University of Minnesota
Driven to Discover℠

Department of Chemistry

Seminar

9:45 a.m. Thursday, November 21, 2013 • 331 Smith Hall

Professor

Andrew Ewing

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Electrochemistry and Mass Spectrometry Imaging in Flies, Cells, and Vesicles

Research interests: Bioanalytical chemistry. Analytical chemistry applied to nerve cells, small in vivo systems and membrane systems; electrochemistry, capillary electrophoresis, mass spectrometry, chemical imaging with all of the above and at the cell and nanometer level.

Website: https://www.chalmers.se/chem/EN/divisions/analytical-chemistry/staff/andrew-ewing

Abstract

In this presentation, several methods and models will be discussed. Electrochemical methods provide a powerful approach to investigate neurotransmitter release and storage from single cells. Additionally, the fly model (Drosophila melanogaster) provides a unique system to examine neurotransmitter release and drug dependence mechanisms in a small, but complete system.

Electrochemical methods in the live adult fly have been developed and tested. Electrochemical cytometry can be used to separate nanometer vesicles, lyse them on an electrode surface, and amperometrically detect the active contents of each vesicle in a high throughput manner. Here, a hybrid capillary-microfluidic device is used surrounding the electrode to rapidly determine levels of aminergic transmitters in vesicles. Vesicular transmitter amounts from PC12 cells were compared to that observed during amperometric detection of release during exocytosis. Only 40% of the catecholamine is released defying the all-or-none release hypothesis. We have also used amperometry to examine post-spike feet that would be expected if the fusion pore was closing again with open and closed exocytosis. We conclude that normal exocytosis is open and closed! In addition, the use of lipids to alter exocytosis has been shown opening a new avenue for pharmaceutical targets. Finally, we have begun to use imaging mass spectrometry to look into liposome models of vesicles with the goal of measuring content across the substructure of the vesicle and at the lipid distribution across the cells of the fly brain.

Host: Professor Philippe Buhlmann
Refreshments will be served prior to the seminar.