

Research Studies and Standardization Activities

1. Study on Industrial Trends

MEMS technology is expected to progress from single-function devices produced through more advanced downsizing of existing parts to multifunction devices produced through the combination of MEMS and nano-devices, the integrated formation of MEMS with semiconductors, and the high integration of MEMS with other MEMS, as well as innovative devices developed through the fusion of nano-bio technologies.

With this background, the Industrial Trends Study Committee (chair: Isao Shimoyama, dean of the Graduate School of Information Science and Technology, the University of Tokyo) under the Micromachine Center is conducting a research study on (1) trends in devices employing MEMS technology (MEMS applications) and products incorporating these devices (MEMS-Inside), and (2) the leading companies in MEMS-related industries and their business profiles (company trends). This study is aimed at keeping track of developments in devices with added value owing to MEMS technology, industrial fields employing such devices, and MEMS-enabled products (MEMS-Inside) and at developing a roadmap for market expansion in the MEMS industry.

The study on MEMS-Inside is being conducted from two perspectives: trends from single-function MEMS toward highly integrated, complex MEMS, and trends in patent applications. Based on these perspectives, data on the future expansion of MEMS applications (MEMS-Inside) will be compiled into 13 industry-specific fields, such as information and communication equipment, automobiles, consumer electronics and appliances, and medical and welfare equipment.

The committee is also conducting a research study on sensor networks and service robots, two up-and-coming fields currently expected to yield further expansion of MEMS applications.

The committee studies trends of companies involved in MEMS-related industries by sorting all domestic companies conducting MEMS business according to the type of business and by determining the type of MEMS-related business or activities the company is conducting and the type of MEMS-related activities to which the company aspires. The committee also studies the organization of Japan's leading MEMS-related companies, the types of devices handled by MEMS device manufacturers and their applications, and the state of MEMS foundries in Japan based on data gathered from companies that participate in the Exhibition Micromachine/MEMS and that apply for MEMS-related patents, and the Micromachine Center's database of micro/nano-related documents.

The Industrial Trends Study Committee will summarize the current status and future outlook of MEMS-related industries in the "FY2009 Report on Industrial Trends" in March 2010 to provide feedback for those involved in the MEMS industry.

2. Standardization Activities

The Subcommittee on MEMS (SC47F) of the Technical Committee on Semiconductor Devices (TC47) under the International Electrotechnical Commission (IEC) is responsible for reviewing MEMS international standardization. On October 18–22, 2009, the SC47F was invited to the IEC General Meeting held in Tel Aviv, Israel for TC47-related committee meetings and working group conferences. Approximately one thousand people attended the opening ceremony, which featured an address by the IEC president, as well as spectacular entertainment imbued with sound and lights, videos, singing, and dancing.



View of the Tel Aviv coastline



The opening ceremony

A total of twenty-six people attended the international conference for SC47F, including ten from Japan, twelve from South Korea, and one each from China, Germany, the United States, and Brazil. The main agenda for this conference was to review the comments by all countries on the three approved New Work Item Proposals (NP) for which voting closed on October 9, 2009. The committee came to an agreement to accept nearly all comments and to prepare a new Committee Draft (CD) based on the results of this review. The approved proposals are as follows.

- (1) Test method of measuring adhesive strength for MEMS structure (proposal from Japan)
- (2) Micropillar compression test for MEMS material (proposal from South Korea)
- (3) Test method for linear thermal expansion coefficients of MEMS material (proposal from South Korea)

Thereafter, South Korea submitted three NPs entitled "Forming limit measuring method of metallic film materials," "Test method for bond strength in PDMS/glass chip," and "Test



The WG conference

method for residual stress measurement." The domestic committee is currently deliberating on Japan's voting position. Within the next six months, Japan plans to propose the two NPs "Bending test method

of thin film materials" and "Standard data for assessing material characteristics."