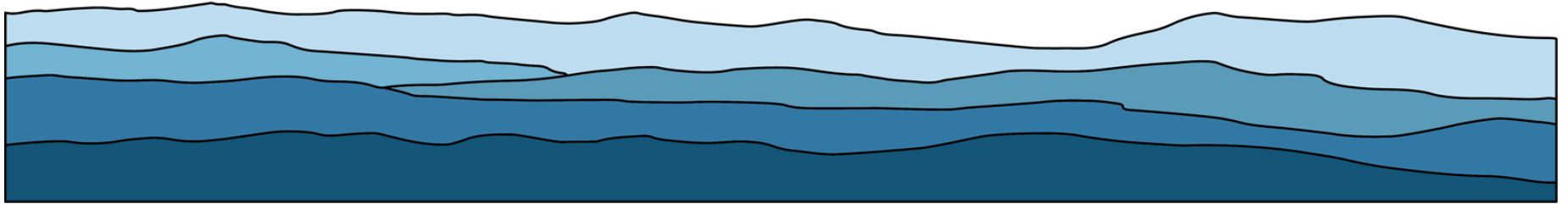


HIGHLANDS IN CHEMISTRY SEMINAR SERIES



Professor Sarah Tolbert

University of California Los Angeles

“From Batteries to Conducting Polymers — Using Chemistry to Improve Energy Materials”

Control of nanoscale structure is key to improving functionality in many new energy materials. This talk will begin with nanostructured battery materials that enable fast charging, and in the process, we will attempt to help refine our understanding of a phenomenon called pseudocapacitive charge storage. We will specifically examine how a combination of short ionic diffusion lengths in nanoporous electrode materials and a lack of first-order phase transitions can work together to reduce the diffusion constraints that limit charge/discharge speed. Charge/discharge kinetics can also be facilitated by adding electronic conductivity to electrodes, and we accomplish that using high conductivity doped conjugated polymers as binder for fast charging cathode electrodes. Finally, we consider high capacity anode materials, and show how nanoporous architecture can stabilize these materials against capacity fade. Here, operando transmission X-ray microscopy (TXM) is key to understanding the role of nanoscale structure. In all cases, we aim to understand how materials performance can be improved through control of static and dynamic structure.

December 6, 2024

2:30 PM ET

Hahn Hall North 140