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Examination of the Electroanalytic Performance of Carbon Nanotube (CNT) Modified Carbon Paste Electrodes as Xanthine Biosensor Transducers

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Abstract: The effect of multi-walled carbon nanotube (MWCNT) and single-wall carbon nanotube (SWCNT) on carbon paste electrode (CPE) electrochemical response was examined by introducing various portions of CNT into the CPE. The optimum electrode structure was determined by comparing the prepared electrodes´ electroanalytical performance towards ferricyanide. Then these optimum compositions were modified with xanthine oxidase (XO) enzyme for obtaining a xanthine biosensor. After the optimization of biosensor working conditions, the developed systems were characterized for xanthine. Linearity was obtained in the concentration range between 1 and 100 μ M xanthine with an RSD value of 3.35% for MWCNT-CPE, while with SWCNT-CPE these values were 1-20 μ M and 3.5%, respectively. The developed biosensors were also applied for the detection of xanthine in denatured plasma samples (MWCNT-CPE) and canned tuna fish samples (SWCNT-CPE), and very good recoveries were obtained.

Key Words: MWCNT, SWCNT, xanthine, amperometric biosensor

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