Fabrication of Electrochemical Sensor for Acetaminophen Based on Levodopa Polymer and Multi-walled Carbon Nanotubes Complex

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In this work, we describe the fabrication of electrochemical sensor for acetaminophen (ACOP) based on levodopa (L-Dopa) polymer and multi-walled carbon nanotubes (MWCNTs) complex modified carbon paste electrode (Poly (L-Dopa)/MWCNTs/CPE). L-Dopa Polymer and MWCNTs complex is prepared by in situ electrochemical polymeric deposition and the electrochemical polymeric deposition behavior of L-Dopa on the surface of MWCNTs was investigated by cyclic voltammetry (CV). A novel method for the determination of ACOP is developed based on a well-defined electrochemical response signal of ACOP at Poly (L-Dopa)/MWCNTs/CPE by differential pulse voltammetry (DPV). Under the optimized conditions, the value of the DPV oxidation peak current linearly depends on the concentration of ACOP in the range from 0.06 to 30 μM . The linear equation for ACOP detection is $I_{pa} (\mu\text{A}) = 0.0718c (\mu\text{M}) + 0.0307$ ($r=0.9990$) and the detection limit is 0.02 μM ($S/N=3$). The recoveries for ACOP are from 98.2% to 99.4% with relative standard deviation (RSD) between 3.9% and 4.6% in diluted serum samples.

Keywords: Acetaminophen; Levodopa; Multi-walled carbon nanotubes; Electrochemical polymeric deposition; Electrochemical sensor.

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