

FUJII LAB.

[Applied Microfluidic Systems]

Department of Mechanical and Biofunctional Systems

Microfluidics, cell engineering, underwater technology and molecular engineering

Precision Engineering / Bioengineering

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

Applied Microfluidic Systems

From Deep-Sea Application to Cell Engineering

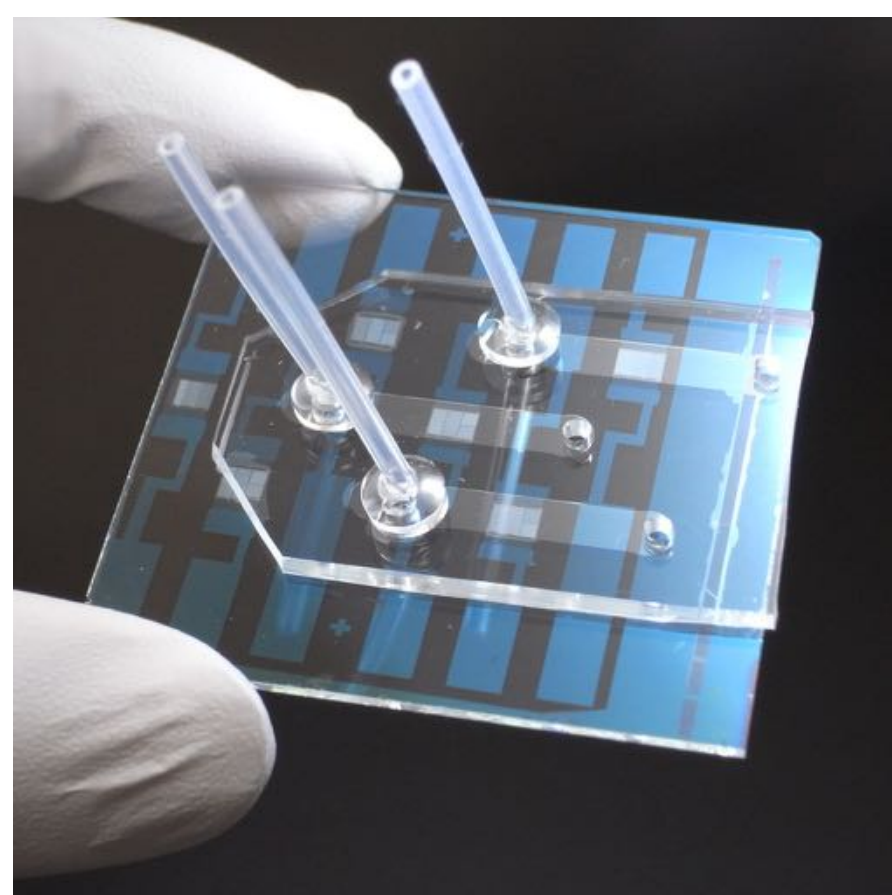
Soft actuator

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



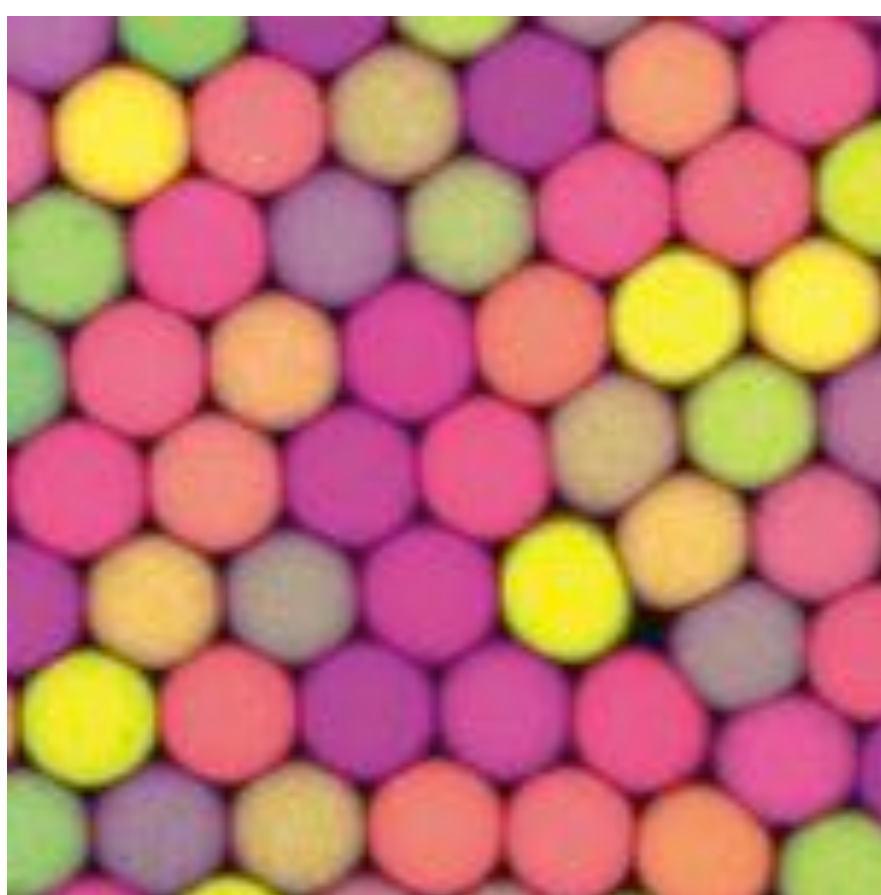
Single cell analysis

We have developed a microwell array device for parallelized single cell analysis using electrostatic functions including dielectrophoresis and electroporation.



