

SEMINAR

Research Talks from the Resnick Fellows



RESNICK INSTITUTE
science + energy + sustainability



Rachel

Ford

Resnick Grad. Research Fellow

Observing In-situ Particle Growth in Polymer Membranes Using Ultra-small Angle Neutron Scattering

Major advances have been made in the preparation of mixed matrix membranes with embedded polymeric particles. One such advance combines the durability of polyvinylidene fluoride with the diverse functionality of hydrophilic polymers. Essential to the preparation of these membranes is the in-situ synthesis of microgel particles in the membrane casting solution. While performance and stability of these membranes have been well documented, probing and understanding the structure-function relationship has proven to be challenging. To address this challenge, we developed a new method using ultra-small angle neutron scattering (USANS) to measure microstructure formation in membrane casting solutions. Traditionally, USANS is applied to equilibrated systems, but in our experiment, we were able to measure transient structural changes during microgel particle growth. Our new approach using USANS will not only enable in-depth structural analysis of membrane casting solutions, but will also enable the study of many systems containing transient microstructure.



Bradley J.

Brennan Ph.D.

Resnick Postdoctoral Scholar

Adventures in Bimetallic Fused Porphyrin Dimers

Many of our chemical feedstocks are derived from fossil fuel resources and/or are energy intensive to produce. To create a more sustainable world, scientists are attempting to find alternative sources or production techniques. Nature often provides inspiration into these pathways with enzymes that can produce ammonia from nitrogen in the air, hydrogen or oxygen gas from water, and turn carbon dioxide into energy rich fuels and feedstocks. A highlight of many of these complex enzymes is the use of multiple metals for storing electrical energy for the chemical transformations. Our research studies dimeric molecules of the biologically-ubiquitous porphyrin that have been synthetically fused, and are capable of incorporating two metals and storing significant electrical charge. This talk will discuss current results on their synthesis, charge storage, and catalytic properties.

3:00 to 4:00 pm | Wednesday, 2/22/17
Guggenheim 101 | Lees-Kubota Lecture Hall
Caltech Campus | resnick.caltech.edu

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