

Extracting QA Metrics from Cylindrical Cell Tomograms

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As global electrification accelerates, the demand for high-performance, energy-dense batteries continues to rise. However, ensuring consistent battery quality remains a significant challenge, as even micron-scale variations can impact performance, lifespan, and safety. X-ray Computed Tomography (XCT) is a powerful non-destructive imaging technique that enables detailed structural analysis, offering a promising solution for advanced battery quality assessment.

In this work, we present automated image analysis methods for extracting key quality assurance (QA) metrics from tomograms of cylindrical battery cells. Specifically, we demonstrate how: (1) the eccentricity and core circularity of the battery jelly roll can serve as indicators of defects such as cathode buckling, (2) electrode overhang defects can be detected and quantified, and (3) large-scale XCT datasets can be leveraged for statistical quality analysis. Our findings highlight the potential of XCT-driven image analysis to enhance manufacturing consistency and improve the reliability of next-generation batteries.