

FUJITA LAB.

[Micro/Nano Mechatronics]

Centre for International Research on MicroNano Mechatronics

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

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.

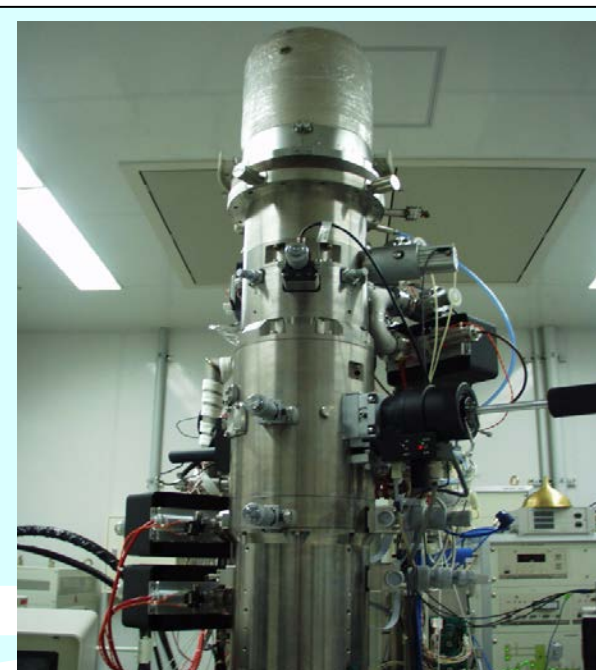
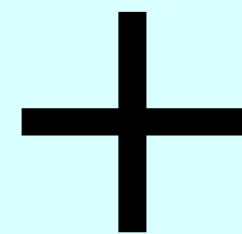
Physics in Nanoworld

