

# Hemoglobin Immobilization on Multiporous Nanofibers of SnO<sub>2</sub> and Chitosan Composite for Hydrogen Peroxide Sensing

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## ABSTRACT

A multiporous nanofiber (MPNFs) of SnO<sub>2</sub> and chitosan has been used for the immobilization of a redox protein, hemoglobin (Hb), onto the surface of glassy carbon electrode (GCE). The multiporous nanofiber of SnO<sub>2</sub> that has very high surface area is synthesized by using electrospinning technique through controlling the tin precursor concentration. Since the constructed MPNFs of SnO<sub>2</sub> exposes very high surface area, it increases the efficiency for biomolecule-loading. The morphology of fabricated electrodes is examined by SEM observation and the absorbance spectra of Hb/(MPNFs) of SnO<sub>2</sub> are studied by UV-Vis analysis. Cyclic Voltammetry and amperometry are employed to study and optimize the performance of the resulting fabricated electrode. After fabrication of the electrode with the Hb and MPNFs of SnO<sub>2</sub>, a direct electron transfer between the protein's redox centre and the glassy carbon electrode was established. The modified electrode has showed a couple of redox peak located at -0.29 V and -0.18 V and found to be sensitive to H<sub>2</sub>O<sub>2</sub>. The fabricated electrode also exhibited an excellent electrocatalytic activity towards the reduction of H<sub>2</sub>O<sub>2</sub>. The catalysis currents increased linearly to the H<sub>2</sub>O<sub>2</sub> concentration in a wide range of  $5.0 \times 10^{-6}$ – $1.5 \times 10^{-4}$  M. Overall experimental results show that MPNFs of SnO<sub>2</sub> has a role towards the enhancement of the electroactivity of Hb at the electrode surface. Thus the MPNFs of SnO<sub>2</sub> is a very promising candidate for future biosensor applications.

**Keywords:** Multiporous SnO<sub>2</sub> Nanofiber, Hemoglobin, Direct Electrochemistry, Electrical Contact, H<sub>2</sub>O<sub>2</sub> Sensing.