Layer by Layer Growth of Electroactive Conducting Polymer/Magnetite Hybrid Assemblies*PS. B. Endrődi, A. Bíró, C. Janaky, I. Y. Tóth, C. Visy*

SYNTHETIC METALS

Abstract

Abstract: Poly(thiophene-acetic-acid)/magnetite nanocomposite electrodes were fabricated from aqueous solutions on PDADMA (polydiallyldimethylammonium chloride) pretreated ITO covered glass electrodes, employing layer by layer (LBL) technique. This approach was selected on the ground of the interaction between the surface OH-groups of the magnetite and the carboxylic group of the thiophene derivative. The gradual development of the hybrid assembly was followed by UV-Vis spectroscopy, and was found to be continuous up to 30 bilayers. Moreover, the absorbance increase at the characteristic wavelengths was linear in the whole examined region. Importantly, the LBL-prepared composites proved to be electroactive, in aqueous phosphate buffer the Fe3+/Fe2+ redox transformation was observed. The electrocatalytic activity of the modified electrodes was demonstrated for electrooxidation of dopamine (DA), and the role of both components as well as their synergistic contribution was elucidated. Preliminary results indicate possible utilization of such hybrid assemblies in the amperometric detection of this analyte.

Keywords: magnetite, poly(3-thiophene-acetic-acid), hybrid, layer by layer, dopamine oxidation