CIRMM/LIMMS

FUJITA LAB.

[Micro/Nano Mechatronics]

Centre for International Research on MicroNano Mechatronics

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

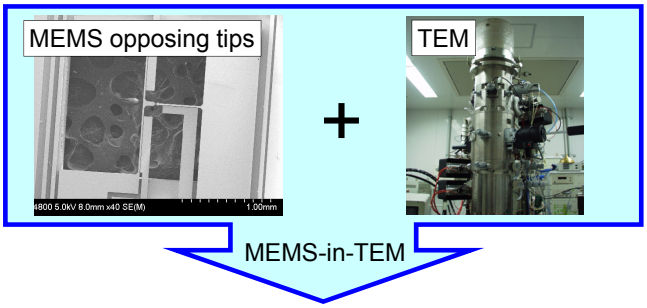
Research field: Nanotechnology, Biotechnology

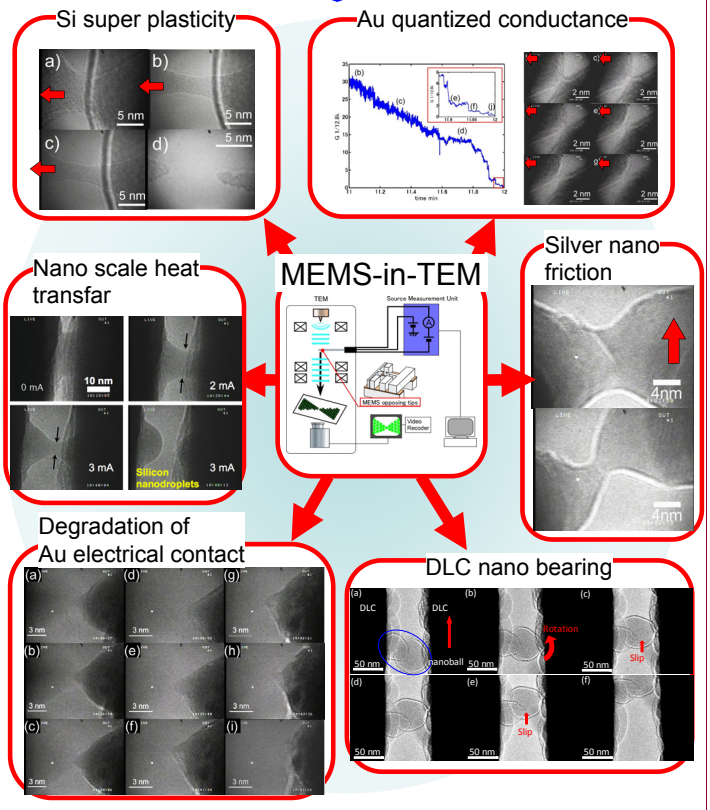
Department of Electrical Engineering and Information Systems

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 real time imaging". With this setup, called MEMS-in-TEM, the formation and deformaiton of nano-scaled junction were in-situ observed, while unique properties of nano structures were measured.



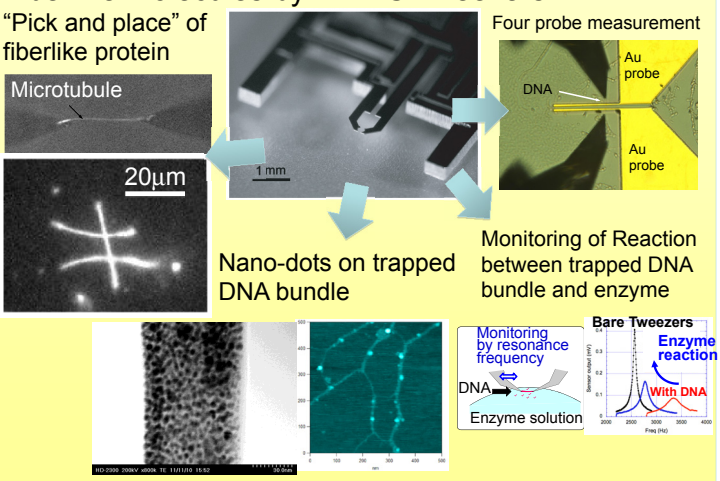


Biological applications

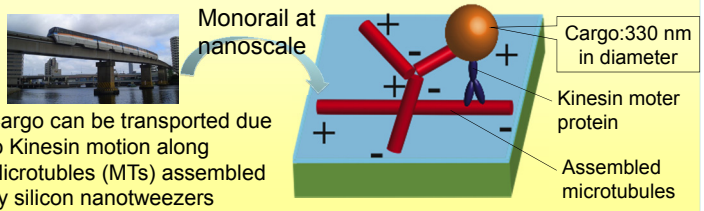
Transportation and reaction measurement of ultra small bio materials, especially single molecular level, were achieved using MEMS devices.

Handling and Characterization of Fiberlike Molecules by MEMS Tweezers

"Pick and place" of fiberlike protein



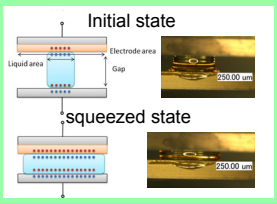
Transport of Nano-objects



Cargo can be transported due to Kinesin motion along Microtubles (MTs) assembled by silicon nanotweezers

Generation with vibration

Put ionic liquid between electrodes. Obtain power output due to change of the contact area.



Diagnostic test

Detection of Tau protein (biomarker of AD, vital for MTs stability) detection by Kinesin motility assay

Suspended MT→ similar condition to organism