

Abstract Submitted
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Non-Destructive Measurement of *in-operando* Lithium Concentration in Batteries via X-Ray Compton Scattering HASNAIN HAFIZ, Northeastern U., K. SUZUKI, Gunma U., B. BARBIELLINI, Northeastern U., Y. ORIKASA, Kyoto U., S. KAPRZYK, Northeastern U. and AGH U. of Sc. and Tech., M. ITOU, JASRI, K. YAMAMOTO, Kyoto U., Y. J. WANG, Northeastern U. and LBNL, Y. UCHIMOTO, Kyoto U., A. BANSIL, Northeastern U., Y. SAKURAI, JASRI, H. SAKURAI, Gunma U. — Non-destructive determination of lithium distribution in a working battery is key for addressing both efficiency and safety issues. Although various techniques have been developed to map the lithium distribution in electrodes, these methods are mostly applicable to test cells. Here we propose the use of high-energy x-ray Compton scattering spectroscopy to measure the local lithium concentration in closed electrochemical cells. A combination of experimental measurements and parallel first-principles computations is used to show that the shape parameter S of the Compton profile is linearly proportional to lithium concentration and thus provides a viable descriptor for this important quantity. The merits and applicability of our method are demonstrated with illustrative examples of $Li_xMn_2O_4$ cathodes and a working commercial lithium coin battery CR2032.

Hasnain Hafiz
Northeastern University

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