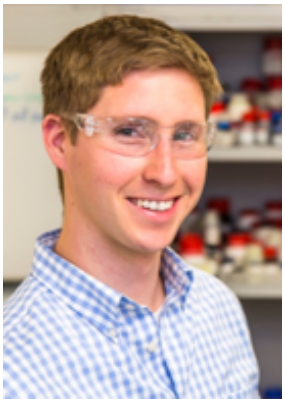
Atomic and Electronic Structure of Complex Metal Oxides during Electrochemical Reaction with Lithium

Abstract

What if we could charge our phones, laptops, electric cars in the time it takes to read this abstract? In this talk, I will explore some complex oxides that are capable of high power and fast charging as lithium-ion battery electrodes and the structural mechanisms that enable rapid lithium transport and cycling stability. Significant atomic and electronic changes occur over several spatiotemporal orders-of-magnitude during battery operation, which require a wide-range of tools to characterise. Herein, the structural chemistry and electrochemical evolution is investigated with local probes (multinuclear solid-state NMR, XANES, EXAFS) and average-structure techniques (X-ray and neutron diffraction) with the goal of understanding fundamental mechanisms that can lead to improved material performance and may also be applicable to new materials discovery. A combination of high-resolution and in situ experimental methods is employed, as well as ab initio calculations and numerical simulations to enable a more detailed understanding of NMR spectra and local coordination environments.

Bio

From 2009–2013, Kent studied chemistry at Indiana University and began his research career in electrochemistry, mineralogy, and analytical chemistry. On a Churchill Scholarship, he moved to the United Kingdom where he recently completed his PhD at the University of Cambridge with Professor Clare Grey, FRS. At Cambridge, Kent focused on understanding the mechanisms of composition–structure–property relationships of high-rate electrochemical energy storage, with a later emphasis on the extension of these principles to new battery materials discovery.



Kent J. Griffith
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Thursday, March 22, 2018
Ryan Hall, Room 4003
2:00 p.m. - 3:00 p.m.