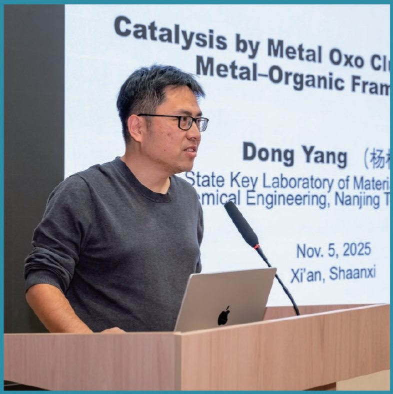
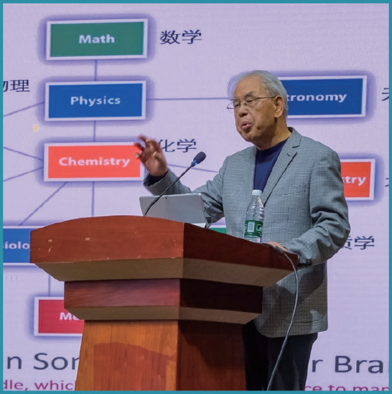
陕西师范大学 SHAANXI NORMAL UNIVERSITY
西安交通大学 XI'AN JIAOTONG UNIVERSITY

2025年11月
November, 2025

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





目 录 Contents

十一月大事记 Events in November

研究亮点 Research Highlight

交流合作 Exchange & Cooperation

总策划：房喻教授
Producer & Editor-in-Chief: Prof. Fang Yu
责任编辑：马佳妮 冯伟
Executive Editors: Ma Jiani, 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

房喻院士受聘为《防化研究》第二届编委会院士顾问编委

Fang Yu appointed as Academician Advisor to Second Editorial Board of CBRN Defense

2025 年 11 月 1 日上午，《防化研究》第二届编委会成立大会在线举行，会上房喻院士受聘为第二届编委会院士顾问编委，刘太宏副教授受聘为第二届编委会青年编委，聘期三年。

会议由军事科学院防化研究院曹树亚研究员主持，全体编委、专家学者以及编辑部成员共计 100 余人参加了会议，就期刊的高质量发展、定位和推介等展开了研讨。

《防化研究》是由军事科学院主管、军事科学院防化研究院主办的自然科学类期刊，主要刊载以下领域的原创性学术论文：化学、生物、核及放射性物质（CBRN）的检测、防护、污染控制技术研究；特种功能材料研究；土壤及水体污染修复技术研究；突发核生化事件应急救援技术研究；防化装备技术保障、测试评估，以及防化专业领域其他相关问题研究。


CBRN Defense

LETTER OF APPOINTMENT

聘 书

兹聘请 房 喻 院士为《防化研究》第二届编委会院士顾问编委，聘期三年。

《防化研究》编辑部

二〇二五年十月二十七日


CBRN Defense

LETTER OF APPOINTMENT

聘 书

兹聘请 刘太宏 副教授为《防化研究》第二届编委会青年编委，聘期三年。

《防化研究》编辑部

二〇二五年十月二十七日

On November 1, 2025, the inaugural meeting of the second editorial board of CBRN Defense was held online, during which Prof. Fang Yu was appointed as an academician advisor to the second editorial board, while Assoc. Prof. Liu Taihong was appointed as a young editorial board member, both for a three-year tenure.

The meeting was chaired by Researcher Cao Shuya from the Institute of CBRN Defense at the Academy of Military Sciences. Over 100 participants, including all editorial board members, experts, scholars, and editorial staff, attended the session to discuss the journal’s high-quality development, positioning, and promotion strategies.

CBRN Defense is a natural science journal supervised by the Academy of Military Sciences and published by the Institute of CBRN Defense under the Academy. It primarily publishes original academic papers in the following fields: research on detection, protection, and contamination control technologies for chemical, biological, nuclear, and radioactive substances (CBRN); research on special functional materials; research on soil and water pollution remediation technologies; emergency response technologies for nuclear, biological, and chemical incidents; technical support, testing, and evaluation of chemical defense equipment; and other relevant studies within the CBRN defense discipline.

房喻院士为赣南师范大学附属中学师生作报告

Fang Yu speaks at Gannan Normal University Affiliated High School

2025 年 11 月 1 日下午，房喻院士应邀来到赣南师范大学附属中学(蓉江校区）参加以“我与院士面对面”为主题的交流活动，并作题为“创新人才培养需要面向未来的教育和教学”的报告。

赣南师大附中校长汪义芳、党委书记黄翔等与老师同学们一起出席了活动。

On November 1, 2025, Prof. Fang Yu was invited to attend an exchange event titled “Face-to-Face with

Academician” at the Affiliated High School of Ganzhou Normal University (Rongjiang Campus), where he delivered a report titled “Cultivating Innovative Talent Requires Future-Oriented Education and Teaching”.

Principal Wang Yifang and Party Secretary Huang Xiang of the school attended the event alongside the teachers and students.

陕师大新概念研究院产业化项目获西安高校科技成果转化大赛创新成果组一等奖

SNNU INCSMM industrialization project wins first prize at Xi’an Higher Education Institutions S&T Achievement Transformation Competition

2025 年 11 月 5 日，陕西师范大学新概念传感器与分子材料研究院副院长杨小刚凭借“STCPS 高端防水拒油透气膜技术产业化”项目获得西安高校科技成果转化大赛创新成果组一等奖。

此次大赛由西安市科技局、市委人才办、市教育局、市人社局主办，聚焦新一代信息技术、高端装备制造技术等 9 大战略性新兴产业领域，分为创新成果组、创业转化组和校企合作组，参赛获奖项目将推荐至省科技厅、市科技局项目库，优先享受科技成果转化政策支持。

大赛从 10 月 31 日开始初赛，共有 230 个项目报名，49 个项目进入初赛，33 个项目进入决赛。研究院研发工程师罗艳彦一同参加了比赛。

此次获奖不仅体现了研究院在科研领域的高水平创新能力，也彰显了研究院在政产学研用深度融合方面发展的良好态势。

On November 5, 2025, Yang Xiaogang, vice dean of the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University, was awarded the First Prize in the Innovation Achievement category at the Xi’an Higher Education Institutions Science and Technology Achievement Transformation Competition for the project “Industrialization of STCPS High-End Waterproof, Oil-Repellent, Breathable Membrane Technology”.

Organized by the Xi’an Municipal Science and Technology Bureau, Municipal Talent Office, Municipal Education Bureau, and Municipal Human Resources and Social Security Bureau, the competition focused on nine strategic emerging industries including next-generation information technology and high-end equipment manufacturing. It featured three categories: Innovation Achievements, Entrepreneurial Transformation, and University-Enterprise Collaboration. Winning projects will be recommended to the provincial and municipal science and technology project databases, receiving priority access to policy supports.

The competition commenced its preliminary round on October 31, with 230 projects registered, 49 projects advancing to the preliminary round, and 33 projects progressing to the finals. R&D Engineer Luo Yanyan also participated in the competition.

This award not only reflects the Institute's high-level innovation capabilities in scientific research but also highlights its strong momentum in achieving deep integration across government, industry, academia, research, and application.

陕师大新概念研究院师生参加中国化学会第十九届全国胶体与界面化学学术会议

SNNU INCSMM Faculty and students attend CCS 19th Chinese Conference on Colloid and Interface Chemistry

2025 年 10 月 31 日至 11 月 4 日，中国化学会第十九届全国胶体与界面化学学术会议在江西省赣州市召开，陕西师范大学新概念传感器与分子材料研究院房喻院士、丁立平教授、刘静教授、刘凯强教授、边红涛教授、彭浩南教授、刘太宏副教授、刘忠山副研究员、赵智豪老师、乔敏博士后和多名学生参会。

房喻院士在大会开幕式为朱步瑶教授颁发了中国化学会胶体与界面化学终身成就奖。丁立平教授、刘静教授、刘凯强教授、边红涛教授、彭浩南教授、刘太宏副教授、刘忠山副研究员、乔敏博士后分别作了题为“多色发光与交互响应性荧光传感体系的构建与应用”“荧光小分子组装动力学调控与发光性能的构效关系”“功能软物质的空间限域结晶及其界面粘附”“离子吸附与界面双层结构的非线性光谱研究”“荧光功能分子动态组装、器件化及气相传感应用”“功能小分子控制组装与激发态过程调控”“多级孔材料的表界面化学和分离传感应用”和“基于多层次界面工程的荧光探针模式识别与痕量检测”的邀请报告。2025 级博士研究生邱泽彪获最佳墙报奖。

本次会议由中国化学会胶体与界面化学专业委员会、江西省化学化工学会主办，赣南师范大学、中国石油勘探开发研究院提高油气采收率全国重点实验室、《Surfaces and Interfaces》、竹纤维复合材料江西省重点实验室、合成药物化学江西省重点实验室承办，展示近年来胶体与界面化学的最新进展，探讨胶体与界面化学在人工智能背景下面临的机遇与使命，推动我国在相关领域学科发展与技术进步。

From October 31 to November 4, 2025, Faculty members and students from the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University, including Prof. Fang Yu, Prof. Ding Liping, Prof. Liu Jing, Prof. Liu Kaiqiang, Prof. Bian Hongtao, Prof. Peng Haonan, A/Prof. Liu Taihong, A/Prof. Liu Zhongshan, Lecturer Zhao Zhihao, Postdoctoral Fellow Qiao Min, and several students attended the 19th Chinese Conference on Colloid and Interface Chemistry of the Chinese Chemical Society held in Ganzhou City, Jiangxi Province.

Prof. Fang Yu presented Prof. Zhu Buyao with the Chinese Chemical Society Lifetime Achievement Award in Colloid and Interface Chemistry during the opening ceremony. Ding Liping, Liu Jing, Liu Kaiqiang, Bian Hongtao, Peng Haonan, Liu Taihong, Liu Zhongshan, and Qiao Min presented reports titled “Construction and Application of Multicolor Luminescence and Interactive Responsive Fluorescence Sensing Systems”, “Regulation of Fluorescent Small Molecule Assembly Kinetics and Structure-Activity Relationships in Luminescence Properties”, “Spatially Confined Crystallization and Interfacial Adhesion of Functional Soft Matter”, “Nonlinear

Spectroscopic Studies of Ion Adsorption and Interfacial Bilayer Structures", "Dynamic Assembly, Device Integration, and Gas-Phase Sensing Applications of Fluorescent Functional Molecules", "Controlled Assembly of Functional Small Molecules and Regulation of Excited-State Processes", "Surface Chemistry of Multiporous Materials and Their Applications in Separation and Sensing", and "Pattern Recognition and Trace Detection of Fluorescent Probes Based on Multilevel Interface Engineering" respectively. Qiu Zebiao, a Class of 2028 doctoral candidate received the Best Poster Award.

The conference is jointly organized by the Colloid and Interface Chemistry Committee of the Chinese Chemical Society and the Jiangxi Society of Chemistry and Chemical Engineering, hosted by Gannan Normal University, the National Key Laboratory of Enhanced Oil and Gas Recovery at the China National Petroleum Corporation Exploration and Development Research Institute, and the Jiangxi Provincial Key Laboratory of Colloid and Interface Chemistry, the Jiangxi Provincial Key Laboratory of Synthetic Medicinal Chemistry, and the journal Surfaces and Interfaces, Jiangxi Provincial Key Laboratory of Bamboo Fiber Composites, and Jiangxi Provincial Key Laboratory of Synthetic Medicinal Chemistry. It showcased recent advancements in colloid and interface chemistry, explored opportunities and challenges for the field within the context of artificial intelligence, and promoted disciplinary development and technological progress in related areas across China.

陕师大研究院传感器方向人才培养模式入选 2025 年陕西省级本科教学案例

SNNU INCSMM's Sensor Talent Cultivation Model selected as 2025 Shaanxi Provincial Undergraduate Teaching Case

2025 年 10 月底，陕西省教育厅发布关于拟认定 2025 年省级本科教学案例名单的公示，陕西师范大学新概念传感器与分子材料研究院彭浩南教授牵头申报的项目“‘感’通产学路，‘智’汇育才心：产教融合托举西部新质传感人才”入选 2025 年度省级教学案例。

该案例完成人为彭浩南、房喻、崔红、丁立平、刘太宏、文瑞娟。

At the end of October 2025, the Shaanxi Provincial Department of Education released a public notice regarding the proposed list of provincial-level undergraduate teaching cases for 2025, and the project titled "Connecting Industry-Academia Pathways Through Sensing, Nurturing Talent Through Intelligence: Industry-Education Integration Cultivates New-Quality Sensing Talent in Western China", led by Prof. Peng Haonan from the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University, was selected as a 2025 provincial-level teaching case.

The case contributors are Peng Haonan, Fang Yu, Cui Hong, Ding Liping, Liu Taihong, and Wen Ruijuan.

房喻院士出席通用高分子高性能化发展战略研讨会

Fang Yu attends Symposium on Development Strategy for High-Performance General-Purpose Polymers

2025 年 11 月 8 日，房喻院士应邀出席在西安召开的“通用高分子高性能化发展战略研讨会”。此次会议由国家自然科学基金委工程与材料科学部支持，主要研讨橡胶、塑料和纤维等通用高分子材料高性能化重大需求、发展现状、关键问题、未来趋势和研究方向布局。

On November 8, 2025, Prof. Fang Yu was invited to attend the "Symposium on the Development Strategy for High-Performance General-Purpose Polymers" held in Xi'an. Supported by the Division of Engineering and Materials Sciences of the National Natural Science Foundation of China, the symposium focused on discussing the critical demands, current development status, key challenges, future trends, and research direction planning for enhancing the performance of general-purpose polymer materials such as rubber, plastics, and fibers.

彭浩南、苗荣在第八届教师教学创新大赛校级决赛中获奖

Peng Haonan and Miao Rong win prizes at finals of SNNU Eighth Faculty Teaching Innovation Competition

2025 年 11 月 8 日，陕西师范大学新概念传感器与分子材料研究院彭浩南教授和苗荣副教授在学校第八届教师教学创新大赛校级决赛上，经过教学创新成果报告、教学设计创新汇报、课堂教学展示三部分的综合评审，分别获得产教融合组一等奖和基础课程组二等奖。

On November 8, 2025, Prof. Peng Haonan and Assoc. Prof. Miao Rong from the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University won the first prize in the Industry-Education Integration category and the second prize in the Basic Course category respectively at the university-level finals of the 8th Faculty Teaching Innovation Competition, after comprehensive evaluation across three components—teaching innovation achievement reports, teaching design innovation presentations, and classroom teaching demonstrations.

