Application of Ionic Liquid-Graphene-NiO Hollowsphere Composite Modified Electrode for Electrochemical Investigation on Hemoglobin and Electrocatalysis to Trichloroacetic Acid

Wenshu Zhao, Xiaoyan Li, Zuorui Wen, Xueliang Niu, Qingfeng Shen, Zhaolan Sun, Ruixia Dong, Wei Sun*

Key Laboratory of Tropical Medicinal Plant Chemistry of Ministry of Education, College of Chemistry and Chemical Engineering, Hainan Normal University, Haikou 571158, P R China,

*E-mail: swyy26@hotmail.com

doi: 10.20964/2017.05.06

Received: 2 January 2017 / Accepted: 8 March 2017 / Published: 12 April 2017

In this present paper NiO hollowsphere was synthesized by a solvothermal method. Then it characterized by different methods including powder X-ray diffraction and scanning electron microscopy. NiO hollowsphere was further mixed with hemoglobin (Hb), ionic liquid and graphene (GR) to get a biocomposite, which was casted on carbon ionic liquid electrode. Spectroscopic data showed that Hb kept its native structure in the mixture. Direct electron transfer of Hb were investigated with a pair of well-defined quasi-reversible redox peaks appeared and the formal peak potential (E^0) was got at -0.341 V (vs. SCE). The Hb modified electrode showed excellent electrocatalysis to trichloroacetic acid (TCA) reduction. Under the selected conditions the currents had a good linear relationship with TCA concentration from 1.5 to 10.0 mmol L⁻¹ and the detection limit was 0.5 mmol L⁻¹ (3 σ). This Hb based electrode exhibited good stability and reproducibility, which could be used for third-generation electrochemical biosensor.

Keywords: NiO hollowsphere, Direct electrochemistry, Hemoglobin, Carbon ionic liquid electrode, Trichloroacetic acid.

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