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器件制备及器件物理

退火温度对聚对苯乙炔MOPPV-ZnSe量子点复合材料太阳电池性能影响

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摘要： 利用原位缩合法制备了聚(2-甲氧基-5辛氧基)对苯乙炔(MOPPV)-ZnSe量子点复合材料,通过对复合材料的X射线衍射、透射电子显微镜、扫描电子显微镜、紫外可见吸收光谱等研究,发现聚合物MOPPV与ZnSe量子点以包覆形式有效地复合在一起,复合材料中ZnSe量子点结晶性良好,尺寸约为4 nm;且两者之间发生光诱导电荷转移,复合材料随着退火温度的升高,其吸收光谱范围发生红移。通过对MOPPV-ZnSe复合材料光电性能的研究发现,复合材料光电性能随着退火温度的升高逐渐表现出明显的二极管特性,转换效率出现先增大后减小的趋势,且在160℃时转换效率达到最大为0.3726%。

关键词： 量子点 复合材料 退火温度 转换效率

Effect of Annealing Treatment on MOPPV-ZnSe Quantum Dots Composite Solar Cells

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Abstract: According to high photoelectric conversion performance of quantum dot composite material, we use in situ condensation method to prepare polymer/poly(2-methoxyl-5-octyloxy)-1,4-phenylenevinylene (MOPPV)-ZnSe quantum dot composites. X-ray diffraction, transmission electron microscope, UV-Vis absorption spectroscopy were employed to study their characteristics. The results indicate that MOPPV and ZnSe quantum dots forming a coating or mosaic structure which can be effectively combined, and ZnSe quantum dots keep good crystallinity, each with an average size of 4 nm in the composite, producing the light induced charge transfer phenomenon. The absorption spectra of the composite have a few red-shift with the increasing of the annealing temperature. The study of composite photoelectric performance indicates that it gradually shows obvious characteristic of diode, the power conversion efficiency reaches the maximum of 0.3726% at the temperature of 160℃.

Keywords: quantum dot composite materials annealing treatment power conversion efficiency
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