国家重点研发计划纳米前沿专项项目 / 课题中期总结会召开

Mid-Term Review Meeting for Nano Frontier National Key R&D Plan held

2025 年 11 月 9 日，国家重点研发计划“纳米前沿”重点专项项目“超高灵敏检测痕量危险有害化学物质的纳米材料与技术”项目 / 课题中期总结会在陕西师范大学新概念传感器与分子材料研究院报告厅召开。

会议由中国科学院新疆理化技术研究所牵头，联合陕西师范大学、中国人民解放军军事科学院防化研究院、

中国科学院化学研究所、公安部禁毒情报技术中心、深圳砺剑防卫技术有限公司等单位共同举办。

会议邀请了中国科学院化学研究所赵进才院士、安徽师范大学田兴友研究员等 9 位国内知名学者组成项目中期总结专家组，全面评估项目中期执行情况，并为下一阶段发展把关定向。陕西师范大学房喻院士和来自 6 家参与单位的 26 名项目骨干参加会议。会议由陕西师范大学化学化工学院院长刘成辉教授主持。

会上，项目负责人窦新存研究员就项目组织实施情况作整体汇报，课题负责人翟全国教授、丁立平教授、窦新存研究员、孔景临研究员依次汇报了课题中期执行情况，评审专家组以现场与线上相结合的方式听取了汇报。

随后，在项目 / 课题讨论及专家组评议环节，专家组成员对各课题的中期执行情况进行了评述，对各课题取得的成果给予了肯定，并提出了要加强课题间联系、凝练代表性成果等重要意见。

窦新存表示团队将认真消化吸收专家组提出的宝贵意见，集中力量加紧攻关，确保下一阶段工作实现质的飞跃与全面提升。

最后，房喻院士作总结性发言。他肯定了专家组指导的关键价值，同时也指出了不足之处与未来努力方向。

他建议项目立足国家长远战略需求，组建专门小组凝练形成高质量的咨询报告，并依托新疆独特的区位优势，谋划提报服务“一带一路”建设的专项建议书，打造具有影响力和说服力的核心成果。

On November 9, 2025, the mid-term review meeting for the project “Nanomaterials and Technologies for Ultra-sensitive Detection of Trace Hazardous and Harmful Chemicals” under the “Nano Frontier” National Key Research and Development Plan was held in the lecture hall of the Institute of New Concept

Sensors and Molecular Materials at Shaanxi Normal University.

The meeting was organized by Xinjiang Technical Institute of Physics and Chemistry of the Chinese Academy of Sciences and co-organized by Shaanxi Normal University, Chemical Defense Research Institute of the PLA Academy of Military Sciences, Institute of Chemistry of the Chinese Academy of Sciences, Anti-Drug Information Technology Center of the Ministry of Public Security, and Shenzhen SRED Security and Surveillance Technology Co., Ltd.

The meeting convened a mid-term review panel comprising nine renowned scholars, including Academician Zhao Jincai from the Institute of Chemistry, Chinese Academy of Sciences, and Researcher Tian Xingyou from Anhui Normal University. The panel conducted a comprehensive assessment of the project's mid-term progress and provided strategic guidance for its next phase of development. Prof. Fang Yu from Shaanxi Normal University and 26 key project personnel from the six participating institutions attended the meeting. The meeting was chaired by Prof. Liu Chenghui, dean of the School of Chemistry and Chemical Engineering at Shaanxi Normal University.

At the meeting, Researcher Dou Xincun, the project leader, presented a comprehensive report on the project's organization and implementation. Subsequently, Professors Zhai Quan Guo and Ding Liping, along with Researchers Dou Xincun and Kong Jinglin, each presented updates on the mid-term progress of their respective research topics. The review panel listened to the reports through a hybrid format combining in-person and online participation.

Subsequently, during the discussion and expert panel review session, members of the expert panel provided commentary on the mid-term progress of each project. They acknowledged the achievements made by each project and offered important recommendations, such as strengthening inter-project collaboration and refining representative outcomes.

Dou Xincun stated that the team will digest and absorb the valuable suggestions put forward by the expert panel, concentrate efforts to accelerate breakthroughs, and ensure that the next phase of research achieves a qualitative leap and comprehensive enhancement.

Finally, in his concluding remarks, Prof. Fang Yu affirmed the critical value of the expert

panel’s guidance while also identifying shortcomings and future directions for improvement. He recommended that the project align with the nation’s long-term strategic needs by establishing a dedicated task force to refine and produce high-quality advisory reports, and leveraging Xinjiang’s unique geographical advantages to develop and submit specialized proposals to serve the Belt and Road Initiative, thereby creating influential and persuasive core outcomes.

薄鑫参加中国化学会第二十三次全国电化学大会并作报告

Bo Xin presents at 23rd National Congress on Electrochemistry

2025 年 11 月 7 日至 10 日，陕西师范大学新概念传感器与分子材料研究院薄鑫副研究员参加了在武汉举行的“中国化学会 2025 第二十三次全国电化学大会”，并作了题为“精细电 / 化学镀与应用”和“绿色宏量制备非均相析氢催化剂”的学术报告。

From November 7 to 10, 2025, Assoc. Prof. Bo Xin from the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University attended the “23rd National Congress on Electrochemistry in 2025 of the Chinese Chemical Society” held in Wuhan, and presented two reports titled “Fine Electro/Electroless-Plating and Application” and “Green & Scalable Synthesis of Heterogeneous Catalysts for Hydrogen Evolution”.

陕师大新概念研究院参加第 27 届中国国际高新技术成果交易会

SNNU INCSMM participates in 27th China Hi-Tech Fair

2025 年 11 月 14 日至 16 日，陕西师范大学新概念传感器与分子材料研究院研发工程师王佩、罗艳彦、田哲赴深圳参加了第二十七届中国国际高新技术成果交易会（高交会），展示了 STCPS 防水透气拒油膜材料及其产业化进展。

本届高交会以“科技赋能产业，融合共创未来”为主题，共设立国之重器重大装备、人工智能与机器人、半导体与集成电路、低空经济与商业航天等 22 个专业展区，全面呈现前沿科技与产业融合的最新成果。

From November 14 to 16, 2025, Wang Pei, Luo Yanyan, and Tian Zhe, R&D engineers from the Institute of New Concept Sensor and Molecular Materials at Shaanxi Normal University, participated in the 27th China Hi-Tech Fair (CHTF) in Shenzhen, where they showcased STCPS waterproof, breathable, and oil-repellent membrane materials along with their industrialization progress.

This year's China Hi-Tech Fair, themed “Empowering Industries with Technology, Co-Creating the Future Through Integration,” features 22 specialized exhibition zones including National Key Equipment, Artificial Intelligence and Robotics, Semiconductors and Integrated Circuits, Low-Altitude Economy and Commercial Aerospace, comprehensively showcasing the latest achievements in the integration of cutting-edge technology and industrial development.

房喻院士出席美国化学会应用材料与表界面论坛并致辞

Fang Yu speaks at ACS Publications’ Applied Materials & Interfaces Forum

2025 年 11 月 16 日，美国化学会期刊应用材料与表界面论坛在西安交通大学创新港校区举办，房喻院士与美国化学会应用材料与表界面期刊主编林歆怡教授担任共同主席，并在开幕式上致辞。

房喻院士强调功能材料与表界面科学是当今科技创新的核心驱动力，正在重塑能源、环境、信息等关键领域的技术格局。他期待本次论坛能够成为一个高效的思想碰撞平台，通过跨学科、跨机构的深度对话，激发新的研究灵感，催生更多具有国际影响力的合作成果，共同推动该领域向更高性能、更智能化的方向发展。

本届论坛由西安交通大学和美国化学会出版部联合主办，西安交通大学前沿科学技术研究院、陕西师范大学新概念传感器与分子材料研究院、西安交通大学新概念传感器与分子材料研究院共同协办。

论坛共安排了 16 场高水平的邀请报告，来自西北地区的 70 余位资深专家及青年才俊参加了会议。陕西师范大学新概念传感器与分子材料研究院丁立平教授、刘凯强教授、边红涛教授、彭浩南教授、刘太宏副教授、刘忠山副教授和薄鑫副研究员参加了会议。

On November 16, 2025, Prof. Fang Yu attended the ACS Publications’ Applied Materials & Interfaces Forum held at the Innovation Port Campus of Xi’an Jiaotong University, serving as co-chairs of the forum together with Prof. Lin Xinyi, editor-in-chief of the ACS Applied Materials & Interfaces, and delivered remarks at the opening ceremony.

Fang Yu said that functional materials and surface/interface science serve as the core driving force behind contemporary technological innovation, reshaping the technological landscape in critical fields such as energy, environment, and information. He hoped that this forum would become an efficient platform for intellectual exchange, where in-depth dialogues across disciplines and institutions would spark new research inspiration and foster more internationally influential collaborative outcomes, collectively propelling the field toward higher performance and greater intelligence.

This forum is jointly organized by Xi’an Jiaotong University and the ACS Publication, with co-organization by the XJTU Frontier Institute of Science and Technology, the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University, and the XJTU Institute of New Concept Sensors and Molecular Materials.

The forum featured 16 high-level invited presentations, with over 70 senior experts and young talents from the northwest region of China attending the conference. Professors Ding Liping, Liu Kaiqiang, Bian Hongtao and Peng Haonan, Associate Professors Liu Taihong and Liu Zhongshan and Bo Xin from the SNNU nstitute of New Concept Sensors and Molecular Materials participated in the event.

房喻院士出席秦创原安康科创中心启用仪式

Fang Yu attends inauguration ceremony of Qinchuangyuan Ankang S&T Innovation Center

2025 年 11 月 18 日，房喻院士应邀出席由安康市委、市政府主办的秦创原安康科创中心启用暨教育科技人才一体改革项目路演活动。

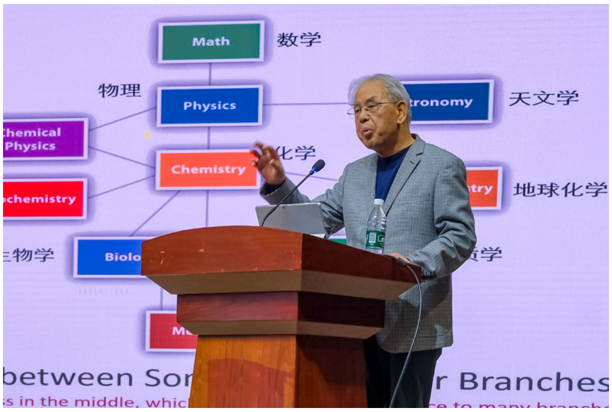
安康市委副书记、代市长张小平，省委科技工委副书记兰壮丽，安康市委副书记高晶华，中国科学院王中林院士，西北大学副校长张志飞，安康学院党委书记钟生海、校长余劲及西安交通大学、西北工业大学、中国农业科学院等 22 家高等院校和科研院所相关负责同志出席活动。

On November 18, 2025, Prof. Fang Yu was invited to attend the inauguration ceremony of the Qinchuangyuan Ankang Science and Technology Innovation Center and the roadshow event for the integrated reform project of education, science and technology, and talent development, hosted by the Ankang Municipal Party Committee and Municipal Government.

Zhang Xiaoping, deputy secretary of Ankang Municipal Party Committee and Acting Mayor; Lan Zhuangli, deputy secretary of Shaanxi Provincial Party Committee's Working Committee for Science and Technology; Gao Jinghua, deputy secretary of Ankang Municipal Party Committee; Academician Wang Zhonglin of the Chinese Academy of Sciences; Zhang Zhifei, vice president of Northwest University; Zhong Shenghai, secretary of the Party Committee of Ankang University; Yu Jin, president of Ankang University; and relevant officials from 22 higher education institutions and research institutes, including Xi'an Jiaotong University, Northwestern Polytechnical University, and the Chinese Academy of Agricultural Sciences, attended the event.

房喻院士赴紫阳开展科普报告与工作调研

Fang Yu visits Ziyang for Science Popularization Lecture and Work Inspection



2025 年 11 月 18 日，中国化学会常务理事、西安市科协主席房喻院士应邀赴紫阳县开展科普报告与工作调研。

在安康市紫阳中学举行的中国化学会“化学大家谈”系列科普报告第十五讲报告会上，房喻院士以《“化”为什么要“学”？只有驾驭变化，才能创造未来》为题，讲述了化学是什么、化学的发展、化学的作用，鼓励大家要保持对未知的好奇心，以扎实严谨的态度对待科学探索；要培养宏大志

向、具备坚韧品格、家国情怀，成为德才兼备的创新型人才。

本次活动由中国化学会和陕西省科学技术协会共同主办，陕西省化学会、中国化学会科普工作委员会、应用化学学科委员会、安康市科学技术协会共同承办。紫阳中学的 400 余名高中学生现场参加了此次活动。同时，来自陕西省其他学校的 4.1 万余名学生观看了活动直播。

会后，房喻院士一行到紫阳科技馆，实地察看了场馆建设规划、科普展品研发、常态化科普活动等工作开展情况。

安康市副市长杨首艳、省科协党组成员、副主席李延潮，安康市科协主席马文艳等有关领导参加活动。

On November 18, 2025, Prof. Fang Yu, standing council member of the Chinese Chemical Society and chairperson of the Xi'an Association for Science and Technology, was invited to Ziyang County to deliver a science popularization lecture and conduct a work inspection.

At the fifteenth lecture of the Chinese Chemical Society's “Chemistry Talks” series of popular science lectures held at Ziyang Middle School in Ankang City, Fang Yu delivered a lecture titled “Why Study Chemistry? Only by Mastering Change Can We Create the Future”. He explained what chemistry is, its development, and its impact, encouraging the audience to maintain curiosity about the unknown and approach scientific exploration with a rigorous and meticulous attitude. He urged them to cultivate grand aspirations, develop resilience, and embrace a sense of national pride, striving to become innovative talents of both moral integrity and professional competence.

This event was jointly organized by the Chinese Chemical Society and the Shaanxi Provincial Association for Science and Technology, and co-hosted by the Shaanxi Provincial Chemical Society, the Science Popularization Committee of the Chinese Chemical Society, the Applied Chemistry Discipline Committee, and the Ankang Municipal Association for Science and Technology. Over 400 high school students from Ziyang Middle School participated in the event on-site. Simultaneously, more than 41,000 students from other schools across Shaanxi Province watched the live broadcast of the event.

Following the lecture, Fang Yu visited the Ziyang Science and Technology Museum to inspect the venue's construction plans, the development of science popularization exhibits, and the implementation of regular science outreach activities.

Ankang City vice mayor Yang Shouyan, Li Yanchao, member of the Party Group and vice chairperson of Shaanxi Provincial Association for Science and Technology, and Ma Wenyan, chairperson of the Ankang Association for Science and Technology, among other relevant officials, participated in the event.

薄膜荧光传感器项目获 2025 陕西省科学实验展演大赛一等奖

Film Fluorescence Sensor Project wins first prize at 2025 Shaanxi Science Experiment Demonstration Competition

2025 年 11 月 20 日，陕西师范大学化学化工学院本科生团队凭借“让‘危险分子’无处遁形”项目获得 2025 陕西省科学实验展演大赛一等奖。

在研发工程师罗艳彦的指导下，郑瑞莹、田依平等五名学生精心设计编排，在舞台上生动演绎了薄膜荧光传感器工作原理，巧妙地将实验过程编排成了一场小舞台剧，让观众直观地看到荧光传感器如何让 TNT、黑索金、太安等“危险分子”现形。

本次大赛由陕西省科学技术厅、陕西省教育厅、陕西省科学技术协会联合主办，旨在弘扬科学家精神，提升全民科学素养。赛事自 7 月 31 日启动初赛以来，吸引了全省 100 个项目报名参赛，30 个项目进入总决赛，最终 5 个项目获得一等奖。

On November 20, 2025, an undergraduate team from the School of Chemistry and Chemical Engineering at Shaanxi Normal University won the first prize at the 2025 Shaanxi Provincial Science Experiment Exhibition Competition with their project titled “Leave ‘dangerous elements’ nowhere to hide”.

