陕西师范大学 SHAANXI NORMAL UNIVERSITY

化学化工学院 School of Chemistry & Chemical Engineering

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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

目 录 Contents

安徽蚌埠市科技局率安徽祥源科技公司一行来访

Anhui Bengbu S&T Bureau and Anhui Xiangyuan Technology visitors received

2025 年 3 月 1 日，安徽省蚌埠市科技局党委委员、副局长闻建忠与安徽祥源科技股份有限公司、安徽祥源智联科技有限公司董事长许晓光高级工程师一行 5 人到访新概念传感器与分子材料研究院。

研究院对外联络与行政办公室主任杨小刚陪同闻建忠、许晓光一行参观了研究院展厅，介绍了研究院研究方向、科研成果及成果转移转化相关情况。随后，双方就化工园区风险感知、智能监管，研究院新概念阻燃材料使用场景及产业转化进行了座谈交流，并交换了合作意向。

研究院副院长丁立平教授、刘太宏副教授参加了座谈交流。

On March 1, 2025, Wen Jianzhong, member of the Party Committee and deputy director of the Science and Technology Bureau of Bengbu City, Anhui Province, and Xu Xiaoguang, senior engineer, chairman of Anhui Xiangyuan Technology Co. and Anhui Xiangyuan Zhilian Technology Co. and their three entourages visited the New Institute of New Concept Sensors and Molecular Materials.

Liaison and Administrative Office director Yang Xiaogang accompanied the guests visit the exhibition hall, and introduced the the Institute's research direction, the research achievements and the transfer and transformation of the achievements. Afterwards, the two sides had a discussion and exchanged ideas on the risk perception and intelligent supervision in chemical parks, the use of the new concept of flame retardant materials and industrial transformation, and exchanged cooperation intentions.

INCSMM vice dean Prof. Ding Liping and A/Prof. Liu Taihong participated in the meeting.

房喻院士出席第一届新港合成科学智汇论坛

Fang Yu attends First iHarbour Wisdom Convergence for Synthetic Science

2025 年 3 月 1 日，房喻院士应邀出席由西安交通大学前沿科学技术研究院主办的第一届新港合成科学智汇论坛，并主持大会报告。

On March 1, 2025, Prof. Fang Yu was invited to attend the First iHarbour Wisdom Convergence for Synthetic Science hosted by the Institute of Frontier Science and Technology, Xi'an Jiaotong University, and presided over the conference reports.

研究院杨小刚主任赴宝鸡市渭滨工业企业调研

Yang Xiaogang visits Baoji Weibin industrial enterprises

2025 年 3 月 5 日，新概念传感器与分子材料研究院对外联络与行政办公室杨小刚主任应邀随陕西师范大学和西安交通大学的专家团队走进宝鸡市渭滨区工业企业进行实地调研。

调研团队先后走访了 7107 超精密加工产业园、麦克传感器股份有限公司、陕西宝成航空仪表有限责任公司、陕西长美科技有限责任公司等多家包括电子信息、新材料、高端装备制造等领域的领军企业，了解企业在智能制造、技术研发等方面的现状和需求，并在座谈会上与企业代表就如何进一步深化合作、推动科技成果转化等议题进行了交流和探讨。

参加此次调研的还有陕西师范大学科学技术处副处长曹晓仪，及西安交通大学前沿科技与技术研究院和仪器科学与技术学院的专家。

On March 5, 2025, Yang Xiaogang, director of the External Liaison and Administrative Office of the Institute of New Concept Sensors and Molecular Materials, was invited to join a field research group with the experts team of Shaanxi Normal University and Xi'an Jiaotong University into the industrial enterprises in Weibin District of Baoji City.

The group visited the 7107 Ultra-precision Machining Industrial Park, MicroSensor Sensor Co. Ltd., Shaanxi Baocheng Aviation Instrument Co. Ltd., Shaanxi Changmei Technology Co. Ltd., and many other leading enterprises in the fields of electronic information, new materials, high-end equipment manufacturing, etc., to understand the current situation and needs of enterprises in intelligent manufacturing, and technology research and development. At the meeting after visits, they exchanged views and discussed with business representatives on how to further deepen cooperation and promote the transformation of scientific and technological achievements.

Also participating in the survey were Cao Xiaoyi, deputy director of the Science and Technology Department of Shaanxi Normal University, and experts from the Institute of Frontier Science and Technology and the School of Instrument Science and Technology of Xi'an Jiaotong University.

房喻院士出席陕西省科普作家协会常务理事会会议

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

2025 年 3 月 6 日上午，陕西省科普作家协会第七届常务理事会第三次会议在新概念传感器与分子材料研究院会议室举行，房喻院士作为理事长出席会议并讲话。

陕西省科学技术协会二级巡视员王晓利和陕西师范大学化学化工学院党委书记高玲香出席会议，协会副理事长、常务理事等 20 余人参加会议，并在会后参观了研究院展厅。会议审议了陕西省科普作协 2024 年工作报告，商议了 2025 年工作计划。

On March 6, 2025, the third meeting of the seventh Standing Council of Shaanxi Popular Science Writers Association was held in the conference room of the Institute of New Concept Sensors and Molecular Materials, and Prof. Fang Yu attended the meeting as the chairman and gave a speech.

Wang Xiaoli, second-level inspector of Shaanxi Science and Technology Association, Gao Lingxiang, secretary of Party Committee of School of Chemistry and Chemical Engineering, Shaanxi Normal University, and more than 20 vice chairmen and executive directors of the association, attended the meeting before visiting the exhibition room of the institute. The meeting reviewed the 2024 work report and discussed the 2025 work plan of the association.

