

Elaboration and characterization of ITO electrode modified by transition metal dispersed into polyaniline thin films

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Abstract: This work presents the characteristics of composite materials thin films of polyaniline (PAni) and nickel (Ni) particles deposited onto indium tin oxide (ITO) substrate. The electropolymerization of aniline was performed in acidic medium by potentiodynamic methods. The nickel particles were electrochemically deposited on the surface of PAni/ITO by reducing metal ions (Ni) using a potentiostatic method from a separate solution. The effect of applied potential as well as immersing time of complexation on the amount of nickel dispersed was investigated. Different characterization techniques were employed to study the electrochemical behavior and surface characteristics of the Ni-PAni/ITO thin films such as Electrochemical Impedance Spectroscopy (EIS), Cyclic Voltammetry, Fourier Transform Infrared Spectroscopy (FTIR), UV-vis Spectroscopy, Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM). The morphology of the obtained composites shows a uniform dispersion of nickel particles onto the polyaniline matrix and reveals that the immersing times of complexation has a significant effect on the amount of incorporated particles. The impedance spectroscopy study reveals that the conductivity of the composite film increases with the amount of nickel incorporated. UV-vis and FTIR results confirm the presence of PAni and Ni particles on the electrode surface.

Keywords : polyaniline, Electro-polymerization, Nickel particles, Chronoamperometry, Materials composites