

Electrode Materials for Energy Storage and Conversion.

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Current status and trends in spinel cathode materials for lithium-ion battery

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Abstract

Lithium-ion batteries (LIBs) are the most suitable and preferred energy storage system for powering electric vehicles (EVs), plug-in hybrid electric vehicles (PHEVs), and stationary applications owing to their attractive properties including high-energy efficiency, lack of memory effect, long cycle life, high energy density, and high power density. The spinel structured LiMn_2O_4 (LMO) and $\text{LiMn}_{1.5}\text{Ni}_{0.5}\text{O}_4$ (LMNO) are particularly attracting research interest among various cathode materials for LIBs because of they being cheap, safe, and rich in resources. These extensively researched spinel LMO and LMNO cathode materials are considered as cathode materials for storage application; however, currently the approach is to control the crystallinity and design morphology to enhance the specific capacity and cyclic stability. Particularly, the porous microsphere is a preferred structure, which shows enhanced electrochemical performance. Therefore, this chapter explores the detailed review of the advances and fundamental electrochemical mechanism of the spinel LMO and LMNO cathodes for LIBs. The relevant research findings related to the mentioned spinel LMO and LMNO cathode materials as well as the research trends are summarized.