

Voltammetric oxidation of ascorbic acid mediated by multi-walled carbon nanotubes/titanium dioxide composite modified glassy carbon electrode.

ABSTRACT

A MWCNT/TiO₂ composite was modified onto glassy carbon electrode and fabricated by mechanical attachment, then applied to detection of ascorbic acid using cyclic voltammetry. Electrode responses were obtained for the oxidation of 0.5 mM ascorbic acid at the glassy carbon electrode modified with MWCNT, TiO₂, MWCNT/TiO₂ composite and an unmodified glassy carbon electrode. A well-defined and highly resolved oxidation peak of ascorbic acid at the MWCNT/TiO₂/GCE with current enhancement and peak potential shift toward the origin being observed, this indicates evidence of electrocatalytic process. In comparison with other electrodes, the observed current enhancements at the MWCNT/TiO₂/GCE were 1.3 folds higher than those obtained by MWCNT/GCE and 1.5 folds by a bare glassy carbon electrode. The response peak current revealed a good linear relationship of up to 2.5 mM ascorbic acid with correlation coefficient of 0.998. A good detection limit of 4.0 μ M was found using MWCNT/TiO₂/GCE. Other usual parameters such as effect of pH, scan rate, temperature, supporting electrolyte and concentration of ascorbic acid were studied.

Keyword: Ascorbic acid; Composite; Cyclic voltammetry; Mechanical attachment; Nanoparticles.