Ag@AgBr/Ag₃PO₄ Nanocomposites as Photocatalyst for Degradation of Rhodamine B

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doi: 10.20964/2021.07.46

Received: 30 November 2020 / Accepted: 14 April 2021 / Published: 31 May 2021

Ternary nano-Ag@AgBr/Ag₃PO₄ was synthesized via an approach involving ion interchange-precipitation and in situ photo-assisted reduction. It was then characterized using X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), high-resolution transmission electron microscopy (HR-TEM), energy dispersive X-ray spectroscopy (EDX), selected area electron diffraction (SAED), X-ray photoelectron spectroscopy (XPS), and UV-Vis diffuse reflectance spectroscopy (DRS). Under visible light irradiation, Ag@AgBr/Ag₃PO₄ had high photocatalytic activity and stability with respect to the decomposition of rhodamine B (RhB). 0.1Ag@AgBr/Ag₃PO₄ showed the best photocatalytic performance and degraded 96% of RhB after 30 min of irradiation. It is known from the effects that different capture factors have on the photocatalytic reaction of RhB by 0.1Ag@AgBr/Ag₃PO₄, holes (h⁺) and superoxide anions (O₂⁻) are primarily responsible for the degradation of RhB. To explain the photocatalytic degradation process of RhB, a Z-type photocatalytic degradation mechanism was proposed.

Keywords: Nanocomposites; Photocatalytic degradation; RhB; Z-type

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