Electrochemical Properties of C/Fe_3O_4 Nanoparticles as Lithium Ion Battery Anodes

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Magnetite, Fe_3O_4, is a promising anode material for lithium ion battery due to its high theoretical capacity (924 mAh/g), comparatively high electrical conductivity, low cost and low toxicity. Its application in practical lithium-ion batteries, however, is still hindered by the poor cycling performance caused by the severe aggregation and huge volume change of Fe_3O_4 particles during conversion process. We reported here the synthesis and cycle performance of carbon-treated Fe_3O_4 nanoparticle(C/Fe_3O_4) as an anode for lithium ion battery. Fe_3O_4 nanoparticles were prepared by liquid interface reaction in an beaker-autoclave. C/Fe_3O_4 samples were prepared either by vapor deposition of carbon sources or encapsulation with graphene sheets. The structure and morphology of C/Fe_3O_4 were characterized by TGA/XRD/TEM/SEM. The electrochemical properties of C/Fe_3O_4 were tested in a half cell with lithium foil as the reference electrode. Cells were galvanostatically cycled at 0.01~3.0 V Li+ /Li, and cyclic voltammograms(CVs) measurements were carried out at a scanning rate of 0.2 mV/s.