Inorganic semiconductor solar cells

Are amorphous inorganic semiconductors suitable for solar cells and photoelectrocatalysis?
Then, the recent successes and current challenges of amorphous inorganic semiconductor-based materials for applications in solar cells, photoelectrocatalysis, and photocatalysis are addressed. In particular, we discuss the mechanisms behind the remarkable performances of amorphous inorganic semiconductors in these fields.

How efficient are solar cells based on inorganic-organic hybrids?
Solar cells based on these inorganic-organic hybrids exhibit a short-circuit current density Jsc of 16.5 mA cm -2,Voc of 0.997 V and fill factor of 0.727,yielding a power conversion efficiency of 12.0%under standard AM 1.5 conditions.

What is the efficiency of organic tandem solar cells?
The highest efficiency reported for organic tandem PV cell is 13.76%. The PV-performance of state of the art organic SCs is given in Table-9. Finally,the absorption range of solar cells plays a critical role in determining the PCE. The bandgap of active layer material determines the absorption range and PCE.

Which semiconductors can be used for solar energy conversion?
Different band-gap semiconductorscan be used for the effective utilization of the solar spectrum for solar energy conversion. Based on this fact,various research groups have developed hetero-junction (HJ) SCs and HJ bipolar transistor SCs [13]. In 2013,B. Endres et al. [14]demonstrated a spin solar cell based on GaAs p-n junction.

Can thin film technology reduce the cost of organic solar cells?
Thin film technology can significantly reduce the cost of organic solar cells[336]. Low carrier mobility and poor optical absorption coefficient are the two most critical issues in the production of polymer based thin film organic SCs. Light trapping techniques and anti reflection techniques can be used for enhancing the PCE of organic SCs.

Can tandem cell technology improve PCE of organic solar cells?
Tandem cell technology can be used for effectively enhancingthe PCE of organic PV cells. In the future,the stability,reliability,flexibility and optical transparency of the organic solar cells needs to be addressed before enter into the photovoltaic market.

In the first generation of solar cells most inorganic semiconductors are based on pn-junctions obtained from single-crystal or doped polycrystalline silicon. As the second most abundant element in the crust of the Earth, Si offers to manufacturers easier access to raw materials. The second generation materials include thin films of amorphous silicon, CIGS, ...

In this work, an ultra-thin (0.815 um) lead-free all-inorganic novel PV cell structure consisting of solid-state

layers with the configuration SnO 2 /ZnOS/CsGeI 3 /CZTSe/Au has been optimized using SCAPS-1D simulator.

This article reviews the rapid progress in the developments of inorganic and organic solar cells (SCs) such as silicon SCs, perovskite SCs, III-V SCs, quantum dot SCs, ...

Hybrid solar cells based upon organic-inorganic semiconductor heterojunctions are currently the subject of significant interest as they incorporate the attractive properties of both organic and inorganic materials, including the ability to tune both the electronic and structural properties over a wide range using solution-based fabrication methods. 1-7 A configuration of ...

Bandgap energies of inorganic semiconductors match more suitably to the solar spectrum than organic materials but have lower absorptivity. Thus, stouter absorbing layers with increased purities are demanded in inorganic solar cells to ensure an efficient function. Cathode materials used are Ag, TiO 2, and Al, Mg, Ca for Organic and inorganic SCs, respectively. ...

Inverted inorganic cesium lead halide (CsPbX3) perovskite solar cells (PSCs) have shown great potential in photovoltaic applications. Herein, Wang et al. overview their progress, summarize the strategies for optimizing functional layers and interfaces, and provide perspectives for future development.

Recently, research on organic solar cells has seen significant progress through the development of non-fullerene electron acceptors (NFAs), in particular delivering increases in single-junction ...

For J-V characterization of solar cells, up to 12 identical cells were measured for each type of devices. Acknowledgements This publication was based upon the work supported by King Abdullah University of Science and Technology (KAUST) Office of Sponsored Research (OSR) under Award no: OSR-2018-KAUST-KAU Initiative-3902, OSR-2019-CARF/CCF-3079, ...

Dye-sensitized solar cells based on titanium dioxide (TiO 2) are promising low-cost alternatives to conventional solid-state photovoltaic devices based on materials such as Si, CdTe and CuIn...

Typical inorganic solar cell semiconductors exhibit higher ? r such as Si (~12) 11 and Gallium Arsenide (~12) 12,13, the emerging organic/inorganic hybrid perovskite solar cells present ? r of ...

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Recently, amorphous inorganic semiconductors have been applied in a variety of new technologies, including solar cells, photoelectrocatalysis, and photocatalysis. It has been reported that ...

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The inorganic semiconductor materials used to make photovoltaic cells include crystalline, multicrystalline, amorphous, and microcrystalline Si, the III-V compounds and alloys, CdTe, and the chalcopyrite compound, copper indium gallium diselenide (CIGS). We show the structure of the different devices that have been developed, discuss the main methods of ...

Inorganic-organic hybrid structures have become innovative alternatives for next-generation dye-sensitized solar cells, because they combine the advantages of both systems.

Organic-inorganic hybrid solar cells combine organic materials, often polymers, with inorganic materials like semiconducting nanoparticles to create solar cells with ...

This review first introduces the general background of amorphous inorganic semiconductor properties and synthesis. Then, the recent successes and current challenges of amorphous inorganic semiconductor ...

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