

# Electroanalytical exploitation of nitroso phenyl modified carbon-thiol interactions: Application to the low voltage determination of thiols

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## Abstract

The electrochemical generation of nitrosophenyl groups covalently attached to graphite powder (nitrosophenylcarbon) from carbon powder chemically modified with nitrophenyl groups and their subsequent reaction with thiols (glutathione, cysteine and homocysteine) has been investigated as a method by which the later can be quantified. The modified carbon powder was immobilized onto a basal plane pyrolytic graphite electrode and characterized by cyclic voltammetry by scanning between 1.0 V and -1.0 V vs. SCE in phosphate buffer (pH 7). Square wave voltammetry (SWV) was used for the determination of thiols and the SWV parameters were optimized. The nitrosophenylcarbon is electrogenerated from nitrophenylcarbon and can chemically oxidize thiols to disulfides. Subsequent reduction of nitrosophenylcarbon to phenylhydroxylaminecarbon during the square wave voltammetric process leads to a decrease in the reductive current. This can be correlated to the concentration of thiol present within the medium. The cyclic voltammetric responses of basal plane pyrolytic graphite electrode, edge plane pyrolytic graphite electrode, glassy carbon electrode and boron-doped diamond electrode in the direct oxidation of thiols were also investigated and all were found to have a significantly higher overpotential compared to the described method using nitrosophenylcarbon.

## Author keywords

Electroanalysis; Modified carbon; Redox mediation; Square wave voltammetry; Thiol detection