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SYNTHESIS AND PHOTOCATALYTIC EVALUATION OF ELECTROSPUN TiO₂ NANOFIBERS DOPED WITH EUROPIUM FOR THE DEGRADATION OF ORGANIC POLLUTANTS.

The importance of water treatment cannot be ignored, especially now that the distribution and availability of this resource have been negatively affected, and it is essential for our survival. Photocatalysis is a technique used to degrade the organic pollutants present in industrial water. Titanium dioxide (TiO₂) is extensively utilized as a photocatalyst due to its chemical stability, easy production and benign impact on human health and the environment further enhance its appeal as a photocatalytic agent. However, the adsorption of organic pollutants is poor, due to its low ability to harvest sunlight. Enhancing photocatalytic performance can be achieved by doping with europium. The TiO₂:Eu³⁺ with 7.5% and TiO₂ nanofibers were fabricated by electrospinning technique. Both nanofibers were calcined at 600°C in an air atmosphere. The nanofibers were characterized by SEM, EDS, XRD, and DRS. SEM images demonstrated that the nanofibers look like network randomly oriented, with some areas with high material density and some empty spaces. From EDS spectra, we confirm the presence of europium in the doped nanofibers. The TiO₂ and TiO₂:Eu³⁺ shown the anatase phase. The bandgap was similar in both samples. The photocatalytic test was performed in the degradation of Rhodamine B (RhB) solution at 2.5 ppm and acetaminophen (AMF) at 7 ppm. With a pollutant-photocatalyst ratio of 1mL:1mg. After 6 hours of reaction, 25% of the AMF was degraded with TiO₂, but with TiO₂:Eu³⁺ 60% of the AMF had already been degraded. For RhB, in the same 6-hour time, with TiO₂ 80% of the dye had already degraded, and with TiO₂:Eu³⁺ 90% of the RDB had already degraded. It can be conclude that the presence of europium enhances the photocatalytic response.

Keywords

Photocatalysis, Titanium dioxide, europium, electrospinning, acetaminophen

Reference

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Author approval

I confirm

Author will attend

I confirm

Primary authors: GONZALEZ AMEZCUA, Andrea (Instituto Politécnico Nacional); Dr CRUZ GONZALEZ, Nadia (Instituto Politécnico Nacional)

Co-author: Dr ZAPATA TORRES, Martín (Instituto Politécnico Nacional)

Presenter: GONZALEZ AMEZCUA, Andrea (Instituto Politécnico Nacional)

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