



# Characteristics of photovoltaic heterostructure cells

In order to obtain the optimal photoelectric properties of vertical stacked MoS<sub>2</sub>/Si heterostructure solar cells, ... Electrical and photovoltaic characteristics of MoS<sub>2</sub>/Si p-n junctions. J ...

The p-GaN/i-In<sub>x</sub>Ga<sub>1-x</sub>N/n-GaN double-heterostructure photovoltaic (PV) cells have been fabricated and the theoretical photovoltaic properties were also calculated in this work. From theoretical simulation, higher efficiency can be obtained in GaN/InGaN double-heterostructure photovoltaic cells with higher In composition in i-InGaN intrinsic layer.

supercell of the BP/SnSe vdW heterostructure is composed of 14 unit cells of BP and 13 unit cells of SnSe, as shown in Fig. 1(c) and (d). The lattice constants of the BP/SnSe vdW heterostructure are  $a = 4.60 \text{ \AA}$ ; and  $b = 13.25 \text{ \AA}$ ; and the lattice 3.14%

Fig. 4 shows that all of the solar cell's characteristics, including  $V_{oc}$ ,  $J_{sc}$ , FF, and  $\eta$ , ... However, all of the PV characteristics are constant beyond  $10^{16} \text{ cm}^{-2}$ . Therefore, the CZT/C<sub>2</sub>N interface defect density has been considered to be  $10^{11} \text{ cm}^{-2}$  we ...

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(a) J-V curves of the ReS<sub>2</sub>/ReSe<sub>2</sub> vdW heterostructure showing photovoltaic effect under various light intensities. The inset image shows the band diagram of the heterojunction under illumination ...

Electric and photovoltaic characteristics of a multi-layer ReS<sub>2</sub>/ReSe<sub>2</sub> heterostructure. Among the various unique properties of two-dimensional materials, the ability ...

Production of photoconverters of solar cells based on the TiO<sub>2</sub>/porous-Si/Si heterostructure can be carried out according to the standard method supplemented by additional technological operations. Ohmic contacts are formed in the upper and lower parts of the structure above the TiO<sub>2</sub> and Si layers.

Among the various unique properties of two-dimensional materials, the ability to form a van der Waals (vdW) heterojunction between them is very valuable, as it offers a superior interface quality without the lattice mismatch problem. In this work, a ReS<sub>2</sub>/ReSe<sub>2</sub> vdW heterostructure was fabricated, and its electrical and photovoltaic behaviors were discovered. ...



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Figure 2: Power Curve for a Typical PV Cell Figure 3: I-V Characteristics as a Function of Irradiance PV cells are typically square, with sides ranging from about 10 mm (0.3937 inches) to 127 mm (5 inches) or more on a side. Typical ...

BiFeO<sub>3</sub> (BFO) is a promising photovoltaic material and TiO<sub>2</sub> tends to be an efficient electronic transmission material in perovskite solar cells. In this paper, FTO/TiO<sub>2</sub>/BFO heterostructure thin films with various TiO<sub>2</sub> thicknesses (0, 50, 100, and 150 nm, respectively) are prepared successfully via a sol-gel method. The effects of TiO<sub>2</sub> layer thickness on the ...

The p-GaN/i-In<sub>x</sub>Ga<sub>1-x</sub>N/n-GaN double-heterostructure photovoltaic (PV) cells have been fabricated and the theoretical photovoltaic properties were also calculated in this work.

In this study, we synthesized nanoscale 2D perovskite capping crusts with  $n = 1$  and 2 Ruddlesden-Popper (RP) perovskite layers, respectively, which form a type-II 2D/3D heterostructure. This heterostructure stabilizes the  $\alpha$ -phase of FAPbI<sub>3</sub>, and facilitates

Double-heterostructure GaN/InGaN photovoltaic cells with In compositions of 10%, 12%, and 14% were also theoretically calculated for comparison. Figure 4 showed the theoretical photovoltaic characteristics of the GaN/InGaN photovoltaic cells with In 14%, and

In order to obtain the optimal photoelectric properties of vertical stacked MoS<sub>2</sub>/Si heterostructure solar cells, we propose a theoretical model to address the relationship among film thickness,...

Bismuth ferrite BiFeO<sub>3</sub> (BFO)-based ferroelectrics have great potential as inorganic perovskite-like oxides for future solar cells applications due to their unique physical properties. In this work, La and Mn co-doped BFO thin ...

Based on this heterostructure, we achieved a champion efficiency of 20.7%, which is the highest value reported for Cs<sub>x</sub>FA<sub>1-x</sub>... The J-V characteristics of the photovoltaic cells were obtained using a Keithley 2400 Source Meter under simulated one-sun AM 1 ...

Abstract The radiation resistance of different types of heterostructural silicon solar cells under irradiation with 1 MeV electrons in the fluence range  $2.5 \times 10^{14}$  -  $10^{15}$  cm<sup>-2</sup> has been studied. Studies have shown that the smallest degradation of the "saturation" currents of the diffusion current flow mechanism from  $J_{0d} \leq 5 \times 10^{-13}$  to  $J_{0d} \leq 3 \times 10^{-12}$  A/cm<sup>2</sup> and ...

