

简单浸渍法制备纳米CuO/TiO₂及其光催化剂活性

王保伟, 孙启梅, 李艳平, 刘思含

天津大学化工学院绿色合成与转化教育部重点实验室, 天津 300072

Photocatalytic activity of nano-CuO/TiO₂ composites prepared by a simple impregnated method

WANG Bao-wei, SUN Qi-mei, LI Yan-ping, LIU Si-han

Key Laboratory for Green Chemical Technology of the Ministry of Education, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China

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摘要 以Cu(NO₃)₂·3H₂O和P25为前驱体,通过简单浸渍法制备了CuO/TiO₂光催化剂,利用N₂物理吸附、XRD、TEM、UV-vis漫反射光谱分析了催化剂的结构特性。研究了Cu组分的负载量、催化剂在反应液中的分散量、催化剂焙烧温度、反应液中甲醇浓度对CuO/TiO₂光催化反应产氢活性的影响,并考察了催化剂的稳定性,提出了该体系光催化反应的机理。结果表明,Cu的适宜负载量为2.0%~7.5%(质量分数),在Cu质量分数2.0%、催化剂焙烧温度350℃、甲醇的体积浓度为10%、催化剂分散量为1.0 g/L时,产氢活性可达到1 022 μmol/(h·g),并且该催化剂具有较好的稳定性。

关键词: TiO₂ CuO 光催化 氢气 可见光

Abstract: CuO/TiO₂ composites were prepared by a simple impregnated method with Cu(NO₃)₂·3H₂O and P25 as precursors. The characteristic of photocatalysts were analyzed by N₂-physisorption, XRD, TEM, UV-vis DRS spectra. In this paper, the effects of Cu content, the scattered catalyst amount, calcination temperature of the photocatalyst and methanol concentration for the photocatalytic activity of CuO/TiO₂ composites were studied. We also investigated the stability of the catalyst and proposed a mechanism of the photocatalytic process. The results suggested that the appropriate content of Cu component in CuO/TiO₂ is 2.0%~7.5% and hydrogen production rate can reach 1 022 μmol/(h·g) at 2.0% of Cu content, 10% of methanol concentration, 350℃ of calcination temperature and 1.0 g/L of scattered catalyst amount. It was also demonstrated that CuO/TiO₂ photocatalyst had a stable activity for H₂ evolution.

Key words: TiO₂ CuO photocatalyst hydrogen visible light

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通讯作者: 王保伟, E-mail: wangbw@tju.edu.cn. E-mail: wangbw@tju.edu.cn



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