

Mizuho Information & Research Institute

Participating company in the MEMS-ONE project

Endeavors in MEMS

While the U.S. and European nations are currently at the forefront of the MEMS industry, momentum has been building recently in Asian countries such as Taiwan and Singapore toward establishing MEMS as a new pillar of their industry with national backing. An increasing number of people in Japan as well are hoping that MEMS technology in the form of accelerometers, pressure sensors, and inkjet print heads will revive Japan's manufacturing industry. In light of this, and with the heightened anticipation for the future market expansion of MEMS, we are applying our past achievements to integrate four of our strengths given below in order to provide solutions for MEMS development.

- **Research:** fact-finding studies through collaboration with a group of experts in economics, policy, and technology
- **Consulting:** drawing on our experience in simulation techniques and research
- **Simulation:** techniques based on our extensive achievements in scientific analysis
- **Software:** development, sales, and customization

Future Endeavors

Our objective is to develop advanced simulators for

semiconductor process analysis, electrostatic-magnetic field analysis, optical, electronic, and plasma analysis, thermal fluid analysis, chemical reaction analysis, and structural analysis to develop advanced simulators for MEMS devices that can help developing this field. It is our goal to lead Japan in performance simulations for MEMS technology.

This year, a research consortium was formed through cooperation among industry and academia. Initiated by the Ministry of Economy, Trade and Industry and the New Energy and Industrial Technology Development Organization (NEDO), the MEMS Open Network Engineering System of Design Tools (MEMS-ONE) project will last for three years until 2006. Our company is participating in MEMS-ONE as a core business for developing a mechanism analysis simulator, process analyzing tools, function-enhanced software (bonding and packaging functions), and a database system.

Contact

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Primary Achievements

Research

- **Micromachining Process Consortium (representative: Prof. Kazuo Sato of Nagoya University)**
- Study on lithography
- Study on microchemical processes
- Survey on machining precision and product precision in manufacturing technology



A microneedle manufactured by anisotropic etching (MICROCAD)

Consulting & Simulation

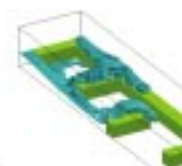
- Capacitance analysis for MEMS devices
- Stress and structural analysis of microstructures, including accelerometers and pressure sensors
- Microfluid analysis
- Polymer structure analysis of resist materials
- Wet/dry etching analysis of microstructures



Pit pattern in an optical disc formed by direct electron beam writing

Software

- **Designing Microstructures**
Anisotropic etching simulator
Plasma etching simulator
- **Lithography**
Optical, electron beam, and X-ray lithography simulators
- **Microfluid analysis**
3D fluid analysis system
- **Electronic device analysis**
Process device simulator



Free surface analysis