

A facile hydrothermal synthesis of CeO₂ nanocubes decorated ZnO nanostructures: optical and enhanced photocatalytic properties

Farhang-Sahlevani, Saeed

Pandiyarajan, Thangaraj

Sanhueza, Felipe

Akbari-Fakhrabadi, Ali

Mansilla, Héctor D.

Contreras, David

Mangalaraja, Ramalinga Viswanathan

Gracia-Pinilla, M. A.

Synthesis of CeO₂, ZnO, and CeO₂ nanocubes decorated on the surface of ZnO ovals via a simple hydrothermal method was investigated. The crystalline nature and purity of CeO₂, ZnO and CeO₂ decorated ZnO were confirmed through X-ray diffraction (XRD) by the co-existence of cubic and hexagonal wurtzite phase of CeO₂ and ZnO, respectively. The transmission electron microscopy (TEM) images revealed that CeO₂ nanocubes were well decorated on the surface of ZnO in oval morphology. The optical properties of the prepared materials were investigated using diffuse reflectance spectroscopy (DRS) and photoluminescence (PL) spectra and also, the oxidation species presented in the materials were identified through X-photoelectron spectroscopy (XPS) spectra survey. The photocatalytic activity of CeO₂ decorated ZnO nanostructures against methylene blue (MB) as a model pollutant under visible light irradiation was enhanced when compared to those of the pure CeO₂ and ZnO nanostructures. The reusability of catalyst studies revealed that the efficiency of the visibility light degradation of MB was increased upon the CeO₂ deposited on the ZnO surfaces.