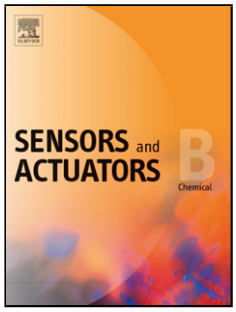

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Enzymeless PEDOT-based electrochemical sensor for the detection of nitrophenols and organophosphates

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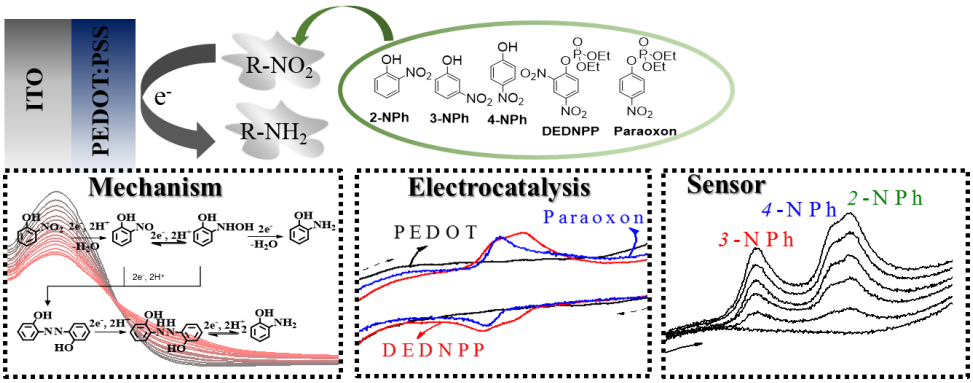
GRAPHICAL ABSTRACT



Highlights

- Enzymeless detection of nitrophenol isomers based on PEDOT:PSS modified electrodes;
- Direct electrochemical detection of DEDNPP and Paraxon pollutants;
- Mechanistic studies of electrocatalytic reactions of nitrophenols;

Abstract

PEDOT:PSS modified electrodes were prepared via one-step electropolymerization and employed as electrochemical sensor for the detection of nitrophenols and organophosphorus compounds. The electrocatalytic behavior of PEDOT towards the redox reactions of the nitrophenol isomers were studied by electrochemical and spectroscopy techniques and a detection mechanism is proposed. The detection of the isomers was possible by the analysis of the oxidation peaks of the intermediates generated by the direct reduction of the nitro groups and the analytical performance was evaluated in terms of the individual analysis of each isomer and in a multi-component solution. It was found that the simultaneous detection of the isomers is feasible, although the quantification is only possible of 3- and 4-NPh in the multi-component sample. In addition, hazardous organophosphate pollutants such as diethyl 2,4-dinitrophenyl phosphate (DEDNPP) and diethyl 4-nitrophenyl phosphate (Paraoxon) were also detected by the study of the electrochemical reduction of the nitro groups presented and as observed by the nitrophenol molecules and some analytical parameters