

高湿度下紫外光辐射对sol-gelTiO<sub>2</sub>薄膜强度、结构和亲水性能的影响

管自生

南京工业大学材料科学与工程学院

收稿日期 修回日期 网络版发布日期 接受日期

摘要 应用sol-gel法制备了TiO<sub>2</sub>薄膜,在321 K和高湿度下应用500 W高压汞灯对薄膜进行辐射处理,应用划痕法测定了薄膜的强度。利用红外光谱(IR)、拉曼光谱(Raman)

和接触角仪研究了光辐射对薄膜和结构和亲水性能的影响,结果表明高

湿度下紫外光辐射可以促使刚制备TiO<sub>2</sub>薄膜中的羟基、有机基团脱落和Ti-O-Ti结构生成,使TiO<sub>2</sub>

薄膜的强度、晶化程度显著提高和薄膜在可见光区域吸收增加。刚制备的sol-gel TiO<sub>2</sub>

薄膜的亲水性能随着光辐射先是下降,然后上升,且各向

亲水同性。通过此方法可以在不耐温的基材上制备致密的高强度的和具有一定光致

亲水性能的初步晶化的TiO<sub>2</sub>薄膜。

关键词 [溶胶-凝胶法](#) [氧化钛](#) [薄膜](#) [亲水性](#) [红外分光光度法](#) [喇曼光谱法](#) [紫外分光光度法](#)

分类号 [0612](#)

## Effects of UV Irradiation on the Intensity, Structure and Hydrophilicity of Sol-gel TiO<sub>2</sub> Films in High-humidity

Guan Zisheng

College of Materials Science and Engineering, Nanjing University of Technology

**Abstract** Titanium oxide thin films were prepared via sol-gel method and irradiated with a 500 W high-pressure mercury lamp in high-humidity at 321 K. The intensity of the films was measured by the scratch method. The effects of irradiation on the structure and hydrophilicity of the films were measured by IR and Raman spectra and water contact angle, respectively. The results indicated that in high-humidity UV irradiation promoted hydroxy and other organic groups to break off and Ti-O-Ti bond to form, which increased the intensity, crystallization and absorption in visible region. Under UV irradiation the hydrophilicity of newly prepared films decreased firstly, then increased. Moreover, the hydrophilicity of TiO<sub>2</sub> films is isotropic. This method can be applied in the preparation of highly intensive, crudely crystalline and hydrophilic TiO<sub>2</sub> films on the temperature- nonresistance materials at low temperature.

**Key words** [SOL-GEL PROCESS](#) [TITANIUM OXIDE](#) [THIN FILMS](#) [HYDROPHILICITY](#) [IR](#) [RAMAN SPECTROMETRY](#) [UV](#)

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