FUJII LAB.

[Applied Microfluidic Systems]

Center for International Research on Integrative Biomedical Systems

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

Microfluidics, cell engineering, underwater technology and molecular engineering

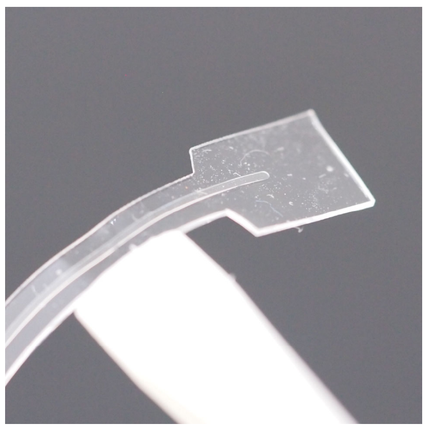
Precision Engineering / Bioengineering

Applied Microfluidic Systems

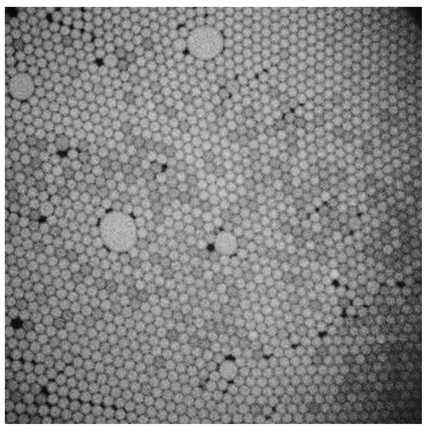
From Deep-Sea Application to Cell Engineering

Soft actuator
We have developed a new unique soft actuator based on “Microhydraulics” which uses microfluidic channels and integrated pumps to create 3D motion.

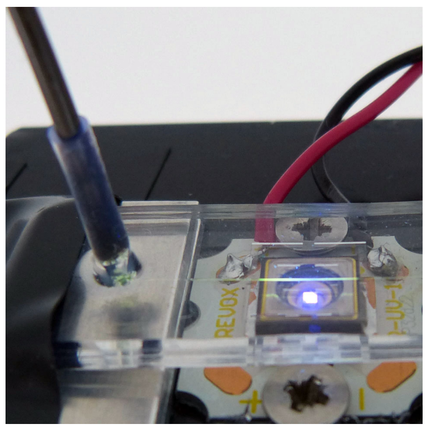
Implant device
A new glaucoma implant device is under development, which can control intraocular pressure at a normal level by using microfluidic technologies.



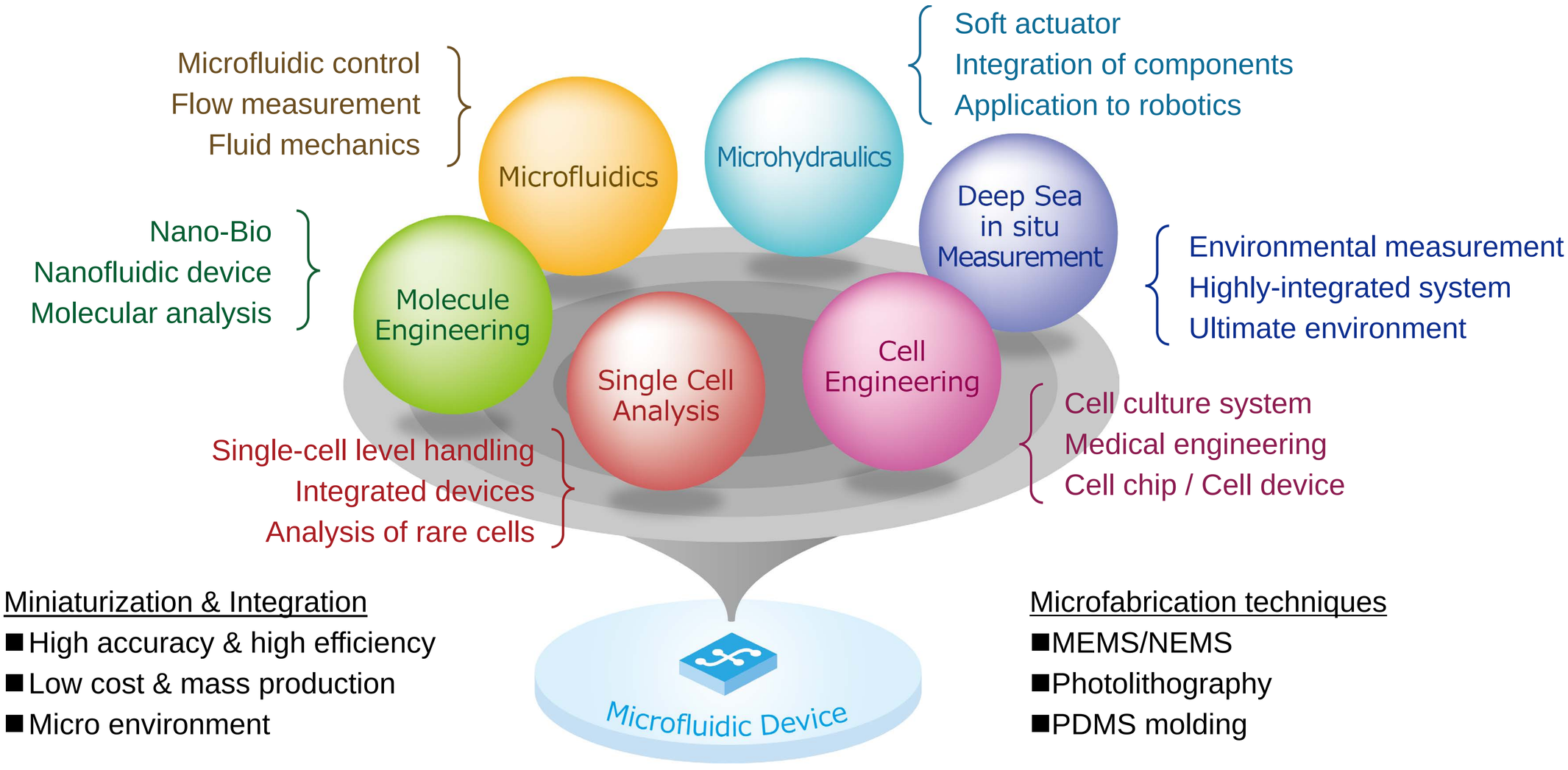
in vitro biochemical networks
Targeting a behavior and encoding it in DNA-based circuits, a bistable memory circuit that can be switched back and forth was demonstrated successfully.



