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Electrical Properties of Co-Doped LiFePO4 Nanomaterial by Impedance Spectroscopy Technique

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The ever-growing public and now commercial sentiment supporting the widespread adoption of low and zero-emission vehicles, it is unsurprising those Li-ion batteries which currently assume the bulk of the cost of electrified vehicles. The main challenge is obtaining cathode material with high energy density, high safety, low cost, environment friendly and long cycle life. Lithium iron phosphate (LiFePO4, LFP) has proved itself to meet these requirements. However, the key limitation has been extremely low electronic conductivity, until now believed to be intrinsic to this family of compounds. Cation doping is one of the most promising methods in improving conductivity of this material. Here, we study the electrical properties of Co-doped LFP samples synthesized by solid state reaction. The phase composition was identified by X-ray diffraction confirming the single phase of LFP. The unit cell volume of LFP obtained by Rietveld refinement method shows that it decreases with increasing Co contents. The electric properties of the samples were measured as a function of temperature and doping content by Impedance spectroscopy technique. The conductivity of LFP sample is dependent on Co doping level.

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