Under the guidance of R&D engineer Luo Yanyan, five students—Zheng Ruiying, Tian Yiping, and others—meticulously designed and choreographed their presentation, and vividly demonstrated the working principles of film-based fluorescent sensors, ingeniously transforming the experimental process into a mini-stage play. This allowed the audience to witness firsthand how fluorescent sensors reveal the presence of "dangerous elements" such as TNT, hexogen, and trinitrotoluene.

This competition was jointly organized by the Shaanxi Provincial Department of Science and Technology, the Shaanxi Provincial Department of Education, and the Shaanxi Association for Science and Technology. It aimed to promote the spirit of scientists and enhance the scientific literacy of the general public. Since the preliminary round commenced on July 31, the event attracted 100 projects from across the province, from which thirty projects advanced to the finals, with five ultimately winning first prizes.

房喻院士出席陕西省化学会 2025 年理事会

Fang Yu attends 2025 Council Meeting of Shaanxi Chemical Society

2025 年 11 月 22 日，房喻院士出席在西安举办的陕西省化学会 2025 年理事会，并在闭幕式环节发表讲话。丁立平教授作为理事也参加了会议。

此次会议由陕西省化学会主办，陕西科技大学化学与化工学院承办。会议总结了陕西省化学会的年度工作并颁发了陕西省化学奖。

On November 22, 2025, Prof. Fang Yu attended the 2025 Council Meeting of the Shaanxi Chemical Society held in Xi'an and delivered remarks during the closing ceremony. Prof. Ding Liping also attended the meeting as a council member.

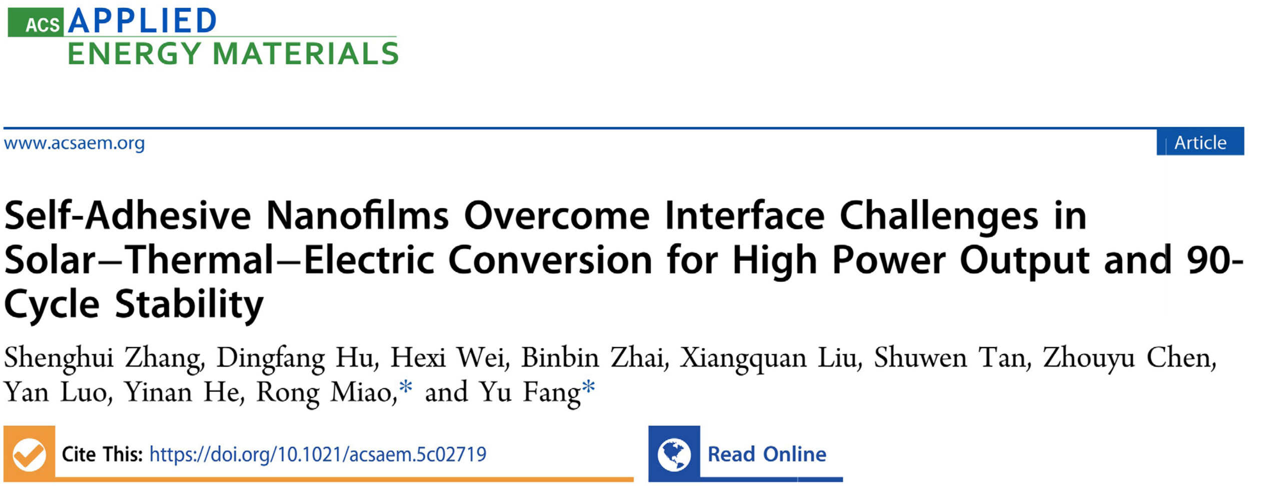
Hosted by the Shaanxi Chemical Society and organized by the College of Chemistry and Chemical Engineering at Shaanxi University of Science and Technology, the meeting reviewed the society's annual work and presented the Shaanxi Chemistry Awards.

马佳妮参加基金委第五届化学理论与机制青年学者学术交流研讨会并作报告

Ma Jiani presents at NSFC Fifth Academic Exchange Symposium for Young Scholars

2025 年 11 月 21 日至 23 日，陕西师范大学新概念传感器与分子材料研究院马佳妮教授参加了在南京举行的国家自然科学基金委员会化学科学部"第五届化学理论与机制青年学者学术交流研讨会"，并作题为"光笼分子反应机制研究"的学术报告。

From November 21 to 23, 2025, Prof. Ma Jiani from the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University attended the Fifth Academic Exchange Symposium for Young Scholars in Chemical Theory and Mechanisms, hosted by the Chemistry Division of the National Natural Science Foundation of China in Nanjing, where she presented a report titled "Research on the Reaction Mechanism of Photocage Molecules".



ACS APPLIED ENERGY MATERIALS

www.acsaem.org | Article

Self-Adhesive Nanofilms Overcome Interface Challenges in Solar−Thermal−Electric Conversion for High Power Output and 90-Cycle Stability

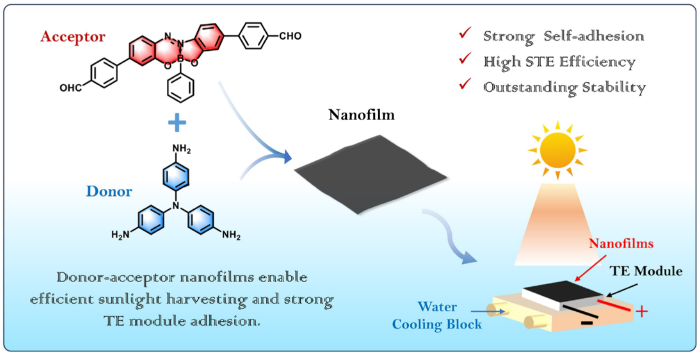
Shenghui Zhang, Dingfang Hu, Hexi Wei, Binbin Zhai, Xiangquan Liu, Shuwen Tan, Zhouyu Chen, Yan Luo, Yinan He, Rong Miao,* and Yu Fang*

Cite This: https://doi.org/10.1021/acsaem.5c02719

Read Online

自粘纳米薄膜通过克服光 – 热 – 电转换中的界面难题，实现高功率输出与 90 次循环稳定性

Shenghui Zhang#, Dingfang Hu, Hexi Wei, Binbin Zhai, Xiangquan Liu, Shuwen Tan, Zhouyu Chen, Yan Luo, Yinan He, Rong Miao*, Yu Fang*. ACS Appl. Energy Mater. 2025, DOI: 10.1021/acsaem.5c02719



在全球能源需求持续增长与化石燃料日益枯竭的背景下，开发高效、稳定的可再生能源技术至关重要。太阳能 – 热能 – 电能（STE）转换技术可将丰富的太阳能转化为便于储存和利用的电能，是极具前景的解决方案之一。然而，该技术的核心挑战在于如何将光热材料与热电模块高效、稳定地集成。传统使用粘合剂或导热膏的界面连接方式，易引发界面热阻、材料利用效率低以及长期运行下的分层失效等问题，严重制约了 STE 器件的性能输出与实际应用。

针对这一关键界面难题，本研究成功开发了一种在潮湿空气 / 二甲基亚砜界面合成的自粘性纳米薄膜。该薄膜厚度仅 55–60 纳米，具备宽光谱吸收与快速光热响应特性，其分子结构中的亚胺基团与纳米级厚度赋予其与多种基底（包括热电模块）的强效自粘附能力，并能耐受极端 pH、水冲洗、热冲击及有机溶剂浸泡，展现出卓越的环境稳定性。基于此，研究团队构建了新型 STE 器件，在 1 倍太阳光照射下实现了 1.46 W m^{-2} 的高实际功率输出，且经历 90 次循环后未出现性能衰减。基于此搭建的装置，能够漂浮在湖面上实现连续电能输出，成功验证其实际应用潜力。本研究为解决 STE 转换中的长期界面瓶颈提供了创新性解决方案，并为发展高性能、长寿命的能量收集器件开辟了新途径。

第一作者：陕西师范大学博士研究生张晟珲
通讯作者：陕西师范大学房喻院士、苗荣副教授

全文链接：https://pubs.acs.org/doi/10.1021/acsaem.5c02719

Against the backdrop of continuously growing global energy demand and the increasing depletion of fossil fuels, the development of efficient and stable renewable energy technologies is of paramount importance. Solar-thermal-electric (STE) conversion technology, which transforms abundant solar energy into storable and utilizable electricity, represents a highly promising solution. However, a core challenge of this technology lies in the efficient and stable integration of photothermal materials with thermoelectric modules—conventional interface connection methods using adhesives or thermal pastes are prone to issues such as interfacial thermal resistance, low material utilization efficiency, and delamination during long-term operation, severely limiting the performance and practical application of STE devices.

To address this critical interface challenge, this study successfully developed a self-adhesive nanofilm synthesized at the humid air/dimethyl sulfoxide interface. With a thickness of only 55–60 nm, the film exhibits broad-spectrum absorption and rapid photothermal response characteristics. The imine groups in its molecular structure and its nanoscale thickness enable strong self-adhesion to various substrates, including thermoelectric modules, while withstanding extreme pH conditions, water rinsing, thermal shock, and organic solvent immersion, demonstrating exceptional environmental stability. Based on this, the research team constructed a novel STE device that achieved a high actual power output of 1.46 W m^{-2} under 1-sun illumination, with no performance degradation after 90 cycles. A device built on this foundation, capable of floating on a lake and continuously generating electricity, successfully validated its practical application potential.

Through a sophisticated interfacial engineering strategy, this study has produced a nanofilm that combines efficient photothermal conversion, robust self-adhesion, and outstanding stability. This provides an innovative solution to the long-standing interface challenges in STE conversion and opens new pathways for the development of high-performance, long-lasting energy harvesting devices.

First Author: Zhang Shenghui, doctoral candidate, Shaanxi Normal University

Correspondence Authors: Prof. Fang Yu, Assoc. Prof. Miao Rong, Shaanxi Normal University

Full Text Link: https://pubs.acs.org/doi/10.1021/acsaem.5c02719

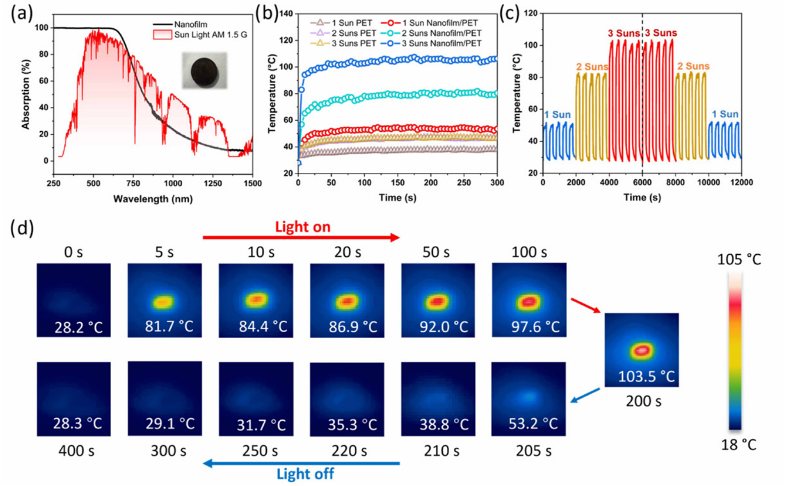


图 1.（a）纳米薄膜的吸收光谱与太阳光谱的对比。（b–d）纳米膜的光热转换能力测试。

Figure 1. (a) Comparison of the absorption spectrum of the nanofilm with the solar spectrum. (b-d) Testing of the photothermal conversion ability of the nanofilm.

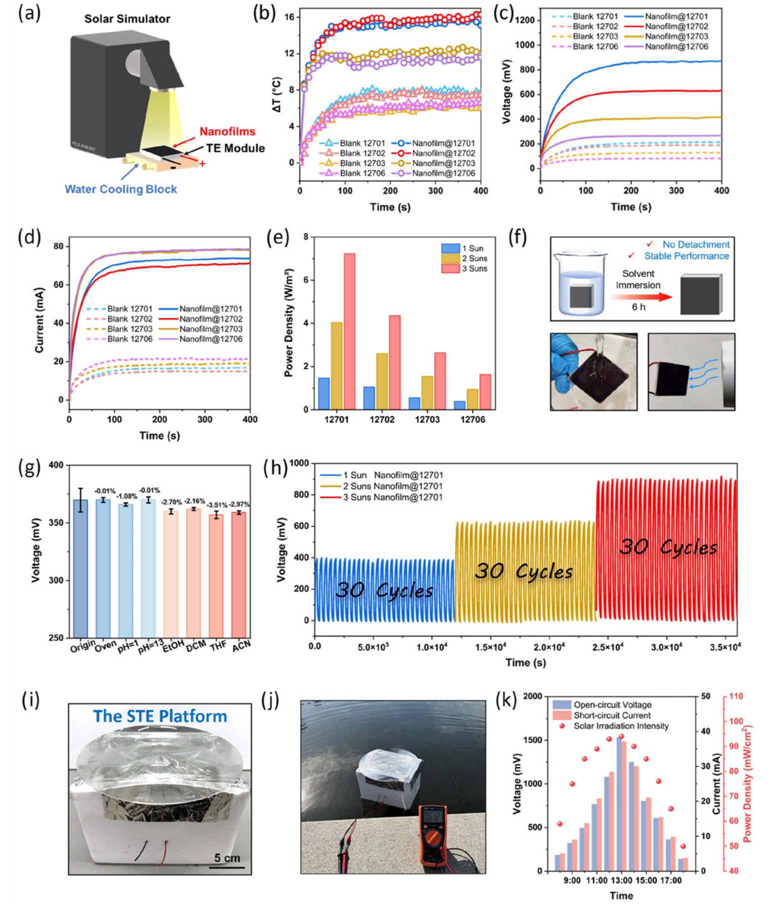


图 2.（a）光热发电装置的示意图。（b–d）平衡温度、开路电压和短路电流。（e）实际最大输出功率。（f–h）稳定性测试。（i–j）搭建的用于实际场景的装置示意图。（k）实际场景下的性能测试。

Figure 2. (a) Experimental setup for measuring STE conversion. (b–d) Equilibrium temperature, open-circuit voltage, and short-circuit current of different STE devices (e) Actual maximum output power density of different STE devices under different irradiations. (f–h) Stability testing of STE devices (i–j) Photograph of the STE platform. (k) Open-circuit voltage and short-circuit current of the STE platform as a function of outdoor solar intensity during different time periods of the day (March 25, 2025; 34.16°N, 108.95°E).

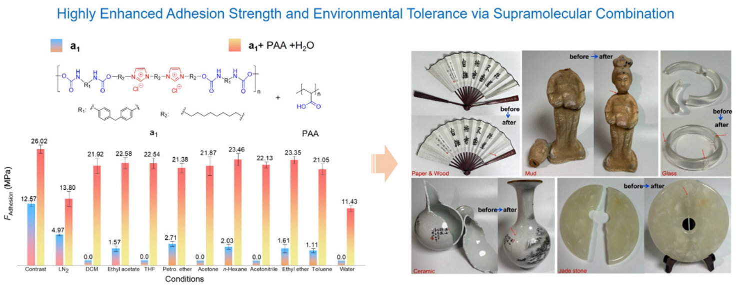

MATERIALS TODAY
Available online 6 November 2025
In Press, Corrected Proof ⓘ What's this?

