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Poly(gallic acid)/MWNT-modified electrode for the selective and sensitive voltammetric determination of quercetin in medicinal herbs

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Glassy carbon electrode modified with multi-walled carbon nanotubes and electropolymerized gallic acid (poly(gallic acid)/MWNT/GCE) has been developed for the direct quercetin quantification. The potentiodynamic electropolymerization procedure has been optimized. The best quercetin response has been registered on the polymeric film obtained using 15 cycles from 10 μM gallic acid in phosphate buffer (PB) pH 6.0 in the potential range from -0.2 to 1.0 V and the scan rate of 100 mV s^{-1}. Scanning electron microscopy (SEM), cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) has been applied for the electrode characterization. The polymeric film has porous structure providing high surface area in comparison to GCE (26.1±4.1 vs. 3.14 mm^2, respectively) as well as gives 1.7-fold decrease of the charge transfer resistance. The poly(gallic acid)/MWNT/GCE response is linear in the ranges of 0.075-25 μM and 25-100 μM of quercetin with the detection limit of 54 nM. The electrode selectivity in the presence of structurally related phenolic compounds is found. The method developed has been successfully applied for the medicinal herbs extract analysis. A good agreement with the independent determination has been obtained.

Keywords: *Voltammetry, modified electrodes, electropolymerization, carbon nanotubes, quercetin, phytochemical analysis.*

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