## **Fine MEMS Project**

## Fine MEMS Project Compiling of a Knowledge Database and Development of an Integrated Design Platform Final Project Year

FY 2008 will be the final year of the Fine MEMS Project that began in FY 2006. Steady achievements are being realized in each research and development topic. The Micromachine Center will place particular emphasis on the following three topics in order to establish various types of manufacturing technology infrastructure to achieve the second generation of what are referred to as highly integrated and complex MEMS.

The first task is the creation of a fine MEMS knowledge database (**Fig. 1**). A server has been set up within the Micromachine Center, and a database system in MediaWiki format has been completed on the Internet. This database will ultimately contain more than 1,000 case studies of knowledge data; as a result of steady progress in registering data, the database already contains many items. In order to both increase data quantity and improve the quality of the data, new functions have been provided, such as the ability to vote for registered case studies, rankings for individual keywords, identification of case studies recommended by committee chairman Shimoyama and so on. Moreover, to improve usability, a search function and improved patent information have been provided. Currently users of this database system are limited to researchers that have registered with the Project. During this fiscal year, however, a general user interface will be provided and integration with the MemsONE knowledge database will be conducted in anticipation of the opening of the database to the general public following the end of the project.



Fig. 1

Secondly, with regard to the "Research & Development of Integrated Design Platform for Fine MEMS" that began in the previous fiscal year, an equivalent circuit model – an integrated platform for MEMS and electronic circuits – was developed and then used to model various devices. In addition, a web library that allows people to view these models over the Internet was developed and the device models, etc. were placed in this library. Based on these achievements, development during this fiscal year will focus on providing greater versatility and making it easy for MEMS and electronic circuit engineers to conduct design. Efforts will focus on the following three points:

- 1) Enhance device models through the use of MEMS equivalent circuit model, which is useful when integrating MEMS with one another, in order to construct a fine MEMS equivalent circuit model that can connect MEMS devices to one another and support high integration.
- 2) Build a collaborative environment between the circuit simulator and the web library system (created to develop functions to extract electrical properties and mechanical properties) in order to develop a function for extracting the electrical properties of MEMS devices and the mechanical properties of the moving parts of MEMS devices.
- 3) Develop mutual transformation of equivalent circuit models and three-dimensional CAD models to enable mutual transformation of the shape data and material property values of equivalent circuit models and three-dimensional CAD models.



Fig. 2 Development of fine MEMS systemized design platform

Lastly, the Micromachine Center has been contracted to assist in the overall operation and management of the fine MEMS project. The Center holds meetings of the Project Promotion Liaison Committee (four times a year), Knowledge Database Committee (six times a year) and Platform Study Committee (four times a year). These committees contribute to the smooth promotion of the project and dissemination of project achievements. In FY 2007, exhibits were displayed at the International Exhibition Micromachine / MEMS and Nanotech 2008. Moreover, a project interim achievements briefing was held in July to present the latest achievements to the many attendees. Exhibiting at International Exhibition Micromachine / MEMS and the holding of an interim achievements briefing are planned for this fiscal year as well.

The final year of the project promises to be filled with activity and we look forward to the results.

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