

# **MICROFABRICATED DEVICES FOR SINGLE CELL ANALYSIS**

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## **ABSTRACT**

BioMEMS or lab-on-a-chip technology is promising technology and enables the possibility of microchip devices with higher throughput or better performance for single cell analysis. We have designed and fabricated microdevices for single cell analysis, with impedance based device for fast cell screening and microchannel based flow systems for high throughput, high time resolution quantal exocytosis measurement with automatic cell positioning and reusability. The automatic cell positioning is realized by differential forces of fluidic dynamics. Microelectrodes are patterned at automatic trap positions for electrochemical detection quantal release of hormones like catecholamines secreted by cells.

We also developed diamond-like carbon (DLC) microelectrodes onto chip device for low noise exocytosis measurement. The DLC microelectrodes were deposited by magnetron sputtering process with nitrogen doping and a bottom ITO conductive layer. Test results show the developed DLC can detect exocytosis with low noise and a stable background current which are comparable to that of carbon-fiber electrodes. They are batch producible at low cost and can realize high-throughput on-chip measurement of quantal exocytosis. The technology developed in this research can have wide ranging applications in electrophysiology, cell based sensors, high throughput screening of new drug development etc.