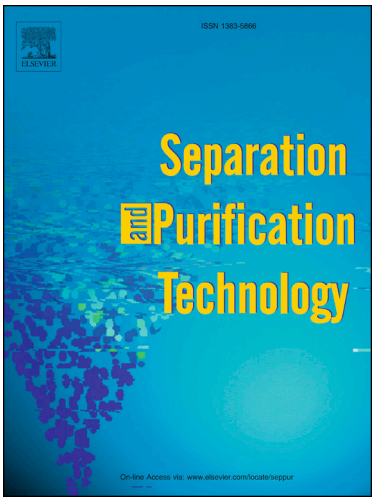

$ZnO/NiWO_4/Ag_2CrO_4$ nanocomposites with p-n-n heterojunctions: Highly improved activity for degradations of water contaminants under visible light

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$ZnO/NiWO_4/Ag_2CrO_4$ nanocomposites with p-n-n heterojunctions: Highly improved activity for degradations of water contaminants under visible light

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Abstract

To develop an efficient photocatalyst under visible light for remediation of environmental pollutants, novel $ZnO/NiWO_4/Ag_2CrO_4$ nanocomposites were synthesized by a simple ultrasonic-assisted method followed by a calcination step. Physiochemical properties of the photocatalysts were characterized by XRD, EDX, SEM, TEM, HRTEM, UV-vis DRS, FT-IR, and PL studies. It was found that the ternary nanocomposite with 30 weight percent of Ag_2CrO_4 displays the highest activity in removal of RhB, in terms of rate constants, which are nearly 43.7, 7.60, and 6.36 folds greater than those of the ZnO, $ZnO/NiWO_4$ (20%), and ZnO/Ag_2CrO_4 (30%) photocatalysts, respectively. This greatly enhanced photocatalytic performance was related to the p-n-n heterojunctions between the counterparts and strong visible-light absorption by $NiWO_4$ and Ag_2CrO_4 semiconductors. Additionally, the ternary nanocomposite exhibited the superior activity towards degradations of MB, MO, and fuchsine. A plausible mechanism was also discussed via active species trapping experiments. This work displayed that the rational design and construction of p-n-n heterojunctions could be powerful for developing highly efficient visible-light-active photocatalysts for environmental and energy applications.

Keyword: $ZnO/NiWO_4/Ag_2CrO_4$; Ternary photocayalyst; Heterojunctions; Visible-light-driven.

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