Facile Synthesis of MnCO_3 Nanoparticles on Ni Foam for Binder-Free Supercapacitor Electrodes

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Rhombohedral MnCO_3 nanoparticles were successfully grown on nickel foam via a facile and one-pot water-bath means, wherein the hydrolyzation of urea supplied alkali and carbonate ions. The structure and morphology of the nanocomposites were investigated by XRD, FIB/SEM and elemental mapping. Microscopic investigations revealed MnCO_3 particles with mean sizes that varied from 110-255 nm. EDS mapping showed a homogeneous distribution of manganese, carbon and oxygen. The electrochemical properties of the produced composites were estimated by cyclic voltammetry (CV), galvanostatic charge-discharge (GCD) and electrochemical impedance spectroscopy (EIS) measurements using 6 M KOH as the electrolyte. The resulting electrodes displayed maximum specific capacitance (163.7 F g^{-1} at 0.5 A g^{-1}), respectable rate capability, and excellent long-term cycling life (91% retention after 1000 cycles). In addition, this manuscript offers us a simple and rapid strategy for the fabrication of electrode materials for use as energy storage devices.

Keywords: MnCO_3 ; urea hydrolysis; electrode materials; supercapacitors

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