刘凯强教授应邀赴河南科技学院作基金写作经验分享报告

Liu Kaiqiang shares grant proposal writing experience at Henan Institute of Science and Technology

2025 年 3 月 10 日上午，新概念传感器与分子材料研究院刘凯强教授应邀赴河南科技学院化学化工学院作“国家自然科学基金申报策略”报告。

刘凯强教授结合自己申报基金的经历和经验，针对大家申报过程中常遇到的问题，从科学研究与创新思想、立题构思、申请书撰写策略、走出误区等几方面作了经验分享报告，并对该院年轻教师的基金本子进行了“面对面、一对一”的指导，提出了针对性的意见和具体详实的修改建议。

On March 10, 2025, Prof. Liu Kaiqiang of the Institute of New Concept Sensors and Molecular Materials was invited to present a lecture on the “Application Strategy of National Natural Science Foundation of China” at the School of Chemistry and Chemical Engineering of Henan Institute of Science and Technology.

Prof. Liu Kaiqiang combined his own experiences in applying for the fund, in view of the problems often encountered in the process of application, from the aspects of scientific research and innovative ideas, the conception of the topic, application writing strategies, the common the misunderstanding and mistakes and so on, made an experience sharing report, and gave “face-to-face, one-on-one” guidance to the fund proposal of the young teachers of the school, putting forward targeted comments and specific and detailed modification suggestions for revision.

房喻院士赴西安市航天城第一中学作科普报告

Fang Yu presents science popularization report at Xi’an Aerospace City No. 1 High School

2025 年 3 月 12 日上午，房喻院士应邀赴西安市科学技术协会主办的“院士进校园”科普报告会西安市航天城第一中学主场活动并作题为“创新人才培养需要面向未来的教育和教学”的专题报告。

房喻院士以其个人学习和成长经历为切入点，从科学是未来、人才是主体、教育是基础等方面展开介绍。他强调，在 AI 赋能教育条件下，重塑教育的观念需要转变，教育的实现方式、教师的作用和教育的评价将会重塑，只有重视教育、重视基础科学、重视基础研究才能更好地贯彻新发展理念，构建新发展格局、推动可持续发展，实现中华民族伟大复兴。同时，他勉励同学们继承弘扬好、践行好科学家精神，把个人理想和国家重大需求相结合，勇当新兴领域与交叉领域的开拓者、关键科技领域的领跑者，抢占世界科技发展的制高点，为实现高水平科技自立自强作出更大贡献。

西安市科协党组书记、常务副主席耿占军，西安市教育局党委委员、副局长王纲，民进西安市委会专职副主委王小玲，西安国家民用航天产业基地党工委委员、管委会副主任蒋阳，西安市科协、航天基地有关部门领导参加了活动。

此次活动在西安市航天城第一中学设立主会场，在西安市航天城第二中学、西安市航天城第三初级中学、西安

雁南中学、西咸新区泾河新城第二学校和西安蓝田工业园高级中学分别设分会场，以“线上线下”相结合的方式，在科普西安抖音平台进行直播，同时在微信公众号、网站平台进行宣传推广，50 余万名师生参与了活动。

On March 12, 2025, Prof. Fang Yu was invited to present a special report titled “Innovative Talent Training Needs Future-oriented Education and Teaching” at Xi’an Aerospace City No. 1 High School, a home event of the “Academicians into Campus” Science Popularization Reports sponsored by Xi’an Association for Science and Technology.

Prof. Fang Yu took his personal learning and growth experience as an entry point, and started his report from the aspects that science is the future, talent is the focus, and education is the foundation. He emphasized that under the conditions of AI-enabled education, the concept of reshaping education needs to be changed in that the realization of education and the role of teachers and the evaluation of education will be reshaped, and only by attaching importance to education, basic science, and basic research can we better carry out the new development concept, build a new pattern of development, promote sustainable development, and realize the great rejuvenation of the Chinese nation. At the same time, he encouraged students to carry forward and practice the spirit of scientists, to combine their personal ideals with the major needs of the country, to be pioneers in emerging and cross-cutting fields, leaders in key scientific and technological fields, to seize the commanding heights of the world’s scientific and technological development, and to make greater contributions to the realization of high-level scientific and technological self-reliance and self-improvement.

Geng Zhanjun, secretary of XAST party group and executive vice chairman, Wang Gang, member of Xi’an Municipal Education Bureau party committee and deputy director, Wang Xiaoling, full-time vice-chairwoman of China Association for Promoting Democracy Xi’an Municipal Committee, Jiang Yang, member of the party working committee and deputy director of the management committee of Xi'an National Civil Aerospace Industrial Base, and other XAST and XNCAIB officials attended the event.

Apart from the main venue set up in Xi’an Aerospace City No.1 High School, the event also set up branch venues in Xi’an Aerospace City No.2 High School, Xi’an Aerospace City No.3 Junior High School, Xi’an Yannan Middle School, Xi’an Jinghe New City No.2 School and Xi’an Lantian Industrial Park Senior High School, and was broadcasted live on the Popular Science Xi’an Douyin account, as well as publicized and promoted on the WeChat public account and website platforms, with more than 500,000 teachers and students participating in the event.

