Organic solar cell assembly

Organic solar cells (OSCs) represent an important emerging photovoltaic (PV) technology that can be produced by high-throughput solution processing from a vast array of organic semiconductors. 1-4 The tunable optical bandgap of organic semiconductors enables them to be more efficient in harvesting near-infrared (NIR) photons to facilitate the short-circuit ...

Supramolecular self-assembly of a novel acceptor-p-porphyrin-p-acceptor compound driven by intermolecular sulfur-sulfur interactions leads to the formation of J-aggregates composed of helical nanowire structures. ... and when utilized as a molecular electron donor with a fullerene acceptor in bulk heterojunction organic solar cells ...

The interface between an electrode and the organic active layer is an important factor in organic solar cells (OSCs) that influences the power conversion efficiency (PCE). In this report, a buffer layer of 2-thenylmercaptan/Au self-assembly film is introduced into OSCs as a substitute for the poly(3,4-ethylene dioxythiophene):poly(styrene ...

Bulk-heterojunction structured small-area organic solar cells are approaching 20% power conversion efficiency, but the blurred film-forming kinetics in the fabrication of large-area devices causes ...

The impact of alkanethiol with different chain length on device performance and the coverage of the thiol on Au NPs got better, and the device performance become better with the growth of the alkyl chain. The interface modification between the organic active layer and the inorganic electrode affects the performance of organic solar cell (OSC). A buffer layer of ...

This study introduces a novel self-assembling deposition (SAD) method utilizing synthesized molecules BPC-M, BPC-Ph, and BPC-F, simplifying the fabrication while achieving high-performance of organic solar cells (OSCs).

Herein, we report a star-shaped giant trimer (G-Trimer) to fabricate organic solar cells by o-xylene with over 19% efficiency, long-term stability, and accessible up-scaling property, a more potential candidate for ...

are favored for further development of perovskite solar cells. In terms of surface property modification, self-assembly monolayers (SAMs) were proved an effective strategy for surface modification, which were success-fully applied in organic solar cells, transistors, organic light-emitting devices, dye-sensitized solar cell, etc. As

Self-assembled monolayers (SAMs), owing to their unique and versatile abilities to manipulate chemical and physical interfacial properties, have emerged as powerful nanomaterials for improving the performance of perovskite solar cells (PSCs).

Organic solar cell assembly

In all-small-molecule organic solar cells (ASM-OSCs), the SM possesses a definite structure and good assembly, but the strong assembly brings mutual restriction of ...

Supramolecular self-assembly of a novel acceptor-p-porphyrin-p-acceptor compound driven by intermolecular sulfur-sulfur interactions leads to the formation of J-aggregates composed of ...

Symmetry-Induced Orderly Assembly Achieving High-Performance Perylene Diimide-Based Nonfullerene Organic Solar Cells Shangshang Chen1+, Dong Meng2*+, Jiachen Huang1, Ningning Liang3, Yan Li2, Feng Liu4, He Yan1* & Zhaohui Wang3* 1Department of Chemistry, Energy Institute and Hong Kong Branch of Chinese National Engineering Research Center for ...

We examine the correlations of the dipole moment and conformational stability to the self-assembly and solar cell performance within a series of isomorphic, solution-processable molecules. These charge-transfer chromophores are described by a D1-A-D-A-D1 structure comprising electron-rich 2-hexylbithiophene and 3,3?-di-2-ethylhexylsilylene-2,2?-bithiophene ...

Here, the authors regulate the assembly behaviour of giant dimeric donors, realizing all-giant-oligomeric-based organic solar cells with promising device efficiency and stability. Caixuan Wang ...

A new D-A type BODIPY dimer, DI-BDP-CZ, was prepared as an efficient small molecule donor for organic solar cell. The binary blended organic solar cells based on DI-BDP-CZ as electron donors were fabricated.. A high-power conversion efficiency (PCE) of 14.97% was achieved with addition of PC 71 BM into DI-BDP-CZ: Y6 system.. The reason of the higher ...

Organic solar cells (OSCs), as a type of lightweight, flexible, and solution-processable photovoltaics, have shown promising prospects in integrating with wearable clothes, smart electronics and ...

Bulk-heterojunction structured small-area organic solar cells are approaching 20% power conversion efficiency, but the blurred film-forming kinetics in the fabrication of large ...

Consequently, a highly efficient GPT-LBL organic solar cell (OSC) with a power conversion efficiency (PCE) of 19.41% (certified 19.0%) was achieved. Noticeably, the large-area (1.03 cm 2) device for GPT-LBL OSCs yields a satisfactory PCE of 17.52% in open-air blade coating, which is one of the best values in green-solvent-processed OSCs. The ...

In, Organic Solar Cells sunlight"s direct transformation into electrical energy has many benefits including reasonable rate, semitransparency, light in weight, roll-to-roll huge area fabrication, and versatility. Morphological control is one of the foundations of the current significant advances in power conversion efficiency. As the ...

The synthesis and characterization of a new molecular dyad consisting of a benzodithiophene-based push-pull

linked to a fullerene derivative through the use of the well-known Copper Azide-Alkyne Huisgen Cycloaddition (CuAAC) reaction is reported herein. Once fully characterized at the molecular level, single component organic solar cells were fabricated to demonstrate ...

