

Can organic materials be used for photovoltaic devices?

Nature Reviews Materials<sup>2023</sup> Cite this article The narrow and intense absorption spectra of organic materials open up the opportunity to develop efficient organic photovoltaic devices that are qualitatively different from other, incumbent solar cell technologies.

Are polycrystalline thin-film copper indium gallium selenide based solar cells a good choice?

Polycrystalline thin-film copper indium gallium selenide (CIGS) based solar cells are well-established and commercially available. The record efficiency of single-junction CIGS solar cells has reached 23.4%, which makes this class of solar cells very attractive for integration into perovskite containing tandem solar cells <sup>26</sup>.

Are solar cells instantaneous photoelectric conversion devices?

However, conventional solar cells are instantaneous photoelectric conversion devices and the electrical output has to be consumed immediately or stored <sup>139</sup>. To address the need of uninterrupted energy availability it is therefore important to develop integrated energy conversion-storage systems.

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School of Physical Science and Technology, Key Laboratory of Semiconductor Photovoltaic Technology and Energy Materials at Universities of Inner Mongolia Autonomous Region, Inner Mongolia University, Hohhot 010021, China \*Email: ... ACS Applied Materials & Interfaces. Cite this: ACS Appl. Mater. Interfaces <sup>2024</sup>, 16, 32, 42566-42576.

The power conversion efficiency (PCE) of ferroelectric photovoltaics (FePvs) was originally not expected to surpass 0.01%, but since FePv efficiencies now exceed this limit by nearly 3 orders of magnitude, FePvs warrant further investigation. Ferroelectricity occurs exclusively in materials with a polar crystal structure where the spontaneous polarization can be reoriented with an ...

The next-generation applications of perovskite-based solar cells include tandem PV cells, space applications, PV-integrated energy storage systems, PV cell-driven catalysis and ...

Optoelectronic devices, such as photodetectors and photovoltaics, are susceptible to surface contamination or water damage that can lead to reductions in performance or stability. Applying superhydrophobic coatings to these devices can introduce self-cleaning behavior and water resistance to extend their lifetime and improve their efficiency. However, existing ...

DOI: 10.1016/j.solener.2021.06.010 Corpus ID: 237733656; Phase change materials in solar photovoltaics applied in buildings: An overview @article{Mahian2021PhaseCM, title={Phase change materials in solar photovoltaics applied in buildings: An overview}, author={Omid Mahian and Sahar Ghafarian and Hamid Sarrafha and Alibakhsh Kasaeian and Hossein Yousefi and ...

Photovoltaic technology is becoming increasingly important in the search for clean and renewable energy 1,2,3. Among the various types of solar cells, PSCs are promising next-generation ...

Lead (Pb) halide perovskites have attracted tremendous attention in recent years because of their rich optoelectronic properties, which have resulted in more than 22% power conversion efficient photovoltaics (PVs). Nevertheless, Pb-metal toxicity remains a huge hurdle for extensive applications of these compounds. Thus, alternative compounds with similar ...

Photovoltaics (PV) is an attractive candidate for powering the rapidly growing market of smart devices in the Internet-of-Things (IoT) such as sensors, actuators, and wearables. Using solar cells and rechargeable batteries to power IoT devices avoids the expensive replacement of disposable batteries and reduces the environmental impact. IoT devices are often operated ...

The photovoltaic effect is used by the photovoltaic cells (PV) to convert energy received from the solar radiation directly into electrical energy [3]. The union of two semiconductor regions presents the architecture of PV cells in Fig. 1, these semiconductors can be of p-type (materials with an excess of holes, called positive charges) or n-type (materials with excess of ...

The Solar Settlement, a sustainable housing community project in Freiburg, Germany Charging station in France that provides energy for electric cars using solar energy Solar panels on the International Space Station. Photovoltaics (PV) is the conversion of light into electricity using semiconducting materials that exhibit the photovoltaic effect, a phenomenon studied in ...

This work discusses the use of donor and acceptor materials from organic photovoltaics in solar fuel applications. These two routes to solar energy conversion have many shared materials design parameters, and in recent years there has been increasing overlap of the molecules and polymers used in each. Here, we examine whether this is a good approach, where knowledge ...

