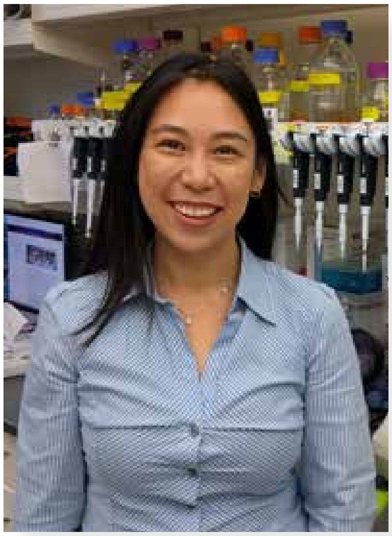

Rice University

George R. Brown School of Engineering
Department of Chemical and
Biomolecular Engineering

Presents

Dr. Lily Cheung

Postdoctoral Research Scholar
Carnegie Institution for Science
Department of Plant Biology

Thursday, February 16, 2017 - 2:30 PM
Herzstein Hall 210

SWEET Sugar Transporters: From Structures to Biomolecular Sensors

More people are expected to be born in the next four decades than existed prior to 1950, yet the area of arable land for food production is not expected to change. Conventional breeding and our current energy-intensive agricultural practices cannot deliver the sustainable crop yield improvements needed to meet the projected demand for food. Fortunately, the past decade has seen exciting advancements in genome sequencing and editing, providing new opportunities to engineer novel crop varieties that are more nutritious, use resources more efficiently, and are better adapted to an ever-changing

environment.Achieving higher yields in crops will require the coordinated modulation of multiple metabolic and signaling pathways that regulate sugar storage and utilization. However, tools that enable the quantitative study of these processes in real time and with cellular resolution remain scarce. To address this need, I will present the development of a biomolecular sensor for the study of sugar transport in vivo. The sensor is comprised of a fusion between a fluorescent protein and a member of the conserved SWEET family of sugar transporters. Using structural insights into the SWEETs and bioinformatics analysis, I designed a sensor suitable for confocal microscopy with both high fluorescence and large dynamic range. Future implementation of sensors of this type in plants will allow the quantification of the spatiotemporal distribution of sugars during development. This will enable researchers to evaluate the effect of genetic and environmental perturbations, and to identify promising targets for manipulation.

About the Speaker

Lily got her research start in the labs of Henrik Pedersen and Mariathi Ierapetritou at Rutgers University, where she graduated Summa Cum Laude with a B.S. in Chemical Engineering in 2008. She then earned her Ph.D. in Chemical Engineering from Princeton University in 2013. Under the supervision of Stanislav Shvartsman, she characterized gene regulatory networks controlling the development of the model organism Drosophila melanogaster, using a combination of molecular biology, genetics, and reaction-diffusion modeling.

During her postdoctoral training with Wolf Frommer at the Carnegie Institution for Science, she received an NSF Fellowship to design biomolecular sensors to quantify sugar transport in plants. Her current interests include the use of high-throughput quantitative techniques and mathematical modeling to advance our understanding of how metabolic and gene regulatory networks interact to control plant growth. Her long term goal is to develop predictive models that will accelerate the design of higher yielding crops.