Voltammetric determination of nitrophenol using PEDOT decorated graphene oxide as composite film

ABSTRACT

A composite film of poly(3,4-ethylenedioxythiophene) (PEDOT) and reduced graphene oxide (ERGO) deposited on screen printed carbon electrode (SPCE) was developed for the sensitive detection of 3-nitrophenol(NP). The electrode was modified with PEDOT/ERGO by using electropolymerization technique on the surface of SPCE. This new hybrid sensing material exhibits high electrocatalytic activity and good selectivity towards the reduction of 3-NP due to its excellent electrical conductivity, strong adsorptive ability and large effective surface area of PEDOT/ERGO composite film. The enhancement factor of the PEDOT/ERGO modified SPCE towards 3-NP was calculated to be 4 times higher compared to bare SPCE. Experimental parameters such as pH of buffer, scan rate, accumulation time and accumulation potential were optimized. Under optimum experimental conditions, the linear calibration curve of the sensor towards concentration of 3-NP was in the range of 0.3 μM to 70 μM with the detection limit of 0.08 μM. Furthermore, the PEDOT/ERGO sensor shows good repeatability and reproducibility with relative standard deviation (RSD) of 3.83 % and 4.85 %, respectively. The sensor also demonstrated potential application for the detection of 3-NP in water samples.