

## Voltammetric detection of potassium ferricyanide mediated by multi walled carbon nanotube titanium dioxide composite modified glassy carbon electrode.

### ABSTRACT

The MWCNT/TiO<sub>2</sub> composite was homogeneously coated on the surface of GCE and applied in the electrochemical determination of 0.1 mM potassium ferricyanide in 0.1 M Na<sub>2</sub>HPO<sub>4</sub> (pH 8.5). The redox couple of potassium ferricyanide with current enhancements of 3.0-3.1 folds was obtained using the MWCNT/TiO<sub>2</sub>/GCE when compared with unmodified GCE. A linear calibration plot showed a correlation coefficient of 0.999, with detection limits of 48.6  $\mu$ M (100 mV/s scan rate) and 1.1  $\mu$ M (5 mV/s scan rate) in the concentration ranges of 0.01-0.2 mM of potassium ferricyanide. High sensitivity responses of 77.6  $\mu$ A/mM for the anodic and of 68.9  $\mu$ A/mM for the cathodic peak currents were also obtained with an excellent correlation coefficient of 0.999. Based on plot of peak current against peak potential, the zero-current potentials were obtained as =209 mV and =189 mV. Diffusion coefficient was found as  $1.52 \times 10^{-5}$  cm<sup>2</sup>/s from chronocoulometry study. The effect of temperature study was carried at 10 oC – 80oC and activation energy obtained was 5.8-6 kJ/mol. The morphology of composite surface was examined by scanning electron microscopy.

**Keyword:** Multi-walled carbon nanotubes; Titanium dioxide; Modified electrode; Potassium ferricyanide; Cyclic voltammetry.