Two-Dimensional MnO₂/reduced Graphene Oxide Nanosheet as a High-Capacity and High-Rate Cathode for Lithium-Ion Batteries

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doi: 10.20964/2018.09.60

Received: 11 June 2018 / Accepted: 10 July 2018 / Published: 5 August 2018

Two-dimensional MnO₂/rGO nanocomposite has been synthesized by a facile wet chemical method at low temperature. Ultrathin layered MnO₂ nanosheets were well-dispersed and tightly attached on the surface of reduced graphene oxide (rGO) sheets. Owing to a special laminar structure and higher electrical conductivity of rGO, the lithium ion diffusion and the electronic transport into the MnO₂/rGO nanocomposites were increased, resulting in improved electrochemical performance as a cathode material in lithium-ion batteries. The first discharge-specific capacity of the layered MnO₂/rGO nanocomposites is 279.7mAh g⁻¹ and maintains at 242mAh g⁻¹ after 60 cycles at 0.1C. And the rate capability of MnO₂/rGO nanocomposites is 236.9, 230.2, 190.3, 159.7 and 121.4mAh g⁻¹ at 0.1C, 0.2C, 0.5C, 1C and 2C, respectively. The excellent electrochemical performances highlight the two-dimensional layered MnO₂/rGO nanocomposites as a potential cathode material of lithium-ion batteries.

Keywords: two-dimensional materials; layered manganese dioxide; reduced graphene oxide; lithium-ion batteries.

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