Electrocatalysis of NADH on 3,5-Dinitrobenzoic Acid Encapsulated on Multiwalled Carbon Nanotube-Modified Electrode

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Resumen

We report that glassy carbon electrode (GCE) modified with multiwalled carbon nanotubes (MWCNTs) can encapsulate or entrap 3,5-dinitrobenzoic acid (35DNB) generating a 35DNB-MWCNTGC electrode. After electrochemical reduction in situ of only one nitro group of 35DNB, it turns into the hydroxylamine derivative (R-NHOH), which can be further oxidized to the nitroso derivative (R-NO). Then, R-NO/R-NHOH redox couple was electrogenerated in situ by cycling the potential between 0.20 and -0.20 V vs Ag/AgCl. The very well-defined and persistent redox couple was characterized with a formal potential, E (o) 'aEuroe= -28 mV vs Ag/AgCl at a scan rate of 20 mV s(-1). Using the Laviron's plot, a transfer coefficient, alpha = 0.45, and an electron transfer rate constant, k (s) = 10.5 s(-1), for the electron transfer of the couple R-NO/R-NHOH, were calculated. This redox reaction results to be a very efficient mediator for electrocatalytic NADH oxidation. The 35DNB-MWCNTGC electrode efficiently catalyzes the oxidation of NADH with a decrease of more than 0.60 V vs Ag/AgCl in the overpotential compared to the bare GCE and a difference of 0.25 V vs Ag/AgCl with respect to the situation without mediator. The preparation of the electrode is very easy and not time-consuming.

Palabras clave

Palabras clave de autor:NADH; Electrocatalysis; Modified electrode; 3,5-Dinitrobenzoic acid; Voltammetry; SEM
KeyWords Plus:NITRO-FLUORENONE DERIVATIVES; SIDEWALL FUNCTIONALIZATION; OXIDATION; ELECTROOXIDATION; PASTE

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