

## MICRONANO

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## MMC Activities

## MicroNano 2008 Report

MicroNano 2008 was held for four days Tuesday, July 29 through Friday, August 1, 2008 at the Tokyo International Exhibition Center (Tokyo Big Sight) and the Ariake Washington Hotel (Ariake, Koto-ku, Tokyo). The exhibition was a resounding success, and the sponsors would once again like to express their appreciation to all who attended.

This year, as last year, MicroNano 2008 featured both an international exhibition and a conference. The number of companies exhibiting at the exhibition came to 358 (in 483 booths). As in past years, the total number of visitors during the three days of the exhibition continues to increase: whereas last year's total attendance was 12,424, this year it was 14,075 – an increase of 13% over last year, and a new record. Attendance by overseas visitors was 2.7 times greater than the previous year. The increase was undoubtedly due to the fact that, in addition to the Micromachine / Nanotech Symposium, a variety of international conferences were held during MicroNano 2008, including the Japan-Germany Business Forum and the MIF Overseas Affiliate Workshop. At these and almost all of the other venues, attendance was so great that the handouts that had been prepared proved to be insufficient to meet the demand. The success of the event is a sure sign that MicroNano has become firmly established as a Tokyo Big Sight event, as well as a sign of the increased interest in micromachine and MEMS technology. Beginning last year, MicroNano has featured both micromachines and MEMS, with a full array of MEMS exhibits. No other exhibition, in Japan or even overseas, offers exhibits in the MEMS field on the scale of

MicroNano, and this appears to be one of the reasons that the event is held in such high regard.

Micromachines and MEMS devices are now key systems and devices that are essential for the manufacture of various products in the manufacturing industry. As the sole venue that combines together both the micromachine industry and the MEMS industry, the organizers of MicroNano feel both a sense of mission and an obligation to meet the high expectations placed on the event. Next year and in future years, they will continue to strive to increase the appeal of MicroNano and make it an event at which the achievements in these industries can be shared with visitors. Next year is particularly noteworthy in that the Exhibition Micromachine / MEMS will celebrate its 20<sup>th</sup> anniversary. The tentative dates and venue for MicroNano 2009 are shown below. The organizers hope that both exhibitors and visitors will once again attend and otherwise support the event.

## MicroNano 2009 (tentative)

- 20<sup>th</sup> Exhibition Micromachine / MEMS
- Conference

Wednesday, July 29 - Friday, July 31, 2009  
East Hall Nos. 5 & 6, Tokyo International  
Exhibition Center (Tokyo Big Sight), Ariake, Tokyo

19<sup>th</sup> Exhibition Micromachine / MEMS

The 19<sup>th</sup> Exhibition Micromachine / MEMS was held in the West Hall Nos. 1 & 2 at the Tokyo International Exhibition Center (Tokyo Big Sight) as one of the events in MicroNano 2008. Both the total number of exhibitors and the total number of attendees set a new record for the exhibition: 358 exhibitors and a total of 14,075 attendees over the three days of the exhibition.

The Micromachine Center booth featured both display panels and survey materials introducing the Center's activities, as well as exhibits of actual wafers and devices that enabled visitors to gain a thorough understanding of MEMS devices. The booth and its exhibits were very popular with attendees.



In addition, a separate MemsONE Consortium booth featured an explanation of the functions of the MemsONE software for MEMS design.

As the table below shows, the scale of the exhibition has been increased each year to accommodate the expansion of the MEMS industry. Next year, the 20<sup>th</sup> Exhibition Micromachine / MEMS is scheduled to be held July 29 - 31, 2009. The exhibition venue will remain the same – Tokyo International Exhibition Center (Tokyo Big Sight) – but the exhibition hall will change to the East Hall Nos. 5 & 6.

