Improved Sensitivity and Selectivity Glucose Biosensor Based on PANI-GRA Nanocomposite Film Decorated with Pt Nanoparticles

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A novel glucose biosensor was prepared by in situ electropolymerization of aniline in GRA synthesized by using electrochemical expansion of graphite in propylene carbonate electrolyte onto platinum (Pt) electrode, followed by electrodeposition of platinum nanoparticles (PtNPs) on Pt/PANI-GRA electrode. Glucose oxidase (GOD) was immobilized on this modified Pt electrode through chitosan. The fabricated process and the electrochemical behaviors of resulting biosensor were investigated by scanning electron microscopy (SEM) and cyclic voltammetry (CV). The developed glucose biosensor exhibited superior sensitivity of $52.67 \mu\text{A mM}^{-1} \text{cm}^{-2}$ and selectivity, which showed no response to the interference from glycine (Gly), Urea (Urea), L-phenylalanine (L-Phe), ascorbic acid (AA), tyrosine (L-Tyr) and D-galactose (D-Gal). The biosensor also showed a fast response time within 3 s. The biosensor was used for the detection of glucose in human blood samples with satisfactory results compared with standard hospital laboratory analysis.

Keywords: Polyaniline; Graphene; Biosensor; Sensitivity; Selectivity

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