Graphene/Tungsten trioxide (Gr/WO₃) composite modified screen-printed carbon electrode for the sensitive electrochemical detection of nitrofurantoin in biological samples

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Graphene /tungsten trioxide (Gr/WO₃) composites were prepared by a simple method. This composite has been used as a potential electrode material for the electrochemical detection of nitrofurantoin (NTF). The as-prepared Gr/WO₃ composite was confirmed by X-ray diffraction (XRD), Field-emission scanning electron microscopy (FESEM), and Raman spectroscopy. Besides, the electrochemical properties of the prepared electrode were identified by different voltammetry techniques such as cyclic voltammetry (CV) and linear sweep voltammetry (LSV). The Gr/WO₃ composite modified screen printed carbon electrode (SPCE) shows an excellent electrocatalytic activity towards the detection of NTF. The Gr/WO₃/SPCE electrode detects NTF with a lower detection limit (0.002 μM), well linear response range (0.01 - 234 μM) and acceptable sensitivity (2.18 $\mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$). Moreover, the Gr/WO₃ modified electrode exhibited good selectivity, reproducibility and higher stability when compared to other modified and unmodified electrodes. In addition to that, Gr/WO₃/SPCE modified electrode achieved appreciable recoveries for the determination of NTF in biological samples.

Keywords: Graphene, Tungsten trioxide, Electrochemical sensor, Nitrofurantoin, Real sample analysis.

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