

# 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

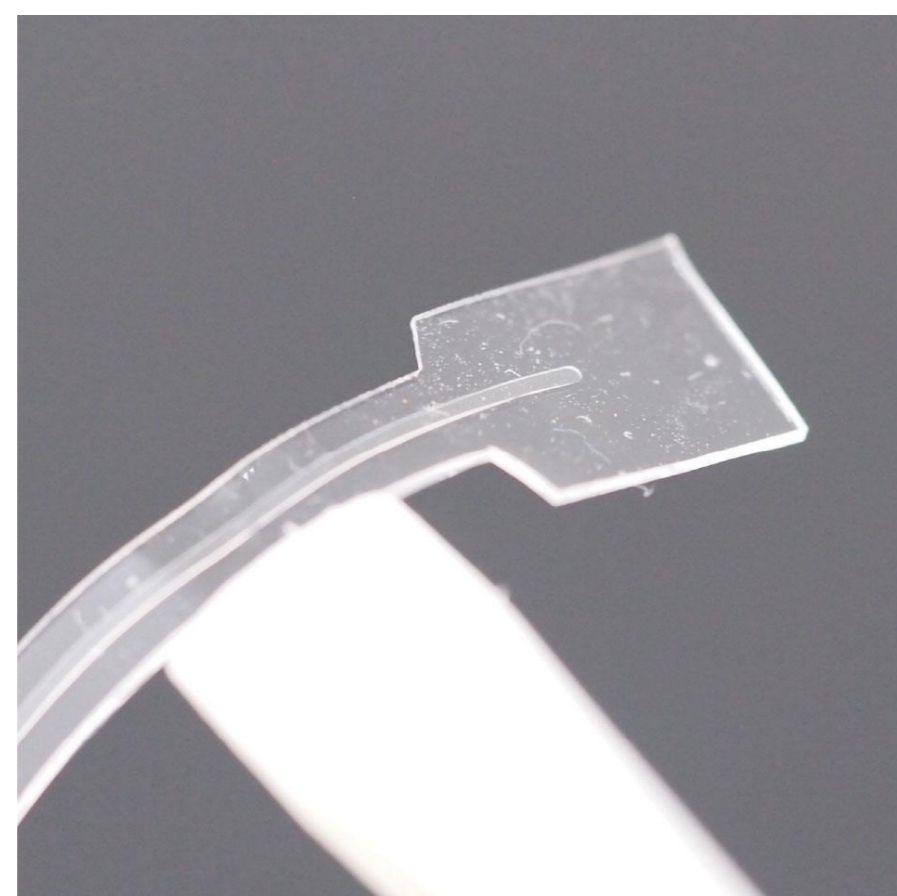
**Soft actuator**

We developed a unique soft actuator based on "Microhydraulics" which uses microfluidic channels and integrated pumps to create 3D motion.



