

## 研究论文

### N掺杂介孔TiO<sub>2</sub>柠檬酸催化合成及其光催化性能研究

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**摘要:** 采用柠檬酸催化溶胶-凝胶法合成了N掺杂介孔TiO<sub>2</sub>,并用XRD、HRTEM、XPS、BET、UV-vis等手段表征了N-TiO<sub>2</sub>。测试结果表明,煅烧前的样品是无定形TiO<sub>2</sub>,低温煅烧后的产物是锐钛矿TiO<sub>2</sub>,而750℃煅烧产物是金红石型。少量N元素的掺杂致使TiO<sub>2</sub>的吸收带边位置发生少许红移,移向可见光区域。N<sub>2</sub>吸附-脱附和光解甲基橙结果显示,N掺杂介孔TiO<sub>2</sub>(3.0 at.%)的BET面积为102 m<sup>2</sup>/g,孔尺寸大小约为9.8 nm,具有比P25更强的光催化降解甲基橙的能力。

**关键词:** 无机非金属材料 介孔TiO<sub>2</sub> N掺杂 甲基橙 光催化

### Citric Acid-Catalyzed Synthesis of N-doped Mesoporous TiO<sub>2</sub> and Their Photocatalytical Properties

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**Abstract:** N-doped mesoporous TiO<sub>2</sub> was prepared via a facile sol-gel route catalyzed by citric acid, and N-TiO<sub>2</sub> was characterized using powder X-ray diffraction (XRD), High-resolution transmission electron microscope (HRTEM), X-ray photoelectron spectrum (XPS), N<sub>2</sub> adsorption (BET), UV-vis diffused reflectance spectra (UV-vis). The results revealed that uncalcined N-TiO<sub>2</sub> was amorphous, and the products calcined under lower temperatures were anatase, while the one annealed at 750°C was rutile. The doping of a little N element resulted in a red shift of the absorption edge, shifting to the visible light region of mesoporous TiO<sub>2</sub>. N<sub>2</sub> adsorption isotherm showed that the BET surface area and the average pore size of N-doped TiO<sub>2</sub> were about 102 m<sup>2</sup>/g and 9.8 nm, respectively. Compared with P25 TiO<sub>2</sub>, N-doped mesoporous TiO<sub>2</sub> exhibited improved photocatalysis activities for photodegradation of methyl orange.

**Keywords:** inorganic non-metallic materials mesoporous TiO<sub>2</sub> N-doped methyl orange photocatalysis

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