Effect of Zn-doping on the Electrochemical Performance of NaFePO₄/C Cathode Material for Lithium Ion Battery

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In this study, we adopted a solid-state method to prepare maricite-NaFePO₄ compound cathode material that doped by Zn and coated by carbon. Using XRD and TEM measured the microstructures and surface topography of the material. The results show that the products are crystal structure of NaFePO₄, and NaFe_{1-x}Zn_xPO₄/C particles with the size of 400-700 nm are coated by 2-3 nm carbon. Electrochemical tests show that the cycling performance and rate capacity of NaFe_{0.97}Zn_{0.03}PO₄/C composite are the best of all the materials. NaFe_{0.97}Zn_{0.03}PO₄/C demonstrated an preliminary discharge performance of 113.5 mAh·g⁻¹ (0.1 C), and retention performance kept at 92% after 50 cycles. The result showed that the discharge capacity of NaFe_{0.97}Zn_{0.03}PO₄/C still maintained 50.6 mAh·g⁻¹ (2 C). All the results proved that Zn-ion doping can effectively increase the electrochemical performance of NaFePO₄/C cathode material.

Keywords: Maricite-NaFePO₄; Electrochemical performance; Solid-state method; Cathode material

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