A Novel fast Fourier Transform Square Wave Voltammetry for Determination of Sulfabenzamide at $\text{Er}_2(\text{WO}_4)_3/\text{CP}$ Electrode

Hana Beigizadeh¹, Mohammad Reza Ganjali^{1,2,*}, Parviz Norouzi^{1,2}

¹ Center of Excellence in Electrochemistry, School of Chemistry, University of Tehran, Tehran, Iran

² Biosensor Research Center, Endocrinology & Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

*E-mail: ganjali@khayam.ut.ac.ir

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In this study, a novel sensitive sulfabenzamide voltammetric sensor has been developed for use through fast Fourier transform square wave voltammetry (FFTSWV). This is achieved through the modification of a carbon paste electrode with Erbium(III) tungstate nanoparticles ($\text{Er}_2(\text{WO}_4)_3$ NPs). The cyclic voltammogram of the analyte contained an irreversible oxidation peak at around 0.92 V vs. Ag/AgCl, which was used for the measurements. To achieve higher sensitivity, the effects of parameters such as, pH, quantity of the nanoparticles used, amplitude and frequency were also optimized. As a result, an optimal linear concentration range of 1.0×10^{-6} – 250.0×10^{-6} M with a limit of detection 0.45×10^{-7} M was reached. Characterization techniques such as transmission electron microscopy (TEM), and X-ray powder diffraction (XRD) were also used to study the size and morphology of the $\text{Er}_2(\text{WO}_4)_3$ NPs. The sensor responses proved to have a good reproducibility and repeatability with acceptable RSD levels of (5.6%, 1.79% respectively), in addition to the long-term stability of almost one month.

Keywords: Sulfonamide, Carbon paste electrode, $\text{Er}_2(\text{WO}_4)_3$ nanoparticles, Fast Fourier transform Square wave voltammetry

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