

Supervised and Unsupervised Scientific Big Data Mining in Nanoscale Spectro-Microscopic Study of Operating Battery

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The in-depth understanding of the minority phases' roles in functional materials, e.g. batteries, is critical for optimizing the system performance and the operational efficiency. Although the visualization of battery electrode under operating conditions has been demonstrated, the development of advanced data-mining approaches is still needed in order to identify minority phases and to understand their functionality. We performed unsupervised data mining on large scale spectro-microscopic data that covers more than 100 unique particles in the LiCoO₂ battery cell. Unanticipated metallic Co particle was identified after the high rate cycling of the cell. Our finding suggests that Co dissolution and precipitation is a vital mechanism that affects the overall performance of the battery cell.