Electrooxidation of Nitrite Ions on Gold/Polyaniline/Carbon Paste Electrode

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Nitrite ions can penetrate from fertilizers into underground water and consequently contaminate the water and food sources. A facile two-step electrochemical method was used to fabricate gold/polyaniline/carbon paste electrode (Au/PAni/CPE) for nitrite sensing. The Au/PAni/CPE was visualized and characterized by scanning electron microscopy, energy-dispersed X-ray spectroscopy, X-ray diffraction and electrochemical methods. The electrocatalytic activity of bare CPE, PAni/CPE and Au/PAni/CPE toward the electrooxidation of nitrite was examined and compared via cyclic voltammetry. To obtain the optimal condition for fabrication of the electrode, the number of cycles in cyclic voltammetry for synthesis of polyaniline and the deposition time in potentiostatic deposition of gold were optimized with respect to the electrooxidation of nitrite. In a phosphate buffer solution (PBS, pH 7.0), the peak current was linear to the concentration of nitrite in the range from 3.8×10^{-5} M to 1.0×10^{-3} M with a detection limit of 2.5×10^{-5} M. The interference effect on the nitrite detection was also studied. The proposed method was also employed for the determination of nitrite in rain and lake water samples.

Keywords: Nitrite, Carbon paste electrode, Polyaniline, Gold particles, Electrocatalysis

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