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## MMC Activities

# Overview of MMC's Activities in Fiscal 2003

## I. Basic Objectives of Activities

The basic objectives of MMC activities are, firstly, to establish basic micromachine technologies and increase utilization of micromachines through research and investigation of micromachines (tiny machines, comprising functional components measuring only a few millimeters or less, that are capable of minutely detailed and complicated operations), collection and provision of micromachine information, and exchange and cooperation with worldwide organizations; and secondly, to contribute to the further development of Japan's industrial economy and to international society.

MMC's basic objectives in FY 2003 are, as in the previous fiscal year, to actively disseminate information on Japanese micromachines; to engage in technical issues concerning the fusion of micro- and nanotechnologies; and to promote the further industrialization of micromachines through such events as MEMS.

## II. Description of Primary Activities

### 1. Research and Investigation of Micromachines

Planned activities are aimed towards gaining a clear understanding of the trends in micromachine technologies and industries and conducting investigations of and research on new technological issues regarding the fusion of micro - and nanotechnologies, as well as making adjustments appropriate for the multidirectional expansion of micromachine technology.

#### (1) Microanalysis/Production System Project (recommissioned NEDO project)

This project involves the systematic collection of all pertinent information regarding the hardware design, which are indispensable for achieving high efficiency in a diversity of analytical and chemical processes, and which is achieved through designing, manufacturing and evaluation processes of microchip devices, into a database that will facilitate efficient use of this information during the term of the project, store and maintain the information after the project's conclusion, and ultimately be made available to the general public. The data framework and accumulated information in the test database created in 2002 will be revised and the database upgraded; survey research will also be conducted to gather further relevant data.

#### (2) Studies on the future prospects of micromachine technology

As we anticipate the industrialization of the micromachine technologies that have been developed thus far, from a technological perspective we must also strive toward further miniaturization in this new technological system of micromachines. With regard to applications, MMC is pursuing the possibilities for the fusion of micromachine technologies with technologies in other fields, such as medical care and biotechnology. Hence, studies on the future prospects of

micromachines are being implemented and approached from various angles.

#### (3) Studies on R & D trends for micromachine technology in Japan and abroad

These studies aim to identify and analyze the latest trends in the rapidly expanding field of micromachine technology, and micromachine R&D in Japan and abroad; and to develop basic technological data to aid in developing micromachine technologies.

#### (4) Studies on the micromachine market

Statistical data on micromachine-related markets that is consistent over time is compiled using models for estimating the micromachine market.

#### (5) Development of new functional materials for MEMS(application submitted to the Japan Machinery Federation)

In order to make MEMS more applicable in a wide range of industrial sectors, such as the telecommunications, bio and medical fields, this research seeks to clarify the possibility of manufacturing minute devices through the combination of functional and heterogeneous materials comprising piezoelectric, magnetic, ceramic, organic, compound, non-silicone chip, nano, and other materials.

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

Opportunities for the industrial application of MEMS have been opening up rapidly in recent years; in order to further accelerate the industrialization of MEMS, this research will comprehensively tackle such challenges as advancing foundry services and coordinating MEMS devices and materials fields. Joint research with businesses that provide foundry services will also be conducted on specific issues such as process standardization, creation of a materials database, and coordination between foundries.

### 2. Collection and provision of micromachine information

Information and documents on micromachine use in universities, industries, and public organizations in Japan and overseas will be collected, combined with survey results and MCC-produced documents, and made freely available in the MMC library.

#### (1) Maintaining and upgrading the MMC library

Technical documents and materials are collected and stored in the MMC library and listed in a database together with other relevant information.

#### (2) Publication of a micromachine periodical

"Micromachine Index," containing abstracts of technical

documents and information on materials, is issued on a regular basis and supplied to supporting members and organizations concerned with micromachines.

### **(3) Publication of a newsletter**

Information concerning the research and governmental trends related to micromachines is distributed monthly to supporting members and other interested individual and organizations.

### **(4) Database compilation and data management system operations**

We will upgrade data in the database and operate to make the database accessible to supporting members.

