



## **GRADUATE SCHOOL OF BIOMEDICAL SCIENCES BIOCHEMISTRY AND MOLECULAR PHARMACOLOGY**

### **Ph.D. THESIS DEFENSE**

**LEJIE ZHANG**

MENTOR: William Kobertz, PhD

Thursday, 9/6/2018 1:00 p.m.

LRB 816

#### **Fluorescent visualization of cellular proton fluxes**

The movement of proton across biological membranes is essential for maintaining cytoplasmic and extracellular pH and mediating the co-transport of metabolites and ions. Because proton-coupled transport often involves movement of multiple substrates, traditional electrical measurements provide limited information about proton transport at the cell surface. Here we have developed two optical approaches to detect proton fluxes from living cells by attaching small-molecule, fluorescent proton sensors to the cell's glycocalyx. The extracellularly facing sensors enable real-time detection of proton accumulation and depletion at the plasma membrane, providing an indirect readout of channel and transporter activity that correlated with whole-cell proton current. The nuts and bolts of the labeling procedure and videos of cell surface proton accumulation and depletion will be presented.

#### **Mentor(s)**

William Kobertz, PhD

#### **Dissertation Exam Committee**

Anthony Carruthers, PhD (Chair)

Stephen Miller, PhD

Michael Francis, PhD

Gang Han, PhD

I. Scott Ramsey, PhD