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Palladium/zinc indium sulfide microspheres: Enhanced photocatalysts prepare methanol under visible light conditions

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Abstract

Zinc indium sulfide microspheres were prepared via the hydrothermal method. Palladium/zinc indium sulfide nanocomposite was prepared using a photo-assisted deposition method. UV-vis diffuse reflectance spectra, X-ray diffraction, transmission electron microscopy, photoluminescence spectra and BET surface area analysis were used to characterize the ZnIn₂S₄ and Pd/ZnIn₂S₄ nanocomposite samples. According to the results, the shape of ZnIn₂S₄ is microspherical and the palladium dopants appear as dots on the surface of ZnIn₂S₄. Additionally, the optical and electronic properties of the Pd/ZnIn₂S₄ nanocomposite samples were improved when compared with those of ZnIn₂S₄. The Pd/ZnIn₂S₄ nanocomposite samples have a higher photocatalytic activity than that of ZnIn₂S₄ for the preparation of methanol from the visible light photocatalytic reduction of carbon dioxide. The 1.5 wt % Pd/ZnIn₂S₄ nanocomposite sample exhibits the best photocatalytic activity and can be used five times for reduction of carbon dioxide without a loss in performance. Our efforts might expand the use of zinc indium sulfide as a photocatalyst working in visible light region. (C) 2016 Taiwan Institute of Chemical Engineers. Published by Elsevier B.V. All rights reserved.

Keywords

Author Keywords: Zinc indium sulfide; Microspheres; Methanol preparation; Visible photoreduction

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