Synthesis of Carbon-coated LiFePO₄ Composites as a Cathode Material for Improved Electrochemical Performance

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In this work, the C@LiFePO₄ composite was successfully synthesized by a simple pyrolysis process, using ascorbic acid as the carbon source. The morphology and microstructure of the C@LiFePO₄ composite were examined by X-ray diffraction, scanning electron microscopy, and transmission electron microscopy. The electrochemical properties were evaluated by the cyclic voltammetry and electrochemical impedance spectroscopy and the rate performance. The uniform carbon coating layer could effectively improve the electrical conductivity and the reversibility of lithium-ion de-intercalation and intercalation in the LiFePO₄ particles. Compared to the pristine LiFePO₄, the C@LiFePO₄ composite displayed much better rate capability and cycling stability. The enhanced rate performance and cycling stability of the C@LiFePO₄ composite could be attributed to the better crystallinity, the improved electrical conductivity as well as the protective effect of carbon layer on LiFePO₄ structure within the crystal structure of the composite.

Keywords: Olivine LiFePO₄; Carbon coating; Pyrolysis process; Cathode materials; Electrochemical performance

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