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

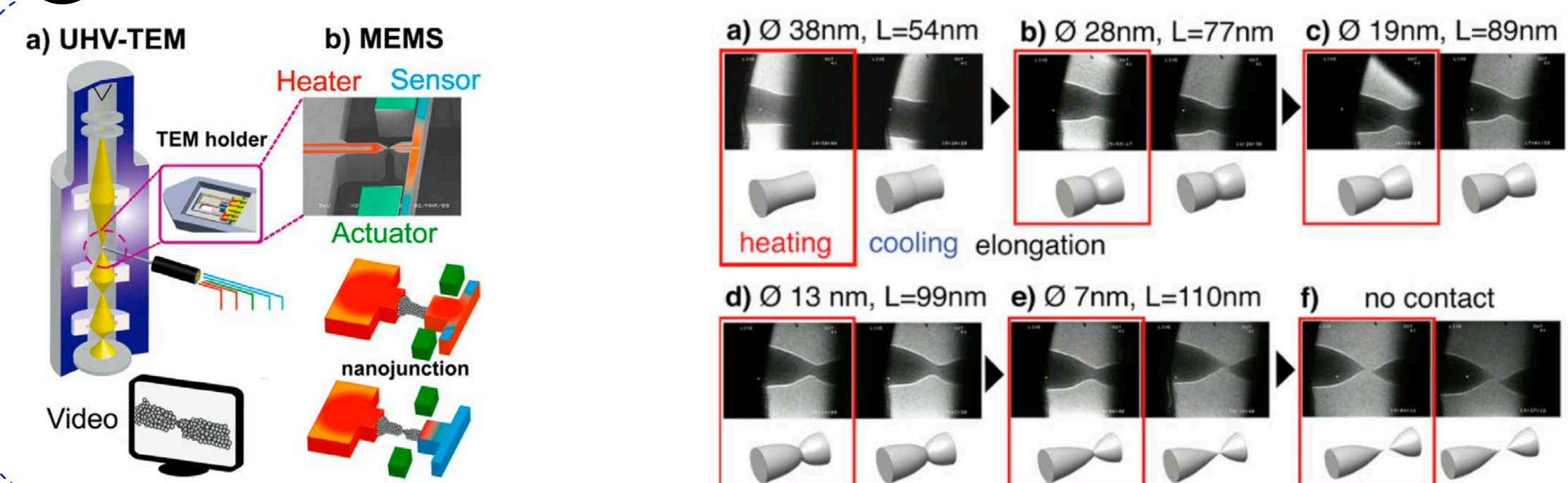
MEMS-in-TEM

MEMS

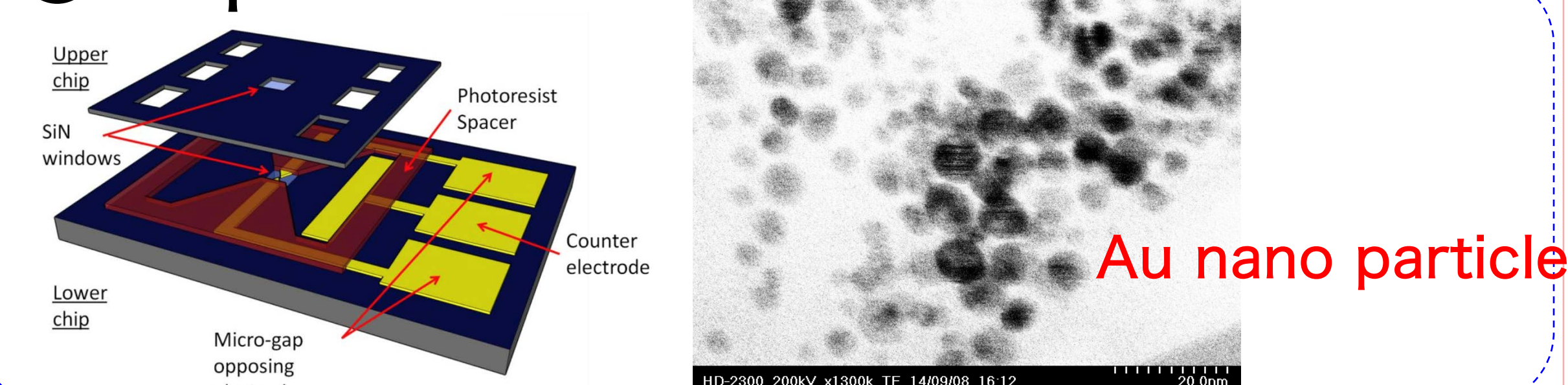
Transmission
Electron
