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Synthesis of Er^{3+} doped ZnO nanoparticles for potential photocatalytic application

Population growth, industrialization, and commercial expansion have increased the use of industrial dyes in sectors such as textiles, pharmaceuticals, a cosmetics; in fact, the textile industry contributes nearly 20% of global drinking water pollution (European Parliament, 2024). This situation has driven the search for efficient treatment methods, among which advanced oxidation processes (AOPs) stand out, as they generate in situ oxidizing species and produce fewer secondary residues compared to conventional physical, chemical, or biological methods.

Among AOPs, photocatalysis is particularly relevant because it generates electron–hole pairs (e−/h+) that promote contaminant degradation. One strategy to enhance photocatalytic efficiency involves reducing the size of nanoparticles (NPs) and introducing structural defects or dopants that modify the bandgap and improve charge separation.

With this objective, we synthesized pure and erbium-doped ZnO nanoparticles using the solvothermal method for potential photocatalytic applications. The samples were characterized by SEM, EDS, XRD, and photoluminescence. Preliminary results show variations in lattice parameters, spherical morphology, and modifications in optical properties, indicating successful dopant incorporation.

Keywords: industrial dyes, photocatalysis, nanoparticles, ZnO-Er

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