

What are layer-by-layer processed organic solar cells?

Layer-by-layer processed organic solar cells have emerged as a promising approach in photovoltaic technology. It is a unique construction process that optimizes morphology, power conversion efficiency, stability, and ultimately the device performance.

Can self-assembled materials be used in tandem solar cells?

Recently, self-assembled materials (SAMs) have garnered significant interest for their utility as hole-selective layers (HSLs) within inverted perovskite solar cells (IPSCs) and in the construction of perovskite-based tandem solar cells, as documented in references 1,2,3,4.

What is layer-by-layer processing?

Zhang et al. (2024); Achieving 19.4% organic solar cell via an in situ formation of p-i-n structure with built-in interpenetrating network, *Joule*, 8 (2), 509-526; DOI: 10.1016/j.joule.2023.12.009. "Layer-by-layer" (LbL) processing, also known as "layer-by-layer" deposition, is a technique used for the fabrication of organic solar cells.

Can self-assembling hole-transport molecules simplify organic solar cells manufacturing?

This research offers a significant contribution to the field of organic solar cells (OSCs), specifically addressing the complexity of traditional fabrication methods. By utilizing self-assembling hole-transport molecules, BPC-M, BPC-Ph, and BPC-F, in a self-assembling deposition (SAD) process, the study simplifies OSC manufacturing.

What is the PCE of a polymer organic solar cell?

A polymer organic solar cell based on the star active layer combination of polymer donor PM6 and non-fullerene acceptor Y6, fabricated by doctor-blade LbL processing technique shows a PCE of 16.35%. This is close to the efficiencies of devices produced in the lab fabricated by spin-coating.

Can self-assembled monolayer be a stable hole-selective contact for inverted perovskite solar cells?

Zhang, S. et al. Conjugated self-assembled monolayer as stable hole-selective contact for inverted perovskite solar cells. *ACS Mater. Lett.* 4, 1976-1983 (2022). Li, C. et al. Fully aromatic self-assembled hole-selective layer toward efficient inverted wide-bandgap perovskite solar cells with ultraviolet resistance. *Angew. Chem. Int.*

Solar cells made by high temperature and vacuum processes from inorganic semiconductors are at a perceived cost disadvantage when compared with solution-processed systems such as organic and dye-sensitized solar cells. ... Solution-processed sintered nanocrystal solar cells via layer-by-layer assembly *Nano Lett.* 2011 Jul 13;11(7):2856-64. doi ...

Perovskite solar cells with inverted architecture have remarkable power conversion efficiency (PCE) and operating stability based on self-assembled molecules (SAMs) hole transport layer. Homogeneous ...

The cell is now built. A final step will be to test the cells electrically in order to know their electrical characteristics. A sorting of the cells is then carried out which will allow the optimization of their assembly. Assembly ...

Based on the PFTP-modified AgNWs/PI substrate, the flexible organic solar cell without hole transport layer was fabricated by blade coating, and a power conversion efficiency of 11.77% was obtained. ... Wu Jiang, Li You-zhan, Tang Hao, et al. Flexible Organic Solar Cells Based on Self-assembly Modified Silver Nanowires Transparent Electrode[J]. ACTA ...

Highly-efficient and stable hole-transport-layer-free perovskite solar cells with monolayer D-o-D type triphenylamine derivatives for hole-extraction are developed. Download: Download high ... 27.1% and 27.6% upon self-assembly of the DMeTPA-O, DMeTPA and DMeOTPA-O monolayers on the ITO surface, respectively, indicative of more hydrophobic ...

This work reports an effective molecular engineering of self-assembled monolayer (SAM) hole-selective layer for the demonstration of high-band-gap perovskite and perovskite-Si ...

For silicon solar cells, the basic design constraints on surface reflection, carrier collection, recombination and parasitic resistances result in an optimum device of about 25% theoretical efficiency. ... By making the front layer very thin, a large ...

5.2 Layer-by-Layer Film-Based Solar Cells LbL is a simple and versatile method for preparing supported thin films [51, 52, 186, 215 - 217]. In this context, its potential for obtaining heterojunctions at the monolayer level is very appealing.

Electric field simulation of single-layer and double-layer nanospheres on Si solar cells: (a) ... Dark field grayscale image for (f) reference solar cell, (g) after one round 10 s assembly, (h) after one round 30 s assembly, (i) after one round 10 min assembly, and (j) after two round 5 min + 5 min assembly. Figure S4: ...

Here, we propose co-assembly strategy with SAM by employing a novel 2-D p-conjugated structure graphdiyne derivative (PAG) with phosphoric acid groups. Through the p ...

We demonstrate that totally solution processable solar cells can be fabricated from inorganic nanocrystal inks in air at temperature as low as 300 °C. Focusing on a CdTe/ZnO thin-film system, we report solar cells that ...

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