Texas Tech University
Department of Chemical Engineering
Seminar Series

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(Photo-)Electrocatalytic Strategies for the Renewable Production of Hydrogen and Ammonia

Abstract

The large-scale generation of chemical fuels and commodities from renewable, carbon-free electricity sources (e.g. wind, solar) is a tantalizing prospect, and both H_2 and NH_3 are exciting target molecules for such processes. Importantly, the efficient synthesis of these species requires the careful coupling of both light and/or electrical energy to chemical reactions. In this seminar, I will discuss my recent efforts toward both the photoelectrocatalytic production of H_2 and electrocatalytic synthesis of NH_3. I will examine the key design considerations for photoelectrocatalytic H_2 electrodes, and relate these factors to our recently demonstrated nanostructured photoelectrode architecture for improved device performance. I will also discuss my efforts toward the electrocatalytic reduction of N_2 to NH_3 using a combination of materials and electrolytes computationally predicted to demonstrate high activity. I will review the guiding principles we have utilized in designing these studies, and I will also discuss our recent efforts in developing rigorous, reliable analytical methods for the demonstration of electrocatalytic reduction of N_2 to NH_3.

Bio

Adam Nielander is a postdoctoral scholar working with Prof. Thomas Jaramillo in the Department of Chemical Engineering at Stanford University. He received his PhD from the California Institute of Technology for his work in semiconductor photoelectrochemistry and solar fuels synthesis with Prof. Nathan Lewis. His current research interests include electrochemical strategies for the production of ammonia and the remediation of wastewaters as well as the chemical control of ultrathin materials for next-generation electronic, photovoltaic, and corrosion-inhibiting technologies.

Friday, Feb 7th
Livermore 101
3:00 pm