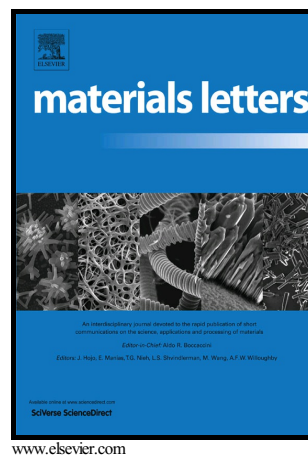


Improved performance of inverted polymer solar cells using Cd₂SSe/ZnS quantum dots

Zhihui Zhang, Chunyu Liu, Zhiqi Li, Xinyuan Zhang, Yongbing Long, Shengping Ruan, Wenbin Guo, Liu Zhang



PII: S0167-577X(16)31713-X
DOI: <http://dx.doi.org/10.1016/j.matlet.2016.10.121>
Reference: MLBLUE21692

To appear in: *Materials Letters*

Received date: 10 September 2016
Revised date: 19 October 2016
Accepted date: 27 October 2016

Cite this article as: Zhihui Zhang, Chunyu Liu, Zhiqi Li, Xinyuan Zhang, Yongbing Long, Shengping Ruan, Wenbin Guo and Liu Zhang, Improved performance of inverted polymer solar cells using Cd₂SSe/ZnS quantum dots *Materials Letters*, <http://dx.doi.org/10.1016/j.matlet.2016.10.121>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Improved performance of inverted polymer solar cells using Cd₂SSe/ZnS quantum dots

Zhihui Zhang¹, Chunyu Liu¹, Zhiqi Li¹, Xinyuan Zhang¹, Yongbing Long³, Shengping Ruan¹, Wenbin

Guo^{1*}, Liu Zhang^{2*}

¹State Key Laboratory on Integrated Optoelectronics, College of Electronic Science and Engineering,
Jilin University, 2699 Qianjin Street, Changchun 130012, People's Republic of China

²College of Instrumentation & Electrical Engineering, Jilin University, 938 Ximinzhu Street,
Changchun 130061, People's Republic of China

³School of Electronic Engineering, South China Agricultural University, Guangzhou, 510642,
China

Abstract

Quantum dots (QDs) materials have been widely used in polymer solar cells (PSCs) to improve device performance. In this paper, the enhanced efficiency of PSCs by incorporating Cd₂SSe/ZnS (CSS-Z) QDs into active layer composed of Poly [N-9"-hepta-decanyl-2,7-carbazolealt-5,5-(4',7'-di-2-thienyl-2',1',3'-ben-zothiadiazole)] (PCDTBT) : [6,6]-phenyl-C70-butyric acid methyl ester (PC₇₁BM) were demonstrated, and the power conversion efficiency (PCE) of devices was increased from 5.72% to 6.75%, accounting for an 18% enhancement compared to the control device. The light trapping of optimized devices is higher than that of the control device, which is beneficial to boost the transport of photo-induced charges. Furthermore, the CSS-Z QDs play a role of charge transfer state, substantially improving exciton dissociation, charge transport, leading to an increased short-circuit current density (J_{sc}) and decreased series resistance (R_s).

Keywords: Cd₂SSe/ZnS QDs, energy conversion, charge carrier transport, solar energy

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/5463541>

Download Persian Version:

<https://daneshyari.com/article/5463541>

[Daneshyari.com](https://daneshyari.com)