FUJII T. & KYO LAB.

[Applied Microfluidic Systems]

Centre for International Research on MicroNano Mechatronics

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

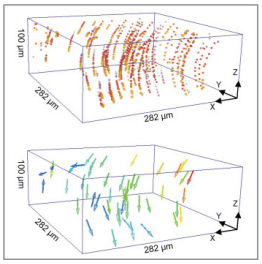
Microfluidics, molecular engineering, cell engineering & underwater technology

Precision Engineering / Bioengineering

Applied Microfluidic Systems

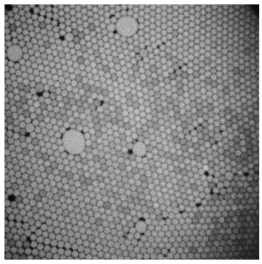
From Deep-Sea Application to Cell Engineering

Holographic micro-PTV
A new measurement technique based on the holographic microscopy has been developed for microfluidics. This enables 3D micro flow measurement.

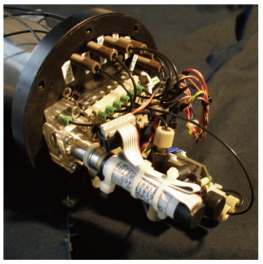


Soft actuator
"μ-Hydraulic Actuating System" has been proposed and demonstrated, which utilizes the microfluidic channel network to produce 3D deformation and functional behavior.

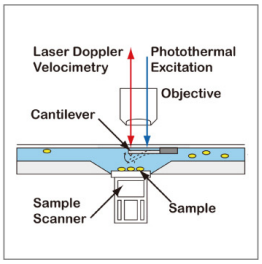
in vitro biochemical networks
Targeting a behavior and encoding it in DNA-based circuits, a bistable memory circuit that can be switched back and forth was demonstrated successfully.



Mn detection in deep sea
Integrated In Situ Analyzer (IISA) for Mn detection has been developed. All necessary components are integrated into a compact body.



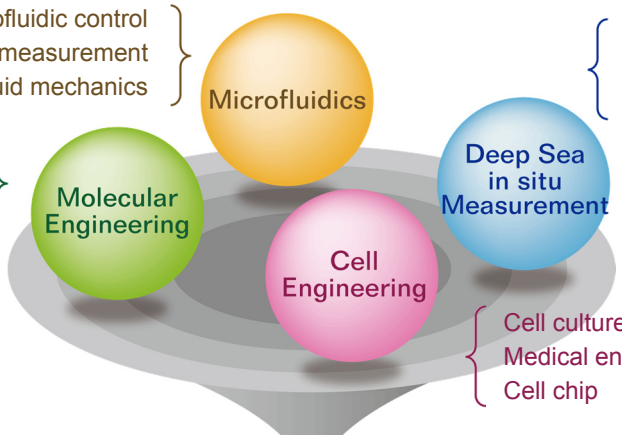
Underwater AFM
A compact AFM system, which is mountable on underwater vehicles, is studied to investigate the nanoscopic samples in deep sea and in situ.



Microfluidic control
Flow measurement
Fluid mechanics

Environmental measurement
Highly-integrated system
Ultimate environment

Nano-Bio
Nanofluidic device
Molecular analysis

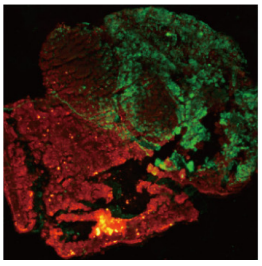


Cell culture
Medical engineering
Cell chip

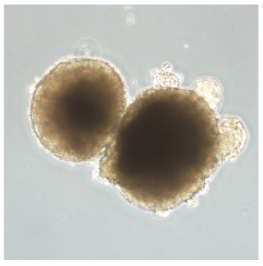
Miniaturization & Integration
- High accuracy & high efficiency
- Low cost & mass production
- Micro environment

Microfabrication techniques
- MEMS/NEMS
- Photolithography
- PDMS molding

Cell/tissue showcasing
A cell/tissue showcase system which regulates fluidic/adhesive conditions is developed by integrating artificial bio-interface into a microfluidic device.

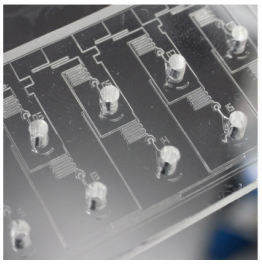


Controlled differentiation
Mouse pluripotent stem cells are seeded in a microchannel and their differentiative state was controlled spatially using microfluidic techniques.



Cancer cell capturing
Capturing of circulating tumor cells has been performed using a peptide aptamer -coated microchannel surface and microfluidic filtering structures.

Antibody screening device
A compact microfluidic device which materializes high-throughput antibody screening has been developed. The device performs 16 assays in parallel.



Microalgae culture
Microalgae such as *Chlamydomonas reinhardtii* has been cultured in a microfludiic deivce to study the environmental effect on the culture.