

Title: High-energy-density redox flow batteries: redox processes and design strategies

Energy storage system is a critical enabling factor for deploying unstable and intermittent renewable power sources such as solar and wind power sources. Redox flow batteries are promising technologies for large-scale electricity storage, owing to its design flexibility in decoupling power and energy capacity. However, the redox flow batteries have been suffering from low volumetric energy density due to low solubility of active materials, which significantly decreases its competitiveness for both stationary and transportation applications. In this presentation, we will discuss new design strategies to increase the energy density of redox flow batteries. We will discuss new flow cathode concepts that offer high-energy-density redox flow chemistries and alleviates contact issues between insulating active materials and conductive carbon network. The interactions between solid and solution phases and their impacts on fluid viscosity and flow cell performance will be discussed.

Biography:

Dr. Yi-Chun Lu received her B.S. degree in Materials Science & Engineering from the National Tsing Hua University, Taiwan, in 2007. She received her Ph.D. degree in Materials Science & Engineering from the Massachusetts Institute of Technology, Cambridge, USA in 2012. After her graduate study, she worked as a Postdoctoral Fellow in the Department of Chemistry at the Technische Universität München, Germany. She was the recipient of the Hong Kong SAR Research Grants Council Early Career Award (2014), Vice-Chancellor's Exemplary Teaching Award, CUHK (2014), European Materials Research Society Graduate Student Award (2011) and Electrochemical Society Battery Division Student Research Award (2010). She is currently an Assistant Professor in the Department of Mechanical and Automation Engineering at The Chinese University of Hong Kong. Dr. Lu's research interest centers on developing fundamental understandings and material design principles for clean energy storage and conversion.

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