

Cd₂Ge₂O₆ 纳米棒的水热法合成及其液相光催化性能

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摘要 以十六烷基三甲基溴化铵、醋酸镉和二氧化锗为前驱物, 在优化的水热条件下制备了 Cd₂Ge₂O₆ 纳米棒. 采用 X 射线粉末衍射、扫描电镜、透射电镜和紫外-可见漫反射光谱等手段对样品进行了表征, 并以甲基橙和水杨酸为模拟污染物, 考察了催化剂的液相光催化性能. 结果表明, 在弱碱性水热条件下可制得 Cd₂Ge₂O₆ 纳米棒, 其液相光催化活性高于商用 TiO₂. 在以 Cd₂Ge₂O₆ 为催化剂的光催化反应体系中, 能生成大量的羟基自由基.

关键词: 镉酸锗 纳米棒 水热法 光催化 水污染

Abstract: Cd₂Ge₂O₆ nanorods were successfully synthesized by a hydrothermal method using cetyltrimethylammonium bromide, cadmium acetate, and germanium dioxide as the precursors. The prepared samples were characterized by X-ray diffraction, scanning electron microscopy, transmission electron microscopy, and UV-Vis diffuse reflectance spectroscopy. The photocatalytic activity was evaluated by the decomposition of methyl orange and salicylic acid in aqueous solution. The active oxygen species in the photocatalytic process were detected by the method of chemiluminescent fluorescence. The results reveal that Cd₂Ge₂O₆ nanorods can be prepared under weak basic conditions by the hydrothermal method. The Cd₂Ge₂O₆ nanorods have a higher photocatalytic activity for decomposing organic pollutants in aqueous solution than the widely used commercial TiO₂. In the photocatalytic process of Cd₂Ge₂O₆, a large number of hydroxyl radicals were produced, which are the main active oxygen species of the photocatalytic system.

Keywords: cadmium germanate, nanorod, hydrothermal method, photocatalysis, water pollution

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