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Sensitive voltammetric detection of Febuxostat at novel graphene based zinc oxide nanoflower composite sensor

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A novel graphene/zinc nanoflower nano-composite modified glassy carbon electrode (GR/ZnOFs/GCE) based electrochemical sensor has been developed for the sensitive determination of a muscle relaxant drug febuxostat (FEB) in methyl alcohol. The developed sensor was characterized by scanning electron microscopy, square wave voltammetry, cyclic voltammetry electrochemical impedance spectroscopy, X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR). It was found that the nanocomposite film of GR/ZnOFs on GCE exhibits excellent electro-catalytic activity towards febuxostate reduction in Britton Robinson buffer at pH 6.5. Detection of FEB at GR/ZnOFs/GCE enhanced the peak current and also lowers the reduction over potential. Various kinetic parameters affecting the monitored electro-catalytic response were investigated and optimized for febuxostate determination. Under optimized conditions the developed sensor shows linear response between increasing concentrations of FEB (10-400 ng mL⁻¹) and cathodic current by square wave voltammetry with correlation coefficient (r^2) of 0.9954. The applicability of proposed sensor is further extended to *in vitro* determination of the drug in pharmaceutical formulation and in waste water with an acceptable recovery and reproducibility. The fabricated (GR/ZnOFs/GCE) sensor holds great promise for simple and sensitive quantification of febuxostat using electro-analytical techniques.

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