



At its five research centers (Life BEANS Center, Life BEANS Center Kyushu, 3D BEANS Center, 3D BEANS Center Shiga, and Macro BEANS Center) and its head office, the BEANS Laboratory has been conducting R&D on process technologies for integrating biomaterials, integrating organic matter, fabricating 3D nanostructures, fabricating 3D nanostructures for space applications, and large-area continuous manufacturing of micro/nanostructures, and has been building up of a knowledge database in heterogeneous technology convergence process development. In this fiscal year, we have so far presented our research achievements at domestic and overseas academic conferences, including the 26th Symposium on Sensors, Micromachines & Applied Systems (hereinafter “Sensor Symposium”), through forty-four presentations and eight paper submissions, and have additionally applied for sixteen patents. In order to further publicize the achievements of the BEANS Project, we held seminars at BEANS research centers (AIST on October 2 and the University of Tokyo on November 25), promoted technology exchange with LETI of France and ITRI of Taiwan, and participated in a panel discussion at the MEMS Executive Congress (held on November 4–6 and organized by the MEMS Industry Group) to introduce the activities of the BEANS Project.

This article describes our participation in the 26th Sensor Symposium, where we gave various presentations on the achievements of the BEANS Project as part of our activities.

1. The 26th Sensor Symposium

Sponsored by the IEEJ Sensors and Micromachines Society, the Sensor Symposium is the largest symposium in Japan on sensors, MEMS, and micromachines. At the 25th Sensor Symposium held in Okinawa in 2008, the first session on BEANS was held together with the Professional Committee of Micro-Nano Engineering of the Japan Society of Mechanical Engineers (JSME). However, a BEANS session was not included in the 26th Sensor Symposium, which was held October 15–16, 2009 at Tower Hall Funabori, Tokyo. Still, the 26th Sensor Symposium, which was held jointly with the 1st Symposium on Micro-Nano Engineering (hereinafter “Micro-Nano Symposium”) organized by the Professional Committee of Micro-Nano Engineering of JSME and the Symposium on Integrated MEMS Technology organized by the Study Group of the Integrated MEMS of the Japan Society of Applied Physics (JSAP), lived up to its name as the largest symposium on sensors, MEMS, and micromachines.

The BEANS Project selected these symposia as the primary venues for presenting the achievements of the Project, giving nine presentations at the 26th Sensor Symposium and three at the Micro-Nano Symposium, for a total of twelve presentations. Since the 26th Sensor Symposium featured 153 presentations in all, including invited lectures, and the Micro-Nano Symposium 56 presentations, the BEANS Project accounted for 5.9% and 5.4% of the respective symposia, exceeding 5% overall.

Broken down by research center, six presentations were given by the Macro BEANS Center, three by the Life BEANS

Center, two by the 3D BEANS Center, and one by the Life BEANS Center Kyushu, resulting in extensive publicity for the BEANS Project. The significance of the research conducted at the Life BEANS Center also received a boost in publicity when researcher Nobuo Misawa received the Igarashi Award for his presentation.

(1) Presentations by the Macro BEANS Center

- Thin film deposition technologies on fibers by inkjet (Akio Mimura senior researcher; Sensor Symposium)
- High speed thin film coating process on fiber-type substrates with die coater (Norihiisa Shibayama, researcher; Sensor Symposium)
- Structural properties of Si films deposited by plasma enhanced chemical transport method under atomospheric pressure (Takaaki Murakami, senior researcher; Sensor Symposium)
- Ejection of microparticulate silicon using mist-jet technology (Yoshinori Yokoyama, senior researcher; Sensor Symposium)
- Flexible sheet device by weaving functional fibers (Takeshi Kobayashi, researcher; Micro-Nano Symposium)
- Microfabrication process of cellular structures in hollow fiber-shaped substrates (Sohei Matsumoto, senior researcher; Micro-Nano Symposium)

(2) Presentations by the Life BEANS Center

- A consideration on mechanisms of droplet formation in flow focusing devices (Yukihito Suzuki, researcher; Sensor Symposium)
- Multichannel chemical sensors using cells expressing olfactory receptors (Nobuo Misawa, researcher; Sensor Symposium)
- Subcutaneous implantable blood glucose sensors using glucose responsive fluorescent gel beads (Hideaki Shibata, researcher; Sensor Symposium)

(3) Presentations by the 3D BEANS Center

- Fabrication and control of InAlGaN quaternary quantum dots with deep-UV emission (Takayoshi Takano, researcher; Sensor Symposium)
- The analysis of a comb-drive actuator with the consideration of depletion layer (Shinji Ueki, researcher; Sensor Symposium)

(4) Presentations by the Life BEANS Center Kyushu

- Thermal properties of nano-structured materials and thermal measurements by MEMS (Koji Miyazaki, senior researcher; Micro-Nano Symposium)



Nobuo Misawa receiving the Igarashi Award