Microscope



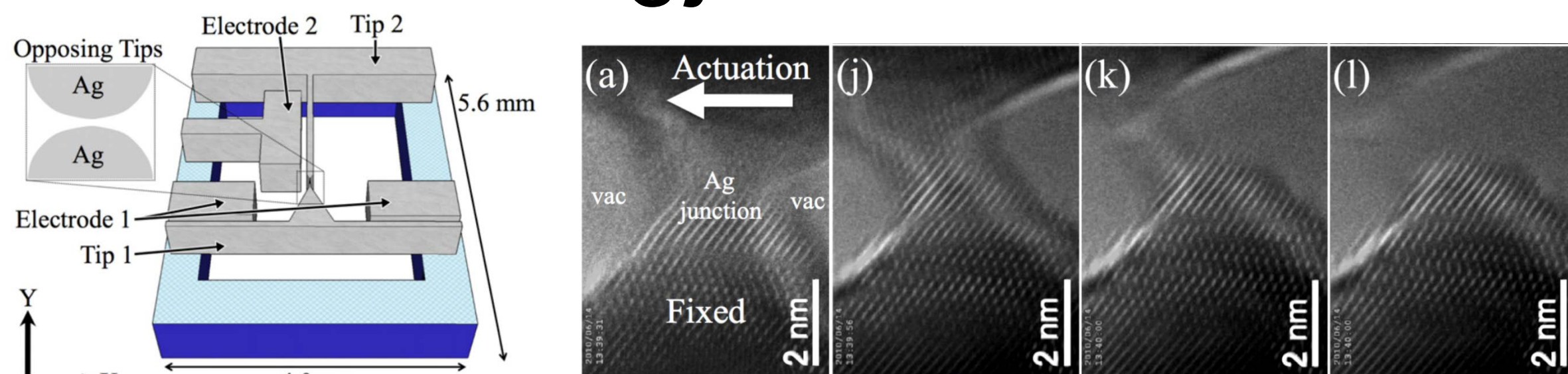
① Nano heat transfer



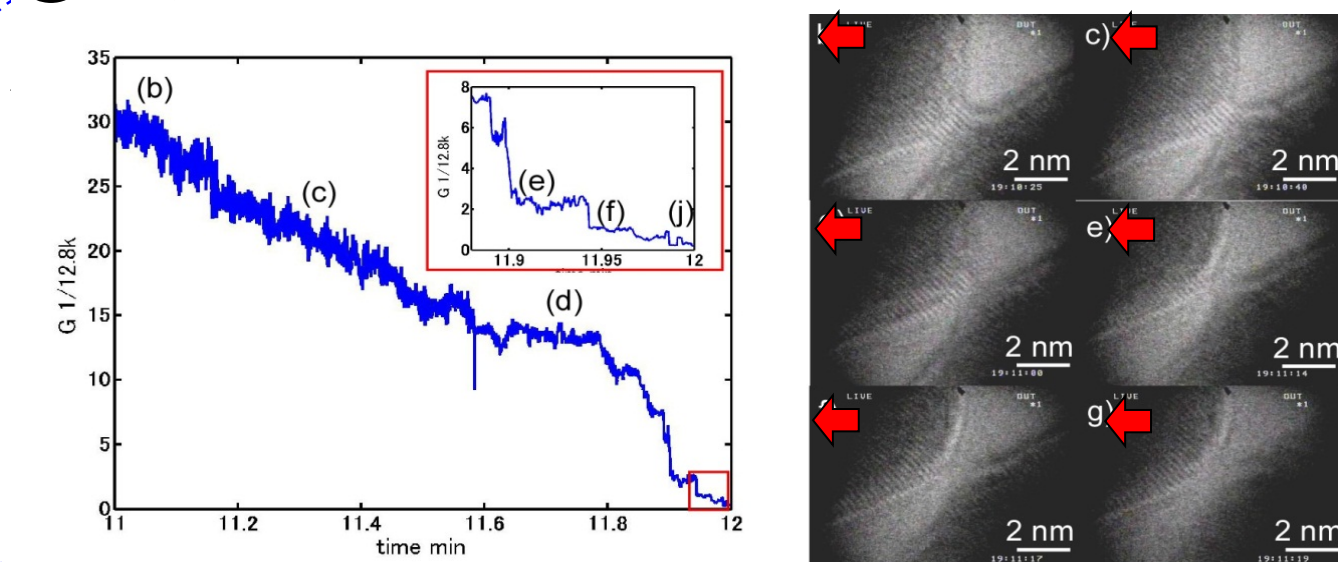
② Liquid cell



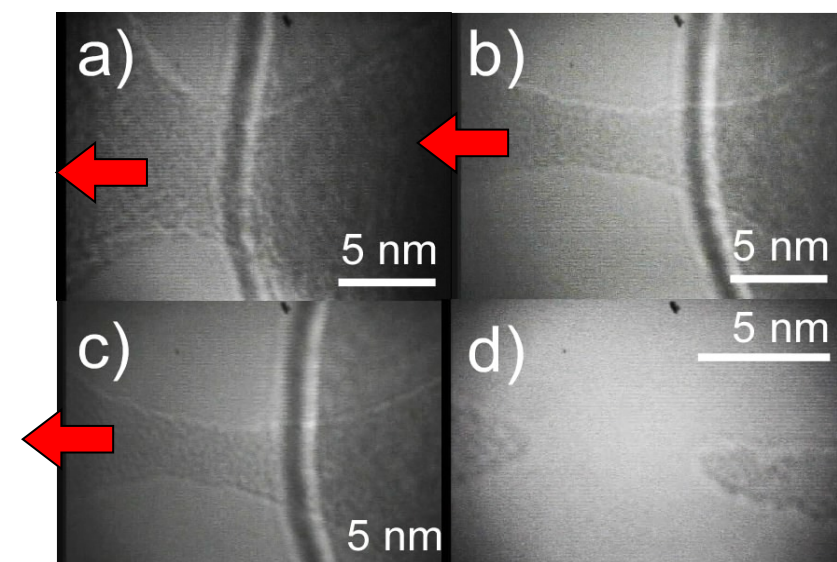
