陕西师范大学
SHAANXI NORMAL UNIVERSITY
西安交通大学
XI'AN JIAOTONG UNIVERSITY

2026年2月
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简报
Newsletter

新概念传感器与分子材料研究院
Institute of New Concept Sensors and Molecular Materials

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房喻院士出席 2025 西安十大科普热词发布暨《科普西安》“科普过大年”活动

Fang Yu attends Release of 2025 Xi’an Top Ten Science Popularization Buzzwords and “Science Popularization for Spring Festival” Event

2026 年 2 月 10 日下午，房喻院士在长安云 – 西安科技馆出席了 2025 西安十大科普热词发布暨《科普西安》春节特别节目—“科普过大年”活动，并为《第 40 届西安市青少年科技创新大赛》“西安市科协主席奖”获奖者颁奖。

此次活动还揭晓了“2025 西安十大科普热词”：“长安云 – 西安科技馆”“青少年科技创新大赛”“科普西安”“科学家精神”“院士进校园”“人工智能大模型”“全国科普月”“科技活动周”“校园科技节”和“科普游”。

本次活动由西安市科学技术协会、西安广播电视台（集团）、陕西西影文化旅游发展有限公司联合主办，省市科协领导及市区县科技管理部门负责人，第 40 届西安市青少年科技创新大赛的部分获奖选手及家人、学校领导代表和现场观众等 300 余人参加了活动。

On February 10, 2026, Prof. Fang Yu attended the Release of 2025 Xi’an Top Ten Science Popularization Buzzwords and the “Science Popularization in Xi’an” Spring Festival Special Program “Science Popularization for the Spring Festival” at Chang’an Cloud - Xi’an Science and Technology Museum, where he presented awards to recipients of the “Xi’an Association for Science and Technology President’s Award” at the 40th Xi’an Youth Science and Technology Innovation Competition.

The event also unveiled the “Top Ten Xi'an Science Popularization Buzzwords for 2025”: “Chang’an Cloud - Xi’an Science and Technology Museum”, “Youth Science and Technology Innovation Competition”, “Science Popularization in Xi’an”, “Scientist Spirit”, “Academicians Entering Campus”, “Large-Scale Artificial Intelligence Models”, “National Science Popularization Month”, “Science and Technology Activity Week”, “Campus Science Festival” and “Science Popularization Tours”.

This event was jointly organized by the Xi’an Association for Science and Technology, Xi’an Broadcasting and Television Station (Group), and Shaanxi Xiying Cultural Tourism Development Co., Ltd. Over 300 attendees participated, including officials from provincial and municipal science associations, heads of science and technology management departments at municipal, district, and county levels, award-winning participants and their families from the 40th Xi’an Youth Science and Technology Innovation Competition, representatives from their schools, and on-site spectators.

房喻院士出席陕西省科普作家协会七届四次常务理事会

Fang Yu attends Standing Council Meeting of Shaanxi Association of Science Writers

2026 年 2 月 11 日上午，房喻院士出席了陕西省科普作家协会第七届常务理事会第四次会议，并作总结讲话。会议审议了 2025 年度工作报告及 2026 年度工作计划，协会管理制度，秦岭生态科普专委会、科幻爱好者专委会成立申请，2025 年度协会财务报告等，并讨论交流了 2026 年度工作。

On February 11, 2026, Prof. Fang Yu attended the Fourth Meeting of the Seventh Standing Council of the Shaanxi Association of Science Writers and delivered concluding remarks. The meeting reviewed the 2025 annual work report and the 2026 work plan, the management regulations, applications for establishing the Qinling Ecological Science Popularization Committee and the Science Fiction Enthusiasts Committee, as well as the 2025 financial report, and also discussed and exchanged views regarding the work plan for 2026.

西安市教育局和陕师大领导看望慰问房喻院士

Xi’an Education Bureau and SNNU officials pay new year visit to Prof. Fang Yu

春节临近，西安市教育局和陕西师范大学校等单位的领导先后来到陕西师范大学新概念传感器与分子材料研究院，看望慰问房喻院士。

2026 年 2 月 11 日，西安市教育局党委书记、局长李红雨代表中共西安市委来到研究院看望慰问房喻院士，市委组织部、市教育局相关同志陪同。

2026 年 1 月 30 日，陕西师范大

学党委书记李晓兵、校长助理袁一芳等来到研究院看望慰问房喻院士。

看望慰问房喻院士的还有中国科学院西安分院，咸阳经开区管委会、咸阳科技创新局，西安交通大学前沿科学技术研究院、仪器科学与技术学院，西北农林科技大学化学与药学院，陕西师范大学党委副书记卢胜利、副校长王云博以及校工会、人才工作处、研究生院、化学化工学院和材料科学与工程学院相关领导等。

As the Spring Festival approaches, officials from the Xi’an Municipal Education Bureau and Shaanxi Normal University visited Prof. Fang Yu at the Institute of New Concept Sensors and Molecular Materials to to extend their regards.

On February 11, 2026, Li Hongyu, secretary of the Party Committee and director of the Xi’an Municipal Education Bureau, came to visit Prof. Fang Yu on behalf of the CPC Xi’an Municipal Committee.

On January 30, 2026, Li Xiaobing, secretary of the SNNU Party Committee, and assistant president Yuan Yifang, came to visit Prof. Fang Yu.

Also coming to visit Prof. Fang Yu were Xi’an Branch of the Chinese Academy of Sciences, Xianyang Economic Development Zone Administrative Committee, Xianyang Science and Technology Innovation Bureau, Xi’an Jiaotong University’s Frontier Institute of Science and Technology and School of Instrument Science and Technology, Northwest A&F University’s School of Chemistry and Pharmacy, SNNU Party Committee vice secretary Lu Shengli, vice president Wang Yunbo, and officials of SNNU Workers’ Union, Graduate School, School of Chemistry and Chemical Engineering and School of Materials Science and Engineering.

“呼吸之元膜法杯”包装设计获 2026 年 IF 设计奖

“Aero Vita De-Hcho Cup” packaging design wins 2026 iF Design Award

iF DESIGN AWARD 2026 WINNER

Porous Membrane Slow-ReleaseFormaldehyde Removal

Product Design / Leisure / Lifestyle / ID: 767273

DESIGN	CLIENT/MANUFACTURER
Beijing Jingdong Century Trading Co., Ltd JingDong Own-Brand Design Team Beijing, China	**Beijing Jingdong Century Trading Co., Ltd** Beijing, China

Congratulations! We are pleased to honor you with an iF DESIGN AWARD

Uwe Cremering
CEO of iF Design

Karen Korellis Reuther
Jury Chairperson

Fritz Frenkler
Jury Chairperson

近日，由京东京造设计团队为陕西师范大学新概念传感器与分子材料研究院与京东京造合作开发的、基于房喻院士团队气体缓释膜技术专利技术打造的“呼吸之元膜法杯”产品的包装设计获得 2026 年 IF 设计奖。

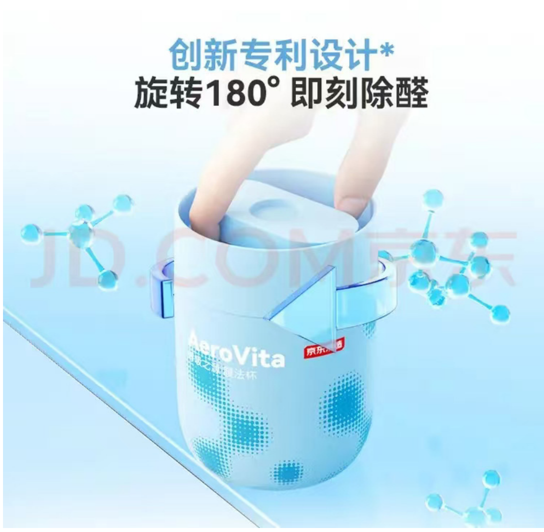
此奖项由德国汉诺威工业设计论坛创办于 1954 年，与德国红点奖、美国 IDEA 奖并称为世界三大设计奖，素有“工业设计界的奥斯卡”之称。

Recently, the packaging design for the “Aero Vita De-Hcho Cup”—a product jointly developed by the JD Jingzao and the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University, utilizing patented gas slow-release membrane technology from Prof. Fang Yu’s group—has been honored with a 2026 iF Design Award.

This award, founded in 1954 by the iF Industrie Forum Design and often referred to as the “Oscar of the industrial design world”, is recognized as one of the world’s three major design awards alongside Germany’s Red Dot Award and the United States’ IDEA Award.

研究院成果转化产品“呼吸之元膜法杯”上架京东平台开售

INCSMM’s commercialized product “Aero Vita De-Hcho Cup” available for purchase on JD.com



2026 年 2 月 21 日，由陕西师范大学新概念传感器与分子材料研究院与京东京造合作开发、基于房喻院士团队气体缓释膜专利技术打造的“呼吸之元膜法杯”产品在京东平台上架开售。

这款“可控释放、持久高效、绿色安全”的科学除醛产品利用国际公认最绿色安全的化学消毒剂二氧化氯气体的除醛原理，通过房喻院士团队独创的气体缓释膜技术，突破了二氧化氯气体可控释放的国际性难题，在确保人体安全浓度范围内实现二氧化氯缓释并持续除醛，可实现 30 天每日除醛率 99%。

On February 21, 2026, the “Aero Vita De-Hcho Cup”—a product jointly developed by the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University and JD Jingzao, utilizing patented gas-slow-release membrane technology from Prof. Fang Yu’s group—is available for purchase on JD.com, a leading Chinese e-commerce giant and one of the most trusted and prominent online shopping platforms in China.

This scientifically formulated formaldehyde-removing product, characterized by “controlled release, long-lasting efficacy, and eco-friendly safety,” leverages the formaldehyde-removing principle of chlorine dioxide gas—the world’s most recognized eco-friendly and safe chemical disinfectant. Through the pioneering gas controlled release membrane technology developed by Prof. Fang Yu’s team, it has overcome the international challenge of achieving controlled release of chlorine dioxide gas, ensuring that chlorine dioxide is released at a controlled rate within safe human concentration levels for sustained formaldehyde removal, and achieving a 99% daily removal rate over 30 days.

