New surface chemistry in electric vehicle batteries revealed

Scientific Achievement

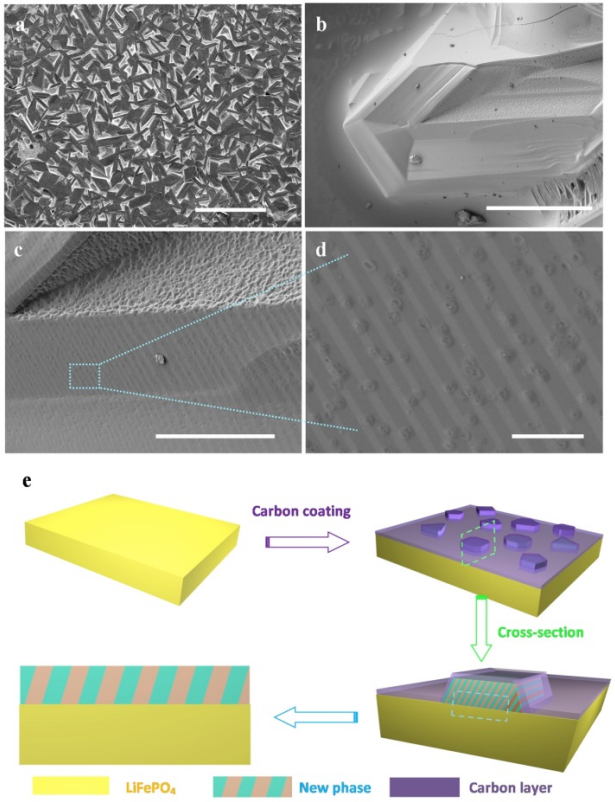
Discovered that carbon coating alters the chemistry of the interactive surface of lithium iron phosphate battery materials, resulting in a size-dependent phase change that affects conductivity and performance.

Significance and Impact

Better understanding of these materials could provide answers on how to improve electric vehicle batteries and advance their manufacturing processes and quality of batteries.

Research Details

- Found that nanoscale particles exhibit extremely high stability, whereas micron-scale particles display a drastic surface melt and surface change, creating micron-sized faults in the battery materials and decreasing performance.
- Using hard x-ray spectroscopic imaging and nanotomography at beamline X8C at the National Synchrotron Light Source, they confirmed that the surface of $LiFePO_4$ battery materials melt during the high-temperature process, leading to the phase change.



Surface new-phase formation. (a-d) Scanning Electron Microscope image of surface phase formation on $LiFePO_4$ after carbon coating. (e) Schematic representation of surface phase formation on $LiFePO_4$. Scale bar 1 mm (a), 500 µm (b), 100 µm (c) and 1 µm (d).

J. Wang, J. Yang, Y. Tang, J. Liu, Y. Zhang, G. Liang, M. Gauthier, Y.K. Chen-Wiegart, M.N. Banis, X. Li, R. Li, J. Wang, T.K. Sham, X. Sun. *Nature Communications* (2014) **5:** 3415.

Work was performed at Brookhaven National Laboratory and Western University, Canada.