## **3. Exchange and cooperation with micro-machine-related organizations worldwide**

To promote affiliation, exchange and cooperation with related organizations in and outside Japan, MMC will involve itself in such activities as participating in the micromachine summits, holding international symposiums, inviting to Japan and sending overseas researchers and experts in the field, and building foundry services.

### **(1) Participation in the 9<sup>th</sup> Micromachine Summit**

MMC will participate in the 9<sup>th</sup> Micromachine Summit in Beijing, China, taking part in discussions of a wide range of topics, including worldwide trends in micromachine technology and its fields of application.

### **(2) Holding symposiums on micromachine technology (partially subsidized by activities promoting the machine industry)**

This year MMC will hold the 9<sup>th</sup> International Micromachine/Nanotech Symposium (focusing on the fusion of MEMS and nanotechnology) with the aim of establishing and disseminating micromachine technologies. The Symposium will include presentations from various countries describing their R & D achievements, as well as their applications of and policies for promoting technology.

### **(3) International Exchange and Dispatch of Researchers**

A group will be dispatched overseas to promote the exchange of information and opinions with micromachine-related research institutes in universities and similar institutions. This group will also participate in international symposiums and academic meetings held overseas. MMC will further promote exchange by inviting experts in the field from America and Europe and by sending our experts and researchers overseas.

### **(4) Building a foundry network system**

Foundries are vital to the industrialization of micromachines, particularly MEMS. In order to improve these facilities, we will undertake the establishment of a system to improve services through a network comprising members of the Foundry Service Industry Committee, who represent businesses either involved in or related to the provision of foundry services.

### **(5) Establishing a forum for the exchange of micromachine technology**

In order to accelerate the development of micromachine technology - a basic technology expected to have a diversity of applications in various fields - MMC will promote this technology by establishing a forum for the exchange of information, joint research, and other promotional activities. This year, MMC will hold a meeting for the exchange of biotechnology and other technologies outside but related to the micromachine field.

## **4. Standardization of micromachines**

In newly established fields of systemized techniques, such as micromachine technology, there is an urgent need for standardization of terminology and measurement and evaluation methods. MMC will work towards the standardization of terminology and measurement and evaluation methods, taking international initiatives into perspective.

### **(1) Standardization of fatigue testing methods for micro-nano materials(application for sponsorship submitted to the Ministry of Economy, Trade and Industry)**

MMC will undertake the development of conventional 1/1000 sized specimens for testing micro-nano materials, R&D on the capabilities required of testing equipment, and the establishment of stable testing conditions for compiling and analyzing data, and standardization of these.

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

The results of MMC research conducted between Fiscal 1999 and Fiscal 2001 as part of the NEDO project "standardization of evaluation method of properties for micromachine material" have been included in international standardization proposals and will be implemented with the support and approval of the Japanese Standards Association.

### **(3) Support for standardization of IEC terminology**

The specifications proposal "Technical Terms in Micromachine Technology" submitted to IEC/TC47/WG4 has been approved at the NP (New Project) stage and is now at the CD (Committee Draft) stage. This year MMC will continue its support of work towards international standardization.

### **(4) Research and investigation of micromachine standardization**

The results of this study will be transmitted worldwide to encourage international standardization, while demonstrating initiative in establishing international standards. This year, in addition to presiding over the on-line International Standardization Forum, MMC will continue its development of standardization policies regarding measurement and evaluation based on its consideration of the selection and prioritization of standardization items.

## **5. Dissemination of information and education about micromachines**

By issuing and distributing quarterly magazines and by holding exhibitions, we hope to disseminate information on micromachines extensively in order to educate as many people as possible.

### **(1) The quarterly magazine "MICROMACHINE" will be published periodically and distributed to those in or connected with the field. The quarterly magazine will also be made available on the Internet through the Center's home page.**

### **(2) The 14<sup>th</sup> Micromachine Exhibition and other events will be held to present the latest research achievements, as well as instruments and equipment for aiding research.**

### **(3) We will serve as the Federation of Micromachine Technology Secretariat to work with and strengthen micromachine-related organizations.**