Microchim Acta (2017) 184:4443–4450
DOI 10.1007/s00604-017-2479-6

ORIGINAL PAPER

A glassy carbon electrode modified with SnO_2 nanofibers, polyaniline and hemoglobin for improved amperometric sensing of hydrogen peroxide

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Received: 30 April 2017 / Accepted: 19 August 2017 / Published online: 4 September 2017

Abstract The authors describe a glassy carbon electrode (GCE) modified with a multiporous nanofibers prepared from SnO_2, polyaniline and hemoglobin, and its application to the amperometric determination of hydrogen peroxide (H_2O_2). The SnO_2 nanofibers were prepared first and then polymerized with polyaniline. Then, the redox protein hemoglobin was co-immobilized with the nanofibers on the surface of the GCE. Chitosan was finally used to improve the stability of the modified GCE. Direct electrochemistry of Hemoglobin at the modified electrode revealed a pair of well-defined redox peaks, with anodic and cathodic peaks at −0.15 and −0.3 V, respectively. The modified GCE exhibits high catalytic response to hydrogen peroxide. Best operated at −0.4 V (vs Ag/AgCl), it displays a linear amperometric response that covers the 2 to 160 μM H_2O_2 concentration range, with a lower detection limit of 0.5 μM. The biosensor has good storage stability, reproducibility and repeatability.

Keywords Direct electrochemistry · Redox protein · Nanomaterials · Electrical contact · Biosensor

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s00604-017-2479-6) contains supplementary material, which is available to authorized users.

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