P.S.B.3.

Thermolysis prepared Co_3O_4 carbon paste electrode decorated with single wall nanotubes as voltammetric sensor for determination of antioxidant α-lipoic acid

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The novel carbon material modified with Co_3O_4 particles, prepared by calcination and mixed with single wall carbon nanotubes, was characterized and used for sensing of prominent antioxidant α-lipoic acid (LA). The new material was prepared by thermolysis of Novolac phenol-formaldehyde resin and cobalt(III) nitrate mixed with graphite powder, producing mostly glassy carbon decorated with cobalt oxide. XRD and SEM measurements were used to study composition, structure and morphology of cobalt oxide modified carbon material. Impedance spectroscopy measurements indicate higher conductivity of thermolysis prepared Co_3O_4 carbon paste electrode with single wall carbon nanotubes ($TPCo_3O_4CPE/SWCNT$) compare to material without nanotubes ($TPCo_3O_4CPE$), while the best voltammetric response of LA was also recorded at $TPCo_3O_4CPE/SWCNT$. In order to find optimal conditions and investigate electrode process, effect of Co content in electrode material, influence of pH and scan rate were studied. The quantification of α-lipoic acid was done by sensitive square-wave voltammetric technique (SWV). Under the optimized SWV parameters, in Britton Robinson buffer solution at pH 6, the linear range was recorded from 2 to 100 μM of LA. $TPCo_3O_4CPE/SWCNT$ electrode exhibits good stability and reputability, too. This new combination of carbon materials, partially self-made, with incorporated Co oxide particles, could be interesting platform for determination of α-lipoic acid in dietary supplements and pharmaceutical formulations, with sensitivity and selectivity comparable and even better than determinations of this analyte at commercially available carbon electrodes and reported modified electrodes.