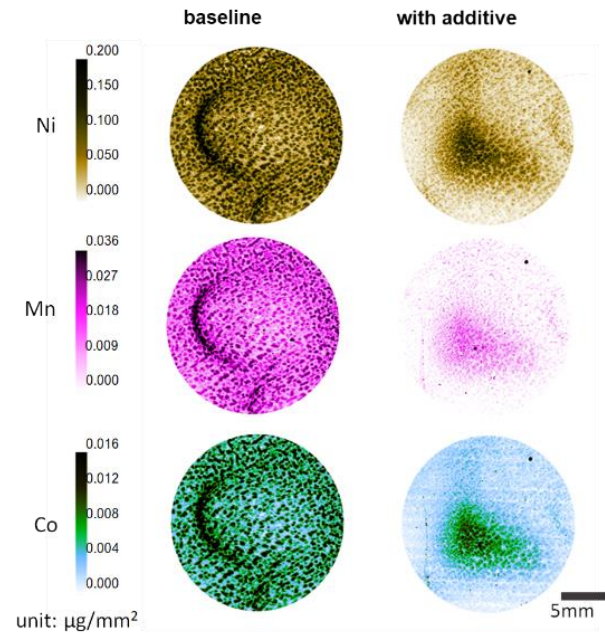


Added Robust Interphase Stabilizes Promising Cathode Material



The image shows the different elements that can be found in the interphase and how they are distributed.

S. Tan, Z. Shadike, J. Li, X. Wang, Y. Yang, R. Lin, A. Cresce, J. Hu, A. Hunt, I. Waluyo, L. Ma, F. Monaco, P. Cloetens, J. Xiao, Y. Liu, X.-Q. Yang, K. Xu, E. Hu. *Nat Energy* 7 (6), 484-494 (2022).

This work was performed at the National Synchrotron Light Source II (NSLS-II).

Scientific Achievement

Scientists demonstrated that adding lithium difluorophosphate (LiDFP) to nickel-rich layered cathode materials (NMC) mitigates cathode degeneration effectively during high voltage cycling, retaining a charge of 97% after 200 cycles (baseline of 77.3%).

Significance and Impact

NMCs are promising next-generation battery materials; however, their practical capacities are far less than the theoretical values due to their structural instability during cycling, especially when charged at high voltages.

Research Details

- Showed the creation of a robust interphase that mitigates strain and cracks as well as metal dissolution on the cathode.
- Interphase is created by adding lithium difluorophosphate.
- Studied the interphase formation and properties using a multimodal approach involving four beamlines at NSLS-II: IOS, QAS, SRX, XPD.
- Machine learning-assisted analysis quantified morphological changes in thousands of particles.