Members' Profiles

Olympus Corporation

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1. Endeavors in MEMS Technology

Olympus launched its Semiconductor Technology Center in 1982 to develop special imaging sensors and peripheral ICs. This led to Olympus' involvement in MEMS in 1989, when Olympus began developing cantilevers for atomic force microscopes (see Fig. 1) using the semiconductor prototype production line. In the meantime, Olympus has actively engaged in research and development on charge modulation image sensors and all-purpose Bi-CMOS devices using electronic devices; various cantilevers, optical scanners (see Fig. 2), and other optical MEMS using MEMS; and various optical sensor modules combining photodiodes and micro-optical devices. Olympus also participated in the ten-year Micromachine Project, which began in 1991 and concluded in the spring of 2001. This project involved the development of small-diameter, active-bending microcatheters tipped with a heavy density of silicon piezoelectric MEMS pressure sensors, as well as piezoelectric diagnostic tactile sensors, helping to create base technologies for a variety of MEMS sensors. In addition, Olympus has conducted biotechnology-related R&D since the second half of the 1980s. In the latter half of the 1990s, Olympus began developing bio-MEMS (or microfluidics devices) in the form of preprocessing free-flow modules for separating DNA and proteins and micro-PCR (polymerase chain reaction) modules for amplification.


Fig.1 Cantilever


Fig.2 Optical scanner

2. Commercialization of MEMS Technology

After many years of accumulating research and development on MEMS technology, Olympus introduced the cofocal scanning laser microscope LEXT OLS3000 in November 2003 as a product capable of utilizing the features of MEMS devices. This microscope is equipped with an optical MEMS scanner and boasts the world's highest resolution among similar microscopes. In August 2004, Olympus introduced the nanosearch microscope LEXT OLS 3500 (see Fig. 3). This microscope is equipped with the functions of a scanning probe microscope using MEMS cantilevers that enable rapid super-wide range observations, from millimeters to nanometers. In April 2004, Olympus announced that, through collaboration with Kanazawa University professor Toshio Ando, it had developed a high-speed atomic force microscope capable of videotaping individual molecules in living proteins by applying soft cantilevers one-twentieth the size of their conventional counterparts. This microscope is expected to contribute widely to fields of basic research in nanobiotechnology, for example.

In November 2004, Olympus introduced a passive capsule observation endoscope (see Fig. 4), which is a culmination of its many years of research and development on micromachines. Now, MEMS has grown into a core technology at Olympus that differentiates its products.

Fig.3 Nanosearch microscope


Fig.4 Capsule endoscope

3. Creating Core Businesses based on MEMS Technology

Currently, Olympus is involved in the national MEMS Project to develop a high-precision fabrication technology for optical switches. As Olympus continues to acquire sophisticated optical MEMS technology, its MEMS foundry service is receiving an increasing number of inquiries. Although the foundry service has been in operation for just over three years, numerous prototypes of MEMS devices have been manufactured, some of which have now entered the mass-production phase. Quality assurance becomes of utmost importance in the mass-production phase, and the laser microscopes OLS3000 and OLS3500 sold by Olympus are ideal for evaluating MEMS devices. When commercial measuring instruments are not sufficiently inspected or assured, Olympus develops special evaluation equipment using its own microscope technologies, making every effort to assure quality.

MEMS is now being said to be vital for industry. Olympus is striving to build a relationship of trust with its customers through the MEMS foundry service and to create future core businesses according to a new business model.

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