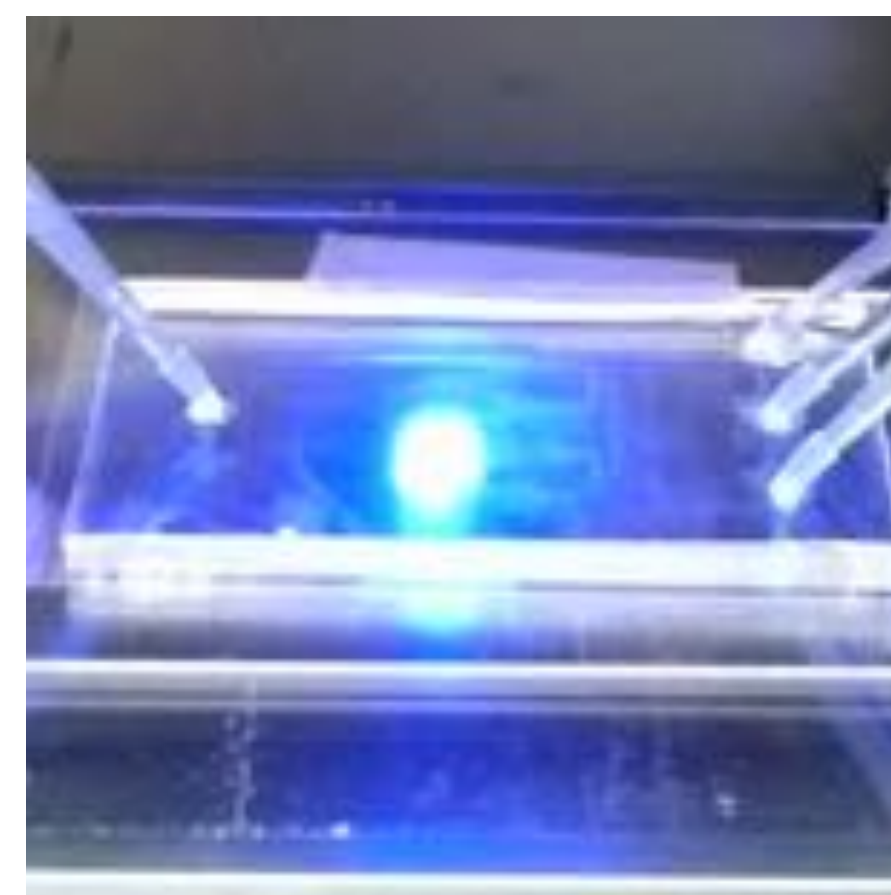
Biochemical networks

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