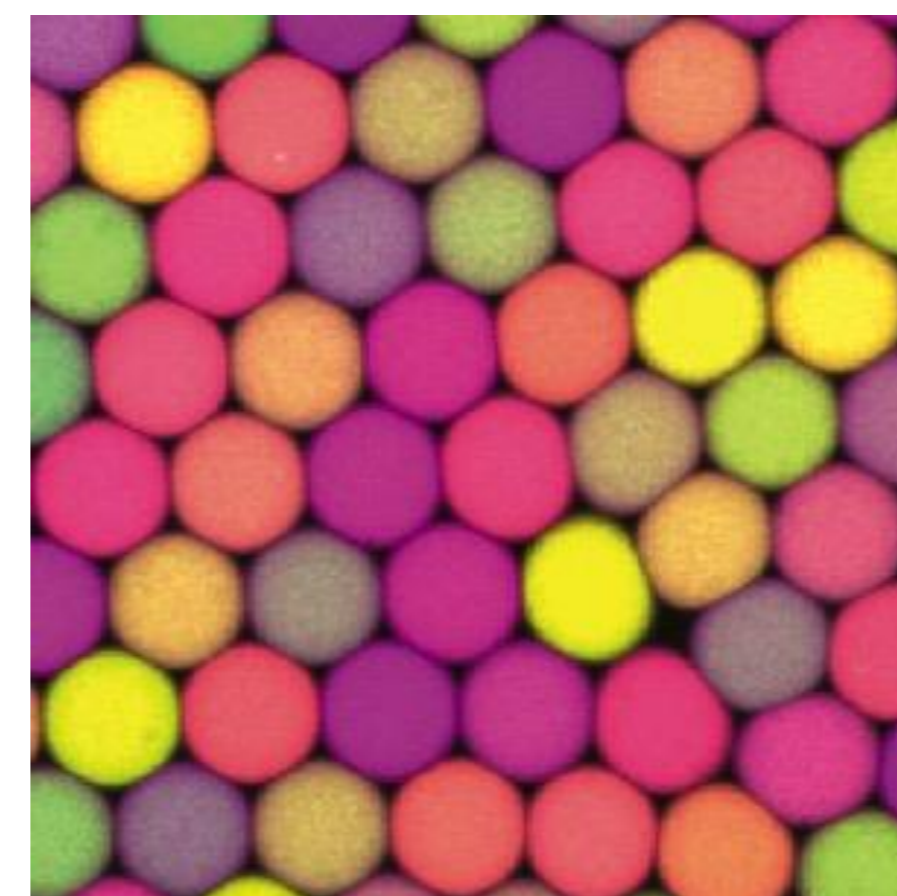
**Implant device**

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



