What is a polymer solar cell?

Polymer solar cells usually consist of an electron- or hole-blocking layer on top of an indium tin oxide (ITO) conductive glass followed by electron donor and an electron acceptor (in the case of bulk heterojunction solar cells), a hole or electron blocking layer, and metal electrode on top.

Can polymersolar cells be used for photovoltaic devices?

Polymersolar cells have gained wide interest in the past few years for their potential in the field of large-area and low-cost photovoltaic devices.

Are polymerized solar cells efficient?

Soc.143, 2665-2670 (2021). Du, J. et al. Polymerized small molecular acceptor based all-polymer solar cells with an efficiency of 16.16% via tuning polymer blend morphology by molecular design. Nat. Commun.12, 5264 (2021). Sun, H. et al. A narrow-bandgap n-type polymer with an acceptor-acceptor backbone enabling efficient all-polymer solar cells.

Which polymer acceptor enables all-polymer solar cells?

An efficient polymer acceptor via a random polymerization strategyenables all-polymer solar cells with efficiency exceeding 17%. Energy Environ. Sci.15,3854-3861 (2022). Wang,J. et al. A new polymer donor enables binary all-polymer organic photovoltaic cells with 18% efficiency and excellent mechanical robustness. Adv. Mater.34,2205009 (2022).

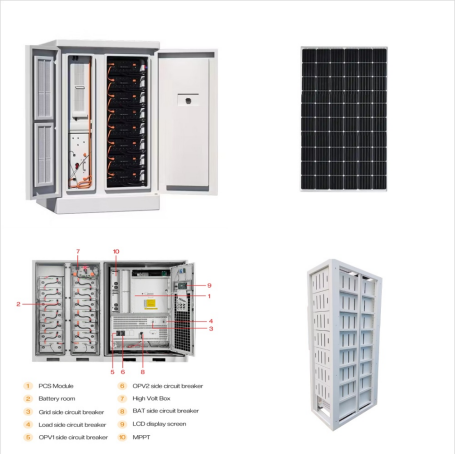
Which n-type polymer enables efficient all-polymer solar cells?

Nat. Commun.12, 5264 (2021). Sun, H. et al. A narrow-bandgap n-type polymer with an acceptor-acceptor backbone enabling efficient all-polymer solar cells. Adv. Mater.32, 2004183 (2020). Jia, T. et al. 14.4% efficiency all-polymer solar cell with broad absorption and low energy loss enabled by a novel polymer acceptor. Nano Energy72, 104718 (2020).

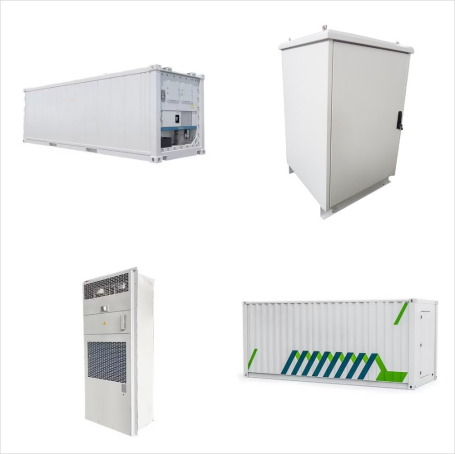
Are semiconducting polymers good for solar energy harvesting?

Based on semiconducting polymers,these solar cells are fabricated from solution-processing techniques and have unique prospects for achieving low-cost solar energy harvesting,owing to their material and manufacturing advantages.

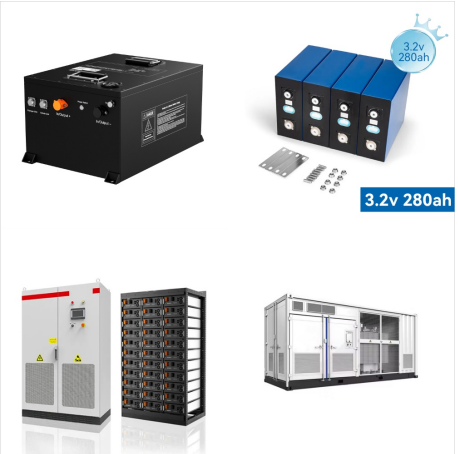
POLYMER PHOTOVOLTAICS



With the emergence of ADA"DA-type (Y-series) non-fullerene acceptors (NFAs), the power conversion efficiencies (PCEs) of organic photovoltaic devices have been constantly refreshed and gradually reached 20% in recent years (19% ???

