

Cesium-Based Additive Leads to More Stable Lithium Metal Batteries

5-ID

SRX

7-BM

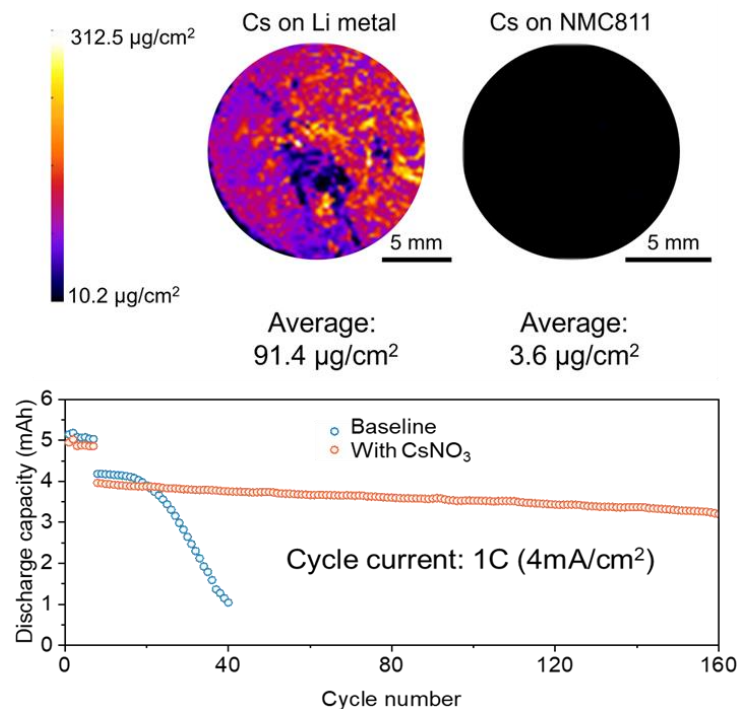
QAS

23-ID-2

IOS

28-ID-2

XPD



Scientific Achievement

Researchers used cesium nitrate (CsNO_3) to stabilize the electrodes of lithium (Li) metal batteries.

Significance and Impact

Cesium additives may be a key to achieving longer-lasting Li metal batteries with improved charging properties.

Research Details

- When CsNO_3 was added to the battery electrolyte, stable, protective "interphase" layers formed on the electrode surfaces.
- The positive electrode is protected by a chemical species derived from the nitrate; the negative electrode gains an interphase dominated by a Cs species not seen before in these batteries.
- Battery performance was studied at the SRX, QAS, IOS, and XPD beamlines at NSLS-II, displaying stability over 200 charging cycles, even under fast charging conditions.

Top: X-ray fluorescence images showing the distribution of Cs species on the surface of NMC811 (positive electrode) and Li metal after 200 cycles in the electrolyte containing the CsNO_3 additive. Bottom: Comparison of cycling performance with and without CsNO_3 additive.

Rahman, M.M., Tan, S., Yang, Y., Zhong, H., Ghose, S., Waluyo, I., Hunt, A., Ma, L., Yang, X., Hu, E. *Nat Commun* **14**, 8414 (2023).

Work performed in part at NSLS-II

National Synchrotron Light Source II