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应用物理 电子学

ZnO纳米棒/PVC复合材料的光催化性能研究

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摘要

用水热法制备了氧化锌纳米棒，在此基础上通过溶液共混制备了氧化锌纳米棒/PVC复合材料前驱体，适当温度下煅烧得到了氧化锌纳米棒/PVC复合材料.借助XRD，TEM，SEM，IR，UV-Vis和ESR等测试手段对氧化锌纳米棒及其复合材料进行了表征.以甲基橙为目标降解物，研究了氧化锌纳米棒和复合材料在可见光下的光催化性能和复合材料制备条件对光催化的影响.实验结果表明，复合材料的最佳制备条件为：氧化锌和PVC的质量比1∶1，煅烧温度250 ℃，煅烧时间1 h.在光催化剂用量为0.5 g/L，甲基橙浓度为10 mg/L，采用15 W家用照明荧光灯做光源的光催化体系下，复合材料对甲基橙的降解率达到88%，表明了制备的氧化锌纳米棒/PVC复合材料具有良好的可见光光催化性能.

关键词 氧化锌纳米棒； PVC； 复合材料； 光催化

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Study on the photocatalytic property of ZnO nanorod/PVC composite (Chinese)

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Abstract

Composite precursor was synthesized by mixing ZnO nanorod which was attained by hydrothermal method and polyvinyl chloride solution, ZnO nanorod/PVC composite was prepared by calcinating the precursor at appropriate temperature. Also, the composite was characterized by XRD, TEM, SEM, IR, UV-Vis and ESR. We studied on the photocatalytic property of ZnO nanorod and its composite under visible light, and evaluated the effect of preparations using methyl orange(MO) as a probe reaction. The experiments showed the optimum conditions for preparing this composite are: the mass ratio of ZnO nanorod and PVC is 1∶1, calcined temperature is 250 ℃ and calcined time is 1 h. Otherwise, the composite can degrade MO up to 88% under illumination with 15 W home light for 3 h when the concentration of MO is 10 mg/L, and the dose of photocatalyst is 0.5 g/L. The results above indicated that ZnO nanorod/PVC composite has good photocatalytic property under visible light.

Key words ZnO nanorod PVC composite photocatalysis

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