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不锈钢基底上**TiO2**薄膜型光催化剂的制备和化学结构

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摘要 采用钛酸正丁酯作为前驱体，通过溶胶-凝胶法在不锈钢基片上制备了TiO2纳米薄膜。利用俄歇电子能谱(AES)和紫外反射光谱等研究手段，对TIO2薄膜的化学结构及基底材料界面相互作用进行了系统研究。结果发现，在不锈钢基底上形成的TiO2薄膜与基底材料发生了明显的界面扩散反应。在TiO2薄膜的形成过程中，不锈钢中Fe元素向TiO2薄膜层扩散，并与从大气氛中扩散到界面的氧发生化学反应，形成铁氧化物界面过渡层。界面氧化过程，导致了Fe向样品表面的偏析和扩散。在高温热处理过程中，Fe可以扩散到TiO2薄膜的表面。薄膜催化剂的紫外反射光谱表明，界面扩散反应导致了Fe扩散进入TiO2薄膜的晶格，从而改变了薄膜催化剂的光吸收性能。

关键词 二氧化钛 薄膜 不锈钢 溶胶-凝胶法 俄歇电子谱法 光催化剂

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The preparation and chemical structure of TiO2 film photocatalyst supported on stainless steel using the sol-gel method

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Abstract TiO2 film was deposited on the stainless seel substrate by using Sol- Gel mehod with Ti(OB4) as a precursor. The film was composed of anatase phase, and the thickness of the film was about 90nm. The interface diffsion and chemical reaction between TiO2 and sainless steel substrate took place during annealing treatment. An iron oxide interlayer was formed during thermal treatment. Fe element segregated from steel substrate and diffused into TiO2 film. With increasing annealing temperature, the thickness of iron oxide interlayer increased and the diffustion depth and concentration of Fe in TiO2 layer increased too. With the increasing of annealing time, the thickness of iron oxide interlayer increased little, but the concentration of iron in TiO2 layer increased greatly. The adsorption intensity of UV can be intensified significantly, and the main absorption peak shifted to higher wavenumber with increasing the annealing temperature and time, which resulted from the diffusion of Fe in TiO2 film and the interaction of iron and TiO2. Fe diffused into the crystalline lattice of TiO2 and changed the lattice parameters of TiO2 film, which resulted in the shift of wave number.

Key words TITANIUM DIOXIDE THIN FILMS STAINLESS STEEL SOL-GEL PROCESS AUGER ELECTRON SPECTROMETRY PHOTOCATALYST

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