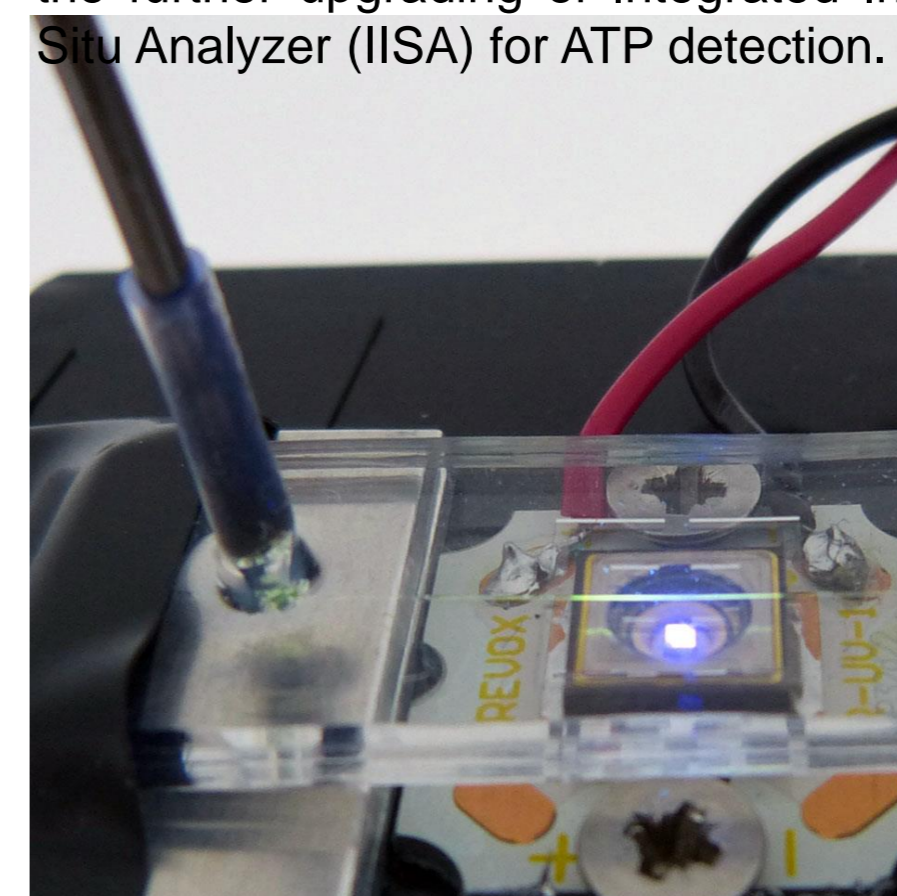
**Biochemical networks**

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



