MMC

MICRONANO

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MMC Activities

Activities of the Micromachine Center in Fiscal 2005

OVERVIEW

The Micromachine Center undertook the following activities regarding research and studies into micromachines (MEMS and other nanoscale machines and systems), the collection and provision of micromachine information, and exchange and cooperation with domestic and worldwide organizations. The aim of these activities was to establish basic micromachine technologies and promote their industrialization, thus contributing to the further development of Japan's industrial economy and to international society.

1. Research and Investigation of Micromachines

We carried out activities aimed at gaining a clear understanding of the technological and industrial trends in micromachines and MEMS as they become key manufacturing technologies. At the same time, we pursued research into new technological issues regarding the fusion of micro - and nanotechnologies. We also made proposals for national government and NEDO projects in fields where new technology development is required.

(Governmental/NEDO project related activities)

(1) In FY2005 the MEMS-ONE: MEMS Open Network Engineering System of Design Tools Project (NEDO-commissioned project) carried out research and development into the production and verification of software based on the research findings from the specification design carried out as part of the system development completed the previous year. Part of this research also involved obtaining related knowledge and data. In addition, thermal and optical nanoimprint analysis functions were introduced as a development issue, and from October we carried out intensive research and development on this theme. The various committees oversaw the progress of development, making changes as necessary following testing of the developed functions. Progress went largely according to the initial plan.

(2) Investigation of methods of promoting MEMS-ONE (NEDO-commissioned project)

Following on from FY2005, we carried out research with Mizuho Information & Research Institute and Nihon Unisys Excelutions into efficient business models for improving the reach of MEMS-ONE, and assembling a consistent body of specialized terminology relevant to the field. To further these ends, we held Exhibition MICROMACHINE to publicize and demonstrate the interim findings of the MEMS-ONE Project, and to survey the attitudes of users.

(3) Committee to investigate next generation projects

Based on a proposal from 2004, we undertook deliberations concerning the research system and development centers from a policy viewpoint, considering refinement of the technological issues pursued and their results, and refinement of the common elements of integration, with a view to initiating a national project from 2006.

(4) As part of the research activities of the micro analysis and production system project, centered on the Association of Microscience Chip DB Systems (Microscience Research Association Contract), we created a database of literature useful for research and development of microchip devices and systems. To this end, we gathered information, provided data and other similar activities.

(Survey, Research and Development of Micromachines)

(5) Study of R&D trends in micromachine technology in Japan and abroad

We examined and analyzed the latest situation regarding micromachine technologies and research trends that are making notable progress in Japan and overseas, and maintained a library of basic technological data that can contribute to advances in micromachine technology.

(6) Joint survey research activities concerning the industrialization of MEMS

In order to facilitate further industrialization of MEMS which in recent years have rapidly been finding new application fields, we have been tackling general issues such as accelerating foundry services, and establishing cooperation with the MEMS equipment and materials fields. At the same time, we continued joint research with businesses that provide foundry services from the previous year, investigating specific issues such as fact-finding at overseas foundries, standardization of processes, establishing materials databases, and cooperation between foundries.

(7) Research regarding standardization strategies for MEMS (JMF-commissioned project)

In order to strengthen and maintain the productive capacity of MEMS and promote strategic international standardization and regulation required as the foundation for international development of MEMS, we carried out research into the technical needs of the MEMS industry. We analyzed Japan's current position in the world, identifying the technological factors crucial to future standardization and regulation, and developed a proposal for a standardization roadmap.

2. Collection and Provision of Micromachine Information

We collected information and documents on micromachines from universities, industry, and public organizations both in Japan and overseas, along with the results of surveys carried

out by MMC. These materials are freely available in the MMC library, and have been disseminated widely, both domestically and internationally.

(1) Improved dissemination and exchange of information through the MMC website

We have actively sought to disseminate and exchange information through the MMC website. We have also improved the contents provided to our supporting members.

(2) Publication of a micromachine periodical

We publish a micromachine periodical entitled *Micromachine Index* which gathers together abstracts of important documents for distribution to supporting members and related agencies.

(3) Publication of a newsletter

We distributed a monthly newsletter *MMC Newsletter* with information concerning research and governmental trends related to micromachines to supporting members.

