Contribution ID: 294 Type: Oral

Peering into Batteries: Electrochemical Insight through Operando Methods

Thursday, 19 November 2020 09:30 (1 hour)

Esther S. Takeuchi
William and Jane Knapp Chair of Energy and the Environment
Stony Brook University
Chief Scientist and Chair
Brookhaven National Laboratory

Abstract

Emerging new applications such as electric vehicles and integration of renewable energy demand expanded function of batteries. However, complex phase transitions of electroactive materials, kinetics of ion transport, and electrode-electrolyte interfacial reactions, still limit the full understanding of functional and degradation mechanisms. To date, many interrogation approaches of batteries are static, unable to track mechanisms arising from dynamic battery (dis)charge behavior. Emerging in situ and operando characterization methodologies focused on multiple size domains and time scales are becoming a powerful approach to resolve existing limitations of material and battery design and provide insights for future directions. A series of illustrative examples of in situ and operando characterization over atomic, crystallite/particle, electrode, and battery system length scales will be provided for lithium based batteries as well as those beyond lithium ion. The use of multiple synergistic methods to gain further insight will also be highlighted.

Primary author: Prof. TAKEUCHI, Esther

Presenter: Prof. TAKEUCHI, Esther

Session Classification: Plenary 1: Prof. Esther Takeuchi, Stony Brook University