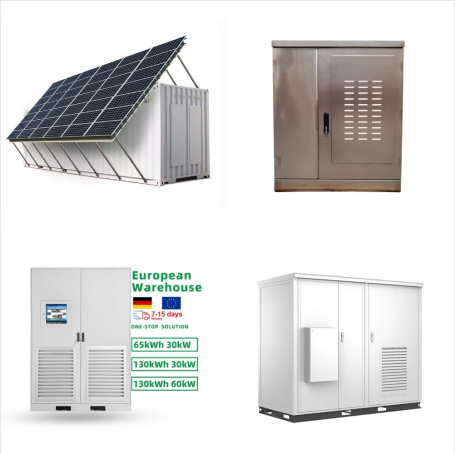


shortcoming for single-junction polymer PV devices in terms of their insuf???cient light absorption. However, this ""disadvantage"" of polymer PV can actually open a door to a new opportunity: visible region transparency. The active layer in a transparent organic photovoltaics (TOPV) device is required to exhibit high trans-

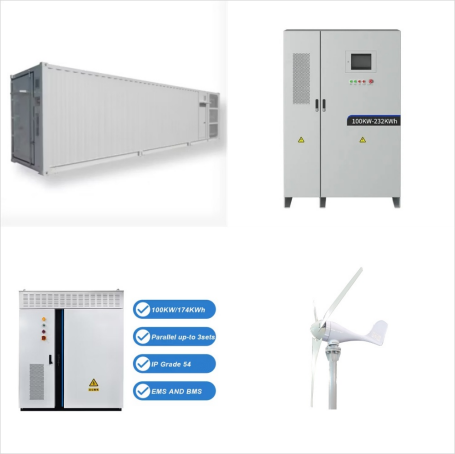


Looking back on history, polymers play a great role as both light absorbers and interfacial materials, which have heavily impacted the development of OPVs. Therefore, it is our great honor to organize this special issue entitled "Polymer-Related Organic Photovoltaics" in Macromolecular Rapid Communications. The issue assembles 16 original

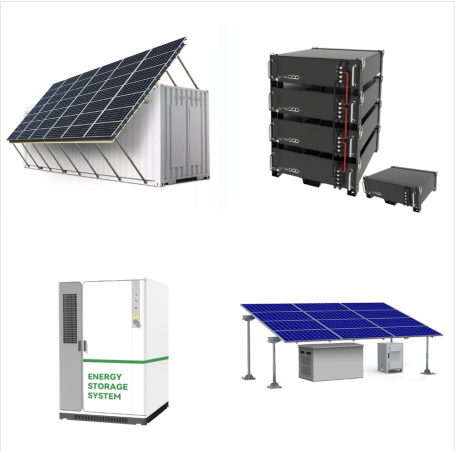
POLYMER PHOTOVOLTAICS



Here, we show that interfacial charge separation can occur through a polaron pair-derived hole transfer process in all-polymer photovoltaic blends, which is a fundamentally different mechanism

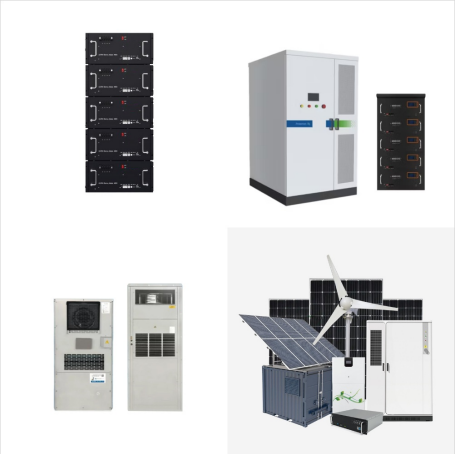


Organic photovoltaics (OPVs) need to overcome limitations such as insufficient thermal stability to be commercialized. The reported approaches to improve stability either rely on the development of new materials or on tailoring the donor/acceptor morphology, however, exhibiting limited applicability. Therefore, it is timely to develop an easy method to enhance ???

