Electrode Characteristics and Lithiation Mechanism of FePc/GN Composites

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doi: 10.20964/2018.03.45

Received: 15 November 2017 / Accepted: 10 January 2018 / Published: 5 February 2018

Iron-phthalocyanine (FePc), a metal-organic compound containing a large π -conjugated and planar multi-ring aromatic structure, can be employed as an organic anode material for lithium-ion batteries. To overcome the poor electronic conductivity of FePc, a good electrically conductive graphene nanosheet carbon skeleton is integrated by a one-step simple mechanical mixing strategy. In addition, the weight ratio of FePc and graphene nanosheets (GNs) is systematically optimized. Electrochemical tests show that the as-prepared 1/2.25-FePc/GN composite exhibits a high reversible capacity of 872 mAh g⁻¹, the specific capacity based on iron-phthalocyanine is up to 1614 mAh g⁻¹. The excellent electrochemical performance of FePc/GN is mainly attributed to the synergistic effect of FePc (large π -conjugated structure, rich in N atoms and aromatic rings) and graphene (flexibility and good electrical conductivity).

Keywords: Iron-phthalocyanine; Energy storage; Organic electrode material; Lithium-ion batteries

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