Thin-film solar cell configuration

Substrate configuration solar cells provide a multitude of advantages from the perspective of numerous inorganic compound thin film solar cells, including the ability to independently customize the absorber layer, enhance the quality of the interface, and have substantial applications in flexible and tandem-based devices.

Thin film solar cells are favorable because of their minimum material usage and rising efficiencies. The three major thin film solar cell technologies include amorphous silicon ...

The first progress for Copper Indium Gallium Selenide (CIGS) thin-film solar cells was made in 1981 when the Boeing company created a Copper Indium Selenide (CuInSe2 ...

Evidence of the progress in hydrogenated amorphous silicon (a-Si:H) solar cell technology includes recent state-of-art triple junction solar cells on stainless steel (substrate configuration) with initial efficiency values (? initial) of 16.3% [1], and a stabilized efficiency (? stable) of 13.4% [2] for similar cells on glass substrates (superstrate configuration).

For this purpose, 1D, 2D and quasiperiodic PCs can significantly contribute to improving solar cell efficiencies. 37-43 In this context, a 2D quasiperiodic PC structure is introduced by Hongjun et al. to improve the optical absorption of thin film silicon solar cells. 37 The thin film silicon solar cell is sandwiched between an antireflecting coating (ARC) from a ...

This paper presents a holistic review regarding 3 major types of thin-film solar cells including cadmium ...

The first GeSe thin-film solar cell with an efficiency of 1.48% was reported in 2017. 33 Considering the high theoretical Schockley-Quiesser efficiency limit of nearly 30% for GeSe ...

Antimony selenide (Sb 2 Se 3) is a promising low-cost photovoltaic material with a 1D crystal structure.The grain orientation and defect passivation play a critical role in determining the performance of ...

junction configuration for solar energy conversion [2]. Both single-junction and multiple-junction solar cells have been investigated over the years. The highest theoretical efficiency of a single-junction solar cell is known to be 33.16%, according to analytical ... in InP thin film solar cells as well, and the efficiency has increased up to ...

In this work, antimony selenide (Sb 2 Se 3) thin films were prepared by co-evaporation of Sb 2 Se 3 and selenium (Se) sources on molybdenum (Mo)-coated soda lime glass. Solar cells were fabricated in the substrate configuration of Ag/ITO/ZnO/CdS/Sb 2 Se 3 /Mo/Glass. The [hk1] preferred orientation grain was found to be beneficial to higher ...

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The use of transparent conducting oxide (TCO) as a substrate in Cu2ZnSn(S,Se)4 (CZTSSe) thin-film solar cells allows for advanced applications, such as bifacial, semi-transparent, and tandem solar ...

The device configuration is generally a determining factor for efficiency. Fig. 2 shows several generic device configurations for inorganic thin-film solar cells. CIGSe solar cells are fabricated with a substrate configuration, where the CIGSe absorber layer is deposited on Mo-coated glass and the electron buffer and transparent conductive oxide (TCO) layer are ...

Amorphous silicon is treated as the best material for the efficient multi-junction and single-junction solar cells to increase the open-circuit voltage in thin-film solar cells. The maximum efficiency seen in a single junction thin film a-Si solar cell is 10.2 % [5]. An a-Si solar cell configuration has been shown in Fig. 2 [5], [6] below.

Inorganic thin-film solar cells based on amorphous ?-Si, GaAs, and other III-V compounds, CdTe and CuInGaSe (CIGS), organic and hybrid organic-inorganic lead or tin halide-based perovskite solar ...

Using CBTS HTL with Al/FTO/CdS/dual absorber Ca3SbI3/Ca3NCl3)/CBTS/Ni structure, this study achieved an optimized efficiency of up to 30.22% with VOC of 1.39 V, FF of 88%, and JSC of 24.75 mAcm-2. This research may offer important information and a practical plan for creating an affordable Ca3SbI3/Ca3NCl3 thin-film solar cell.

This paper presents the enhancement of photovoltaic performance through doped solar cell structure design configuration. The proposed solar cell configuration is designed with Mo/CsSn x Ge (1-x) I 3 /Zn (1-y) Mg y O/ZnO. The spectral current density and reflection-absorption transmission solar cell power parameters are studied with wavelength ...

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