Silver Nanoparticles Decorated on Graphene Oxide Sheets for Electrochemical Detection of Ascorbic Acid(AA) in Human Urine Sample

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Here, we report a non-enzymatic Silver nanoparticle-decorated graphene oxide (Ag NPs-GO) nanocomposite based electrochemical biosensor for the detection of ascorbic acid using the ultra-sensitive electrochemical method. In this work, Ag NPs-GO nanocomposite synthesized through simple and cost-effective ultra-sonication method. As produced composite was characterized by FE-SEM, TEM, EDX, FT-IR, XRD, EIS and electrochemical methods. The electrochemical behavior of ascorbic acid at the surface of Ag NPs-GO nanocomposite modified screen-printed carbon electrode (SPCE) was investigated by cyclic voltammetry (CV) technique while ascorbic acid sensing was performed by Differential pulse voltammetry method. The as-developed biosensor exhibited lower detection limit of 25 nM and the sensitivity is $1.71 \mu\text{A } \mu\text{M}^{-1} \text{ cm}^{-2}$ ($R^2=0.997$) towards ascorbic acid in the linear range of 1–210 μM with no surface fouling was observed. To evaluate the practical application, the detection of AA performed in the real sample of human urine and vitamin C tablets to predict unknown concentrations of in the PBS pH 7.0.

Keywords: non-enzymatic biosensor; Ultra-sonication method; Ag NPs-GO nanocomposite; ascorbic acid; Electrochemical detection

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