ADVANCED FUNCTIONAL MATERIALS

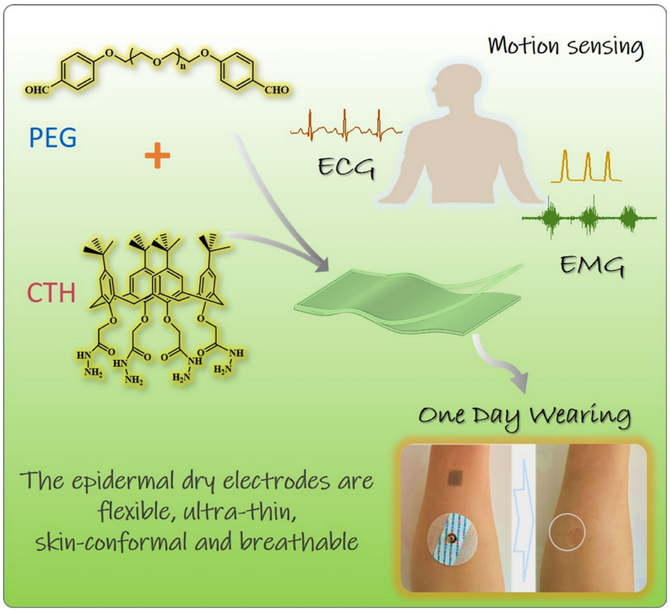
RESEARCH ARTICLE | Full Access

Stretchable, Breathable and Skin-conformal Nanofilm-based Epidermal Dry Electrodes for Electrophysiological and Motion Monitoring

Junjie Wang, Binbin Zhai, Jing Zhang, Hanyang Ning, Qi He, Tinghao Wu, Kang Li, Chi Zhang, Yanyan Luo, Aiping Chi, Wei Ren, Zhongshan Liu ✉, Yu Fang ✉

用于电生理和运动监测的柔性透气纳米薄膜表皮干电极

Junjie Wang, Binbin Zhai, Jing Zhang, Hanyang Ning, Qi He, Tinghao Wu, Kang Li, Chi Zhang, Yanyan Luo, Aiping Chi, Wei Ren, Zhongshan Liu*, Yu Fang*. Advanced Functional Materials 2026, e24980, DOI: 10.1002/adfm.202524980



表皮电生理信号，例如心电图、肌电图和脑电图，如同人体内部传递信息的“电报”，不仅在临床诊断中发挥着重要作用，也是研究大脑活动与运动功能、进行健康监测的主要工具。柔性表皮电极作为采集这些信号的关键材料，可直接贴附于皮肤表面，并可分为湿电极和干电极两大类。尽管凝胶湿电极具有自粘附的特性，但其较差的透气性与易脱水的问题，限制了该电极在长期监测中的应用。为了克服这些问题，兼具可拉伸性、良好透气性且与皮肤顺应性的干电极成为当前研究的热点。

在本研究中，我们研发了一种新型超薄表皮干电极，它是基于界面纳米膜与银纳米线复合制备而得到的。该薄膜（通称 PEG–CTH）由聚乙二醇醛基与杯[4]芳烃衍生物通过气–液界面交联聚合而成。薄膜结构中的酰腙键与聚乙二醇链段协同作用，可进一步增强其与皮肤的粘附力。

在喷涂银纳米线后，所制备的薄膜电极在高达100%的应变下仍表现出稳定的导电性能。同时，电极在模拟出汗前后的粘附强度基本保持稳定。在此基础上，我们进一步通过多

模态感知（如应变与剪切力检测），对人体肢体运动进行了监测，以系统评估该薄膜电极的机械坚固性。最后，通过采集高质量的心电图与肌电图信号，并成功检测出大肌群及具有挑战性的精细肌群活动信号，本研究探讨且验证了该表皮电极在实际生理监测中的实用性能。进一步地，通过将所获取的精细肌群的肌电信号与深度学习算法相结合，成功实现了对五种不同手指手势的高精度识别，准确率达到 100%。

第一作者：陕西师范大学硕士研究生王俊杰
通讯作者：陕西师范大学房喻院士、刘忠山副教授
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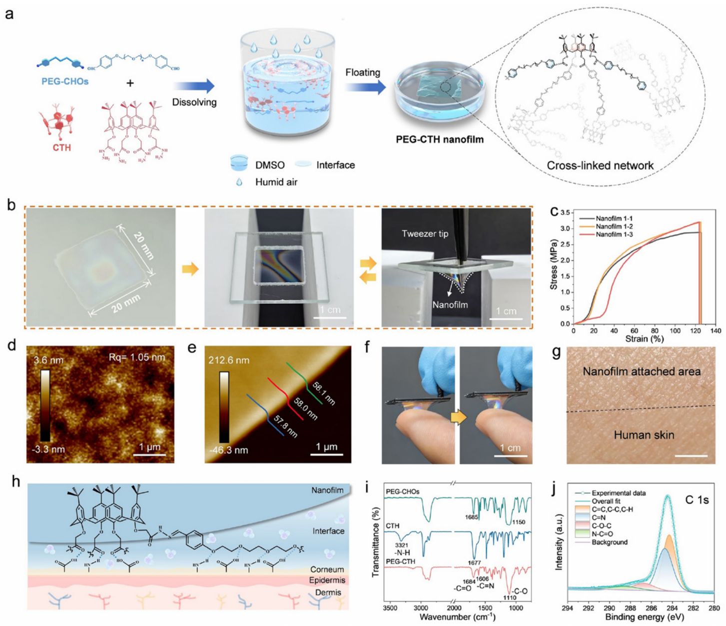

图 1. PEG−CTH 纳米膜的表征
Figure 1. Characterization of the PEG-CTH nanofilm

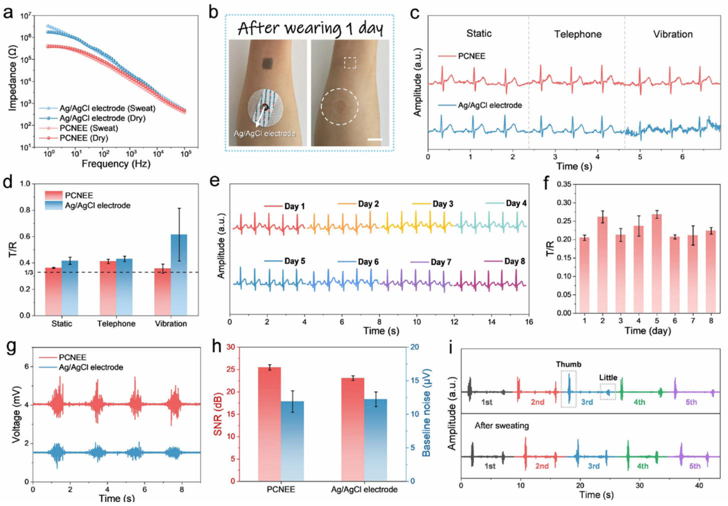

图 2. 纳米膜表皮电极的电生理信号监测
Figure 1. PEG-CTH nanofilm-based epidermal electrodes for bio-signals monitoring

Epidermal electrophysiological signals—such as electrocardiogram (ECG), electromyogram (EMG), and electroencephalogram (EEG)—act as the body's "telegraph", serving as vital tools not only for medical diagnosis but also for health monitoring in brain and exercise research. Recording these signals requires epidermal electrodes adhered to the skin, which are classified as either wet or dry. While gel-based wet electrodes are self-adhesive, they suffer from poor gas permeability and dehydration, limiting their use in prolonged monitoring. To overcome these limitations, dry electrodes with inherent stretchability, breathability, and skin-conformality have attracted significant interest.

In this work, we present an ultrathin dry epidermal electrode fabricated from a crosslinked nanofilm coated with silver nanowires. This nanofilm, denoted as PEG-CTH, is synthesized via air-liquid interfacial polymerization between aldehyde-terminated polyethylene glycol (PEG-CHOs) and a calix[4]arene derivative. The acyl-hydrazone and polyethylene glycol moieties within the nanofilm promote strong skin adhesion.

After being spray-coated with silver nanowires, the nanofilm electrode exhibits stable conductivity even under 100% strain. Furthermore, the adhesion force of the nanofilm electrode is maintained before and after sweating. We assess its mechanical robustness through multimodal sensing of human body motions, including strain and shear force. Finally, we demonstrate the practical utility of these nanofilm epidermal electrodes by acquiring high-quality electrocardiogram and electromyogram signals, as well as by monitoring motions of both large muscle and fine muscle, where the latter is one of the most demanding tests for flexible electrodes. By combining them with a deep learning algorithm, high recognition accuracy (100%) is achieved for five different finger gestures.

First Author: Wang Junjie, master's student, Shaanxi Normal University
Correspondence Authors: Prof. Fang Yu, Assoc. Prof. Liu Zhongshan, Shaanxi Normal University
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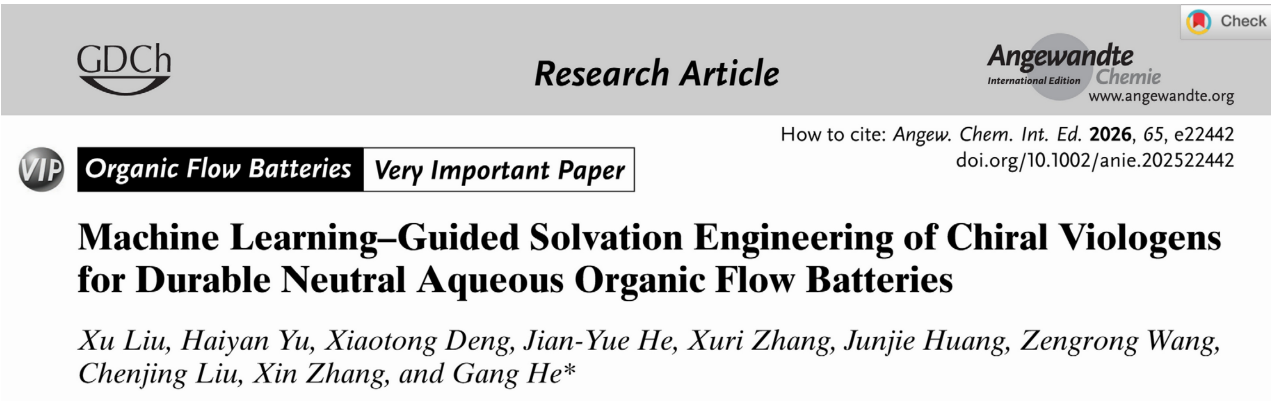

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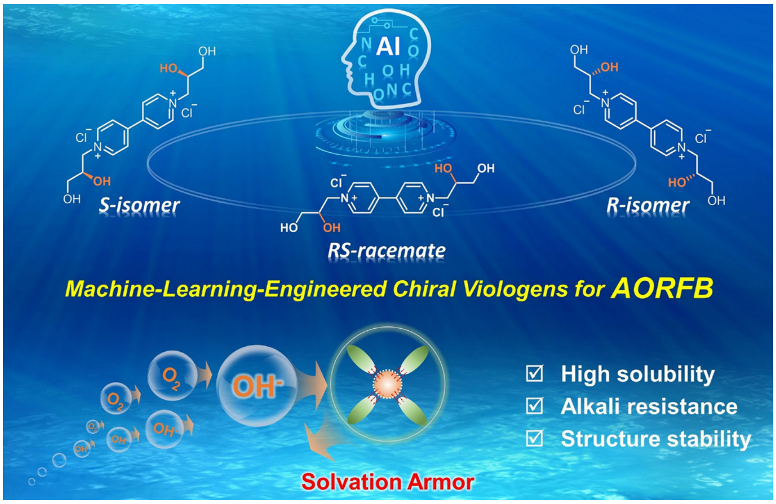
VIP **Organic Flow Batteries** *Very Important Paper*

Machine Learning–Guided Solvation Engineering of Chiral Viologens for Durable Neutral Aqueous Organic Flow Batteries

*Xu Liu, Haiyan Yu, Xiaotong Deng, Jian-Yue He, Xuri Zhang, Junjie Huang, Zengrong Wang, Chenjing Liu, Xin Zhang, and Gang He**