房喻院士出席先进稀有金属材料及应用发展论坛暨西北有色金属研究院科技创新大会

Fang Yu attends Advanced Rare Metal Materials and Application Development Forum and Technological Innovation Conference of Northwest Nonferrous Metals Research Institute

2025 年 3 月 17 日，先进稀有金属材料及应用发展论坛暨西北有色金属研究院科技创新大会在西安开幕，房喻院士应邀出席开幕式活动。

本次论坛由中国有色金属学会、中国材料研究学会和西北有色金属研究院联合举办，邀请行业领域相关两院院士及高校院所和企业的专家、科技工作者参加，围绕稀有金属领域应用基础研究、工艺技术、产业应用的发展现状和趋势进行学术交流。

会前，陕西省委书记赵一德会见

出席活动的院士代表，省长赵刚参加会见并在开幕式上致辞。省委常委、西安市委书记方红卫，省委常委、省委秘书长王海鹏，省政协副主席杨冠军，河北省政协副主席张福成，西安市市长叶牛平，西北工业大学党委书记李言荣，省直有关部门负责同志参加活动。

On March 17, 2025, Prof. Fang Yu was invited to attend the opening ceremoney of the Advanced Rare Metal Materials and Application Development Forum and the Technological Innovation Conference of Northwest Nonferrous Metals Research Institute held in Xi'an.

The forum was jointly held by the Chinese Non-ferrous Metals Society, the Chinese Materials Research Society and the Northwest Non-ferrous Metals Research Institute, inviting academicians of Chinese Academy of Sciences and Chinese Academy of Engineering, experts and scientific and technological workers from universities, institutes and enterprises of the relevant industries to participate in the academic exchange on the development status and trend of basic research, process technology and industrial application in the field of rare metals.

Zhao Yide, secretary of the Shaanxi Provincial Party Committee, met with academician representatives attending the event, and Shaanxi Province governor Zhao Gang attended the meeting and addressed the opening ceremony. Fang Hongwei, member of the Standing Committee of the Provincial Party Committee and secretary of the Xi'an Municipal Party Committee, Wang Haipeng, member of the Standing Committee and secretary-general of the Provincial Party Committee, Yang Guanjun, vice chairman of the Shaanxi Provincial CPPCC, Zhang Fucheng, vice chairman of the Hebei Provincial CPPCC, Xi'an Mayor Ye Niuping, Northwestern Polytechnical University party secretary Li Yanrong, and officials from relevant departments of the province participated in the event.

房喻院士在西安市科协九届三次全委会上作工作报告

Fang Yu presents work report at third plenary meeting of XSTA Ninth Committee

2025 年 3 月 19 日，西安市科学技术协会第九届委员会第三次全委会在西安召开，市科协主席、中国科学院院士房喻代表常委会作工作报告，总结回顾市科协 2024 年工作，分析当前形势和存在问题，安排部署 2025 年重点工作。

市科协党组书记、常务副主席耿占军主持会议。市科协九届委员会委员参加会议，市级学会理事长、秘书长，高校科协主席、秘书长，部分企业科协负责人，各区县科协主要负责人，市科协机关各部门、各直属单位主要负责人等列席会议。

全委会前，房喻院士还主持了市科协九届二次常委会，会议审议通过了《西安市科协九届二次常委会工作报告》。

On March 19, 2025, Prof. Fang Yu, chairman of the Xi'an Science and Technology Association presented a work report at the third plenary meeting of the XSTA's Ninth Committee held in Xi'an on behalf of its Standing Committee, in which he summarized and reviewed XSTA's work in 2024, analyzed the current situation and existing problems, and planned and arranged the key work in 2025.

XSTA Party Group secretary, executive vice chairman Geng Zhanjun presided over the meeting. Members of the XSTA Ninth Committee, the director general and secretary general of the municipal association, the university science and technology associations, the heads of enterprises science and technology associations, district and county science and technology associations, and XSTA departments and units attended the meeting.

Before the plenary meeting, Fang Yu also presided over the second meeting of the Standing Committee of the Ninth Session of XSTA's Ninth Committee, which reviewed and passed the Report on the Work of the Second Standing Committee of the Ninth Committee of the Xi'an Science and Technology Association.

彭浩南教授受邀为西北核技术研究院人工智能学习班授课

Peng Haonan presents AI class for Northwest Institute of Nuclear Technology

2025 年 3 月 20 日，新概念传感器与分子材料研究院彭浩南教授受邀赴西北核技术研究院，为人工智能学习班作题为《人工智能赋能科研创新》的专题报告。

彭浩南教授指出人工智能正推动科研范式变革，通过智能数据中台可提高数据分析效率、优化科研决策，借助生成式 AI 开拓创新维度；分享了其团队在人工智能科研平台构建中的举措及相关成果，并提出“可信 AI 科研”四准则，强调了数据安全与伦理的重要性。

彭浩南教授还与学习班科研骨干就 AI 议题展开交流，并建议科研人员构建“专业 + 算法”的双能力模型。西北核研院表示将与传感器研究院加强合作，加速推进科研智能化转型。

On March 20, 2025, Prof. Peng Haonan of the Institute of New Concept Sensors and Molecular Materials was invited to the Northwest Institute of Nuclear Technology to give a presentation titled “Artificial Intelligence Enabling Scientific Research Innovation” for its Artificial Intelligence Study Class.

Prof. Peng argued that AI is driving the paradigm change of scientific research, and the intelligent data center can improve the efficiency of data analysis, optimize research decision-making, and open up the dimension of innovation through generative AI. He also shared his team’s initiatives and results in the construction of AI research platforms, and put forward the four guidelines of “Trustworthy AI Research”, emphasizing the importance of data security and ethics.

Prof. Peng exchanged views on AI issues with the researchers of the class and suggested that they build a dual-competency model of “specialty + algorithm”. NWINT has expressed its intent to strengthen cooperation with INCSMM to accelerate the intelligent transformation of research.

