摩乐新能源

MOLEC NEW ENERGY

产品手册

Product Catalog 2025

深圳市摩乐新能源科技有限责任公司

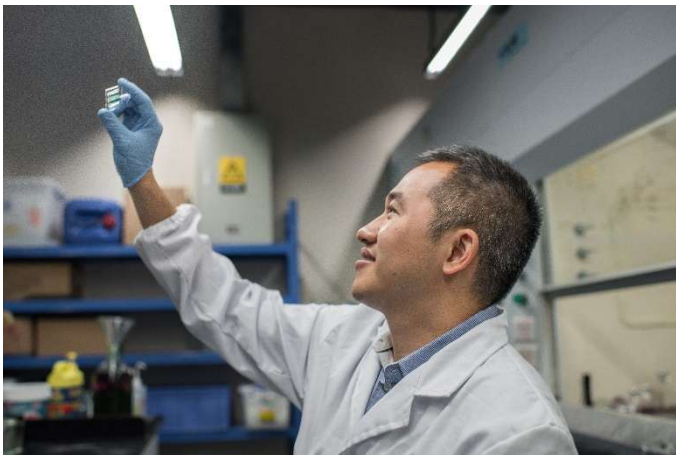
Shenzhen MOLEC New Energy Co., LTD

目录/ CONTENT

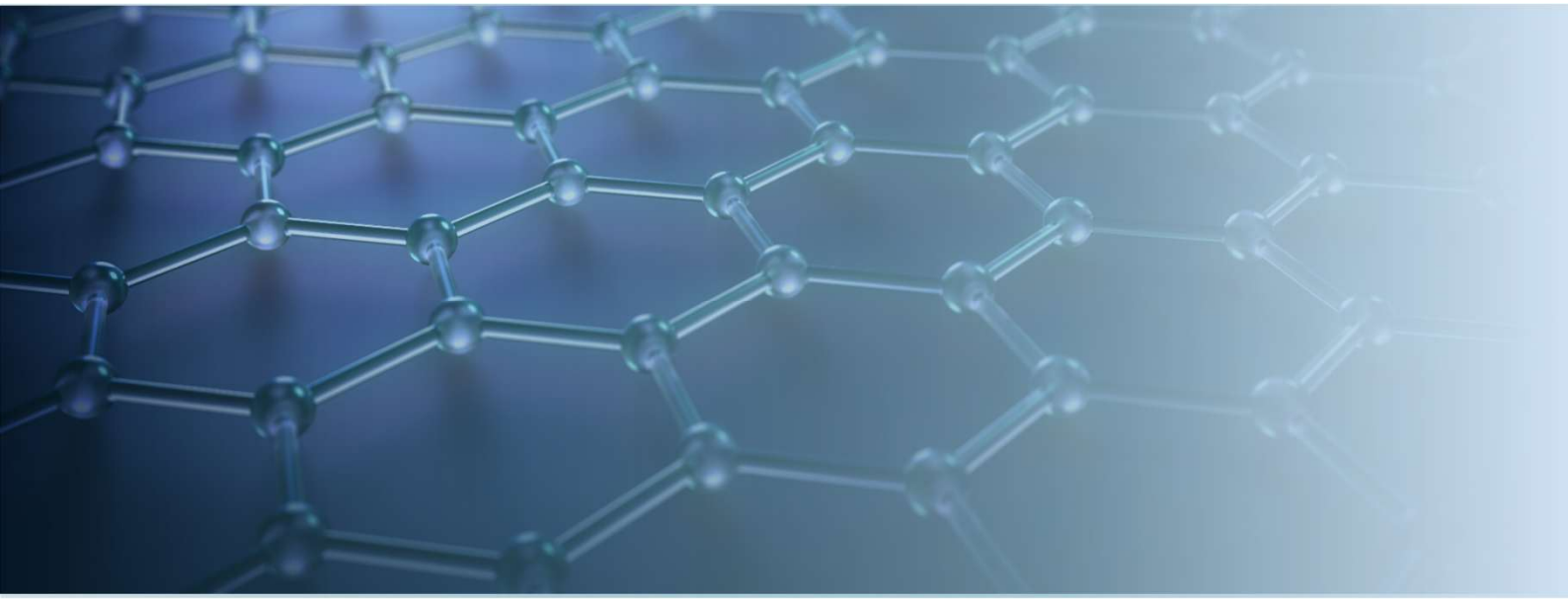
01 COMPANY PROFILE 企业简介

关于摩乐

- 摩乐新能源作为钙钛矿光伏领域的创新先锋，由知名企业恒丰集团旗下深圳市财富港科技创业投资有限公司战略投资，2024年12月创立
- 创始团队来自南方科技大学，长期从事有机半导体材料及钙钛矿光伏应用研发，相关产品经过性能验证
- 迄今为止，摩乐新能源团队已成功开发出一系列钙钛矿光伏关键材料，包括空穴传输材料，钝化剂等



- 摩乐新能源以“材料创新驱动能源革命”为使命，致力推进钙钛矿光伏技术产业化，助力全球碳中和目标实现。



质量保证：
一流产品、一流质量、一流信誉、一流服务
全方位质检报告；先进检测平台；优质服务团队

经验丰富：
聚集多位高校技术人才、优秀的团队管理精英

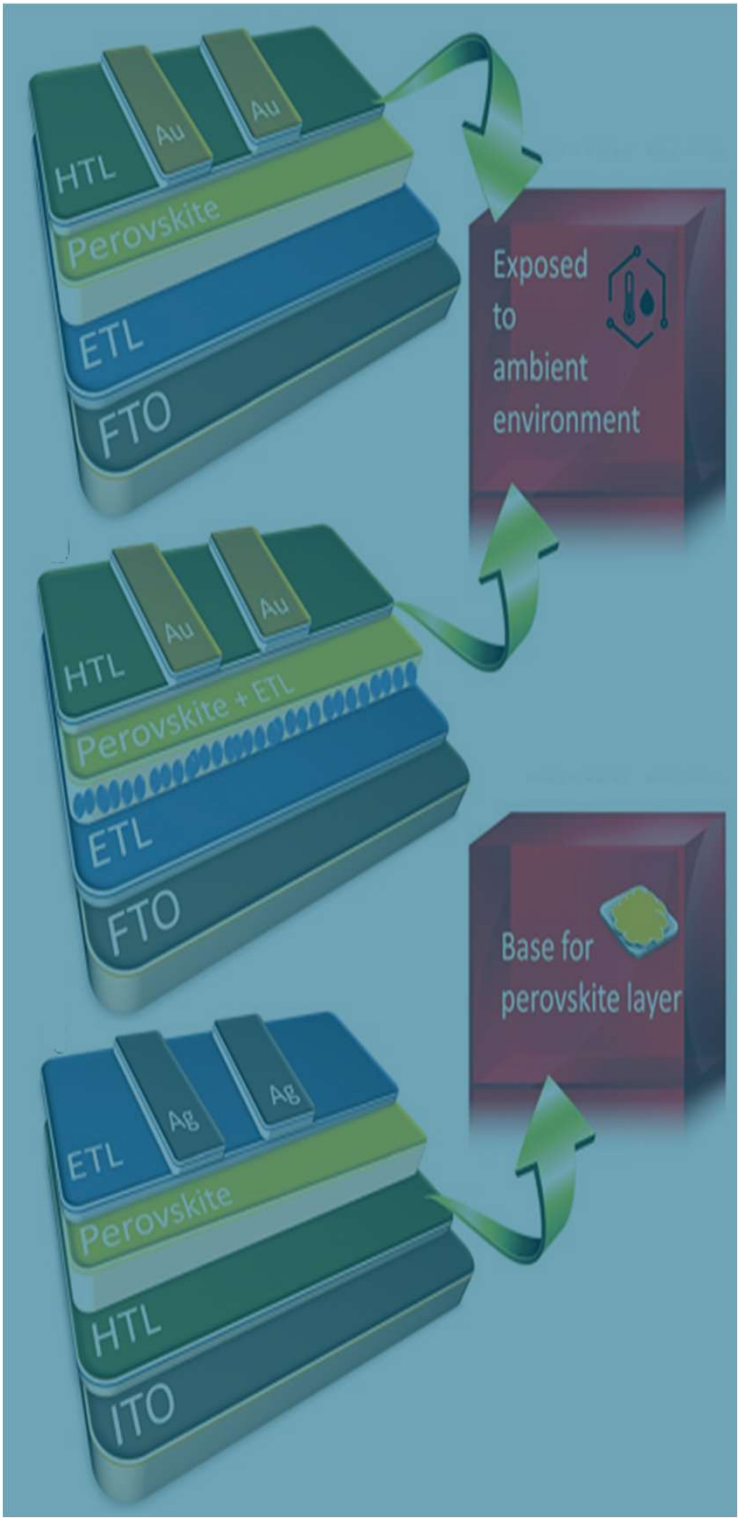
性能验证：
HPLC、NMR、DSC、TGA、UV-vis、UPS.....
Device J-V、Device MPP.....