The all-inorganic  $\alpha$ -CsPbI<sub>3</sub> perovskite with the most suitable band gap faces serious challenges of low phase stability and high moisture sensitivity. We discover that a simple phenyltrimethylammonium bromide (PTABr) post-treatment could achieve a bifunctional stabilization including both gradient Br doping (or alloying) and surface passivation. The ...

Porphyrins are one of the most promising materials for organic photovoltaics (OPVs) because of their easily tunable functional groups. Herein, we present the design and synthesis of two porphyrin-based small molecule donors, IDT-2TPE and TPE, in which two porphyrin units are bridged by an indacenodithiophene (IDT)

diethynylene unit for the former and a single ...

A novel nonfullerene small molecular acceptor (BZIC) based on a ladder-type thieno[3,2-b]pyrrolo-fused pentacyclic benzotriazole core (dithieno[3,2-b]pyrrolobenzotriazole, BZTP) and end-capped with 1,1-dicyanomethylene-3-indanone (INCN) has been first reported in this work. Through introducing multifused benzotriazole and INCN, BZIC could maintain a high ...

A conventional crystalline silicon solar cell (as of 2005). Electrical contacts made from busbars (the larger silver-colored strips) and fingers (the smaller ones) are printed on the silicon wafer. Symbol of a Photovoltaic cell. A solar cell or photovoltaic cell (PV cell) is an electronic device that converts the energy of light directly into electricity by means of the photovoltaic effect. [1]

Bifacial, Color-Tunable Semitransparent Perovskite Solar Cells for Building-Integrated Photovoltaics. ACS Applied Materials & Interfaces 2020, 12 (1) ... ACS Applied Energy Materials. Cite this: ACS Appl. Energy Mater. 2019, 2, 1, ...

PV manufacturers are competing against each other in a constant race to increase cell efficiency. This challenge is driving the transition from mainstream passivated emitter rear contact (PERC) cells to Heterojunction (HJ) cells. ... Applied Materials offers a dedicated version of the Tempo Presto metallization line designed explicitly for HJ ...

This Review surveys recent progress in semitransparent organic photovoltaic devices and discusses strategies to optimize their efficiency, visible transparency, lifetime and ...

Applied Materials will start installing panels later this year that use a variety of state of the art solar technologies. Once completed in 2008, Applied Materials" system will generate over 2,330 ...

Herein, the precise fabrication of Sb<sub>2</sub>S<sub>3</sub> and low Se content Sb<sub>2</sub>SeyS<sub>3-y</sub> indoor photovoltaics is reported, and a measurement protocol for photovoltaic performance is suggested and applied. Insertion of the SnO<sub>2</sub> buried layer decreases the thickness and parasitic absorption of the CdS layer. The introduction of minor Se into Sb<sub>2</sub>S<sub>3</sub> and the use of spiro-OMeTAD:TMT ...

The evolution of photovoltaic cells is intrinsically linked to advancements in the materials from which they are fabricated. This review paper provides an in-depth analysis of the latest developments in silicon-based, organic, and perovskite solar cells, which are at the forefront of photovoltaic research. We scrutinize the unique characteristics, advantages, and limitations ...

Acs Applied Energy Materials 2023; 6(19): 10078-10087. Kumagai N, Shimizu T, Minoda H, et al. Visualization of tens of nanometers spaced donor: Acceptor bulk heterojunctions across submicrometer-square cross sections of organic photovoltaic cells. Acs Applied Energy Materials 2023; 6(18): 9363-9370.

This list is drawn from an extremely wide range of journals, including IEEE Journal of Photovoltaics, Solar Energy Materials and Solar Cells, Renewable Energy, Renewable and Sustainable Energy Reviews, Journal of Applied Physics, and Applied Physics Letters. To assist readers, the list is separated into broad categories, but please note that ...

**Background** In recent years, solar photovoltaic technology has experienced significant advances in both materials and systems, leading to improvements in efficiency, cost, and energy storage capacity.

This symposium was designed to address fundamental and applied research on innovative photovoltaics materials and concepts, as well as device integration. ... The success story of hybrid perovskite solar cells confirms that research on novel photovoltaic materials can produce outstanding breakthroughs. There are several contributions to the ...

There are a variety of different semiconductor materials used in solar photovoltaic cells. Learn more about the most commonly-used materials. ... They can also be applied to a variety of supporting materials, such as flexible plastic, making OPV able to serve a ...

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