Redefining interfacial adhesion of linear ionic polyurethanes through supramolecular combinatorial strategy for the restoration of cultural heritage materials

Wenhe Jiang [a 1], Zhongwen Sun [a 1], Ruitong Wang [a 1], Xiaozhu Zhao [a], Xianshu Zhou [a], Yanlin Wei [b], Chaowen Shen [a], Yongsheng Fang [a], Li Niu [a], Xinling Deng [a], Xinai Guo [a], Hongtao Bian [a], Hua Xu [a c], Pujun Jin [c], Hui Yang [d], Kaiqiang Liu [a] ✉, Yu Fang [a]

超分子作用组合策略在高效胶黏剂创制与文物材料界面粘接中的应用

Wenhe Jiang#, Zhongwen Sun#, Ruitong Wang#, Xiaozhu Zhao, Xianshu Zhou, Yanlin Wei, Chaowen Shen, Yongsheng Fang, Li Niu, Xinling Deng, Xinai Guo, Hongtao Bian, Hua Xu, Pujun Jin, Hui Yang, Kaiqiang Liu*, Yu Fang. Mater. Today, 2025, DOI: 10.1016/j.mattod.2025.11.011



文物材料修复对胶黏剂性能要求严苛，需胶黏剂兼具优异界面润湿性、较强粘接力与环境耐受性。传统聚氨酯胶黏剂虽界面黏接强度突出，但通常依赖有机溶剂提升基材的界面润湿性——这既给文物修复操作带来不便，也会对环境、操作人员健康带来不同程度的危害。因此，发展高粘接强度、强润湿性且环境友好的聚氨酯胶黏剂，成为文物保护领域的一项重要课题。

针对这一挑战，本研究提出了两步法超分子作用组合策略，发展了系列高性能环保型聚氨酯胶黏剂。首先，通过共价键合，研究将含静电作用位点的咪唑鎓离子片段与提供氢键作用位点的氨酯键引入线性聚合物骨架，设计合成系列离子型聚氨酯（图 1），显著改善了界面润湿性与初始粘附力。为解决溶剂化效应导致的分子内聚力下降、界面易失效问题，研究进一步引入超分子组合策略：通过调控水、聚丙烯酸等组分，精准平衡离子型聚氨酯与添加剂间的分子间相互作用（氢键、π－π 堆积、阳离子－π 相互作用及静电力等）。以此所得复合胶黏剂具有高强的界面粘接力以及优良的环境耐受性（水、有机溶剂、液氮等），其性能已超越了多数有机溶剂辅助的商用胶黏剂以及已报道的超分子胶黏剂（图 2）。研究采用核磁滴定、变温核磁及分子动力学模拟等技术，揭示了超分子组合前后分子作用平衡的变化规律与作用机制。

研究表明，该类胶黏剂在文物修复中表现出显著的应用潜力，即可通过简单间歇性预热处理方式，实现纸张、木头、泥塑、陶瓷、玉石等材质的有效粘接（图 3），为文化遗产保护领域功能性胶黏剂的设计开发提供了新思路。

第一作者：陕西师范大学硕士研究生姜闻赫、孙中文和王瑞彤
通讯作者：陕西师范大学刘凯强教授
全文链接：https://doi.org/10.1016/j.mattod.2025.11.011

The restoration of cultural relics demands stringent performance criteria for adhesives, which must combine excellent interfacial wettability, strong adhesion strength, and high environmental tolerance. Traditional polyurethane adhesives, despite their outstanding interfacial adhesion, have generally relied on organic solvents to improve interfacial wetting of substrates—this not only complicates restoration operations but also poses risks of environmental contamination and harm to personnel. Thus, developing polyurethane adhesives with high strength, superior wettability, and environmental friendliness has emerged as an urgent priority in cultural heritage conservation.

To tackle this challenge, professor Liu Kaiqiang's research group at our institute proposed a two-step supramolecular combinatorial strategy, yielding a series of high-performance, eco-friendly polyurethane adhesives. First, imidazolium ionic segments as electrostatic sites for enhanced wettability and urethane bonds providing hydrogen-bonding sites were grafted onto a linear polymer backbone via covalent modification (Figure 1). This yielded ionic polyurethanes with significantly improved interfacial wettability and initial adhesion. To address the loss of molecular

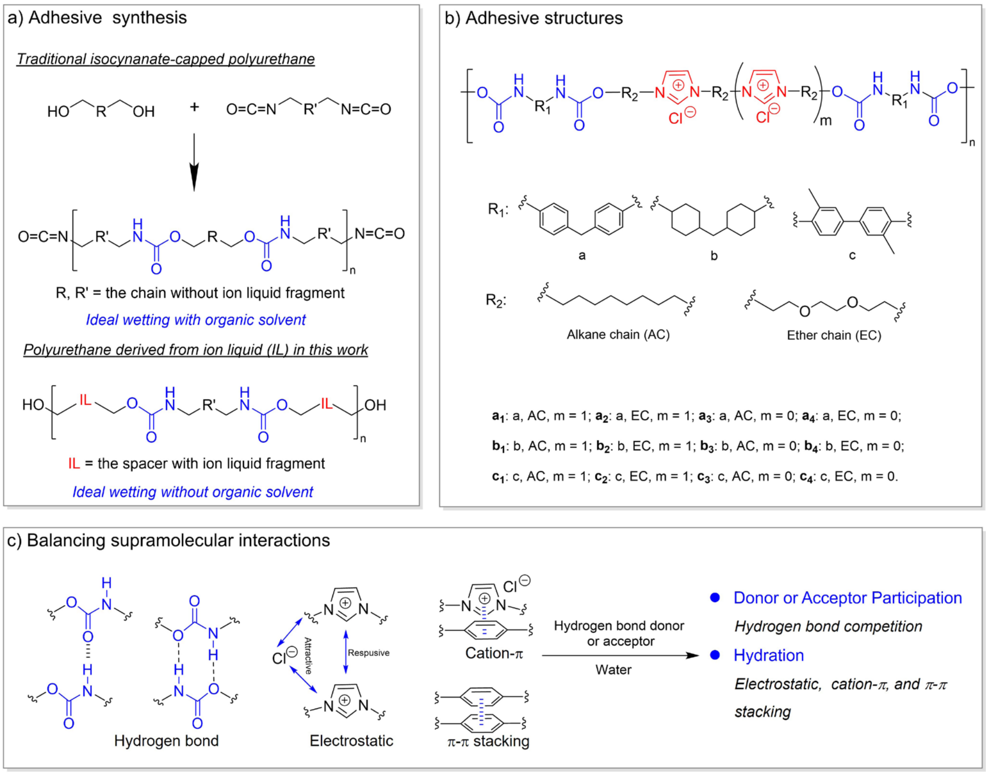


图 1. 分子设计与可能的超分子作用模式

Figure 1. Molecular design and potential intermolecular forces before and after supramolecular combination

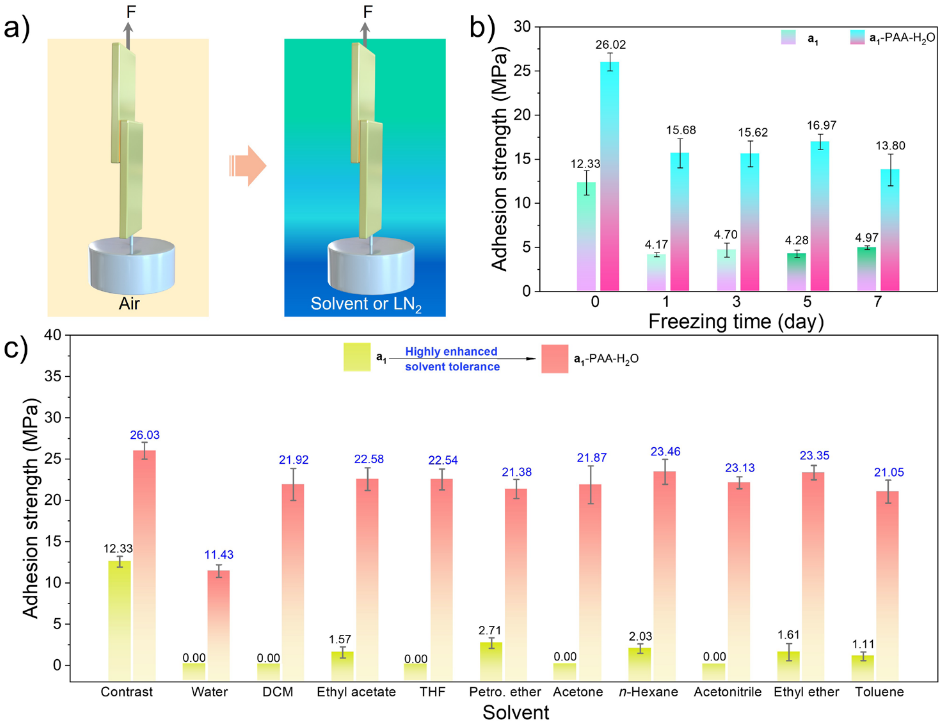


图 2. 组合前后粘接界面的环境耐受性

Figure 2. Environmental tolerance of adhered interfaces before and after supramolecular combination

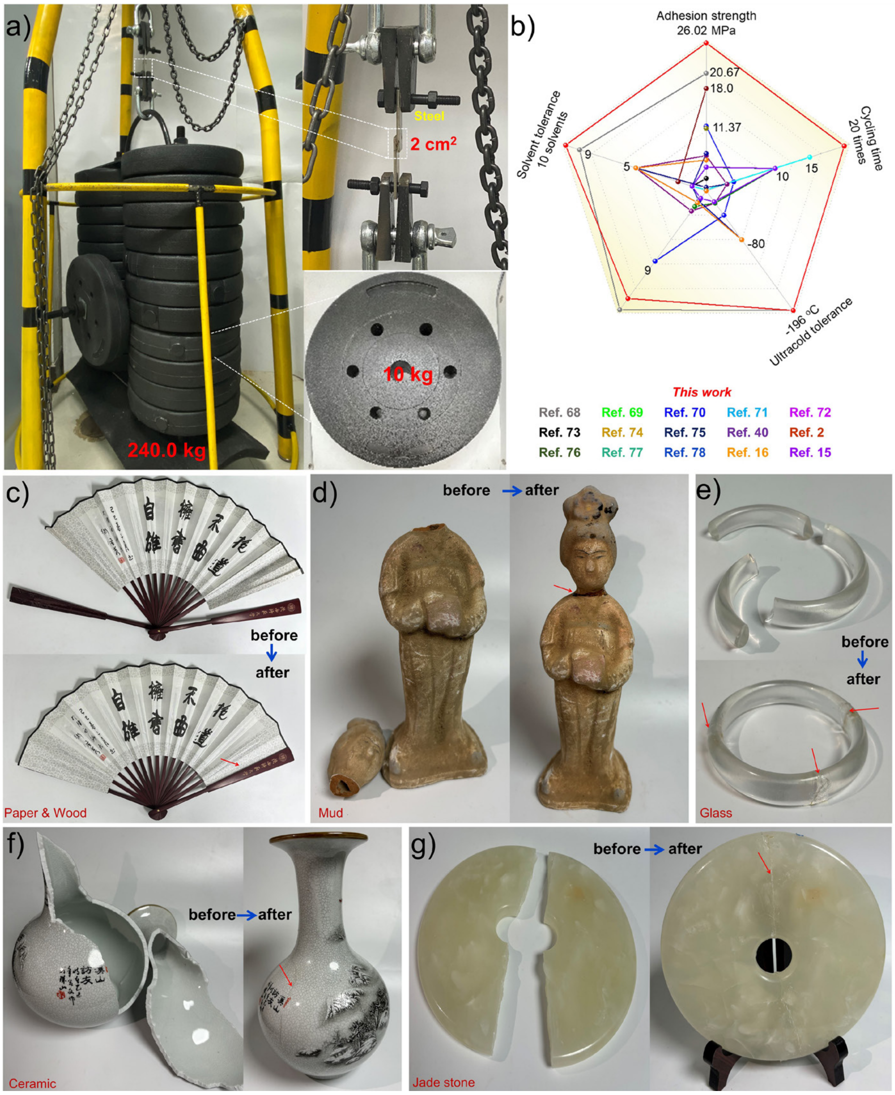


图 3. 悬挂持久性与性能比较、以及破碎文物材料的粘接

Figure 3. Durability under hanging conditions, performance comparison, and bonding of broken cultural relic materials

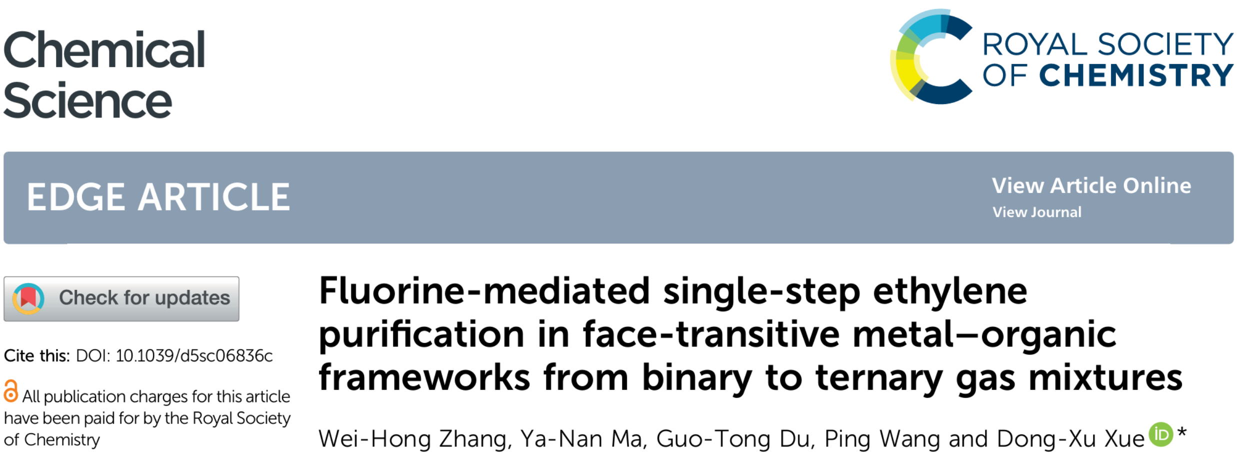
cohesion and interfacial instability caused by solvation effects, the group further balanced multiple intermolecular interactions (hydrogen bonding, π-π stacking, cation-π interactions, and electrostatic forces) between ionic polyurethane and additive by tuning components. The resulting composite adhesive not only delivers exceptional interfacial strength but also exhibits robust tolerance in harsh environments—including water, organic solvents, and liquid nitrogen—outperforming most solvent-based commercial adhesives and previously reported supramolecular adhesives (Figure 2). Techniques such as NMR titration, variable-temperature NMR, and molecular dynamics simulations reveal difference of shearing energies and adhesion mechanisms before and after supramolecular combination.

To be summarized, such a class of functional adhesives demonstrate remarkable potential in cultural relic repair: simple intermittent preheating enables efficient bonding of diverse materials, including paper, clay sculptures, ceramics, and jade (Figure 3). It thus establishes a new paradigm for designing functional adhesives tailored to cultural heritage protection.