定制服务：
针对客户实验需求、产线特点提供材料分子结构微调方案及应用指导

02 PRODUCT CENTER
产品中心 ▸▸▸

MOLEC NEW ENERGY

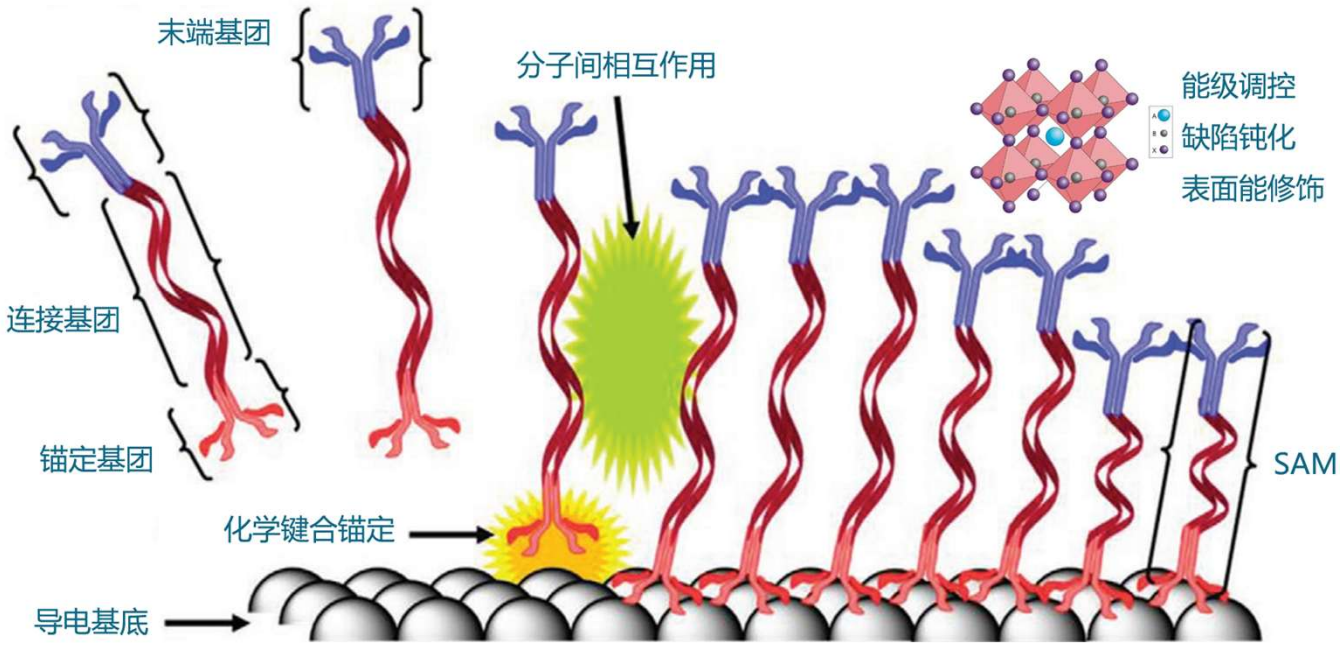
空穴传输材料（HTM)▶▶▶



- HTM的主要功能是高效提取钙钛矿层光生空穴，并传输至电极，同时阻隔电子回流以减少复合损失，是提升器件效率的关键。HTM可覆盖钙钛矿表面缺陷，抑制离子迁移，延缓材料分解，从而提升器件长期稳定性。优质HTM具备一定疏水性，阻挡水氧侵入钙钛矿层，减少环境因素引发的降解
- 无机HTM高稳定、但与钙钛矿的晶格匹配度较低，易引入界面缺陷
- 有机HTM通过分子设计可匹配钙钛矿的能级结构，优化电荷提取效率。兼容界面钝化功能提升器件长期稳定性。适合旋涂、喷涂等低成本工艺，可拓展柔性、叠层等多种器件应用

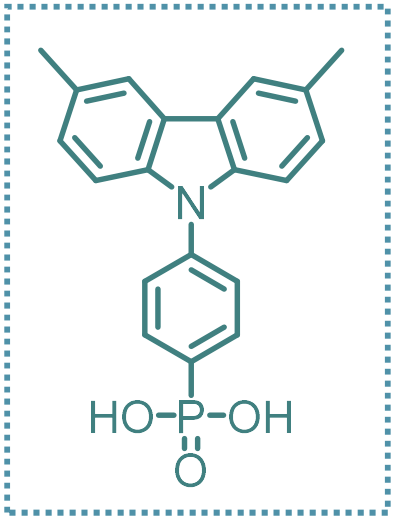
自组装咔唑磷酸衍生物HTM ▸▸▸
CARBAZOL-PHOSPHONIC ACID SAM

- 效率与稳定性协同提升：通过磷酸锚定基团、苯环共轭连接基团实现单分子层/少分子层致密的器件界面、减少钙钛矿层非辐射复合损失；结合端基咔唑修饰，形成高质量钙钛矿制备界面
- 适配大面积量产工艺：通过分子结构理性设计，改善成膜均匀性，适配产线的大面积制备需求
- 成本优势与工艺简化：相比传统空穴传输材料，SAM用量少，材料成本降低90%以上；适配蒸镀、旋涂、刮涂等多种工艺。

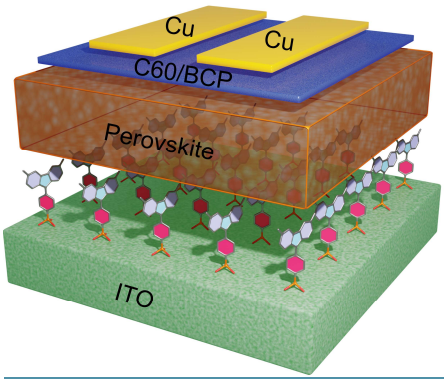


自组装咔唑磷酸衍生物HTM ▶▶▶
CARBAZOL-PHOSPHONIC ACID SAM

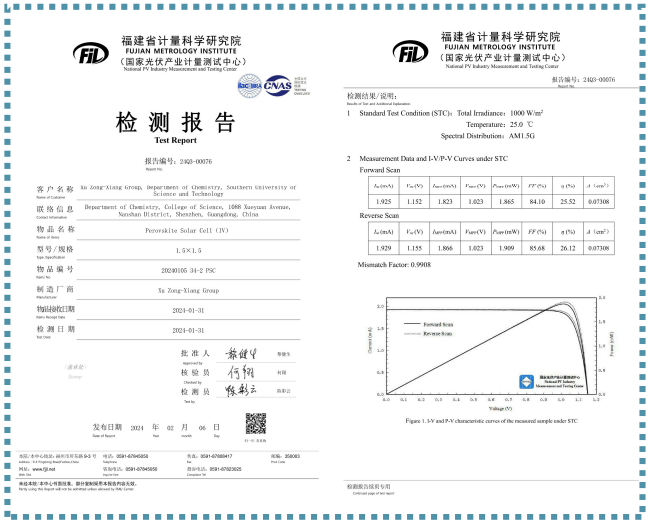
基于商用SAM如Me-4PACz的成功经验，通过将其柔性碳链连接基团替换为共轭的苯环，增强材料光电稳定性，不仅调节了铟锡氧化物电极的功函数，还促进了电荷载流子的提取和传输



