Enzymatic Electrochemical Biosensor Based on Multiwall Carbon Nanotubes and Cerium Dioxide Nanoparticles for Rutin Detection

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In this study, a simple and sensitive enzymatic electrochemical biosensor was developed to detect rutin by cyclic voltammetry (CV), differential pulse voltammetry (DPV) and square wave voltammetry (SWV) using a carbon paste electrode modified with a multiwall carbon nanotube (MWCNT), cerium oxide nanoparticle (CeO₂), and crude extract source of peroxidase enzyme (POx) composite. The electrochemical parameters and experimental conditions were optimized and evaluated. The enzymatic electrochemical biosensor (CeO₂/POx/MWCNTs/CPE) showed excellent electrocatalytic activity towards the detection of rutin. The surface physical characteristics of the modified electrode were studied by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). This biosensor demonstrated selectivity, stability, and reproducibility, which was further applied to detect rutin in medicine tablets and capsules with recoveries in the range of 97-102%.

Keywords: Multiwall carbon nanotubes, Cerium dioxide nanoparticles, Crude extract, Rutin, POx.

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