③ Nano tribology



④ Quantized conductance of



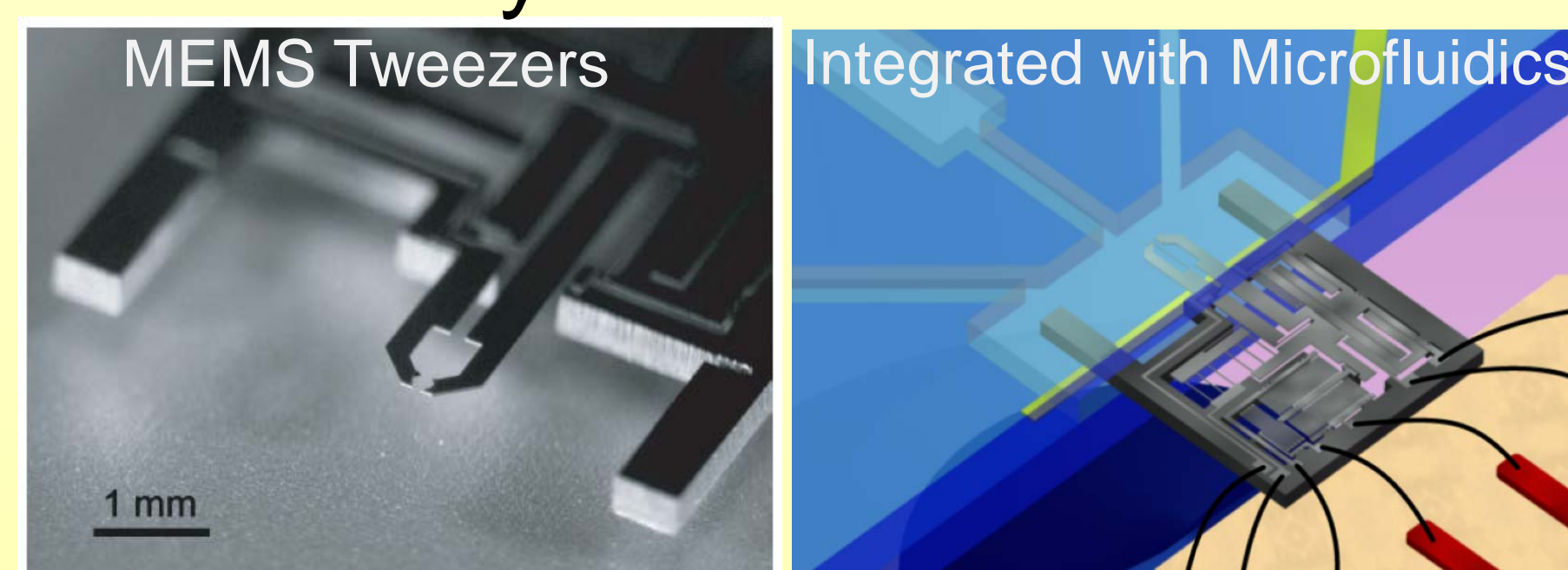
⑤ Si super plasticity



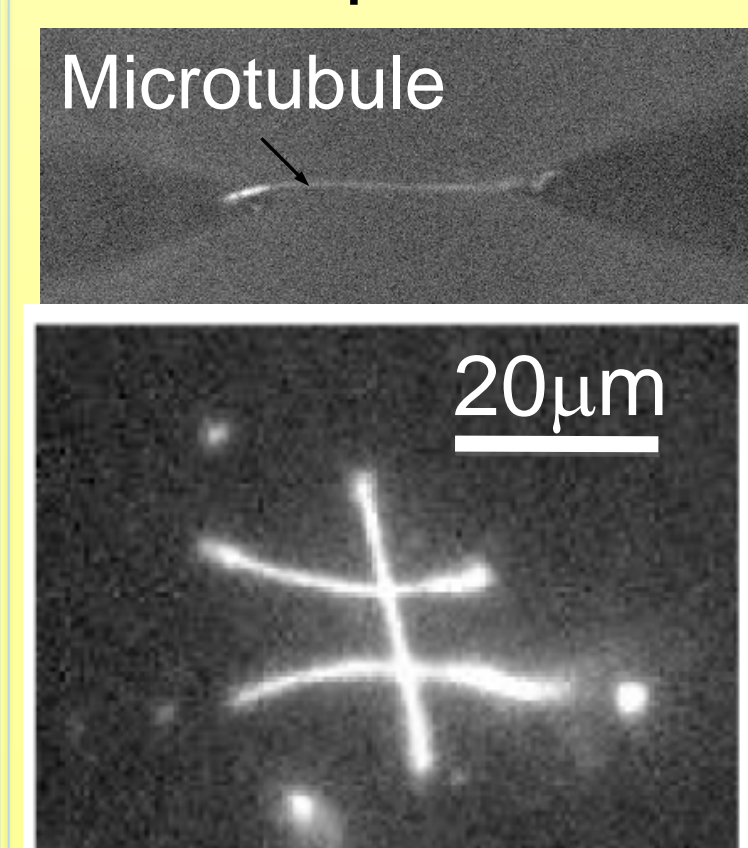
MEMS for Biological applications