First Authors: Jiang Wenhe, Sun Zhongwen, and Wang Ruitong, master's students, Shaanxi Normal University

Correspondence Author: Prof. Liu Kaiqiang, Shaanxi Normal University

Full Text Link: https://doi.org/10.1016/j.mattod.2025.11.011



Chemical Science

ROYAL SOCIETY OF CHEMISTRY

EDGE ARTICLE

View Article Online
View Journal

Check for updates

Cite this: DOI: 10.1039/d5sc06836c

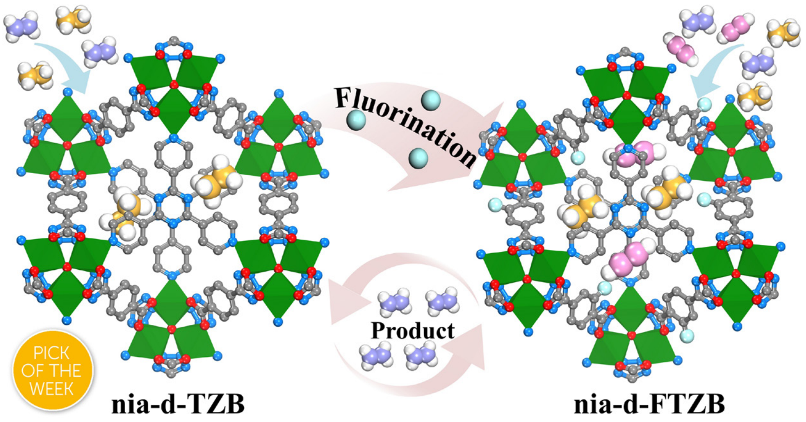
All publication charges for this article have been paid for by the Royal Society of Chemistry

Fluorine-mediated single-step ethylene purification in face-transitive metal–organic frameworks from binary to ternary gas mixtures

Wei-Hong Zhang, Ya-Nan Ma, Guo-Tong Du, Ping Wang and Dong-Xu Xue*

氟介导的面传递 MOF 实现二元 / 三元 C_2 混合气中乙烯一步纯化

Wei-Hong Zhang, Ya-Nan Ma, Guo-Tong Du, Ping Wang, and Dong-Xu Xue*. Chem. Sci., 2025, DOI: https://doi.org/10.1039/D5SC06836C



乙烯是化工行业的关键原料，需从乙烷 / 乙烯二元混合物或乙炔 / 乙烷 / 乙烯三元混合物中提纯至聚合级（纯度 >99.9%）。传统分离方法（如低温蒸馏）能耗高，而多孔吸附材料的吸附分离技术是高效替代方案。因此，设计和合成高选择性和高吸附量的新型 MOF 仍然受到高度期待。其中，面传递 MOF 因具有单一三角形或四边形窗口类型，在区分结构相似的 C_2 气体方面潜力巨大。

利用网格化学和混合配体策略，我们使用相同的金属源和一个三齿三嗪配体，以及一个带有羧酸和四唑基的异功能线性配体 (TZB) 和氟化配体（FTZB），合成了两例具有 nia–d 拓扑的三核锰基 MOF 结构：nia–d–TZB 和 nia–d–FTZB。nia–d–TZB 优先吸附乙烷，可从乙烷 / 乙烯二元混合物中一步提纯乙烯；nia–d–FTZB 则同时优先吸附乙炔和乙烷，实现从乙炔 / 乙烷 / 乙烯三元混合物中一步获得聚合级乙烯。

单晶 X 射线衍射测试表明，有两个不同的笼子存在于这两种化合物中，即三角双锥笼（I）和反三棱柱笼（II）。两种结构的三角双锥笼型尺寸均为 9.96 × 16.15 $Å^2$。由于线性配体中氟的存在，反三棱柱笼 II 从 nia–d–TZB 中的 13.17 × 6.30 $Å^2$ 改变为 nia–d–FTZB 中的 12.62 × 6.23 $Å^2$。同时，由部分 TPT 连接体和两个线性配体定义的三角形窗口作为框架的唯一入口 / 出口。孔径大小从 nia–d–TZB 中的 5.16 Å 适度减小到 nia–d–FTZB 中的 5.0 Å。尽管如此，这些窗口尺寸足以允许 C_2 气体分子通过。

通过与乙腈或丙酮连续交换三天，然后在 120°C 真空下抽真空。在 77 K 下测得的氮气吸附等温线显示为 I 型吸附等温线，这与材料的微孔特性一致。在 1 bar 下，nia–d–TZB (546 $cm^3\ g^{-1}$) 比 nia–d–FTZB (503 $cm^3\ g^{-1}$) 表现出更高的氮气吸附量。与之相对应的是，nia–d–TZB 的比表面积和孔体积分别为 2029 $m^2\ g^{-1}$ 和 0.85 $cm^3\ g^{-1}$，nia–d–FTZB 的比表面积和孔体积分别为 1987 $m^2\ g^{-1}$ 和 0.78 $cm^3\ g^{-1}$。而且，两种材料对 C_2H_2 和 C_2H_6 的吸附量始终高于 C_2H_4。在 nia–d–TZB 中，主客体相互作用顺序遵循 $C_2H_6 > C_2H_2 >$

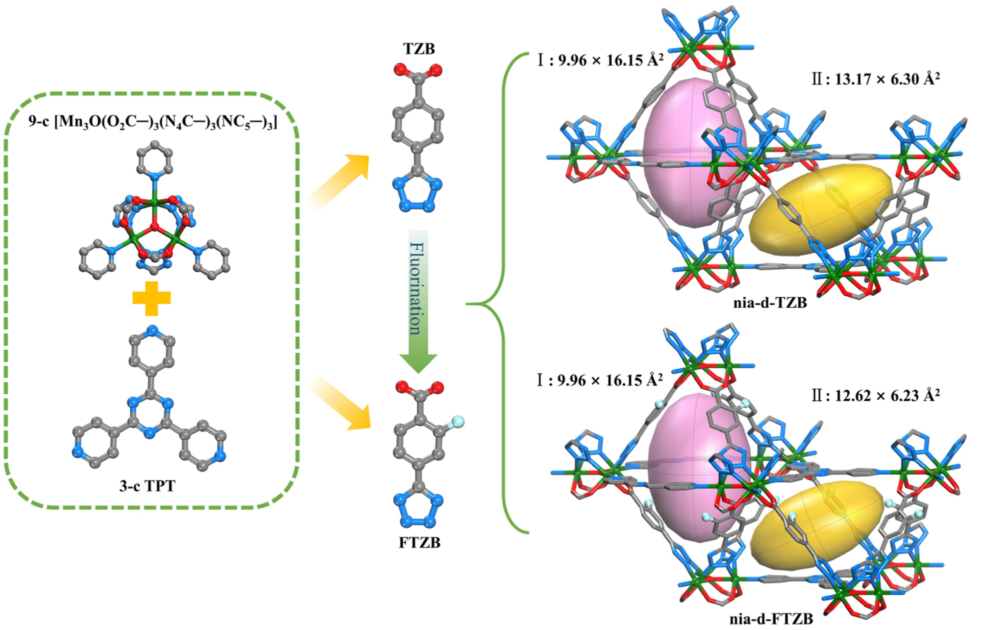


图 1. 三核锰簇和混合连接体组成的两种 MOF 结构示意图
Figure 1. Schematic representation of the two MOFs constructed from a trinuclear manganese cluster and respective mixed linkers associated with corresponding cage sizes.

C_2H_4，而在 nia–d–FTZB 中，C_2H_2 的吸附量最高，其次是 C_2H_6，最后是 C_2H_4，零点吸附焓（Qst）与吸附行为相一致，IAST 计算表明，在 298 K 和 1 bar 下，对于 C_2H_2/C_2H_4（50/50, v/v）混合物的选择性，nia–d–TZB 为 1.11，nia–d–FTZB 为 1.45 。相同条件下，C_2H_6/C_2H_4（50/50, 10/90, v/v）混合物对 nia–d–TZB 的选择性为 1.58，对 nia–d–FTZB 的选择性为 1.41。最后，同时进行了二元和三元混合物的穿透实验和 GCMC 模拟，证明了两种材料对二元 / 三元 C_2 混合气中一步纯化乙烯的优异性能。

总之，该工作为设计合成面传递 MOF 材料、实现先进的气体分离性能建立了一个重要范例，强调了晶体多孔材料在节能减排方面的应用潜力。

第一作者：陕西师范大学硕士研究生张伟宏
通讯作者：陕西师范大学薛东旭教授
全文链接：https://pubs.rsc.org/en/Content/ArticleLanding/2025/SC/D5SC06836C

Ethylene is a key feedstock in the chemical industry and must be purified to polymerization grade (>99.9%) from either ethane/ethylene binary or acetylene/ethane/ethylene ternary mixtures. Conventional separation processes such as low-temperature distillation are extremely energy-intensive; adsorptive separation with porous solids offers a far more efficient alternative. Nevertheless, the rational design and synthesis of novel MOFs that combine exceptionally high selectivity with high gravimetric uptake is still strongly desired. Face-transitive-topology MOFs—whose nets contain only one kind of window—show exceptional promise for discriminating among the structurally similar C_2 hydrocarbons. However, existing MOFs still struggle to achieve simultaneous, high-efficiency separation of both binary and ternary C_2 mixtures.

Leveraging reticular chemistry and a mixed-ligand strategy, we report the synthesis of two nia-d-type trinuclear manganese-based MOFs using the same metal source and a tridentate triazine ligand, as well as a hetero-functional linear linker bearing carboxylic acid and tetrazole motifs. One linker is fluorine-free, while the side arm of the carboxylate in the other linker is methods inefficient. nia-d-TZB preferentially adsorbs ethane and can purify ethylene in one step from ethane/ethylene binary mixtures, nia-d-FTZB preferentially adsorbs both acetylene and ethane, achieving one-step polymerization grade ethylene from acetylene/ethane/ethylene ternary mixtures.

Two distinct cage motifs are present in both compounds, i.e., a triangular bipyramidal cage (cage-I) and an anti-prismatic cage (cage-II). The dimensions of cage-I are 9.96 × 16.15 Å² in both structures. The presence of fluorine in the linear linker slightly perturbs cage-II, changing its dimensions from 13.17 × 6.30 Å² in nia-d-TZB to 12.62 × 6.23 Å² in nia-d-FTZB . At the same time, the triangular windows, defined by portions of the TPT linker and two linear linkers, serve as the sole entrances/exits for the framework. The aperture size modestly decreases from 5.16 Å in nia-d-TZB to 5.0 Å in nia-d-FTZB . Nevertheless, these window dimensions remain sufficient to permit the passage of C_2 gas molecules.

After sequential solvent exchange with acetonitrile and acetone for three days, the samples were activated under dynamic vacuum at 120 °C. Nitrogen sorption isotherms recorded at 77 K exhibit reversible Type-I profiles, At 1 bar, nia-d-TZB (546 $cm^3\ g^{-1}$) exhibits a higher nitrogen uptake than nia-d-FTZB (503 $cm^3\ g^{-1}$) .Correspondingly, The BET surface areas and total pore volumes are

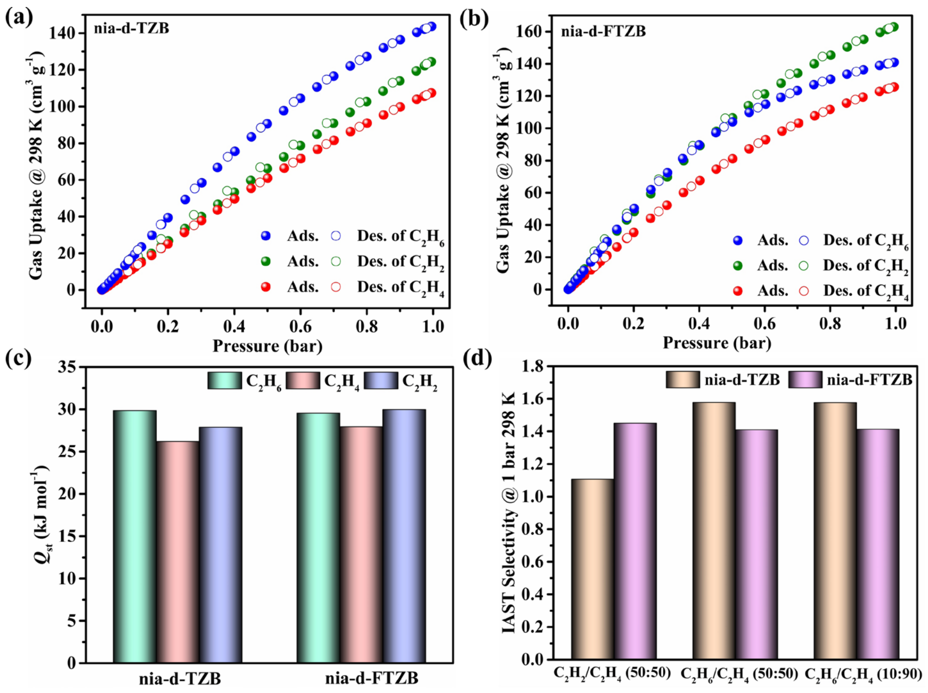


图 2. (a) nia−d−TZB 在 298 K 时的 C_2H_2、C_2H_6、C_2H_4 吸附等温线；(b) nia−d−FTZB 在 298 K 时的 C_2 吸附等温线；(c) nia−d−TZB 和 nia−d−FTZB 的 C_2H_2、C_2H_6 和 C_2H_4 的 Qst；(d) 298 K 和 1 bar 条件下，nia−d−TZB 和 nia−d−FTZB 对 C_2H_2/C_2H_4（50/50, v/v）和 C_2H_6/C_2H_4（50/50, 10/90, v/v）的选择性

Figure 2. (a) C_2H_2, C_2H_6, and C_2H_4 sorption isotherms of nia-d-TZB at 298 K; (b) C_2 sorption isotherms of nia-d-FTZB at 298 K; (c) Qst of C_2H_2, C_2H_6 and C_2H_4 for nia-d-TZB and nia-d-FTZB; (d) IAST selectivity of nia-d-TZB and nia-d-FTZB for C_2H_2/C_2H_4 (50/50, v/v) and C_2H_6/C_2H_4 (50/50, 10/90, v/v) at 298 K and 1 bar.