《中小学科学教育》刊发房喻院士谈人工智能与科学教育和人才培养的文章

Fang Yu’s article on AI, science education and talent cultivation published in “Science Education for Primary and Secondary Schools”

近日，《中小学科学教育》2025 年第 2 期“人工智能时代的科学教育与人才培养”专刊刊发房喻院士的文章《人工智能时代：从基础研究的重要性看科学教育与人才培养》。

文章分为四个部分，首先指出人类文明面临重大挑战，人工智能等新技术成为应对危机的关键力量；其次强调面对第四次工业革命，科研和教育范式亟待变革以适应新需求；第三部分着重阐述加强基础研究和基础学科人才培养是国家强大和民族复兴的根本；最后指出中小学科学教育在培养创新人才中的重要性，并呼吁社会各界重视基础研究的作用。

本期专刊旨在探讨人工智能如何赋能科学教育，挖掘人工智能在培养学生创新思维与实践能力等方面的潜力，为培养适应未来社会发展的创新人才提供思路与方法。专刊重磅推出杨玉良、房喻、徐宗本三位院士的引领性思考，同时有来自北京大学、中国科学院国家天文台等机构的研究者以及中国人民大学附属中学等中小学校的实践者，分享人工智能赋能科学教育的理论研究和实践探索，共同推动科学教育在人工智能时代的创新发展。

微信公众号链接：

https://mp.weixin.qq.com/s/S6TTdPnrFDuDT_xdEn3RVQ

Recently, Prof. Fang Yu’s article “The Era of Artificial Intelligence: Science Education and Talent Cultivation from the Importance of Basic Research” was published in the special issue of “Science Education and Talent Cultivation in the Age of Artificial Intelligence” in the Science Education for Primary and Secondary Schools, No. 2, 2025.

The article is divided into four parts: First, it points out that human civilization is facing major challenges, and new technologies such as artificial intelligence have become a key force to cope with the crisis. In the face of the fourth Industrial revolution, the paradigms of scientific research and education need to be changed to meet the new needs. The third part focuses on the strengthening of basic

research and basic discipline personnel training is the foundation of national strength and national rejuvenation; Finally, it highlights the importance of science education in primary and secondary schools in cultivating innovative talents, and appeals to all sectors of society to pay attention to the role of basic research.

The purpose of this special issue is to explore how artificial intelligence can empower science education, tap the potential of artificial intelligence in cultivating students' innovative thinking and practical ability, and provide ideas and methods for training innovative talents to adapt to future social development. The special issue presents the thinking of three academicians Yang Yuliang, Fang Yu, and Xu Zongben, while researchers from Peking University, the National Astronomical Observatories of the Chinese Academy of Sciences and practitioners from primary and secondary schools such as the affiliated high school of Renmin University of China shared the theoretical research and practical exploration of AI enabling science education, in an effort to jointly promote the innovative development of science education in the era of artificial intelligence.

WeChat Article Link:
https://mp.weixin.qq.com/s/S6TTdPnrFDuDT_xdEn3RVQ

科学教育大家谈 | 房喻院士：人工智能时代：从基础研究的重要性看科学教育与人才培养

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编者按 人工智能时代的科学教育与人才培养专刊

人工智能无疑已经成为近年来的第一科技热词。无论是2024年诺贝尔物理学奖、化学奖均授予人工智能领域的科学家，还是近日国产人工智能产品DeepSeek的异军突起，人工智能已经深度融入科学和社会各领域，深刻改变着我们的学习与工作方式。在此背景下，科学教育迎来新的挑战与机遇。

《中小学科学教育》2025年第2期特推出"**人工智能时代的科学教育与人才培养**"专刊。本期专刊旨在探讨人工智能如何赋能科学教育，挖掘人工智能在培养学生创新思维与实践能力等方面的潜力，为培养适应未来社会发展的创新人才提供思路与方法。专刊重磅推出**杨玉良、房喻、徐宗本三位院士**的引领性思考，同时有来自北京大学、中国科学院国家天文台等机构的研究者以及中国人民大学附属中学等中小学校的实践者，分享人工智能赋能科学教育的理论研究和实践探索，共同推动科学教育在人工智能时代的创新发展。

房喻，中国科学院院士，陕西师范大学化学化工学院教授，陕西师范大学原校长。

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Miniaturized Separation-Sensing Tandem Enabled by Fluorescent Monoliths

Jie Wang, Ruijuan Wen, Jinglin Kong, Jing Liu, Zhongshan Liu ✉, Yu Fang ✉

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荧光整体材料实现微型分离传感一体化

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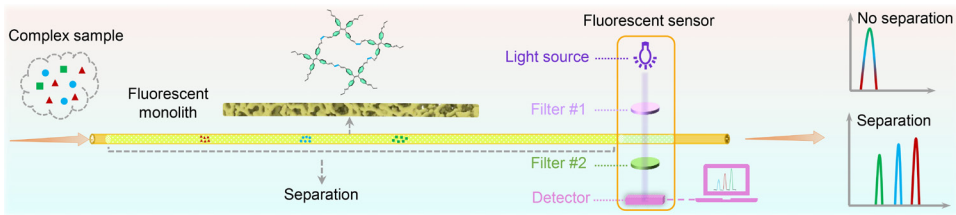

