

# Ag(Au)/石墨烯-TiO<sub>2</sub> 复合光催化剂的制备及其模拟太阳光光催化性能

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**摘要** 分别采用溶剂热还原和光还原沉积法制备了石墨烯-TiO<sub>2</sub> 和 Ag(Au)/石墨烯-TiO<sub>2</sub> 复合光催化剂, 并表征了其相结构、形貌、孔隙率、光谱吸收性质以及组成结构。结果表明, 石墨烯与 TiO<sub>2</sub> 通过 C-O-Ti 共价键相互作用, Ag 或 Au 纳米粒子均匀沉积在石墨烯和 TiO<sub>2</sub> 表面。在模拟太阳光照射下, 通过对水相中罗丹明 B 和甲基橙的降解, 考察了光催化剂活性的差异, 并研究了其降解动力学。结果表明, 由于量子效率的提高、带隙能的降低以及结构性质的优化, 复合光催化剂表现出比纯 TiO<sub>2</sub> 更高的光催化活性。

**关键词:** 石墨烯 二氧化钛 银 金 溶剂热还原 光还原 罗丹明 B 甲基橙

**Abstract:** To improve the solar utilization efficiency of TiO<sub>2</sub>, the graphene-TiO<sub>2</sub> and Ag(Au)/graphene-TiO<sub>2</sub> composite photocatalysts were prepared by solvothermal reduction and photoreduction deposition technique, respectively. The phase structure, morphology, porosity, optical absorption property as well as composition and structure of as-prepared materials were characterized. The results indicated that TiO<sub>2</sub> interacts with graphene via Ti-O-C covalent bonds and Ag or Au nano-particles evenly deposit on the graphene and TiO<sub>2</sub> surface. The photocatalytic activity and degradation kinetics of the as-prepared photocatalysts were studied by the degradation of aqueous rhodamine B and methyl orange under solar simulating Xe lamp irradiation. The results indicated that the composite photocatalysts exhibit higher photocatalytic activity compared with pure TiO<sub>2</sub> due to enhanced quantum efficiency, narrowed band gap, and perfect textural properties.

**Keywords:** graphene, titania, silver, gold, solvothermal reduction, photoreduction, rhodamine B, methyl orange

收稿日期: 2012-09-01; 出版日期: 2012-10-26

引用本文:

姜凌霄, 李可心, 颜流水等. Ag(Au)/石墨烯-TiO<sub>2</sub> 复合光催化剂的制备及其模拟太阳光光催化性能[J]. 催化学报, 2012, V33(12): 1974-1981

JIANG Ling-Xiao, LI Ke-Xin, YAN Liu-Shui etc. Preparation of Ag(Au)/Graphene-TiO<sub>2</sub> Composite Photocatalysts and Their Catalytic Performance under Simulated Sunlight Irradiation[J]. Chinese Journal of Catalysis, 2012, V33(12): 1974-1981

链接本文:

<http://www.chxb.cn/CN/10.3724/SP.J.1088.2012.20820> 或 <http://www.chxb.cn/CN/Y2012/V33/I12/1974>





















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