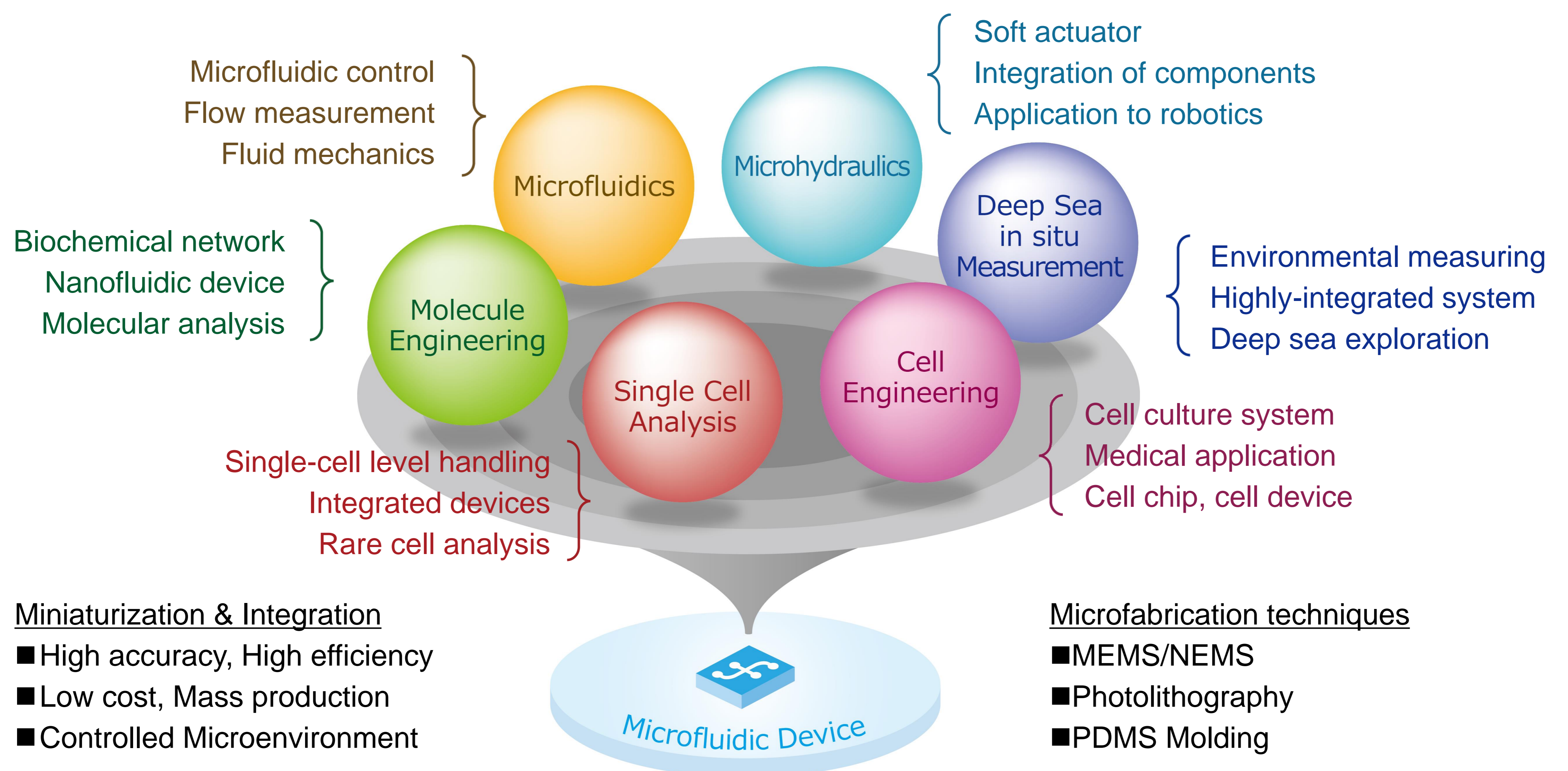
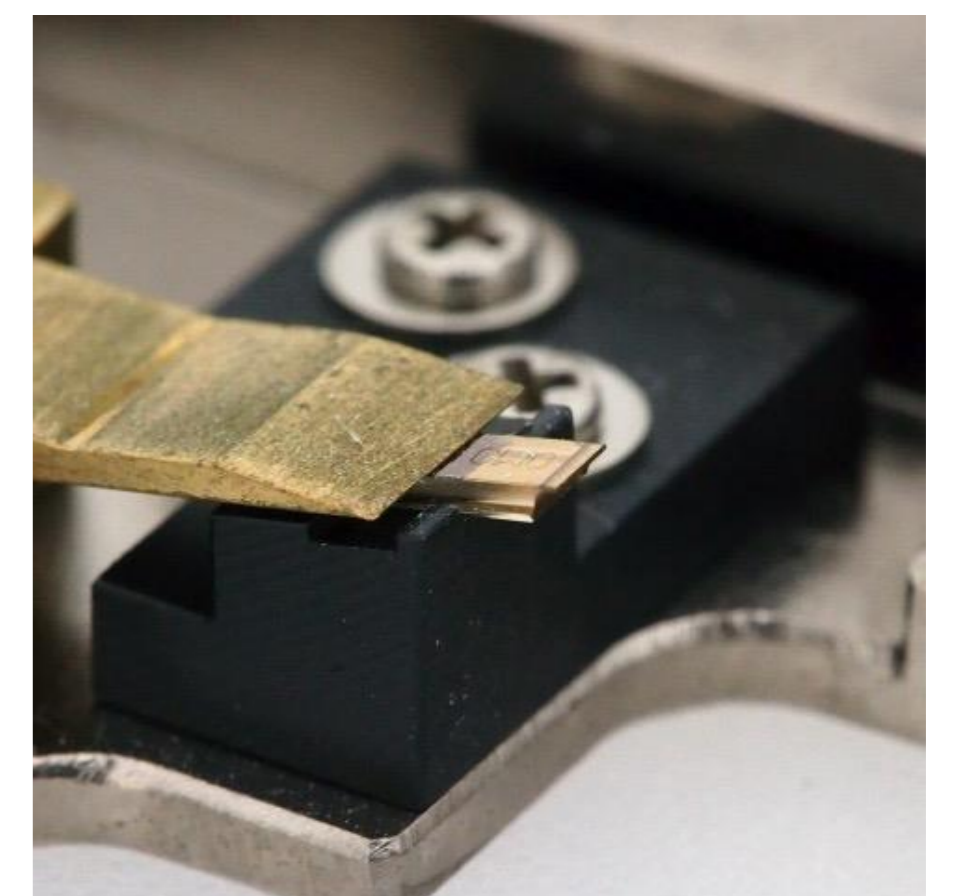
**ATP detection in deep sea**