具有高灵敏度的便携式荧光传感器已被广泛用于环境分析、肉类新鲜度评估、非法药物、化学战剂和爆炸物的检测。但在实际场景中，由于众多的干扰因素，经常会遇到性能下降的问题。随着对混合物传感技术的需求不断增加，两种策略（主成分分析（PCA）和传感阵列）已被开发用于快速定性分析。但这两种方法都高度依赖于原始数据，这些数据容易受到样本多样性和环境因素（如湿度、干扰性）的影响。事实上，传感阵列和主成分分析方法都很难进行定量分析。迄今为止，通过荧光传感器或其他传感器对混合物的区分传感仍然是一个挑战，这个问题的根本在于传感器前端分离单元的缺失，我们设想将分离单元与传感器结合起来可能为混合物的传感提供一个新的平台（图 1）。

在此，本研究利用动态共价化学制备了一种新型的传感介质，即多孔荧光整体材料（图 2）。荧光整体材料采用具有聚集诱导发射特性（AIE）

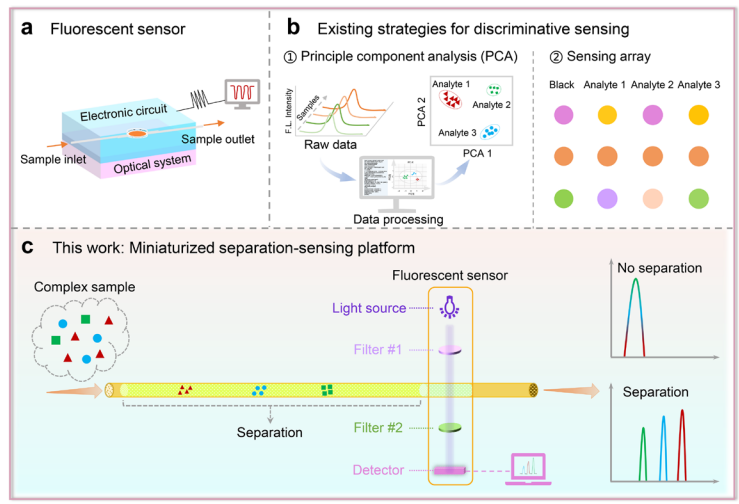

图 1.a) 荧光传感器；b) 现有的区分传感策略；c) 微型化的分离传感平台。
Figure 1. a) Illustration for fluorescent sensor. b) Existing strategies used for discriminative sensing. c) Miniaturized separation-sensing platform.

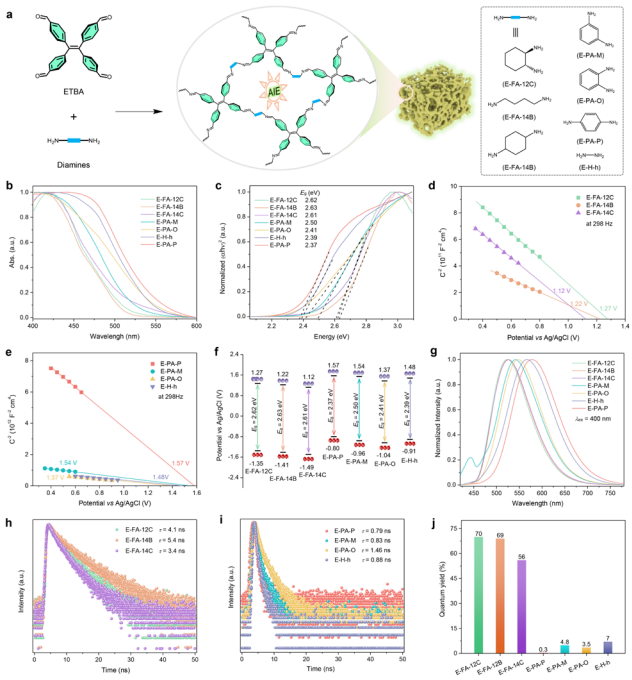

图 2. 荧光整体材料的合成及光物理性质。

Figure 2. Synthesis and photophysical property of fluorescent monoliths. a) Chemical structures. b) Diffuse reflectance UV-vis absorption spectra. c) Tauc plots. d and e) Mott-Schottky plots at 298 Hz. f) Distribution of valence band and conduction band. g) Fluorescence emission spectra. h and i) Fluorescence lifetime analysis. j) Quantum yield.

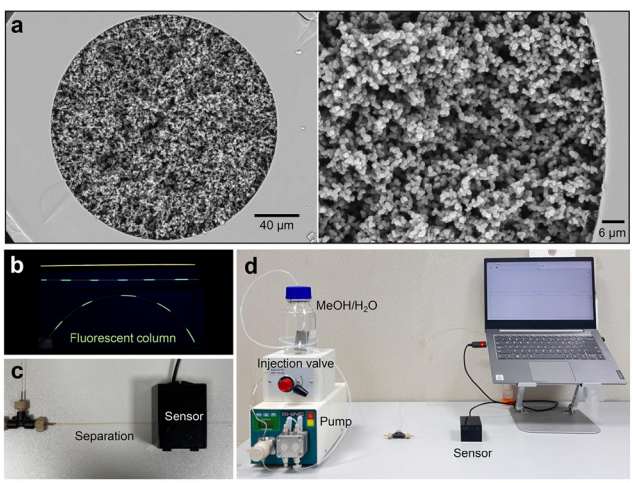

图 3.E−FA−12C 荧光柱的 a) 扫描电镜图像；b) 日光和紫外光下荧光整体柱的照片；c) 具有分离和传感能力的整体柱；d) 自制的分离传感平台。

Figure 3. a) SEM images of E-FA-12C fluorescent column. b) Photos of column under day light and UV light. c) Column with separation and sensing capacities. d) Home-made separation-sensing platform.