(4) Maintaining and upgrading the MMC library

We upgraded the library by gathering further technical documentation and materials, and added this and other information to our database.

3. Exchange and Cooperation with Micromachine-Related Organizations Worldwide

In order to promote exchange with related organizations in and outside Japan, we participated in the Micromachine Summit, held an international symposium, employed and dispatched researchers and experts, and undertook cooperation with domestic and external agencies aimed at establishing a micromachine foundry network.

(1) Participation in the 11th Micromachine Summit

We participated in the 11th Micromachine Summit held in Dallas, where we discussed wide-ranging issues regarding micromachine technology and worldwide trends in the fields of micromachine applications.

(2) Hosting the 11th International Micromachine/Nanotech Symposium (partially sponsored by the Japan Motorcycle Racing Organization)

We hosted the 11th International Micromachine/Nanotech Symposium which focused on technological issues involved in the merger of micromachines/MEMS technology and nanotechnology, and on the outlook for this field.

(3) International exchange and dispatch of researchers

We promoted exchanges with overseas universities and other micromachine-related research agencies, sending researchers on missions overseas. They also participated in international symposia and academic conferences held overseas. Furthermore we promoted exchanges by inviting experts from Europe and America and dispatching Japanese experts and researchers overseas.

(4) Building a MEMS foundry network system

In order to establish the foundries essential for industrialization of MEMS, we promoted the establishment of a system aimed at improving services through networking with businesses providing foundry services and the Foundry Service Industry Committee formed by related companies.

(5) Establishing a forum for the exchange of cutting-edge micro/nano technology

In order to promote the development of cutting-edge micro/nano technology, a basic technology that is expected to find applications in many fields, we continued holding meetings of cutting-edge micro/nano technology exchange forums from the previous year as a forum for information exchange and the development of joint research.

4. Promotion of Standardization of Micromachines

In the technological field of micromachine/MEMS, standardization is being promoted as international initiatives get underway.

(1) Standardization of fatigue testing methods for micro-nano materials (NEDO-commissioned project)

Continuing on from the previous year, we carried out research into standard methods for fatigue testing to enable measurement and evaluation of the mechanical characteristics of various thin film materials with widths of 10 μm and lengths of 100 μm or less, with a view to international standardization. Therefore we carried out fatigue testing with specimens about 1/1,000 the dimensions of earlier specimens in order to establish the limits of application of fatigue testing methods used for currently standardized millimeter-order specimens. Fiscal 2005 was the last year of this 3-year project, and we incorporated the results of the project in the draft standard "Fatigue Testing Methods for Thin Film Materials".

(2) Standardization of tensile testing methods for thin film materials

Based on the results of "Standardization of Measurement and Evaluation Methods for the Characteristics of Micromachine Materials" carried out as a NEDO-commissioned project from FY1999 to 2001, we proposed it to IEC as an international standard in 2003. In 2004 a Committee Draft of the standard was recognized, and in 2005 we proposed a Committee Draft for Vote and continued our activities towards international standardization.

(3) Standardization of micromachine specialist terminology

The international standardization proposal for micromachine specialist terminology that we made to the IEC in 2002 was recognized by Committee Draft for Vote in 2004 via the New Project stage. In 2005 it was prepared as a Final Draft for International Standard as the final stage, and we continued our activities towards international standardization.

(4) Research and investigation of micromachine standardization

In order to continue to develop new strategic international standards proposals, we prepared a roadmap for international standardization and identified standardization proposal issues in concert with the MEMS-ONE Project, the Reliability Evaluation Committee and so on.

5. Dissemination of information and education concerning micromachines

We issued publications, held expositions, and conducted a wide range of PR and educational activities regarding micromachines.

(1) Besides publishing a regular public relations magazine, we are disseminating information on the MMC website.

(2) We exhibited leading-edge products and manufacturing materials related to the micromachine/MEMS industry, and hosted the 16th Exhibition MICROMACHINE as a forum for announcing the latest research findings.

(3) As the organizer of the Federation of Micromachine Technology, we worked to consolidate and strengthen micromachine-related organizations.