Voltammetric sensing of nitrite in aqueous solution using titanium dioxide anchored multiwalled carbon nanotubes

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Abstract

A glassy carbon electrode modified with TiO2 anchored on multiwalled carbon nanotube particles was used for voltammetric determination of nitrite in phosphate buffer solution (pH 7). Characterization of modified electrodes was performed using transmission electron microscopy (TEM), energy dispersive X-ray spectrometer (EDS), and voltammetric techniques. Under optimal conditions, TiO2/MWCNT/GCE reduced oxidation potential by 250 mV and enhanced i pa by 2.7-fold (≈ 172%) higher when compared with bare glassy carbon electrode. A linear voltammetric response from 0.02 to 600 μM with a detection limit of 0.011 μM (s/n = 3) was obtained using DPV. The apparent diffusion coefficient for nitrite was calculated to be $2.15 \times 10{-}6$ cm2 s−1. The fabricated sensor was used for the determination of nitrite in water samples and the results were consistent with the values obtained by the ultraviolet–visible spectroscopy (UV-Vis) method.