的四醛基四苯乙烯（ETBA）和二胺类单体来制备。它们的孔隙率和光物理性质可以由脂肪胺、芳香胺和水合肼等二胺连接臂来调节。为了实现分离与传感串联平台，我们通过原位聚合在毛细管柱中制备了荧光整体柱（图 3a）。荧光整体柱具有均匀的通孔结构，这赋予整体柱良好的渗透性和分离能力。通过刮掉不透明的聚酰亚胺涂层构建了一个荧光传感窗口，然后集成到管状层压光学传感器中（图 3b, c）。

利用荧光整体材料的分离和传感能力，自主搭建了一个死体积可忽略的微型分离传感一体化平台（图 3d）。实现了甲醇中微量水、沙林模拟剂、全氟烷基化合物和金属离子的定量分析。分离传感平台还实现了苯、甲苯、乙苯和二甲苯的分离检测，检测限低至 86、54、19 和 58 ng（图 4）。

这项研究是首次使用荧光整体材料来实现分离 – 传感串联。该工作不仅为新型传感介质的制备提供了新思路，还为生产便携式设备提供了良好的基础，使现场环境分析、食品安全监测和药物检测等实际应用成为可能。

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Fluorescent sensor with high sensitivity has been adapted into portable devices for environment analysis, meat freshness assessment, illicit drug, warfare agent and explosive detections. However, it often encounters performance degradation due to interferents in real scenarios. With increasing requirements for mixture sensing, two strategies, exemplified by the principal component analysis (PCA) and sensing array, have been developed for rapid qualitative analysis. Both methods are highly dependent on the raw data, which are susceptible to sample diversity and environmental factors (e.g., humidity, interferent). Indeed, the sensing array and PCA methods are difficult for quantitative analysis. To date, discriminative sensing for mixture by either fluorescent sensor or other sensors remains a challenge. This issue is attributed to the absence of a separation unit prior to the sensor. we assume that incorporating the separation unit with sensors may provide a new platform for mixture sensing (Figure 1).

Here, we utilize dynamic covalent chemistry to produce a new sensing medium, named porous fluorescent monolith (Figure 2), which can separate mixture and meanwhile be integrated into a sensor for discriminative detection. Fluorescent monoliths are prepared by using 4,4′,4″,4‴-(ethene-1,1,2,2-tetrayl)tetrabenzaldehyde (ETBA) and diamines as monomers. Their porosity and photophysical property can be modulated by the diamine linkers including fatty amines, aromatic amines and hydrazine hydrate. Considering that the separation and sensing will benefit from good mass transfer, we constructed a through-porous structure in fluorescent