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

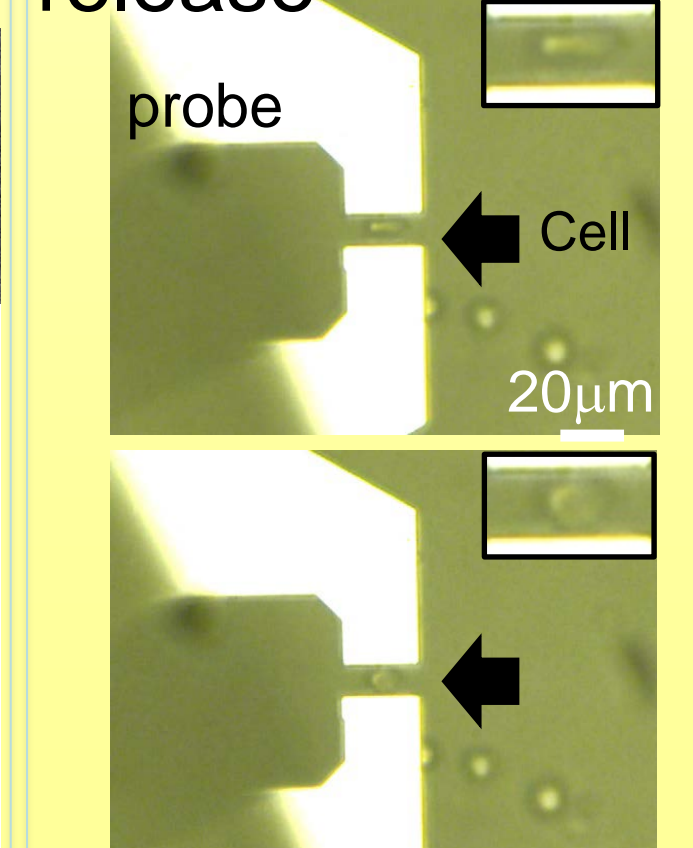
Handling and Characterization of Biosamples by MEMS Tweezers



