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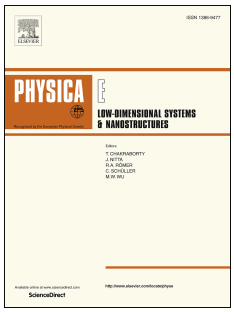

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Improved electron density through Hetero-junction binary sensitized TiO_2/ CdTe / D719 system as photoanode for dye sensitized solar cell

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Abstract

The combined effect of dual sensitization and hetero-junction symmetry has been investigated on the performance of TiO_2 based dye sensitized solar cell. CdTe nanoaprticles have been introduced in TiO_2 matrix to function as sensitizer as well as act as hetero-junction between D719 dye and TiO_2 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 TiO_2 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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