

Immobilization of Cobalt Ions on F-Multi-Wall Carbon Nanotubes-Chitosan Thin Film: Preparation and Application for Paracetamol Detection

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Abstract : In the present study, a nanocomposite of f-MWCNTs-Chitosan was prepared by the immobilization of Co(II) transition metal through self-assembly method and used for the simultaneous voltammetric determination of paracetamol (PA). The composite material was characterized by field emission scanning electron microscopy (FESEM) and energy dispersive X-Ray analysis (EDX). The electroactivity of cobalt immobilized f-MWCNTs with excellent adsorptive polymer chitosan was assessed during the electro-oxidation of paracetamol. The resulting GCE modified f-MWCNTs/CTS-Co showed electrocatalytic activity towards the oxidation of PA. The electrochemical performances were investigated using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and differential pulse voltammetry (DPV) methods. Under favorable experimental conditions, differential pulse voltammetry showed a linear dynamic range for paracetamol solution in the range of 0.1 to 400 $\mu\text{mol L}^{-1}$ with a detection limit of 0.01 $\mu\text{mol L}^{-1}$. The proposed sensor exhibited significant selectivity for the paracetamol detection. The proposed method was successfully applied for the determination of paracetamol in commercial tablets and human serum sample.

Keywords : nanomaterials, paracetamol, electrochemical technique, multi-wall carbon nanotube

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