

SELF-ALIGNED MICROCHIP DEVICE FOR AUTOMATED MEASUREMENT OF QUANTAL EXOCYTOSIS

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ABSTRACT

Here we describe a method to fabricate a multi-channel high-throughput microchip device for measurement of quantal transmitter release from individual cells. Instead of bringing carbon-fiber electrodes to cells, the device uses a self-aligning surface chemistry approach to bring cells to an array of electrochemical microelectrodes. The microelectrodes are small and “cytophilic” in order to promote adhesion of a single cell whereas all other areas of the chip are covered with a thin “cytophobic” film to block cell attachment and facilitate movement of cells to electrodes. This cytophobic film also insulates unused areas of the conductive film, thus the device is “self aligned”. Amperometric spikes resulting from single-granule fusion events were recorded on the device and had amplitudes and kinetics similar to those measured using carbon-fiber microelectrodes. Use of this device will increase the pace of basic neuroscience research and may also find applications in drug discovery or validation.