Promotion Effects of CNTs-MnO₂ Nanowires-composite on Direct Electron Transfer of Hemoglobin for Amperometric H₂O₂ Determination

Chuan-yin Liu^{1,2,*}, En-yong Shi¹, Ji-ping Yao¹, Rong Peng¹

¹ School of Chemical Engineering and Food Science, Hubei University of Arts and Sciences, Xiangyang 441053, P.R. China

² Hubei Key Laboratory of Low Dimensional Optoelectronic Materials and Devices, Xiangyang 441053, P.R. China

*E-mail: liucyin2002@sina.com

doi: 10.20964/2018.06.75

Received: 5 February 2018 / Accepted: 31 March 2018 / Published: 10 May 2018

MnO₂ nanomaterials with controlled morphologies were synthesized by different methods and characterized by SEM, XRD. The promotion ability of as-prepared MnO₂ nanomaterials towards the direct electron transfer (DET) of hemoglobin has been studied. It is found that promotion effect of carbon nanotubes (CNTs) and MnO₂ nanowires nanocomposite can be observed for the DET of hemoglobin. In the optimum conditions, the symmetrical redox peak can be observed with peak separation of 58 mV and formal potential of -0.339 V, respecting the direct electron transfer of hemoglobin on this composite film. The rate constant has also been estimated to be 1.10 s⁻¹. The proposed biosensor has favorable reproducibility, stability and sensitivity, and has been used to amperometric determination of hydrogen peroxide with detection limit of 2.4×10⁻⁸ mol/L, and the Michealis-Menten constant can also be estimated to be 0.32 mmol/L.

Keywords: CNTs-MnO₂ nanowires nanocomposite; Hemoglobin; Direct electron transfer; Hydrogen peroxide

[FULL TEXT](#)

© 2018 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/>).