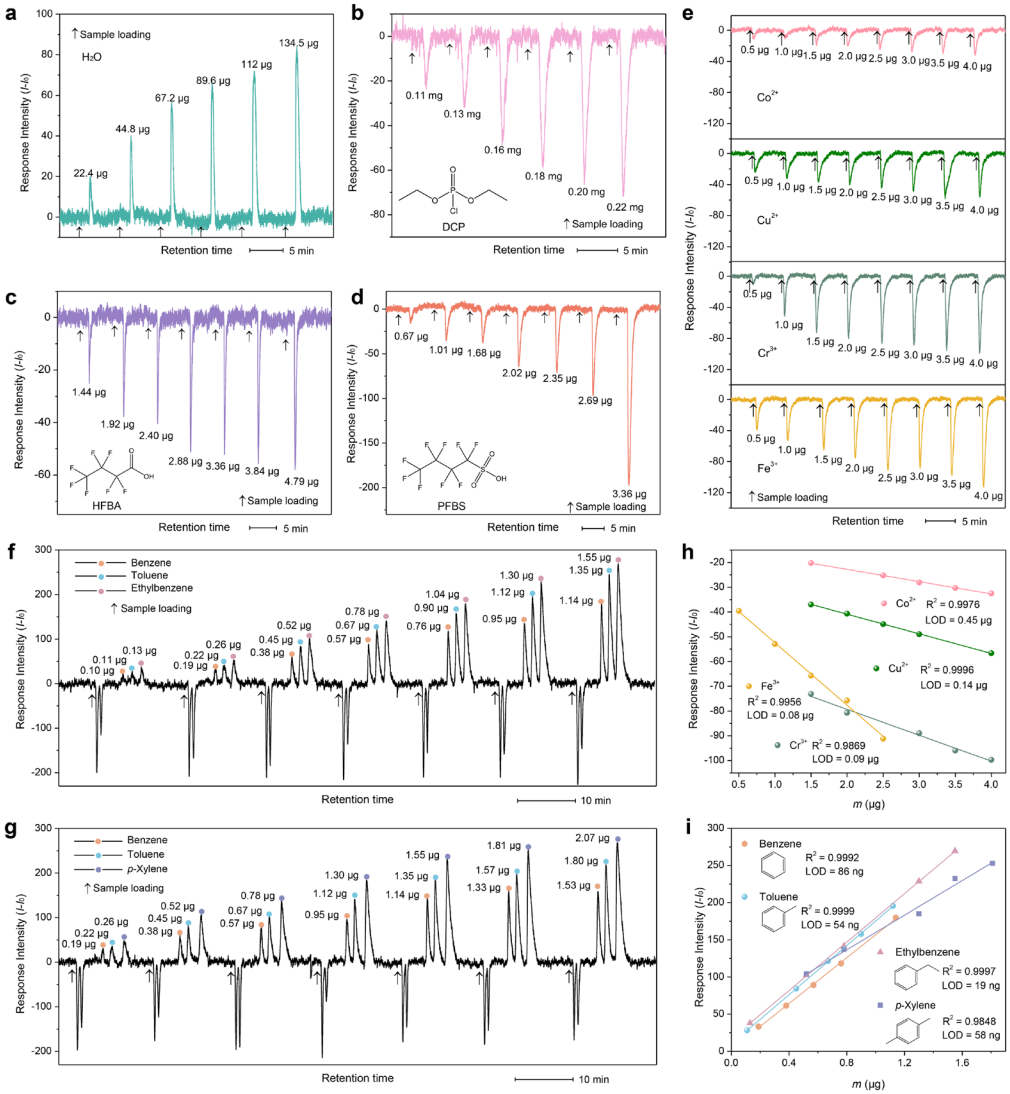

图 4. 分离传感平台的应用。

Figure 4. Validation and application of separation-sensing platform. a) Trace water in methanol. b) DCP. c) HFBA. d) PFBS. e) metal ions. f) BTE mixture. g) BTX mixture. h and i) Relationship of response intensity versus analyte mass loaded. a-e) obtained with E-H-h fluorescent column. f and g) obtained with E-FA-12C fluorescent column.

monoliths by adjusting binary solvent ratios. To achieve a separation-sensing tandem platform, we prepared fluorescent monoliths in capillary column through in situ polymerization of monomers (Figure 3a).

Taking advantage of separation and sensing capacities of the fluorescent monolith, we set up a miniature separation-sensing platform (Figure 3d) with negligible dead volume, and realize quantitative analysis for trace water in methanol, a sarin simulant, perfluoroalkyl compounds and metal ions. The separation-sensing platform furthermore demonstrates baseline separation for benzene, toluene, ethylbenzene and xylene, with limit of detections of 86, 54, 19 and 58 ng, respectively (Figure 4) .

To our knowledge, this is the first time that a fluorescent monolith is used to realize a separation-sensing tandem. We anticipate our findings will provide a promising strategy for producing portable devices with the on-site discriminative sensing ability for real samples.

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ADVANCED MATERIALS

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Localized and Controllable Mineral Salts Crystallization Enabled by Dye Modified Gold Nanorods with Enhanced Photothermal Conversion

Xudong Yan, Yutong Shang, Yi Li, Xiangyi Wang, Yiling Yao, Liping Ding, Taihong Liu, Rong Miao ✉, Yu Fang

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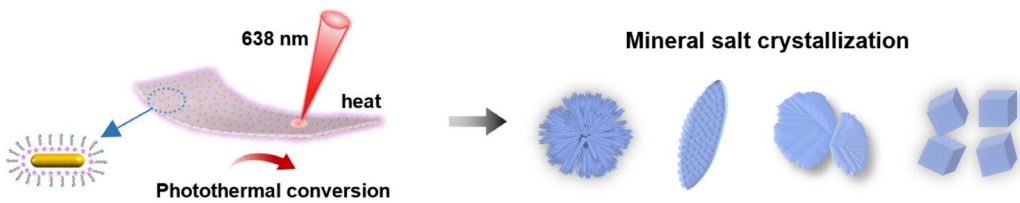
染料修饰金纳米棒提升光热转换效率及矿物盐可控、限域结晶

Xudong Yan, Yutong Shang, Yi Li, Xiangyi Wang, Yiling Yao, Liping Ding, Taihong Liu, Rong Miao*, and Yu Fang. Adv. Mater. 2025, 2417138 DOI: 10.1002/adma.202417138



光热材料因其在能源转换、生物医学、环境治理等领域的广泛应用而备受关注。金纳米棒（GNRs）作为一种典型的光热材料，具有独特的局域表面等离子体共振特性，能够高效地将光能转化为热能，是光热领域的热点材料。然而，传统 GNRs 的光热性能受限于其光吸收效率和分散稳定性，难以满足日益增长的高效、稳定光热材料的需求。因此，如何通过合理的材料设计和功能化修饰，进一步提升 GNRs 的光热性能，成为当前研究的重要方向。有机染料种类多、光物理性质可调，可以通过分子结构精确设计，提升染料激发态的非辐射跃迁，获得高效光热转换。然而，有机材料通常面临光漂白问题，尤其是在固态应用中。本研究报道了一种简便有效的方法，通过将特别设计的有机光热分子修饰于 GNRs 表面，构建了兼具高效光热转换和优异稳定性的有机 – 无机杂化光热材料。

在 638 nm 激光照射下，修饰后的 GNRs 掺杂的薄膜表面温度升高可高达 111° C，是相同条件下未修饰 GNRs 掺杂薄膜的两倍。通过调节掺杂材料浓度或光功率，可以将薄膜的表面温度精确控制在 31 至 116° C 之间。此外，研究发现，仅掺杂有机分子的薄膜在光照一次之后就发生了明

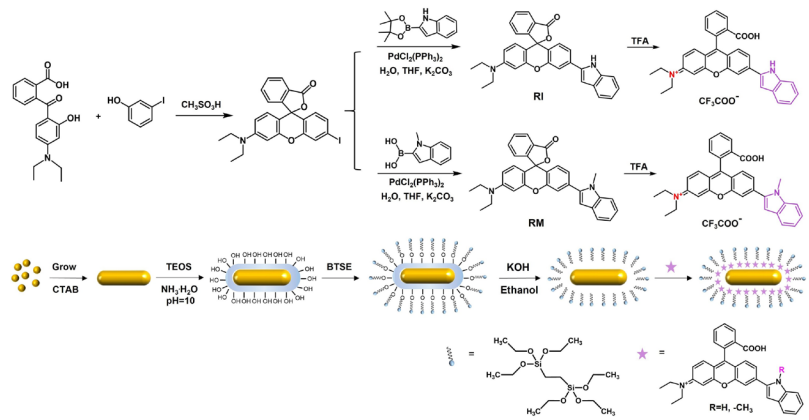


图 1. 修饰 GNRs 的合成过程。

Figure 1. The synthesis process of modifying GNRs.

