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Mo的掺杂方式对TiO₂光催化活性的影响

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摘要: 通过溶胶凝胶法制备了以不同方式和不同浓度掺Mo的TiO₂薄膜。通过X射线衍射(XRD)、UV-VIS透射光谱、电化学阻抗谱分析了Mo对TiO₂薄膜晶粒结构、光吸收性能、阻抗的影响。甲基橙催化降解实验表明, 钼的最佳掺杂方式为在薄膜底层掺杂, 在表层及体相掺杂的效果均比未掺杂的TiO₂差; 其中以Mo的摩尔分数为1.0%、在薄膜底层掺杂时TiO₂薄膜的光催化活性最佳。并从载流子分离效率方面讨论了掺杂方式及掺杂浓度对光催化活性的影响。

关键词: 光催化; TiO₂; 薄膜; Mo; 掺杂方式

Effects of doping modes on photocatalytic activities
of Mo/TiO₂ films

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Abstract: TiO₂ thin films doped with Mo were synthesized under various modes and concentrations. The effects of Mo doping on TiO₂ films were characterized by XRD, UV-VIS transmittance spectra and electrochemical impedance spectroscopy. The results show that TiO₂ catalysts doped with Mo⁶⁺ extend absorption edge and charge transfer resistance of interfacial decrease. The degradation of methyl orange shows that the best doping mode of Mo⁶⁺ is doped on a bottom layer and the photocatalytic activity is lower than pure TiO₂ under surface Mo⁶⁺-doped and bulk Mo⁶⁺-doped modes. Of all, the best Mo⁶⁺-doped concentration is 1.0% (in mole fraction) on a bottom layer and the activity is increased obviously. The effects of doping mode and doping concentration on the photocatalytic activities of Mo⁶⁺-doped TiO₂ films from charge carriers separated efficiency aspect were discussed.

Key words: photocatalysis; TiO₂; thin film; Mo; doping mode

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