

NiCo₂S₄@CeO₂ 的制备及其降解直接湖蓝 5B 的研究

摘 要

CeO_2 价格便宜、容易获取、无毒无害，是一种常用的稀土氧化物半导体材料，其具有独特的晶体结构、可控的形貌以及优秀的储氧能力，但是 CeO_2 光催化效率低，只能吸收部分可见光，在光催化应用领域的发展存在局限性，因此需要对 CeO_2 进行改进来提高它的光催化性能。选择纺锤状 CeO_2 作为前驱体，通过水热合成法制备出 $\text{NiCo}_2\text{S}_4@\text{CeO}_2$ 二元复合催化剂，然后采取 XRD 衍射，SEM 表征，FTIR 表征对其进行一系列的表征，XRD、FTIR 分析表明了 $\text{NiCo}_2\text{S}_4@\text{CeO}_2$ 复合催化剂的制备很成功，SEM 分析得出 CeO_2 的微观结构是立方体状。为了研究 $\text{NiCo}_2\text{S}_4@\text{CeO}_2$ 的催化活性本文以直接湖蓝 5B 为污染物进行光催化降解，结果 $\text{NiCo}_2\text{S}_4@\text{CeO}_2$ 二元复合催化剂的降解效果明显，其催化活性比纯 CeO_2 的光催化活性有了很大提高，并且其浓度为 0.08 g/L 时对直接湖蓝 5B 的降解效果最佳，去除率达到了 44.5% 左右。

关键词：光催化， CeO_2 ，复合材料，直接湖蓝 5B

ABSTRACT

CeO₂ is cheap, easy to obtain, non-toxic and harmless, is a commonly used rare earth oxide semiconductor material, which has a unique crystal structure, controllable morphology and excellent oxygen storage capacity, but CeO₂ photocatalytic efficiency is low, only It can absorb part of the visible light, and its development in the field of photocatalysis has limitations, so CeO₂ needs to be improved to improve its photocatalytic performance. The spindle-shaped CeO₂ was selected as the precursor, the NiCo₂S₄@CeO₂ binary composite catalyst was prepared by hydrothermal synthesis, and then XRD diffraction, SEM characterization, and FTIR characterization were used to perform a series of characterization. XRD and FTIR analysis showed that The preparation of NiCo₂S₄@CeO₂ composite catalyst was very successful. The SEM analysis showed that the microstructure of CeO₂ was cubic. In order to study the catalytic activity of NiCo₂S₄@CeO₂, this article uses direct lake blue 5B as a pollutant for photocatalytic degradation. As a result, the degradation effect of the NiCo₂S₄@CeO₂ binary composite catalyst is obvious, and its catalytic activity is greatly improved compared to the photocatalytic activity of pure CeO₂, and its concentration is 0.08 g/L, the best degradation effect of Direct Lake Blue 5B, the removal rate reached about 44.5%.

Key words: Photocatalysis, CeO₂, Compound material, Direct blue 5

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