产品编号	**MOLEC-SAM-001**
产品性状	白色粉末
产品纯度	99%
热稳定性	309°C (T_d)
HOMO能级	5.43 eV（UPS）
LUMO能级	1.98 eV（UPS）



反式小面积器件
认证效率26.12%


福建省计量科学研究院
FUJIAN METROLOGY INSTITUTE
（国家光伏产业计量测试中心）
National PV Industry Measurement and Testing Center

检 测 报 告
Test Report

报告编号：2403-00076

客户名称 Name of Customer	Xu Zong-Xiang Group, Department of Chemistry, Southern University of Science and Technology
联络信息 Contact Information	Department of Chemistry, College of Science, 1088 Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, China
物品名称 Name of Item	Perovskite Solar Cell (IV)
型号/规格 Type Specification	1.0×1.5
物品编号 Item No.	20240105 34-2 PSC
制造厂商 Manufacturer	Xu Zong-Xiang Group
物品到位日期 Date of Item Arrival	2024-01-31
检测日期 Test Date	2024-01-31

批准人 Approved by
校核员 Checked by
检测员 Test by

发布日期 Date of Report 2024 年 02 月 06 日

福建省计量科学研究院
FUJIAN METROLOGY INSTITUTE
（国家光伏产业计量测试中心）
National PV Industry Measurement and Testing Center

报告编号：2403-00076

检测结果/说明：
1 Standard Test Condition (STC): Total Irradiance: 1000 W/m²
Temperature: 25.0 ℃
Spectral Distribution: AM1.5G

2 Measurement Data and I-V/P-V Curves under STC
Forward Scan

I_{sc}(mA)	V_{oc}(V)	I_{mpp}(mA)	V_{mpp}(V)	P_{mpp}(mW)	FF(%)	η(%)	A (cm²)
1.925	1.152	1.823	1.023	1.865	84.10	25.52	0.07308

Reverse Scan

I_{sc}(mA)	V_{oc}(V)	I_{mpp}(mA)	V_{mpp}(V)	P_{mpp}(mW)	FF(%)	η(%)	A (cm²)
1.929	1.155	1.866	1.023	1.909	85.68	26.12	0.07308

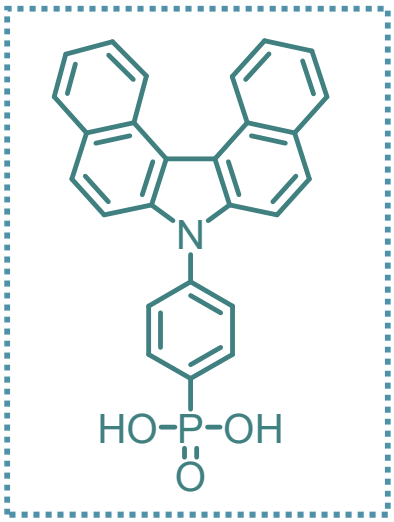
Mismatch Factor: 0.9908

Figure 1. I-V and P-V characteristic curves of the measured sample under STC

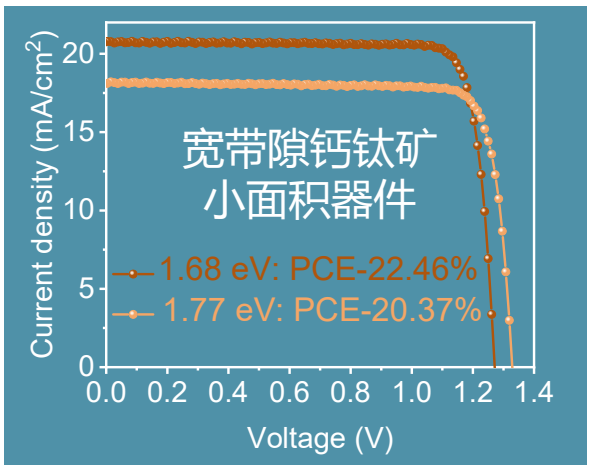
Z. X. Xu, et al., *Joule*, **2024**, 8, 2123-2134

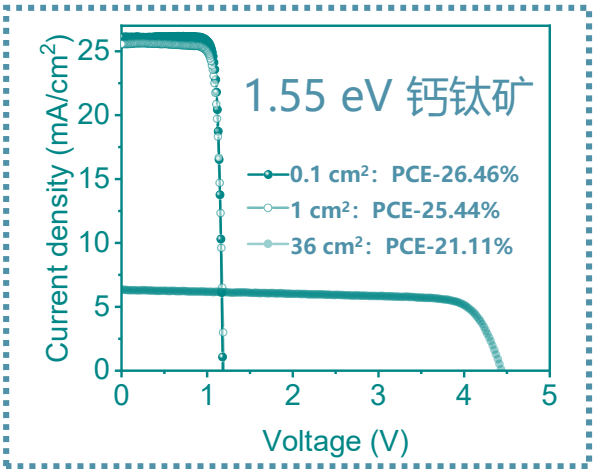
自组装咔唑磷酸衍生物HTM ▸▸▸
CARBAZOL-PHOSPHONIC ACID SAM

苯并咔唑膦酸SAM通过增强的分子间π-π相互作用，自组装形成具有亲水表面的有序双层结构，能够钝化埋底钙钛矿界面缺陷，实现不同带隙钙钛矿高质量、大面积的制备，同时增强界面电荷提取和传输



产品编号	**MOLEC-SAM-002**
产品性状	白色粉末
产品纯度	99%
热稳定性	325°C (T_d)
HOMO能级	5.41 eV（CV）
LUMO能级	2.10 eV（CV）





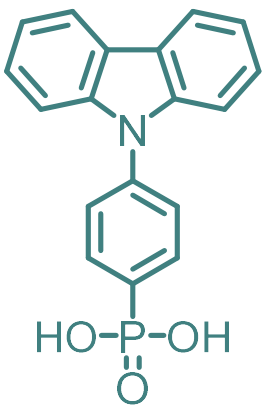
Z. X. Xu, et al., *Nature Communications*, **2025**, 16, 86

