

# For Better Li-ion Batteries, Scientists Watch One at Work

## Scientific Achievement

Observed changing chemical phase and structure of a common lithium-ion battery anode material, copper oxide (CuO), as the battery is cycled (charged and discharged)

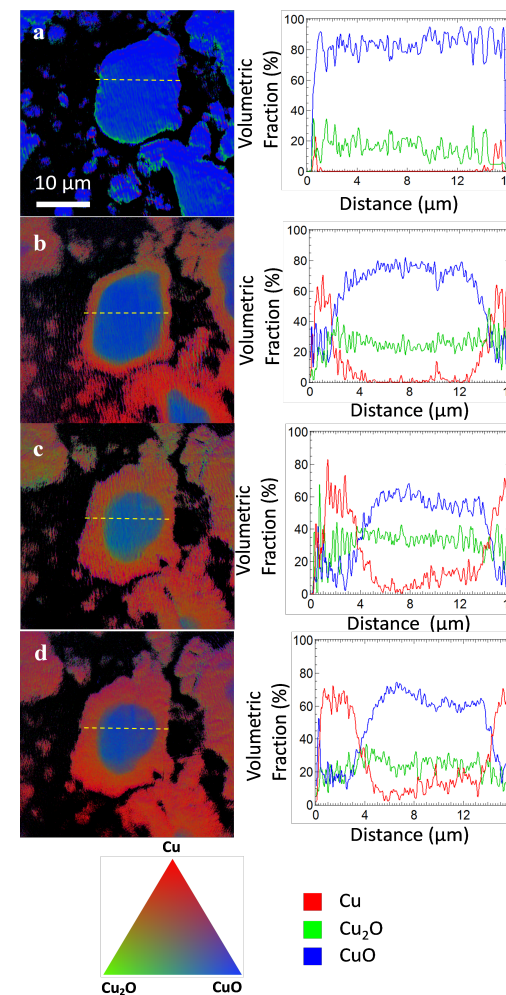
## Significance and Impact

Information on the electrochemical reaction that takes place can be used to design better electrode materials for Li-ion batteries, which power many consumer electronics

## Research Details

- CuO anode, in the form of particles with core-shell structures, was studied with a new technique, transmission x-ray microscopy, and a conventional x-ray absorption technique.
- Data yielded distributions of chemical phase changes and chemical composition percentages of  $\text{Cu}_2\text{O}$ , CuO, and Cu phases as Li ions are incorporated and extracted. Data also show particle shape/structure changes during cycling.
- A size-dependent and core-shell charge-discharge mechanism is suggested for the electrochemical reaction.

Work was performed at Brookhaven National Laboratory  
JJ Wang, Y Chen-Weigart, and J Wang *Chem. Commun.* 2013, **49**, 6480-6482



Left column: Chemical phase mappings of a CuO anode during cycling. Right: Line profile showing the corresponding chemical changes of an anode particle.