

Synthesis and characterization of graphene-MnO₂ composites by microwave irradiation

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We present a rapid method to synthesize graphene-MnO₂ composites through deposition of nanoscale MnO₂ on the surface of graphene under microwave irradiation. Fabricated graphene-MnO₂ hybrid material was investigated for electrochemical behavior. A thin layer of birnessite-type MnO₂, coated around graphene was confirmed by scanning electron microscopy (SEM), transmitting electron microscopy (TEM), X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS). This thin layer of the oxide enhanced capacitance compared to bare graphene. Other electrochemical behavior shows better performance due to the synergetic effect of graphene and MnO₂. The improved electrochemical performance may be attributed to the increased electrode conductivity in the presence of graphene substrate, the increased effective interfacial area of thin MnO₂ with electrolyte.