自组装咔唑磷酸衍生物HTM ▸▸▸
CARBAZOL-PHOSPHONIC ACID SAM

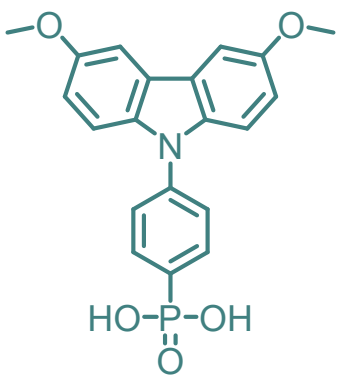
分子结构设计：根据器件能级需求定制HOMO/LUMO、偶极矩、官能团

溶剂适配：提供醇基或混合溶剂配方，兼容客户现有不同器件工艺

工艺包支持：提供成膜工艺参数优化指南（浓度、时间、后处理温度）



MOLEC-SAM-003



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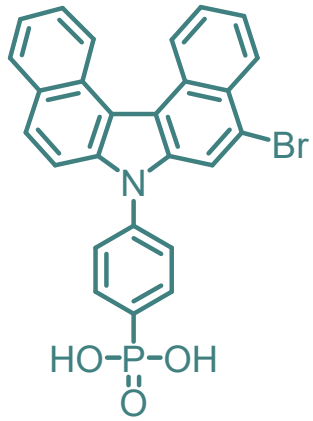
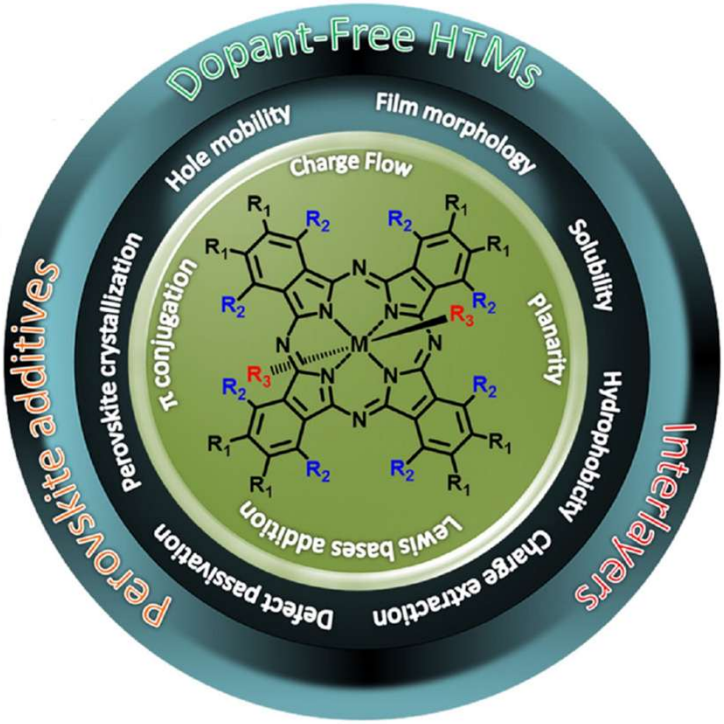


MOLEC-SAM-005

应用场景	性能提升效果
钙钛矿太阳能电池	提升开路电压，适用不同带隙钙钛矿
有机光伏（OPV）	提高填充因子，延长器件寿命
OLED发光器件	提高外量子效率（EQE），降低启亮电压
量子点LED（QLED）	提升色纯度，提高发光效率

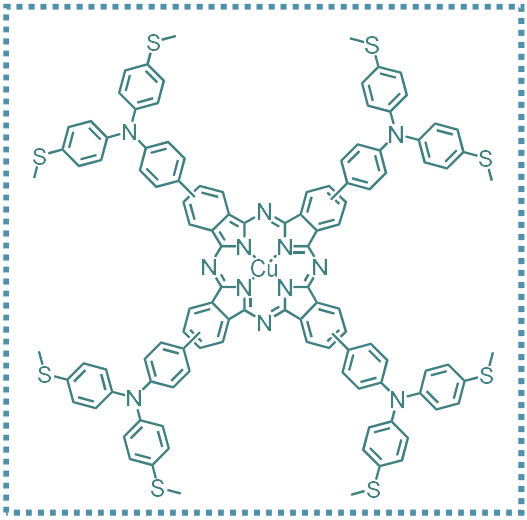
金属酞菁衍生物 ▸▸▸
METAL PHTHALOCYANINE

- 高迁移率与能级匹配：减少界面复合损失，有利于激子分离和电荷收集
- 低成本与工艺兼容性：兼容溶液法或真空蒸镀实现大面积成膜，适配产线生产需求
- 环境稳定性与钝化功能：提升器件在高温、高湿环境下的长期稳定性
- 结构调控功能多样性：可做空穴传输材料、界面修饰材料及钝化剂

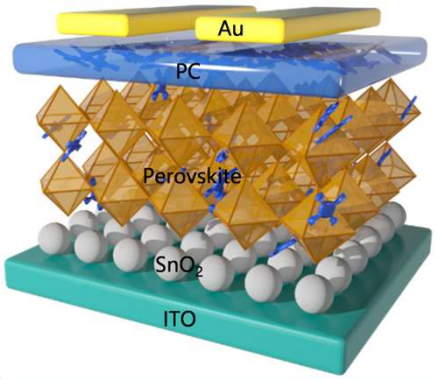


金属酞菁HTM▸▸▸
METAL PHTHALOCYANINE

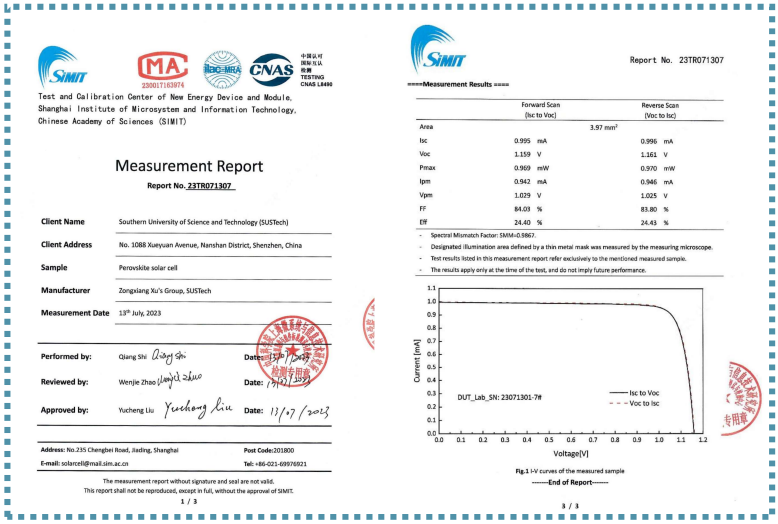
具有富电子SMe-TPA取代基的分子工程化酞菁材料显示出高载流子迁移率、匹配的HOMO能级、优异的热稳定性和钙钛矿缺陷钝化功能，用于溶液加工钙钛矿器件的无掺HTM，表现出优异的效率和稳定性



产品编号	MOLEC-PC-001
产品性状	蓝色粉末
产品纯度	99%
热稳定性	416°C (T_d)
HOMO能级	5.42 eV（UPS）
LUMO能级	3.90 eV（UPS）



正置小面积器件
认证效率24.43%



Test and Calibration Center of New Energy Device and Module,
Shanghai Institute of Microsystem and Information Technology,
Chinese Academy of Sciences (SIMIT)

Measurement Report
Report No. 23TR071307

Client Name	Southern University of Science and Technology (SUSTech)
Client Address	No. 1088 Xueyuan Avenue, Nanshan District, Shenzhen, China
Sample	Perovskite solar cell
Manufacturer	Zongxiang Xu's Group, SUSTech
Measurement Date	13th July, 2023

Performed by: Qiang Shi Date: 13/7/2023
Reviewed by: Wenjie Zhao Date: 13/7/2023
Approved by: Yucheng Liu Date: 13/7/2023

Address: No.235 Chengbei Road, Jiading, Shanghai Post Code:201800
E-mail: solarcell@mail.sim.ac.cn Tel: +86-021-69976921

The measurement report without signature and seal are not valid.
This report shall not be reproduced, except in full, without the approval of SIMIT.
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Report No. 23TR071307

=====Measurement Results=====

	Forward Scan (Isc to Voc)	Reverse Scan (Voc to Isc)
Area	3.97 mm^2	
Isc	0.995 mA	0.996 mA
Voc	1.159 V	1.161 V
Pmax	0.969 mW	0.970 mW
Ipm	0.942 mA	0.946 mA
Vpm	1.029 V	1.025 V
FF	84.03 %	83.80 %
Eff	24.40 %	24.43 %

- Spectral Mismatch Factor: SMM=0.9867.
- Designated illumination area defined by a thin metal mask was measured by the measuring microscope.
- Test results listed in this measurement report refer exclusively to the mentioned measured sample.
- The results apply only at the time of the test, and do not imply future performance.

