



APPLIED  
MICROFLUIDIC  
SYSTEMS  
LAB

# FUJII T. 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

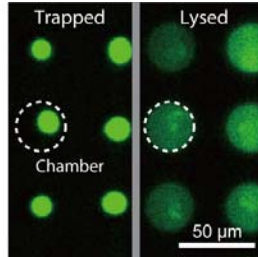
## Applied Microfluidic Systems

### From Deep-sea Application to Cell Engineering

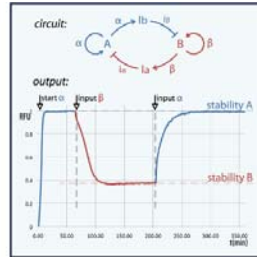
**Micro pump-valve system**  
2 fluidic channel networks, 10 electro-osmotic pumps and 5 membrane-type valves are successfully integrated into a monolithic PDMS device.



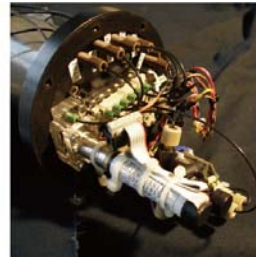
**Single-cell analysis**  
Mammalian cells are trapped and lysed using a micro chamber array device. Dielectrophoresis and electroporation are used for single-cell manipulation.



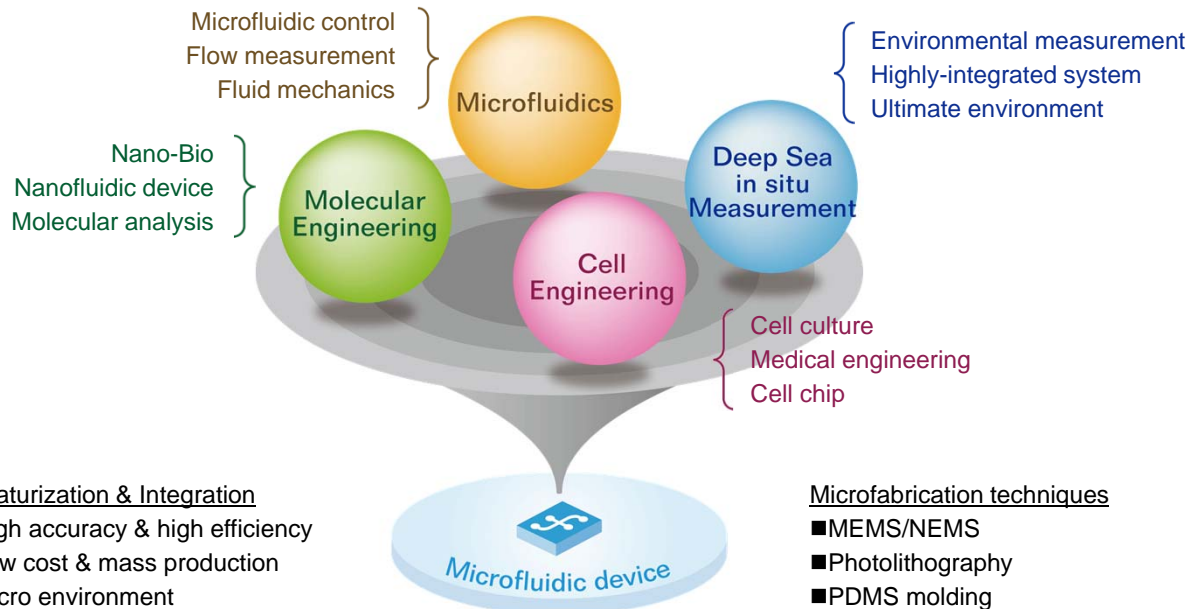
**in vitro biochemical networks**  
Target a behavior and encode it in DNA-based circuits: here a bistable (A or B) memory circuit that can be switched back and forth.



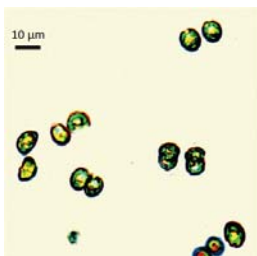
**Mn detection in deep sea**  
Integrated In Situ Analyzer (IISA) for Mn detection has been developed. All necessary components are integrated into a compact body.



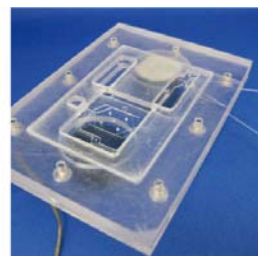
**ATP quantification**  
An integrated microfluidic system has been developed, which includes pumps, valves, and flow regulators for in-situ ATP measurement in deep sea.



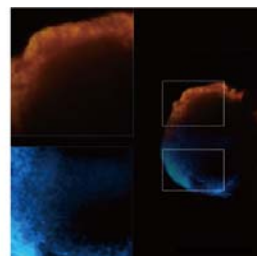
**Microalgae culture**  
Microalgae such as *Chlamydomonas reinhardtii* has been cultured in a microfluidic device to study the environmental effect on the culture.



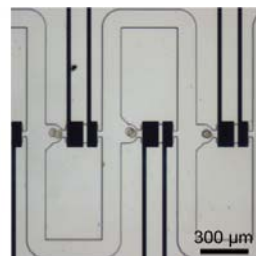
**On-chip human model**  
An in vitro human model system for pharmacokinetic prediction has been developed so as to perform screening assays of drug efficacy and toxicity.



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



**Embryo culture system**  
Mammalian embryos are treated automatically on a dynamic micro array, which has functions of trapping and collection for embryo culture.



**Cancer cell detection**  
An adhesion-based cell separation to detect metastatic cancer cells is performed using a peptide aptamer-coated microchannel surface.

