

Fabrication of Gold Nanoparticles Self-Assembled Functionalized Improved Graphene on Carbon Paste Electrode for Electrochemical Determination of Levodopa in the Presence of Ascorbic Acid

Authors : Mohammad Ali Karimi, Hossein Tavallali, Abdolhamid Hatefi-Mehrjardi

Abstract : In this study, an electrochemical sensor based on gold nanoparticles (AuNPs) functionalized improved graphene (AuNPs-IGE) was fabricated for selective determination of L-dopa in the presence of ascorbic acid by a novel self-assembly method. The AuNP IGE modified carbon paste electrode (AuNPs-IGE/CPE) utilized for investigation of the electrochemical behavior of L-dopa in phosphate buffer solution. Compared to bare CPE, AuNPs-IGE/CPE shows novel properties towards the electrochemical redox of levodopa (L-dopa) in phosphate buffer solution at pH 4.0. The oxidation potential of L-dopa shows a significant decrease at the AuNPs-IGE/CPE. The oxidation current of L-dopa is higher than that of the unmodified CPE. AuNPs-IG/CPE shows excellent electrocatalytic activity for the oxidation of ascorbic acid (AA). Using differential pulse voltammetry (DPV) method, the oxidation current is well linear with L-dopa concentration in the range of 0.4-50 $\mu\text{mol L}^{-1}$, with a detection limit of about 1.41 nmol L⁻¹ (S/N = 3). Therefore, it was applied to measure L-dopa from real samples that recoveries are 94.6-106.2%. The proposed electrode can also effectively avoid the interference of ascorbic acid, making the proposed sensor suitable for the accurate determination of L-dopa in both pharmaceutical preparations and human body fluids.

Keywords : gold nanoparticles, improved graphene, L-dopa, self-assembly

Conference Title : ICBNN 2016 : International Conference on Biomedical Nanoscience and Nanotechnology

Conference Location : Zurich, Switzerland

Conference Dates : July 21-22, 2016