Fig.1 I-V curves of the measured sample
-----End of Report-----
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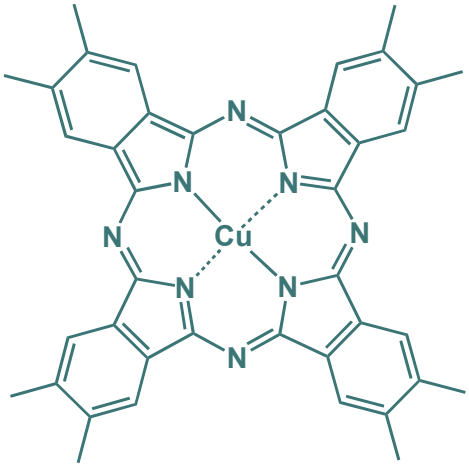
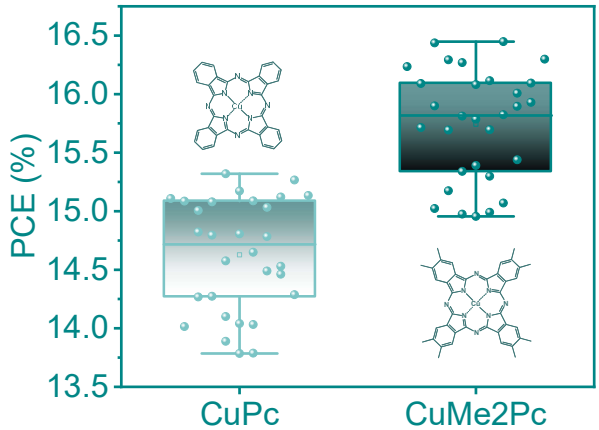
Z. X. Xu, et al., *Energy Environ. Sci.*, **2024**, 17, 5080–5090
Z. X. Xu, et al., *Adv. Funct. Mater.*, **2022**, 32, 2206585

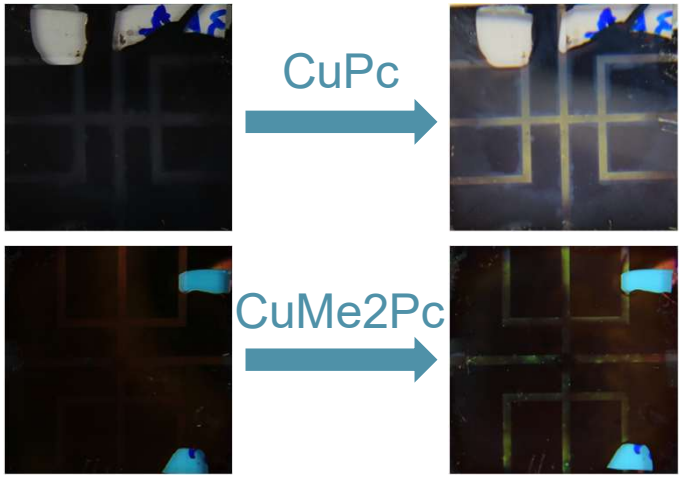
金属酞菁HTM▸▸▸
METAL PHTHALOCYANINE

甲基修饰酞菁，采用蒸镀工艺制膜，表现出了平行于衬底方向的分子排列和更高的空穴迁移率，提高了器件的空穴抽取能力。同时，还具有高光/电/热稳定性和更疏水的表面特性，保护钙钛矿吸光层免于水分子的破坏，显著地改善了钙钛矿太阳能电池的稳定性



产品编号	**MOLEC-PC-002**
产品性状	蓝色粉末
产品纯度	99%
热稳定性	607°C (T_d)
HOMO能级	5.20 eV（UPS）
LUMO能级	3.50 eV（UPS）





Z. X. Xu, et al., *Energy Environ. Sci.*, **2024**, 17, 5080–5090
Z. X. Xu, et al., *Nano Energy*, **2017**, 31, 322-330

钝化剂材料（PASSIVATOR）▶▶▶

缺陷钝化剂是实现高效稳定钙钛矿光伏器件的关键材料

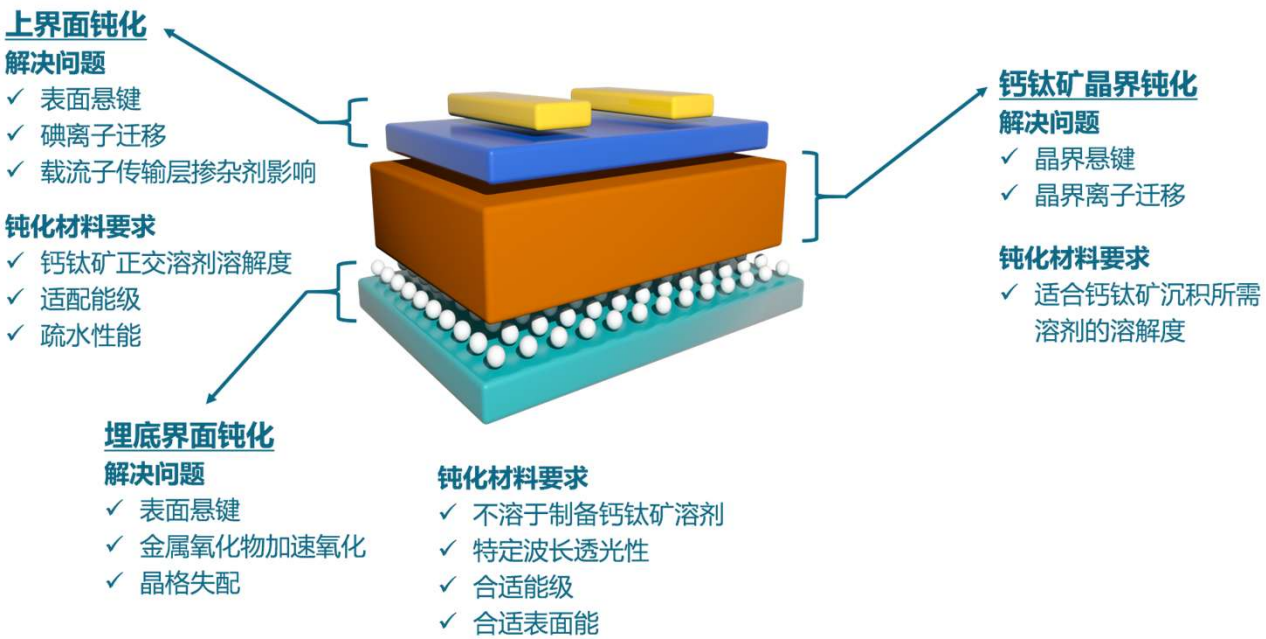
缺陷态的物理覆盖与化学键合：通过沉积在钙钛矿表面或晶界形成致密层，直接覆盖未配位离子或空位缺陷，减少缺陷暴露；与缺陷位点形成强化学键

抑制离子迁移与相分离：填充晶界或晶格通道，阻挡离子的迁移，减少电场/光照下的相分离和离子累积；通过增强晶界结合能，抑制缺陷扩散路径，提升材料机械稳定性

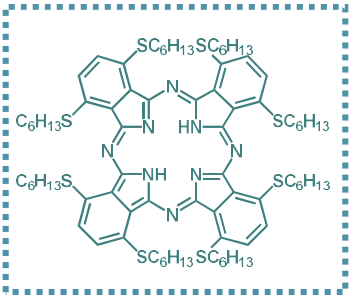
能级调控与电荷传输优化：通过能带弯曲调节钙钛矿与电荷传输层的界面能级，减少界面势垒；消除深能级缺陷态，降低Shockley-Read-Hall复合概率，提升载流子寿命

