Enhanced Direct Electron Transfer Of Redox Protein Based On Multiporous Sno2 Nanofiber-Carbon Nanotube Nanocomposite and Its Application In Biosensing

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ABSTRACT
A novel third generation H2O2 biosensor is fabricated using multiporous SnO2 nanofiber/carbon nanotubes (CNTs) composite as a matrix for the immobilization of redox protein onto glassy carbon electrode. The multiporous nanofiber (MPNFs) of SnO2 is synthesized by electrospinning technique from the tin precursor. This nanofiber shows high surface area and good electrical conductivity. The SnO2 nanofiber/CNT composite increases the efficiency of biomolecule loading due to its high surface area. The morphology of the nanofiber has been evaluated by scanning electron microscopy (SEM). Cyclic Voltammetry and amperometry technique are employed to study and optimize the performance of the fabricated electrode. A direct electron transfer between the protein's redox centre and the glassy carbon electrode is established after fabrication of the electrode. The fabricated electrode shows excellent electrocatalytic reduction to H2O2. The catalysis currents increases linearly to the H2O2 concentration in a wide range of 1.0 10−6–1.4 × 10−4 M and the lowest detection limit was 30 nM(S/N= 3). Moreover, the biosensor showed a rapid response to H2O2, a good stability and reproducibility.

Keywords: Multiporous SnO2 nanofiber; Carbon nanotube; Redox protein; Direct electrochemistry; Electrical contact; H2O2 sensing