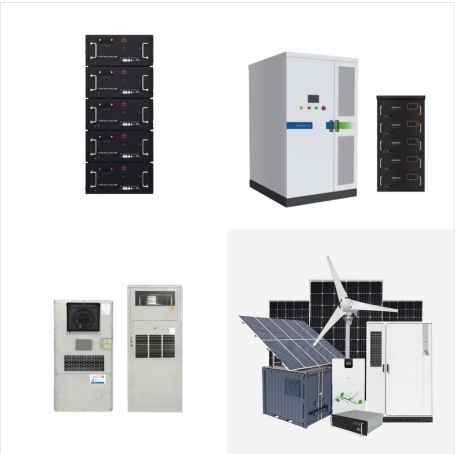


The field of polymer organic photovoltaics (OPV) has made impressive improvements over the last 10 years with power conversion efficiencies increasing from 8% to 18%. The design of new polymer donors and non-fullerene (NFA) acceptors have been the driving force for these large improvements. The Reynolds group designs new classes of polymers

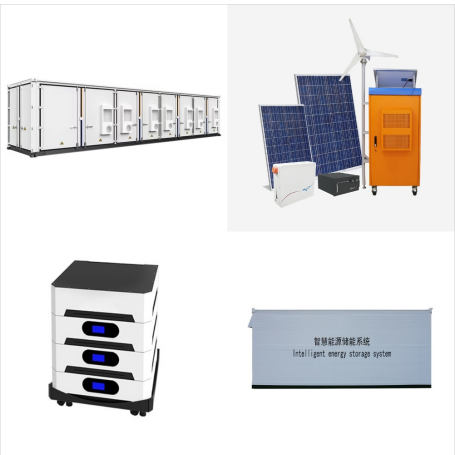
POLYMER PHOTOVOLTAICS



Conjugated polymers are attractive semiconductors for photovoltaic cells because they are strong absorbers and can be deposited on flexible substrates at low cost. Cells made with a single polymer and two electrodes tend to be inefficient because the photogenerated excitons are usually not split by the built-in electric field, which arises from differences in the ???



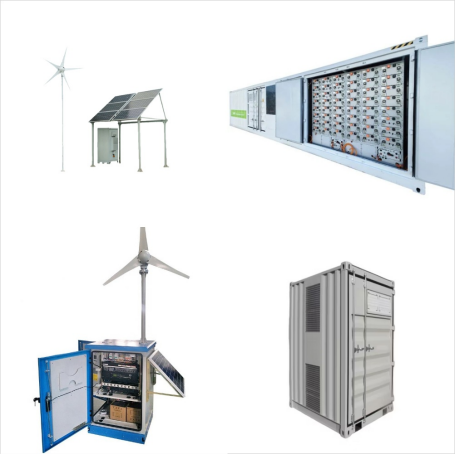
Two families of main-chain polymer donors, based on fluorene or phenylene and donor-acceptor-donor comonomers in alternating copolymers, are used to absorb the high-energy parts of the solar spectrum and to give high photovoltages in combinations with fullerene acceptors in devices. The synthesis of novel conjugated polymers, designed for the purpose of ???



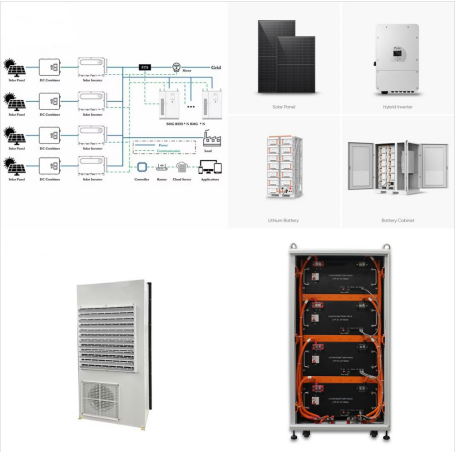
The carrier collection efficiency (?? c) and energy conversion efficiency (?? e) of polymer photovoltaic cells were improved by blending of the semiconducting polymer with C 60 or its functionalized derivatives. Composite films of poly(2-methoxy-5-(2???-ethyl-hexyloxy)-1,4-phenylene vinylene) (MEH-PPV) and fullerenes exhibit ?? c of about 29 percent of electrons per ???