机器学习指导的手性紫精溶剂化工程赋能中性水系有机液流电池

Xu Liu, Haiyan Yu, Xiaotong Deng, Jianyue He, Xuri Zhang, Junjie Huang, Zengrong Wang, Chenjing Liu, Xin Zhang, Gang He*. Angew. Chem. Int. Ed. 2026, DOI: 10.1002/anie.202522442



中性水系有机液流电池（AORFBs）作为新能源配套储能技术的重要候选体系，其整体能效由有机电解质材料的理化特性决定。然而，传统经验探索的“试错法”设计方案往往缺乏普适性理论指导，导致材料性能参差不齐，尤其在高浓度电池性能中普遍存在溶解度－稳定性权衡难题。紫精衍生物因独特的光电响应特性以及结构可调性，已成为中性AORFB负极电解液设计的理想模板。当前主流的分子设计策略聚焦于对双吡啶母核结构的功能化修饰，进一步衔接末端N-烷基化反应构筑亲水性功能层，从而实现溶解度的梯度提升。然而，固有的碱性降解机制——在碱性工况下，吡啶C–N键受到亲核攻击解离（SN2反应）——严重制约电池循环寿命。深层次问题在于，紫精电解质与溶剂水分子间的动态溶剂化效应对结构稳定性的调控规律尚未阐明。

本工作率先利用大型语言模型（LLMs）的机器学习策略，经过1300多项AORFB研究训练，用于预测具有邻位二羟基基团的手性紫精。这种键合网络形成了一种动态、pH适应性的“溶剂化装甲”，稳定了紫精母体结构。R-/S-对映体的溶解度比RS-外消旋体高1.66倍。分子模拟和原位光谱证实，二羟基基团通过溶剂化结构保护反应性C–N键，从而增强紫精在pH=11范围内的稳定性。基于此，对称电池（1 M）在3652次循环中实现了99.42%的容量保留率。1 M R基AORFB在533次循环中保持100%容量，优于[(NPr)2V]Cl4（94.92%）和磺酸改性紫精[(SPr)2V]（65.49%）。此外，kg-Ah级手性紫精的规模合成以及电堆测试（2 M）得到成功验证，证明手性紫精具有极大的产业化潜力。

第一作者：西安交通大学助理教授刘旭
通讯作者：西安交通大学何刚教授

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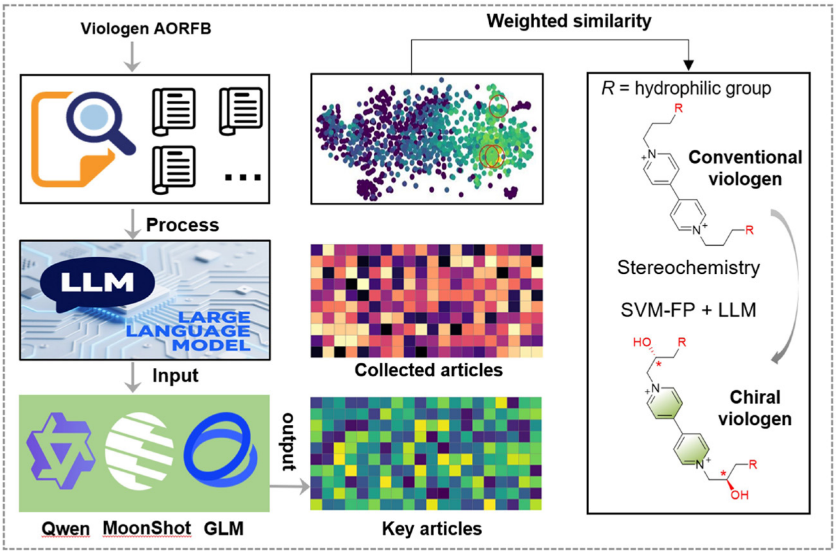

图 1. 由大型语言模型驱动的文献信息提取流程

Figure 1. Literature information extraction pipeline powered by large language models

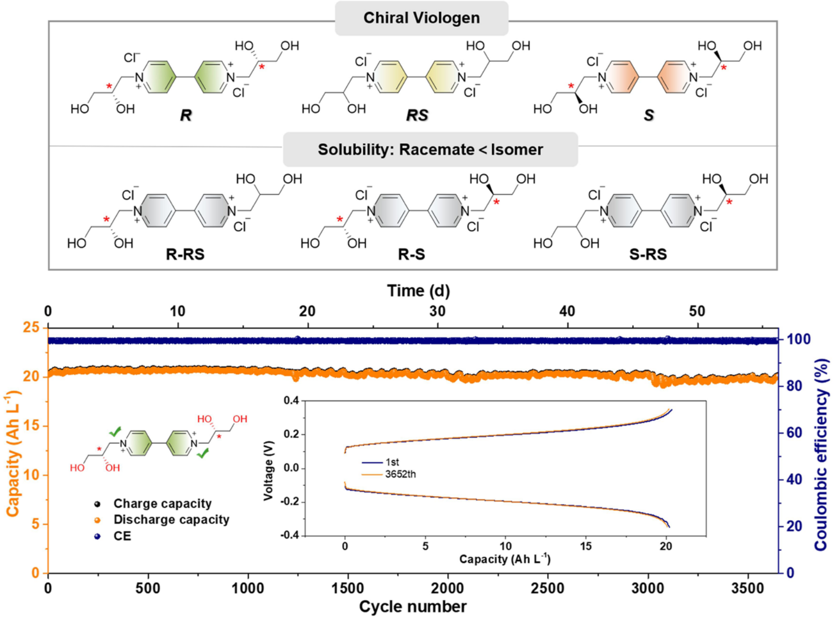

图 2. 手性紫精的结构示意图和电池性能测试

Figure 2. Structural diagram of chiral viologens and battery performance test

Neutral aqueous organic redox flow batteries (AORFBs), as pivotal candidate systems for new energy-complementary storage technologies, have their overall energy efficiency directly determined by the physicochemical properties of organic electrolyte materials. However, design strategies based on traditional empirical exploration via the “trialand-error” approach frequently lack universal theoretical guidance, resulting in significant performance variations among materials, particularly manifesting in a ubiquitous solubility-stability trade-off within high-concentration battery systems. Viologen derivatives have attracted significant attention as promising anolyte templates for neutral AORFBs due to their favorable optoelectronic properties and structural tunability. Current mainstream molecular design strategies concentrate on the functionalization of the bipyridine core structure (steric hindrance modulation, conjugation extension, etc) to achieve performance optimization. Critically, these modification schemes universally involve terminal N-alkylation reactions to construct hydrophilic functional layers, thereby enabling gradient enhancement of solubility. Furthermore, conventional N-alkylated viologen electrolytes in AORFBs undergo irreversible nucleophilic S_N2 dealkylation degradation.

Here we report a machine learning (ML) strategy using large language models (LLMs) trained on over 1300 AORFB studies to predict chiral viologens with ortho-dihydroxy motifs. This bonding network forms a dynamic, pH-adaptive “solvation armor” that stabilizes the viologen structure. The R-/S-enantiomers (2.75/2.76 M) exhibit 1.66 times higher solubility versus RS-racemate. Molecular simulations and in situ spectroscopy confirm that the dihydroxy groups protect reactive C-N bonds via a solvation structure (unrelated to chiral effect), enhancing stability to pH 11. The 1 M $R^{2+}/R^{+\bullet}$ redox couple sets a new record by achieving 99.42% capacity retention over 3652 cycles. The 1 M R-based AORFB shows 100% retention over 533 cycles, outperforming quaternary ammonium- ($[(NPr)_2V]Cl_4$, 94.92%) and sulfonate-modified viologen ($(SPr)_2V$), 65.49%). Stable cycling across 0.1 ~ 2.5 M demonstrates decoupling of degradation from concentration. This strategy is validated by 2.5 kg-scale synthesis and Ah-class stack testing (98.65% retention over 77 cycles), demonstrating industrial scalability. This work establishes a generalizable, ML-enabled platform for electrolyte development, bridging molecular design and practical AORFB deployment.

First Author: Liu Xu, Asst. Prof., Xi’an Jiaotong University

Correspondence Author: Prof. He Gang, Xi’an Jiaotong University

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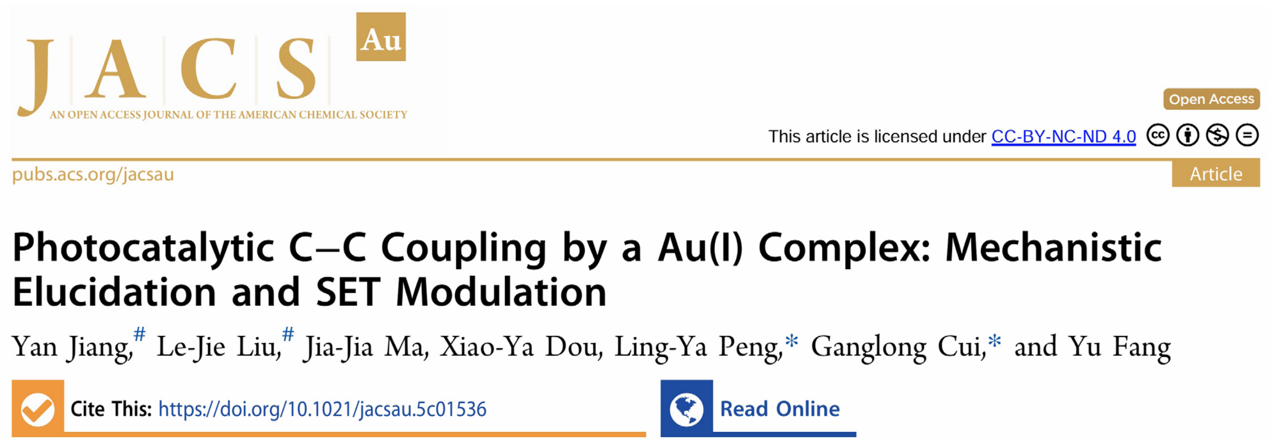

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Photocatalytic C–C Coupling by a Au(I) Complex: Mechanistic Elucidation and SET Modulation

Yan Jiang,[#] Le-Jie Liu,[#] Jia-Jia Ma, Xiao-Ya Dou, Ling-Ya Peng,* Ganglong Cui,* and Yu Fang

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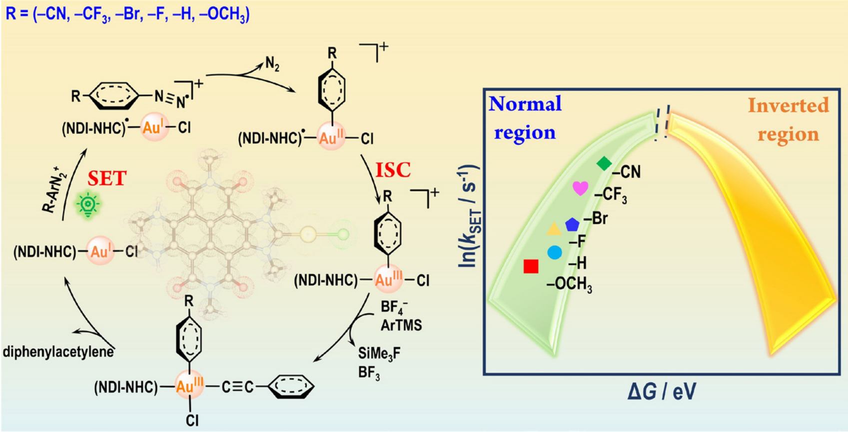
Au 配合物光催化 C-C 偶联：机理阐明和单电子转移调控

