Ce-TiO₂/carbon Nanotube Composite Modified Glassy Carbon Electrode for Electrochemical Detection of Caffeic Acid

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In this paper, cerium doped titanium dioxide/carbon nanotubes (Ce-TiO₂/CNTs) composite was successfully prepared, and the Ce-TiO₂/CNTs modified glassy carbon electrode (Ce-TiO₂/CNTs/GCE) was applied to the electrochemical detection of caffeic acid (CA). Electrochemical methods such as cyclic voltammetry (CV) and differential pulse voltammetry (DPV) were used to characterize the electrochemical behaviors of the Ce-TiO₂/CNTs/GCE. Electrochemical data indicates the Ce-TiO₂/CNTs/GCE possesses a higher peak current for CA oxidation compared with bare GCE, Ce-TiO₂/GCE and CNTs/GCE. Combined with the good catalytic ability of Ce-TiO₂ and the large specific surface area as well as the excellent electrical conductivity of CNTs, the Ce-TiO₂/CNTs exhibited excellent electrochemical sensing of CA. Under the optimum conditions, the oxidation peak current at Ce-TiO₂/CNTs/GCE had a good linear relationship with CA concentration in the range of 1.0 nM to 10.0 μM.

Keywords: Caffeic acid; Cerium-titanium dioxide; Carbon nanotubes; Modified electrode.

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