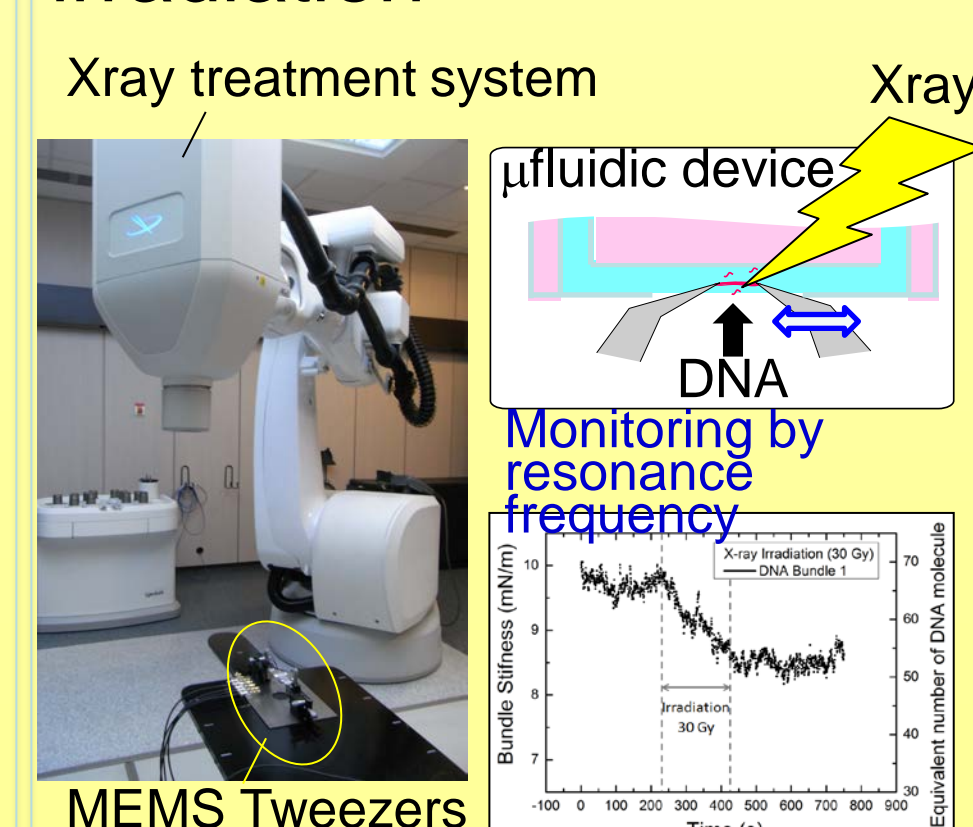
"Pick and place" of
fiberlike protein



Cell trapping,
compression and
release

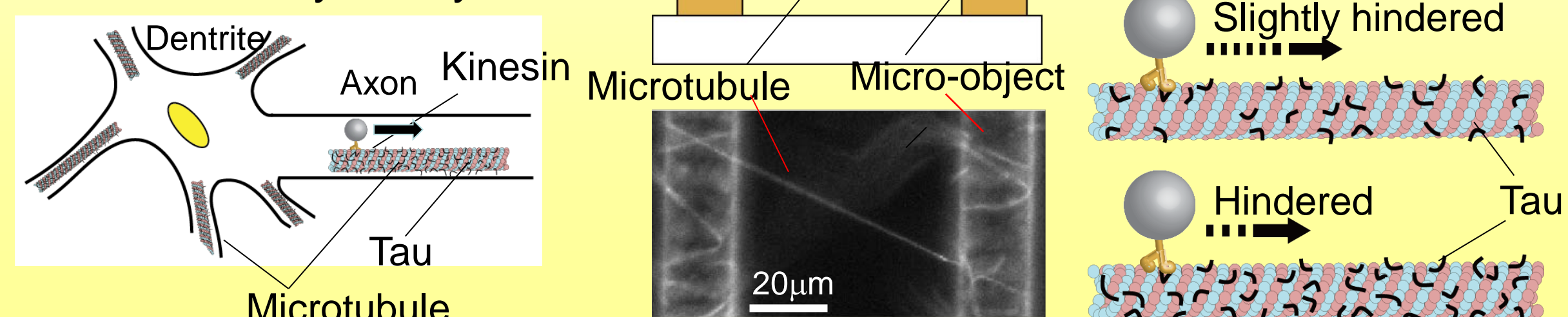


Monitoring of DNA
degradation by X-ray
irradiation



Diagnostic test

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



Generation with vibration

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