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 ...

We report on bulk-heterojunction (BHJ) organic photovoltaics (OPVs) based on the self-assembled monolayer (SAM) 2PACz as a hole-selective interlayer functionalized directly onto the indium tin oxide (ITO) ...

Perylene diimides (PDIs) are a competitive class of non-fullerene acceptors in organic solar cells (OSCs), owing to their advantages of low cost and good stability. Monomeric PDIs need fewer synthetic steps thus reducing synthetic complexity, which is vital for mass production. The device performances of OSCs based on monomeric PDI acceptors have ...

Discotic materials have attracted remarkable interest for application in organic solar cells. We analyze a series of phenyl-substituted hexa-peri-hexabenzocoronenes (HBCs) with residue modifications blended with perylenediimide (PDI) as donor material. ... In this study the assembly of six residue modified donor molecules blended with a ...

Additive-assisted layer-by-layer (LBL) deposition affords interpenetrating fibril network active layer morphology with a bulk p-i-n feature and proper vertical segregation in organic solar cells (OSCs). This approach captures the balance between material interaction and crystallization that locks the characteristic length scales at tens of nanometers to suit exciton ...

Organic solar cells (OSCs) based on non-fullerene acceptors have recently achieved high power conversion efficiencies over 19%, thus rapidly advancing third-generation photovoltaic technologies. ... Self-assembly monolayers (SAMs) are also potential anode modifiers, yet require further systematic investigation. Compared with PEDOT:PSS, the SAMs ...

Herein, we report a star-shaped giant trimer (G-Trimer) to fabricate organic solar cells by o-xylene with over 19% efficiency, long-term stability, and accessible up-scaling property, a more potential candidate for commercial photovoltaic materials than its linear-shaped dimer and polymer counterparts.Due to the high molecular weight and unique star-shaped ...

It has been illustrated that SAMs can play significant role in regulation interfacial optoelectronic properties and therefore they have been applied to many systems including organic solar cells ...

Non-fused ring acceptors achieving over 15.6% efficiency organic solar cell by long exciton diffusion length

of alloy-like phase and wertical phase separation induced by hole ...

phosphonic acid-based self-assembly monolayers. For practical applications, research on interlayer materials should prioritize ... representatives for non-fullerene organic solar cells. Chemical structures of the materials are classified and provided. Trends in Chemistry 40 Trends in Chemistry, January 2024, Vol. 6, No. 1.

Self-assembled monolayers (SAMs) have become pivotal in achieving high-performance perovskite solar cells (PSCs) and organic solar cells (OSCs) by significantly ...

Super SAM: Two self-assembled monolayers (SAMs; Br-2PACz and MeO-2PACz) are investigated as hole-extracting interlayer in organic photovoltaics and compared against the widely used PEDOT : PSS. Cells...

Organic solar cells (OSCs) comprising organic semiconductors in the active layer have attracted considerable attention due to their intrinsically flexible and semi-transparent features that can enable multipurpose applications like building- and vehicle-integrated photovoltaics. 1, 2 The state-of-the-art p-i-n-OSCs based on an archetypical hole-transporting ...

During past several years, the photovoltaic performances of organic solar cells (OSCs) have achieved rapid progress with power conversion efficiencies (PCEs) over 18%, demonstrating a great practical application prospect. The development of material science including conjugated polymer donors, oligomer-like organic molecule donors, fused and ...

Perylene diimide based all small-molecule organic solar cells: Impact of branched-alkyl side chains on solubility, photophysics, self-assembly, and photovoltaic parameters ... issues with solubility and self-assembly properties of small-molecules can be addressed, allowing for greater flexibility in adapting donor:acceptor pairs to larger ...

Super SAM: Two self-assembled monolayers (SAMs; Br-2PACz and MeO-2PACz) are investigated as hole-extracting interlayer in organic photovoltaics and compared against the widely used PEDOT : PSS.Cells based on the ternary bulk-heterojunction blend PM6 : BTP-eC9 : PC 71 BM and ITO/Br-2PACz as the anode exhibit the highest power conversion ...

Unique assembly of giant star-shaped trimer enables non-halogen solvent-fabricated, thermal stable, and efficient organic solar cells Caixuan Wang, Xiaoming Ma, Yi-fan Shen, Dan Deng, Hao Zhang, Tong Wang, Jianqi Zhang, Jing Li, Rui ...

Organic waste-derived solar cells (OWSC) are a classification of third-generation photovoltaic cells in which one or more constituents are fabricated from organic waste material. ... The solar cell assembly configurations and choice of fundamental materials were stated and summarized comparably. Some interesting findings include the striking ...

Organic solar cell assembly

Organic solar cells (OSCs) have attracted a considerable attention in the last decade on account of their potentials such as flexibility, light-weight and capability of being manufactured over large areas [1], [2], [3].With the development of organic photovoltaic materials, especially non-fullerene acceptors, the power conversion efficiency (PCE) of OSCs has been ...

Our findings demonstrated that this green-solvent-processible open-air-printed self-assembly strategy is beneficial to close the lab-to-fab gap of organic photovoltaic towards ...