

硫化亚铜/四针状氧化锌晶须纳米复合材料的制备及其光催化性能

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摘要 在聚乙烯吡咯烷酮的辅助下, 采用多元醇法制备了不同铜/锌摩尔比的硫化亚铜/四针状氧化锌晶须纳米复合材料, 并利用 X 射线衍射、场发射扫描电镜、X 射线光电子能谱和紫外-可见漫反射光谱对样品进行了表征. 结果表明, 在紫外光照射下, 样品对甲基橙的光降解效率优于纯 ZnO 晶须. 在铜/锌摩尔比低于 4% 时, 样品的光催化性能随着铜/锌摩尔比增加而增加, 但随着铜/锌摩尔比的继续增加, 样品的光催化性能下降. 此外, 还采用周期实验来评价催化剂的稳定性. 结果表明, 该催化剂具有优异的光催化稳定性.

关键词: 氧化锌 硫化亚铜 多元醇法 光催化性能 甲基橙

Abstract: Nanocomposites of tetrapod-like ZnO whisker (T-ZnOw) with loaded Cu₂S were synthesized with different Cu/Zn molar ratios with the assistant of poly(vinyl pyrrolidone) (PVP) by the polyol process. The composite samples were characterized by X-ray diffraction, field emission scanning electron microscopy, X-ray photoelectron spectroscopy, and UV-visible diffuse reflectance spectroscopy. The photocatalytic activities for the Cu₂S/T-ZnOw nanocomposites increased with Cu/Zn molar ratio up to 4%, and then decreased with further increase of the Cu/Zn molar ratio up to 10%. The Cu₂S/T-ZnOw nanocomposites exhibited higher activity than T-ZnOw for the photocatalytic degradation of methyl orange. Recycling experiments were also performed. The photocatalytic activity of the photocatalyst showed no decrease after three cycles, which demonstrated that the Cu₂S/T-ZnOw photocatalyst had excellent stability.

Keywords: zinc oxide, copper sulphide, polyol method, photocatalytic performance, methyl orange

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