Yan Jiang#, Le-Jie Liu#, Jia-Jia Ma, Xiao-Ya Dou, Ling-Ya Peng*, Ganglong Cui*, and Yu Fang. JACS Au. 2026, DOI: 10.1021/jacsau.5c01536



金属配合物催化的交叉偶联反应在有机合成领域已取得显著进展。其中，Au 配合物的引入进一步拓展了该领域的发展空间，其独特的强 π 酸性可高效活化不饱和 C–C 键。然而，此类反应通常依赖于外加氧化剂与光敏剂的参与。目前，利用单一 Au(I) 配合物直接光催化重氮盐进行交叉偶联反应的研究尚处于起步阶段。2024 年，Peris 课题组报道了一种 Au 配合物 [(NDI–NHC)–Au–Cl]，该催化剂能够催化芳基重氮盐与炔基硅烷的交叉偶联反应。然而，针对这类仅基于单一组分 Au 配合物的光催化交叉偶联反应，其反应机理仍缺乏系统深入的认识，理解其光催化反应机理对催化体系的理性设计至关重要。

首先，在光激发下，Au 配合物 [(NDI–NHC)–Au–Cl] 的光物理过程可由四态模型（S_0，S_1，T_2，T_1）解释。随后，从三重态的 [(NDI–NHC)–Au–Cl] 出发，依次经历单电子转移（SET）、氮气消除、自由基加成及系间窜跃等步骤，最终经由还原消除完成催化循环。另外，我们对相应的无辐射跃迁过程如单电子转移和系间窜跃过程进行了速率常数计算，结果表明其在反应中扮演着重要角色。其中，SET 过程是决定反应能否启动的关键步骤。若该过程动力学不利，后续反应将难以发生，因此对 SET 过程的有效调控至关重要。进一步研究发现，在芳基重氮盐骨架中引入氰基等吸电子基团，可增大反应的驱动能、降低重组能，提升单电子转移效率，降低反应能垒。基于以上机理探索，我们将单电子转移调控策略拓展至 Ag(I) 和 Cu(I) 配合物体系。理论计算表明，这些催化剂在 C–C 偶联反应中都表现出与 Au(I) 催化剂相当的反应活性，同时具备更优的成本效益。

本工作系统阐明了氮杂卡宾 Au(I) 配合物催化芳基重氮盐与炔基硅烷反应的内在机理，并基于 Marcus 理论对单电子转移过程进行了有效调控，并

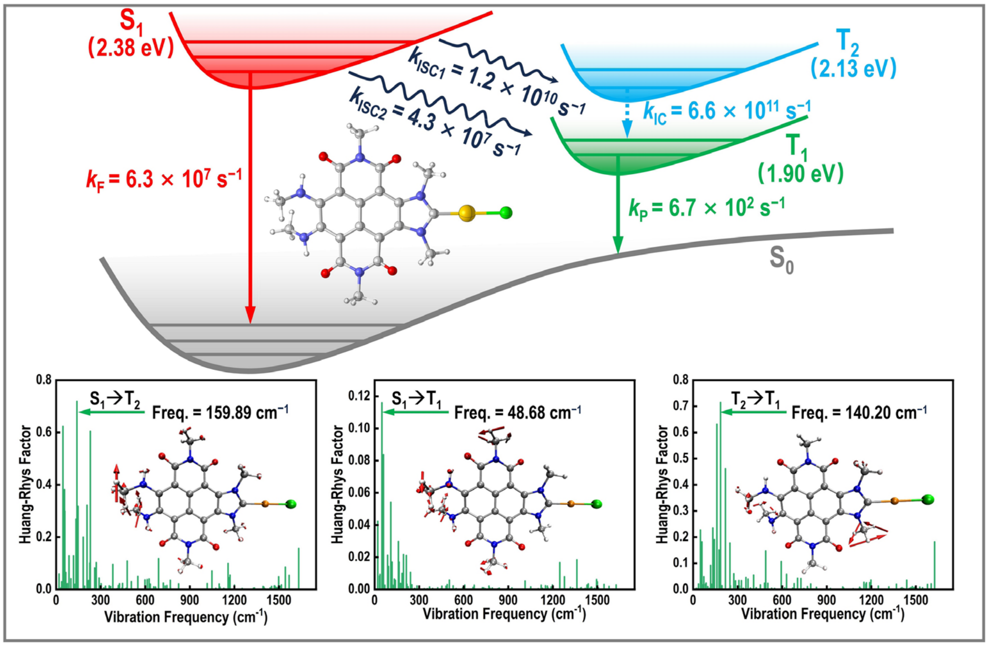


图 1. [(NDI-NHC)–Au–Cl] 配合物的辐射和无辐射过程（包括辐射无辐射速率及 Huang-Rhys 因子）

Figure 1. Calculated radiative and nonradiative processes of [(NDI-NHC)−Au−Cl], the adiabatic energies at the MS-CASPT2 level of the excited states, the largest Huang−Rhys factors, and their associated vibrational modes are presented.

将该模型进一步扩展至其他 d^{10} 金属配合物体系，为后续 C–C 偶联反应的研究及催化剂理性设计提供了重要理论依据。

第一作者：陕西师范大学硕士研究生江艳、刘乐洁

通讯作者：陕西师范大学彭灵雅博士、北京师范大学崔刚龙教授

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Metal complex-catalyzed cross-coupling reactions have achieved remarkable progress in organic synthesis. The introduction of Au complexes has further revitalized this field, leveraging their strong π-acidity to efficiently activate unsaturated C–C bonds. However, the use of external oxidants and photosensitizers becomes a prerequisite for the cross-coupling reaction. The direct photocatalytic cross-coupling reaction of diazonium salts using a standalone Au(I) complex is still in its infancy. In 2024, Peris et al. reported an Au complex [(NDI-NHC)–Au–Cl], which catalyzes the cross-coupling reaction of aryldiazonium salts and alkynyl-silanes. However, the mechanistic understanding of single-component Au photocatalytic cross-coupling reactions remains underdeveloped, which would be crucial for the design of catalytic systems.

Upon photoexcitation, a four-state model (S_0, S_1, T_2, and T_1) of the photophysical process is identified. The reaction proceeds via a triplet-state-initiated tandem comprising single electron transfer (SET), N_2 extrusion, radical addition, and intersystem crossing, culminating in reductive elimination to complete the catalytic cycle. Furthermore, introducing electron-withdrawing groups such as the cyano group into the aryldiazonium scaffold enhances SET efficiency by a certain cancellation of the reorganization energy by driving energy, thereby reducing the free energy barrier. The nonradiative decay dominates the reaction coordinates. Leveraging these mechanistic insights, the SET modulation strategy is theoretically extended to Ag and Cu complexes, which exhibit comparably high performance in C–C coupling reactions along with improved cost-effectiveness. This work not only establishes fundamental structure-reactivity relationships in Au-photocatalyzed cross-couplings but also provides a general framework for optimizing photoinduced electron transfer processes.

This work systematically elucidates the underlying mechanism of the reaction between aryldiazonium salts and alkynylsilanes catalyzed by N-heterocyclic carbene Au(I) complexes. By effectively modulating the single-electron transfer process based on Marcus theory, the established model was further extended to other d^{10} metal complex systems, providing an important theoretical foundation for subsequent research on C–C coupling reactions and the rational design of catalysts.

First Authors: Jiang Yan and Liu Lejie, master's student, Shaanxi Normal University

Correspondence Authors: Dr. Peng Lingya, Shaanxi Normal University; Prof. Cui Ganglong, Beijing Normal University

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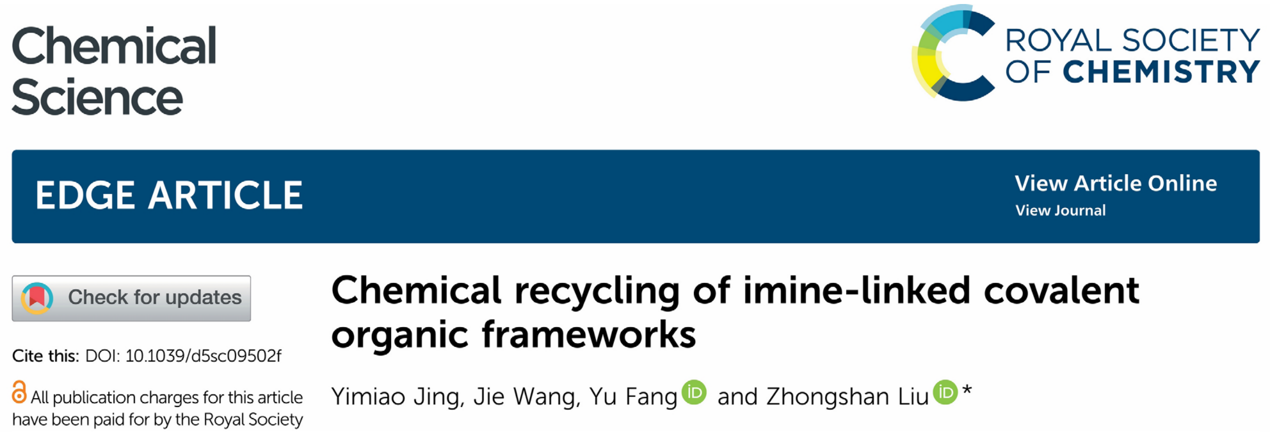

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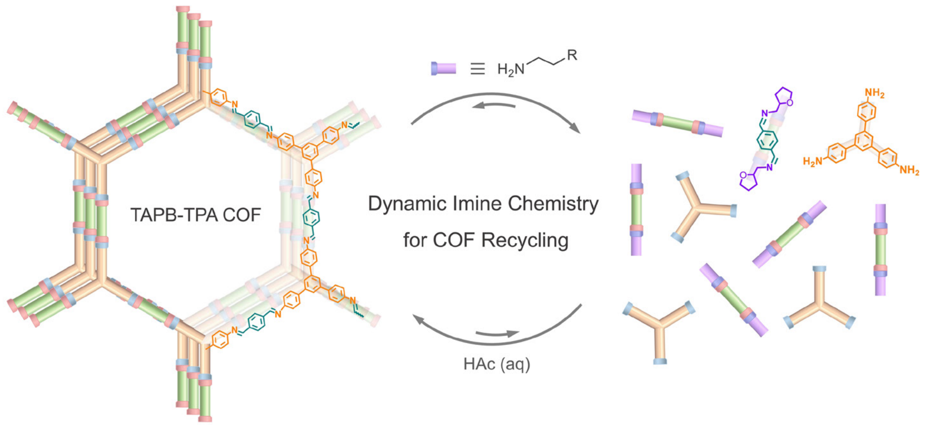
Chemical recycling of imine-linked covalent organic frameworks

Yimiao Jing, Jie Wang, Yu Fang and Zhongshan Liu*

亚胺类共价有机框架材料的化学回收

Yimiao Jing, Jie Wang, Yu Fang, Zhongshan Liu*. Chem. Sci., 2026, DOI: 10.1039/D5SC09502F