环境稳定性增强：疏水性钝化剂形成防水/氧保护层，减缓钙钛矿水解和氧化；通过键合抑制表面分解反应，延缓相变和光致退化

多功能协同效应：优化钙钛矿结晶过程，减少针孔和晶界缺陷密度；动态键合型钝化剂在光照或热应力下可修复新生成的缺陷

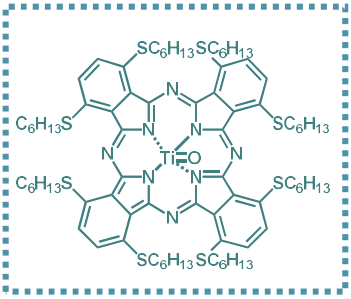


钝化剂材料（PASSIVATOR）▶▶▶



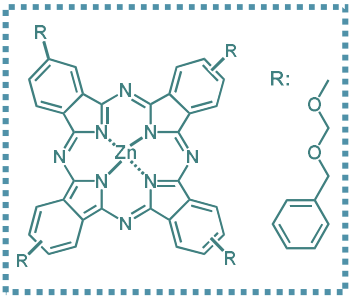
MOLEC-PC-003

- 侧链官能团Lewis酸碱相互作用钝化
- 中心氢原子动态氢转移增强钝化
- 反溶剂添加，钝化器件效率22.53%提升到24.03%



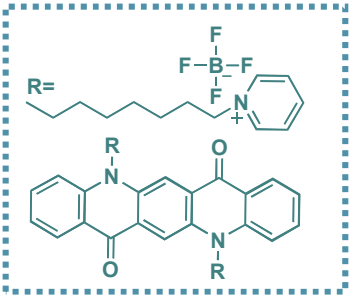
MOLEC-PC-004

- 侧链官能团Lewis酸碱相互作用钝化
- 中心Ti=O键双重钝化增强
- 反溶剂添加，钝化器件效率17.67%提升到19.39%



MOLEC-PC-005

- 侧链官能团Lewis酸碱相互作用钝化
- 中心金属调控，适于极性溶剂加工
- 钙钛矿前驱体添加，钝化器件效率23.59%提升到26%



- 功能化的大π-共轭阳离子贯穿钙钛矿薄膜
- 阴离子自发富集在钙钛矿/载流子传输层界面
- 阴阳离子自发分布及多种化学键协同钝化作用
- 钙钛矿前驱体添加，钝化器件效率20.9%提升到23.1%

Z. X. Xu, et al., *Nano Energy*, **2023**, 118, 108974
Z. X. Xu, et al., *Small,* **2021**, 17, 2005216
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Z. X. Xu, et al., *Angew. Chem.*, **2022**, 134, e202117

03 INNOVATION PLATFORM
创新平台 ▸▸▸

MOLEC NEW ENERGY

研发、生产平台
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- 实力雄厚的研发创新团队
- 克级到公斤级产品定制生产服务



检测设备（部分设备照片）
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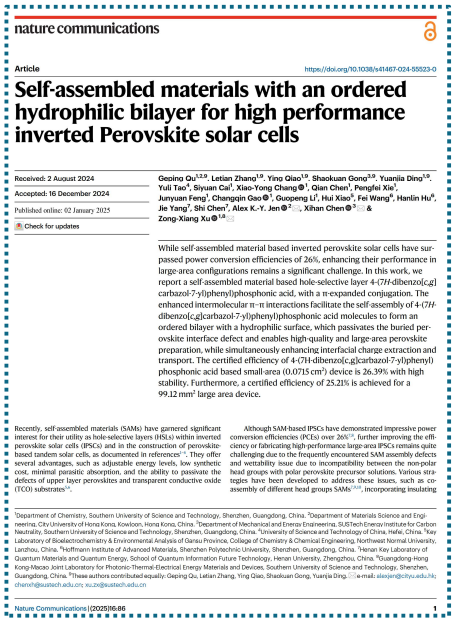
卓越研究成果
EXCELLENT RESEARCH OUTPUT

卓越材料性能，顶刊发布



nature communications

Article

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Self-assembled materials with an ordered hydrophilic bilayer for high performance inverted Perovskite solar cells

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Geqing Qu[1,2,3], Letian Zhang[1,3], Ying Qiao[1,3], Shaokuan Gong[2,3], Yuanjia Ding[1,3], Yuli Tao[4], Siyuan Cai[1], Xiao-Yong Chang[5], Qian Chen[1], Pengfei Xie[1], Junyuan Feng[1], Changqin Gao[5], Guopeng Li[1], Hui Xiao[5], Fei Wang[6], Hanlin Hu[6], Jie Yang[7], Shi Chen[7], Alex K.-Y. Jen[8] ✉, Xihan Chen[2,3] ✉ & Zong-Xiang Xu[1,3] ✉

Recently, self-assembled materials (SAMs) have garnered significant interest for their utility as hole-selective layers (HSLs) within inverted perovskite solar cells (PSCs) and in the construction of perovskite-based tandem solar cells, as documented in references[1–4]. They offer several advantages, such as adjustable energy levels, low synthetic cost, minimal parasitic absorption, and the ability to passivate the defects of upper layer perovskites and transparent conductive oxide (TCO) substrates[5,6].

Although SAM-based IPSCs have demonstrated impressive power conversion efficiencies (PCEs) over 26%[7,8], further improving the efficiency or fabricating high-performance large-area IPSCs remains quite challenging due to the frequently encountered SAM assembly defects and wettability issue due to incompatibility between the non-polar head groups with polar perovskite precursor solutions. Various strategies have been developed to address these issues, such as co-assembly of different head groups SAMs[9,10], incorporating insulating

While self-assembled material based inverted perovskite solar cells have surpassed power conversion efficiencies of 26%, enhancing their performance in large-area configurations remains a significant challenge. In this work, we report a self-assembled material based hole-selective layer 4-(7*H*-dibenzo[c,g]carbazol-7-yl)phenylphosphonic acid, with a π-expanded conjugation. The enhanced intermolecular π−π interactions facilitate the self-assembly of 4-(7*H*-dibenzo[c,g]carbazol-7-yl)phenylphosphonic acid molecules to form an ordered bilayer with a hydrophilic surface, which passivates the buried perovskite interface defect and enables high-quality and large-area perovskite preparation, while simultaneously enhancing interfacial charge extraction and transport. The certified efficiency of 4-(7*H*-dibenzo[c,g]carbazol-7-yl)phenyl) phosphonic acid based small-area (0.0715 cm^2) device is 26.39% with high stability. Furthermore, a certified efficiency of 25.21% is achieved for a 99.12 mm^2 large area device.

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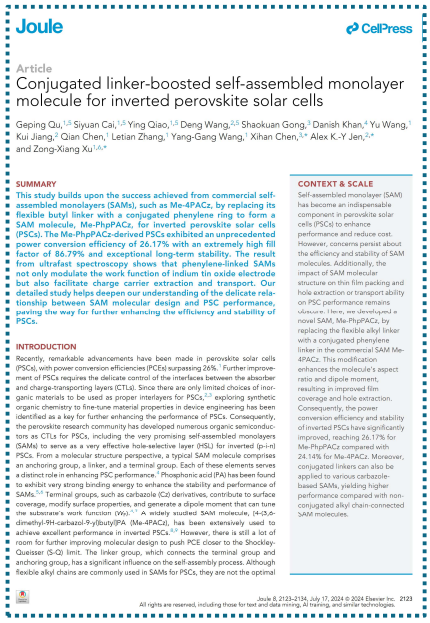

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Article

Conjugated linker-boosted self-assembled monolayer molecule for inverted perovskite solar cells

Geping Qu,[1,5] Siyuan Cai,[1,5] Ying Qiao,[1,5] Deng Wang,[2,5] Shaokuan Gong,[3] Danish Khan,[4] Yu Wang,[1] Kui Jiang,[2] Qian Chen,[1] Letian Zhang,[1] Yang-Gang Wang,[1] Xihan Chen,[3,*] Alex K.-Y Jen,[2,*] and Zong-Xiang Xu[1,6,*]

