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Hosted by the Department of Chemical Engineering

Distinguished Seminar Speaker

The Significance of the Double Layer Structure of Ionic Liquids and Deep Eutectic Solvents for Electrochemical Processes

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Abstract: Ionic Liquids (ILs) and deep eutectic solvents (DESs) represent concentrated electrolytes with negligible volatility, electrochemical and thermal stability, and nonflammability that are desirable for electrochemical processes. The electrode-electrolyte interfacial structure of these electrolytes present unique behavior that impacts the outcomes of electron transfer reactions at the electrode surface. We examined these interfaces and the redox reactions relevant to energy storage and electrocatalysis with a combination of techniques including surface enhanced Raman spectroscopy (SERS), in-situ UV-Vis spectroscopy, electrochemical impedance spectroscopy (EIS), neutron reflectivity (NR), and voltammetry. This presentation will highlight the impact of solvation, ionic interactions, surface adsorption, and hydrogen bonding and transfer on interfacial structure, redox reactions, and catalytic mechanisms in particular for CO₂ electroreduction.

Biography: Prof. Burcu Gurkan is recently promoted to Full Professor in Chemical and Biomolecular Engineering at Case Western Reserve University. Her research focuses on deep eutectic solvents and ionic liquids for applications in separations, energy conversion and storage. She completed her PhD from the University of Notre Dame and postdoctoral trainings at the Massachusetts Institute of Technology and The University of Akron. She is the recipient of NASA Early Career Faculty, NSF CAREER, and ACS PRF New Investigator awards. She is the Deputy Director of BEES2 (Breakthrough Electrolytes for Energy Storage Systems) – a DOE Energy Frontier Research Center (EFRC) and a key researcher in 4C (Center for Closing the Carbon Cycle) EFRC. Prof. Gurkan is the past chair of Transport and Energy Processes division of AIChE. She is the 2024 Programming Chair of Energy and Fuels division of ACS and the elected Chair of 2026 Gordon Research Conference on Separation Science. She serves as an Associate Editor of ACS Applied Engineering Materials. (References: Gurkan Group website is <https://www.energylab-cwru.com/> and BEES EFRC website is <https://engineering.case.edu/research/centers/breakthrough-electrolytes-for-energy-storage>)