Year	Venue	Total No. of Attendees
19 <sup>th</sup> (2008)	Tokyo International Exhibition Center (Tokyo Big Sight)	14,075
18 <sup>th</sup> (2007)	Tokyo International Exhibition Center (Tokyo Big Sight)	12,424
17 <sup>th</sup> (2006)	Tokyo Forum	11,736
16 <sup>th</sup> (2005)	Science Museum	9,098

## 14<sup>th</sup> International Micromachine / Nanotech Symposium

On the first day of MicroNano 2008, July 29, 2008, the 14<sup>th</sup> International Micromachine / Nanotech Symposium was held at the Ariake Tokyo Bay Washington Hotel. As indicated by the symposium's subtitle ("Technology Convergence MEMS, LSI, Nano and Bio") the focus of this year's symposium was 2<sup>nd</sup> generation MEMS, for which integration with semiconductors is being pursued, as well as BEANS, the 3<sup>rd</sup> generation MEMS that are intended to integrate nano- and biotechnologies.

In the morning keynote address entitled "MEMS Industrialization Perspective in Japan," Kyoto University Professor and NEDO Program Manager Hidetoshi Kotera gave an overview of the MEMS integration and fusing of different fields currently being promoted in Japan, covering such aspects as national government policy and industry-academic liaison efforts. Next, Roger T. Howe of Stanford University gave an absorbing presentation about integrated MEMS efforts in the United States and new efforts aimed at future MEMS development.

The afternoon sessions began with the MEMS LSI Integration session. Albert Chang of the Asia Pacific Microsystems (APM) foundry in Taiwan gave a presentation on CMOS / MEMS integration from a foundry perspective. Yoshiaki Toyoshima of Toshiba Corporation gave a presentation on cooperation and integration with regard to MEMS and CMOS. Wilbur Catabay of the Silicon Valley Technology Center spoke about deployment of the technology in 8" wafers in the MEMS integration process. In the final presentation in that session, Susumu Sugiyama of Ritsumeikan University spoke about the Fine MEMS project which will be completed this year. In these presentations, the speakers introduced MEMS integration efforts from a variety of perspectives and expressed a variety of opinions.

In the next session, entitled "MEMS Emerging Applications," Uwe Kleinkes of the iVAM Microtechnology

Network in Germany spoke about new applications for MicroSystems Technology (MST) at European companies. Yoshio Sekiguchi of Omron Corporation gave a presentation on MEMS microphones and deployment in 8" wafer manufacture. Ryo Ota of Olympus Corporation spoke about bio and medical applications for cantilever and mirror devices. Each of these presentations focused on the latest applications for MEMS technologies and the latest trends in commercial development.

The final session was entitled "Emerging Technology: BEANS" and focused on the integration of MEMS with nano- and bio technologies. Jouni Ahopelto of VTT spoke about the nanoimprinting technology currently being promoted in Europe and the nanopatterning technology expected to be promoted in the future. Ichiro Yamashita of Matsushita Electric Industrial gave a presentation on the nanopatterning technology that utilizes the self-organizing property of proteins and the application of this technology in device development. Finally, Associate Professor Koji Miyazaki of the Kyushu Institute of Technology spoke about the BEANS project, whose goal is to achieve high performance exceeding that of thermoelectric power generation through the control of nanostructures. In this session as well, there was spirited discussion of research trends, technological potential and so on.

The symposium was filled to capacity (200 persons) and was a resounding success, thanks not only to the outstanding presentations but also to the hard work of the Steering Committee and Program Committee and the international advisors, as well as to all who provided their assistance and cooperation in emceeing and coordinating operations on the day of the event.

The 15<sup>th</sup> International Micromachine / Nanotech Symposium will be held next year, once again as part of MicroNano 2009.



Professor Hidetoshi Kotera

Symposium venue

Albert Chang

Professor Roger T. Howe

# Japanese-German Micro / Nano Business Forum

The Japanese-German Micro / Nano Business Forum was held on July 30 as part of MicroNano 2008. The forum was sponsored jointly by the Micromachine Center and the iVAM Microtechnology Network of Germany, a MEMS Industry Forum overseas affiliate.

In the opening ceremony, Peter Scholz, of the Industry and Energy Ministry in Germany's North Rhine-Westphalia (NRW) Province, and Keiichi Aoyagi, executive director of the Micromachine Center, spoke about the significance of the forum and their expectations for this year's event.

