

Enhancement the electrochemical conductivity of a modified reduced graphene oxide/calixarene screen-printed electrode using response surface methodology

ABSTRACT

In this paper, Response Surface Methodology with central composite design (RSM/CCD) was used to optimize a modified electrode for improved electron transfer rate and electrochemical performance. The modification was done on a screen-printed carbon electrode (SPCE) with reduced graphene oxide (ERGO)/calix [4] arene (ERGOC4-SPCE). The properties of the modified electrodes were analyzed via cyclic voltammetry, Raman spectroscopy, and Fourier-Transform Infrared (FT-IR) spectroscopy. Then, different variables were optimized, namely, the concentration of graphene oxide, GO (A), the number of scan cycles of graphene oxide (B), and the deposition time (C). The effect of the optimized variables on the reduction-oxidation peak current response of the potassium ferricyanide redox system was analyzed. By using statistical analysis, it shows a significant effect of the concentration of GO, the deposition time, and the number of scans cycles on the peak current response. The coefficient of determination (R^2) value of 0.9987 produced indicated a good fit of the model with experimental finding.