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Enhanced electrochemical performance in LiFePO4/graphene nanocomposite cathode material for lithium ion batteries KULWINDER DHINDSA, B. MANDAL, M.W. LIN, M. NAZRI, Wayne State University, P. VAISHNAVA, Kettering University, V. NAIK, University of Michigan-Dearborn, G.A. NAZRI, R. NAIK, Z.X. ZHOU, Wayne State University — We synthesized $LiFePO_4$/graphene nano-composite employing a sol-gel method, where graphene oxide solution was added to the $LiFePO_4$ precursors during the synthesis. Electrical measurement reveals that the addition of 10% graphene (by weight) to $LiFePO_4$ increases its conductivity by 5 orders of magnitude. SEM images of the composite show that the material consists of $LiFePO_4$ nanoparticles (with a mean particle size $\sim$ 50 nm) homogeneously mixed with graphene sheets; the latter provides a three-dimensional conducting network for Li+ ion and electron transport. A large specific capacity of 170 mAh/g was observed at a discharge rate of C/2. To further increase the conductivity and inhibit particle size growth of $LiFePO_4$ (thus to increase the rate capacity), we coated the nanoparticles with a thin carbon layer by adding 0.25M lauric acid as precursor in addition to graphene oxide during the synthesis. The respective roles of graphene and lauric-acid-induced carbon coating in the specific capacity and charge-discharge rate of the $LiFePO_4$ cathode material will be discussed.

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