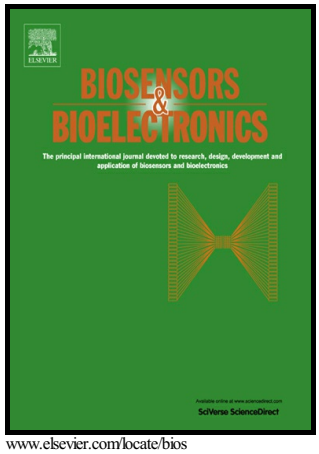

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Investigate electrochemical immunosensor of cortisol based on gold nanoparticles/magnetic functionalized reduced graphene oxide

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Abstract

A sensitively competitive electrochemical immunosensor for the detection of cortisol was successfully developed based on gold nanoparticles and magnetic functionalized reduced graphene oxide (AuNPs/MrGO). In order to construct the base of the immunosensor, the MrGO was initially fabricated by chemical cross-linking and used to modify the nafion pretreated glassy carbon electrode. Subsequently, the surface of electrode was modified by AuNPs via electrochemical deposition. A variety of cortisol (Cor) can be firmly loaded in the AuNPs/MrGO with large specific surface area and good bioactivity to construct the basic electrode (Cor/AuNPs/MrGO/Nafion@GCE), which was characterized by the cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS), respectively. Due to the cortisol on the surface of basic electrode and samples can competitively combine with the cortisol antibody labelled by horseradish peroxidase (HRP-Strept-Biotin-Ab). Finally, the detection signal of electrochemical immunosensor (HRP-Strept-Biotin-Ab-Cor/AuNPs/MrGO/Nafion@GCE) in the test liquid had negative correlations with the concentration of cortisol in samples. The AuNPs/MrGO with excellent electrical conductivity being applied, the electrochemical response of the immunosensor was immensely amplified. The immunosensor displayed excellent analytical performance for the detection of cortisol range from 0.1 to 1000 ng/mL with a detection limit of 0.05 ng/mL at 3σ. Moreover,