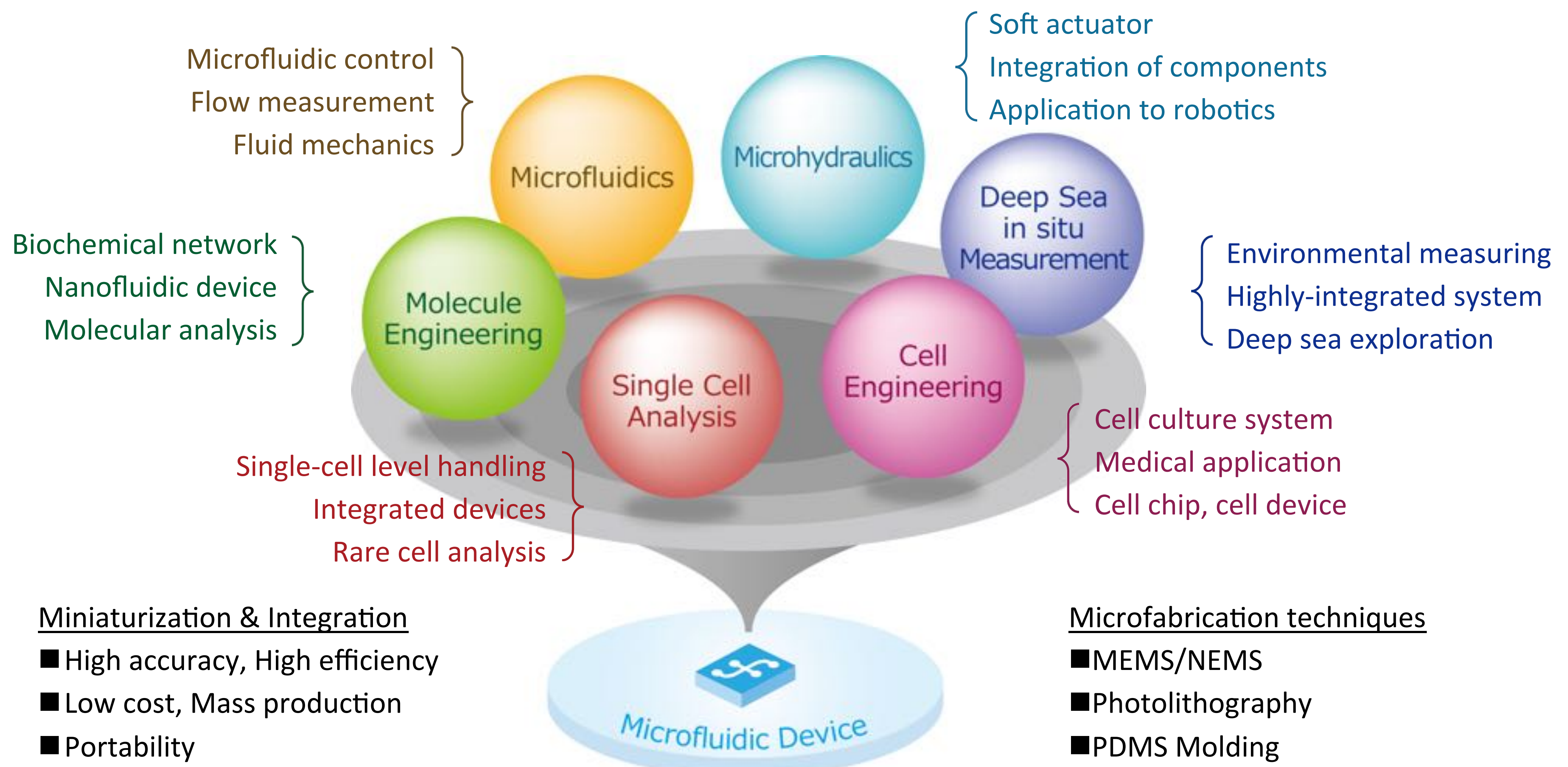
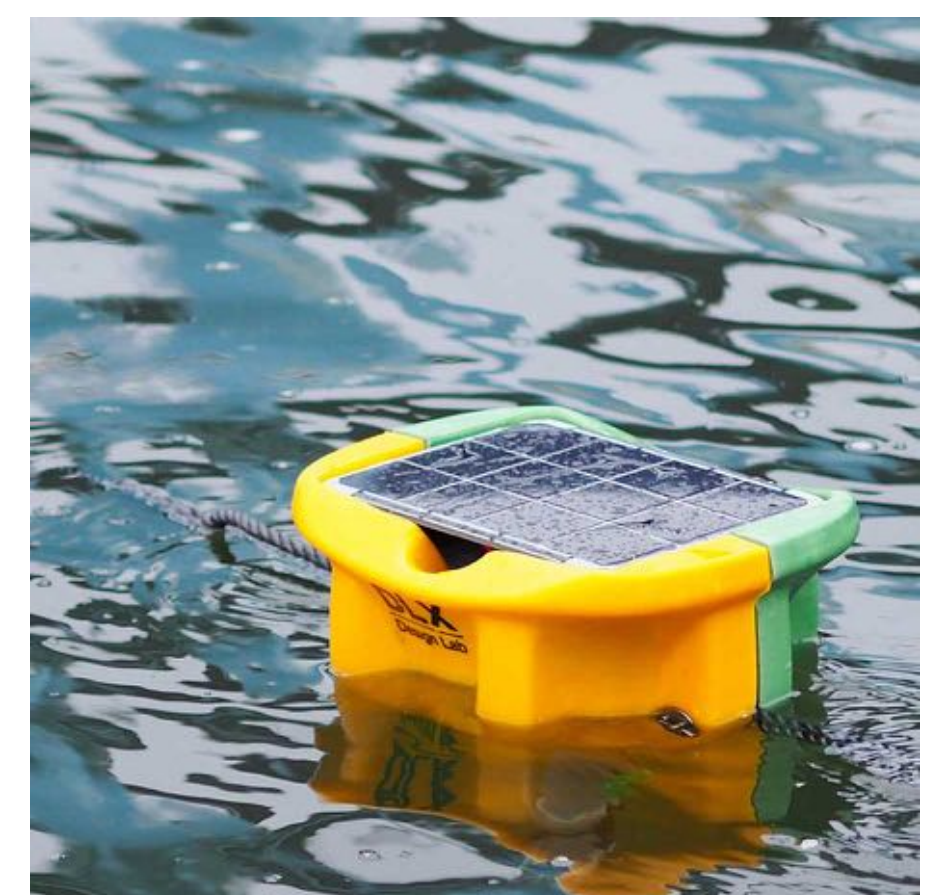
Control of gene expression

