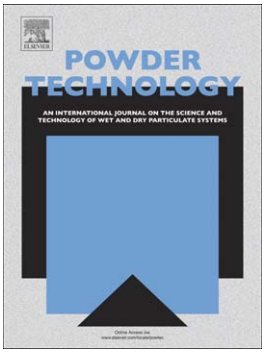

Graphene sheets based $Ag@Ag_3PO_4$ heterostructure for enhanced photocatalytic activity and stability under visible light

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Graphene sheets based $Ag@Ag_3PO_4$ heterostructure for enhanced photocatalytic activity and stability under visible light

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Abstract:

We designed the reduced graphene oxide (RGO) based $Ag@Ag_3PO_4$ hetero-photocatalyst by coprecipitation and photoreduction. The graphene sheets are fully coated with $Ag@Ag_3PO_4$ nanocrystals with an average diameter of 200 nm. $Ag@Ag_3PO_4$/RGO hetero-photocatalyst showed strong absorbance in the visible region and low recombination rate of holes and electrons. Compared with $Ag@Ag_3PO_4$, Ag_3PO_4 and Ag_3PO_4/graphene oxide (GO), $Ag@Ag_3PO_4$/RGO hetero-photocatalyst exhibited greatly enhanced photocatalytic activity under visible-light irradiation for the photodegradation of not only cationic dye (rhodamine B) but also anionic dye (methyl orange), which is usually difficult to be degraded over other catalysts. Moreover, the hetero-photocatalyst can be used repetitively with a high photocatalytic activity. The mechanism was explored and confirmed, showing that the improvements are attributed to the effective charge transfer from Ag_3PO_4 nanocrystals to RGO through Ag nanoparticles, which hinders the recombination of electron/hole pairs and the photocorrosion of Ag_3PO_4. This study could provide new insights in the design and fabrication of highly efficient visible light-driven novel photocatalysts for solving energy and environmental problems.

Keywords: Silver phosphate; Reduced graphene oxide; Photocatalytic; Rhodamine B; Stability.

1 Introduction

Energy and environmental problems have emerged as global concerns and are associated with

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