共价有机框架（COFs）是一类具有可定制拓扑结构和永久孔隙的晶态多孔材料，在吸附、分离、催化和传感等领域展现出广阔的应用前景。尽管 COFs 的合成方法和应用研究蓬勃发展，但其废弃后的化学回收却是一个尚未开发的领域。传统的物理回收方法（如吸附－脱附或磁分离）难以保持回收 COFs 的结构完整性和性能稳定性，也无法从复合材料中回收物理上不可分离的 COFs 部分。因此，开发一种能够再生高质量 COFs 的化学回收策略是非常必要的。

本工作通过动态亚胺化学的胺－亚胺交换反应成功开发了一种亚胺类 COFs 的化学回收策略，实现了 COFs 的化学解聚和原位再生。在室温下，亲核性较强的烷基单胺会进攻 COFs 的芳香亚胺键，将交联的骨架解聚成小分子烷基亚胺和芳香胺单体，从而实现 COFs 的化学解聚。烷基取代的亚胺在乙酸存在下不稳定，很容易通过可逆的胺－亚胺交换反应恢复为芳香族亚胺。基于此，本工作提出了两种原位回收路线：室温回收（RTR）和溶剂热回收（STR），无需繁琐的单体纯化过程就能够使 COFs 原位再生，回收率高达 92%。通过粉末 X 射线衍射和氮气、苯蒸气吸附测量证明，回收的 COFs 保持了其结晶度、特征孔径和吸附性能。该工作为多孔有机材料的可持续发展提供了前景策略。

第一作者：陕西师范大学硕士研究生井燚淼
通讯作者：陕西师范大学刘忠山副教授
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Covalent organic frameworks (COFs), featuring customizable topologies and permanent porosities, have demonstrated potential applications in adsorption, separation, catalysis, and sensing. Unlike booming synthetic methods and applications, the chemical

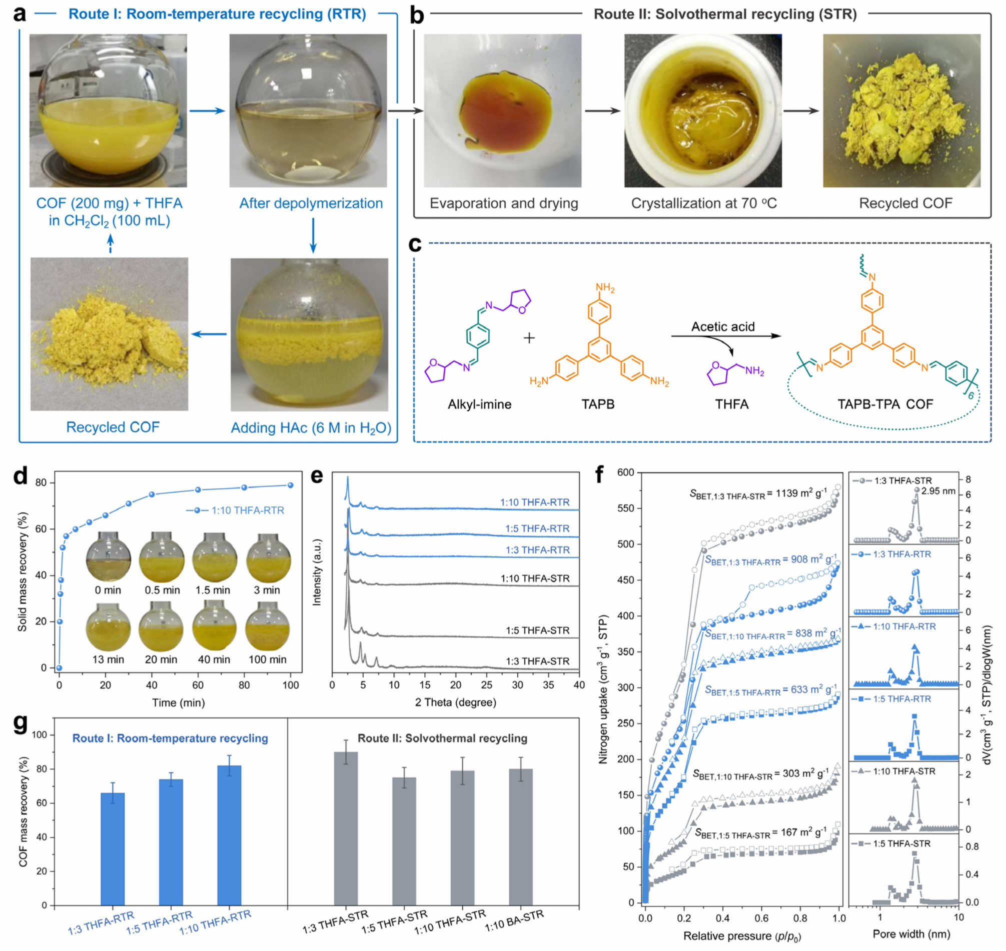

图 1. 化学回收路线示意图及回收 COFs 的性能表征

Figure 1. Chemical recycling routes and characterization of recovered COFs

recycling of end-of-life COFs remains undeveloped. Several studies have attempted physical recovery strategies by means of adsorption-desorption or magnetic separation. However, these methods struggle to retain the structural integrity and performance stability of the recovered COFs and also fail to recycle physically inseparable COF moieties from composite materials. Therefore, developing a chemical recycling strategy that can regenerate high-quality COFs is highly desired.

This work reported closed-loop recycling methods for imine-linked COFs, realizing their chemical depolymerization and reconstruction through dynamic imine chemistry. An alkyl monoamine with a stronger nucleophilicity is adopted to attack aromatic imine linkages of COFs at room temperature, depolymerizing the crosslinked frameworks into small molecular alkyl-imines and aromatic amine monomers. The alkyl-substituted imines are unstable in the presence of acetic acid and easily revert back to the aromatic imines via reversible transamination. Based on this, this work proposed two in situ recycling methods, including room-temperature recycling (RTR) and solvothermal recycling (STR), enabling in situ regeneration of COFs without tedious monomer purification and with recoveries up to 92%. As evidenced by powder X-ray diffraction and nitrogen and benzene vapor adsorption measurements, the recovered COFs retain their crystallinity, characteristic pore size and adsorption performance. The successful recycling of imine-linked COFs offers a promising strategy for the sustainable development of porous organic materials.

First Author: Jing Yimiao, master’s student, Shaanxi Normal University
Correspondence Author: Assoc. Prof. Liu Zhongshan, Shaanxi Normal University

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Letter

Programming the Excited-State Landscape Via Carborane Count for Dual TADF/RTP

Yangtao Shao,[#] Xubin Wang,[#] Hexi Wei, Xinli Li, Rongrong Huang, Shiwei Yin, Haonan Peng,* and Yu Fang*

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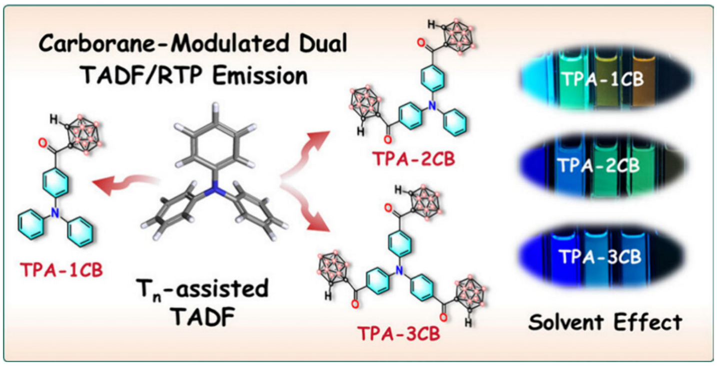
碳硼烷衍生物的激子激发态布居调控—热活化延迟荧光 / 室温磷光

Yangtao Shao#, Xubin Wang#, Hexi Wei, Xinli Li, Rongrong Huang, Shiwei Yin, Haonan Peng*, Yu Fang*. J. Phys. Chem. Lett. 2026, DOI: 10.1021/acs.jpclett.6c00063



此前的研究主要通过调控聚集态、分子构象或异构体工程，以及晶体工程等手段实现 TADF 与 RTP 的双重发射。在这些工作中，双延迟发射的实现或切换多依赖于外部堆积、主体或晶体环境因素，这使得单一分子参数的剥离及其与自旋动力学之间可归因的结构关联的建立面临挑战。当前，能够在环境条件下呈现稳定的 TADF/RTP 双延迟发光的纯有机体系仍相对有限，其背后可推广的分子设计原则亦有待深入探索。

本研究通过调控邻位碳硼烷官能化三苯胺（TPA-1Cb/2Cb/3Cb）中的碳硼烷数量，实现了对 S_1–Tn 能级（S_1 = 最低单重激发态；T_n = 低位三重态）的调控。研究发现随着碳硼烷单元的增加，S_1–T_n 能级排布发生改变，促进了系间窜越（ISC）及 T_n 辅助的反向系间窜越（RISC），同时聚集态限域效应有效抑制了非辐射衰减，从而实现了双通道发射。光谱学与瞬态吸收实验证实：TPA-2Cb/3Cb 在溶液相表现出 TADF 特性，而在环境气氛下，其固态体系展现出对空气稳定的 TADF/RTP 共存发射，超长 TADF 寿命分别达 67.4 ms（TPA-2Cb）与 105.3 ms（TPA-3Cb）。基于晶体结构的 TD–DFT 计算将发射通道的改变归因于碳硼烷数量依赖的 $\Delta E(S_1–T_n)$ 调控及有限的自旋－轨道耦合（SOC）；而 TPA-1Cb 因 S_1-T_1/T_2 能隙较大，仍以 RTP 为主导。上述结果不仅为时间可调控的双发射提供了一条简捷的构建路径，同时也为在碳硼烷衍生物中实现 TADF/RTP 双发射建立了一套可行的设计原则。

第一作者：陕西师范大学博士研究生邵洋涛、王旭斌
通讯作者：陕西师范大学房喻院士、彭浩南教授
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Previous works achieve TADF and RTP emission by regulating the aggregation state, molecular conformation or isomer engineering, and crystalline engineering38-42. In many of these studies, the dual delayed emission is primarily enabled or switched by external packing/host/crystal factors, which can make it challenging to isolate a single intrinsic molecular parameter and establish a mechanistically attributable structure-spin-dynamics correlation. However, purely organic systems that can exhibit TADF/RTP dual delayed emission under ambient conditions remain relatively limited, and the underlying generalizable molecular design principles still require further exploration.

Here we implement carborane-number engineering in o-carborane functionalized triphenylamines (TPA-1Cb/2Cb/3Cb) to program the S$_1$-T$_n$ landscape (S$_1$ = lowest singlet excited state; T$_n$ = low-lying triplet states). Increasing the carborane count reshapes S$_1$-T$_n$ alignments and facilitates intersystem crossing (ISC) and Tn-assisted reverse intersystem crossing (RISC), while aggregate confinement suppresses nonradiative decay, enabling dual-channel emission. Spectroscopy and transient absorption establish solution-phase TADF for TPA-2Cb/3Cb and solid-state, air-robust TADF/RTP coexistence under ambient atmosphere with ultralong TADF lifetimes of 67.4 ms (TPA-2Cb) and 105.3 ms (TPA-3Cb). TD-DFT based on crystal structures attributes channel allocation to carborane-count-dependent tuning of ΔE(S$_1$-T$_n$) and finite spin-orbit coupling (SOC), whereas TPA-1Cb remains RTP-dominant due to large S$_1$-T$_1$/T$_2$ separations. These results define a compact route to time-programmable, dual emission and offer a generalizable design principle for building concurrent TADF/RTP in carborane-based luminophores.

