

Accepted Manuscript

Title: Mitigation of Interface Recombination by Careful Selection of ETL for Efficiency Enhancement of MASnI₃ Solar Cell

Authors: Faisal Baig, Yousaf Hameed Khattak, Bernabé Marí, Saira Beg, Syed Rizwan Gillani, Abrar Ahmed



PII: S0030-4026(18)30786-1
DOI: <https://doi.org/10.1016/j.ijleo.2018.05.135>
Reference: IJLEO 60998

To appear in:

Received date: 12-3-2018
Revised date: 27-5-2018
Accepted date: 29-5-2018

Please cite this article as: Baig F, Khattak YH, Marí B, Beg S, Gillani SR, Ahmed A, Mitigation of Interface Recombination by Careful Selection of ETL for Efficiency Enhancement of MASnI₃ Solar Cell, *Optik* (2018), <https://doi.org/10.1016/j.ijleo.2018.05.135>

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 proof before it is published in its final 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.

Mitigation of Interface Recombination by Careful Selection of ETL for Efficiency Enhancement of MASnI₃ Solar Cell

Faisal Baig^{1,2}, Yousaf Hameed Khattak^{1,2,*}, Bernabé Marí¹, Saira Beg³, Syed Rizwan Gillani, Abrar Ahmed²

¹ School of Design Engineering, Departament de Física Aplicada, Universitat Politècnica de Valencia, Camí de Vera València, (Spain)

²Electrical Engineering Department, Federal Urdu University of Arts, Science and Technology Islamabad (Pakistan)

³COMSATS Institute of Information Technology Islamabad (Pakistan)

*Corresponding Author: yousaf.hameedk@gmail.com

Abstract

Lead halide perovskite solar cells (LHPSC) are of great potential for commercial application with conversion efficiency exceeding 20%. But the toxic nature of lead, fabrication of perovskite solar cell is still not considered for commercial applications. Methylammonium tin halide perovskite (MASnI₃) is being used as an alternate absorber layer for replacement of LHPSC but the power conversion efficiency (PCE) achieved from MASnI₃ solar cell is still far less from LHPSC. To investigate the limitation of MASnI₃ solar cell performance numerical analysis was performed. For device modeling different electron transport layer (ETL) and methylammonium tin halide (MASnBr₃) as hole transport layer (HTL) was used. From analysis it was revealed that open circuit voltage (V_{oc}), short circuit current (J_{sc}), fill factor (FF) and PCE are highly depended on ETL conduction band offset (CBO) between ETL/Absorber (MASnI₃) interface, thickness of ETL and donor doping concentration of ETL. With +CBO at junction a “cliff” is formed at the interface, this leads to high interface recombination because of built in potential to separate charge carriers. In contrast to –CBO a “spike” suppress interface recombination but a larger value of spike will lead to degradation of device performance. For selection of ETL, a moderate value of –CBO

Download English Version:

<https://daneshyari.com/en/article/7223309>

Download Persian Version:

<https://daneshyari.com/article/7223309>

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