

Electrocatalytic oxidation of ascorbic acid at polypyrrole thin film incorporating palladium particles

Charif DEHCHAR, Imene CHIKOUCHE, Rochdi KHERRAT, Saida ZOUGAR, Ahmed ZOUAOUI

Abstract: In this paper, we report a simple sensing strategy for electrochemical determination of ascorbic acid (AA) using a combination of polypyrrole (PPy) thin film and palladium particles composites deposited onto n-doped silicon (Si) substrate. A two-step electrochemical process was employed to synthesize the composite films: At first, PPy film (average thickness 200 nm) was electro-generated on Si substrate from an organic solution of the pyrrole under galvanostatic conditions. Secondly, palladium particles were electrodeposited on PPy/Si surface from a separate solution by chronoamperometry technique. The surface morphology analysis of the obtained composites shows a uniform dispersion of palladium particles onto the polymer matrix and reveals that the electrodeposition time has a significant effect on the amount and size of the incorporated palladium particles. The electrochemical reactivity of the Pd-PPy/Si-modified electrodes towards the oxidation of AA was studied by cyclic voltammetry method in 0.1 M, pH 7.0 phosphate buffer solution. The oxidation current was proportional to the concentration of AA in the range of 0.5–10 mM with a detection limit of 0.2 mM.

Keywords : ascorbic acid, composite, electrocatalysis, Electropolymerization, palladium, Polypyrrole