An Electrochemical Sensor Based on MB/Ag-ZnO/Graphene Modified Glassy Carbon Electrode for Determination of L-Tryptophan in Biofluid Samples

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In this work, graphene (GR) and Ag-ZnO nanocomposites were prepared and used together with methylene blue (MB) as electrode materials to modify a glassy carbon electrode (GCE). The electrochemical behavior of L-tryptophan (L-Trp) on the fabricated MB/Ag-ZnO/GR/GCE was investigated by cyclic voltammetry and differential pulse voltammetry. MB/Ag-ZnO/GR clearly enhanced the electrochemical oxidation of L-Trp. In a 0.1 mol/L phosphate buffer solution at pH 4.0, the peak current response at the modified electrode increased linearly with an increase in the L-Trp concentration from 2.0×10^{-6} to 1.4×10^{-4} mol/L, and the detection limit ($S/N = 3$) was 1.0×10^{-6} mol/L. The electrode showed good reproducibility, stability, and selectivity. The sensor was used for the determination of L-Trp in biofluid samples (pig serum and pig urine), and the recovery rate ranged from 97.1% to 104.2%. The fabricated electrode was proposed for the electrochemical analysis of L-Trp, indicating the potential for practical applications in the biological field.

Keywords: Graphene, Ag-ZnO nanocomposites, L-Tryptophan, Methylene blue

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