

## Electrochemical measurements of multiwalled carbon nanotubes under different plasma treatments

### ABSTRACT

In the present work, we described the post-treatment effects of applying different plasma atmosphere conditions on the electrochemical performances of the multiwalled carbon nanotubes (MWCNTs). For the study, a composite of MWCNTs/Co/Ti was successfully grown on the silicon substrate and then pre-treated with ammonia, oxygen and hydrogen plasma. The composite was characterized by making use of field emission scanning electron microscopy (FESEM) for the surface morphology and Raman spectroscopy for the functionalization. Further, the electrochemical measurements were performed with the use of the cyclic voltammetry (CV) applied in the 0.01 M potassium ferricyanide in 0.1 M KCl solution. On testing, the results indicated that the NH<sub>3</sub>-treated MWCNTs have the highest efficiency as compared to the other pretreatments and control. This increased performance of NH<sub>3</sub> treated sample can be linked to the enhanced surface area of the composite, thereby improved adsorption and associated interaction with that of the analyte molecules at the electrodes. Further comparison of the electrode with that of commercial Dropsens electrodes provided the confirmation for the efficiency of the NH<sub>3</sub>/MWCNTs, thereby suggesting for the potentiality of applying the NH<sub>3</sub> modified electrode towards electrochemical applications.

**Keywords:** Multiwalled carbon nanotubes; Plasma treatment; Raman spectroscopy; Cyclic voltammetry