Direct Electrochemistry of Glucose Oxidase on a Graphene-Graphene Oxide Nanocomposite-Modified Electrode for a Glucose Biosensor

Bo Wang¹, Xiaoli Wang², Zhifang He¹, Xiufeng Zhao², Linyu Wang¹

¹ Hebei Key Laboratory of Heterocyclic Compounds. School of chemical engineering & materials, Handan University, Handan, 056005, PR China.

² Department of medicine, First Hospital of Handan City, Handan, 056005, PR China.

*E-mail: hdxyxb@hdc.edu.cn

doi: 10.20964/2019.08.34

Received: 5 April 2019 / Accepted: 20 May 2019 / Published: 30 June 2019

Direct electrochemistry of glucose oxidase (GOD) was conducted on the surface of a novel graphene-graphene oxide (GR-GO) nanocomposite. GR-GO possesses the virtues of excellent biocompatibility and conductivity, and high sensitivity to local perturbations, and can provide a biocompatible microenvironment for protein immobilization and a suitable electron transfer distance between the electroactive centers of GOD and the electrode surface. The voltammetric results indicated that GOD assembled on GR-GO retained its native structure and bioactivity, exhibited a surface-confined process, and underwent an effective direct electron transfer (DET) reaction with an apparent rate constant (k_s) of 3.5 s^{-1} . Furthermore, the proposed biosensor exhibited a wider linear response to glucose concentrations between 0.1 mM and 11 mM, with a detection limit of 20 μM and a much higher sensitivity ($15.85\text{ }\mu\text{A mM}^{-1}\text{ cm}^{-2}$).

Keywords: direct electron transfer, graphene, graphene oxide, glucose oxidase

[FULL TEXT](#)

© 2019 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).