filed as exhibits to your registration statement.

Government Regulation, page 85

19. We note your disclosure on page 71 concerning your development of a microfluidic system for fetal aneuploidies. Please revise to disclose whether you have submitted an application to FDA and whether the PMA or 510(k) process will apply.

Executive Compensation, page 95

20. Please tell us how you concluded that the disclosure required by Item 402(s) of Regulation is not required.

2009 Corporate Goals, page 98

21. Please revise to disclose the 2009 targets in quantitative terms. To the extent you believe that disclosure of such information, on a historical basis, would result in competitive harm such that the information could be excluded under Instruction 4 to Item 402(b) of Regulation S-K, please provide us with a detailed explanation supporting your conclusion. To the extent that it is appropriate to omit specific targets or performance objectives, you are required to provide appropriate disclosure pursuant to Instruction 4 to Item 402(b) of Regulation S-K. Refer also to Question 118.04 of the Regulation S-K Compliance and Disclosure Interpretations available on our website at http://www.sec.gov/divisions/corpfin/guidance/regs-kinterp.htm. In discussing how difficult or likely it will be to achieve the target levels or other factors, you should provide as much detail as necessary without disclosing information that poses a reasonable risk of competitive harm.

Option Awards, page 101

22. We note your disclosure on page 105 and 109. Please revise to disclose the number of repriced warrants that you granted to each named executive officer in December 2009.

Employment Agreements and Offer Letters, page 109

23. Please revise to describe briefly the functions and responsibilities of the Chief Business Officer position.

Certain Relationships and Related Party Transactions, page 119

24. Please revise to disclose the related party transaction described in the first sentence of note 11 on page F-50.

Financial Statements

25. Please tell us why you have not disclosed significant related party transactions on the face of your financial statements. Please refer to the requirement in Rule 4-08(g) of Regulation S-X.

26. Please update your financial statements when required by Rule 3-12 of Regulation S-X.

Note 3. License Agreement, page F-19

27. Please clarify your basis in the accounting literature for recording the other income of $2.1 million during the fourth quarter of 2009 related to the sub-license arrangement and provide us your calculation of how you determined the amount of the gain.

Note 4. Cash Equivalents, page F-21

Note 4. Fair Value of Financial Instruments, page F-47

28. Please revise the table of cash equivalents on pages F-21 and F-47 to agree with your balance sheets.

Note 5. Long-Term Debt, page F-22

29. Please present a table listing all debt which agrees with the balances of current and non-current long-term debt presented on the balance sheets as of each fiscal year end. In addition, provide a table of the actual future payments due as of the end of the fiscal year for each of the next five years and thereafter, as required by FASB ASC 470-10-50.

Note 9. Conversion, page F-27

30. Please tell us whether you expect to meet the conditions in Note 9 for the automatic conversion of preferred stock.

Note 10. Stock-Based Compensation, page F-29

31. You disclose on page F-31 that in the absence of an active trading market for your common stock your Board of Directors obtained contemporaneous valuations from an unrelated third-party valuation firm to determine the estimated fair value of your common stock. We also reference the discussion of the use of the valuation firm on page 45. Please tell us the nature and extent of your reliance on the third-party valuation firm for the valuation of your stock. Please also consider the guidance in Securities Act Rule 436 and Question 141.02 of the Compliance and Disclosure Interpretations on Securities Act Sections, which can be found at http://www.sec.gov/divisions/corpfin/guidance/sasinterp.htm.

32. Please tell us why the weighted-average fair value of options granted decreased in fiscal 2009 as indicated on page F-31. We also note the decrease in the estimated per share fair value of common stock on page 44.

33. Please provide us with a chronological schedule of each issuance of your ordinary shares, stock options, preferred stock and warrants for the last twelve months through the date of your response. Include the following information for each issuance per grant date:
- Number of shares issued or issuable,
- Purchase price or exercise price per share,
- Any restriction or vesting terms,
- Management's fair value per share estimate,
- How management determined the fair value estimate,
- Identify the recipient and relationship to the company,
- Nature and terms of any concurrent transactions with the recipient, and
- Amount of any recorded compensation element and accounting literature relied upon.

In the analysis requested above, highlight any transactions with unrelated parties believed by management to be particularly evident of an objective fair value per share determination. Progressively bridge management's fair value per share determinations to the current estimated IPO price per share. Also indicate when discussions were initiated with your underwriter(s). We will delay our assessment of your response pending inclusion of the estimated IPO price in the filing.

34. Please revise to clarify your accounting treatment for the amendment to the long-term debt agreement and reduction in the exercise price of the warrants discussed on page F-38.

Exhibits

35. Please include a currently dated and signed consent from your independent auditors with any amendment of the filing.

36. We note that you plan to file a number of material contracts with future amendments. To the extent possible, please file these exhibits with your next amendment. We may have further comment on your disclosure once we review these agreements.

Confidential Treatment Request

37. We note your pending application for confidential treatment. We will provide any comments on your application separately. All comments must be resolved and your application must be complete before the effective date of your registration statement may be accelerated.

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 the information the Securities Act of 1933 and all applicable Securities Act rules require. 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 you request acceleration of the effective date of the pending registration statement please provide a written statement from the company 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

- 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.

Please refer to Rules 460 and 461 regarding requests for acceleration. We will consider a written request for acceleration of the effective date of the registration statement as 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. Please allow adequate time for us to review any amendment prior to the requested effective date of the

registration statement.

You may contact Jeanne Bennett at 202-551-3606 or Brian Cascio, Accounting Branch Chief, at 202-551-3676 if you have questions regarding comments on the financial statements and related matters. Please contact Joseph McCann at 202-551-6262 or Mary Beth Breslin, Senior Attorney, at 202-551-3625 with any other questions.

Sincerely,

Martin James
Senior Assistant Chief Accountant

cc (via fax): David J. Segre, Esq. – Wilson Sonsini Goodrich & Rosati P.C.