

Controlled concentration of Mn salt for the synthesis of manganese oxide/mesoporous carbon film as potential

ABSTRACT

Manganese oxide (Mn₂O₃) mesoporous carbon (MPC) was synthesized by the incipient wetness of impregnation at room temperature and followed by calcination of 300 °C. The structure and morphology of Mn₂O₃/MPC were characterized by Fourier transform infrared (FTIR) spectrum, atomic force microscopy (AFM) and field emission scanning electron microscopy (FESEM). The electrochemical performance of synthesized composites was evaluated by cyclic voltammetry (CV), galvanostatic measurement of charge-discharge (GCD) as well as power and energy density characteristics. The specific capacitance of the composite electrode when 10 wt.% Mn salt was coated on the surface of MPC film could reach 53.59 mF cm⁻² as compared to MPC film at only 15.23 mF cm⁻². These are in good agreement with the electrochemical performance improvement results of the energy and power density recorded for Mn₂O₃/MPC, which lead to higher specific capacitance as supported by the CV and GCD results in 1 M potassium chloride (KCl) of electrolyte. This enhanced capacitance was attributed to the outstanding electric properties of MPC film as well as the faradaic redox reactions of manganese oxide as proven by FESEM and EDX analysis. The results indicate the promising application of the fabricated Mn₂O₃/MPC composite as electrodes for supercapacitors.

Keyword: Manganese oxide; Mesoporous carbon; Composite; Specific capacitance; Supercapacitor