

Photocatalytic Degradation of 2-Propanol and Phenol Using Au Loaded MnWO₄ Nanorod Under Visible Light Irradiation

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Abstract

Single crystalline MnWO₄ nanorod has been prepared by low temperature hydrothermal reaction at 180 °C. The prepared MnWO₄ possesses band gap of 2.63 eV. Photochemical decomposition method has been followed to disperse Au nanoparticles onto MnWO₄ nanorod. The prepared Au loaded MnWO₄ nanorod demonstrated greatly enhanced photocatalytic activity in decomposing 2-propanol and evolving CO₂ in gas phase and phenol in aqueous phase compared to bare MnWO₄ and commercial TiO₂ nanoparticles (Degussa P25) under visible light ($\lambda \geq 420$ nm) irradiation. The Au loading was optimized to 3.79 wt% for the highest efficiency. The enhanced photocatalytic activity originates from the absorption of visible light by MnWO₄ as well as the introduction of nanoparticulate Au on the surface of MnWO₄ as cocatalyst to impede the recombination of photogenerated charge-carriers.