The sessions featured presentations from eight companies and research organizations from Germany and other parts of Europe that were also exhibitors at Exhibition Micromachine / MEMS. The presentations focused on MEMS packaging, auto-assembly, laser processing 3-dimensional measurement and other state-of-the-art technologies, as well as new product announcements. Presentations from Japan included a discussion of the injection molding of metallic powder by Taisei Kogyo Co., Ltd. (an iVAM Microtechnology Network member), a presentation by Matsushita Electric Works, a MEMS Industry Forum member, on its proprietary MID technology (MIPTECH), and a presentation by Olympus Corporation on the latest cantilever technologies and their application in business activities. The Micromachine Center also gave a presentation on efforts to promote industrial applications for MEMS in Japan

through industry-government-academic cooperation. The final presentation, by Professor Masayoshi Esashi of Tohoku University (a MEMS Industry Forum advisor), focused on business development through open collaboration on the part of industry and academia.

Moreover, on Thursday, July 31, an International Affiliate Workshop was held at a special venue set up at MicroNano 2008. The workshop featured presentations on the activities of affiliates in Korea, Brazil and Singapore.



## MEMS Forum

The MEMS Forum was held on August 1, 2008 at a special venue set up within Exhibition Micromachine / MEMS. The purpose of the MEMS Forum is to offer information about the activities of the MEMS Industry Forum, a special project committee of the Micromachine Center, and to provide a forum for the exchange of views regarding MEMS, in order to achieve a deeper common recognition of issues involved in the growth and expansion of MEMS-related industries.

This year's MEMS Forum began with an overview of MEMS Industry Forum activities by Keiichi Aoyagi, director of the MEMS Industry Forum secretariat. Session 1 focused on current issues relating to the establishment of a MEMS industry infrastructure. Session 2 featured presentations on the activities of MEMS Industry Forum academy affiliates. Session 3 focused on the status of specific activities relating to issues in the development of the MEMS industry, including international standardization, personnel training, support for MEMS-related research and development at the MEMS foundry experimental research institutions established and operated by local governments, and the infrastructure for MEMS design. Below is a list of the presentation titles and the names of the presenters for each session in this year's MEMS Forum.

### Session 1 Advancement of MEMS Industries and Technologies

- (1) Strengthening of MEMS industry infrastructure  
Isao Shimoyama, The University of Tokyo
- (2) Toward MEMS market expansion:  
1<sup>st</sup> generation MEMS - 3<sup>rd</sup> generation MEMS (BEANS)  
Junji Adachi, Micromachine Center

### (3) Technical strategy roadmap for the MEMS field

Hideaki Watanabe, New Energy and Industrial Technology Development Organization (NEDO)

### Session 2 Industry-Academic Collaboration

Session 2 was a session on industry-academic collaboration, organized and chaired by Professor Kazuo Sato of the School of Graduate Studies at Nagoya University. Presentations in this session were from the perspective of industry-academic collaboration, which supports the activities of the MEMS Industry Forum, and were conducted by the following MEMS Industry Forum academy affiliates.

- (1) Remarks at the beginning of the industry-academic collaboration session  
Kazuo Sato, Nagoya University
- (2) Wearable microsensors: an advanced general sensing technology for achieving a safe and secure society  
Kazusuke Maenaka, University of Hyogo
- (3) Mass production of next-generation optical elements through ultra-precision micro three-dimensional machine processing  
Eiji Shamoto, Nagoya University
- (4) Introduction to the Micro Energy Research Council, Micro / Nano Optical Specialist Forum, Japan Society of Mechanical Engineers  
Hiroki Kuwano, Tohoku University

### Session 3 Issues for MEMS Industry Development

Session 3 focused on the committee activities of the MEMS Industry Forum in the Micromachine Center, comprising



international standardization efforts in the MEMS field, issues relating to the strengthening of the MEMS foundry infrastructure, an example of a micro/nano manufacturing personnel training program (a topic currently being pursued by MEMS Industry Forum affiliate organizations), and the current state of research and development assistance to local companies.

