

The 15 graduate students and two assistant professors who work with Itaru Osaka (at left) all come from applied chemistry backgrounds, but they also learn to fabricate organic photovoltaic devices ...

Single-junction organic solar cell with over 15% efficiency using fused-ring acceptor with electron-deficient core. *Joule*, 3 (2019), pp. 1140-1151. ... New phase for organic solar cell research: emergence of y-series electron acceptors and their perspectives. *ACS Energy Lett*, 5 (2020) ...

A new certified world record efficiency for large-area organic photovoltaic (OPV) modules is demonstrated, namely 14.5% on the total module area (15.0% on active area). This achievement is enabled by finite element method (FEM) computer simulations used to optimize the coating homogeneity and the solar module layout. Barely any performance loss is ...

Organic photovoltaic cells (OPVs) have fascinated significant research attention recently because of their advantages such as flexibility, low cost, simple preparation process, and lightweight. [1 - 3] In the past five years, the design of new organic materials and optimization of OPVs resulted in a dramatic increase in power conversion ...

NREL developed the Computational Database for Active Layer Materials for Organic Photovoltaic Solar Cells with calculations on electronic properties of tens of thousands of new polymers and small molecules that are potential candidates for new absorbers.

Single-junction organic solar cell with over 15% efficiency using fused-ring acceptor with electron-deficient core. *Joule*. 2019; 3:1140-1151. Full Text. Full Text (PDF) ... Completely non-fused electron acceptor with 3D-interpenetrated crystalline structure enables efficient and stable organic solar cell. *Nat. Commun.* 2021; 12:5093. Crossref ...

Fortunately, non-fullerene acceptors like ITIC, Y6 and their derivatives feature a high T_g of about 180 °C and 205 °C, ... Z. et al. Tandem organic solar cell with 20.2% efficiency.

Ternary blending and copolymerization strategies have proven advantageous in boosting the photovoltaic performance of organic solar cells. Here, 15% efficiency solar cells using copolymerization donors are demonstrated, where the electron-withdrawing unit, ester-substituted thiophene, is incorporated into a PBDB-TF polymer to downshift the molecular energy and ...

Organic photovoltaic (OPV) cells, also known as organic solar cells, are a type of solar cell that converts sunlight into electricity using organic materials such as polymers and small molecules. 83,84 These materials are carbon-based and can be synthesized in a laboratory, unlike inorganic materials like silicon that require extensive mining ...

Single-junction organic solar cell with over 15% efficiency using fused-ring acceptor with electron-deficient core. ... A nonfullerene semitransparent tandem organic solar cell with 10.5% power conversion efficiency. Adv Energy Mater, 8 (2018), p. 1800529, 10.1002/aenm.201800529.

As a promising solar energy-harvesting technology, organic photovoltaic (OPV) cells have advantages like light-weight, flexibility, transparency, and potential low costs 1,2,3 the last three ...

Flexibility is the most prominent advantage of organic solar cells (OSCs) compared with traditional photovoltaic devices, showing an irreplaceable commercial potential. Currently, the maximum power conversion efficiencies (PCEs) of single-junction OSCs have been over 19% and 16% upon rigid and flexible substrates, respectively, which meet the criteria for commercial ...

A new class of non-fullerene acceptor, Y6, by employing a ladder-type electron-deficient-core-based central fused ring with a benzothiadiazole core is reported. Organic photovoltaics made from Y6 in conventional and inverted architectures each exhibited a high efficiency of 15.7%, measured in two separate labs. Inverted device structures certified at Enli ...

Device engineering of non-fullerene organic photovoltaics with extrapolated operational T 80 lifetime over 45,000 h in air ... operation of OSCs.12-15 Thermal annealing of the photoactive layer at an elevated temperature to increase chain dynamics toward more ordered molecular organiza-

[15, 18 -20] In the inset, the V_{OC} of the devices are plotted versus the energy gap determined from the EQE ... he was postdoc at the TU Dresden (Germany). Since 2018, he is group leader of the organic solar cell group at the TU Dresden. His research activity is centered on the fabrication, characterization, and understanding of fundamental ...

In a typical organic solar cell, the frontier energy levels of the donor and acceptor must have an energetic offset that provides this driving force to split the exciton efficiently. ... For example, it has been shown that relatively low non-radiative voltage losses of 0.15 eV are achievable in an NFA-based OPV device consisting of high ...

Organic photovoltaic (OPV) solar cells are earth-abundant and low-energy-production photovoltaic (PV) solutions. They have the theoretical potential to provide electricity at a lower cost than first- and second-generation solar technologies.

The first organic solar cell was reported by researchers at the University of California, Santa Barbara in 1986. These cells are ... G. Yip H. L. Lau T. K. Lu X. Zhu C. Peng H. Johnson P. A. Leclerc M. Cao Y. Ulanski J. Li Y. Zou Y. Single-junction organic solar cell with over 15% efficiency using fused-ring acceptor with electron-deficient ...

Organic solar cells (OSCs) have been developed for few decades since the preparation of the first photovoltaic

device, and the record power conversion efficiency (PCE) ...

Organic solar cells (OSCs) have been developed for few decades since the preparation of the first photovoltaic device, and the record power conversion efficiency (PCE) certified by national renewable energy laboratory (NREL) has exceeded 17%.

An organic solar cell or organic photovoltaic (OPV) cell is a photovoltaic cell that uses organic electronics - a branch of electronics that deals with thin film of p-conjugated semiconducting organic molecules, oligomers or polymers for light absorption and charge transport. ... 15.1.3. Characterization of organic photovoltaic cells and ...

Commun. 15, 1830 (2024). Article ... Grüne, J. et al. Triplet excitons and associated efficiency-limiting pathways in organic solar cell blends based on (non-) halogenated PBDB-T and Y-Series.

Cui, Y. et al. Achieving over 15% efficiency in organic photovoltaic cells via copolymer design. Adv. Mater. 31, 1808356 (2019). Article Google Scholar Li, S. et al. A wide band gap polymer with a ...

Here, we review recent progress in semitransparent organic photovoltaics for power windows and other building-applied uses, and discuss the potential strategies to endow them ...

This study reported a record-breaking efficiency of 29.15% for a tandem solar cell that combines a perovskite solar cell with a silicon solar cell. The researchers achieved this high efficiency by carefully optimizing the materials and design of the tandem cell, demonstrating the potential for future improvements in solar cell technology [65].

Ternary blending and copolymerization strategies have proven advantageous in boosting the photovoltaic performance of organic solar cells. Here, 15% efficiency solar cells using ...

In organic photovoltaics, high power conversion efficiencies (PCE) are mostly achieved on device areas well below 0.1 cm². Herein, organic solar cells based on a D18:Y6 absorber layer on an active area of ≥ 1 cm² with a certified PCE of 15.24% are reported. The impacts of the sheet resistance of the transparent electrode and the cell design are quantified by means of full ...

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