

Public Abstract

First Name:Xiaohui

Middle Name:

Last Name:Chen

Adviser's First Name:Kevin

Adviser's Last Name:Gillis

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:FS 2007

Department:Biological Engineering

Degree:PhD

Title:OPTICAL STIMULATION OF QUANTAL EXOCYTOSIS ON TRANSPARENT MICROCHIPS

Neurons and neuroendocrine cells secrete signaling molecules via Ca^{2+} -dependent exocytosis, a process in which intracellular vesicles fuse with the cell membrane and release their contents of hormones and neurotransmitters into the extracellular space in response to an increase in intracellular Ca^{2+} concentration. Photorelease of caged Ca^{2+} is a uniquely powerful tool to study the dynamics of Ca^{2+} -triggered exocytosis from individual cells. Using photolithography and other microfabrication techniques, we have designed and microfabricated a novel biochip device to integrate photolysis of caged Ca^{2+} , ITO amperometry, and fluorescence photometry together for higher-throughput on-chip stimulation and detection of Ca^{2+} -dependent exocytosis. This biochip device has potential applications for higher-throughput screening of drugs and toxins that target exocytosis. In addition, studies of exocytosis which use Green Fluorescent Protein as a reporter of gene expression could benefit from the transparent device.