

# **Toshiba Develops MEMS Based Manipulation Technology for Injecting Nanoparticles in Cells**

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Toshiba Corporation today announced the development of manipulation technology for injecting nanoparticles in cells by using subtle vibration generated by a micro electro mechanical system (MEMS)—a fruit of Toshiba's fusion of nanotechnology and biotechnology.

Compared with conventional techniques using laser beam to affect cells physically, the newly developed technology has advantages, such as simultaneous manipulation of numerous cells. Expected applications in the field of biotechnology include a medical analytical tool for investigating the reaction of cells to physical effects and clarifying their detailed properties, and, looking further ahead, a technique for affecting specific cells.

The principle of this technology is as follows. Vibration produced by MEMS causes nanoparticles in a liquid to adhere to cell surfaces. When vibration is applied continuously to nanoparticles adhering to cell surfaces, vibration is converted to thermal energy that affects cell surfaces physically, resulting in injection of nanoparticles into the cells.

Using Toshiba's advanced semiconductor process technology, the company has fabricated a nanoparticle manipulator with a water-repellent MEMS-based diaphragm consisting of numerous micro dishes (20  $\mu\text{m}$  x 20  $\mu\text{m}$ ) arranged in a lattice format. In an experiment involving the application of a water droplet containing yeast cells and silica (glass)

particles, the principle of this technology was verified.

Toshiba will investigate combinations of various nanomaterials and physical energy excited by MEMS with a view to applying this technology to a novel non-chemical technique for targeting specific cells.

As the mechanical drive of the MEMS structure can be miniaturized to as little as a few square micrometers, optimization of the structure according to the type of cell and application to nanoparticle manipulators for targets other than cells will be pursued.

This technology was announced as one of late news in the session on new application fields for semiconductor technology at the 2005 IEEE International Electron Devices Meeting (IEDM), the world's foremost forum for semiconductor technologies, held from December 5 to 7 in Washington, DC, in the United States.

Source: Toshiba

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