Sonochemical assisted synthesis MnO_2 /RGO nanohybrid as effective electrode material for supercapacitor

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Sonochemical assisted synthesis MnO_2 /RGO nanohybrid as effective electrode material for supercapacitor

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Abstract

Manganese dioxide (MnO_2) needle-like nanostructures are successfully synthesized by a sonochemical method from an aqueous solution of potassium bromate and manganese sulfate. Also, hybride of MnO_2 nanoparticles wrapped with graphene oxide (GO) nanosheets are fabricated through an electrostatic coprecipitation procedure. With adjusting pH at 3.5, positive and negative charges are created on MnO_2 and on GO, respectively which can electrostatically attract to each other and coprecipitate. Then, MnO_2/GO pasted on stainless steel mesh is electrochemically reduced by applying -1.1 V to obtain MnO_2/RGO nanohybrid. The structure and morphology of the MnO_2 and MnO_2/RGO nanohybrid are examined by Raman spectroscopy, X-ray diffraction (XRD), atomic force microscopy (AFM), field emission-scanning electron microscopy (FE-SEM), energy dispersive spectroscopy (EDX), and thermal gravimetric analysis (TGA). The capacitive behaviors of MnO_2 and MnO_2/RGO active materials on stainless steel meshes are investigated by cyclic voltammetry (CV), galvanostatic charge/discharge test and electrochemical impedance spectroscopy (EIS) by a three-electrode experimental setup in an aqueous solution of 0.5 M sodium sulfate in the potential window of 0.0–1.0 V. The electrochemical investigations reveal that MnO_2/RGO exhibits high specific

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