# Photocatalytic activity of Eu-doped $CeO_2$ from a morphological perspective

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Over the last years, environmental awareness has led us to a better understanding of the implications of pollution on our health and nature. The disposal of pollutants in water resources is particularly concerning and threatens the whole ecosystem that depends on it. Therefore, the demand for environment-friendly technologies to reduce, remediate, or prevent pollution has experienced a boost in the scientific community. A relevant and prominent research field is the use of catalysts to eliminate organic pollutants from water by photocatalytic processes. Recently, the synthesis of nanostructured catalysts with different morphologies offers a promising alternative to achieve better photocatalysts [1]. In this work, we studied the influence of different morphologies of europium doped ceria samples on their photocatalytic activity towards Rhodamine B. All samples were synthesized using the microwave-assisted hydrothermal (MAH) method. X-ray diffraction (XRD) analysis revealed that the nanostructures are single-phased and polycrystalline. Raman and infrared spectroscopies confirmed the samples are pure, and the europium cations isomorphically substituted the host cerium cations in the lattice. Transmission electron microscopy (TEM) showed nanorods, nanocubes, nanopolyhedrons, and irregular-shaped nanostructures were obtained. The nanopolyhedrons showed the best photocatalytic activity towards Rhodamine B, while the nanocubes were the least effective. Compared to irregular-shaped ceria nanostructures, the nanopolyhedrons were 5x more efficient in degrading the Rhodamine B dye. This study shows that morphology plays a significant role in the photocatalytic activity and can improve the elimination of hazardous organic pollutants from water.

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References:

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