Synthesis of NiO/Activated Carbon Composites and Their Application as Electrode Materials for Capacitors

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Electrochemical capacitor (EC) based on NiO/activated carbon (AC) composite electrodes was investigated in this work to improve its electrochemical performance. NiO/AC composites were prepared as anode, while HyperCoal-based ACs were used as cathode for EC. The composites were characterized by means of X-ray diffraction and scanning electron microscopy. The porosity of HyperCoal-based ACs was characterized by N₂ adsorption-desorption analyses. The electrochemical characterization of capacitor was examined using galvanostatic charge-discharge in 1 M and 8 M KOH electrolyte solution. The results show that NiO/AC composite electrodes exhibit a good electrochemical performance with a maximum specific capacitance (C_g) of 214.48 F g⁻¹ at the charge-discharge current density of 40 mA g⁻¹ in 1 M KOH electrolyte. Meanwhile, the C_g increases gradually with the increase of NiO content. In addition, the C_g of EC prepared in 8 M KOH aqueous is higher than that of EC prepared in 1 M KOH aqueous until the content of NiO reaches up to 55.6%.

Keywords: electrochemical capacitor, NiO, activated carbon, composite electrodes, specific capacitance.

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