

Synthesis and Characterization of Polypyrrole-Coated Non-Conducting Cellulosic Substrate and Modified by Copper Oxide

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Abstract : The aim of this work is to synthesize modified Polypyrrole films (PPy) containing nanoparticles of copper oxides onto a non conducting cellulosic substrate. Firstly, the chemical polymerization of polypyrrole onto cellulosic substrate is carried out using FeCl₃ as an oxidant and Pyrrole as monomer. Different parameters were optimized (monomer concentration, duration of the experiment, nature of supporting electrolyte, temperature, etc.) in order to obtain films with different thickness and different morphologies. Thickness and topography of different PPy deposits were estimated by a profilometer apparatus. The electrochemical reactivity of the obtained electrodes were tested by cyclic voltammetry technique (CV) and electrochemical impedance spectroscopy (EIS). Secondly, the modification of the PPy film surface by incorporation of copper oxide nanoparticles is conducted by applying a galvanostatic procedure from CuCl₂ solution. Surface characterization has been carried out using scanning microscope (SEM) coupled with energy dispersive X-ray analysis (EDX), Fourier-transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD). The analysis showed the presence of the copper oxide nanoparticles (CuO) in the polymer films with dimensions less than 50 nm.

Keywords : polypyrrole, modified electrode, cellulosic substrate, copper oxide

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