POLYMER PHOTOVOLTAICS

Polymer photovoltaics are a promising alternative energy for visible-spectrum applications because the absorption spectra of organic semiconductors, including polymer and small-molecule types, are not continuous as in inorganic semiconductors. As a result, the design of organic materials is able to pass visible light and absorb non-visible

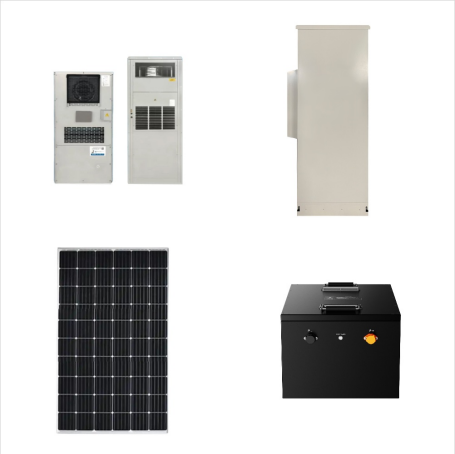


Polymer solar cells [40] or Organic photovoltaic are mainly fabricated through solution processing in an appropriate organic solvent as compared to small molecule solar cells which needs thermal deposition in a high-vacuum environment due to their low molecular weight as compared to polymers.

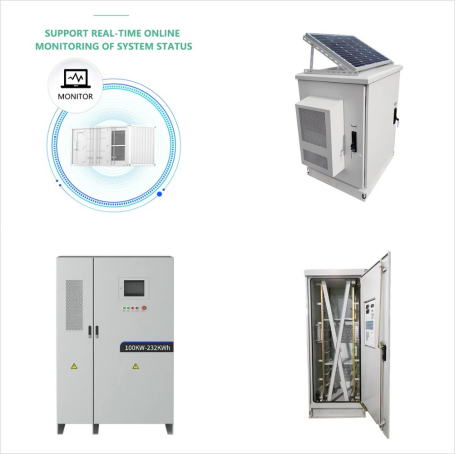


Abstract We review the morphologies of polymer-based solar cells and the parameters that govern the evolution of the morphologies and cells made of organic semiconductors, especially conjugated polymers. This is, in part, due to the rapid growth in the photovoltaic market and, in part, to the advances that have been made in our

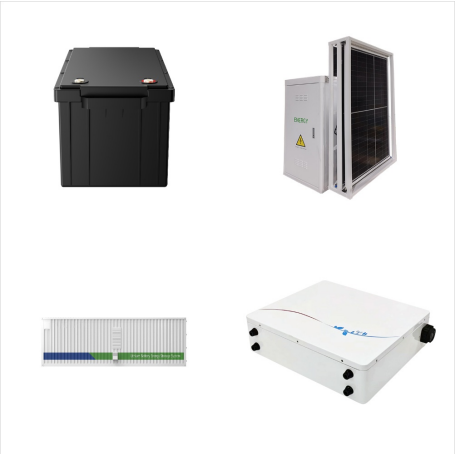
POLYMER PHOTOVOLTAICS



All-polymer solar cells (all-PSCs), consisting of polymer-donor and polymer-acceptor materials, possess many advantages over polymer-fullerene solar cells, including tunable chemical and electronic properties as well as enhanced stabilities 13, 14, 15, 16, 17, 18, 19, 20, 21.

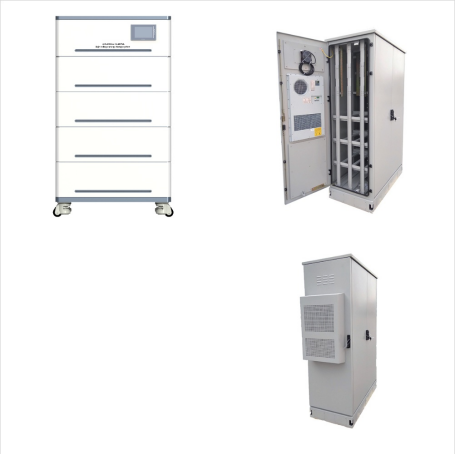


Presently, the new generation of solar cells???the third-generation photovoltaics based on nanocrystals, polymers, dyes, perovskites, and organic materials???is a highly flourishing field in solar energy research [].Even though the achieved power conversion efficiency and stability are low in most cases, third-generation solar cells are renowned due to their ???

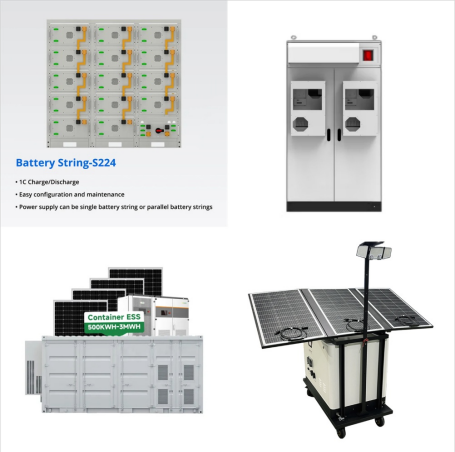


Provided by the Springer Nature SharedIt content-sharing initiative Policies and ethics Polymer solar cells are typically based on bulk-heterojunction active layers containing polymers and fullerene or other molecules, which are solution-processable. The easy processing is the biggest difference comparing to the small molecule-based solar cells.

