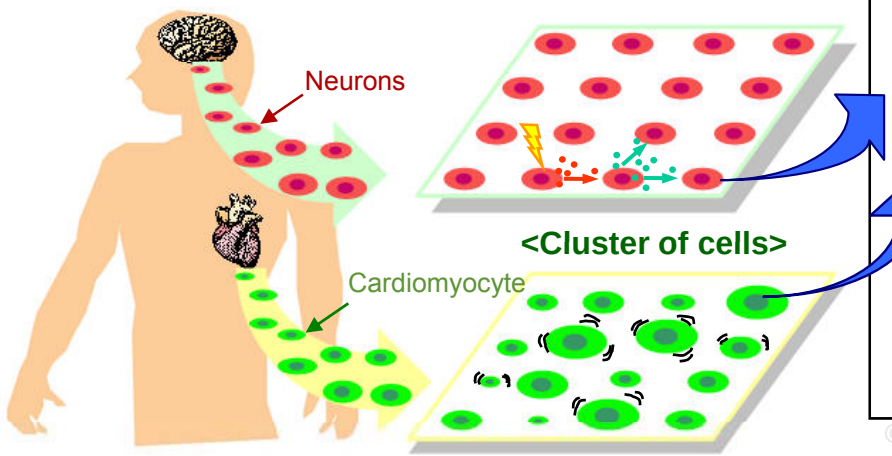
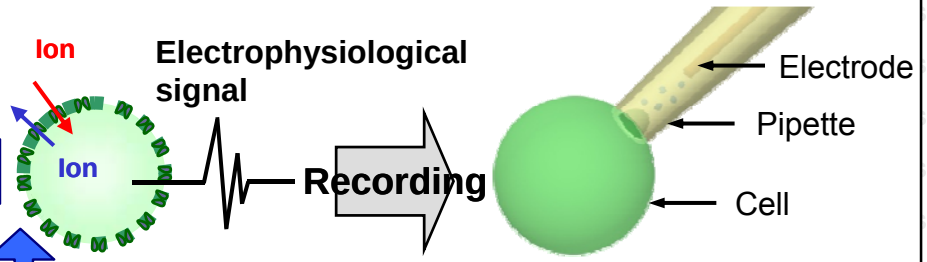
Research Outline

Cellular Activity



<Cluster of cells>



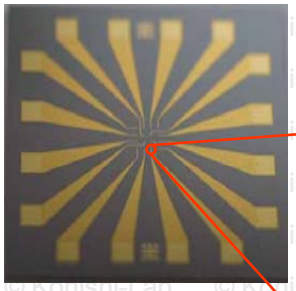
<Single-cell>

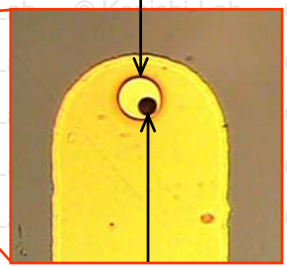
Patch-clamp technique

Drawbacks : Pipette Manipulation & Low-Throughput

MEMS Technology

Micro Channel Array (MCA)





Integration of Suction hole & Electrode

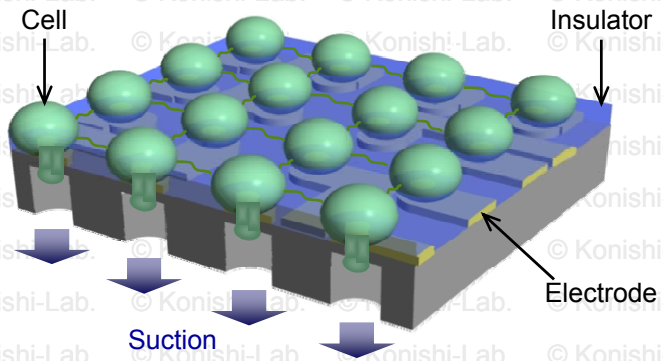
Improvement of Cellular Selectivity & S/N ratio
by Sucking and Clamping

