

Influence of Complexing Agents on the Structure and Electrochemical Properties of $\text{LiNi}_{0.80}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ Cathode Synthesized by Sol-Gel Method: a Comparative Study

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A comparative study refers to textural and electrochemical properties of different Li-ion battery $\text{LiNi}_{0.80}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ cathode materials (denoted as NCA; being prepared by the sol-gel method using EDTA, glycine and citric acid as complexing agents) have been reported in this work. The textural properties of the as-prepared samples were characterized by scanning electron microscopy (SEM), transmission electron microscopy (TEM) and powder X-ray diffraction (XRD). Characterization results display that the resultant NCA-EDTA cathode shows the best structural integrity, the best layer structure, and the largest lattice spacing. The initial discharge capacity of the NCA-EDTA electrode synthesized by using EDTA as complexing agents is much larger than those for NCA-glycine and NCA-citric acid. Meanwhile, the resultant NCA-EDTA cathode also exhibits more excellent cycle ability than those of NCA-glycine and NCA-citric acid. In addition, compared with NCA-glycine and NCA-citric acid samples, the NCA-EDTA still shows the largest Li^+ diffusion coefficient. All these advantages related to the electrochemistry may come down to the structural advantages of the NCA-EDTA under the assistant of EDTA in the synthesis processes.

Keywords: $\text{LiNi}_{0.80}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$; citric acid; EDTA; glycine; the comparative study

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