Applied Microfluidic Systems

F-block Elevator Hall



EUJI 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 an unique soft actuator on "Microhydraulics" which based microfluidic channels and uses 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.



detection in deep ATP sea

A new in situ calibration method using "caged ATP" is currently studied for the further upgrading of Integrated In tu 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.



Soft actuator Integration of components Application to robotics

Deep Sea in situ Measurement

Environmental measuring Highly-integrated system **Deep sea exploration**

Microfluidic control Flow measurement Fluid mechanics

Biochemical network Nanofluidic device

Microfluidics

Microhydraulics

Molecular analysis

Single-cell level handling Integrated devices Rare cell analysis

Molecule

Engineering

Miniaturization & Integration ■ High accuracy, High efficiency ■ Low cost, Mass production ■ Controlled Microenvironment

Cell / tissue showcasing A cell/tissue showcase system which regulates fluidic/adhesive conditions is developed by integrating artificial biointerface 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.



Single Cell Analysis

Cell Engineering

Cell culture system Medical application Cell chip, cell device

Microfabrication techniques ■MEMS/NEMS Photolithography ■PDMS Molding

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.





Microfluidic Device

A microfluidic cell culture system which

enables dynamic control of a signal

molecule concentration has been

developed for cell signaling study.

Cell culture system

Institute of Industrial Science