**(1) International standardization trends in MEMS fields**

Professor Kuniki Ohwada, Teikyo University

**(2) AIST training of micro / nano manufacturing personnel, focusing on industry-academic personnel training partnership projects**

Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology (AIST)

**(3) Strengthening of MEMS foundry infrastructure**

Susumu Sugiyama, Ritsumeikan University

**(4) Activities for the establishment of a MEMS Foundry Network**

Fumihiko Sato, Omron Corporation and Chair, Foundry Service Industry Committee, MEMS Foundry Network

**(5) Case studies of the use of MEMS technologies in research and development assistance by the Kanagawa Industrial Technology Center**

Manabu Yasui, Kanagawa Industrial Technology Center

**(6) MemsONE functions and future plans (MEMS design and analysis support system) Ver. 1.1**

Yukihisa Maeda, MemsONE Consortium, Nihon Unisys Excelutions

This year, as last year, the MEMS Forum was held at a special venue that had been set up within Exhibition Micromachine / MEMS. On the day of the forum, the attendance exceeded the capacity of the special venue (400 persons). The MEMS Forum featured exhibits of new technologies and products. The Forum also facilitated participation in conferences on MEMS-related technical trends and industry trends, and provided an overview of the current state of MEMS business and MEMS technologies and the prospects for both, and it was well-received by attendees.

The MEMS Industry Forum makes every effort to ensure that the content of the MEMS Forum provides the opportunity to enhance the common recognition of issues relating to the growth of MEMS-related industries. We hope that visitors will continue to attend and benefit from the MEMS Forum in future years as well.

## Fine MEMS Project Interim Achievements Meeting

As part of MicroNano 2008, a meeting was held to announce the interim achievements of the Highly Integrated and Complex MEMS Manufacturing Technology Development Project (Fine MEMS Project) commissioned and subsidized by the New Energy and Industrial Technology Development Organization (NEDO). The meeting was held on Thursday, July 31, 2008 at the Tokyo International Exhibition Center (Tokyo Big Sight) and was hosted by the NEDO and the Fine MEMS Project Promotion Committee of the Micromachine Center, with support from the Ministry of Economy, Trade and Industry (METI).

At the opening ceremony, Akira Uehara, Executive director of NEDO, delivered an address of welcome to the attendees on behalf of the organizers. Next, Motoki Korenaga, deputy director of the Manufacturing Industries Bureau of the Ministry of Economy, Trade and Industry, an invited guest, gave a presentation entitled "MEMS Industry Strategies and Expectations for the Fine MEMS Project." Isao Shimoyama, Dean of the Graduate School of Information Science and Technology of The University of Tokyo and the leader of the Fine MEMS Project, gave a presentation entitled "Overview of Fine MEMS Project" in which he presented an the outline of the project's achievements including grant projects. After these presentations, there were detailed reports on the latest

achievements in nine consignment projects from the heads of development in each area, followed by a lively discussion.

Even from the viewpoint of attendance, the meeting was a resounding success. For this year's meeting, 250 seats – more than twice the number of last year's interim achievements meeting – had been prepared. However, by the time the meeting began, these seats were filled and that there were a lot of standing audience, and all 400 copies of the meeting material prepared in advance had been handed out. Similarly, there were many visitors to the NEDO Fine MEMS Project booth within the exhibition venue, and this booth soon became a site of a lively discussion on the details of the interim achievements of the Fine MEMS project and other issues. Judging from the air of excitement that pervaded both the meeting and the exhibition venue from start to finish, expectations for this project are extremely high, and both the meeting and the Fine MEMS Project booth were deemed as a outstanding success about publicizing the development efforts for highly integrated and complex MEMS manufacturing technologies. The responses from a questionnaire survey conducted for meeting attendees and exhibition booth visitors will be analyzed and used the questionnaire data to rapidly achieve practical applications for the manufacturing technologies developed as part of the Fine MEMS Project.

