In Situ Multimodal Characterization of Lithium/Sodium Ion Batteries by Using Electrochemical Liquid Cell

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Rechargeable Li or Na ion batteries have an unmatchable combination of high energy and power density, making it the perfect energy storage of choice for portable electronics, power tools, and hybrid/full electric vehicles. The development of electrochemical liquid cell visualization method sheds lights on strategies of addressing batteries failures, improving batteries design and also enabling the next generation energy storage systems. In this poster presentation, we are interested in failure mechanism study of Lithium/Sodium Ion Batteries at relevant length scale utilizing imaging and spectroscopy protocols. By developing a home-made electrochemical liquid cell TEM, we can directly vapture the dynamic electrochemical lithiation and delithiation of electrode in a commercial LiPF6/EC/DEC electrolyte, such as lithium metal dendritic growth, electrolyte decomposition, and solid-electrolyte interface (SEI) formation. This is a really useful technique in the battery field because it opened a venue by which to look inside the electrochemistry at unprecedented level, and thus improve electrode design for reducing short circuit failure and improving the performance of lithium/Sodium ion batteries.