

### 论文摘要

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## 热处理温度对TiO<sub>2</sub>纳米管阵列薄膜光生阴极 保护性能的影响

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**摘 要:** 在0.5 mol/L NH<sub>4</sub>HF<sub>2</sub>与1.0 mol/L NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub>的混合溶液中, 利用阳极氧化的方法在钛基体上原位合成自组装有序的TiO<sub>2</sub>纳米管阵列薄膜材料, 研究不同热处理温度对薄膜晶型及光生阴极保护能力的影响。结果表明: 在外加电压为20 V时, 对钛基体氧化8 h可得到长度为2 μm、内径为80 nm、外径为100 nm的TiO<sub>2</sub>纳米管阵列; 经600 °C热处理后, TiO<sub>2</sub>纳米管阵列具有稳定的管状结构, 薄膜电极电位可负移至-0.389 V (vs SCE), 表现出较佳的光生阴极保护能力。

**关键字:** TiO<sub>2</sub>纳米管阵列薄膜; 阳极氧化; 光生阴极保护

## Effect of annealing temperature on photo-induced cathodic protection of aligned TiO<sub>2</sub> nanotube thin films

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**Abstract:** The aligned TiO<sub>2</sub> nanotube thin films were fabricated on the Ti substrate in 0.5 mol/L NH<sub>4</sub>HF<sub>2</sub> and 1.0 mol/L NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> aqueous solution via anodic oxidation method. The crystal type and photo-induced cathodic protection performance were investigated after the TiO<sub>2</sub> nanotube thin films were annealed at different temperatures. The results show that the nanotubes with inner diameter of 80 nm, outer diameter of 100 nm and length of 2 μm can be obtained after the Ti substrate is anodized for 8 h with the anodizing voltage of 20 V. The nanotube structure still remains even after being annealed at 600 °C, and their open circuit potential can negatively shift to about -0.389 V(vs SCE), which means that the annealed TiO<sub>2</sub> nanotube thin films have excellent photo-induced cathodic protection properties.

**Key words:** aligned TiO<sub>2</sub> nanotube thin film; anodic oxidation; photo-induced cathodic protection

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