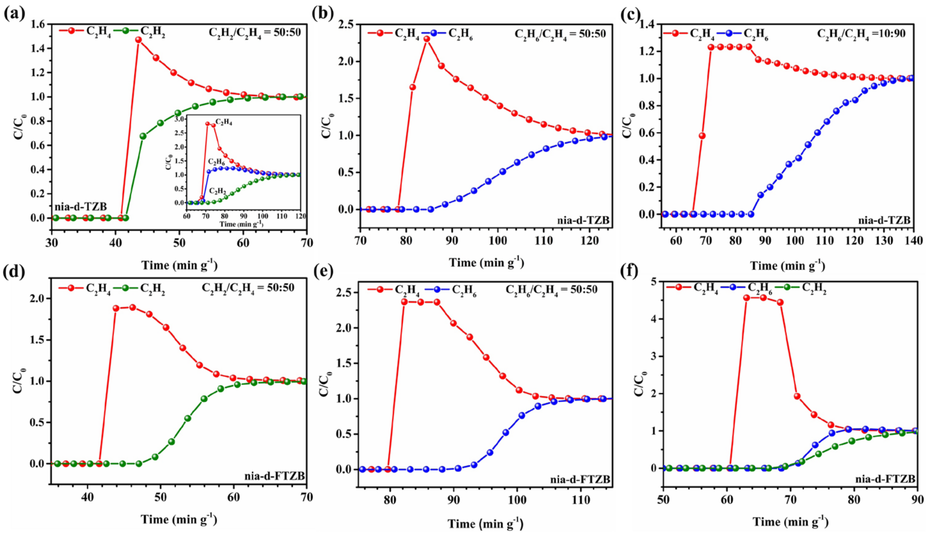


图 3.(a) C_2H_2/C_2H_4（50/50, v/v）和 $C_2H_6/C_2H_4/C_2H_2$ (1/1/1, v/v/v), (b) C_2H_6/C_2H_4（50/50, v/v）和 (c) C_2H_6/C_2H_4（10/90, v/v）在 298 K， 1 bar 下的总气量为 1.0 mL min^{-1} 时 nia−d−TZB 的穿透曲线；(d) C_2H_2/C_2H_4 (50/50, v/v), (e) C_2H_6/C_2H_4 (50/50, v/v), (f) $C_2H_6/C_2H_4/C_2H_2$ (1/1/1, v/v/v)，总气量 1.0 mL min^{-1} 时，nia−d−FTZB 的穿透曲线

Figure 3. Experimental breakthrough curves for nia-d-TZB at total gas flow of 1.0 mL min^{-1} of (a) C_2H_2/C_2H_4 (50/50, v/v) and $C_2H_6/C_2H_4/C_2H_2$ (1/1/1, v/v/v), (b) C_2H_6/C_2H_4 (50/50, v/v) and (c) C_2H_6/C_2H_4 (10/90, v/v) at 298 K and 1 bar; Experimental breakthrough curves for nia-d-FTZB at total gas flow of 1.0 mL min^{-1} of (d) C_2H_2/C_2H_4 (50/50, v/v), (e) C_2H_6/C_2H_4 (50/50, v/v) and (f) $C_2H_6/C_2H_4/C_2H_2$ (1/1/1, v/v/v) at 298 K and 1 bar.

2,029 m^2 g^{-1} and 0.85 cm^3 g^{-1} for nia-d-TZB, and 1,987 m^2 g^{-1} and 0.78 cm^3 g^{-1} for nia-d-FTZB, respectively.

Single-component C_2-hydrocarbon isotherms reveal that both frameworks consistently take up more C_2H_2 and C_2H_6 than C_2H_4 For nia-d-TZB, the guest-host interaction hierarchy is $C_2H_6 > C_2H_2 > C_2H_4$, whereas nia-d-FTZB displays the highest uptake for C_2H_2, followed by C_2H_6 and then C_2H_4. Zero-coverage isosteric heats of adsorption (Qst) mirror these trends. Ideal adsorbed solution theory (IAST) calculations at 298 K and 1 bar give selectivities of 1.11 (nia-d-TZB) and 1.45 (nia-d-FTZB) for an equimolar C_2H_2/C_2H_4 mixture (50/50, v/v). Under identical conditions, the C_2H_6/C_2H_4 selectivity is 1.58 for nia-d-TZB and 1.41 for nia-d-FTZB (50/50 and 10/90, v/v). Dynamic breakthrough and GCMC studies of binary/ternary C_2 feeds confirm the two MOFs' exceptional one-step ethylene purification and reverse C_2H_6/ C_2H_4 separation.

In summary, the results establish a critical paradigm for the deliberate design of face-transitive MOFs that achieve advanced gas-separation performance, underscoring the potential of crystalline porous materials to contribute to energy savings and emission reductions.

First Author: Zhang Weihong, master's student, Shaanxi Normal University
Correspondence Author: Prof. Xue Dongxu, Shaanxi Normal University

Full Text Link: https://pubs.rsc.org/en/Content/ArticleLanding/2025/SC/D5SC06836C

analytical chemistry

pubs.acs.org/ac Article

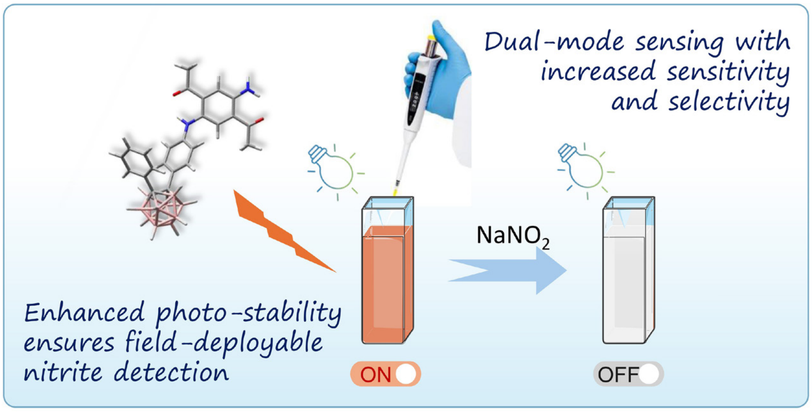
Photostable *o*-Carborane-DAPA Hybrids for On-Site Nitrite Screening: Dual-Mode Detection Achieving Sub-100 nM Sensitivity in Complex Food Matrices

Hexi Wei, Yangtao Shao, Xubin Wang, Yan Luo, Mengyu Ji, Ruijuan Wen, Rongrong Huang,* Xiaogang Liu,* and Yu Fang*

Cite This: https://doi.org/10.1021/acs.analchem.5c05140 **Read Online**

用于现场亚硝酸盐检测的光稳定性邻碳硼烷–DAPA 杂合体系：双模式检测在复杂食品基质中实现低于 100 nM 的灵敏度

Hexi Wei, Yangtao Shao, Xubin Wang, Yan Luo, Mengyu Ji, Ruijuan Wen, Rongrong Huang*, Xiaogang Liu*, Yu Fang*. Anal. Chem. 2025, DOI: 10.1021/acs.analchem.5c05140



亚硝酸盐作为一种广泛使用的食品防腐剂和工业添加剂，其对于食品安全和防腐的益处早已为人所知。然而，世界卫生组织（WHO）报告指出，亚硝酸盐的过量积累会带来严重的健康风险，包括致癌和毒性效应。这凸显了对可靠、高效的检测方法以监控亚硝酸盐水平、保障公众健康的迫切需求。

在本研究中，我们开发了一种基于邻碳硼烷的荧光探针 DAPA–1CB，该分子通过将邻碳硼烷单元整合到 DAPA 骨架中进行战略设计。与参比化合物 DAPA–2CB 相比，DAPA–1CB 在保留特异性氨基识别位点的同时，通过邻碳硼烷修饰显著提升了光稳定性并增大了斯托克斯位移，这对实现有效可靠的荧光检测至关重要。研究结果表明 DAPA–1CB 对亚硝酸根的检测表现出卓越的灵敏度和选择性，其在荧光模式下的检测限达 85 nM，比色模式下达 34 nM。该探针能有效区分亚硝酸根与其他潜在干扰物，并已成功应用于泡菜、培根和熏鱼等食品样品的检测，其高回收率证实了在食品安全监测中的实际适用性。

第一作者：陕西师范大学博士研究生韦何曦
通讯作者：新加坡科技设计大学博士后黄蓉蓉、南洋理工大学刘晓刚副教授、陕西师范大学房喻教授

全文链接：https://doi.org/10.1021/acs.analchem.5c05140

Nitrite, a widely used food preservative and industrial additive, has long been associated with its benefits in food safety and preservation. However, the World Health Organization (WHO) has reported that excessive accumulation of nitrite poses serious health risks, including carcinogenic and toxic effects. This underscores the urgent need for

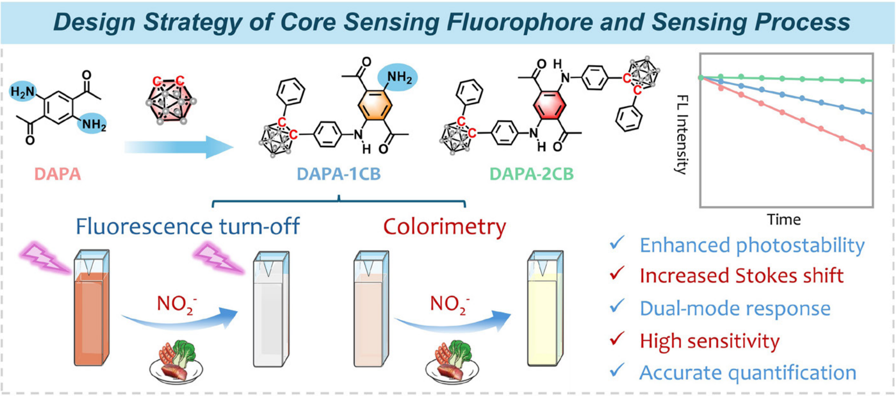


图 1. 传感荧光团 DAPA-1CB 的设计策略及其对亚硝酸盐传感性能示意图
Figure 1. Schematic illustration for the design strategy of the sensing fluorophore DAPA-1CB and its sensing performance towards nitrite.

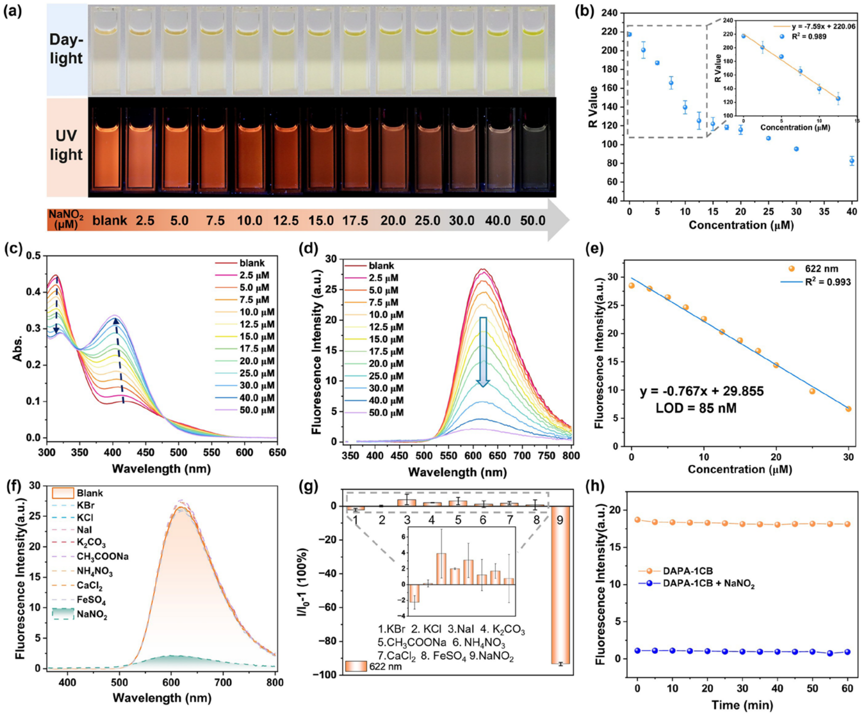


图 2.DAPA-1CB 的亚硝酸盐传感性能
Figure 2. Sensing performance for the detection of nitrite.

reliable and efficient detection methods to monitor nitrite levels and safeguard public health.

In this study, we reported the development of an o-carborane-based fluorophore, DAPA-1CB, which was strategically designed by integrating o-carborane units into a DAPA (diaminophenylalanine) skeleton. Compared to the reference compound DAPA-2CB, the specific functional group (-NH2) was maintained in DAPA-1CB for specific interactions with nitrite. The modification with the o-carborane unit not only enhances photostability but also significantly increases the Stokes shift of the compounds, which is critical for effective and reliable fluorescence detection. Our results demonstrate that DAPA-1CB exhibits exceptional sensitivity and selectivity for nitrite detection, with detection limits as low as 85 nM in fluorescence mode and 34 nM in colorimetric mode. Furthermore, DAPA-1CB successfully distinguishes nitrite from other potential interferences, making it a promising candidate for real-world applications. Notably, this probe has been successfully applied to detect nitrite in food samples, such as pickles, bacon, and smoked fish, with high recovery rates, confirming its practical applicability in food safety monitoring.

First Author: Wei Hexi, doctoral candidate, Shaanxi Normal University
Correspondence Authors: Postdoc Researcher Huang Rongrong, Singapore University of Technology and Design; Assoc. Prof. Liu Xiaogang, Nanyang Technological University; Prof. Fang Yu, Shaanxi Normal University

Full Text Link: https://doi.org/10.1021/acs.analchem.5c05140

Chemical Science

ROYAL SOCIETY OF CHEMISTRY

EDGE ARTICLE

View Article Online
View Journal

Check for updates

Cite this: DOI: 10.1039/d5sc06627a

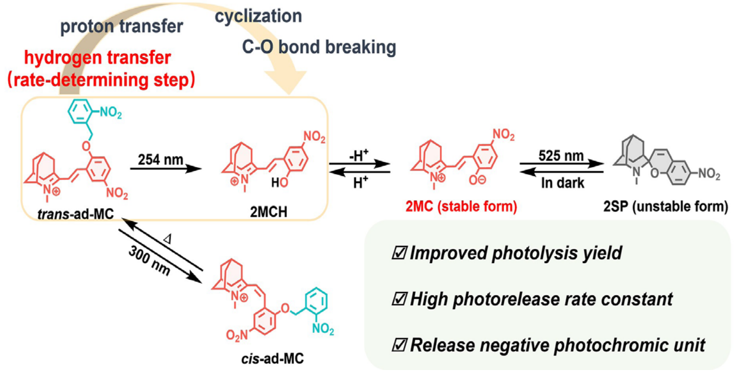
All publication charges for this article have been paid for by the Royal Society of Chemistry

Tuning the photocaged spiropyran photoswitch with a sterically hindered adamantane group: releasing the stable merocyanine

Yifan Su,†[a] Xiang Li,†[b] Dexin Zheng,†[a] Joakim Andreásson,[c] Hong Wang,[b] Le Yu,*[d] Jian Chen,*[b] Jiani Ma*[a] and Yu Fang[a]

用空间受阻金刚烷基团调谐光笼螺吡喃光开关：释放稳定的花青素

Yifan Su,† Xiang Li,† Dexin Zheng,† Joakim Andreásson, Hong Wang, Le Yu,* Jian Chen,* Jiani Ma,* and Yu Fang. Chem. Sci., 2025, DOI: 10.1039/d5sc06627a



光笼分子和分子光开关是两类重要的有机光功能分子。光笼是指将活性基团通过化学键“掩蔽”于光敏基团，在特定波长光照下实现定时定点靶向释放。分子光开关是指通过光照调控有机分子的不同形式，从而改变体系的颜色，实现“开－关”的响应模式。邻硝基苯是经典的光笼分子单元，螺吡喃 (SP) 是广受关注的分子光开关。在紫外光照射下，稳定的无色 SP 光异构化为有色花菁 (MC) 形式，在可见光或热反应条件下，MC 可逆转变为 SP。

在本工作中，我们巧妙地融合了光笼分子和分子光开关概念，将具有金刚烷的负光致变色单元 (2MC) 与邻硝基苯基结合，设计了一种新的多功能光笼－光开关分子，ad-MC。首次实现了对 MC 的有效光控释放。该分子的多态“开关密码”可被不同波长“触发”，实现了光脱笼和光开关的“灵活”应用。由于该分子的光化学反应涉及到：双键的顺反异构、光脱笼反应和 MC 和 SP 的光致变色过程，其机理研究颇具挑战。我们通过比较研究，利用飞秒瞬态吸收光谱和激发态理论计算解析了 ad-MC 的光化学反应机理。该工作为设计多功能有机光功能分子提供了新的思路。

