

What is an organic solar cell (OSC)?

An organic solar cell (OSC) or plastic solar cell is a type of photovoltaic that uses organic electronics, a branch of electronics that deals with conductive organic polymers or small organic molecules, for light absorption and charge transport to produce electricity from sunlight by the photovoltaic effect.

What are organic photovoltaic cells?

Most organic photovoltaic cells are polymer solar cells. Fig. 2. Organic Photovoltaic manufactured by the company Solarmer. The molecules used in organic solar cells are solution-processable at high throughput and are cheap, resulting in low production costs to fabricate a large volume.

What is a typical organic solar cell device structure & representative photoactive materials?

Fig. 1: Typical organic solar cell device structure and representative photoactive materials used in organic solar cells. a, A typical organic solar cell (OSC) comprises an electron-transport layer (ETL), hole-transport layer (HTL), transparent conducting layer (TCL) and a photoactive layer.

How are organic solar cells made?

Organic materials for photoactive layer Typically, organic solar cells are fabricated using a blend active layer composed by a p-type conjugated polymer used as donor component, and a n-type organic semiconductor as an acceptor component.

Why is molecular orientation important in organic solar cells?

The regulation principle of optimizing molecular orientation is revealed. The morphological characteristics of the active layer in organic solar cells (OSCs), encompassing phase separation structure, domain sizes, crystallinity and molecular orientation play a pivotal role in governing the photoelectric conversion processes.

Which molecule is used in solution-processed organic solar cells?

Zhou, J. et al. Small molecules based on benzo [1,2-b:4,5-b']dithiophene unit for high-performance solution-processed organic solar cells. J. Am. Chem. Soc. 134,16345-16351 (2012). Kan, B. et al. Solution-processed organic solar cells based on dialkylthiol-substituted benzodithiophene unit with efficiency near 10%. J. Am. Chem.

Organic solar cells (OSCs) can be a promising solution for the delivery of clean and renewable energy in a number of applications [[1], [2], [3], [4]]. The benefits of using organic materials have been widely discussed, which include lightweight, flexibility, desirable mechanical properties, and scalability [[1], [2], [3], [4]]. The newer generations of OSCs are based on non ...

Context Three novel organic semiconductors (Fig. 1), which are molecule (a) and molecule (c) have the same

wing unit molecules (b) and (c) have the same core unit were reported. Thus, the influence of wing units on solar cell device performance parameters such as the opto-electronics properties, non-linear optics (NLO), electronic properties, and natural ...

Organic solar cells (OSCs) have developed rapidly in recent years. However, the energy loss (E loss) remains a major obstacle to further improving the photovoltaic performance. To address this issue, a ternary strategy has been employed to precisely tune the E loss and boost the efficiency of OSCs. The B-N-based polymer donor has been proved to ...

Here we report efficient normal structure organic solar cells delivering promising stability under different conditions, based on PM6:BTP-eC9 blend and AZO/Al ...

The morphological characteristics of the active layer in organic solar cells (OSCs), encompassing phase separation structure, domain sizes, crystallinity and molecular ...

For organic solar cells to be competitive, the light-absorbing molecules should simultaneously satisfy multiple key requirements, including weak-absorption charge transfer state, high dielectric ...

In this study, we developed a multiscale simulation framework to estimate the power conversion efficiencies of bulk heterojunction organic solar cells based on the molecular structures of the donor and acceptor. Firstly, we proposed a ...

The photoactive layer materials of organic solar cells (OSCs) play a critical role in achieving excellent performance. Chlorophyll derivatives are commonly used due to their environmental friendliness, low cost, and easy accessibility. However, ...

Abstract Organic solar cells (OSCs) have been developed for few decades since the preparation of the first photovoltaic device, ... Beijing National Laboratory for Molecular, Sciences CAS Research/Education Center for ...

Encouragingly, all-polymer solar cells largely address such problems in organic solar cells (OSCs) [31]. All-polymer solar cells are a kind of OPV cells with a bulk heterojunction (BHJ) active layer of a polymeric electron donor and a polymeric electron acceptor.

An organic solar cell (OSC [1]) ... Recent research has shown that high-performing small molecular donor structures tend to have planar 2-D structures and can aggregate or self assemble. [121] Since performance of these devices ...

Effect of molecular structure on the photochemical stability of acceptor and donor polymers used in organic solar cells+ Suraj Prasad, a Zewdeh Genene, b Cleber F. N. Marchiori, a Shivam Singh, a Leif K. E. Ericsson, a Ergang Wang, b C. Moyses Araujo a and Ellen Moons *a

The research of organic solar cells (OSCs) has made great progress, mainly attributed to the invention of new active layer materials and device engineering. In this comment, we focused on A-D-A type molecules and device engineering, and summarized the recent developments and future challenges from the view point of chemists, including power ...

The bulk heterojunction (BHJ) morphology of photovoltaic materials is crucial to the fundamental optoelectronic properties of organic solar cells (OSCs). However, in the photoactive layer, the intrinsic crystalline packing structure of Y6, currently the hallmark molecule among Y-series non-fullerene acceptor

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The performance of organic solar cells depends on number of parameters such as energy levels of the frontier molecular orbitals, effective charge separation which signifies ...

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