A Novel Electrochemical Sensor Based on a Graphene-Silver Platform for the Sensitive Determination of a Tumor-Supplied Group of Factors

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This work reported the facile fabrication of a silver nanoparticle (AgNP)/graphene oxide (GO)-based nanocomposite with glucose as a reducing and stabilization agent using an eco-friendly and low-cost method. The synthetic process could be conveniently employed in the fabrication of a disposable electrochemical sensor using a glassy carbon electrode (GCE). Based on the experimental results, this nanocomposite displayed the integrated properties of graphene and silver nanoparticles, which significantly promoted its electrocatalytic behavior. The electrochemical features of the AgNPs/GO/GCE with the tumor-supplied group of factors (TSGF) was evaluated by differential pulse voltammetry (DPV) and cyclic voltammetry (CV). Compared with the GO film, the AgNPs/GO film displayed an obviously higher activity for TSGF electro-oxidation with a tenfold enhancement in the peak current. Under the selected test conditions, the oxidation peak currents were found to be proportional to the concentration of TSGF within the ranges of 0.01 μM - 50.0 μM and 50.0 μM - 800.0 μM . The developed sensor was used for the detection of TSGF in real specimens and showed desirable recoveries in the range of 98.18% - 102.52%.

Keywords: Silver; Graphene; Tumor supplied group of factors; Electrochemical sensor; Human serum

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