LiFePO₄/C Composite Prepared by Coal Based Carbon Sources

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A novel carbon source which was obtained from coal has been successfully applied to prepare LiFePO₄/C composite for the first time. The LiFePO₄/C composite was characterized by X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscope (TEM), Thermal Gravimetric (TG), Raman spectra and electrochemical techniques. TG curves indicated that the coal had a high carbon-containing (32 wt. %). TEM images showed that the surface of LiFePO₄ was covered with a carbon layer of ~3 nm. The electrochemical performance was greatly improved by coating with coal based carbon source due to the enhanced electronic conductivity. It exhibited high initial capacity of 156.7 mAh/g at 0.1 C-rate and 96.5 mAh/g at 2 C-rate, which were higher than the pure LiFePO₄. The R_{ct} of the LiFePO₄/C composite and pure LiFePO₄ were 270 Ω and 450 Ω, respectively. Thus, the approach for the preparation of LiFePO₄/C composite by using coal as carbon source may open new prospects for utilization of coal in lithium ion batteries.

Keywords: Coal, Carbon, LiFePO₄/C composite, Acid treated.

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