

ABSTRACT

The pre-grafted screen-printed gold electrode modified with phenyl-amino monolayer was investigated for covalent immobilization of phenyl-amine functionalized single-walled carbon nanotubes (PA-SWCNT) and metal tetra-amino phthalocyanine (MTAPc) using Schiff-base reactions with benzene-1,4-dicarbaldehyde (BDCA) as cross-linker. The PA-SWCNT and MTAPc modified electrodes were applied as hybrids for electrochemical sensing of H_2O_2 . The step-by-step fabrication of the electrode was followed using electrochemistry, impedance spectroscopy, scanning electron microscopy and Raman spectroscopy and all these techniques confirmed the fabrication and the immobilization of PA-SWCNT, MnTAPc and CoTAPc onto gold surfaces. The apparent electron transfer constant (k_{app}) showed that the carbon nanotubes and metallo-phthalocyanines hybrids possess good electron transfer properties compared to the bare, pre-grafted and the MTAPc modified gold electrode surfaces without PA-SWCNT. The electrochemical sensing of hydrogen peroxide was successful with PA-SWCNT–MTAPc hybrid systems showing higher electrocatalytic currents compared to the other electrodes. The analytical parameters obtained using chronoamperometry gave good linearity at H_2O_2 concentrations ranging from 1.0 to 30.0 $\mu\text{mol L}^{-1}$. The values for the limit of detection (LoD) were found to be of the orders of 10^{-7} M using the 3δ for all the electrodes. The PA-SWCNT–MTAPc modified SPAuEs were much more sensitive compared to PA–MTAPc modified SPAuEs.