Dye-sensitized solar cells based on the different heterostructure perovskite/TiO<sub>2</sub> electrodes are assembled, and high conversion efficiency ( $\eta$ ) are calculated from the current density-voltage (J ...



# Characteristics of photovoltaic heterostructure cells

Organic solar cells have emerged as promising alternatives to traditional inorganic solar cells due to their low cost, flexibility, and tunable properties. This mini review introduces a novel perspective on recent advancements in organic solar cells, providing an overview of the latest developments in materials, device architecture, and performance ...

The devices exhibited typical J-V characteristics under both dark and illuminated conditions of Schottky-based solar cells, indicating the viability of this photovoltaic ...

Photogenerated hot carriers can be harnessed in spatially confined photovoltaic materials (2D van der Waals heterostructures), owing to slow hot carrier cooling and restricted ...

We demonstrate an external power conversion efficiency of (3.6±0.2)% under AM1.5 spectral illumination of 150 mW/cm<sup>2</sup> (1.5 suns) with vacuum-deposited copper phthalocyanine/C60 thin-film double-heterostructure photovoltaic cells incorporating an exciton-blocking layer (EBL). We show that the anode work function influences the photocarrier ...

A model describing heterostructure solar cells based on zinc and copper oxides is developed. Seed layers of ZnO and CuO are synthesized by spray pyrolysis. Local current-voltage characteristic of ...

[1] Novoselov K S, Geim A K, Morozov S V, Jiang D, Zhang Y, Dubonos S V, Grigorieva I V and Firsov A A 2004 Electric field effect in atomically thin carbon films *Science* 306 666 Crossref Google Scholar [2] Cahangirov S, Topsakal M, Aktürk E, Sahin H and Ciraci S 2009 Two- and one-dimensional honeycomb structures of silicon and germanium *Phys. Rev. Lett.* ...

In this study, the photovoltaic properties of double-heterostructure p-GaN/i-InGaN/n-GaN photovoltaic cells with In composition of 10%, 12%, and 14% were fabricated and characterized ...

Introduction. The power conversion efficiency (PCE) of organic-inorganic hybrid perovskite solar cells (PSCs) has experienced a rapid increase, reaching a certified efficiency of 26.1%, 1,2,3,4,5 which has sparked optimism ...

Today, fill factors in 2D heterostructure photovoltaic structures are typically in the range 0.3-0.5, only half as large as in conventional silicon solar cells.

Here, we reviewed the recent progress on photovoltaic solar cells of these 2D materials and their heterostructures with different device configurations. The p-n junction solar ...

First-principles calculations are performed to explore the geometry, bonding, and electronic structures of six ultrathin photovoltaic heterostructures consisting of pristine and B- or N-doped fullerenes and MoS<sub>2</sub> ...



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3.3 Bonded III-V/CIGS Multijunction Solar Cells CuInGaSe (CIGS), a I-III-VI<sub>2</sub> compound semiconductor, has advantages as a photovoltaic material, including its low cost, high efficiency, [132-134] and excellent radiation tolerance. [135, 136] Particularly for the purpose of space use, InGaP/GaAs/CIGS triple-junction solar cells were fabricated by using metal-particle ...

By constructing gradient arrangement energy levels using a low-/three-dimension heterojunction strategy, Huo et al. report an improved power conversion efficiency up to 14.15% with a fill factor of 79.03% of a hole ...

Herein, we report on the electrical characteristics of a multi-layer ReS<sub>2</sub>/ReSe<sub>2</sub> heterojunction as a diode and its photovoltaic properties as a solar cell. This research is meaningful in that we studied the vdW ...

Summary. Dissociation of organic molecules is one critical factor leading to degradation of perovskite solar cells. The much-improved thermal stability of formamidinium (FA) can significantly reduce molecular dissociation; however, ...

Download figure: Standard image High-resolution image Photo-electrical measurements are essential to investigate the performance of photovoltaic cells. Figure 3(a) shows the photovoltaic profile of the graphene/h-BN/n-Si solar cell. As expected, the performance of ...

Sb<sub>2</sub>Se<sub>3</sub> heterostructure solar cells: Techniques to improve efficiency Author links open overlay panel Yogesh Singh a b, Sanju Rani a b, Shashi c, Rahul Parmar d, Raman Kumari a b, Manoj Kumar a b, A. Bala Sairam e, Mamta a b, V.N. Singh a b Show more ...

2.1 Phototransducers based on a novel vertical epitaxial heterostructure architecture utilizing concentrated photovoltaic solar cell tunnel junctions In order to increase the output voltage of the phototransducers to higher levels, parquet geometries of single or tandem junction devices have previously been devised using planar configurations with multiple series ...

First principles investigations of type-II BP/Sc<sub>2</sub>CF<sub>2</sub> van der Waals heterostructure for photovoltaic solar cells March 2023 DOI:10. ... The electronic characteristics and band alignment of the ...

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