SUMMARY

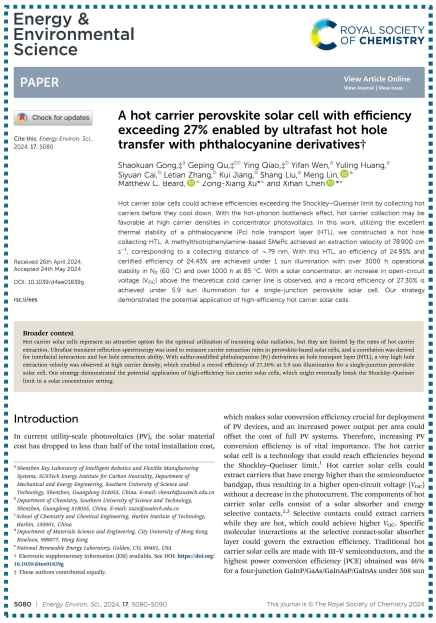
This study builds upon the success achieved from commercial self-assembled monolayers (SAMs), such as Me-4PACz, by replacing its flexible butyl linker with a conjugated phenylene ring to form a SAM molecule, Me-PhpPACz, for inverted perovskite solar cells (PSCs). The Me-PhpPACz-derived PSCs exhibited an unprecedented power conversion efficiency of 26.17% with an extremely high fill factor of 86.79% and exceptional long-term stability. The result from ultrafast spectroscopy shows that phenylene-linked SAMs not only modulate the work function of indium tin oxide electrode but also facilitate charge carrier extraction and transport. Our detailed study helps deepen our understanding of the delicate relationship between SAM molecular design and PSC performance, paving the way for further enhancing the efficiency and stability of PSCs.

CONTEXT & SCALE

Self-assembled monolayer (SAM) has become an indispensable component in perovskite solar cells (PSCs) to enhance performance and reduce cost. However, concerns persist about the efficiency and stability of SAM molecules. Additionally, the impact of SAM molecular structure on thin film packing and hole extraction or transport ability on PSC performance remains obscure. Here, we developed a novel SAM, Me-PhpPACz, by replacing the flexible alkyl linker with a conjugated phenylene linker in the commercial SAM Me-4PACz. This modification enhances the molecule's aspect ratio and dipole moment, resulting in improved film coverage and hole extraction. Consequently, the power conversion efficiency and stability of inverted PSCs have significantly improved, reaching 26.17% for Me-PhpPACz compared with 24.14% for Me-4PACz. Moreover, conjugated linkers can also be applied to various carbazole-based SAMs, yielding higher performance compared with non-conjugated alkyl chain-connected SAM molecules.

INTRODUCTION

Recently, remarkable advancements have been made in perovskite solar cells (PSCs), with power conversion efficiencies (PCEs) surpassing 26%.[1] Further improvement of PSCs requires the delicate control of the interfaces between the absorber and charge-transporting layers (CTLs). Since there are only limited choices of inorganic materials to be used as proper interlayers for PSCs,[2,3] exploring synthetic organic chemistry to fine-tune material properties in device engineering has been identified as a key for further enhancing the performance of PSCs. Consequently, the perovskite research community has developed numerous organic semiconductors as CTLs for PSCs, including the very promising self-assembled monolayers (SAMs) to serve as a very effective hole-selective layer (HSL) for inverted (p-i-n) PSCs. From a molecular structure perspective, a typical SAM molecule comprises an anchoring group, a linker, and a terminal group. Each of these elements serves a distinct role in enhancing PSC performance.[4] Phosphonic acid (PA) has been found to exhibit very strong binding energy to enhance the stability and performance of SAMs.[5,6] Terminal groups, such as carbazole (Cz) derivatives, contribute to surface coverage, modify surface properties, and generate a dipole moment that can tune the substrate's work function (Wk).[7,8] A widely studied SAM molecule, (4-(3,6-dimethyl-9H-carbazol-9-yl)butyl)PA (Me-4PACz), has been extensively used to achieve excellent performance in inverted PSCs.[9,10] However, there is still a lot of room for further improving molecular design to push PCE closer to the Shockley-Queisser (S-Q) limit. The linker group, which connects the terminal group and anchoring group, has a significant influence on the self-assembly process. Although flexible alkyl chains are commonly used in SAMs for PSCs, they are not the optimal



Energy & Environmental Science

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Cite this: *Energy Environ. Sci.*, 2024, **17**, 5080

A hot carrier perovskite solar cell with efficiency exceeding 27% enabled by ultrafast hot hole transfer with phthalocyanine derivatives†

Shaokuan Gong,[‡a] Geping Qu,[‡bc] Ying Qiao,[‡b] Yifan Wen,[b] Yuling Huang,[b] Siyuan Cai,[b] Letian Zhang,[b] Kui Jiang,[b] Shang Liu,[a] Meng Lin,[b] Matthew L. Beard,[d] Zong-Xiang Xu*[bc] and Xihan Chen*[a]

Hot carrier solar cells could achieve efficiencies exceeding the Shockley–Queisser limit by collecting hot carriers before they cool down. With the hot-phonon bottleneck effect, hot carrier collection may be favorable at high carrier densities in concentrator photovoltaics. In this work, utilizing the excellent thermal stability of a phthalocyanine (Pc) hole transport layer (HTL), we constructed a hot hole collecting HTL. A methylthiotriphenylamine-based SMePc achieved an extraction velocity of 78 900 cm s^{-1}, corresponding to a collecting distance of ~79 nm. With this HTL, an efficiency of 24.95% and certified efficiency of 24.43% are achieved under 1 sun illumination with over 1000 h operational stability in N_2 (60 °C) and over 1000 h at 85 °C. With a solar concentrator, an increase in open-circuit voltage (V_{OC}) above the theoretical cold carrier line is observed, and a record efficiency of 27.30% is achieved under 5.9 sun illumination for a single-junction perovskite solar cell. Our strategy demonstrated the potential application of high-efficiency hot carrier solar cells.

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Accepted 24th May 2024

DOI: 10.1039/d4ee01839g

rsc.li/ees

Broader context

Hot carrier solar cells represent an attractive option for the optimal utilization of incoming solar radiation, but they are limited by the rates of hot carrier extraction. Ultrafast transient reflection spectroscopy was used to measure carrier extraction rates in perovskite-based solar cells, and a correlation was derived for interfacial interaction and hot hole extraction ability. With sulfur-modified phthalocyanine (Pc) derivatives as hole transport layer (HTL), a very high hole extraction velocity was observed at high carrier density, which enabled a record efficiency of 27.30% at 5.9 sun illumination for a single-junction perovskite solar cell. Our strategy demonstrated the potential application of high-efficiency hot carrier solar cells, which might eventually break the Shockley–Queisser limit in a solar concentrator setting.

Introduction

In current utility-scale photovoltaics (PV), the solar material cost has dropped to less than half of the total installation cost, which makes solar conversion efficiency crucial for deployment of PV devices, and an increased power output per area could offset the cost of full PV systems. Therefore, increasing PV conversion efficiency is of vital importance. The hot carrier solar cell is a technology that could reach efficiencies beyond the Shockley–Queisser limit.[1] Hot carrier solar cells could extract carriers that have energy higher than the semiconductor bandgap, thus resulting in a higher open-circuit voltage (V_{oc}) without a decrease in the photocurrent. The components of hot carrier solar cells consist of a solar absorber and energy selective contacts.[2,3] Selective contacts could extract carriers while they are hot, which could achieve higher V_{OC}. Specific molecular interactions at the selective contact-solar absorber layer could govern the extraction efficiency. Traditional hot carrier solar cells are made with III–V semiconductors, and the highest power conversion efficiency (PCE) obtained was 46% for a four-junction GaInP/GaAs/GaInAsP/GaInAs under 508 sun

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[b]Department of Chemistry, Southern University of Science and Technology, Shenzhen, Guangdong 518055, China. E-mail: xuzx@sustech.edu.cn
[c]School of Chemistry and Chemical Engineering, Harbin Institute of Technology, Harbin, 150001, China
[d]Department of Materials Science and Engineering, City University of Hong Kong, Kowloon, 999077, Hong Kong
[d]National Renewable Energy Laboratory, Golden, CO, 80401, USA
† Electronic supplementary information (ESI) available. See DOI: https://doi.org/10.1039/d4ee01839g
‡ These authors contributed equally.

