Facile Synthesis of Fe₃O₄/graphene Nanosheets with High Conductivity for Application in Supercapacitors

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doi: 10.20964/2017.03.63

Received: 20 December 2016 / *Accepted:* 19 January 2017 / *Published:* 12 February 2017

The Fe₃O₄ grafted on monolayer graphene nanosheets (Fe₃O₄/GNs) were prepared by a facile method,. The structure and conductivity of Fe₃O₄/GNs were further characterized by X-ray diffraction, Transmission electron microscope, Atomic Force Microscope, Raman spectroscopy and four probe techniques. The results indicated that the Fe₃O₄ was uniformly coated on surface of monolayer GNs with high conductivity of 88.6S/cm. Moreover, the electrode based on Fe₃O₄/GNs has been characterized by the cyclic voltammetry, galvanostatic charge/discharge and electrochemical impedance spectra. The Fe₃O₄/GNs electrode exhibited excellent specific capacitance of 248.5 F/g, which was higher than that reported in previous works. The improvement was attributed to high conductivity and double-layer capacitance of the GNs. The work not only demonstrates the controlled synthesis of high-quality Fe₃O₄/GNs at mild conditions on a large scale, but also provides a universal route for the rational design of supercapacitors with high performance.

Keywords: monolayer graphene nanosheets; Fe₃O₄; liquid-phase exfoliation; electrical conductivity; supercapacitors.

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