

研究论文

高度分散的Pt/TiO<sub>2</sub>的制备及光催化活性

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**摘要** 用柠檬酸作为空穴捕获剂和分散剂, 在温和条件下用光催化还原法将3 nm金属铂沉积在7 nm的锐钛矿相及介孔二氧化钛纳米晶表面. TEM观察显示铂的负载量为 $w=1.0\%$ 时, 多数二氧化钛纳米晶表面沉积了岛状的铂团簇, XPS和电子衍射结果表明铂以游离态存在. 负载 $w=1.0\% \sim 2.0\%$ 铂的TiO<sub>2</sub>在苯酚光氧化反应中活性显著提高. Pt/TiO<sub>2</sub>在氨气中经550 °C氮化, 可制得氮掺杂的Pt/TiO<sub>2</sub>可见光光催化剂, 氮化过程中铂团簇没有烧结和显著长大.

**关键词** [二氧化钛](#) [光催化沉积](#) [光催化剂](#) [铂](#) [可见光催化](#)

分类号

## Preparation and the Enhanced Photocatalytic Activity of Highly Dispersed Pt Loaded on TiO<sub>2</sub> Nanocrystals

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**Abstract** The metallic platinum clusters in size of 3 nm were photocatalytically deposited on anatase (7 nm) or mesoporous TiO<sub>2</sub> in the presence of citric acid as a double-functional agent (a hole scavenger and a dispersant to keep Pt clusters from agglomeration). The particle size of the deposited platinum was uniform and in the range of 3~4 nm, and the surface of majority of TiO<sub>2</sub> nanocrystals was deposited with an island of Pt cluster. Both XPS and ED results identified that the deposited Pt consisted of metallic atoms. The Pt/TiO<sub>2</sub> showed a significantly enhanced photocatalytic activity using the degradation of phenol as a model reaction. The Pt/TiO<sub>2</sub> was subjected to nitridation in the flowing NH<sub>3</sub> at 550 °C, and Pt-loaded TiO<sub>2-x</sub>N<sub>x</sub> nanocrystals were obtained. The particle size of Pt clusters was preserved and Pt clusters were not sintered at this temperature.

**Key words** [titania](#) [photocatalytic deposition](#) [photocatalyst](#) [platinum](#) [visible light driven photocatalysis](#)

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