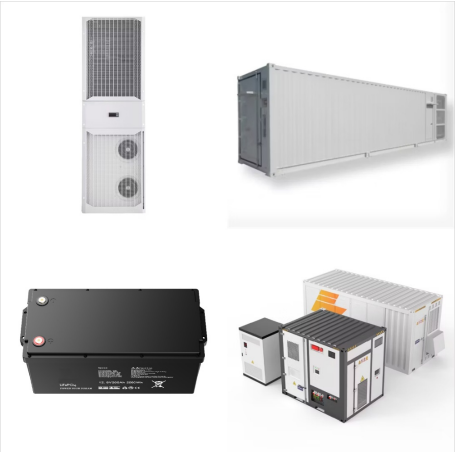
POLYMER PHOTOVOLTAICS



Herein, the latest progresses of polymer solar cells with efficiency over 17% are briefly reviewed from the aspects of active material design, interface material development, and device technology. At last, the opportunities and challenges of organic photovoltaic commercialization in the ???



A large light-receiving angle in planar solar cells is crucial for flexible installation of distributed photovoltaics. Here, authors report sequential-processed all-polymer solar cells with nano



The emerging dye-sensitized solar cells, perovskite solar cells, and organic solar cells have been regarded as promising photovoltaic technologies. The device structures and components of these solar cells are imperative to the device's efficiency and stability. Polymers can be used to adjust the device components and structures of these solar cells purposefully, ???

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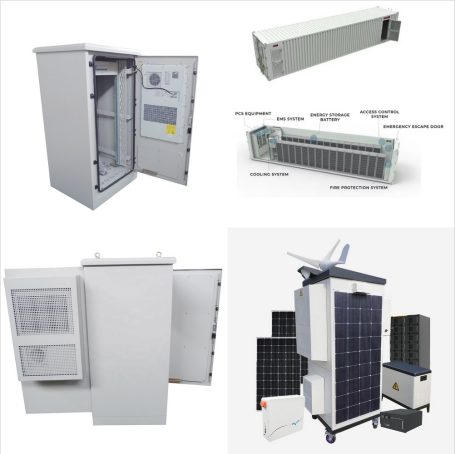
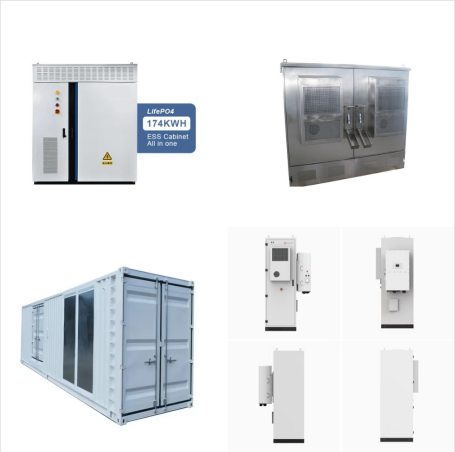
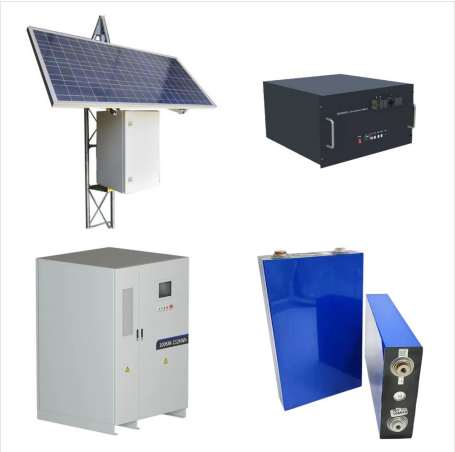


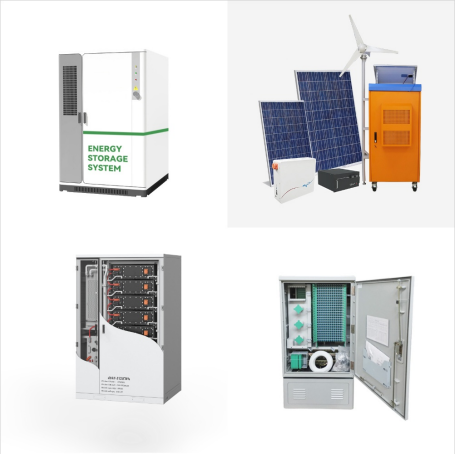
Polymer photovoltaics have become a promising alternative energy due to lightweight properties, environmental friendliness, and solution processabil-ity. Transparent organic photovoltaics in particular have been recently receiving more attention ???



