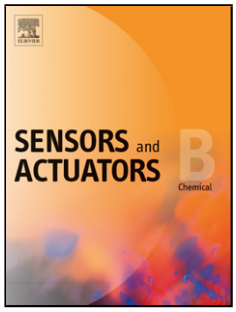

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Electrodeposited Prussian Blue on carbon black modified disposable electrodes for direct enzyme-free H_2O_2 sensing in a Parkinson's disease *in vitro* model

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Highlights

- An enzyme-free Carbon Black-Prussian Blue based electrochemical sensor for H_2O_2 sensing is proposed
- Carbon Black successfully assist the electrodeposition of Prussian Blue
- Interference-free H_2O_2 direct quantification in cell cultures has been achieved
- The proposed sensor has been applied to H_2O_2 monitoring in 6-OHDA cellular model of Parkinson's disease

Abstract

In this work, we present the combination of Carbon Black (CB) and electrodeposited Prussian Blue (PB) covered with a Nafion layer on Screen-Printed electrodes (CB/PB-SPE) used for non-enzymatic H_2O_2 sensing in Neuroblastoma cell line SH-SY5Y. These cells were challenged with 6-hidroxidopamine (6-OHDA) for modelling Parkinson's disease. The electrodes surface was investigated using Scanning Electron Microscopy (SEM) and electrochemically characterized, in terms of electroactivity and stability. Electrochemical sensing of H_2O_2 was carried out at very low potentials (-50mV), with a LOD of 0.01 µM and linear range between 0.2 and 1000 µM, allowing interference-free detection of H_2O_2 in the selected cell culture. The H_2O_2 concentration was successfully monitored in an experimental model of Parkinson's disease. These results pave the way to a method for the continuous monitoring of H_2O_2 in culture medium for future studies of the role of H_2O_2 in Parkinson's disease.

Keywords: Prussian Blue; Carbon Black; Hydrogen Peroxide; Screen-Printed electrodes; Parkinson's disease; Cell cultures