IN SITU SYNCHROTRON PXRD STUDIES OF THE FORMATION OF $LiCoO_2$ FROM CoOOH AND LiOH UNDER HYDROTHERMAL CONDITIONS.

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Abstract

Lithium cobalt oxide, $LiCoO_2$, is an important cathode material for Li-ion batteries. The cathodic properties are dependent of the $LiCoO_2$-particles size, and use of nanoparticles is a way to optimize the properties of the material. Thus, control of the particle size is of great interest.

In situ synchrotron PXDR has been used to study the synthesis of $LiCoO_2$ nanoparticles from CoOOH and LiOH under hydrothermal conditions. The reaction was studied in both near- and supercritical media, and investigations on the effect of the LiOH concentration were also done. The data have been treated by sequential Rietveld refinement from which information on the reaction rate, unit cell, particle size and morphology can be extracted. The results indicate that the reaction proceeds by a dissolution-recrystallization mechanism; $LiCoO_2$ is formed and grows as CoOOH is dissolved. The rate of the reaction is highly dependent on both temperature and LiOH concentration. Thus, particle size can be controlled by adjusting these parameters.