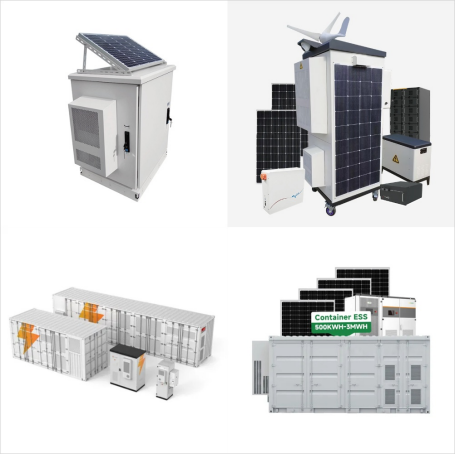
Introduction to Polymer Solar Cells New Chemistry for Organic Photovoltaic Materials New Polymer Donors for Polymer Solar Cells Fullerene derivatives as Acceptors for Polymer Solar Cells Polymer Solar Cells with Non-Fullerene Acceptors Solution-Processed Small Molecule Solar Cells Advances in Interfacial Materials for Polymer Solar Cells Coherence and Uncertainty in ???



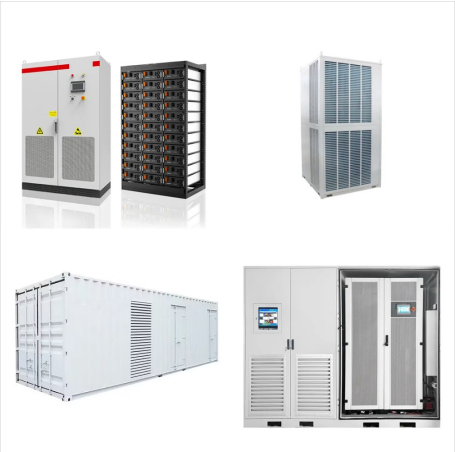
Since the introduction of n-type polymers and their exploration in organic photovoltaics, several PSCs have shown excellent Photovoltaic System Efficiency [3]. The open-circuit voltage of perovskite solar cells (PKSCs) can be improved by inserting polymer passivation layers at the interfaces between the charge transport and perovskite layers [4] .



- Index - Preface - List of abbreviations - Introduction - The Polymer Solar Cell - Characterization of Organic Solar Cells - Lifetime and Stability Studies - Processing and Production of Large Modules - Outlook - References

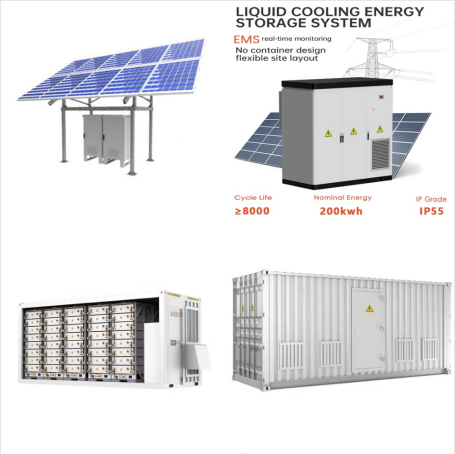


The efficiencies of polymer photovoltaic (PV) cells got a major boost with the introduction of the bulk heterojunction (BHJ) concept 7,8 consisting of an interpenetrating network of electron donor



Solvent-Activated Transformation of Polymer Configurations for Advancing the Interfacial Reliability of Perovskite Photovoltaics J Am Chem Soc. 2024 Sep 25;146(38):26060-26070. doi: 10.1021/jacs.4c05904. which limits the interfacial performance of the photovoltaic devices. Although solvent post-treatment could occasionally regulate the

POLYMER PHOTOVOLTAICS



? The M-series molecules with a ladder-type fused-ring core are promising acceptors (A) for organic solar cells (OSCs) owing to their excellent optoelectronic properties and facile synthesis. To further optimize their photovoltaic performance, two M-series acceptors (M36 and M13) with similar chemical structures are judiciously selected and combined in a photoactive ???