We are developing a novel system enabling temporal control of gene expression by combining optogenetics and microfluidics.



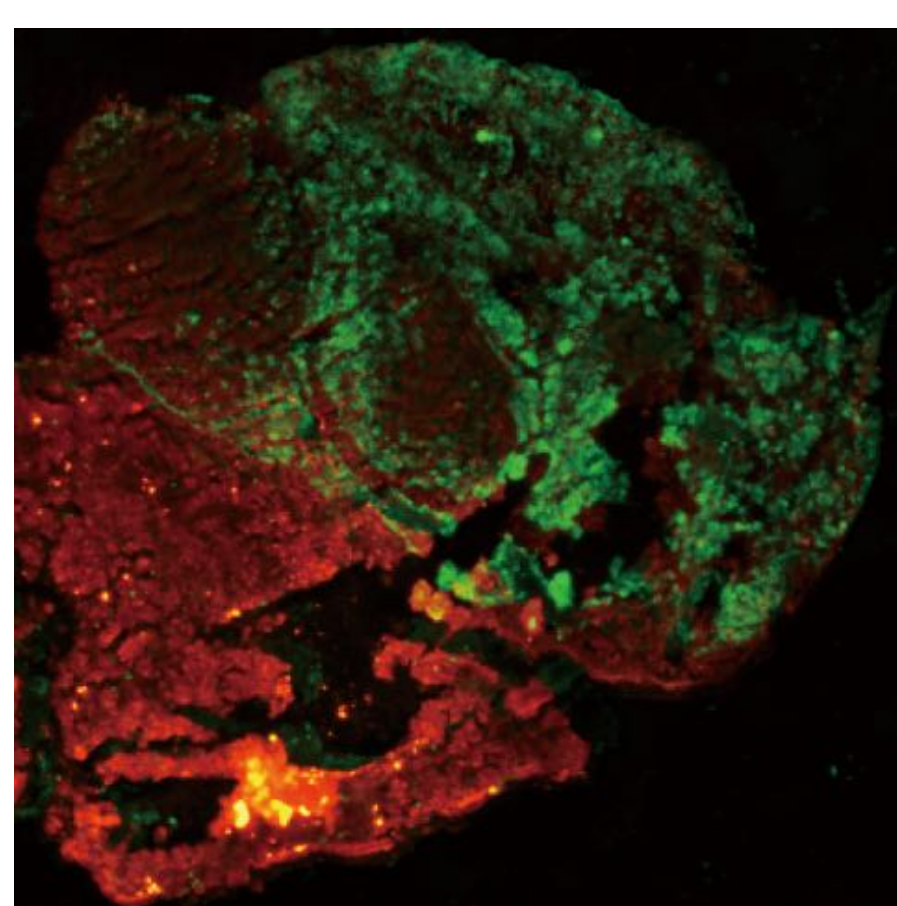
Ocean monitoring

With the aim of creating an open platform for global ocean monitoring, we're working on prototyping sensing devices and testing them in oceans.