Fundamental structure toward
Tissue Formation & Quantitative Analysis

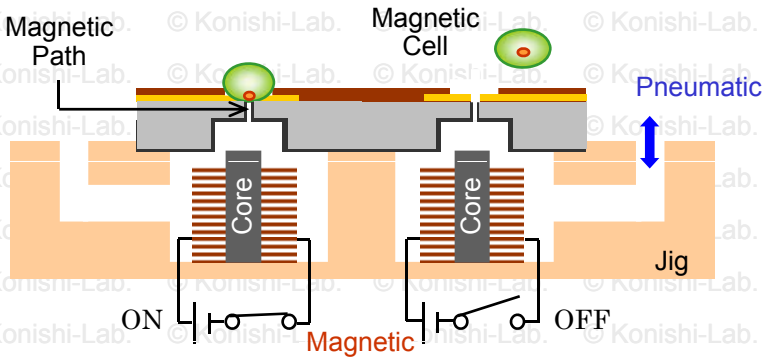
Research Objective

Cell Interface with MCA for Cell Manipulation & Quantitative Analysis

Extracellular Interface

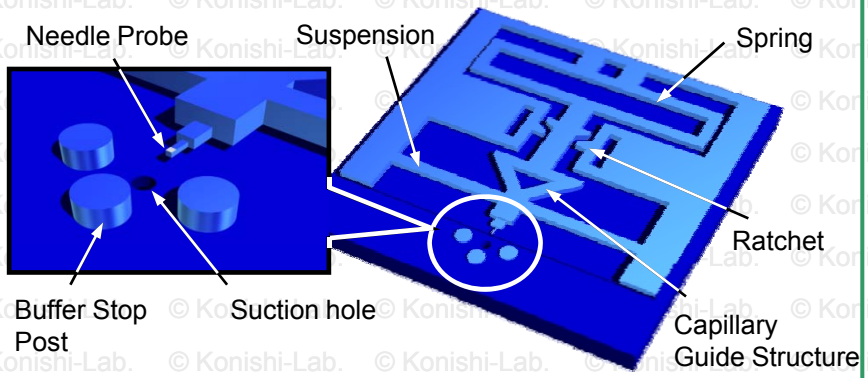


MCA for Cellular Network Analysis

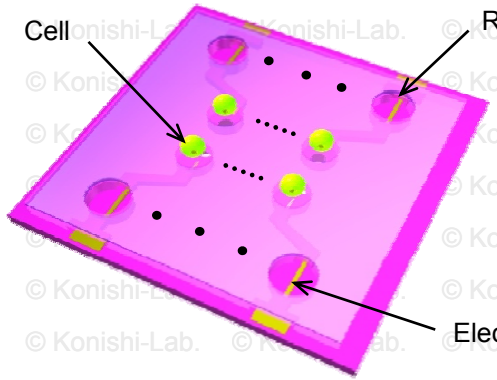


MCA for Magnetic & Pneumatic Cell Manipulation

Intracellular Interface



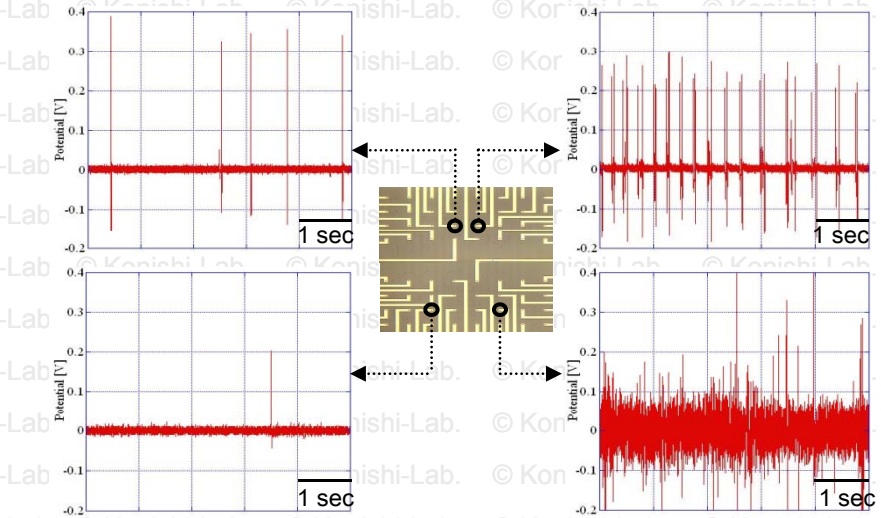
Self-Aligned Bio Probe with MCA



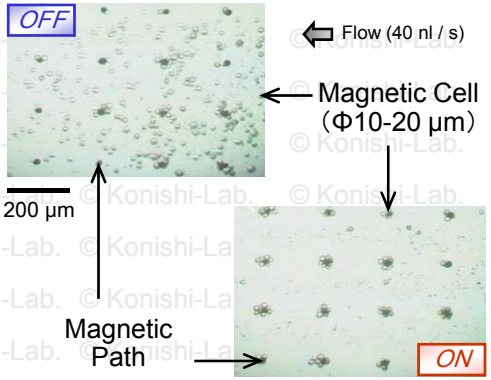
Photodynamic Perforator with MCA

Experimental Results

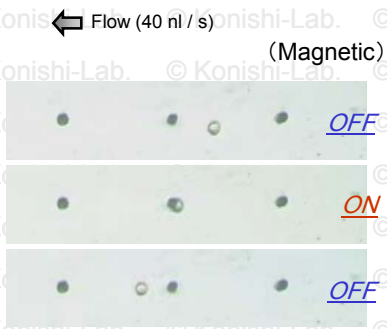
Extracellular Interface



Simultaneous Multipoint Recording of Cell Slice Activities

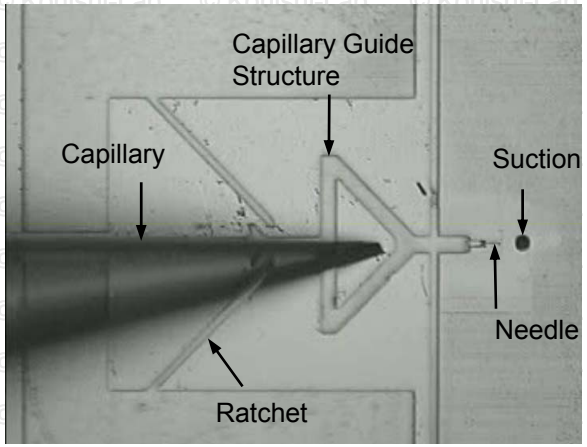


Magnetic Induction @ 70 mA

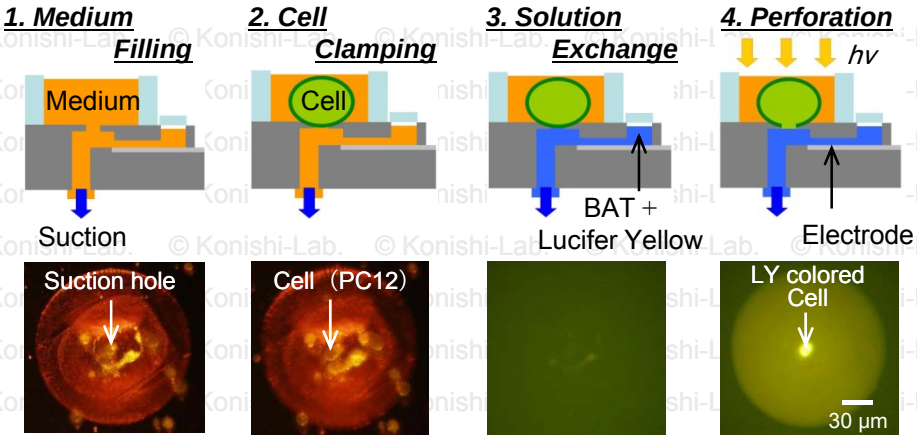


Transfer of Single-Cell between Magnetic Paths

Intracellular Interface



Operating of Self-Aligned Bio Probe with MCA



Photodynamic Perforation of Cell Membrane

Summary

Cell Interface with MCA

Extracellular

Cellular Network Analysis

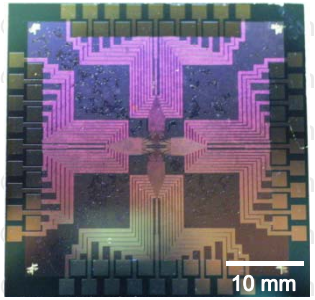
Magnetic & Pneumatic Cell Manipulation

Intracellular

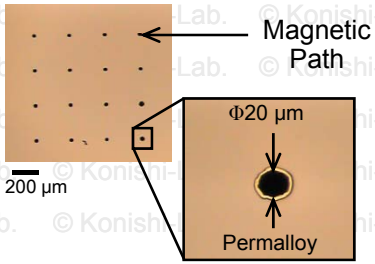
