A Novel Photoelectrochemical Sensor for Thiamphenicol Based on Porous Three-Dimensional Imprinted Film

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In this study, we designed a novel photoelectrochemical (PEC) sensor for thiamphenicol (TAP), which based on porous graphene (P-r-GO), MoS₂ nanoflower, dendritic Pt-Pd NPs (Pt-Pd NPs), amino multi-walled carbon nanotubes (NH₂-MWCNTs), molecularly imprinted polymer (MIP) and L-shape glassy carbon electrode (L-GCE). Firstly, MoS₂ and P-r-GO nanoflower composite was prepared by one-step hydrothermal method. Then, this composite suspension was coated on L-GCE surface to virtually form a porous interface. After that, the suspension of Pt-Pd NPs and NH₂-MWCNTs was dropped onto MoS₂-P-r-GO / L-GCE. Subsequently, TAP was imprinted on above modified electrode by cyclic voltammetry as o-phenylenediamine was monomer. Afterwards, ascorbic acid was selected as a photocurrent probe when TAP was removed from MIP film and adsorbed on sensing surface. The resulting PEC sensor possessed excellent response for TAP, and its linear range was $1.0 \times 10^{-9} \sim 3.5 \times 10^{-6} \text{ mol L}^{-1}$ with the detection limit of $5.0 \times 10^{-10} \text{ mol L}^{-1}$. This sensor was used to determine TAP in real food samples with favorable results.

Keywords: Photoelectrochemical sensor; Thiamphenicol; Porous graphene; MoS₂; Molecularly imprinted polymer

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