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Session 2A Presentation 1

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Discussions of Testing Challenges and Technologies of Probing Bio-MEMS Sensors for Mass Production

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Contents

- Outlook on the Market of Bio-MEMS
- Test Challenges and Technologies of Bio-MEMS
- Wet Test Approach of Microfluidics Wafer Testing
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Discussions of Testing Challenges and Technologies of Probing Bio-MEMS Sensor for Mass Production



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The Innovative Applications of Microfluidic Chips

Next generation DNA sequencing could examine over 22,000 genes at once.

- Shorten schedule from several weeks to few hours.
- Find out the problems of genes quickly through technologies of Big Data.
- Point-of-Care Testing(POCT) is a new method of medical diagnostic.
 - Patients could do medical test at home or bed-side by innovative biological devices.
 - Doctors could take appropriate actions in time by tracing information of healthcare from network.



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Test Strategy and Test Cost The second test challenge -- How to provide a suitable test input to Bio-MEMS devices with reasonable test methods and cost for mass production. The third test challenge -- Reliability for the applications of in vivo. The design for reliability is important for the Bio-MEMS devices to be applied in vivo. **Bio-MEMS Devices** Thermopile Inertial Silicon Silicon Micro-Pressure Microfluidics Sensor Sensor Microphone needles Test Status Wafer Test / Chip Test Package Test / Final Test System Level Test Complexity / ASP Mature / 1 Mature / 1 Mature / 1 Array / J Array / ≈ Acceptable Yield Good Good Bad Good Bad Good Yield>90% Acceptable Mature Portion Need Enhance Not ready Yield>50% Bad Yield< 50% Test**ConX*** Discussions of Testing Challenges and Technologies of Probing Bio-MEMS Sensor for Mass 9 Production

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Inject Buffer Solutions on the Test Target

- There are two major methods to inject buffer solutions to test Bio-Sensor.
- The first method is dropped liquids on surface of sensors by micro-pipet.
- The second method is bumped and filled liquids on surface of sensors by cover.



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Test Bio-Chips by Filling Liquid into Cover

- The module of fluidics system could be integrated into probe card to achieve inject different kinds of liquids on sensor area and do wafer probing test at the same time.
- The fluidics system included micro-pumps, micro-pipes, micro-valves and PDMS cover with reference electrode.







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Summary

- The biochemical microfluidic chips dominated the growing rate of Bio-MEMS market -- Microfluidic sensors could be fabricated by micro scale structure of MEMS process and integrated with CMOS process to perform multi-functions.
- The principle of biological microfluidic sensor is ion-sensitive field-effect transistor (ISFET). The wet test of wafer probing methods are good to detect the performance of ISFET and enhance production yield of wafer process.
- The residuum of previous process could effect the test stability and accuracy of wet test methods. It is important subjects to narrow down this effects when wet test be applied to wafer probing process.



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Thanks for Contributors

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