Au@Pt Hybrid Nanorods Encapsulated in B, S dual-doped Graphene as Highly Sensitive Immunosensing Platform for Electrochemical Determination of Aflatoxin B₁

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doi: 10.20964/2020.07.19

Received: 13 February 2020 / Accepted: 9 April 2020 / Published: 10 June 2020

A specific electrochemical immunosensor for ultra-sensitive determination of Aflatoxin B₁ (AFB₁) was developed according to a dual enhancing strategy. The dual-doped graphene (BS-G) was obtained by a simple microwave-assisted hydrothermal approach, sulfur and boron affinity for peanut-shaped Au@Pt NRs embedded into BS-G nanosheets, ultrathin BS-G effectively enwrapped most of the individual Au@Pt NRs with excellent dispersibility. It is noteworthy that two faces at the interface between (002) crystal faces of BS-G and (111) planes of Au@Pt NRs are compatible, accelerating the charge transfer between the hybrid nanocatalysts and AFB₁. Moreover, the highly dispersed COOH groups and defect sites of the BS-G precisely control the orientation of anti-AFB₁ immobilized on the sensor surface, meanwhile, the strong electronic interactions endow the Au@Pt NRs/BS-G hybrid nanocatalysts with remarkable biocompatibility and multivalent affinity interactions with the high molar ratio of anti-AFB₁ for enhanced immunoreactions. Thus, the designed immunosensor exhibits ultra-efficient electron-transfer abilities, excellent sensitivity, and favorable selectivity, the detection limit is 0.0052 ng·mL⁻¹ and the linear range is 0.025-60.00 ng·mL⁻¹.

Keywords: AFB₁; B, S dual-doped grapheme; Au@Pt NRs; Au@Pt NRs/BS-G hybrid nanocatalysts, Electrochemical immunosensor

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