

过渡金属掺杂的多孔二氧化钛薄膜电极光催化氧化技术

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Oxidative Photoelectrochemical Technology with Titanium/Transition Metal Doped-TiO₂ Multi-nanoporous Thin-Film Anodes

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摘要 研究了铂和镍掺杂的锐钛矿结构的二氧化钛多孔薄膜电极的制备与光催化氧化技术用于染料废水的净化处理.电极由在钛片上通过电化学阳极三步氧化法制备,产生稳定的过渡金属掺杂的二氧化钛多孔薄膜电极.对生物难降解的偶氮染料废水(酸性红G)用所制备的电极进行了紫外光照射下的光催化降解实验,结果表明掺Pt电极大大提高了光催化活性,掺Ni反而降低了其光催化活性.根据所掺金属的电子功函和电子亲和力解释了这一作用.被处理水溶液的酸值增加有利于光催化降解.

关键词: 多孔薄膜电极 光催化降解性能 掺杂 染料废水

Abstract: The present investigation reports the preparation of platinum and nickel doped-anatase multi-nanoporous thin film electrodes. These doped electrodes were prepared from titanium plates by a three step electrochemical method. Investigations concerning degradation of a non-biodegradable azo dye (acid red G) in the presence of these electrodes irradiated by artificial UV-light were carried out. It has been found that the presence of Pt⁴⁺ into TiO₂ can cause a significant increase in the catalytic activity, especially in the photodegradation of the dye. Incorporation of Ni²⁺ was detrimental to this process. Efficiency of metal-doped TiO₂ electrodes was explained on the basis of electroaffinity and the electron work function. It was observed that photocatalytic degradation of the dye was strongly favored in acidic solutions.

Keywords:

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