Facile Preparation of Layered Ni(OH)₂/Graphene Composite from Expanded Graphite

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A layered Ni(OH)₂/graphene composite was firstly prepared by electrochemical deposition of nickel nanoparticles between layers of expanded graphite in Ni²⁺ containing solution, and then the deposited nickel nanoparticles were converted into Ni(OH)₂ via cyclic voltammetry in 6 M KOH electrolyte. Images of transmission electron microscopy show that Ni(OH)₂ particles are uniformly distributed on graphene sheets with an average diameter of 6 nm. The Ni(OH)₂/graphene composite with an areal loading of 5 mg cm⁻² demonstrates a maximum specific capacitance of 856 F g⁻¹ at 1 A g⁻¹, and 79 % of the specific capacitance can be retained after 2000 cycles at a current density of 10 A g⁻¹. Commercial expanded graphite is much cheaper than activated carbon and considerably much cheaper than graphene, therefore this technique is very promising for mass production of supercapacitor electrodes.

Keywords: Expanded graphite; Layered Ni(OH)₂/graphene; Electrodeposition; Supercapacitors; Nickel nanoparticle

FULL TEXT

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