Highly Sensitive and Indirect Electrochemical Sensing of Ascorbic Acid Based on the Catalytic Oxidation of Glucose on the Ni Nanoparticles-ionic Liquid Composite

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In this system, a Ni nanoparticle-ionic liquid platform (Ni_{NP}-IL) was developed for synergistical and indirect determination of ascorbic acid (AA) via electrocatalytic recycle between Ni and glucose. The Ni_{NP}-IL film was characterized by scanning electron microscope and cyclic voltammetry. The activation of Ni_{NP}-IL/CPE in alkaline media, forming a Ni(OH)₂/NiO(OH)-IL film, was found to induce the adsorption of AA at the electrode surface. Based on the electrocatalytic oxidation of glucose at the activated Ni_{NP}-IL/CPE in 0.08 mol/L NaOH solution, a novel detection strategy was constructed for indirect determination of AA. Under optimal conditions, AA was amperometrically determined by using the as-prepared Ni_{NP}-IL/CPE with a detection limit of 4.5×10^{-8} mol/L (S/N = 3). Possible interferences from the coexisting ions were also investigated. The results indicated that the designed biosensor could be used for the detection of AA in the presence of dopamine, borate, nitrate, chloride, acetate and carbonate ions.

Keywords: Ni nanoparticles, ionic liquid, glucose, ascorbic acid, indirectly determination.

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