World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:9, No:1, 2015

Electrochemical and Photoelectrochemical Study of Polybithiophene–MnO2 Composite Films

Authors : H. Zouaoui, D. Abdi, B. Nessark, F. Habelhames, A. Bahloul

Abstract : Among the conjugated organic polymers, the polythiophenes constitute a particularly important class of conjugated polymers, which has been extensively studied for the relation between the geometrical structure and the optic and electronic properties, while the polythiophene is an intractable material. They are, furthermore, chemically and thermally stable materials, and are very attractive for exploitation of their physical properties. The polythiophenes are extensively studied due to the possibility of synthesizing low band gap materials by using substituted thiophenes as precursors. Low band gap polymers may convert visible light into electricity and some photoelectrochemical cells based on these materials have been prepared. Polythiophenes (PThs) are good candidates for polymer optoelectronic devices such as polymer solar cells (PSCs) polymer light-emitting diodes (PLEDs) field-effect transistors (FETs) electrochromics and biosensors. In this work, MnO2 has been synthesized by hydrothermal method and analyzed by infrared spectroscopy. The polybithiophene+MnO2 composite films were electrochemically prepared by cyclic voltammetry technic on a conductor glass substrate ITO (indium–tin-oxide). The composite films are characterized by cyclic voltammetry, impedance spectroscopy and photoelectrochemical analyses. The results confirmed the presence of manganese dioxide nanoparticles in the polymer layer. An application has been made by using these deposits as an electrode in a photoelectrochemical cell for measuring photocurrent tests. The composite films show a significant photocurrent intensity 80 µA.cm-2.

Keywords : polybithiophene, MnO2, photoelectrochemical cells, composite films
Conference Title : ICCIS 2015 : International Conference on Chemical Industry and Science
Conference Location : Jeddah, Saudi Arabia
Conference Dates : January 26-27, 2015