

研究论文

## MEH-PPV和PCBM共混体系光电池中电荷传输及性能与光强的关系

於黄忠<sup>1,2</sup>, 彭俊彪<sup>2</sup>

1. 华南理工大学物理科学与技术学院,
2. 高分子光电材料及器件研究所, 特种功能材料教育部重点实验室, 广州 510640

收稿日期 2007-6-1 修回日期 网络版发布日期 2007-12-3 接受日期

**摘要** 以MEH-PPV{poly[2-methoxy-5-(2'-ethylhexoxy)]-1,4-phenylene vinylene}作为电子给体材料, PCBM[1-(3-methoxycarbonyl)-propyl-1-1-phenyl-(6,6)C<sub>61</sub>]作为电子受体材料, 制成了共混体系的高性能太阳电池. 光电池在100 mW/cm<sup>2</sup>强度光照下, 其开路电压 $V_{oc}$ 为0.8 V, 短路电流密度 $J_{sc}$ 为5.06 mA/cm<sup>2</sup>, 填充因子 $FF$ 为48.1%, 能量转换效率 $\eta$ 为1.93%. UV-Vis及PL图表明, MEH-PPV与PCBM之间没有发生化学变化, 但有明显的荧光猝灭, 说明光生激子能有效地快速分离, 并在各自的传输网络中传递. 分析了光照及暗导I-V曲线的物理意义, 探讨了MEH-PPV与PCBM之间的电荷传输, 研究了在不同强度的光照下器件性能的变化. 随着光强的增加, 器件的短路电流密度线性增大, 开路电压也略有升高, 并联电阻和填充因子下降, 串联电阻变化不明显. 分析了其物理机理, 并进行了合理的解释.

**关键词** [太阳电池](#) [聚合物](#) [电子给体材料](#) [电子受体材料](#)

**分类号** [O64](#) [TN15](#)

## Charge Transport and the Relationship Between Performance and Light Intensity of the Solar Cell Based on the Blend of MEH-PPV and PCBM

YU Huang-Zhong<sup>1,2\*</sup>, PENG Jun-Biao<sup>2</sup>

1. College of Physics Science & Technology,
2. Institute of Polymer Optoelectronic Materials and Devices, Key Laboratory of Specially Functional Materials and Advanced Manufacturing Technology, South China University of Technology, Guangzhou 510640, China

**Abstract** The highly efficient solar cells based on the blend of MEH-PPV{poly[2-methoxy-5-(2'-ethylhexoxy)]-1,4-phenylene vinylene} as a donor and PCBM[1-(3-methoxycarbonyl)-propyl-1-1-phenyl-(6,6)C<sub>61</sub>] as an acceptor were fabricated.

We obtained an open circuit voltage of 0.8 V, short circuit current density of 5.06 mA/cm<sup>2</sup> and fill factor of 48.1% under 100 mW/cm<sup>2</sup> air-mass 1.5 solar simulator illumination, yielding a 1.93% power conversion efficiency. There was not chemistry reaction between MEH-PPV and PCBM from their UV-Vis chart. The intense PL of MEH-PPV was, however, almost completely quenched, implying the excitons are effectively separated on the interface of donor and acceptor and transported in bicontinuous path. We also analyzed physical meaning of the I-V curve chart under illumination and dark condition, discussed the charge transport between MEH-PPV and PCBM, and studied the diversification of solar cells performance at different light intensity. With the increase of incident light intensity, the short circuit current density of the solar cells enhanced, open circuit voltage increased slowly, the parallel resistance and the fill factor descended, series resistance did not change distinctly.

**Key words** [Solar cell](#) [Polymer](#) [Electronic donor material](#) [Electronic acceptor material](#)

DOI:

### 扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(436KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中包含“太阳电池”的相关文章](#)

▶ 本文作者相关文章

· [於黄忠](#)

·

· [彭俊彪](#)

