

Electrochemical Oxidation of Methionine Mediated by a Fullerene-C60 Modified Gold Electrode

Abstract

The usefulness of a C60-fullerene modified gold (Au) electrode in mediating the oxidation of methionine in the presence of potassium ions electrolyte has been demonstrated. During cyclic voltammetry, an oxidation peak of methionine appearing at ≈ 1.0 V vs. Ag/AgCl was observed. The oxidation current of methionine is enhanced by about 2 times using a C60 modified gold electrode. The current enhancement is significantly dependent on pH, temperature and C60 dosage. Calibration plot reveals linearity of up to 0.1 mM with a current sensitivity of close to 50 mA L mol⁻¹ and detection limit of 8.2106 M. The variation of scan rate study shows that the system undergoes diffusion-controlled process. Diffusion coefficient and rate constant of methionine were determined using hydrodynamic method (rotating disk electrode) with values of 1.11105 cm² s⁻¹ and 0.0026 cm s⁻¹ respectively for unmodified electrode while the values of diffusion coefficient and rate constant of methionine using C60 modified Au electrode are 5.7106 cm² s⁻¹ and 0.0021 cm s⁻¹ respectively

Keyword: C60 modified Au electrode, Voltammetry, Methionine analysis, Electrocatalysis