Rapid and simultaneous determination of tetracycline and cefixime antibiotics by mean of gold nanoparticles-screen printed gold electrode and chemometrics tools

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Rapid and simultaneous determination of tetracycline and cefixime antibiotics by mean of gold nanoparticles-screen printed gold electrode and chemometrics tools

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Abstract

The screen-printed gold electrode (SPGE) modified with the formation of self-assembly monolayer (SAM) of cysteine (Cys) on gold-nanoparticles (Au_{nano}) was utilized for rapid and simultaneous determination of tetracycline and cefixime antibiotics by square wave voltammetry (SWV). Electrochemical investigation and characterization of the modified electrode was achieved using cyclic voltammetry (CV) and scanning electron microscopy (SEM). A principal component artificial neural network (PCANN) with three layer back-propagation network was utilized for the analysis of the voltammogram data. It is possible to simultaneously determine the tetracycline and cefixime concentrations in the ranges of 10^{-5} and 10^{-3} $molL^{-1}$, under the optimum conditions. Moreover the SPGE-Au_{nano}-Cys biosensor together with chemometrics tools was successfully applied to the determination of tetracycline and cefixime in biological fluids, which may provide a promising alternative in routine biosensing applications.

Keywords: Screen-printed gold electrode, Gold nanoparticles, Self-assembly monolayer, Biosensor, Principal component artificial neural network, Square wave voltammetry

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