

FULL PAPERS

掺杂纳米金粒子的火焰氧化TiO₂膜的光电化学性质的研究

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摘要 通过Ti片的火焰氧化和吸附Au纳米颗粒制备了纳米金粒子修饰的TiO₂电极,

SEM和TEM的结果显示了Au纳米粒子均匀地分散在TiO₂电极表面。通过修饰纳米Au粒子, TiO₂电极的光电流有将近2

倍的提高。光电流和交流阻抗实验得出在0.5M Na₂SO₄溶液中, 相对于TiO₂电极, 纳米Au/TiO₂复合电极的平带电位负移了约

100mV。这种光电效应的提高可通过纳米Au/TiO₂

电极能抑制光生电子-空穴对的复合和改进界面的电荷传递来解释。这种纳米金属-半导体复合有望用于未来的太阳能电池方面。

关键词 [TiO₂膜](#), [Au纳米材料](#), [光电化学](#)

分类号

Photoelectrochemical Properties of TiO₂ Films Modified with Gold Nanoparticles

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Abstract A nano-Au modified TiO₂ electrode was prepared via the oxidation of Ti sheet in flame and subsequent modification with gold nanoparticles. The results of SEM and TEM measurements show that the Au nanoparticles are well dispersed on TiO₂ surface. A near 2-fold enhancement in photocurrent was achieved upon the modification with Au nanoparticles. From the results of photocurrent and electrochemical impedance experiments it was found that the flatband potential of nano-Au/TiO₂ electrode negatively shifted about 100 mV in 0.5 mol/L Na₂SO₄ solutions compared with that of bare TiO₂ electrode. The improvement of photoelectrochemical performance was explained by the inhibition for charge recombination of photo-induced electrons and holes, and the promotion for interfacial charge-transfer kinetics at nano-Au/TiO₂ composite film. Such nanometal-semiconductor composite films have the potential application in improving the performance of photoelectrochemical solar cells.

Key words [TiO₂](#), [Au](#), [nano materials](#), [photoelectrochemistry](#)

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