Modification of Carbon Paste Electrode with Conductive Polyglycine-nafion Composite Membrane and Multi-wall Carbon Nanotubes for the Determination of Dopamine

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In this work, a novel method was developed to fabricate modified carbon paste electrode (CPE) by a composition of conductive polyglycine-nafion membrane and multi-wall carbon nanotubes (MWCNTs) (Poly(gly)-nafion/MWCNTs/CPE). The conductive Poly(gly)-nafion composite membrane on MWCNTs/CPE was prepared by drop-coating and in situ electrochemical polymeric deposition. Electrochemical behaviors of the fabricated electrodes were studied using cyclic voltammetry (CV) and linear sweep voltammetry (LSV). Compared with the bare CPE, Poly(gly)-nafion/MWCNTs/CPE exhibited more effective electrochemical catalytic performance for the determination of dopamine (DA). The oxidation peak current of LSV increased linearly with two concentration intervals of DA over the range of 0.1-3.0 μM and 3.0-20.0 μM in BRBS with pH 5.0 at Poly(gly)-nafion/MWCNTs/CPE, and the limit of detection (LOD) was 0.03 μM (S/N=3). Finally, the proposed method was successfully applied to detect dopamine in human serum samples.

Keywords: Carbon paste electrode, Multi-walled carbon nanotubes, Polyglycine, Nafion, Dopamine

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