

## 氮掺杂纳米TiO<sub>2</sub>粉体的制备研究

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### 摘要

以锐钛矿相纳米TiO<sub>2</sub>粉体和盐酸胍的混合物为起始反应物, 通过在不同温度条件下对反应物直接进行热处理制得了淡黄色的掺氮纳米TiO<sub>2</sub>粉体. 采用XRD、BET、XPS、紫外-可见光漫反射对所制备的粉体进行了性能表征. XPS测试表明, 掺氮粉体N1s的结合能峰位于396.9eV处, 表明N原子以Ti--N键的形式存在于TiO<sub>2</sub>中, N原子进入了TiO<sub>2</sub>晶格, 实现了掺杂. 其中, 在350°C、保温2.5h的条件下所制样品的掺氮量达到8.3%. XRD分析表明, 实验制得的氮掺杂TiO<sub>2</sub>粉体在350、450、550、650°C热处理3h后仍为锐钛矿相; 掺氮样品均具有好的紫外光吸收, 且吸收边均红移至可见光区; 350°C保温2.5h时具有最好的紫外-可见光响应, 其吸收边红移至700nm左右. 亚甲基蓝的可见光降解实验表明氮掺杂样品具有良好的可见光催化活性.

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## Preparation of Nitrogen-doped Nano-TiO<sub>2</sub> Powders

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### Abstract

Light yellow nitrogen-doped nano-TiO<sub>2</sub> powders were prepared by directly calcining the mixture of anatase TiO<sub>2</sub> powders and guanidine hydrochloride in the muffle furnace at different temperatures. The as-synthesized powders were characterized by XRD, BET, XPS and UV-Vis reflectance spectroscopy. X-ray photoelectron spectroscopy (XPS) results show that N atoms are incorporated into the lattice of TiO<sub>2</sub> and the concentration of N is up to 8.3at%. XRD patterns indicate that all the powders are anatase crystalline phase. The UV-visible response and higher absorption in the visible light region can be observed. UV-Vis spectral absorption results show that the synthesized N-doped TiO<sub>2</sub> powder calcined at 350°C for 2.5h, has red-shifted well into visible region up to 700nm. The photodegradation of methylene blue shows that N-doped TiO<sub>2</sub> has high visible light photocatalysis.

**Key words** [direct calcining method](#) [N-doped TiO<sub>2</sub>](#) [visible light response](#) [photocatalysis](#)

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