JEFFREY I. ZINK INORGANIC CHEMISTRY SEMINAR SERIES

Dr. David Kwabi

Department of Mechanical Engineering, University of Michigan

"Designing Organic Redox-Flow Batteries for Energy Storage and CO2 Capture"

Abstract: Avoiding the most severe consequences of climate change can be achieved by increasing the pace at which carbon-free/renewable power is adopted to replace fossil fuels, capturing and permanently sequestering CO2 away from the atmosphere, or both. Large-scale implementation of both approaches is primarily challenged by technological barriers. Because renewable (e.g. solar and wind) power is intermittently available, its more extensive deployment on the grid requires low-cost storage technologies. CO2 capture systems must likewise be inexpensive and energy-efficient while enabling high rates of CO2 uptake from point and distributed sources. Electrochemical devices with organic active materials are promising candidates for both tasks. They can store electrical energy in the form of batteries and enable selective separation processes – in the latter case, without the Carnot efficiency limit that conventional thermal separation methods face. In this talk, I will discuss our group's recent progress in using numerical modeling and statistical inference techniques to understand the kinetics of charge carrier conversion and decomposition in organic redox-flow batteries for grid-scale energy storage. I will also discuss how these techniques can be extended to understanding the performance limits of electrochemical CO2 capture scheme featuring reversible pH swings created by proton-coupled electron transfer in aqueous electrolytes.

Meet the Speaker

11:45 a.m. I YH 3096

Wednesday, October 2nd, 2024

4:00 p.m. I YH4222 - Collaboratory Dongwon Yoo Seminar & Conference Hall

UCLA College | Physical Sciences Chemistry & Biochemistry

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