

Electrochemical, Ultrasensitive Detection of Nitrite using modified carbon paste electrode with Novel Polyaniline encapsulated CuO doped Magnetite

Roopa D. L^{a*}

^aPG Department of Chemistry and Research Centre, NMKRV College for Women, Jayanagar, Bangalore -11
Email – dloopacta@gmail.com.

ABSTRACT:

A novel electrochemical sensor based on conducting polymer and copper oxide doped magnetite nanoparticles was reported for the detection of nitrite ions (NO_2^-). The hybrid material polyaniline encapsulated copper oxide(CuO) doped magnetite(Fe_3O_4) nanocomposite ($\text{CuO}/\text{Fe}_3\text{O}_4@$ PANI) was prepared via oxidation of aniline using ammonium peroxydisulfate in presence of CuO and Fe_3O_4 followed by probe ultrasonication. The morphology and the electro-catalytic properties of the obtained electrodes were investigated with Fourier Transform Infrared Spectroscopy (FTIR), powder X-ray diffraction (PXRD), Scanning Electron Microscopy (SEM), Cyclic Voltammetry (CV), and Electrochemical Impedance Spectroscopy (EIS) showing an improvement of the electronic transfer due to the synergic effect between the properties of polyaniline and CuO doped Fe_3O_4 . Under the optimum experimental conditions, the ($\text{CuO}/\text{Fe}_3\text{O}_4@$ PANI) exhibited excellent electro-catalytic activity towards nitrite detection. The calibration plot of nitrite detection was linear in the range of concentration from 10 to 140 μM with a low detection limit of 7 nM which can be employed in the determination of nitrite in river and drinking water with the advantages of good reproducibility, anti-interference and long-term stability.

Key words: PANI, CuO, Magnetite, Nitrites.