A Comparative Study of Synthesis Processes for $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ Cathode Material

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This work explores the preparation of $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$, a high voltage cathode material, using the rheological route and two conventional liquid-phase methods. The microstructure of the as-prepared powder materials and the electrochemical performances of $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ electrodes are characterized by X-ray diffraction, scanning electron microscopy and electrochemical tests. Although the samples were synthesized through similar methods, the resulting electrochemical properties are quite different. The $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ material synthesized via the rheological method not only shows a good cycle performance, but also exhibits the highest discharge capacity of 146.2 mAh g^{-1} . This is mainly ascribed to the combination of solvents in the rheological process which speed up the dispersion and improve the mixability of the precursors, thus inducing the formation of small and uniform electrode particles.

Keywords: Lithium-ion battery, rheological method, cathode material, electrochemical property

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