Graphene enhanced LiFeBO₃/C composites as cathodes for Li-ion batteries

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doi: 10.20964/2018.02.52

Received: 27 October 2017 / Accepted: 14 December 2017 / Published: 28 December 2017

Graphene enhanced LiFeBO₃/C composite electrodes are synthesized by a solid-state reaction. The effects of a graphene conductive additive on the LiFeBO₃/C electrodes are characterized by XRD, SEM and electrochemical tests. The results show that the electronic conductivities of the LiFeBO₃/C electrodes increase with increasing graphene content. The electronic conductivities of the LiFeBO₃/C electrodes with Super P (SP) and 5% graphene (5%GN+SP) are 5.16×10^{-3} S/cm and 1.65×10^{-2} S/cm, respectively. The lithium ion diffusion coefficient (D_{Li}) of the LiFeBO₃/C electrode with 3% graphene (3%GN+SP) is the highest at 9.85×10^{-14} cm² s⁻¹, which is much higher than that of the SP electrode (5.94×10^{-14} cm² s⁻¹). The 3%GN+SP electrode has the highest capacity of 189.6 mAh/g at 0.1 C, and its cyclic retention is 95% after 50 cycles at 1 C. The performance enhancement is mainly attributed to the moderate addition of the graphene conductor, which could improve both the electronic conductivity and ionic diffusion coefficient of the LiFeBO₃/C.

Keywords: Li-ion battery, cathode, LiFeBO₃, graphene, conductive additives

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