近日，陕西师范大学马佳妮教授团队在《Chemical Science》上发表题为 "Tuning the photocaged spiropyran photoswitch with a sterically hindered adamantane group: releasing the stable merocyanine" 的研究论文。该研究设计了一种新型螺吡喃基光开关分子 ad–MC，首次实现了稳定荧光花菁染料 (2MC) 的光控释放，为化学生物学应用提供了新的工具。

稳态吸收光谱和 1H–NMR 分析表明：ad–MC 在 300 nm 光照下发生 trans → cis 异构化；在 254 nm 光照下，ad–MC 能够高效释放稳定的 MC，其光解产率达到 0.19，其在 525 nm 光照下转变为 SP。

飞秒瞬态吸收光谱结合理论计算揭示了 ad–MC 的光化学反应机制。研究表明，ad–MC 的光解笼反应通过连续的氢原子转移、质子转移、环化和 C–O 键断裂过程。

第一作者：陕西师范大学博士研究生苏怡帆、湖南科技大学硕士研究生李想、陕西师范大学硕士研究生郑德馨
通讯作者：陕西师范大学马佳妮教授、西北大学于乐副教授、湖南科技大学陈建教授
全文链接：https://pubs.rsc.org/en/content/articlelanding/2025/sc/d5sc06627a

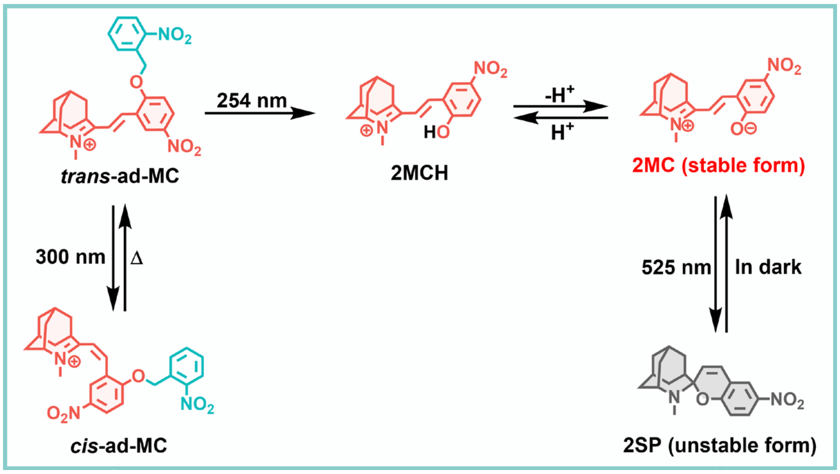


图 1. ad–MC 的光化学反应路径

Figure 1. The photochemical pathways of ad-MC.

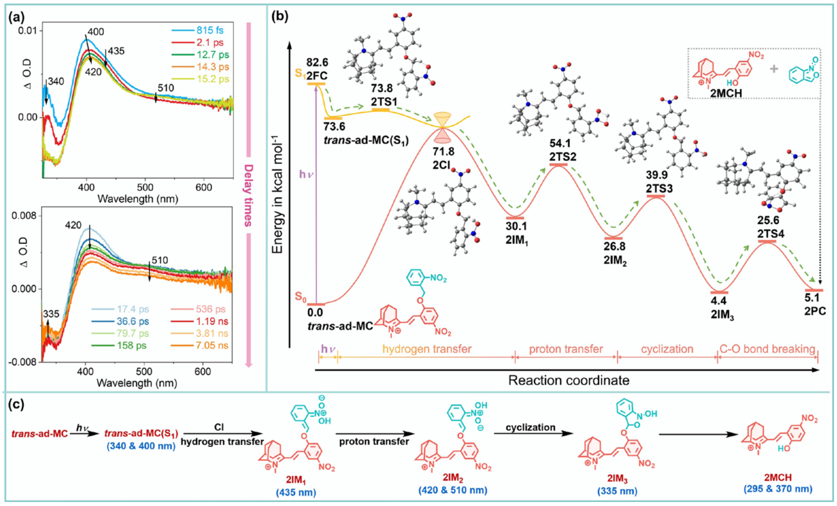


图 2. (a) ad–MC 在乙醇中的飞秒瞬态吸收（fs–TA）光谱（λex=266 nm）。(b) ad–MC 光化学反应势能面（PES），基于 PBE0/def2–TZVP 理论水平（EtOH）计算。(c) ad–MC 的光释放反应机理示意图。

Figure 2. (a) fs-TA spectra of ad-MC in EtOH (λex = 266 nm). (b) The PES of the photochemical reaction of ad-MC (PBE0/def2-TZVP (EtOH)). (c) Photorelease reaction mechanism of ad-MC.

Molecular photoswitches isomerize between two or more forms by exposure to light or by thermal processes, accompanied by color changes. Spiropyran (SP) derivatives are widely studied. The stable colorless SP form photoisomerizes to the colored merocyanine (MC) form by UV light, whereas the reverse reaction is triggered by visible light or in a thermal reaction. Based on our previously reported (J. Am. Chem. Soc., 2018, 140, 14069) photolabile o-nitrobenzyl caged merocyanine switch (denoted as in-MC) and a negative photochromic spiro[azahomoadamantane-pyran] (Anal. Bioanal. Chem., 2023, 415, 715), we have designed a novel multiphotochromic molecule, ad-MC, by combining an adamantane-containing negative photochromic unit (2MC) and o-nitrobenzyl. A wavelength dependent photorelease of the stable 2MC form is demonstrated for the first time. The detailed photochemical reaction mechanisms of ad-MC and in-MC were investigated using femtosecond transient absorption spectroscopy and DFT/TD-DFT calculations. The results show that the photochemical mechanisms are the same for both molecules, but the variation in excited state hydrogen transfer barriers' heights leads to the observed differences in photolysis yields and rates of decaging. The structure–reactivity relationships revealed for ad-MC and in-MC expand the diversity and functionality of SP-based photoswitches for promising utilization in chemical biology applications.

Steady-state absorption spectroscopy and ^{1}H-NMR analysis revealed that ad-MC undergoes trans→cis isomerization upon 300 nm irradiation. More significantly, under 254 nm light irradiation, ad-MC efficiently releases the stable fluorescent MC form (2MC), achieving a photolysis yield of 0.19—markedly higher than the 0.12 yield observed for in-MC.

Femtosecond transient absorption spectroscopy combined with theoretical calculations revealed the photochemical reaction mechanism of ad-MC. The study demonstrates that the photorelease reactions of both ad-MC and in-MC follow a similar multi-step mechanism, involving sequential hydrogen transfer, proton transfer, cyclization, and C–O bond cleavage processes.

First Authors: Su Yifan, doctoral candidate, Shaanxi Normal University; Li Xiang, master's student, Hunan University of Science and Technology; Zheng Dexin, Li Xiang, master's student, Shaanxi Normal University
Correspondence Authors: Prof. Ma Jiani, Shaanxi Normal University; Prof. Chen Jian, Hunan University of Science and Technology; Assoc. Prof. Yu Le, Northwest University
Full Text Link: https://pubs.rsc.org/en/content/articlelanding/2025/sc/d5sc06627a

Sensors & Actuators: B. Chemical 448 (2026) 138996

Contents lists available at ScienceDirect

Sensors and Actuators: B. Chemical

journal homepage: www.elsevier.com/locate/snb

Check for updates

A high-performance fluorescence BTEX sensor: Film device optimization and optical unit design

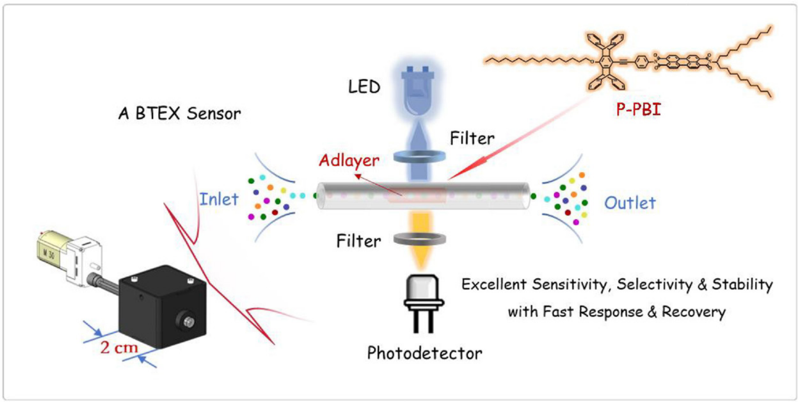
Zhouyu Chen, Leyi Tang, Jiancheng Zhou, Ruijuan Wen, Jianfei Ma, Chi Zhang, Helan Zhang, Zhi-Hao Zhao, Yanyan Luo*, Yu Fang*

Key Laboratory of Applied Surface and Colloid Interface of Ministry of Education, Shaanxi Provincial Key Laboratory of New Concept Sensors and Molecular Materials, School of Chemistry and Chemical Engineering, Shaanxi Normal University, Xi'an 710119, PR China

高性能荧光式 BTEX 传感器：薄膜器件优化与光学单元设计

Zhouyu Chen, Leyi Tang, Jiancheng Zhou, Ruijuan Wen, Jianfei Ma, Chi Zhang, Helan Zhang, Zhi-Hao Zhao, Yanyan Luo*, Yu Fang*.

Sens. Actuators B Chem. 2026, DOI: 10.1016/j.snb.2025.138996



TEX（苯、甲苯、乙苯和二甲苯）作为环境中普遍存在的高挥发性污染物，因其具有急性毒性，长期接触可能引发白血病及神经系统疾病等严重健康问题，发展高灵敏的现场实时监测技术显得尤为迫切。然而，现有检测方法难以在 ppb 级检测灵敏度、快速响应与长期稳定性之间实现良好平衡。

在本研究中，我们利用高荧光性苝二酰亚胺衍生物（P–PBI）作为传感材料，通过对薄膜器件结构及光学单元的系统优化，有效克服了传感膜均匀性、传质效率与信噪比等关键技术瓶颈，研制出高性能薄膜荧光传感器。该传感器对 BTEX 系列组分具备超高检测灵敏度（苯检测限达 8.6 ppb，邻二甲苯达 1.2 ppb），响应时间低于 4 秒，恢复时间不超过 10 秒。在长达八个月的稳定性测试与 1000 次疲劳循环中表现优异，其综合性能超越传统气相色谱–火焰离子化检测器 (GC–FID) 及便携式光离子化检测器(PID)。在加油站、胶粘剂车间等实际场景中的成功验证，进一步表明该传感器在复杂环境下具备卓越的可靠性，为 BTEX 的现场快速监测提供了有效的技术解决方案。

第一作者：陕西师范大学硕士研究生陈周玉
通讯作者：陕西师范大学房喻院士、研发工程师罗艳彦
全文链接：https://www.sciencedirect.com/science/article/pii/S0925400525017721

BTEX (benzene, toluene, ethylbenzene, and xylenes) are common volatile pollutants in the environment that pose significant health risks due to their acute toxicity. Long-term exposure to these compounds can lead to severe health issues, including leukemia and neurological disorders. Therefore, there is an urgent need to develop highly sensitive on-site real-time monitoring technologies. However, existing detection methods often struggle to balance sensitivity at the parts per billion (ppb) level, rapid response time, and long-term stability.

In this study, we used a highly fluorescent perylene bisimide derivative (P-PBI) as our sensing material. By systematically optimizing the thin-film device structure and optical unit, we successfully addressed several key technical challenges, including the uniformity of the sensing film, mass transfer efficiency, and signal-to-noise ratio. As a result, we developed a high-performance thin-film fluorescent sensor. This sensor exhibits ultra-high sensitivity for BTEX components, achieving a detection limit of 8.6 ppb for benzene and 1.2 ppb for o-xylene. It has a response time of under 4 seconds and a recovery time of within 10 seconds. The sensor demonstrated excellent performance over an eight-month stability test and sustained 1000 fatigue cycles, outperforming traditional gas chromatography-flame ionization detectors (GC-FID) and portable photoionization detectors (PID). Successful validation of the sensor in real-world scenarios, such as gas stations and adhesive workshops, further confirms its exceptional reliability in complex environments, providing an effective solution for rapid on-site BTEX monitoring.

First Author: Chen Zhouyu, master’s student, Shaanxi Normal University
Correspondence Authors: Prof. Fang Yu, R&D Engineer Luo Yanyan, Shaanxi Normal University
Full Text Link: https://www.sciencedirect.com/science/article/pii/S0925400525017721

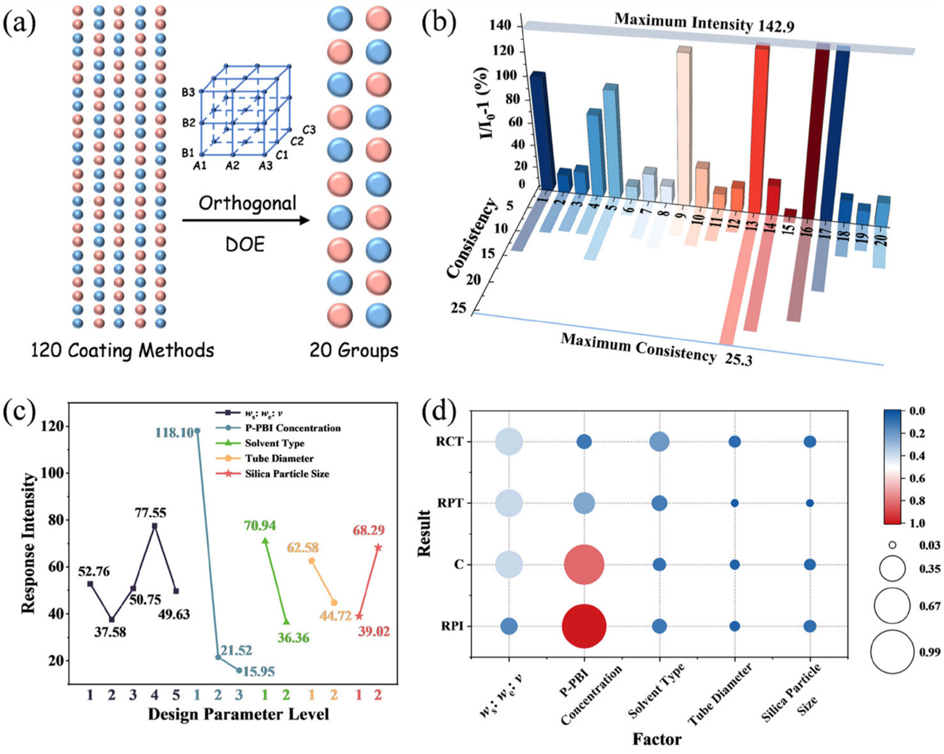


图 1. 薄膜器件优化
Figure 1. Film device optimization

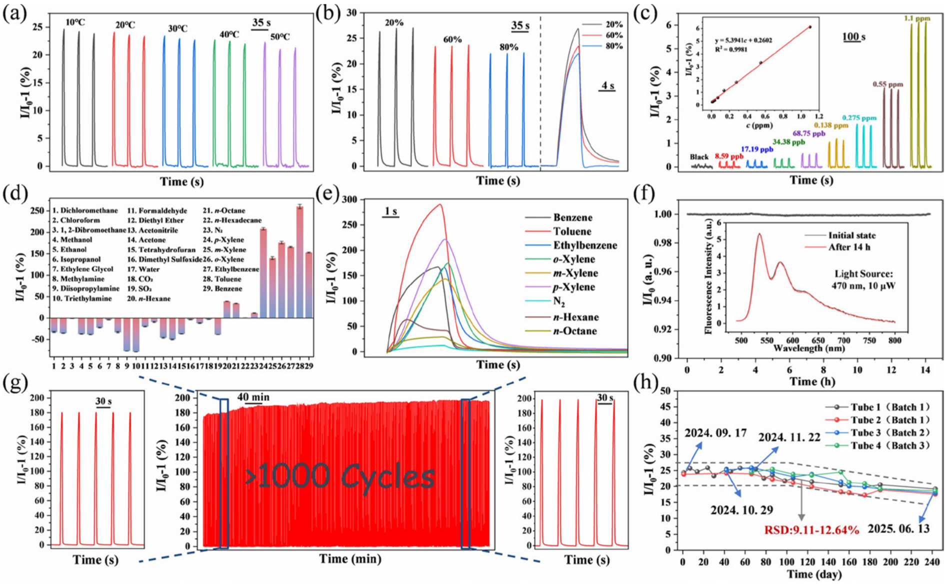


图 2. BTEX 传感器的气相传感性能
Figure 2. Sensing performance of the BTEX sensor

Angewandte Chemie International Edition
GDCh A Journal of the German Chemical Society

