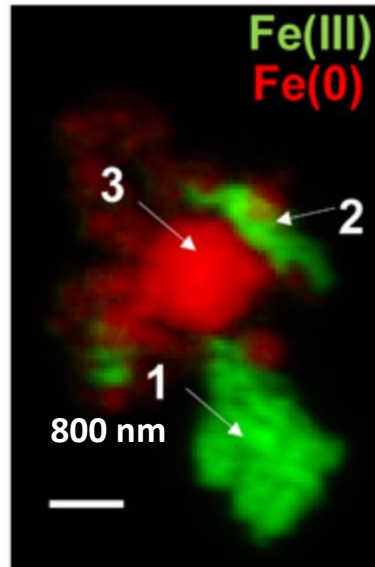
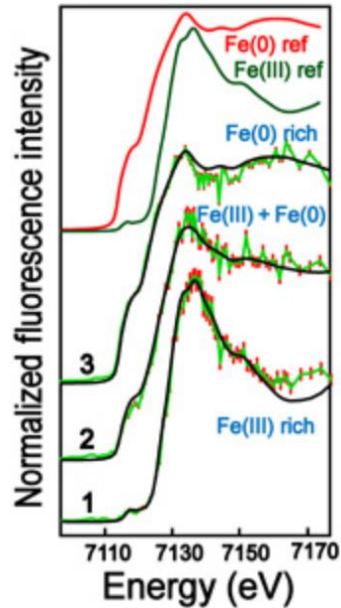


Chemical Imaging with Unprecedented Nanoscale Resolution



This image shows how different iron species are distributed within one battery particle using high resolution x-ray imaging at the nanoscale.

A. Pattammattel, R. Tappero, M. Ge, Y. S. Chu, X. Huang, Y. Gao, H. Yan, *Sci. Adv.* **6** : 37, eabb3615 (2020).

Work was performed in part at Brookhaven National Laboratory

Scientific Achievement

Scientists demonstrated spectroscopic chemical imaging at unprecedented nanoscale resolution.

Significance and Impact

Understanding chemical interplay at the nanoscale in materials such as batteries and microchips allows for faster development of new technologies; this work demonstrates the ability to resolve the chemical structure of such materials with high sensitivity and <50 nm spatial resolution.

Research Details

- Studies combined fluorescence-yield x-ray absorption near-edge structure (XANES) spectroscopy with a hard x-ray nanoprobe to achieve the nanoscale chemical imaging at the HXN beamline at NSLS-II.
- Scientists applied the method to study lithium-ion battery particles (Li_xFePO_4) and revealed the morphology change of the trace iron-phosphide phase in pristine and partially (de)lithiated samples.