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福建省计量科学研究院
FUJIAN METROLOGY INSTITUTE
（国家光伏产业计量测试中心）
National PV Industry Measurement and Testing Center

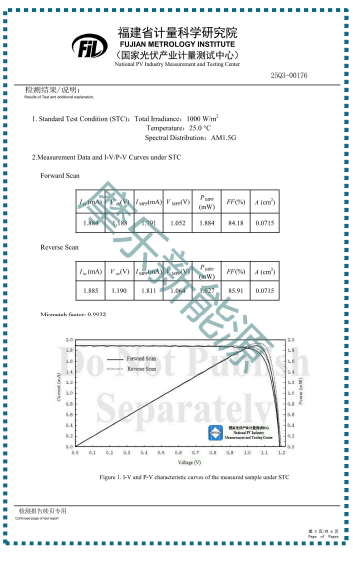
检 测 报 告
Test Report

报告编号：25Q3-00176

客户信息 Name of Customer: Zong-Xiang Xu's Group, Southern University of Science and Technology
联络信息 Contact Information: 1088 Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong Province, China
物品名称 Name of Item: Perovskite Solar Cell (1Y)
型号/规格 Type/Specification: 1.5 cm × 1.5 cm
物品编号 Items No.: 20241231-#17
制造厂商 Manufacturer: Department chemistry, Southern University of Science and Technology
物品接收日期 Items Received Date: 2025.02.07
检测日期 Test Date: 2025.02.07

批准人 Approved by:
核验员 Checked by:
检测员 Tested by:
盖章 Stamp:

发布日期 Date of Report: 2025 年 02 月 08 日



福建省计量科学研究院
FUJIAN METROLOGY INSTITUTE
（国家光伏产业计量测试中心）
National PV Industry Measurement and Testing Center

25Q3-00176

检测结果/说明：

1. Standard Test Condition (STC): Total Irradiance: 1000 W/m^2
Temperature: 25.0 °C
Spectral Distribution: AM1.5G

2.Measurement Data and I-V/P-V Curves under STC

Forward Scan

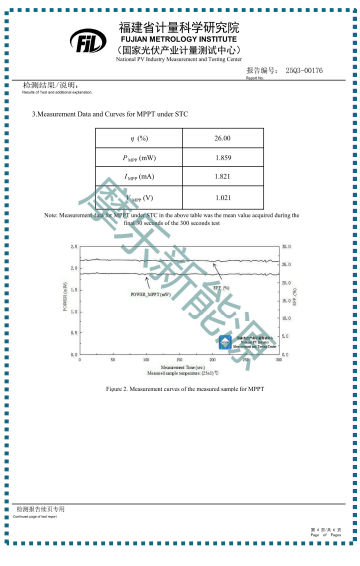
I_{sc}(mA)	V_{oc}(V)	I_{mpp}(mA)	V_{mpp}(V)	P_{mpp} (mW)	FF(%)	A (cm^2)
1.894	1.188	1.801	1.052	1.894	84.18	0.0715

Reverse Scan

I_{sc} (mA)	V_{oc}(V)	I_{mpp}(mA)	V_{mpp}(V)	P_{mpp} (mW)	FF(%)	A (cm^2)
1.885	1.190	1.811	1.054	1.927	85.91	0.0715

Mismatch factor: 0.9932

Figure 1. I-V and P-V characteristic curves of the measured sample under STC



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National PV Industry Measurement and Testing Center

报告编号：25Q3-00176

检测结果/说明：

3.Measurement Data and Curves for MPPT under STC

η (%)	26.00
P_{MPP} (mW)	1.859
I_{MPP} (mA)	1.821
V_{MPP} (V)	1.021

Note: Measurement data for MPPT under STC in the above table was the mean value acquired during the final 60 seconds of the 300 seconds test.

Figure 2. Measurement curves of the measured sample for MPPT

卓越研究成果
EXCELLENT RESEARCH OUTPUT

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孙果(0755-26406581)

发文日：2025年01月10日

申请号或专利号：202311417935.5　　发文序号：202501100034181O

申请人或专利权人：深圳市摩乐新能源科技有限责任公司

发明创造名称：一种基于共轭连接基团的自组装单分子层材料及其制备方法、太阳能电池

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孙果(0755-26406581)

发文日：2025年01月22日

申请号或专利号：202210052926.X　　发文序号：202501220159271O

申请人或专利权人：深圳市摩乐新能源科技有限责任公司

发明创造名称：一种 II 共轭离子化合物及其应用、钙钛矿薄膜及其制备方法、钙钛矿太阳能电池

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孙果(0755-26406581)

发文日：2025年01月10日

申请号或专利号：201910115714.1　　发文序号：202501100006831O

申请人或专利权人：深圳市摩乐新能源科技有限责任公司

发明创造名称：一种邻苯二氮卓生物及其制备方法、一种金属酞菁衍生物及其制备方法和应用

手 续 合 格 通 知 书

上述专利申请或专利，申请人或专利权人于 2024 年 12 月 24 日提出著录项目变更请求，经审查，符合专利法及其实施细则的相关规定，准予变更，现将变更的内容通知如下：

变更项目:专利权人
变更类别:转移
变更前：
第 1 专利权人
专利权人是否代表人：是
专利权人姓名或名称：南方科技大学
专利权人国籍或注册国家（地区）：中国
专利权人邮政编码：518000
专利权人地址：广东省深圳市南山区西丽学苑大道 1088 号
专利权人证件号码：12440300552109303I
专利权人证件类型：
专利权人类型：大专院校

变更后：
第 1 专利权人
专利权人是否代表人：是
专利权人姓名或名称：深圳市摩乐新能源科技有限责任公司
专利权人国籍或注册国家（地区）：中国
专利权人邮政编码：518000
专利权人地址：广东省深圳市光明区公明街道西田社区展辉路 60 号蜂巢科创厂 1 栋十楼
专利权人证件号码：91440300MAE6YYCTXH
专利权人证件类型：统一社会信用代码
专利权人类型：工矿企业

200028
2023.03

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号　国家知识产权局专利局受理处收
电子申请，应当通过专利业务办理系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。

国 家 知 识 产 权 局

518052
深圳市南山区粤海街道高新区社区高新南七道 20 号深圳国家工程实验室大楼 A503 深圳市君胜知识产权代理事务所（普通合伙）
孙果(0755-26406581)

发文日：2025年01月14日

申请号或专利号：201910395790.0　　发文序号：202501140077464O

申请人或专利权人：深圳市摩乐新能源科技有限责任公司

发明创造名称：一种空穴传输材料及其制备方法、钙钛矿太阳能电池

手 续 合 格 通 知 书

上述专利申请或专利，申请人或专利权人于 2024 年 12 月 24 日提出著录项目变更请求，经审查，符合专利法及其实施细则的相关规定，准予变更，现将变更的内容通知如下：

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专利权人国籍或注册国家（地区）：中国
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专利权人地址：广东省深圳市南山区西丽学苑大道 1088 号
专利权人证件号码：12440300552109303I
专利权人证件类型：
专利权人类型：大专院校

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