Research Seminar

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“Developing Multi-Dimensional Transmission Electron Microscopy to Measure Materials’ Dynamics in their Native Environments”

Abstract

In-situ environmental TEM (ETEM) is a rapidly evolving area and has experienced impressive developments in imaging nanomaterials’ transformation in response to the change of environments over the past years due to the availability of dedicated environmental TEMs and holder-based systems. With the tremendous progress made on the sample environment side, the throughput of analytical scanning TEM (STEM) imaging and spatially resolved spectroscopic imaging becomes a major bottleneck for various applications where real-time 2D and 3D elemental and chemical information is highly needed. Here, in this talk, I will present the latest advances in the field and show how to integrate them to improve the understanding of the degradation mechanism of lithium-rich layered oxides, which is a class of high-capacity layered cathode materials that can meet the high energy density demand of electric vehicle batteries. I will also showcase the development of in-situ liquid cell electron microscopy and its application in the investigation of metal deposition mechanisms in metal-anode batteries. At the end of the talk, I will present some of the newly developed 3D imaging methods for investigating electrode/electrolyte interfaces, such as low-dose cryogenic electron tomography, and share my visions for how to utilize them to solve material sciences problems.

Biography

Ruoqian Lin obtained her B.S. in Pharmaceutical Engineering in China. After that, she joined Stony Brook University and received training in TEM, energy storage, and synchrotron X-ray techniques. After receiving her Ph.D. in 2018, she has been a postdoc working closely with the Battery500 Consortium which is DOE’s flagship program on lithium ion battery. This program supports more than 20 top battery scientists including two Nobel Laureates. She has been well recognized by both the battery and the EM community. She received the Battery500 Young Investigator Award in 2019, the Presidential Student Award from the Microscopy Society of America in 2016, and the Best Poster Award from the Battery500 Consortium in 2018.