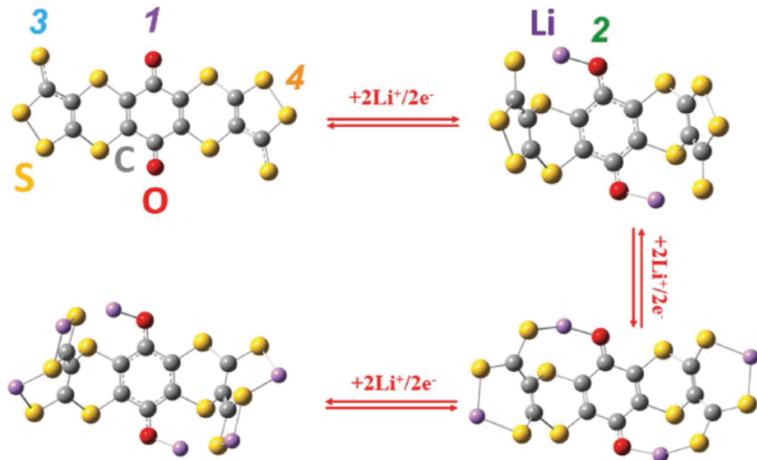


Organic Cathode for High Performance Lithium Batteries



The image shows the structural evolution of the new organic battery electrode during the lithiation process. The measurements and calculations suggest that the process has three stages, in which Li₂, Li₄ and Li₆ are formed sequentially (shown clockwise in the figure).

Z. Shadike, H.-S. Lee, C. Tian, K. Sun, L. Song, E. Hu, I. Waluyo, A. Hunt, S. Ghose, Y. Hu, J. Zhou, J. Wang, P. Northrup, S.-M. Bak, X.-Q. Yang, *Adv. Energy Mater.* 1900705 (2019).

Work was performed in part at Brookhaven National Laboratory

Scientific Achievement

Scientists designed a new, energy-dense, cost-effective, environmentally friendly, organic cathode material for lithium batteries.

Significance and Impact

The demand for lithium batteries in everyday life is rising; therefore new, optimized battery materials are needed.

Research Details

- Battery material design is based on an organodisulfide compound containing carbon, hydrogen, sulfur, and oxygen, which is free of toxic heavy metals.
- Organic components stabilize the sulfur during (dis)charging cycles by preventing side reactions.
- Investigation of the electronic structure at the NSLS-II IOS beamline showed that the carbonyl group improves the capacity of the cathode.
- The structure of the material was confirmed by using the NSLS-II IOS, TES, and XPD beamlines along with the SXRMB beamline at the Canadian Light Source.