COLLEGE OF ENGINEERING, COMPUTER SCIENCE, & TECHNOLOGY

Seminar in Interdisciplinary STEM Research

February 13th – Thursday, 3:05-4:20 PM PST

Location: E&T C-256

HOSTED BY CREST-CATSUS AND SIKAND SITI CENTERS



Alejandra Hormaza, PhD

Alejandra Hormaza holds a Ph.D. in Mechanical Engineering and is an Assistant Professor in the Department of Mechanical Engineering at the California State Polytechnic University, Pomona. She completed her education at the University of California, Irvine where she focused on hydrogen-related research for over a decade under the guidance of Professor Jack Brouwer. Previously, Dr. Hormaza worked at the California Energy Commission, Environmental Defense Fund, and Hydroplane, a startup focused on developing a fuel cell-powered airplane. Her research has involved investigating gaseous fuel leakage of hydrogen and natural gas blends from natural gas infrastructure and the feasibility of using offshore wind and seawater for high-temperature electrolysis. Dr. Hormaza is passionate about sustainable energy systems and developing a pathway to clean energy.

Hydrogen For Sustainable Energy Systems

Abstract: Hydrogen is poised to play an essential role in achieving 100% carbon-free energy systems by serving as an energy vector for storage and transmission, as well as a precursor for more energy-dense fuels. Hydrogen can serve as a medium for long-term energy storage and can ensure renewable power grids are resilient while relying entirely on intermittent resources like solar and wind. Solid oxide electrolysis (SOE) offers a highly efficient pathway (80-90%) for hydrogen production due to its thermodynamic and kinetic advantages, making it a critical technology in the transition to sustainable energy. While any source of electricity can be used to power SOE systems, green hydrogen made from a renewable power source, like solar, onshore, or offshore wind, represents the most sustainable pathway to achieving net zero emissions.

This talk will provide a comprehensive overview of hydrogen's role in a decarbonized energy future. The talk will delve into the various avenues for clean hydrogen production, particularly from electrolysis technologies, and examine hydrogen's important role in decarbonizing sectors, that are hard to decarbonize through electrification. For industries like aviation and steel, electrification is technically or economically unfeasible, and hydrogen provides a viable alternative. Lastly, the presentation will conclude with a review of how the natural gas system may be used for hydrogen transmission and storage.

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