Communication | Full Access

Achieving Charge-Transfer from the Boron-Vertices of *o*-Carborane: Dual-Emission with a Shift of 505 nm (2.1 eV)

Xiaoyang Xu, Xueyuan Zhao, Shuang Xu, Xinning Zhang, Qihao Wang, Lin Wu, Xin Li, Junqing Shi, Prof. Jiani Ma ✉, Prof. Lei Ji ✉, Prof. Wei Huang ✉

First published: 30 October 2025 | https://doi.org/10.1002/anie.202521735

邻碳硼烷硼顶点实现电荷转移：双发射位移 505 nm (2.1 eV)

Xiaoyang Xu+, Xueyuan Zhao+, Shuang Xu, Xinning Zhang, Qihao Wang, Lin Wu, Xin Li, Junqing Shi, Jiani Ma,* Lei Ji,* and Wei Huang*. Angew. Chem. Int. Ed. 2025, e21735. DOI: https://doi.org/10.1002/anie.202521735

2017 年，Chujo 及其同事报道了碳位取代邻碳硼烷表现出强烈的电荷转移（CT）发射。过去的几十年，几乎所有关于碳硼烷发光的研究都聚焦于碳顶点。人们认为硼顶点在电子共轭中是‘惰性’的，无法有效参与电荷转移过程。如何“激活”沉默的硼顶点，让其参与到光电子的“舞蹈”中来，成为该领域一个悬而未决的挑战。

近日，西北工业大学黄维院士团队纪雷教授课题组与陕西师范大学马佳妮课题组合作，首次发现并验证了邻碳硼烷硼顶点相关的电荷转移发光，并在国际化学顶级期刊《德国应用化学》（Angew. Chem. Int. Ed）上发表题为“Achieving Charge–Transfer from the Boron–Vertices of o–Carborane: Dual–Emission with a Shift over 505 nm (2.1 eV)”的论文。研究团队设计并合成了三个新型的 9,12– 取代邻位碳硼烷分子（1, 2a, 2b）。其设计精髓在于：在硼顶点安装强电子给体的同时，在碳顶点引入苯基。这两个苯基就像是天线，当芳基连接在碳顶点时，会降

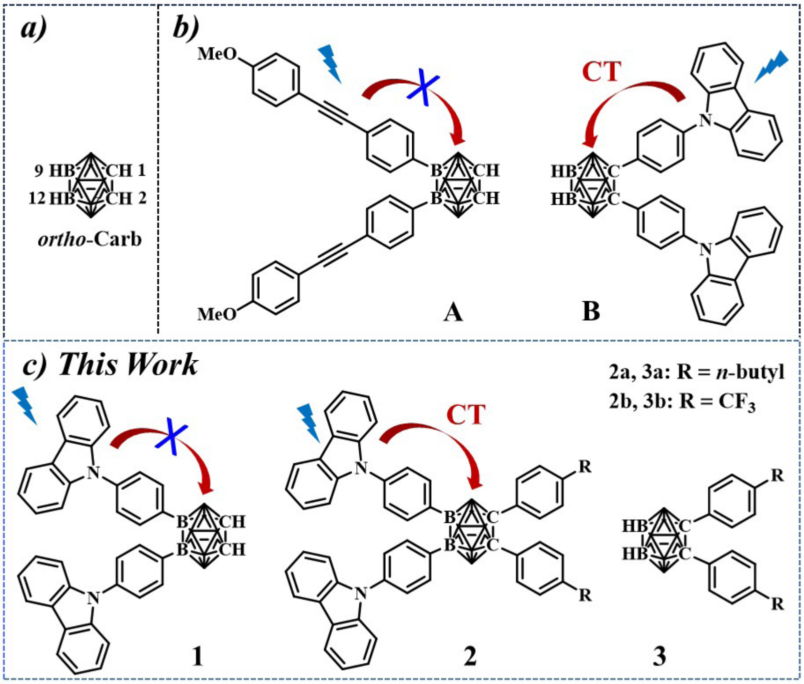


图 1.（a）邻碳硼烷的化学结构及本文讨论的关键位置编号；碳硼烷中化学键的交叉点表示 BH 顶点；（b）9,12– 取代邻碳硼烷和 1,2– 取代邻碳硼烷的结构；（c）本文报道的化合物，红色箭头表示允许或不允许的电荷转移途径。

Figure 1. (a) Chemical structures of o-carborane and numbering of the key positions discussed in this paper; the cross point of bonds in carborane represents BH vertex; (b) structures of 9,12-substituted o-carborane and 1,2-substituted o-carborane; (c) compounds reported in this paper. The red arrow indicates the allowed or not allowed charge transfer pathway.

低该轨道的能量，从而增强碳硼烷C–C反键的接受电子能力，激活从硼端取代基到碳端的电荷转移。系统的光物理研究和理论计算表明，硼顶点功能化给体在光激发下可向邻碳硼烷笼进行了有效电荷转移，并且同时展现出局域激发（LE）和CT两个发射峰。

在正己烷等非极性溶剂中，化合物2a和2b表现出了罕见的双发射现象。化合物2b在甲苯溶液中的两个发射峰分别位于紫外区的345纳米和近红外区的850纳米，横跨了505纳米（能量差为2.1 ev）的巨大区间，且两个峰都不在可见光区，是看不见的“黑色”双发射，为构筑特殊功能应用的黑色发光材料具有一定的指导意义。势能面（PES）扫描揭示了LE态与CT态之间存在巨大的能隙，这解释了为何在CT发射出现的同时，反卡莎（anti–Kasha）规则的LE发射得以保留。

该论文首次实现了从邻位碳硼烷硼顶点出发的高效电荷转移，并成功制备出具有巨大波长差（高达505纳米）的单分子双发射材料。从根本上拓展了碳硼烷基功能材料的设计范式，颠覆了长期以来以碳为中心的碳硼烷发光观点，揭示了一种激活硼顶点参与电子共轭的新策略，为开发基于邻碳硼烷的高性能双发射材料开辟了新途径。

第一作者：西北工业大学博士研究生徐晓阳、硕士研究生赵雪媛

通讯作者：西北工业大学黄维院士、纪雷教授，陕西师范大学马佳妮教授

全文链接：https://doi.org/10.1002/anie.202521735

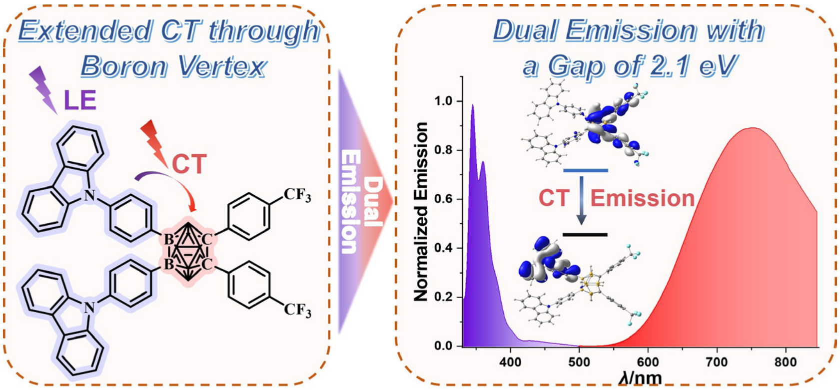


图2. 左图展示了化合物2b通过硼顶点实现的电荷转移过程；右图为化合物2b的双发射光谱。

Figure 2. The left figure shows the charge transfer process of compound 2b through boron vertices; The right figure shows the dual emission spectrum of compound 2b.

In 2017, Chujo and colleagues reported that carbon substituted ortho carboboranes exhibited strong charge transfer (CT) emission. In the past few decades, almost all research on the luminescence of carboranes has focused on carbon vertices. People believe that boron vertices are 'inert' in electron conjugation and cannot effectively participate in charge transfer processes. How to "activate" the silent boron vertices and involve them in the "dance" of optoelectronics has become an unresolved challenge in this field.

The research team proposed designed and synthesized three novel 9,12-substituted ortho carboborane molecules (1, 2a, 2b). The essence of its design lies in the installation of a strong electron donor at the boron vertex and the introduction of a phenyl group at the carbon vertex. These two phenyl groups are like antennas. When the aryl group is attached to the carbon vertex, it reduces the energy of the orbital, thereby enhancing the electron accepting ability of the C-C antibonding of the carborane and activating charge transfer from the boron end substituent to the carbon end. The photophysical research and theoretical calculations of the system indicate that boron vertex functionalized donors can effectively transfer charges to adjacent carborane cages under photoexcitation, and exhibit both localized excitation (LE) and CT emission peaks simultaneously.

In non-polar solvents such as n-hexane, compounds 2a and 2b exhibit rare double emission phenomena. The two emission peaks of compound 2b in toluene solution are located at 345 nanometers in the ultraviolet region and 850 nanometers in the near-infrared region, spanning a huge range of 505 nanometers (with an energy difference of 2.1 ev), and neither peak is in the visible light region. It is an invisible "black" dual emission, which has certain guiding significance for constructing black luminescent materials for special functional applications. The potential energy surface scan reveals a huge energy gap between the LE state and the CT state, which explains why the anti Kasha rule of LE emission is preserved while CT emission appears.

This paper achieves efficient charge transfer for the first time from the vertices of adjacent carboborane boron, and successfully prepares single-molecule dual emissive materials with a huge wavelength difference (up to 505 nm). Fundamentally expanding the design paradigm of carbon boron alkyl functional materials, overturning the long-standing carbon centered view of carbon borane luminescence, revealing a new strategy for activating boron vertices to participate in electron conjugation, and opening up new avenues for developing high-performance dual emission materials based on adjacent carbon boranes.

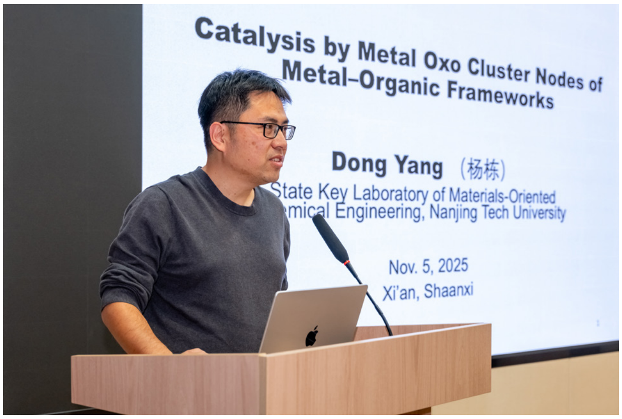
First Authors: Xu Xiaoyang, doctoral candidate, Zhao Xueyuan, master’s student, Northwestern Polytechnical University

Correspondence Authors: Academician Huang Wei, Prof. Ji Lei, Northwestern Polytechnical University; Prof. Ma Jiani, Shaanxi Normal University

Full Text Link: https://doi.org/10.1002/anie.202521735

南京工业大学杨栋教授应邀作报告

Prof. Yang Dong from Nanjing Tech University invited to give a report



2025 年 11 月 5 日下午，南京工业大学化工学院杨栋教授受邀访问陕西师范大学新概念传感器与分子材料研究院，并作题为“MOF 金属氧化物团簇节点的催化作用”的学术报告。

杨栋教授的研究探索金属有机框架（MOF）材料的稳定性、催化活性与其金属节点结构和配位环境之间的关联性。通过对锆基、铝基 MOF 的分析，发现表面羟基与甲酸根可有效表征金属位点反应性，甲醇脱水制二甲醚反应验证了其催化性能。节点羟基类型影响反应活性，甲酸根配位模式可区分孤立 / 成对节点。该研究明确了 MOF 活性位点的化学本质，为设计与优化多孔催化材料提供了重要依据。

报告会由边红涛教授课题组博士研究生马欣欢主持，薛东旭教授及 30 多名研究生参加了此次报告会。

On the afternoon of November 5, 2025, Prof. Yang Dong from the School of Chemical Engineering at Nanjing Tech University visited the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University, and presented a report titled “Catalysis by Metal Oxo Cluster Nodes of Metal-Organic Frameworks”.

Prof. Yang’s research explores the correlation between the stability and catalytic activity of metal-organic framework (MOF) materials and their metallic node structures and coordination environments. Analysis of zirconium-based and aluminum-based MOFs reveals that surface hydroxyl and formate groups effectively characterize metal site reactivity, with methanol dehydration to dimethyl ether reactions validating their catalytic performance. The type of node hydroxyl influences reaction activity, while the formate coordination pattern distinguishes isolated/paired nodes. This study clarifies the chemical nature of MOF active sites, providing crucial insights for designing and optimizing porous catalytic materials.

The report was chaired by Ma Xinhuan, a doctoral candidate in Prof. Bian Hongtao’s research group. Prof. Xue Dongxu and more than 30 graduate students attended the event.

芯派科技董事长罗义来访

SemipPower Technology chairman Luo Yi received

2025 年 11 月 5 日，芯派科技股份有限公司董事长、西北工业大学深圳校友会会长罗义，到访参观了陕西师范大学新概念传感器与分子材料研究院，并与房喻院士进行了会谈交流。陕西师范大学深圳校友分会会长李秉谦及校友工作办公室主任刘洪超陪同来访。

On November 5, 2025, Mr. Luo Yi, chairman of Semipower Technology Co., Ltd. and president of the Shenzhen Alumni Association of Northwestern Polytechnical University, visited the Institute of New Concept Sensors and Molecular Materials at Shaanxi Normal University, and held discussions with Prof. Fang Yu. He was accompanied by Mr. Li Bingqian, president of the Shenzhen Alumni Branch of Shaanxi Normal University, and Ms Liu Hongchao, director of SNNU Alumni Affairs Office during the visit.


圖書館