A Facile synthesis of ultra-small cerium oxide nanoparticles for enhanced Electrochemical Detection of Nitrobenzene in water samples

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The ultra-small cerium oxide nanoparticles (CeO₂ NPs) have been synthesized by the hydrothermal process. The structure and morphology of as-prepared nanoparticle were studied by transmission electron microscopy (TEM) and energy dispersive X-ray spectroscopy (EDX). The results confirm that the morphology of CeO₂ NPs was obtained uniform and spherical structure with the size ranging from approximately 2-5 nm. The obtained CeO₂ NPs was evaluated by the electrochemical sensing of nitrobenzene (NB). In order to, the sensor based on the modified SPCE exhibits good electrocatalytic activity and the sensitivity was about 1.1166 $\mu\text{A } \mu\text{M}^{-1} \text{ cm}^{-1}$. Remarkably, the CeO₂ NPs modified electrode showed the excellent lowest detection limit 0.092 μM over the linear range from 0.1 to 520 μM . Moreover, the ultra-small CeO₂ NPs was established good recoveries towards the determine the NB in tap water and river water samples.

Keywords: Cerium oxide; Hydrothermal; Nitrobenzene; Tap water; Mineral water.

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