First Authors: Shao Yangtao and Wang Xubin, doctoral candidate, Shaanxi Normal University
Correspondence Authors: Prof. Fang Yu, Prof. Peng Haonan, Shaanxi Normal University

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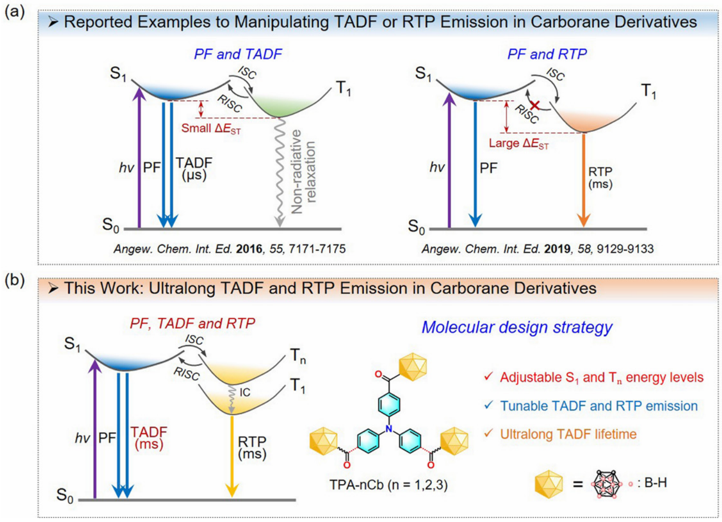


图 1.（a）文献报道的碳硼烷基发光体中产生 TADF 或 RTP 的设计策略。（b）本工作：通过碳硼烷数量工程调控 ΔEST 及 ISC/RISC 过程，实现超长寿命 TADF 与可调谐 TADF/RTP 双发射。PF = 瞬时荧光；TADF = 热激活延迟荧光；RTP = 室温磷光。

Figure 1. (a) Reported design concepts for generating TADF or RTP in carborane-based emitters. (b) This work: carborane-number engineering that programs ΔE_{ST} and ISC/RISC to realize ultralong-lifetime TADF and tunable TADF/RTP dual emission. PF = prompt fluorescence; TADF = thermally activated delayed fluorescence; RTP = room-temperature phosphorescence.

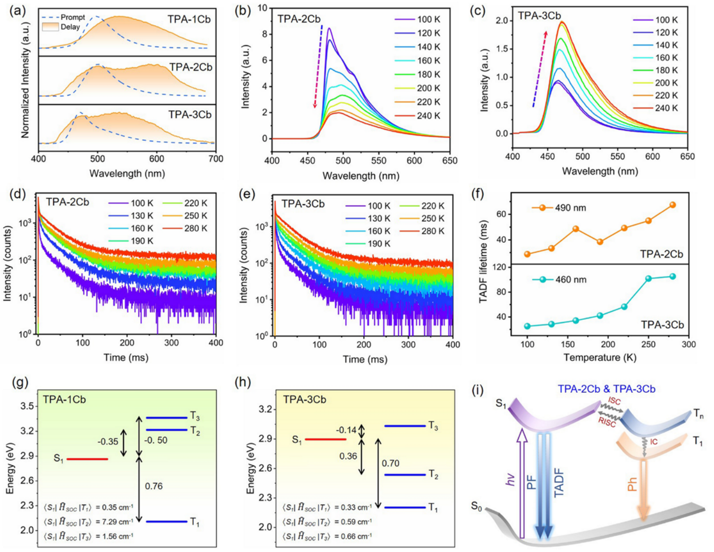


图 2.（a）TPA-1Cb/2Cb/3Cb 的固态稳态光致发光谱（蓝色）及延迟发光谱（橙色，门控时间 = 25 ms），激发波长 λ_{ex} = 360 nm。（b, c）TPA-2Cb 与 TPA-3Cb 粉末的变温稳态光致发光谱。（d, e）TPA-2Cb 与 TPA-3Cb 在 490 nm（TPA-2Cb）及 460 nm（TPA-3Cb）处监测的变温瞬态发光衰减曲线。（f）TPA-2Cb 与 TPA-3Cb 的 TADF 寿命随温度变化关系图。（g, h）固态下 TPA-1Cb 与 TPA-3Cb 的能级结构图及代表性自旋－轨道耦合（SOC）常数值（TD-DFT 计算，B3LYP/def2-SVP 基组）。（i）所提出的固态光物理过程示意图（PF/TADF/RTP）。

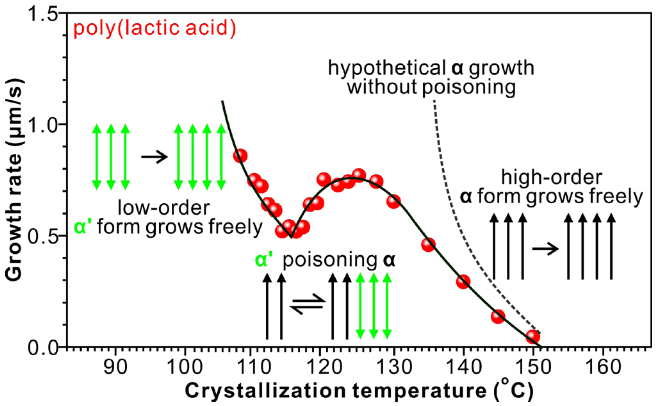
Figure 2. (a) Solid-state PL (blue) and delayed PL (orange, gate = 25 ms) of TPA-1Cb/2Cb/3Cb (λ_{ex} = 360 nm). (b, c) Temperature-dependent steady-state PL of TPA-2Cb and TPA-3Cb powders. (d,e) Temperature-dependent transient PL decays monitored at 490 nm (TPA-2Cb) and 460 nm (TPA-3Cb). (f) TADF lifetimes of TPA-2Cb and TPA-3Cb vs temperature. (g, h) Energy-level diagrams and representative SOC values for TPA-1Cb and TPA-3Cb (TD-DFT, B3LYP/def2-SVP) in the solid state. (i) Proposed solid-state photophysical pathways (PF/TADF/RTP).

Polymorphic Self-Poisoning in Poly(Lactic Acid): A New Phenomenon in Polymer Crystallization

Shu-Gui Yang,[1,2] Xiang-bing Zeng,[3] Feng Liu,[1,2] and Goran Ungar[1,3]
[1]*State Key Laboratory for Mechanical Behavior of Materials, Shaanxi International Research Center for Soft Matter, School of Material Science and Engineering, Xi'an Jiaotong University, Xi'an 710049, China*
[2]*Institute of New Concept Sensors and Molecular Materials, Shaanxi Key Laboratory of New Conceptual Sensors and Molecular Materials, Xi'an Jiaotong University, Xi'an 710049, China*
[3]*School of Chemical, Materials and Biological Engineering, University of Sheffield, Sheffield S1 3JD, United Kingdom*

聚乳酸多晶态自中毒：高分子结晶新机制

Shu-Gui Yang, Xiang-bing Zeng*, Feng Liu, Goran Ungar*. Physical Review Letters 2026, 136 (1), 018101



聚乳酸凭借优异的刚性、力学强度与生物可降解性，被视为聚丙烯、聚乙烯、尼龙等传统石油基高分子材料最具潜力的替代材料。然而，聚乳酸热力学稳定晶相 α 晶结晶速率极慢；在常规成型加工条件下，往往仅能获得低结晶度样品，难以满足商业化应用对材料耐热性的需求。更特殊的是，与多数高分子体系结晶动力学随过冷度增大呈指数加快的规律不同，聚乳酸即便在过冷度增加时，结晶速率反而减缓；聚乳酸产品多以亚稳态的低结晶度 α' 晶固化，这一特性导致材料易在室温下物理老化，进而出现材料脆化失效的问题。这一独特的结晶动力学减缓现象，被归因于一种新发现的“多晶态自中毒”效应。从晶体结构来看，α 晶中分子链段严格遵循“朝上－朝下”的交替有序排列，而 α' 晶中链段朝向则呈随机分布状态。由于聚乳酸分子无法区分这种晶态结构差异，当降温至 α' 晶趋于稳定结晶的区间时，大量随机取向的链段会附着在 α 晶的生长表面，且“误以为自身”已形成稳定结构。这些取向错误

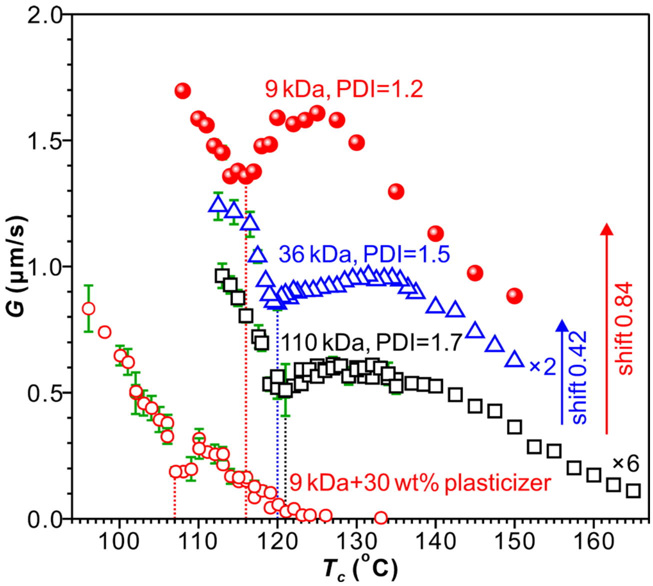


图 1. 不同分子量聚乳酸体系球晶生长速率－温度关系，包括：PLLA−9k，PLLA−36k 和 PLLA−110k，以及 PLLA−9k 加入 30 wt% 增塑剂的增塑体系。为了便于对比，PLLA−36k 和 PLLA−110k 的数据分别增大了 2 和 6 倍，并沿 y 轴平移。

Figure 1. Spherulite radial growth rate vs T_c for PLLA-9k, PLLA-36k, and PLLA-110k, and for PLLA-9k containing 30% plasticizer. Values for PLLA-36k and PLLA-110k were multiplied by 2 and 6; PLLA-36k and PLLA-9k datasets were shifted vertically as indicated.

