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CeO_2-doped – domestic carbon material decorated with MWCNT as an efficient green sensing platform for electrooxidation of dopamine

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ABSTRACT

The goal of this work was to develop green electrode material that unites all advantages of domestic made, synthesized porous carbon powder and ceria dioxide nanoparticles known due to exceptional catalytic properties. Thermal decomposition of Novolac phenol-formaldehyde resin and cerium sulfate resulting in producing a high-performance CeO_2 porous carbon material highly sensitive to dopamine (DA) electrooxidation. Morphological and structural characteristics of the material were determined by SEM and XRD measurements, while electrochemical characterization was performed by EIS and CV. The sensitivity of DA determination on the proposed CeO_2-doped carbon material was enhanced by adding multi-wall carbon nanotubes to finally prepare a mixture for a specific carbon paste electrode ($TPCeO_2$&MWCNT@CPE). SWV technique was used for quantification of dopamine in Britton-Robinson buffer pH 6 in the concentration range of 0.5-100 μM of DA, with the detection limit of 0.14 μM and quantification limit of 0.44 μM. Good selectivity overstudied bioactive compounds enables the successful and efficient application of the proposed electrode and developed an analytical procedure for the determination of dopamine in spiked urine samples.

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