From Cathode to Anode — An adventure of the elemental studies

Luxi Li[1*], Han Gao[2], Zonghai Chen[2], Xiang Liu[2], Tongchao Liu[2], Guiliang Xu[2], Feng Lin[3], Olga Antipova[1]
[1]*Advanced Photon Source, Argonne National Laboratory, 9700 S Cass Ave, Lemont IL 60439;*
[2]*Chemical Sciences and Engineering, Argonne National Laboratory, 9700 S Cass Ave, Lemont IL 60439;*
[3]*Department of Chemistry, Virginia Tech, 1040 Drillfield Drive, Blacksburg, VA 24061.*

The Scanning-probe X-ray Fluorescence Microscopy has been an indispensable and nondestructive method to measure the sample elemental information in both 2D and 3D fashion. Combining with the energy-dispersive detection, it enables researchers to quantify elements with atomic numbers higher than 12, and it's highly sensitive to trace elements. In rechargeable lithium ion batteries, the majority of the commonly used transition metals, such as nickel, cobalt, manganese and the doped trace elements for example, aluminum, titanium and lanthanum, falls into the X-ray fluorescence (XRF) detection regime. In this presentation, I will explore the applications of XRF in 1) the post-mortem studies of the transition metal deposition on the anode materials to understand the connection between transition metal dissolution and the capacity loss in the cyclic process, 2) the characterization of the engineered cathode laminate and 3) the composition determination of core-shell and concentration-gradient cathode particles with XRF tomography.