A Novel Nonenzymatic Hydrogen Peroxide Electrochemical Sensor Based on Facile Synthesis of Copper Oxide Nanoparticles Dopping into Graphene Sheets@Cerium Oxide Nanocomposites Sensitized Screen Printed Electrode

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A novel electrochemical sensor for nonenzymatic hydrogen peroxide (H₂O₂) detecting based on facile synthesis of copper oxide (CuO) nanoparticles dopping into graphene sheets@cerium oxide nanocomposites sensitized screen printed electrode (SPE) was fabricated. CuO nanoparticles were dopped into GS@CeO₂ nanocomposites via a facile solvothermal process. X-ray powder diffractometer (XRD) combines with fourier transform infrared spectroscopy (FTIR) were used to characterize the composition of GS@CeO₂-CuO nanocomposites. Electrochemical impedance spectroscopy (EIS) was utilized to study the interfacial properties as well as scanning electron microscopy (SEM) was employed to characterize the morphologies of different electrodes. The electrochemical properties of electrochemical sensor were investigated by cyclic voltammetry (CV) and chronoamperometry (i-t curve) methods. After all experimental parameters were optimized, the GS@CeO₂-CuO hybrid nanomaterials modified SPE (SPE|GS@CeO₂-CuO) showed a good performance towards the electrocatalytic reduction of H₂O₂. A wide linear detection range (LDR) of CV peaks from 5.0×10⁻³ mM to 18.0 mM (*R*=0.9994) and a low limit of detection (LOD) of 2.1×10⁻³ mM (*S/N*=3) was achieved. The proposed electrochemical sensor was quick, selective, sensitive, simple, stable and reliable to quantitative determination of trace H₂O₂ in real samples.

Keywords: Copper oxide; Graphene sheets@cerium oxide; Screen printed electrode; Nonenzymatic; Hydrogen peroxide.

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