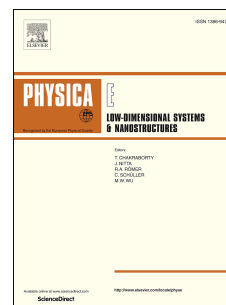


Accepted Manuscript

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PII: S1386-9477(17)31455-8

DOI: [10.1016/j.physe.2018.03.026](https://doi.org/10.1016/j.physe.2018.03.026)

Reference: PHYSE 13092

To appear in: *Physica E: Low-dimensional Systems and Nanostructures*

Received Date: 20 September 2017

Revised Date: 21 March 2018

Accepted Date: 30 March 2018

Please cite this article as: A.K. Pandey, M.S. Ahmad, M. Alizadeh, N.A. Rahim, Improved electron density through hetero-junction binary sensitized TiO₂/ CdTe / D719 system as photoanode for dye sensitized solar cell, *Physica E: Low-dimensional Systems and Nanostructures* (2018), doi: 10.1016/j.physe.2018.03.026.

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Improved electron density through Hetero-junction binary sensitized TiO₂/ CdTe / D719 system as photoanode for dye sensitized solar cell

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Abstract

The combined effect of dual sensitization and hetero-junction symmetry has been investigated on the performance of TiO₂ based dye sensitized solar cell. CdTe nanoparticles have been introduced in TiO₂ matrix to function as sensitizer as well as act as hetero-junction between D719 dye and TiO₂ nanoarchitecture. Four concentrations of CdTe i.e. 0.5wt%, 2wt%, 5wt% and 8wt% have been investigated. Morphological and compositional studies have been conducted using scanning electron microscope (SEM) and X-ray diffraction (XRD) respectively. Light absorption characteristics have been investigated by employing Uv-vis spectroscopy and the overall performance has been studied using solar simulator and electrochemical impedance spectroscopy (EIS). Performance has been found to be increased with the addition of CdTe due to high electron density and reduction in recombination reactions. An increase of 41.73% in incident photo conversion efficiency (IPCE) and 75.57% in short circuit current density (J_{sc}) have been recorded for the specimens containing 5wt% CdTe compared to bare TiO₂ based DSSCs. Further addition of CdTe leads to reduction in overall performance of DSSCs.

Keywords: CdTe; DSSC; dual sensitization; electron transfer; hetero-junction.

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