

# BIOENGINEERING

PRESENTS

## Synthesis of Responsive Organic Materials for Intracellular Delivery and CryoEM Structure Elucidation



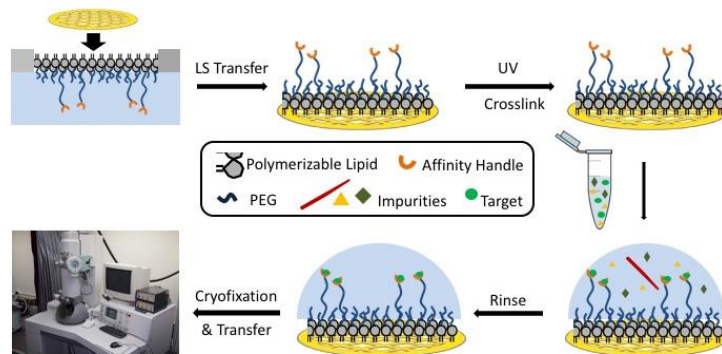
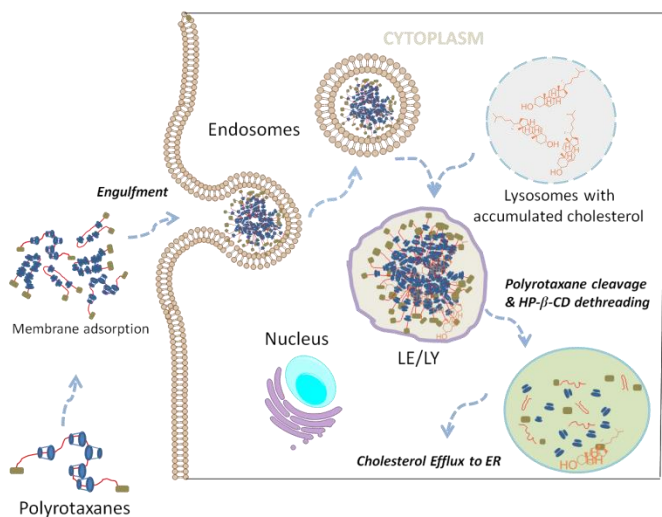
MONDAY, FEBRUARY 29, 2016  
2:00 PM – 3:00 PM  
2101 ENGINEERING V

**David Thompson, Ph.D.**  
Purdue University  
Professor, Department of Chemistry

### ABSTRACT:

**Bioresponsive Carrier Materials.** Transport of drugs and nucleic acids across biological membranes in a target-specific manner is a major challenge facing the development of efficient next-gen therapeutics. The Thompson Lab has synthesized a family of self-assembled  $\beta$ -cyclodextrin:polymer materials that condense nucleic acids into stable nanoparticles that enable cellular internalization, yet release the nucleic acid cargo within the acidic endosomes of target cells. Variants of these constructs also display robust cholesterol efflux activity in cell and animal models of the rare lysosomal disorder, Niemann-Pick Type C disease.

**Non-fouling Materials for CryoEM Single Particle Reconstruction.** We have also been focused on the development of new organic materials to accelerate protein structure elucidation via cryoelectron microscopy from samples derived directly from cell lysates. Recent efforts in the preparation of electron microscopy grids bearing non-fouling ultrathin affinity coatings and their performance in single particle reconstruction efforts with a variety of protein targets will be discussed.



## BIOGRAPHY:

**Professor Thompson** received Bachelor degrees in Chemistry and Biology from the University of Missouri-Columbia (1978) and a Ph.D. degree in Organic Chemistry from Colorado State University (1984) for his work with Louis S. Hegedus. After postdoctoral studies with James K. Hurst (1984-1987), he joined the Department of Chemical & Biological Sciences at the Oregon Graduate Institute as an Assistant Professor (1987-1994). He then moved to the Department of Chemistry at Purdue University where he has held the position of Professor since 2000 and a courtesy appointment in the Department of Biomedical Engineering since 2010. Prof. Thompson has served as Visiting Professor at the University of British Columbia (1992), University of Florida (2003), Japan Advanced Institute of Science & Technology (2005), Osaka University (2006), Technical University of Denmark (2012), and Chulalongkorn University (2013). He has been recognized as a University Faculty Scholar, a Top Ten Outstanding Teacher in the College of Science at Purdue, and the Head of the Organic Chemistry Division (2003-2010). Prof. Thompson is a Co-Director of the Chemical and Structural Biology Group in the Purdue University Center for Cancer Research, a member of the Editorial Advisory Boards of *Langmuir* (2000-2005) and *Bioconjugate Chemistry* (2004-2013), and an Alternate Counselor of the ACS Division of Colloid and Surface Science. He presently serves as an Associate Editor of *WIREs: Nanomedicine & Nanobiotechnology* (2005-present). Dr. Thompson has published over 120 papers in areas focused on the synthesis of bioresponsive self-assembling materials for gene and drug delivery, materials development for accelerated protein structure determination, analytics-guided microfluidic synthesis of bioactive small molecules, and membrane protein sensors for high-throughput screening.