

Synthesis and Electrochemical Properties of $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ Cathode Materials for Lithium-Ion Battery

주서희, 김동원*
한양대학교 화학공학과
(dongwonkim@hanyang.ac.kr*)

Recently, many research groups have reported that transition metal-substituted spinel materials ($\text{LiMn}_{2-x}\text{M}_x\text{O}_4$, $\text{M} = \text{Cr, Co, Fe, Ni}$) showed a higher voltage plateau at around 5V. Among them, $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ especially has good electrode performance. $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ cathodes usually exhibit two plateaus around 4.3V and 4.7V, corresponding to the redox reactions of $\text{Mn}^{3+}/\text{Mn}^{4+}$ and $\text{Ni}^{2+}/\text{Ni}^{4+}$ redox couples, respectively. Co-precipitation method is a simple route to prepare fine, well-crystallized, high purity and homogeneous powders of single or multi-component oxide. In this study, the nanorod shaped $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ cathode powders were prepared by co-precipitation method with oxalic acid. Oxalic acid was added into the solution to control the morphologies of $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ cathode powders. In addition, the use of oxalic acid further improved the electrochemical properties. The effects of the ratios of oxalic acid to metal on the characteristics of $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ cathode powders prepared by co-precipitation are investigated. The structure and electrochemical properties of this cathode powders were characterized by XRD, SEM, and charge-discharge test.