Simple and Cost-effective Synthesis of Co_3O_4 Modified GCE Electrode for $\text{C}_6\text{H}_6\text{O}$ Detection with Unique Lamellar Structure

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Herein, we present a simple and cost-effective strategy to prepare Co_3O_4 modified glassy carbon electrode ($\text{Co}_3\text{O}_4/\text{GCE}$). The unique lamellar structure of Co_3O_4 is prepared by a hydrothermal process and characterized by XRD and SEM. Then, the as-prepared $\text{Co}_3\text{O}_4/\text{GCE}$ is utilized for $\text{C}_6\text{H}_6\text{O}$ detection and electrochemical performance is measured by cyclic voltammetry and electrochemical impedance spectroscopy. The electrochemical measurements are used to characterize the electron transport at the solution-electrode interface. Through the use of square wave voltammetry, the electrochemical response of $\text{C}_6\text{H}_6\text{O}$ on Co_3O_4 modified was significantly increased in 0.1 M phosphate buffer solution (pH 5.8). The proposed electrode has shown a linear relationship in the concentration range of 3.3 μM to 33 μM , with a $\text{C}_6\text{H}_6\text{O}$ detection limit of 2.03×10^{-6} M and sensitivity of 0.67 $\mu\text{A } \mu\text{M}^{-1}$. Moreover, the as-prepared Co_3O_4 has shown excellent repeatability and stability, which make it an ideal choice for the replacement of other costly electrode systems.

Keywords: Lamellar stacking structure; Co_3O_4 ; Electrochemical determination; $\text{C}_6\text{H}_6\text{O}$

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