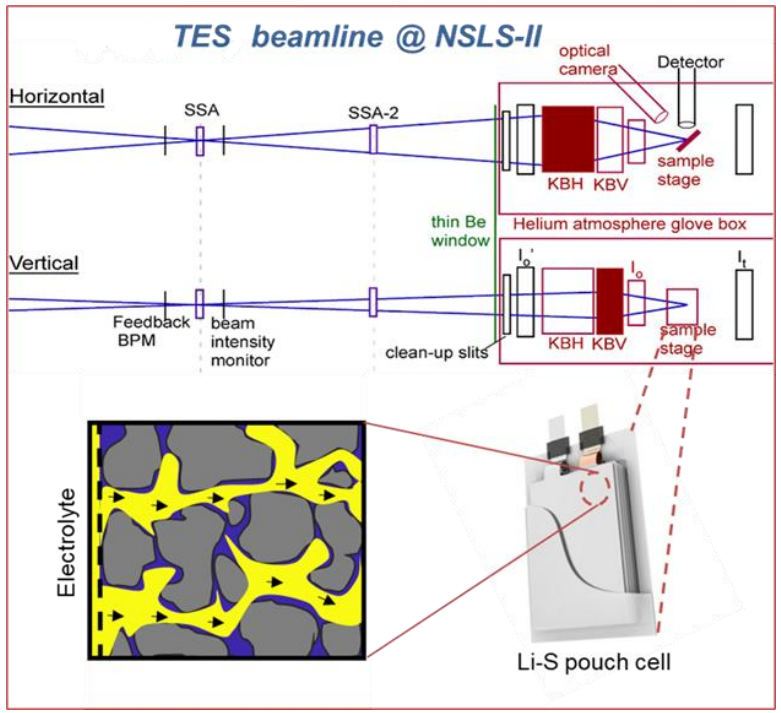
Understanding Critical Failure in Li-S Pouch Cells



The schematics depict the reaction heterogeneity of high-mass-loading sulfur electrode in practical Li-S pouch cells.

Scientific Achievement

Scientists used state-of-the-art characterization tools to discover the reason for the catastrophic failure of a high-energy lithium-sulfur (Li-S) pouch cell and proposed stabilization strategies.

Significance and Impact

Li-S batteries are a promising, sustainable energy storage technology; however, their current limitations are not well understood. This work offers new insights into Li-S battery limitations for scalable applications.

Research Details

- First pouch cell level characterization of the distribution of the chemical species.
- Used characterization methods, incl. x-ray studies at the TES beamline at NSLS-II & fluid-flow simulations to reveal the failure mechanism during cycling.
- Attributed failure to uneven sulfur/polysulfide reactions and electrolyte depletion.
- Revealed that the uneven reactions stem from low electrolyte diffusion.

L. Shi, S.-M. Bak, Z. Shadike, C. Wang, C. Niu, P. Northrup, H. Lee, A. Y. Baranovskiy, C. S. Anderson, J. Qin, S. Feng, X. Ren, D. Liu, X.-Q. Yang, F. Gao, D. Lu, J. Xiao, J. Liu. *Energy Environ. Sci.* **13** (10), 3620-3632 (2020).

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