Electrochemical Sensor for Ultrasensitive Determination of Bisphenol A based on Gold Nanoparticles/ β -cyclodextrin Functionalized Reduced Graphene Oxide Nanocomposite

Yang Yun^{1,2,*}

¹ Department of Application Chemistry, College of Science, Tianjin University of Commerce, Tianjin, 300134, P. R. China

² Tianjin Key Laboratory for Prevention and Control of Occupational and Environmental Hazards, Logistics University of PAPF Tianjin, 300162, P. R. China.

*E-mail: yyun@tjcu.edu.cn

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In this work, an electrochemical sensor based on a β -cyclodextrin functionalized reduced graphene oxide/gold nanoparticles (β -CD/RGO/Au) composite modified glassy carbon electrode (GCE) was proposed for the ultrasensitive detection of bisphenol A (BPA). The β -CD/RGO/Au nanocomposite was synthesized by a microwave heating method followed by an electrodeposition process. The prepared nanocomposite was carefully characterized by FTIR, Raman spectroscopy, UV-vis spectroscopy, SEM, EDX and XRD. The electrocatalytic oxidation of BPA on the modified GCE was investigated by cyclic voltammetry (CV) and differential pulse voltammetry (DPV). The results showed that the β -CD/RGO/Au modified GCE could effectively enhance the electrochemical detection performance towards oxidation of BPA due to the synergetic effects of RGO and Au NPs with supramolecular recognition capability of β -CD. The proposed sensor exhibited excellent linear relationship between the detection current and BPA concentration in the range from 0.01 to 50 μ M. The detection limit was estimated as 0.003 μ M (S/N = 3). Moreover, the proposed BPA sensor has also been successfully used for determining BPA in various real samples.

Keywords: Graphene; Gold nanoparticle; Electrochemical; Electrodeposition; Bisphenol A

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