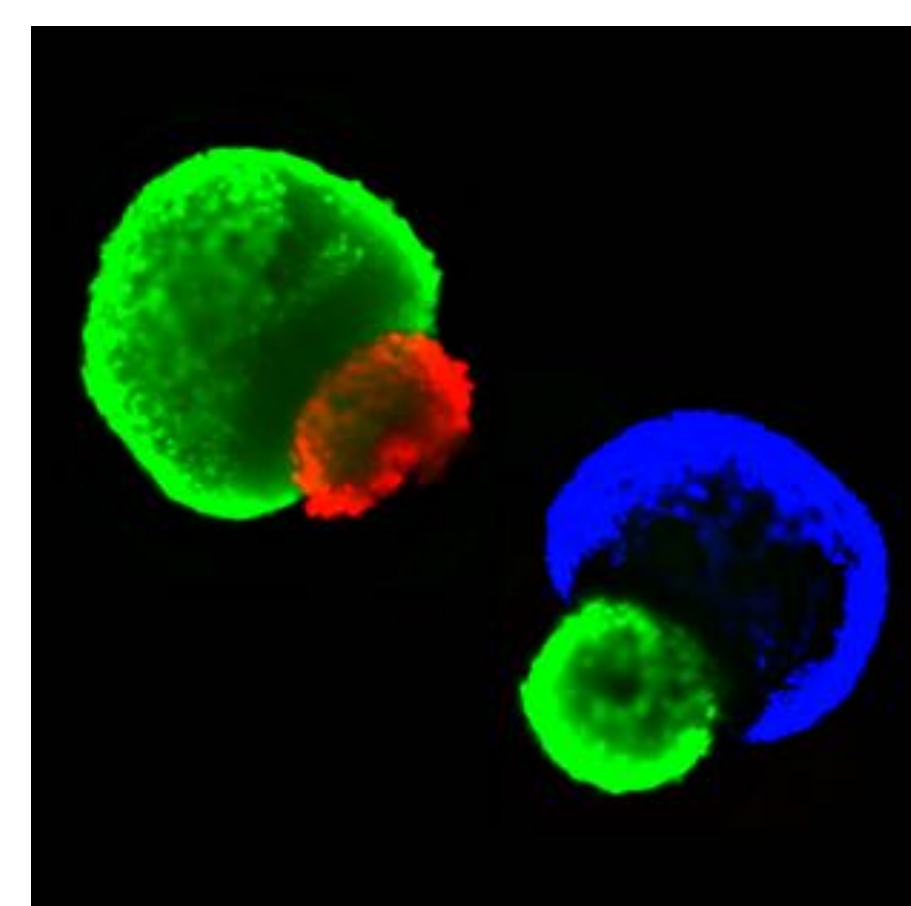
Cell / tissue showcasing

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



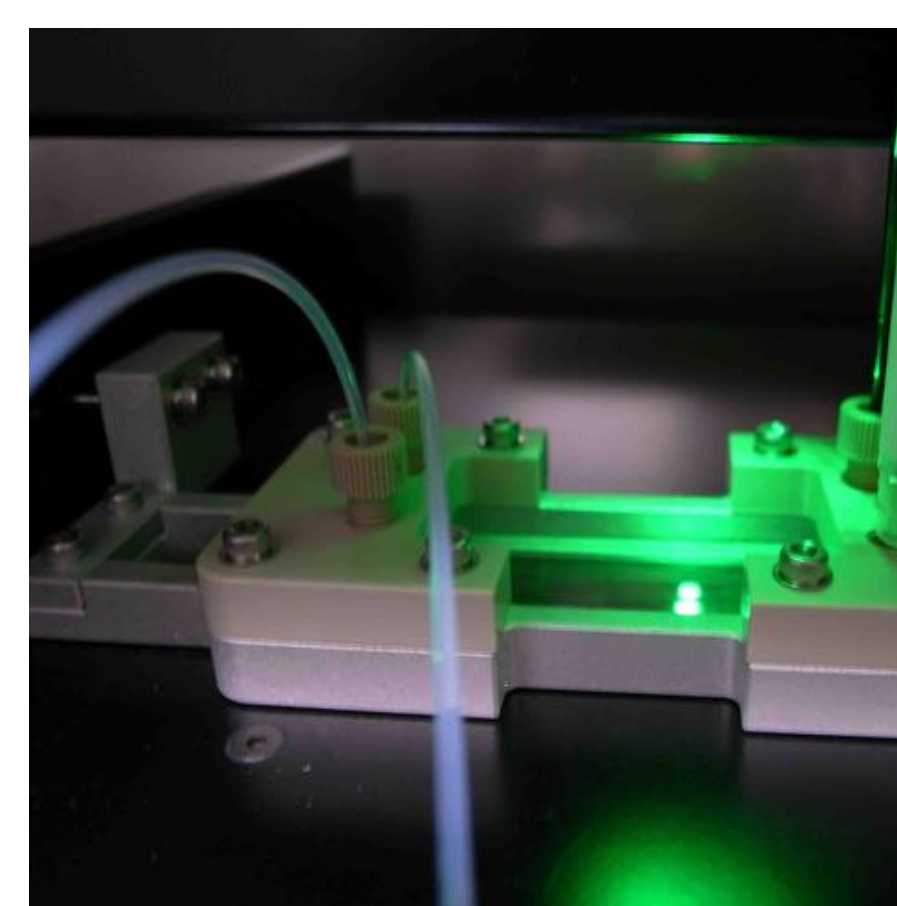
Compartmentalized culture

A compartmentalized culture system for cell aggregate has been developed for spatially controlled differentiation of iPS cells or anticancer drug evaluation.



