

论文

纳米TiO<sub>2</sub>-SnO<sub>2</sub>复合薄膜的光生阴极保护作用及机理研究

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摘要:

用溶胶-凝胶法和旋转涂膜技术在导电玻璃(ITO)表面构筑纳米TiO<sub>2</sub>膜和纳米TiO<sub>2</sub>-SnO<sub>2</sub>复合膜,应用AFM、XRD对膜的形貌及晶体结构进行表征.用光电化学和腐蚀电化学相结合技术,通过测试时间-电位曲线和交流阻抗谱研究光生阴极保护状态下316L不锈钢电极在0.5 mol/L NaCl溶液中的微观界面电荷分布及电子传递规律,探讨光生阴极保护的作用机理.结果表明以TiO<sub>2</sub>-SnO<sub>2</sub>复合膜作为光生阳极时,在紫外光照下,316L不锈钢电极可在阴极保护状态,并且在切断光源后,光生电极电位仍可在较长的一段时间内维持在-0.2 V左右,仍具有一定的阴极保护作用.

关键词: 纳米TiO<sub>2</sub>-SnO<sub>2</sub>复合膜 光生阴极保护 腐

Studies of Mechanism on Photogenerated Cathodic Protection of the TiO<sub>2</sub>-SnO<sub>2</sub> Composite Films

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Abstract:

By the sol-gel method and spin-coating process,the nano TiO<sub>2</sub>-SnO<sub>2</sub> composite films have been prepared on the surface of the indium-tin oxide(ITO)glass and 316L stainless steel.The morphology and crystalline structure have been characterized by AFM and XRD.The anticorrosion property of the composite coatings has been studied under dark condition by electrochemical methods.Similarly,the performance of photogenerated cathodic protection of the composite coatings has been measured in 0.5 mol/L NaCl solution(pH=4-6)by combining photoelectrochemical system with corrosion electrochemical system under UV illumination.The results show that in dark the nano TiO<sub>2</sub>-SnO<sub>2</sub> composite films have a poorer anticorrosion property than that of the nano TiO<sub>2</sub> coatings.Under UV illumination condition the composite films as a photoanode provide a cathodic protection for 316L,and when the UV light is shut off,its photogenerated potential can remain a cathodic protection of metal for 6 hours.The mechanism of the photogenerated cathodic protection has also been studied by electrochemical impedance spectra.

Keywords: nano TiO<sub>2</sub>-SnO<sub>2</sub> composite film photogenerated cathodic protection corrosion mechanism

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