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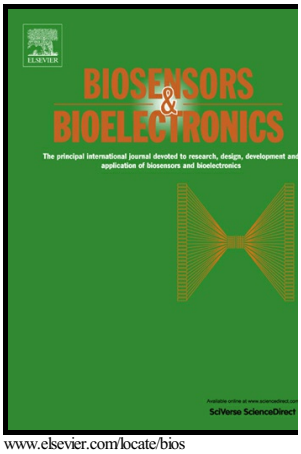

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Fabrication of a facile electrochemical biosensor for hydrogen peroxide using efficient catalysis of hemoglobin on the porous Pd@Fe_3O_4-MWCNT nanocomposite

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Abstract

In this work, a sensitive amperometric biosensor for hydrogen peroxide based on synergetic catalysis of hemoglobin and porous Pd@Fe_3O_4-MWCNT nanocomposite has been constructed. With attention to the utilities of large surface area and outstanding catalytic performance, Pd@Fe_3O_4-MWCNT nanocomposite was employed as the nano-stabilizer for the immobilization of hemoglobin (Hb). The immobilized Hb on the surface of nanocomposite as an electrochemical biosensor efficiently catalyzed the reduction of hydrogen peroxide, amplified the electrochemical signal and enhanced the sensitivity. Results of voltammetry and electrochemical impedance examinations showed that the nanocomposite could enhance the electron conductivity and provide more sites for the immobilization of Hb. A linear response from 0.2-500 µM with detection limit of 0.063 µM for hydrogen peroxide was achieved. The apparent Michaelis–Menten constant $K_{app}{}^{M}$ value was 21 µM. Thus, the nanocomposite could be applied for fabrication of a third generation biosensor for hydrogen