Double-layer photovoltaic cell device

Do lead-free solar cells have a double absorption layer?
A novel lead-free solar cell with a double absorption layer, based entirely on germanium, is proposed. Using the SCAPS-1D simulator, the CsGeI 3 and MAGeI 3 materials are well-matched. In this study, we focus on optimizing the structure of perovskite solar cells (PSCs) comprising a single absorption layer of FTO/n-CsGeI 3 /MAGeI 3 /p-CsGeI 3 /Pt.

How CS 2 Biagi 6 double perovskite solar cells improve photovoltaic (PV) performance?
The main highlight of this research work includes the photovoltaic (PV) performance enhancement of Cs 2 BiAgI 6 double perovskite solar cells (PSCs) by optimizing the optoelectronic parametersof the absorber,electron transport layer (ETL),hole transport layer (HTL),and various interface layers.

Are double perovskite solar cells eco-friendly?
P. Singh and A. Kumar, Device engineering of double perovskite based solar cells towards high-performance, eco-friendly solar cells. Opt. Quantum Electron. 55, 304 (2023). H.I. Alkhammash, M. Mottakin, and M. Hossen, Design and defect study of Cs2AgBiBr 6 double perovskite solar cell using suitable charge transport. Semicond. Sci.

Can bpdc form a bilayer electron transport layer in organic solar cells?
However,BPDC has been used to form a bilayer electron transport layer(ETL) in organic solar cells recently by Rahaman et al. . Their work showed significantly improved ETL/active layer interface,eliminating nano ridges and defect centres,which led to ~20 % improvement of PCE in organic solar cells.

Does a double perovskite subcell improve the stability of a tandem device?
The designed lead-free all-DPTSC shows improved stabilityin the face of temperature fluctuations. The analysis in this study indicates that enhanced performance of the double perovskite subcell is required for the tandem device to be beneficial.

Does double sided passivation improve the performance of perovskite solar cells?
Low-cost double-sided passivation of perovskite solar cells improved perovskite surface and PV performance by 11.7 %. Biphenyl-4,4 -dicarboxylic acid used for the first time to passivate perovskite solar cells. Passivation created a barrier to migrating ions,reducing intrinsic degradation and J-V hysteresis.

Additive-assisted layer-by-layer deposition creates a bulk p-i-n structure and vertically segregated fibril network morphology in the active layer of organic solar cells. This morphology optimizes exciton and carrier diffusion, thereby ...

The extensive outcomes of the specific modeling method for hybrid photovoltaic solar cells at the illumination condition of AM 1.5G spectrum are shown in this simulation work. This research aims to optimize the

efficiency of the device structures by introducing the novel hybrid-absorber layer (AL). The hybrid solar cell (HSC) has higher efficiency with an absorber ...

4 ???· Tremendous efforts have been devoted to device engineering 5,6, molecular structure modification of photovoltaic materials 7,8,9,10,11,12,13,14 and morphology optimization of active layers 15,16 ...

It has been successfully employed to simulate and understand various crystalline and thin-film-based photovoltaic cells" device characteristics and performance, for example, Perovskite, CZTS, Si, CdTe, CIGS solar cells [28-30]. In the current contribution, all SCAPS-1D simulations were performed using the standard testing conditions (STC) of AM 1.5 light ...

The double-layer ZnO was formed on the surface of sputtered ZnO by the simple electrodeposition method. The photovoltaic performance of devices with ZnO layer was enhanced compared to that without ZnO layer. For the device with double-layer ZnO porous oriented nanopillar structure, the performance was improved further.

In general, the light absorption in the active layer (or junction) of an OPV device results in formation of strongly bound electron-hole pairs, so-called excitons. 7-9 Separation of the excitons into free charge carriers is ...

A planar architecture double perovskite solar cell (DPSC) has been proposed and modeled employing Pb free La2NiMnO6 absorber layer. In present work, fluorine-doped tin oxide (FTO) is employed as transparent electrode, tungsten disulfide (WS2) is used as ETL, cuprous oxide (Cu2O) as HTL and La2NiMnO6 material is utilized as an absorber layer using ...

Due to its enhanced J sc, Table 3 shows that our proposed double active layer device has a higher PCE percentage (32.42%). Current density versus voltage characteristics for single and double absorber layers PSCs are shown in Fig. 3. According to a comparison of J-V curves; the double-layer structure performs better because of its greater J sc and somewhat ...

The proposed design of a Double absorber solar cell is FTO/STO/CsPbI 3 /CZTSSe/NiO/W, where FTO is utilized as a transparent conducting oxide (TCO), STO as ETL, CsPbI 3 & CZTSSe as active layers, NiO as HTL, and Tungsten (W) as a back electrode are depicted in Fig. 2 (a). Here, all simulations have been performed at 300 K, with a frequency of ...

This research aims to optimize the efficiency of the device structures by introducing the novel double perovskite absorber layer (PAL). The perovskite solar cell (PSC) has higher efficiency with both lead perovskite (PVK), i.e., methylammonium tin iodide (MASnI3) and Caseium tin germanium iodide (CsSnGeI3). The current simulation uses Spiro-OMeTAD as ...

Using this approach, we also demonstrate a certified centimetre-scale (1.11 cm2) 10% efficiency Cu2ZnSnS4 photovoltaic device; the first kesterite cell (including selenium-containing) of standard ...

Perovskite solar cells (PSCs) are an emerging photovoltaic technology that promises to offer facile and efficient solar power generation to meet future energy needs. PSCs have received considerable attention in recent years, have attained power conversion efficiencies (PCEs) over 22%, and are a promising candidate to potentially replace the current photovoltaic ...

Organic-inorganic hybrid perovskite solar cells (PSCs) have generated considerable interest as a promising alternative to traditional inorganic photovoltaic devices because of their potential to achieve a high efficiency at competitive costs [[1], [2], [3], [4]].The power conversion efficiencies (PCEs) of PSCs have risen steadily from ~3% [5] to 22.1% [6] in ...

Consistent with the results obtained from the rigid devices, the double-heterojunction FPSCs exhibit higher average photovoltaic ... Modification of 3D perovskite by 2D layer at the top and bottom interfaces, accompany by the planar imprinting, enhances the mechanical stability of double-heterojunction films. The discrepancy in coefficients of thermal expansion between ...

Double-junction tandem solar cells (TSCs), featuring a wide-bandgap top cell (TC) and narrow-bandgap bottom cell (BC), outperform single-junction photovoltaics, ...

Perovskite solar cells (PSCs) are a novel emerging technology that are the third generation of solar cells, following wafer-based and thin-film-based predecessors. Solar photovoltaic (PV) ...

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