Preparation of 3D Au NPs-poly-L-glutamate/graphene Nanocomposite Modified Electrode for Sensing of Bisphenol A

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In this work, a simple, sensitive and rapid electrochemical sensor for bisphenol A determination based on a 3D Au NPs-poly-L-glutamate/graphene nanocomposite was proposed and the structures of the nanocomposite were characterized by scanning electron microscopy (SEM), Fourier transform infrared spectroscopic (FTIR) and X-ray diffraction (XRD). The electrochemical behaviors of bisphenol A on the nanocomposite GCE were investigated by cyclic voltammetry (CV) and differential pulse voltammetry (DPV). In the potential range of 0.0 ~ 1.0 V, an irreversible oxidation peak appeared on the modified electrode in 0.1 mol L⁻¹ phosphate buffer solution (pH = 6.0). Under the optimum conditions, the anode peak current of bisphenol A increased linearly with its concentration in the ranges from 0.009 μmol L⁻¹ to 0.1 μmol L⁻¹ and 0.1 μmol L⁻¹ to 1.0 μmol L⁻¹ with the detection limit down to 3×10⁻¹⁰ mol L⁻¹ (S/N = 3) and the corresponding linear regression equations were $I_{pa}(\mu A) = -0.1129 C(\mu mol L^{-1}) + 0.5532$ (N = 6, R² = 0.9057) and $I_{pa}(\mu A) = -0.05970 C(\mu mol L^{-1}) + 0.02182$ (N = 5, R² = 0.9950) respectively. The proposed method was successfully used for the determination of bisphenol A content in wastewater and milk samples, and the recoveries were in the range from 98.10% to 104.9%.

Keywords: bisphenol A, electrochemistry, grapheme, L-glutamic acid, sensors

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