Copper-polypyrrole composite films: Electrochemical synthesis and morphological study

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Abstract: In this study, we investigated the characteristics of composite thin films of polypyrrole (PPy) and copper (Cu) particles deposited onto indium tin oxide (ITO) substrate. The composites were synthesized using a facile two-step electrochemical process: at first, PPy films were grown in organic media by electropolymerization method under potentiodynamic control. Then, Cu particles were inserted within the polymeric matrix by reducing metal ions (Cu2+) using potentiostatic method. The surface morphology of the Cu-PPy composites was analyzed by Atomic Force Microscopy (AFM) and Scanning Electron Microscopy (SEM). It was found that the obtained composites showed a globular morphology of the PPy film with a large amount of Cu particles well-dispersed on its surface with an average particles size of about 300 to 700 nm. The four-probe measurements demonstrated an enhancement in electrical conductivity of the Cu-PPy composites compared to the pristine PPy.

Keywords: composite, Conducting Polymer, copper, Electrochemical Deposition.