

研究快报

TiO₂/ZnO薄膜电极中光生电子的传输及其在太阳电池中的应用

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收稿日期 2007-6-1 修回日期 网络版发布日期 2007-11-12 接受日期

摘要 制备了TiO₂纳米颗粒和ZnO纳米棒混合的多孔薄膜电极, 利用瞬态光电压技术研究了染料敏化TiO₂/ZnO薄膜中光生载流子的传输特性. 实验结果表明, ZnO纳米棒增加了薄膜中自由电子扩散速率, 减小了复合几率, 改善了能量转换效率.

关键词 [太阳电池](#) [瞬态光电压](#) [电子传输](#) [多孔薄膜电极](#)

分类号 [0643](#)

Electron Transportation in the TiO₂/ZnO Film Electrodes and Application for Dye-sensitized Solar Cells

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Abstract The TiO₂ based dye-sensitized solar cells doped with different sizes of ZnO nanorods were fabricated and studied by photoelectrochemical measurements. The results show that the energy conversion efficiency of the dye-sensitized solar cells after the addition of ZnO nanorods(1%, mass fraction) was increased by 6%—20% in comparison with that without ZnO nanorods. The effect of different sizes of ZnO nanorods on the electronic transportation properties was studied in the composite semiconductor film by means of transient photovoltage technology(TPV). The result indicates that the electron diffusing velocity in N3-sensitized TiO₂/ZnO film electrode was about 1—3 order of magnitude faster than that in TiO₂ electrode. The experimental results indicate that the TiO₂/ZnO electrode can improve the electron transport, decrease the recombination, enhance V_{oc} , and increase efficiency of energy conversion.

Key words [Solar cell](#) [Transient photovoltage](#) [Electron transportation](#) [Nanoporous film electrode](#)

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