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.



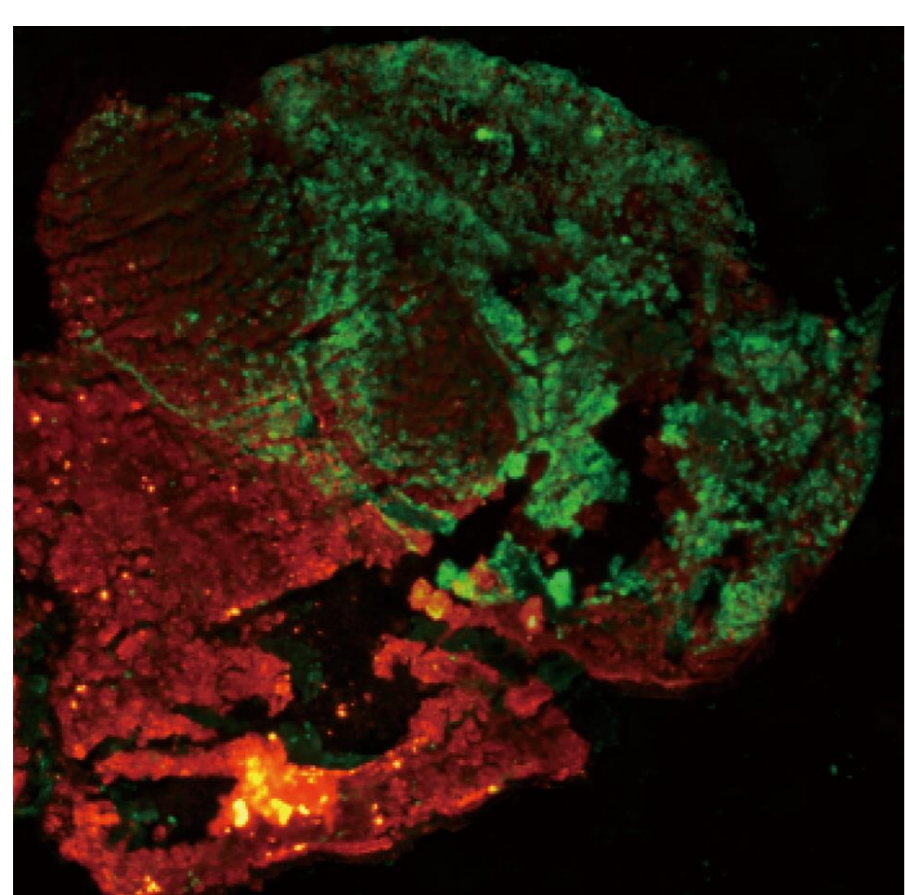
**Underwater AFM**

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



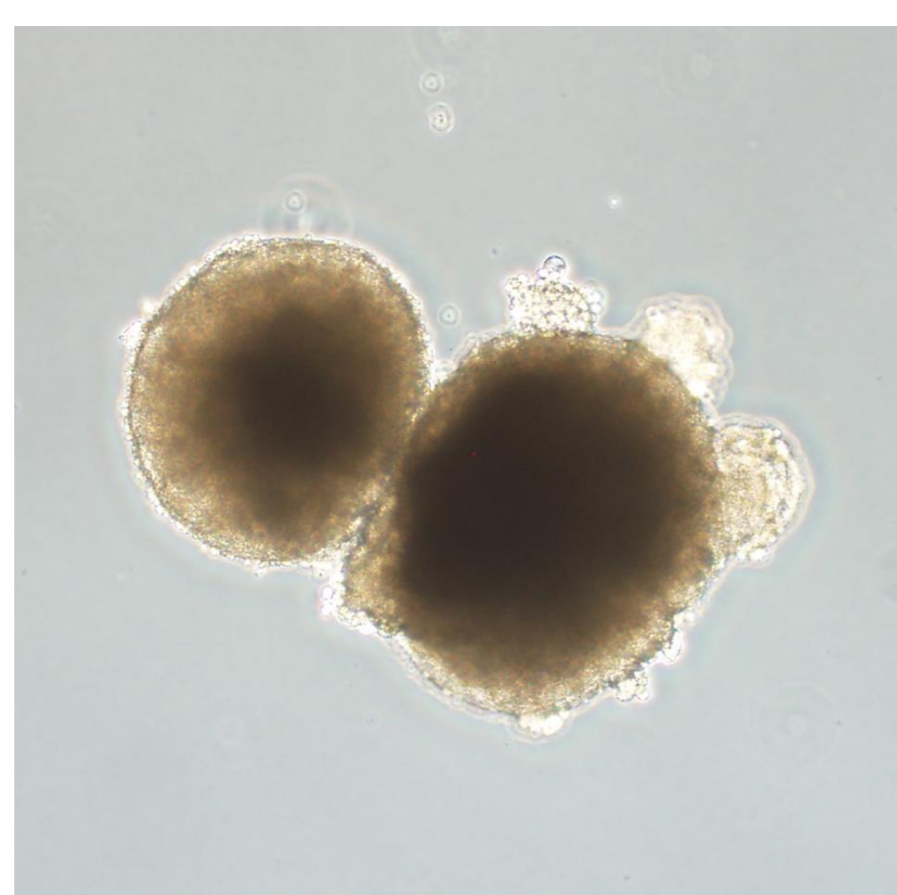
**Cell / tissue showcasing**

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



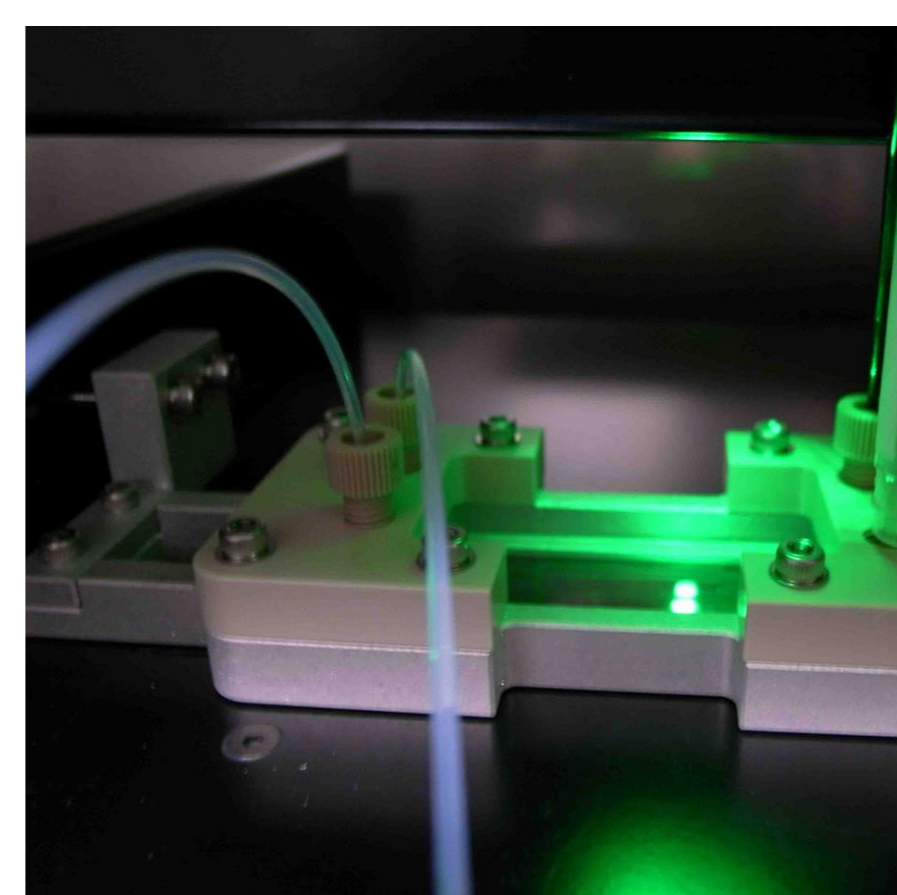
