A Z-scheme visible light-driven Ag₃PO₄/CeO₂ composite and its application for Rhodamine B degradation

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Efficient, visible-light-driven Ag₃PO₄/CeO₂ composites with various concentrations Ag₃PO₄ were synthesized using a simple two-step method. The photocatalysts were characterized by various morpho-structural and optical methods, such as XRD, SEM, TEM, HR-TEM, EDX, SAED, XPS and DRS. The photocatalytic performance of Ag₃PO₄/CeO₂ composites was investigated by the photodegradation of Rhodamine B. The results shown that the photocatalytic degradation rate of 3:1 Ag₃PO₄/CeO₂ reached 95% in 36 minutes, which is 1.6 times higher than the yield of pure Ag₃PO₄. The photocatalytic efficiency was the lowest for pure CeO₂, reaching only 9% within 36 min. Cycling runs of 3:1-Ag₃PO₄/CeO₂ to RhB 59% is higher than that of Ag₃PO₄ 32%, which demonstrates that the combination and synergistic effect of CeO₂ and Ag₃PO₄ can improve the stability of photocatalyst. After active species capture experiments, a Z-scheme reaction mechanism was also presented to elucidate the mechanism of the photocatalytic degradation process shown by the composites.

Keywords: Composite; Photocatalytic degradation; Z-scheme.

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