ATP detection in deep sea
A new in situ calibration method using “caged ATP” is currently studied for the further upgrading of Integrated In Situ Analyzer (IISA) for ATP detection.



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.



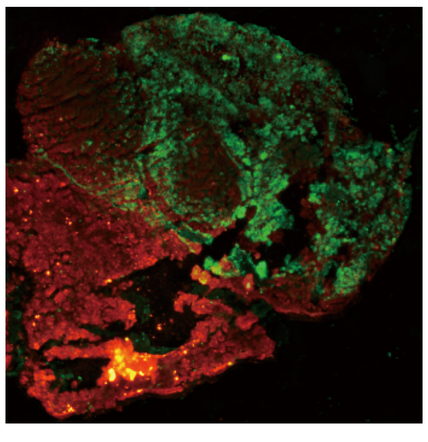
Miniaturization & Integration

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

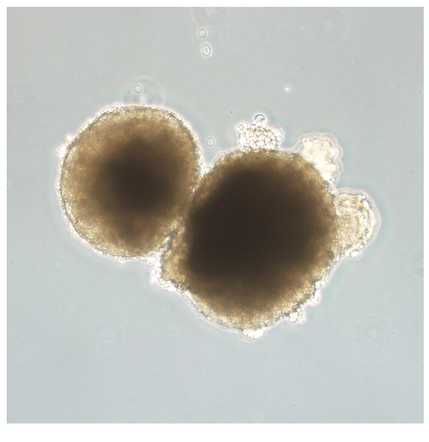
Microfabrication techniques

- MEMS/NEMS
- Photolithography
- PDMS molding

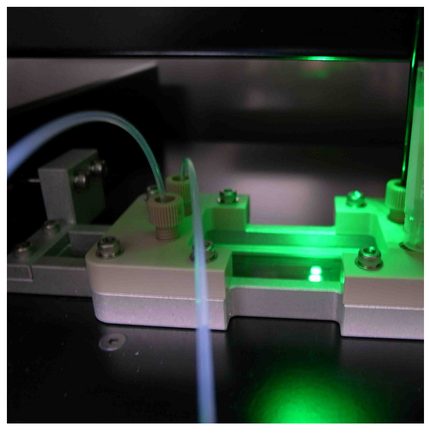
Cell / tissue showcasing
A cell/tissue showcase system which regulates fluidic/adhesive conditions is developed by integrating artificial bio-interface into a microfluidic device.



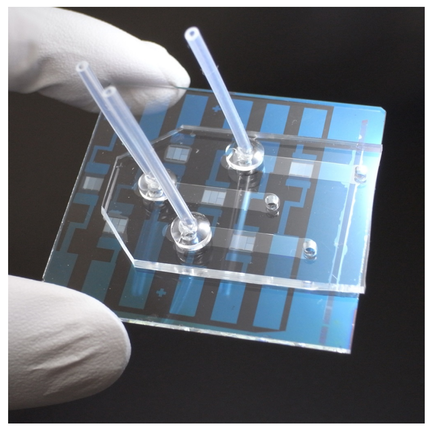
Controlled differentiation
Mouse pluripotent stem cells are seeded in a microchannel and their differentiative state was controlled spatially using microfluidic techniques.



Microfluidic ell culture system
Microfluidic cell culture system which enables dynamic control of a signal molecule concentration has been developed for cell signaling study.



Single cell analysis
We are developing a micro-well array device to investigate cells individually using key technologies such as EP, electroporation and microfluidics.



CTC analysis
We perform single-cell PCR and immunostaining of circulating tumor cells (CTCs) to show usefulness in diagnosis or treatment of cancer.