研究报告

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RGO/TiO_2光催化降解2,4-二氯苯氧乙酸研究

Preparation of RGO/TiO_2 composites materials for photocatalytic degradation of 2,4-dichlorophenoxyacetic acid

关键词：紫外光/热还原法 石墨烯 RGO/TiO_2复合材料 2,4-二氯苯氧乙酸 光催化降解

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摘要：通过Hummers法及紫外光/热还原工艺制得还原氧化石墨烯(RGO),采用溶胶-凝胶-煅烧法,以RGO和钛酸酊脂为前驱体制备出RGO/TiO_2光催化复合材料,并利用XRD、FT-IR等对其进行了表征.对RGO/TiO_2光催化降解性能的研究发现,复合光催化剂RGO/TiO_2对2,4-二氯苯氧乙酸(2,4-D)的光催化降解活性显著优于纯TiO_2,并且发现负载量和pH值对光催化降解性能有较大的影响:RGO/TiO_2投加量为1.2 g·L^{-1}、RGO负载量2%、pH为3、初始浓度为50 mg·L^{-1}反应12 h,2,4-D去除率达到98.75%;2,4-D降解率随着RGO/TiO_2投加量的增大先增大后减小;RGO/TiO_2对2,4-D的降解为脱氯还原和催化氧化过程,产生氯酚、苯酚等中间产物.

Abstract：The reduced graphene oxide (RGO) was synthesized by the methods of Hummers and UV/thermal reduction process, the RGO/TiO_2 composite photocatalyst materials were prepared through sol-gel-calcination method by using RGO and tetra-n-butyl titanate as precursors. These complexes were characterized by XRD and FT-IR. The studies indicate that composites RGO/TiO_2 exhibited significantly higher photocatalytic activity than pure TiO_2 on degradation of 2,4-dichlorophenoxyacetic acid (2,4-D). The photocatalytic activity of composites RGO/TiO_2 depended on loading rate of RGO and pH value:after 12 h, the degradation of 2,4-D reached 98.75% when the dosage of RGO/TiO_2 was 1.2 g·L^{-1}, the content of RGO was 2%, pH was 3 and the initial concentration of 2,4-D was 50 mg·L^{-1}. The degradation rate of 2,4-D increased first and then decreased with increasing the dosage of RGO/TiO_2. The degradation of 2,4-D by RGO/TiO_2 through the process of dechlorination and catalytic oxidation, and produced chlorophenols, phenol and other intermediate products.

Key words：UV/thermal reduction method graphene RGO/TiO_2 composites 2,4-dichlorophenoxyacetic acid photocatalytic degradation