Perovskite solar cell holes

The highest power conversion efficiencies (PCEs) of >25% reported for single-junction perovskite solar cells (PSCs) rely on regular n-i-p architectures ().However, inverted p-i-n PSCs have several advantages, including low-temperature processability and long-term operational stability derived from non-doped hole-transporting materials (2, 3). ...

Perovskite solar cells have reached a power conversion efficiency over 25%, and the engineering of the interface between the perovskite and hole transport layer (HTL) has been crucial to achieve ...

Reducing interface nonradiative recombination is important for realizing highly efficient perovskite solar cells. In this work, we develop a synergistic bimolecular interlayer (SBI) strategy via 4 ...

An inorganic hole conductor for organo-lead halide perovskite solar cells. Improved hole conductivity with copper iodide. J. Am. Chem. Soc. 136, 758-764 (2014). Article Google Scholar ...

A schematic cross section of the triple-layer, perovskite-based, fully printable mesoscopic solar cell shows that the mesoporous layers of TiO 2 and ZrO 2 have thicknesses of ~1 and 2 mm, respectively, ...

The red and blue pairings are electron-hole pairs. Mirror images reflected from the substrate reduce the ability of excited electrons in the perovskite to recombine with their atomic cores, increasing the efficiency of the perovskite to harvest solar light. (Illustration by Chloe Zhang)

Perovskite solar cells have demonstrated the efficiencies needed for technoeconomic competitiveness. With respect to the demanding stability requirements of photovoltaics, many techniques have ...

Perovskite solar cells are often tested indoors under conditions that do not represent outdoor use. Fei et al. found that faster degradation of the cells in outdoor testing stems from higher ultraviolet levels that cause debonding at the indium-tin oxide and hybrid hole-transporter layer interfaces.The authors designed a hole-transfer material with a ...

The hole-transporting material (HTM) is a key component in perovskite solar cells (PSCs), as it helps transfer charges and reduces unwanted interactions ...

Perovskite QDs serve as efficient hole-extraction material in thin-film solar cells. Jiang et al. report a surface treatment coupled with film fabrication leads to ultrathin (25 nm) perovskite QD film on the surface of planar Sb2(S,Se)3 light-harvesting material and produce a device based on perovskite QDs/Sb2(S,Se)3 heterojunction, ...

The basic understanding of electron and hole currents in perovskite layers is an important step in the direction of unraveling the device physics of perovskite solar cells and light-emitting ...

Perovskite solar cell holes

We propose a novel hole-transporting bilayer as a selective contact for fully ambient printed perovskite solar cells with carbon electrodes. We selectively deposit two hole-transporting materials with an energetic offset between their HOMO levels and achieve not only improved power conversion efficiencies compared with conventional ...

The hole-transporting material (HTM) plays a crucial role in the performance and stability of perovskite solar cells (PSCs). Ideally, it facilitates lossless charge transfer and suppresses charge recombination and ion migration between the perovskite and electrode.

The structure of perovskite solar cells differs slightly from the classical structure of Al-BSF c-Si solar cells. Perovskite solar cells can be manufactured using conventional n-i-p or p-i-n architecture, sandwiching the perovskite absorber layer between a Hole Transporting Layer (HTL) and an Electron Transporting Layer (ETL).

Low-bandgap (LBG, Eg ?1.25 eV) tin-lead (Sn-Pb) perovskite solar cells (PSCs) play critical roles in constructing efficient all-perovskite tandem solar cells ...

Hole transport layers (HTLs) in perovskite photovoltaics do not just play a key role in device performance; they also determine the overall flexibility, cost, and opportune tandem solar cell applications. Currently used HTLs have limited functionality and are costly. Here, we develop an efficient bifunctional and cost-effective HTL based ...

The hole-transporting material (HTM) plays a crucial role in the performance and stability of perovskite solar cells (PSCs). Ideally, it facilitates lossless charge transfer and suppresses charge recombination and ion migration between the perovskite and electrode. These bulk and interface functionalities require tailored ...

The hole-transporting material (HTM) plays a crucial role in the performance and stability of perovskite solar cells (PSCs). Ideally, it facilitates lossless charge transfer and suppresses charge recombination ...

We demonstrate PSCs that achieve stabilized efficiencies exceeding 20% with copper (I) thiocyanate (CuSCN) as the hole extraction layer. A fast solvent removal method enabled the creation of compact, ...

