Clarkson University
Department of Chemical and Biomolecular Engineering
SEMINAR

"Electrochemical deionization for water desalination and selective ion separation"

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Climate change and anthropogenic pollution are driving increased scarcity of freshwater resources in many regions around the globe. Meanwhile, the development of clean energy technologies relies on critical materials (such as lithium), which can be extracted from water streams. Electrochemical deionization based on carbonaceous and intercalation electrodes has been proposed as a promising candidate for desalinating saline water and for selectively separating toxic or valuable ionic constituents from water. In this talk, I will first introduce our work on the performance evaluation and techno-economic assessment for electrochemical desalination of brackish water. Parametric models were established to estimate the unit cost of water desalination and energy efficiency in electrochemical desalination with different configurations, and results were compared against brackish water reverse osmosis. In the second part of the talk, I will present our work on the development of selective electrochemical separation systems, focusing on the recovery of lithium from water streams. We investigated the selectivity of lithium separation in electrolyte solutions with different cation concentration ratios as well as in simulated brines. Results show that lithium chloride with high purity can be extracted from high-salinity brines in the presence of competing monovalent and divalent cations.

Monday, April 24th, 2023 at 2:30 PM
Virtual – Zoom
Link: https://clarkson.zoom.us/j/99844383543?pwd=emxWb1l4KzRzazJJSVk1cGpWWUxvQT09
Meeting ID: 998 4438 3543
Password: CBESeminar

Xitong Liu received his B. Eng. Degree (2010) and M. Eng. Degree (2013) in Environmental Engineering from Nanjing University and his Ph.D. degree in Geography and Environmental Engineering from the Johns Hopkins University (2017). Following postdoctoral training at Carnegie Mellon University, he joined the George Washington University as an assistant professor in 2019. His research aims to study environmental interfacial phenomena and develop more efficient and cost-effective water purification and resource recovery technologies. Currently, his group focuses on the fundamentals and application of interfacial and separation technologies in 1) water desalination; 2) groundwater remediation; and 3) recovery of critical materials from water streams.