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Title of Thesis: Electrochemical Biosensor Based on Nanoparticles Modified Electrodes

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Abstract :

An effective electrochemical sensor for the determination of dopamine based on carbon paste (CP) electrode modified with gold nanoparticles (GNMCPE) was introduced. The advantages of the gold nanoparticles enhanced the sensitivity of the CP-electrode significantly. In a mixture of DA, AA and UA the sensor shows high selective response towards DA and no response for AA or UA. The effect of various experimental parameters including time of deposition of gold nanoparticles on CP-electrode, pH, scan rate, accumulation time and types of electrolytes were studied to find the highest sensitivity for the determination of DA. Another promising electrochemical sensor was developed using carbon paste electrode, gold nanoparticles and Nafion (CP-electrode/Nafion modified with gold nanoparticles-[electrode (2)]). This sensor is sensitive for the determination of catecholamine compounds, in the presence of interference molecules. Simultaneous determinations of DA with 5-TH and ACOP with L-DOPA in binary mixtures were achieved with good separation. Also a highly sensitive and simple method was investigated for the determination of acetaminophen and morphine using both electrodes. Under optimized experimental conditions, their sensitivities were improved greatly. Moreover, the present method was also applied for their determination in the presence of common interferents and in binary mixture with dopamine (DA). Also the effect of various experimental parameters on the voltammetric response of TR and GSH were investigated using [electrode (2)]. At the optimum conditions, the concentration of TR and GSH was determined and the effects of common interferences on the current responses were studied. The results showed that the method was simple and sensitive enough for their determination in clinical preparations and in commercial tablet under physiological conditions with good precision.

Keywords:

Electrochemical sensor; Carbon paste electrode; Gold nanoparticles; Nafion; Catecholamine compounds.