An Electrochemical Sensor based on conductive polymers/Graphite Paste Electrode for Simultaneous Determination of Dopamine, Uric acid and Tryptophan in Biological Samples

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A graphite paste electrode (GPE) modified with chemically synthesized Polythiophene nanostructures (PTh) was proposed for simultaneous voltammetric detection of Dopamine (DA), Uric acid (UA) and Tryptophan (Trp). The prepared electrode (PTh/GPE) showed a good improvement in catalytic activity of electrochemical oxidation DA, UA and Trp, leading to significant improves in the supposed peak currents and decreasing the peak potentials. In the calibration curve obtained from Linear sweep voltammetry it was illustrated the peak currents of DA, UA and Trp enhanced linearly with their concentration. The concentration range was found for DA, UA and Trp, 10–180 $\mu\text{mol L}^{-1}$, 6–180 $\mu\text{mol L}^{-1}$ and 6–180 $\mu\text{mol L}^{-1}$ in 0.1 M phosphate buffer solution (pH 4.0) respectively. The anodic peak height of analytes was investigated in different pH and scan rates and the optimum pH and scan rate was obtained. The LODs (S/N= 3) were 1, 0.57 and 0.61 μM for DA, UA and Trp, respectively. Consequently, the applicability of the voltammetric sensor was evaluated by simultaneous determination of DA, UA and Trp in biological samples. This present sensor showed valuable characteristics such as stability and repeatability during analytical experiments.

Keywords: Graphite paste electrode, Polythiophene nanostructures, Simultaneous determination, Electrochemical oxidation

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