FACILE SYNTHESIS OF ACTIVATED CARBON/ZINC OXIDE NANOSTRUCTURE FOR SUPERCAPACITOR APPLICATION

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ABSTRACT

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For the first time, supercapacitor has been made-up by making use of nanostructured activated carbon (AC) doped with zinc oxide (ZnO) composite electrodes. Zinc oxide nanostructure was synthesized by the sol-gel method using conventional Hexamethylenetetramine (HMTA) reagent as the reducing agent. The objective of this thesis is to prepare and characterize activated Carbon/Zinc Oxide nanostructures and to evaluate the effect of Zinc Oxide addition on the super capacitive performance of activated carbon. The composites have been characterized by X-ray diffraction analysis (XRD) and Fourier transform infrared spectroscopy (FTIR). Electrochemical properties of the prepared nanocomposite electrodes and the supercapacitor have been studied using cyclic voltammetry (CV) and AC impedance spectroscopy in 1 M H_2SO_4 electrolyte. The AC/ ZnO nanocomposite electrode showed a specific capacitance of 398 F/g at scan rate 50 mV/s. It has been establish that the AC/ZnO have excellent electrochemical reversibility and capacitive characteristics in 1 M H_2SO_4 electrolyte. It has also been observed that the specific capacitance is constant up to 100 cycles at all current densities.

TABLE OF CONTENTS

LIST OF TABLES