

UCSD NANOENGINEERING/CHEMICAL ENGINEERING
Virtual **SEMINAR SERIES**

Wednesday, February 17, 2021

Seminar Presentation: 11:00am - 12:00pm PST

Zoom Seminar***“Impact of Electrochemical Interfaces on Electrode Electrochemistry”*****Chunmei Ban, PhD***Associate Professor
CU Boulder, Boulder CO*

Abstract: Electrochemical reactions including (de)lithiation—which enables rechargeable lithium-ion batteries—begin when electrons and ions meet at the surface/interface between an electrode and an electrolyte, however knowledge about surface and the electrode-electrolyte interface is accumulated at the last, largely dependent the availability and capability of in-situ nondestructive and surface-sensitive characterization techniques. Understanding the effect of electrochemical interfaces on electrode electrochemistry is of great importance in designing stable surface against electrolyte attacks, enabling all-solid-state batteries with metallic anodes, and developing new electrode materials with high energy and power density. Equally important is the ability to engineer surface/interface structure and modify their properties, which requires self-limiting atomic manufacturing and synthesis for electrode surface. This presentation will focus on the study of electrochemical interfaces by using recently developed spectroscopic and electrochemical techniques. Data from these in-situ and ex-situ techniques have provided important insight into the composition, structure and properties of electrochemical interfaces, which helps better understanding the impact of surface and interface electrochemistry on electrode electrochemistry. A variety of electrode-electrolyte systems will be discussed, including the silicon-carbonate electrolyte interface, the lithium metal-sulfide solid electrolyte interface and the lithium-ion cathode-carbonate electrolyte interface. At the end, promising surface engineering and modification methods will be introduced in order to facilitate electron transfer and mass transport at electrode and electrolyte interface for reversible and durable rechargeable batteries.

Educational Development: Effort in recruiting diverse students participating STEM research project and help undergraduate and graduate students develop their careers in STEM areas.

Biosketch: Chunmei Ban is an Associate Professor at the Paul M. Rady Department of Mechanical Engineering and also affiliated with Materials Science and Engineering Program at University of Colorado Boulder. Previously, Ban was a Senior Scientist in the Materials and Chemical Science & Technology Directorate at National Renewable Energy Laboratory (NREL). Ban has more than 10 years of experience working on developing next-generation, high-energy electrochemical materials including silicon, metal oxides and phosphates cathodes, multivalent anodes and organic radical materials. Her research on the surface-modification techniques has been successfully applied for stabilizing surface and interface of materials and has been granted multiple patents. Since 2010, Ban has been a principal investigator and has led DOE-awarded projects in high-energy cathodes, intermetallic anodes and direct recycling process for battery materials. Ban received a bachelor's and master's degree from the Department of Chemical Engineering from Tianjin University, China and holds a PhD in Chemistry from the State University of New York at Binghamton, supervised by Prof. M Stanley Whittingham.

Register to receive a zoom link the day of the seminar:

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