

Fujita Laboratory

[Scientific Research on Micro/Nano Mechatronics]

Centre for International Research on MicroNano Mechatronics

<http://www.fujita3.iis.u-tokyo.ac.jp/>

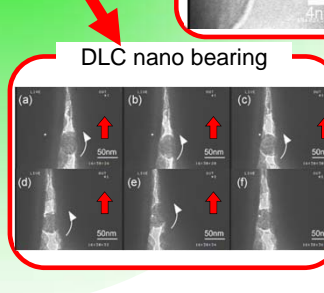
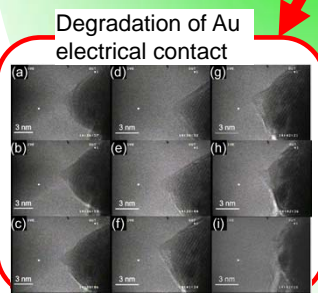
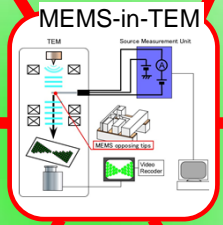
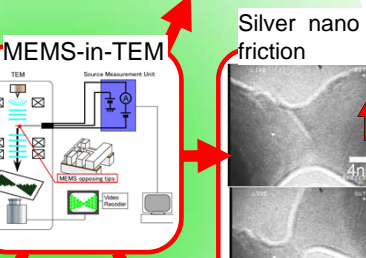
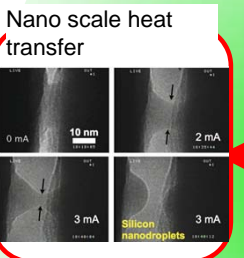
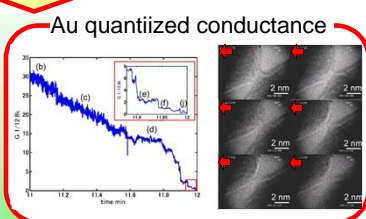
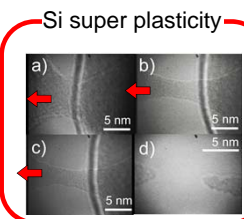
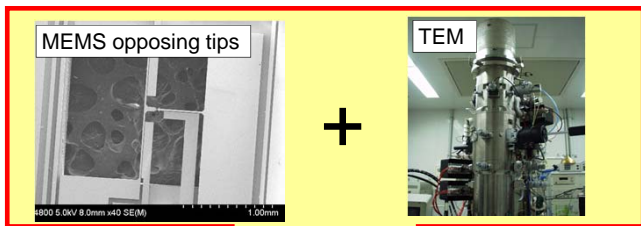
Research Field: Nanotechnology, Biotechnology

Department of Electric Engineering

From the beginning of MEMS(Micro Electro Mechanical Systems), our group has investigated the fabrication technology and applications of MEMS in the forefront of the field. Currently we focus on MEMS application to two major research fields, "nanotechnology" and "biotechnology". In nanotechnology, the combination between MEMS and TEM (Transmission Electron Microscope) enabled us to study nano physics under in-situ observation. In biotechnology, the combination between molecule and MEMS opened a new scientific field, which cannot be realized by bulk experiment.

Physics in Nanoworld

We combined "MEMS opposing tips" and "TEM with atomic resolution and realtime imaging". With this setup, called MEMS-in-TEM, nano-scaled deformation was in-situ observed, while unique properties of nano structures were measured.



Biological applications

Transportation and reaction measurement of ultra small bio materials, especially single molecular level, were achieved using MEMS devices.

Handling and Characterization of Fiberlike Molecules by MEMS Tweezers

"pick and place" of fiberlike protein

Microtubule

Nano-dots on trapped DNA bundle

Monitoring of Reaction between trapped DNA bundle and enzyme

F_{reson} (Hz)

Time from immersion (s)

Transport of Nano-objects

Monorail at nanoscale

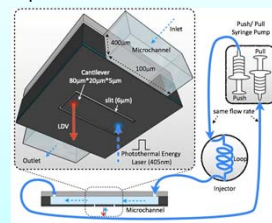
Cargo can be transported due to Kinesin motion along microtubules assembled by silicon nanotweezers

Cargo in 330nm diameter

Kinesin motor protein

High Sensitive Bio Sensor

Oscillating cantilever at the interface between air and liquid to detect bio material



Droplet Manipulation

pL Droplet formation by Liquid-Dielectrophoresis in open environment