的链段会持续滞留在 α 晶生长界面，形成物理屏障，最终显著阻碍 α 晶的生长。此处的“毒剂”源自于高分子自身链段因朝向的错误，而成为阻碍晶体生长的“内源性杂质”—这与小分子杂质抑制晶体生长不同，熔融状态下的高分子链段难以快速调整自身取向，导致这一“自中毒”效应难以通过常规手段缓解。

针对这一核心问题，目前提出的关键解决方案方向为设计结构对称的可降解高分子—通过优化分子链结构，避免链段的朝向问题，从根源上减少“自中毒”效应的发生。值得注意的是，初步研究证实，“多晶态自中毒”现象并非聚乳酸独有，在其他聚合物体系中同样存在，且在快速成型加工（如注塑、挤出等）所伴随的高度过冷条件下，这一效应会表现得更为显著，成为制约这类高分子材料性能提升与商业化应用的共性瓶颈。

第一作者：西安交通大学杨书桂副教授
通讯作者：英国谢菲尔德大学 Xiang-bing Zeng 教授，西安交通大学 Goran Ungar 教授
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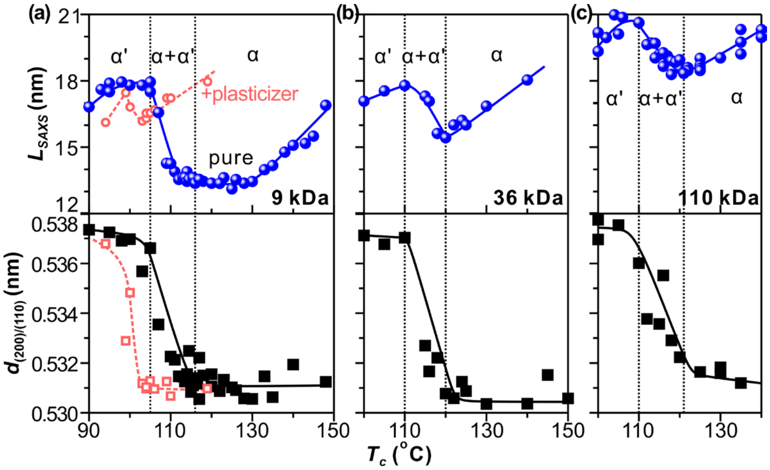

图 2. 不同分子量聚乳酸体系的 X 射线表征数据。顶部为 SAXS 长周期数据，底部为 (110)/(200) 晶面间距。(a) PLLA−9K，(b) PLLA−36k，(c) PLLA−110K，PLLA−9K 增塑体系数据为 (a) 中红色空心点。所有的样品均在 DSC 设备中进行等温结晶后，再快速冷却至室温。

Figure 2. X-ray data for the three polymers as a function of T_c. Top: SAXS long period. Bottom: 110/200WAXS lattice spacing. (a) PLLA-9K, (b) PLLA-36k, and (c) PLLA-110K. The data for plasticized PLLA-9k are shown as red empty circles in (a). All the samples were crystallized isothermally in DSC apparatus, then quenched at room temperature, recorded at room temperature.

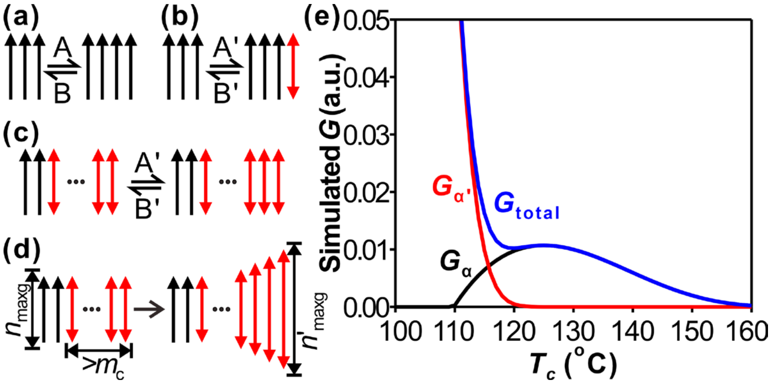

图 3. (a)−(d) 为多晶态自中毒模型示意图。(a) 为 α 晶链段（黑色单向箭头）附着到未被毒害的 α 晶生长表面。*A* 和 *B* 分别为附着速率和解离速率。(b) 为 α′ 晶链段（红色双向箭头）附着在 α 晶生长表面，其附着速率和解离速率分别为 *A*′ 和 *B*′ 。(c) α′ 晶链段继续附着在 α 晶被 α′ 晶链段毒害的生长表面，α 晶链段此时无法附着。(d) 当 α′ 晶链段附着数量大于临界值 m_c，α′ 晶生长并增厚。(e) 理论计算的 α 晶，α′ 晶和总的生长速率。Figure 3. (a)–(d) Schematic models used in simulation of measured growth rate. (a) Growth of α phase happens by attachment of a new α stem (black single arrow) to a clean unpoisoned growth front. The attachment rate is *A* and the detachment rate is *B*. (b) An α′ stem (red double arrow) can attach to the α-phase growth front, with attachment rate A′ and detachment rate B′. (c) Poisoning of α growth as further α′ stems can attach to the poisoned surface, but α stems cannot. (d) α′ phase can grow through thickening, but this is assumed to happen only when the number of α′ stems at the poisoned growth front is over a critical value m_c. (e) Simulated growth rate of α and α′ phases and total, respectively.

Poly(lactic acid) (PLA) is meant to be the prime biodegradable and biosourced substitute for classic polymers such as polypropylene. But crystallization of its desirable α-form is too slow for fast commercial processing, even slowing down instead of accelerating with increasing supercooling. So products end up brittle in the inferior α’ form with low crystallinity. The crystallization slow-down is now explained by a new phenomenon called “polymorphic self-poisoning”. In α-form chains follow a strict up-down order, while in the less stable α’ orientation is random. But the polymer molecules don’t “know” that, and on cooling, as α’ is nearing stability, the randomly attached chains “think” they are already stable. So they linger at the surface of α crystal blocking its growth, before eventually melting away. “Poisoning” is the term used for crystal growth blocked by attached impurities. But here the “impurities” are the native molecules, just in wrong orientation. While small molecules in melt change orientation easily, polymer chains do not. Suggested solution: design symmetric chain plastics. Preliminary work suggests that “polymorphic self-poisoning” also happens in other polymers, particularly at high supercooling encountered in fast commercial processing.

First Author: Assoc. Prof. Yang Shugui, Xi’an Jiaotong University
Correspondence Authors: Prof. Xiang-bing Zeng, The University of Sheffield, Prof. Goran Ungar, Xi’an Jiaotong University
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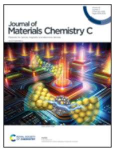

From the journal:
Journal of Materials Chemistry C

Controlling self-assembly and charge transport in photo-responsive nanostructured materials

Check for updates

Yu Cao,[*ab] Tejal Nirgude,[c] Frédéric Dubois,[d] Dharmendra Pratap Singh,[*d] Fengcheng Xi,[a] Feng Liu[ab] and Mohamed Alaasar[*ce]

光响应纳米结构材料的自组装及电荷传递调控

Yu Cao*ab, Tejal Nirgudec, Frédéric Duboisd, Dharmendra Pratap Singh*d, Fengcheng Xia, Feng Liuab, Mohamed Alaasar*ce. J. Mater. Chem. C, 2026,14, 1799-1804

π 共轭液晶因其有序性与迁移率的独特结合，已成为应用于电子学及光子学等领域的多功能平台，在液晶中引入特定官能团和结构单元可显著调控其自组装行为与物理性质。其中，为共轭核心引入弯曲特性是一种高效创制特殊组装行为的方式；这种弯曲核心的分子设计方式也与极性以及铁电性有密切的联系，因而成为功能液晶的一个重要研究方向。然而，如何调控弯曲核心液晶分子的物理性质仍尚未有明确范式，而解析其构效关系则是系统优化这类液晶材料的关键思路。

本工作中，我们设计了以 4- 溴间苯二酚为核心的弯曲核心分子，通过在弯曲核心结构的顶点位置引入溴取代，以及在芳香核的不同位置进行氟化修饰 (AHH，AFH，AFF)，实现了对分子弯曲程度，堆积方式以及导电性质的调控，如图 1 所示。其中，共轭核心特定位点的氟化使我们得以通过氟原子的体积效应（弱化共轭）与吸电子效应（强化共轭），系统性地调控共轭核心间的排布方式。如图 1a–b 所示，外侧氟化分子 AFH 在体积效应的诱导下产生了一种全新的弯曲核心分子组装模式，兼具传统的柱相结构特征以及三维胶束结构的特征，成为一种介于柱相与胶束相之间的新型组装模式。相较而言，非氟化及全氟化分子 AHH 与 AFF 则形成常规的六方柱相结构，如图 1d–e 所示，说明核心氟化对调控组装结构有重要作用。这种组装模式的变化也直接表现在了材料的功能性质上。通过空间电荷限制电流技术（SCLC）确定了氟化对空穴迁移率的影响，其中 AFH 由于三维结构中有限的空穴传输通道而显示出最低的空穴迁移率，仅 2.48×10^{-5} cm^{2}V^{-1}s^{-1}，如图 1c 所示。而 AHH 和 AFF 则基于共轭效应以及柱相结构中的一维通道，产生了最高超过 1000 倍的提升，达到 2.68×10^{-2} cm^{2}V^{-1}s^{-1} 和 2.65×10^{-3} cm^{2}V^{-1}s^{-1}，如图 1f 所示。

总而言之，本工作为弯曲核心分子的功能化以及液晶体系的相行为拓展提供了一种基于共轭核心氟化的调节手段，实现了空穴迁移率的显著提升，在柔性电子学、有机场效应晶体管以及光电探测器等领域显示出广阔的应用前景。

第一作者：西安交通大学曹瑜副教授
通讯作者：西安交通大学曹瑜副教授，法国滨海大学 Dharmendra Pratap Singh 副教授，开罗大学 Mohamed Alaasar 副教授
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π-conjugated liquid crystals, due to their unique combination of order and mobility, have emerged as versatile platforms for applications such as electronics and photonics. The incorporation of specific functional groups and structural units into liquid crystals can significantly modulate their self-assembly behavior and physical properties. Introducing a bent shape into the conjugated core represents an efficient approach to create novel assembly structures. The bent-core strategy is also closely linked to polarity and ferroelectricity, making it a crucial topic in functional liquid crystals. However, a clear paradigm for controlling the physical properties of bent-core liquid crystal molecules remains elusive, and elucidating their structure-property

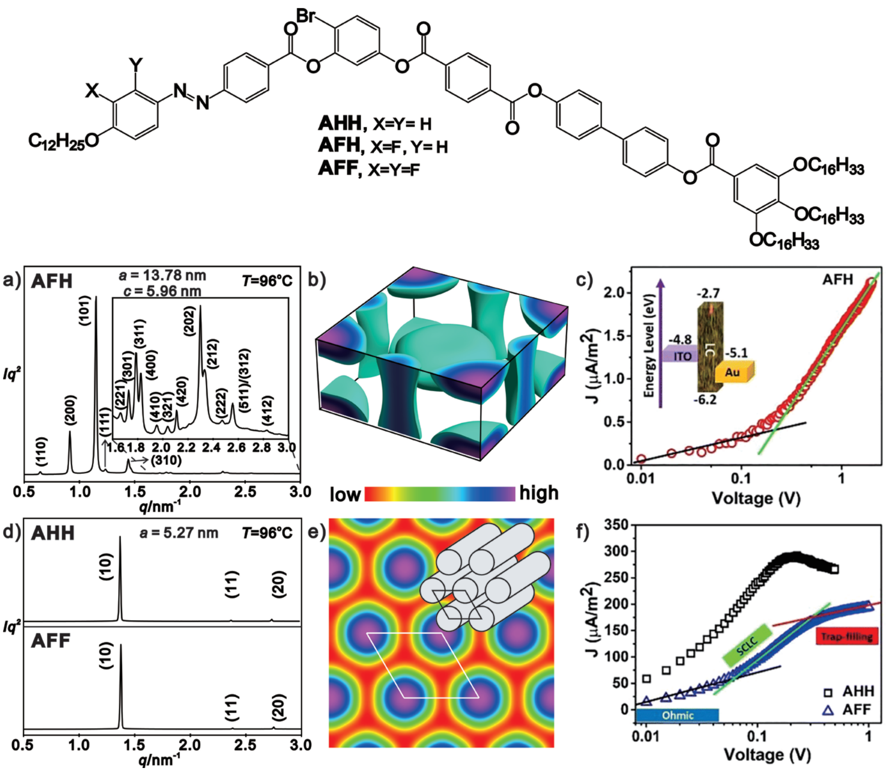

图 1. 新型弯曲核心分子及其两种典型的组装结构和空穴传输能力

Figure 1. Two typical self-assembled structures of the novel bent-core liquid crystal molecules and their SCLC results

relationships is a key approach for such liquid crystal materials.

