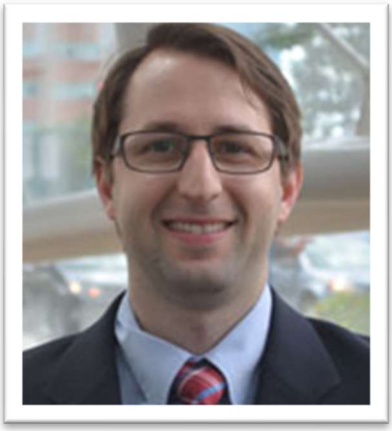
UC Irvine Samueli
Department of Chemical and Biomolecular Engineering

Dec 5, 2025
EH 2430
11:00a – 12:00p



Interface Modification for Electrocatalysis

Joshua Snyder, Ph.D.

Associate Professor of Chemical and Biological Engineering
Drexel University

Abstract: The growth and viability of deep decarbonization through the hydrogen economy is dependent upon scientific advances that will address the existing political, regulatory, and technological barriers that currently hinder electrochemical energy technologies. The strong correlation between device-level performance and catalytic electrode activity/durability highlights the criticality of identifying the limiting processes and developing strategies to address these limitations. While much of the development of electrodes for electrochemical energy and manufacturing technologies has focused on catalyst materials, the complexity of the interface between those catalysts and the electrolyte and its role in defining reaction activity/selectivity provides opportunities for improvements in reaction efficiency through targeted manipulation. However, we are currently limited by existing knowledge gaps related to the structure of this interface and, most importantly, the true role of water and the effects of solvation of adsorbed species. In this presentation I will highlight our group's work on using molecular interfacial modifiers to both study the influence of intentional manipulation of electrochemical interfacial structure/composition and drive improvements for reaction efficiency. With these molecular interfacial additives, we are able to exploit the interaction between surface adsorbed species and solvating components to drive increased reaction rates and improved material durability for the oxygen reduction reaction, reversible hydrogen electrocatalysis, and aromatic hydrogenation.

Bio: Joshua Snyder, Associate Professor of Chemical and Biological Engineering at Drexel University, has been working in the area of electrochemical energy storage and conversion, with specific emphasis on hydrogen generation and utilization, for more than 20 years. He received his BS/MS in Chemical Engineering from Drexel University in 2006 and his PhD in Chemical Engineering from Johns Hopkins University in 2012. He was a Director's Postdoctoral Fellow at Argonne National Laboratory from 2012-2014, working in the Materials Science Department. He has been a professor at Drexel University since 2014 and was awarded the Electrochemical Society's Toyota Young Investigators Award in 2016 and NSF CAREER Award in 2020.

Hosted by: *Prof. Vojislav Stamenkovic*