The 2D perovskite formed by tetradecylammonium spacer cations realizes the optimal balance between defect passivation, energy level structure, and charge transport. The planar hole transport layer-free carbon electrode perovskite solar cells achieve an efficiency of 20.40 %.

Perovskite solar cells (PSCs) have good photophysical performance, low fabrication cost and high power conversion efficiency (PCE), and are considered as a promising alternative to silicon-based solar cells. 1,2,3,4,5 In recent years, PSCs have developed rapidly, and PCE has increased from 3.8% in 2009 to over 25% currently. 6,7 ...

Perovskite solar cell holes

The molecular design and conformations of hole-transporting materials (HTM) have unravelled a strategy to enhance the performance of environmentally sustainable perovskite solar cells (PSC). Several attempts have been made and several are underway for improving the efficiency of PSCs by designing an efficient HTM, which ...

Organic-inorganic halide perovskite solar cells (PSCs) have received extensive research in the field of optoelectronic materials. The absorption layer widely used in PSCs is methylammonium lead trihalide (MAPbX3, X = Cl, Br, I), still, the toxicity of lead (Pb) restricts its development, tin-based perovskite MASnI3 has attracted much ...

Efficient, stable, and fully printed carbon-electrode perovskite solar cells enabled by hole-transporting bilayers. Author links open overlay panel Tian Du 1 2, Shudi Qiu 1, Xin Zhou 3, Vincent M. Le Corre 1, Mingjian Wu 3, Lirong Dong 1, Zijian Peng 1, Yicheng Zhao 1 2, Dongju Jang 1, Erdmann Spiecker 3, Christoph J. Brabec 1 2 4, Hans ...

Since the first publication of all-solid perovskite solar cells (PSCs) in 2012, this technology has become probably the hottest topic in photovoltaics. ... In the same way, holes are injected into a hole-transporting material. In this case, as is indicated in Figure 1 C, the V oc is limited by the difference of quasi Fermi levels at the ...

Introduction. Solar cells, directly converting light into electrical power, become one of the most promising technologies to mitigate global challenges of significant imbalance in power consumption and access to energy persist [1], [2], [3], [4].Recently, perovskite solar cells (PSCs) have attracted great attention in both scientific and ...

One approach for improving the power conversion efficiencies (PCEs) of inverted perovskite solar cells (PSCs) has been to use self-assembled monolayers (SAMs), such as [2-(9H-carbazol-9-yl)ethyl]phosphonic acid (2PACz) and its derivatives, as hole transport materials (HTMs) (1, 2).The main reasons why SAMs enhance PCEs ...

Perovskite solar cells (PSCs) based on organic-inorganic halide perovskites have been increasingly studied in recent years. Since the first report in 2009 of a perovskite material used in solar ...

Perovskite solar cells are a new generation of photovoltaic technology that show great promise, especially in the form of flexible cells. ... Step 5: Adjacent to the perovskite layer is the hole transport layer (HTL) which allows the holes from the excited perovskite to move toward the metallic cathode for extraction. The commonly used hole ...

Here, the authors characterize space-charge-limited electron and hole currents in metal-halide perovskites, applicable in emerging solar cells. The currents are ...

Perovskite solar cell holes

Development of suitable hole transport materials is vital for perovskite solar cells (PSCs) to diminish the energy barrier and minimize the potential loss. Here, a low-cost hole transport molecule named SFX-POCCF3 (23.72 $/g) is designed with a spiro[fluorene-9,9"-xanthene] (SFX) core and terminated by trifluoroethoxy units. ...

Since the first publication of all-solid perovskite solar cells (PSCs) in 2012, this technology has become probably the hottest topic in photovoltaics. Proof of this is the number of published papers and the citations that they are receiving--greater than 3,200 and 110,000, respectively-- in just the last year (2017). However, despite this intensive ...

Grain boundaries in organic-inorganic halide perovskite solar cells (PSCs) have been found to be detrimental to the photovoltaic performance of devices. Here, we develop a unique approach to ...

Recently, perovskite solar-cells have shown a rapid rising trajectory of efficiencies exceeding 19%. 1 Such cells are advantageous because of easy fabrication and inexpensive raw materials. 2,3,4 ...

The defective bottom interfaces of perovskites and hole-transport layers (HTLs) limit the performance of p-i-n structure perovskite solar cells. We report that the addition of lead chelation molecu...