Self-Aligned Bio Probe

Photodynamic Perforator

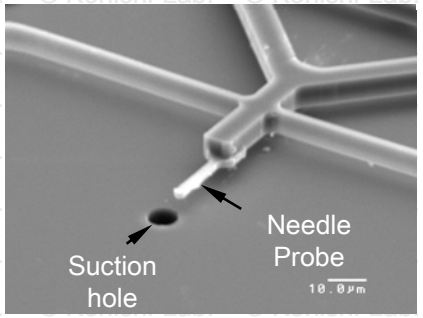
Single-Cell & Cellular Network Analysis



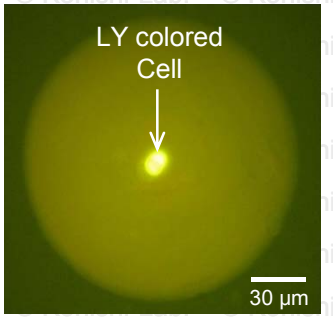
MCA for Cellular Network Analysis



Magnetic &Pneumatic Cell Manipulation



Self-Aligned Bio Probe with MCA



Photodynamic Perforator with MCA

Publication

○T.Hiranishi, W.Tonomura, K.Ino, M.Okochi, H.Honda and S.Konishi, “Both Pneumatic and Magnetic Induction of Scattered Cells on Micro Channel Array for Cellular Analysis”, *IEEE International Conference on Micro Electro Mechanical Systems (MEMS2008)*, pp.284-287, Tucson, Arizona, USA, 2008.

○W.Tonomura, T.Kurashima, Y.Takayama, H.Moriguchi, Y.Jimbo and S.Konishi, “Simultaneous Multipoint Measurement of Cellular Network by Isolated Micro Channel Array with Pt-Black Electrodes”, *IEEE International Conference on Transducers & Eurosensors*, pp.1793-1796, Lyon, France, 2007.

○K.Iso, T.K.Saito, H.Muguruma, H.Tabata and S.Konishi, “Photodynamic Perforation of Cell Membrane on Micro Channel Array toward Intracellular Technology”, *IEEE International Conference on Micro Electro Mechanical Systems (MEMS2007)*, pp.445-448, Kobe, Japan, 2007.