World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:18, No:09, 2024

Mechanism of Charge Transport in the Interface of $CsSnI_3$-$FASnI_3$ Perovskite Based Solar Cell

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Abstract : Lead-free perovskite photovoltaic (PV) technology employing non-toxic tin halide perovskite absorbers is pivotal for advancing perovskite solar cell (PSC) commercialization. Despite challenges posed by perovskite sensitivity to oxygen and humidity, our study utilizes DFT calculations using VASP and NanoDCAL software and SCAPS-1D simulations to elucidate the charge transport mechanism at the interface of $CsSnI_3$-$FASnI_3$ heterojunction. Results reveal how inherent electric fields facilitate efficient carrier transport, reducing recombination losses. We predict optimized power conversion efficiencies (PCEs) and highlight the potential of CsSnI3-FASnI3 heterojunctions for cost-effective and efficient charge transport layer-free (CTLF) photovoltaic devices. Our study provides insights into the future direction of recognizing more efficient, nontoxic heterojunction perovskite devices.

Keywords : charge transport layer free, $CsSnI_3$-$FASnI_3$ heterojunction, lead-free perovskite solar cell, tin halide perovskite., Charge transport layer free
Conference Title : ICASEM 2024 : International Conference on Advanced Solar Energy Materials
Conference Location : Toronto, Canada
Conference Dates : September 19-20, 2024