THE OHIO STATE UNIVERSITY

The William G. Lowrie Department of Chemical and Biomolecular Engineering Graduate Program Cordially invites you to attend a seminar on

Converting CO_2, Water, and Sunlight into Liquid Fuels: Towards Affordable Solar Fuels and Chemicals

Dr. Aisulu Aitbekova

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Liquid Sunlight Alliance DOE Energy Hub
Division of Engineering and Applied Science, California Institute of Technology

January 16, 2024, 11:30 AM
130 Koffolt Lab, CBEC 151 W Woodruff Ave
Reception at 11:00 AM - CBEC Lobby

Bio

Aisulu Aitbekova is a Kavli Nanoscience Institute Postdoctoral Fellow in the Harry Atwater Group at the California Institute of Technology. She earned her Ph.D. in Chemical Engineering working with Matteo Cargnello at Stanford University. Aisulu received her M.S. in Chemical Engineering Practice from the Massachusetts Institute of Technology and B.S. in Chemical Engineering from Nazarbayev University in Kazakhstan. Her PhD work focused on developing novel catalytic materials. By synthesizing catalysts with well-defined properties (size, shape, and composition) and tracking their dynamic nature using X-ray absorption spectroscopy, she studied how a property of a catalyst affects its performance and used this knowledge to develop more efficient materials for thermocatalytic CO_2 conversion and automotive exhaust emission control. Now, as a postdoctoral member in the Liquid Sunlight Alliance DOE Energy Hub, Aisulu develops solar-driven processes (photoelectrochemical CO_2 reduction, photothermal ethylene oligomerization, and tandem photoelectrochemical/photothermal CO_2 conversion into liquid fuels) through catalyst synthesis, device fabrication, and reactor engineering.

Abstract

Generating solar fuels for difficult-to-electrify areas (such as long-distance transportation) necessitates the development of technologies optimized at multiple levels. On a molecular level, we need to create catalytic materials that stably convert CO_2 with high conversion rates and selectivity to desired products. On a system level, we need to engineer reactors that efficiently convert solar energy into heat required to run chemical reactions. This stringent requirement presents a challenge to convert CO_2 into liquid fuels. In this talk, I will present our work to develop a tandem photoelectrochemical-photothermal system that turns CO_2, water, and sunlight into multicarbon products. From molecular to system level, this work aims to pave the way towards affordable solar fuels and chemicals for everyone.