Progress in foreign research on solar cells

How can organic solar cells improve power conversion efficiency?
The development of novel acceptor and donor materials, interfacial materials for better charge-carrier collection, and optimization of phase-separation morphology contribute to remarkable enhancements in the power conversion efficiency (PCE) of organic solar cells (OSCs) has reached 19%.

What is progress in photovoltaics?
Progress in Photovoltaics: Research and Applications is a leading journal in the field of solar energy,focused on research that reports substantial progress in efficiency,energy yield and reliability of solar cells. It aims to reach all interested professionals,researchers,and energy policy-makers.

What are the parameters of a solar cell?
Generally,the open-circuit voltage (VOC),fill factor (FF) and short-circuit current density (JSC)of solar cells are defined by the current density and voltage (J-V) properties of the solar cells [,,]. All of these parameters have intimate connections to the photoactive materials (acceptor and donor materials).

How has solar technology changed over the last quarter century?
Within the last quarter century,PV technology has evolved significantly,making solar power a prominent player in the energy sector. To further growth,several scientists aim to enhance module performance and reduce costs through innovations like multi-junction solar cells using novel materials.

Can solar cells achieve a PCE of more than 20%?
Several challengesremain in the way of achieving PCEs of more than 20%. However,maintaining the long-term stability and higher efficiency of OSCs compared to other types of solar cells is still a major impediment to their commercialization.

How does a solar cell work?
A solar cell (SC) comprises multiple thin layers of semiconductor materials. When sunlight shines on an SC, photons excite electrons in the semiconductor materials, generating an electric current. In recent years, there have been rapid advancements in SC research, primarily focused on improving efficiency and reducing costs.

This paper summarizes the recent research progress from the aspects of structural improvement for further PCE enhancement, material stability and life improvement, ...

MHPs commonly are obtained with t and µ in the range of 0.81-1.1 and 0.44-0.9, respectively. Despite these constraints, a broad range of ions enables good results.

This review aims to present recent advances and historical progress in perovskite solar cell research by

emphasizing experimental studies on tunable bandgap ...

In the context of global energy transformation, solar cells have attracted much attention as a clean and renewable energy conversion technology [1].However, traditional organic-inorganic hybrid perovskite solar cells are limited in large-scale commercial applications due to limitations in stability and cost [2, 3] order to overcome these challenges, all ...

The defect-rich surface of wide-bandgap perovskite solar cells leads to severe interfacial carrier loss and phase segregation. Here, the authors reconstruct the surface through nano-polishing ...

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Realization of ultra-high FF in c-Si solar cell. (a) PCE of notable high-performance silicon solar cells in relation to V OC and FF. 11 The blue and red solid lines are the FF-V OC curves calculated by only considering the bulk intrinsic recombination and the surface J 01 recombination, and assuming a negligible series resistance (R S), where blue and red solid ...

This review aims to present recent advances and historical progress in perovskite solar cell research by emphasizing experimental studies on tunable bandgap perovskite materials, single-junction, tandem, multijunction, and flexible perovskite solar cell architectures, to provide a comprehensive and systematical guideline for possibly ...

Solar cells have made a lot of progress over time, which has made them smaller in size and more efficient. The development of novel acceptor and donor materials, interfacial materials for better charge-carrier collection, and optimization of phase-separation morphology contribute to remarkable enhancements in the power conversion efficiency ...

Perovskite solar cells (PSCs) have been skyrocketing the field of photovoltaics (PVs), displaying remarkable efficiencies and emerging as a greener alternative to the current commercial technologies. With the ongoing European Green Deal and the REPowerEU Plan, the European Union (EU) emphasizes the need of creating a novel, strong PV value and ...

2 ???· Current leakage through localized stacked structures, comprising opposite types of carrier-selective transport layers, is a prevalent issue in silicon-based heterojunction solar cells. Nevertheless, the behavior of this leakage region remains unclear, leading to a lack of guidance for structural design, material selection and process sequence control, thereby causing ...

However, silicon solar cells are not yet economically competitive with fossil fuels, necessitating further cost reduction. Research explores alternatives like organic/polymeric ...

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Their power conversion efficiency (PCE) has risen from 3.9% to 25.2% since 2009 [1 - 9], which surpasses the most effective thin-film solar cells such as CuInGaSe (CIGS) and CdTe and could be comparable with crystal silicon solar cells [10]. This remarkable progress is due to its excellent optoelectronic properties: excellent light absorption ...

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Solution-processed polymer solar cells (PSCs) have attracted dramatically increasing attention over the past few decades owing to their advantages of low cost, solution processability, light weight, and excellent flexibility. Recent progress in materials synthesis and devices engineering has boosted the power conversion efficiency (PCE) of single-junction ...

However, silicon solar cells are not yet economically competitive with fossil fuels, necessitating further cost reduction. Research explores alternatives like organic/polymeric SCs, perovskite, quantum dot cells, dye-sensitized solar cells (DSSCs), and multi-junction cells to achieve high conversion efficiency at lower expenses [15], [16]. To ...

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