In this work, we designed bent-core molecules based on a 4-bromoresorcinol core. By introducing a bromine substituent at the apex of the bent-core structure and fluorinating the aromatic core at different positions (AHH, AFH, AFF), we modulated the open angle, packing mode, and conductive properties of the molecules. Fluorination at specific sites on the conjugated core enabled us to systematically tune the arrangement between conjugated cores through both the steric effect (weakening conjugation) and the electron-withdrawing effect (strengthening conjugation) of the fluorines. As shown in Figure 1a-b, the peripherally fluorinated molecule AFH, induced by steric effects, adopts a novel assembly mode for bent-core molecules. This mode combines both columnar phases and micellar structures, representing a new type of assembly intermediate between columnar and micellar phases. In contrast, the non-fluorinated and fully fluorinated molecules AHH and AFF form conventional hexagonal columnar structures (Figure 1d-e), indicating the significant role of core fluorination in modulating the assembly structure. This change in assembly mode is directly reflected in the functional properties of the materials. The influence of fluorination on hole mobility was determined using the space-charge-limited current (SCLC) technique. AFH exhibited the lowest hole mobility, 2.48×10^{-5} $cm^2V^{-1}s^{-1}$, as shown in Figure 1c, due to limited hole transport pathways within its three-dimensional structure. In contrast, AHH, benefiting from conjugation effects and one-dimensional channels within the columnar phase, showed a more than 1000 times boosting at most in Figure 1f, reaching mobilities as high as 2.68×10^{-2} $cm^2V^{-1}s^{-1}$ and 2.65×10^{-3} $cm^2V^{-1}s^{-1}$.

In summary, this work constitutes a modulation strategy based on conjugated core fluorination for the functionalization of bent-core molecules and the expansion of phase behavior in liquid crystal systems. Besides, the work enables a significant enhancement in hole mobility. This exhibits broad application prospects in fields such as flexible electronics, organic field-effect transistors, and photodetectors.

First Author: Assoc. Prof. Cao Yu, Xi'an Jiaotong University

Correspondence Authors: Assoc. Prof. Cao Yu; Assoc. Prof. Dharmendra Pratap Singh, Universite' du Littoral Cote d'Opale; Assoc. Prof. Mohamed Alaasar, Cairo University

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科学家、企业家、投资家的彼此信任是成果从实验室走向市场的必须

房喻

我一直认为，科技革命是人类文明发展的根本动力。每一次重大突破，不仅深刻改变了人类的生活方式，更重塑了全球政治经济格局。今天，我国发展步入新阶段，内外条件正在发生深刻变化，科技在支撑民族复兴、推动国家统一进程中的作用，愈发凸显。

作为一名科技工作者，我深知，科学研究的价值不仅在于发现与发明，更在于它能否走出实验室、迈入生产线，真正转化为驱动经济社会发展的现实动力。这一过程常常是那些令科技工作者引以为傲的成果能否在产业土壤中“生根发芽”的瓶颈。

在我看来，《创见》的创办正是秦创原科技金融研究院对这一时代之问的回应。作为“科技金融”专刊，《创见》扎根秦创原这片创新热土，无疑将成为连接实验室与生产线、融通学术思想与产业现实的桥梁。我由衷期待，它能成为广大科技工作者探索成果转化“星辰大海”的同行者与见证者。

我的这份期待，源于陕西日益优化的创新生态。不久前，“央地共建西安区域科技创新中心工作推进会”在西安召开，15家中央单位共聚一堂，标志着西安建设“具有全国影响力的科技创新中心”正式上升为国家战略。其目标，正是要构筑具有国际竞争力的创新生态，使西安成为辐射带动西部发展的战略支点。

这份期待，更源于陕西尤其是西安不断崛起的创新实力。在最近发布的《国家创新型城市创新能力评价报告2024》中，西安居全国第七、西部第一。在世界知识产权组织发布的全球创新指数中，西安科技集群连续两年跻身全球前20，高居第18位。

更令我振奋的是，在《自然》最新发布的“2024年全球高质量科研领先城市”榜单中，我所在的化学学科，西安表现亮眼，位列全国第九、西部第一。这些成绩，正是这座城市系统而有力推动科教资源转化为产业竞争力的底气所在。

宏伟蓝图已经铺展，深厚积淀赋予我们底气。然而，将丰沛的科教资源转化为现实的产业优势，关键在打通“最后一公里”。这也正是《创见》所倡导的“政策引导、技术挖掘、资本对接、生态共建”的发展逻辑。

在我看来，政策是“指南针”，它指引科研工作与国家战略、区域发展同频共振；技术挖掘是“伯乐”，它识别并释放科研成果中蕴藏的巨大潜力，让深藏闺中的智慧被产业看见、被资本理解；资本对接是“催化剂”，我深切体会到，金融活水是跨越成果转化“死亡之谷”的生命线，有耐心、懂科技的“聪明资本”是点燃创新火种的重要燃料；生态共建则是“沃土”，唯有构建起科学家、企业家、投资家彼此信任、协同共生的系统，创新才能持续、发展才能恒久。

立足秦创原，我们正站在前所未有的宏大舞台。愿《创见》如一道追光，照亮前行之路，让每一位科技工作者的奇思妙想都能被看见，让每一颗有价值的创新种子都能被滋养，最终在这片古老而充满生机的三秦大地上，开花结果，绚烂成景。

（此文为房喻院士为“秦创原科技金融研究院”主办刊物《创见》2026年第01期创刊号撰写的寄语）

Mutual trust among scientists, entrepreneurs, and investors is essential for bringing innovations from the laboratory to the marketplace

Fang Yu

I have always believed that technological revolutions are the fundamental driving force behind the development of human civilization. Each major breakthrough has not only profoundly transformed the way people live but also reshaped the global political and economic landscape. Today, as China's development enters a new phase and both internal and external conditions undergo profound changes, the role of science and technology in supporting national rejuvenation and advancing the process of national reunification has become increasingly prominent.

As a scientist, I fully understand that the value of scientific research lies not only in discovery and invention, but also in its ability to move beyond the laboratory and onto the production line, truly transforming into a tangible force that drives economic and social development. This process often represents the bottleneck that determines whether the achievements scientists take pride in can take root and flourish in the soil of industry.

In my view, the launch of Innovation Insights represents the Qinchuangyuan Science and Technology Finance Research Institute's response to this pressing question of our era. As a dedicated publication on "technology finance", Innovation Insights, rooted in the fertile ground of innovation at Qinchuangyuan, will undoubtedly serve as a bridge connecting laboratories with production lines and bridging academic ideas with industrial realities. I sincerely hope it will become a companion and witness for the vast community of scientific and technological workers as they explore the vast expanse of transforming research outcomes into tangible achievements.

My anticipation stems from Shaanxi's increasingly optimized innovation ecosystem. Not long ago, the "Central-Local Joint Construction of Xi'an Regional Science and Technology Innovation Center Work Promotion Meeting" held in Xi'an brought together 15 central government agencies, signifying that the construction of Xi'an as a "nationally influential science and technology innovation center" has been elevated to a national strategy. Its objective is precisely to build an internationally competitive innovation ecosystem, positioning Xi'an as a strategic fulcrum that radiates and drives the development of the western region.

This anticipation stems also from the rising innovative strength of Shaanxi, particularly Xi'an. In the recently released "National Innovative Cities Innovation Capability Evaluation Report 2024", Xi'an ranked seventh nationwide and first in western China. In the Global Innovation Index published by the World Intellectual Property Organization, Xi'an's science and technology cluster has secured a spot among the world's top 20 for two consecutive years, climbing to 18th place.

What excites me even more is that in Nature's latest ranking of "The leading cities in the world for high-quality research in 2024", Xi'an has delivered outstanding performance in my field of chemistry, ranking ninth nationwide and first in western China. These achievements reflect the city's systematic and robust efforts to transform scientific and educational resources into industrial competitiveness.

A grand blueprint has been laid out, and our deep-rooted heritage gives us the confidence to move forward. However, transforming abundant scientific and educational resources into tangible industrial advantages hinges on bridging the "last mile". This precisely aligns with the development logic advocated by Innovation Insights: policy guidance, technological exploration, capital integration, and ecosystem co-creation.

In my view, policy serves as a "compass", guiding scientific research to align with national strategies and regional development. Technological exploration acts as a "discoverer of talent", identifying and unlocking the immense potential within research outcomes, enabling hidden wisdom to be recognized by industry and understood by capital. Capital integration serves as the "catalyst". I have come to deeply appreciate that financial resources are the lifeline for crossing the "valley of death" in technology transfer, while patient, tech-savvy "smart capital" provides the vital fuel to ignite the spark of innovation. Ecosystem co-creation is the "fertile soil". Only by building a system where scientists, entrepreneurs, and investors trust and collaborate can innovation be sustained and development endure.

Standing on the foundation of Qinchuangyuan, we now find ourselves on an unprecedented grand stage. May Innovation Insights serves as a spotlight, illuminating the path ahead—ensuring every scientist's brilliant idea is seen, every valuable seed of innovation is nurtured, and ultimately, on this ancient yet vibrant land of Shaanxi, blossom into a magnificent landscape.

(This article was written by Prof. Fang Yu for the inaugural issue of *Innovation Insights*, published by the Qinchuangyuan Science and Technology Finance Research Institute in January 2026.)

总策划：房喻教授
Producer & Editor-in-Chief: Prof. Fang Yu
责任编辑：丁立平 冯伟
Executive Editors: Ding Liping, Feng Wei
翻译：冯伟
Translator: Feng Wei
校对：团队全体老师
Proofreading: Fang Group teachers

地址：陕西省西安市长安区西长安街 620 号
陕西师范大学长安校区
Chang'an Campus, Shaanxi Normal University,
620 West Chang'an Avenue,Chang'an District, Xi'an,
Shaanxi, P. R. China
网站 (Website)：https://incsmm.snnu.edu.cn
电子邮箱 (Email)：incsmm@snnu.edu.cn