ABSTRACT - ORAL

Next generation cathode materials: optimization of the solution-based synthesis of Mn-based disordered rock salts (DRX) for enhanced batteries

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Abstract

Mn-based disordered rock salts (DRX) have the potential to replace current Ni and Co-based cathode materials, given their high energy density as well as the cheap and abundant source of precursors, enhancing sustainability in lithium-ion batteries (LIB). Its commercialization is impeded by detrimental short-range order (SRO) at the atomic level, which disrupts lithium percolation channels and reduces battery performance. SRO is promoted by high-temperature synthesis. Here we present a novel solution-based synthesis protocol to produce metastable Li1.2Ti0.4Mn0.4O2 DRX, opening the door to more sustainable DRX positive electrode materials for LIB. Using XRD diffraction, atomistic simulations, and cell-cycle stability tests, we investigate the material's atomic structure and battery performance.