化学学报 2005 63 (3): 215-218 ISSN: 0567-7351 CN: 31-1320/06

研究论文

纳米结构TiO_2/聚3-甲基噻吩多孔膜电极光电化学研究

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收稿日期 2004-4-7 修回日期 2004-10-8 网络版发布日期 接受日期

摘要 用光电流作用谱、光电流-电势图、紫外-可见吸收光谱等光电化学方法研究了导电玻璃(ITO)/TiO_2/聚3-甲基噻吩(PMT)电极的光电转换性质. 结果表明, PMT膜为p型半导体, 其禁带宽度为1.93 eV. 并通过循环伏安和光电化学方法确定了其导带位置为－3.44 eV, 价带为－5.37 eV, 在纳米TiO_2与PMT之间存在p-n异质结, ITO/TiO_2/PMT电极不仅提高了光电流, 而且使产生光电流的起始波长红移至＞600 nm, 从而提高了宽禁带半导体的光电转换效率.

关键词 TiO_2/PMT复合膜电极 光电化学 导电聚合物

分类号

Photoelectrochemical Study on the Nanostructured TiO_2/PMT Film Electrode

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Abstract The photon-current conversion properties of nanostructured TiO_2/poly(3-methythiophene) (PMT) film electrode were studied by using the photocurrent action spectra, the photocurrent dependence of potential and UV-Vis absorption spectra. The bandgap of PMT film is 1.93 eV. The diagram of energy level of PMT film was determined with cyclic voltamogramm and photoelectrochemical method. The conduction band of PMT film is －3.44 eV. The p-n heterojunction existed in the TiO_2/PMT film electrode, which favors the separation of electron-hole pairs. The nanostructure can enlarge the visible optical absorption region and obviously increase the photocurrent in visible region. The photocurrent threshold shifted to ＞600 nm, and the photon-electron conversion efficiency could be improved.

Key words nanostructured TiO_2/PMT electrode photoelectrochemistry conducting polymer

DOI:

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