## Activities of the Micromachine Center Research Studies and Standardization Activities

## 1. MicroNano 2009

In the MEMS Forum held at MicroNano 2009, Dr. Shuichi Shoji, a professor at Waseda University, gave a talk on "Trends in MEMS Technology at International Conferences and the Future Outlook for MEMS." Dr. Shoji is the chairman of the Investigative Committee on Technological Trends at Home and Abroad established by the MEMS Industry Forum to study these trends. On the topic of standardization, Dr. Kuniki Owada of Teikyo University gave a speech entitled "Recent Trends in MEMS International Standardization: Heightened Significance and Business Applications" and Dr. Kazuki Takashima of Kumamoto University spoke on "International Standards for Evaluating MEMS Materials."

At the Exhibition Micromachine/MEMS, the Micromachine Center presented an exhibit detailing terms and definitions for

MEMS that have been proposed or established thus far, tensile testing methods for thin film materials, standard test pieces for tensile testing, and fatigue testing methods for thin film materials, as well as drafts of international standards that are either currently under review or under development.



## 2. Survey of Technological Trends at Home or Abroad (First Semester)

For its activities in the first half of 2009 in the Survey of Technological Trends at Home and Abroad, the Committee conducted a survey on Transducers 2009 (the 15<sup>th</sup> Annual Conference on Solid-State Sensors, Actuators and Microsystems). The Transducers conference features presentations on the latest R&D casework related to microsensors and microactuators and has occurred biennially since the first conference was held in Boston, Massachusetts in 1981. As the 15<sup>th</sup> installment of this conference, Transducers 2009 was held in Denver, Colorado in June 21–25.

Transducers 2009 drew 984 participants from 28 countries according to the advance registration. The conference attracted 1,307 paper submissions, with an acceptance rate of 45.9%, as well as 216 oral presentations and 384 poster presentations. **Fig. 1** shows the numbers of submissions and corresponding acceptance rates over the past several conferences.





**Fig. 2** shows the numbers of oral presentations by country for the past three conferences. The U.S. had the most presentations at Transducers 2009 with 94, an increase of 1.7 times over its previous conference's total of 56. Japan was second with 43 presentations, less than half of that from America, while Taiwan had a remarkable increase in presentations to take the third spot. The top three presenters were followed by Germany, Switzerland, China, the Netherlands, and South Korea.





## Fig.2 Numbers of oral presentations by country for the past three conferences

**Fig. 3** shows the numbers of presentations broken down by specific technological field. Among the basic technologies (1-1 through 1-7 in Fig. 3), actuators were the most popular, followed by packaging technologies, whose number increased dramatically over the previous conference. Under applied technologies (2-1 through 2-9 in Fig. 3), mechanical sensors occupied the top spot with a considerable increase in number over the previous conference. This topic was followed in popularity by fluidic and biomedical systems, while the number of presentations on chemical/biosensors was half that of the previous conference.



Fig.3 Numbers of presentations broken down by specific technological field