Hydrothermal Synthesis of Manganese Sulfide Decorated Graphene Oxide for Effective Electrochemical Sensing of Dopamine

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Microsphere like structured manganese sulfide decorated graphene oxide (MnS/GO) composites were synthesized by using simple hydrothermal method. The above prepared MnS/GO composite was characterized by using X-ray diffraction spectroscopy (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray analysis (EDX), and Raman spectroscopy. The obtained results confirmed the formation of MnS/GO composite with required stoichiometry and morphology. For the first time, MnS based materials were used as a modifier and dopamine as a model system for the electrochemical application. The electrochemical studies were performed for MnS/GO composite modified GCE using Cyclic Voltammetry (CV) and linear sweep voltammetry techniques. The results suggest that the effective response of MnS/GO/GCE with very low limit of detection (LOD) and sensitivity of 0.007 μM and 3.11 $\mu\text{A } \mu\text{M}^{-1}\text{cm}^{-2}$ respectively. Moreover the selectivity results exhibited excellent interference property of MnS/GO/GCE towards sensing of dopamine. Moreover, the reported MnS/GO/GCE sensor exhibits excellent long cyclic stability, and selectivity and greater support for the real-time detection of DA in human urine samples. Thus, the proposed MnS/GO/GCE is believed as an excellent electrode material for the sensing of dopamine.

Keywords: MnS microspheres, graphene oxide, dopamine, electrochemical sensor, LSV technique

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