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Iridium doped ZnO nanocomposites: Synergistic effect induced photocatalytic degradation of methylene blue and crystal violet(Article)

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Abstract

A series of novel iridium (Ir) nanoparticles doped ZnO nanocomposites were constructed via one-pot simple hydrothermal strategy and used as a visible light driven photocatalyst for the degradation of Methylene Blue (MB) and Crystal Violet (CV). The synthesized pure ZnO and Ir loaded ZnO nanocomposites were systematically characterized by crystal structure, structural morphology, elemental and optical properties. The photocatalytic performance of Ir doped ZnO (2%) nanocomposite is much higher than that of pure ZnO and other Ir doped ZnO nanocomposites and more encouragingly, 10 mg/L of MB can be completely removed within 50 min of irradiation. The Ir doped in the lattice of ZnO can act as the electron trapping sites, which effectively improve the charge carrier separation. The enhanced photocatalytic activity of Ir doped ZnO (2%) composite is mainly attributed to the synergistic interaction between ZnO and Ir NPs, which could not only enhance the light absorption range, but also accelerate photo-induced interfacial charge transfer during the photocatalytic processes. Influence factors such as initial dye concentrations and catalyst doses were investigated. The generation of reactive oxidative species (ROS) such as $^{[rad]}OH$, h^+ and $O_2^{[rad]-}$ was also been demonstrated. Moreover, this study also paves a new vista for promising applications in environmental water purity and energy harvesting. © 2019 Elsevier B.V.

Author keywords

Dye solutions | Iridium | Photocatalyst | Synergistic effect | Visible light irradiation

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