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Soft X-ray Spectroscopy for Understanding the Cycling Mechanism of Novel Lithium-ion Batteries RUIMIN QIAO, ROBERT KOSTECKI, Lawrence Berkeley Natl Lab, IVAN LUCAS, Sorbonne Universités, KRISTIN PERSSON, WEI CHEN, Lawrence Berkeley Natl Lab, HONG LI, RUI WANG, Institute of Physics, Chinese Academy of Sciences, WANLI YANG, Lawrence Berkeley Natl Lab — Energy and environment are two major concerns of the modern world. Transition to the sustainable clean energy globally in the future, however, depends on the development of next generation electrical energy storage systems. Among the energy storage techniques considered at present, rechargeable lithium-ion batteries, which are ubiquitous in today's portable electronic devices and now enable the electric vehicles, remain promising to facilitate the use of renewable energy on a large scale. For such application, transformational changes in battery technologies are critically needed, which require a fundamental understanding of the complex, interrelated physical and chemical processes between electrode materials and electrolytes Soft x-ray absorption spectroscopy(sXAS) is a powerful tool to probe the chemical species and the electronic states with elemental sensitivity. This presentation will discuss examples on using sXAS to study battery materials for both fundamental understanding and practical developments. We will showcase how sXAS fingerprints the battery operation by detecting the evolving electron states. Recent results on SEIs and Li-rich cathode materials will be discussed. Our results offer important information for improving Li batteries.

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