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Hosted by the Department of Chemical Engineering

Distinguished Seminar Speaker

Sustainability through Plastic Upcycling and Molecular Design of Green Solvents

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Abstract: This talk will give overviews of two relatively new research areas in the group of Prof. Jason E. Bara. First, efforts in plastic waste depolymerization and upcycling will be discussed with a focus on progress that is being made in two particularly challenging materials: poly(vinyl chloride) (PVC) and polyurethanes (PU). As PVC is the 3rd-most produced plastic worldwide, it is also very different than other commodity polyolefins including polyethylene (PE) and polypropylene (PP). PVC offers unique opportunities for chemistry (via depolymerization and functionalization) as well as solubility behaviors which enable it to be fractionated which can be advantageous and enable new applications for waste PVC, including 3D printing. Bara's group is also developing a new process dubbed "imidazolysis" which can break down crosslinked PU materials with recovery of small molecules. With respect to the design of green solvents, this talk will illustrate how Bara and collaborators are utilizing molecules with glycerol "skeletons" to tackle challenges in CO₂ capture (including direct air capture (DAC)), batteries, plastic wastes, additive manufacturing, and extractions of lithium and other critical materials from dilute sources.

Biography: Jason received a B.S. in Chemical Engineering from Virginia Commonwealth University and a Ph.D. in Chemical Engineering from the University of Colorado at Boulder. He has authored more than 160 peer-reviewed research publications on the topics of separations, ionic liquids, polymer membranes, and chemical process engineering. He has also been awarded 15 U.S. patents for new technologies developed in these areas. In recognition of his research, he received the Permeance Prize for Mid-Career Excellence from the North American Membrane Society (NAMS) (2024), Early Career Fellow from the Industrial & Engineering Chemistry Division of ACS (2021), the *Membranes* (MDPI) Young Investigator Award (2020) and the FRI/John G. Kunesh Award from the Separations Division of AIChE (2015). Jason has also been recognized for his contributions to chemical engineering education as the 2018 recipient of the Ray W. Fahien Award from ASEE and the 2017 recipient of the David Himmelblau Award for Innovations in Computer-Based Chemical Engineering Education Award from AIChE.