Morphological and Optical Properties of SnO₂ Doped ZnO Nanocomposites for Electrochemical Sensing of Hydrazine

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SnO₂/ZnO nanomaterials were synthesized by sol-gel method using polyethylene glycol with different SnO₂ contents. The synthesized samples were annealed at 600 °C. The effects of SnO₂/ZnO were investigated Viz., molar ratios, morphology, optical and photocatalytic properties. The prepared samples were analyzed by XRD, TEM, SEM, FT-Raman spectroscopy, N₂ physical adsorption, FT-IR, and UV-Vis spectroscopy. The optical band gaps of SnO₂/ZnO nanocomposites were obtained from UV-diffuse reflectance spectroscopic studies. The photocatalytic activities of prepared samples increased with the decrease SnO₂ content, which could be explained by increase in charge parting resulting from the coupling of ZnO with SnO₂ due change in potential energy. Additionally, the SnO₂/ZnO nanocomposite with the optimal molar ratio was used to change a glassy carbon electrode (GCE) and then employed successfully for the electrochemical sensing of hydrazine at various concentrations using the amperometric technique. The modified GCE showed high sensitivity 1.16 μAμM⁻¹cm⁻², linear dynamic range 2.5 to 25μM (R² = 0.9997), fast response time within 5s and a limit of detection (LOD) 0.36 μM at (S/N=3).

Keywords: Electrochemical sensing; Cyclic voltammetry; SnO₂/ZnO ; Nanocomposites ; Sol-gel ; Photocatalytic degradation

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