Effect of Tween80 Surfactant on Cycle Performance of LiFePO₄/C Composites for Lithium Ion Batteries

Xiao-Hui Zhang, Hong-Qiang Wang, Feng-Hua Zheng, Qing-Yu Li*
Key Laboratory for the Chemistry and Molecular Engineering of Medicinal Resources (Ministry of Education of China), School of Chemistry and Pharmaceutical of Guangxi Normal University, Yucai Road No.15, Guilin, Guangxi, PR China
Correspondence author: Qing-Yu Li, Tel: 86-18877313663, Fax: 86-0773-5858562, E-mail: zxhui0176@163.com

The influence of carbon coating on the cycle performance of lithium iron phosphate (LFP) composite cathode material using Tween80 as carbon source for lithium-ion batteries was investigated. According to the result of Fourier transform infrared spectroscopy (FTIR) characterization, Tween80 surfactant molecules bond to the surface of LiFePO₄ and form an adsorption layer, which contributes to the formation of a homogeneous carbon layer tightly coating on the surface of cathode material particles at sintering process. The transmission electron microscopy (TEM) images show that the carbon layer around LiFePO₄ using Tween80 as carbon source still coat on the surface of particles after 200 cycles at 5 C rate, as a comparison, the carbon layer of the sample using glucose sheds. Electrochemical impedance spectroscopy (EIS) as well as charge-discharge test was carried out to investigate electrochemical performance of both the two samples, the lower charge transfer resistance ($R_t$) and the higher lithium ion diffusion coefficient of LiFePO₄ using Tween80 exhibits excellent capacity retention, which gives a decline of only 4.6% and 8.6% of the initial discharge specific capacity after 100 and 200 cycles times respectively at 5 C rate.

References