**Controlled differentiation**

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



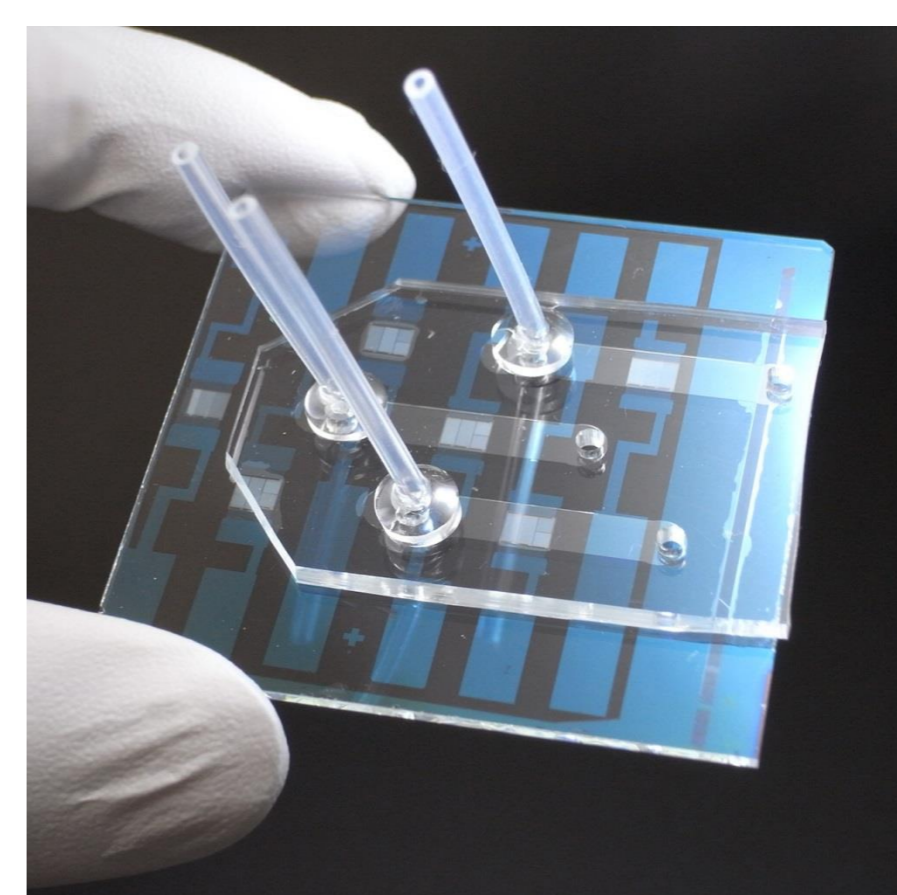
**Cell culture system**

A 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 microwell array device to investigate cells individually using key technologies such as dielectrophoresis and electroporation.



**CTC analysis**

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