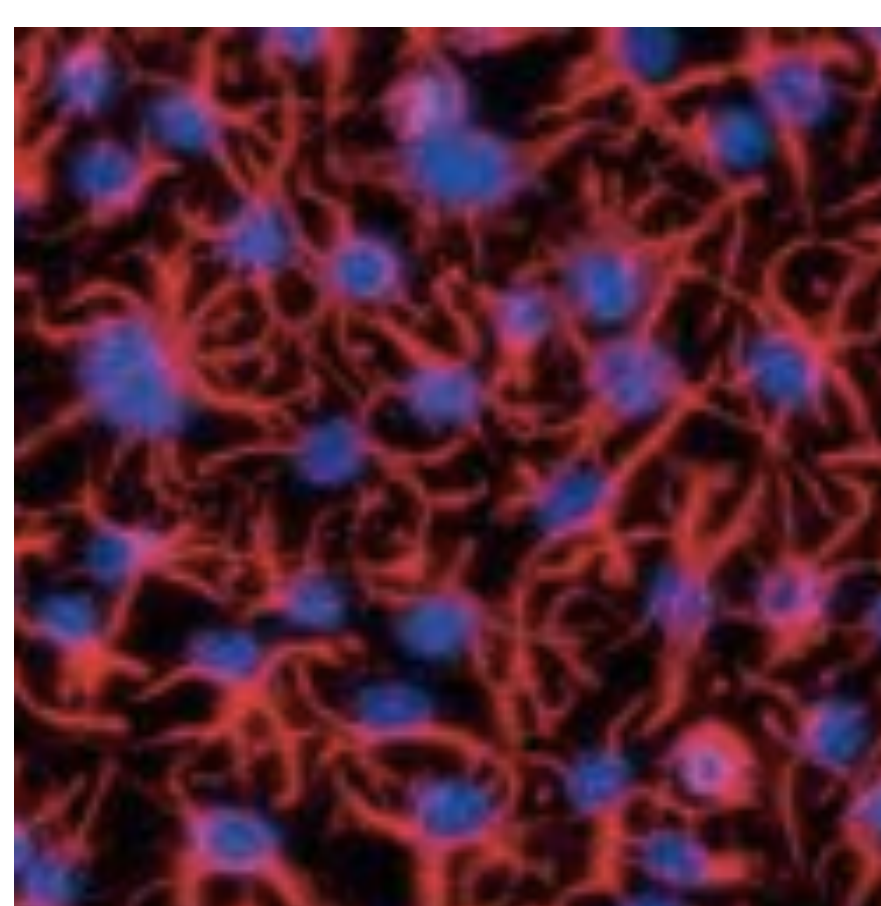
Cell culture system

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



Kidney on a chip

We are developing a kidney podocyte culture system with physiological filtration by slit diaphragms for drug discovery research.



CTC analysis

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

