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Indium oxide nanoparticles modified carbon paste electrode for sensitive voltammetric determination of aromatase inhibitor formestane

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Abstract

This paper reports a novel, simple and sensitive electrochemical method for the determination of formestane (FMT) in aqueous media (BR buffer solution, pH 5.2) on indium oxide nanoparticles modified carbon paste electrode (In_2O_3 NPs/CPE). The prepared In_2O_3 nanoparticles were characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM). The fabricated In_2O_3 NPs/CPE displayed high effective surface area, more reactive sites and excellent electrochemical catalytic activity toward the oxidation of FMT. The voltammetric oxidation of FMT was studied at a carbon paste and indium oxide nanoparticles modified carbon paste electrodes by cyclic voltammetry and its determination were carried out by square wave anodic adsorptive stripping voltammetry (SWAASV). The electrochemical parameters such as surface concentration (Γ), electron transfer coefficient (α), and the electron transfer rate constant (k_s) of FMT at the modified electrode were calculated. Under the optimal conditions at In_2O_3 NPs/CPE, a linear relationship was realized between the anodic peak currents and FMT concentrations in the range of 0.19 to 2.91 μM , with the detection limit of $6.2 \times 10^{-8} \text{M}$. This modified electrode was used as a sensor for determination of FMT in blood serum and urine samples with satisfactory results.

Keywords: Indium oxide nanoparticles, Modified carbon paste electrode, Formestane, Determination, Voltammetry

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