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Low Potential Determination of NADH at 1-Hydroxypyrene/reduced Graphene Oxide Modified Electrode

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This work presents a facile method to availably synthesize the reduced graphene oxide (rGO), which utilizes the dopamine (DA) as the reducing agent. PDA/rGO was prepared by the simultaneous reduction of GO with dopamine hydrochloride and the self-polymerization of dopamine. The surface polydopamine (PDA) film was removed by immersing in a strong alkali solution (pH>10) to obtain the pure rGO. Then 1-hydroxypyrene (1-OHP) was absorbed on the surface of rGO modified glassy carbon electrode (GCE) via π-π stacking interaction to fabricate a 1-OHP-rGo modified GCE (denoted as 1-OHP/rGO/GCE). The synergistic effect between the 1-OHP and rGO effectively reduced the oxidation over-potential of nicotinamide adenine dinucleotide (NADH), which realized the determination of NADH under relatively low potential (-0.06 V *vs.* SCE), which negatively shift 623 mV compared with that at the bare GCE. Further, the amperometric response of the modified electrode to NADH shows a linear concentration range of 100 μM to 3800 μM with the calculated limit of detection of 14.8 μM at a signal-to-noise ratio of 3. We expect that this biosensor could be used for determination of NADH in biosamples.

Keywords: nicotinamide adenine dinucleotide; graphene; biosensors; polydopamine; 1-hydroxypyrene

FULL TEXT