显的光漂白作用，而修饰后的 GNRs 掺杂的薄膜具有更优异的稳定性和可重复使用性，在循环使用 10 次之后依然保持很好的光热转换性能。为理解修饰 GNRs 优异的光热转换性能，我们利用密度泛函理论计算了所设计分子的激发态构象及前线轨道。结果表明，所设计分子中涉及较强的分子内电荷转移，且具有极低的辐射跃迁概率。因而，我们推断，修饰 GNRs 的优异光热性能得益于等离子体热效应和非辐射弛豫的协同作用。基于修饰 GNRs 掺杂薄膜的优异光热转换效率、出色的稳定性和可重复使用性，我们以该薄膜作为能量转换器，成功实现了多种矿物盐（NaCl、$CaCO_3$、$BaCO_3$ 和 $SrCO_3$）的可控光热诱导结晶及表面图案化。研究成果不仅为高性能光热材料的设计与制备提供了新的技术路径，还拓展了光热材料在能源转换、微纳加工和结晶控制等领域的应用前景。

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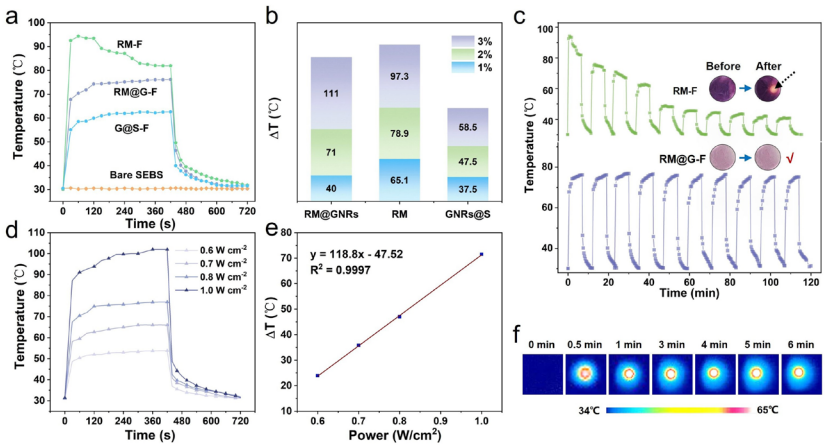

图 2. 不同材料掺杂薄膜的光热转换性能。
Figure 2. The photothermal conversion performance of films doped with different materials.

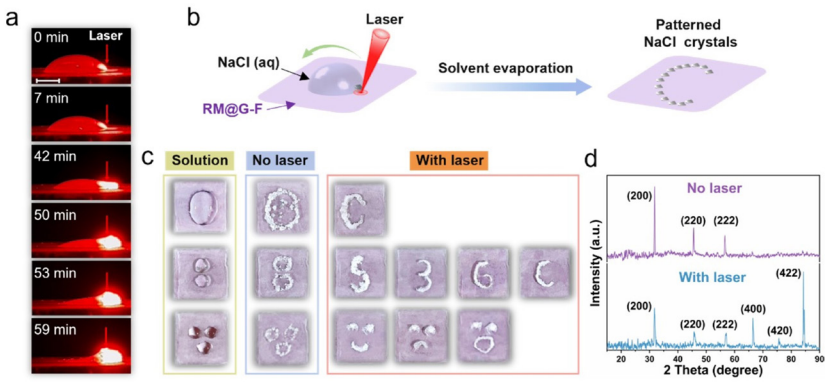

图 3. 光热诱导 NaCl 晶体的表面图案化。
Figure 3. Photothermally induced surface patterning of NaCl crystals.

Photothermal materials have attracted significant attention due to their broad applications in energy conversion, biomedical fields, environmental remediation, and beyond. As a typical photothermal material, gold nanorods (GNRs) possess unique localized surface plasmon resonance properties, enabling efficient conversion of light energy into heat, making them a focal point in photothermal research. However, the photothermal performance of conventional GNRs is constrained by their light absorption efficiency and dispersion stability, making it difficult to meet the growing demand for highly efficient and stable photothermal materials. Therefore, how to further enhance the photothermal performance of GNRs through rational material design and functional modification has become an important research direction.

Organic dyes, with their diverse types and tunable photophysical properties, can be precisely designed at the molecular level to enhance non-radiative transitions in the excited state, thereby achieving efficient photothermal conversion. However, organic materials often face challenges such as photobleaching, especially in solid-state applications. This study reports a simple and effective method to construct organic-inorganic hybrid photothermal materials with both high photothermal conversion efficiency and excellent stability by modifying specially designed organic photothermal molecules onto the surface of GNRs.

Under 638 nm laser irradiation, the surface temperature of the modified GNR-doped film increased by up to 111°C, twice that of the unmodified GNR-doped film under the same conditions. By adjusting the doping concentration or laser power, the surface temperature of the film could be precisely controlled between 31°C and 116°C. Additionally, the study found that films doped solely with organic molecules exhibited significant photobleaching after just one illumination cycle, whereas the modified GNR-doped films demonstrated superior stability and reusability, maintaining excellent photothermal conversion performance

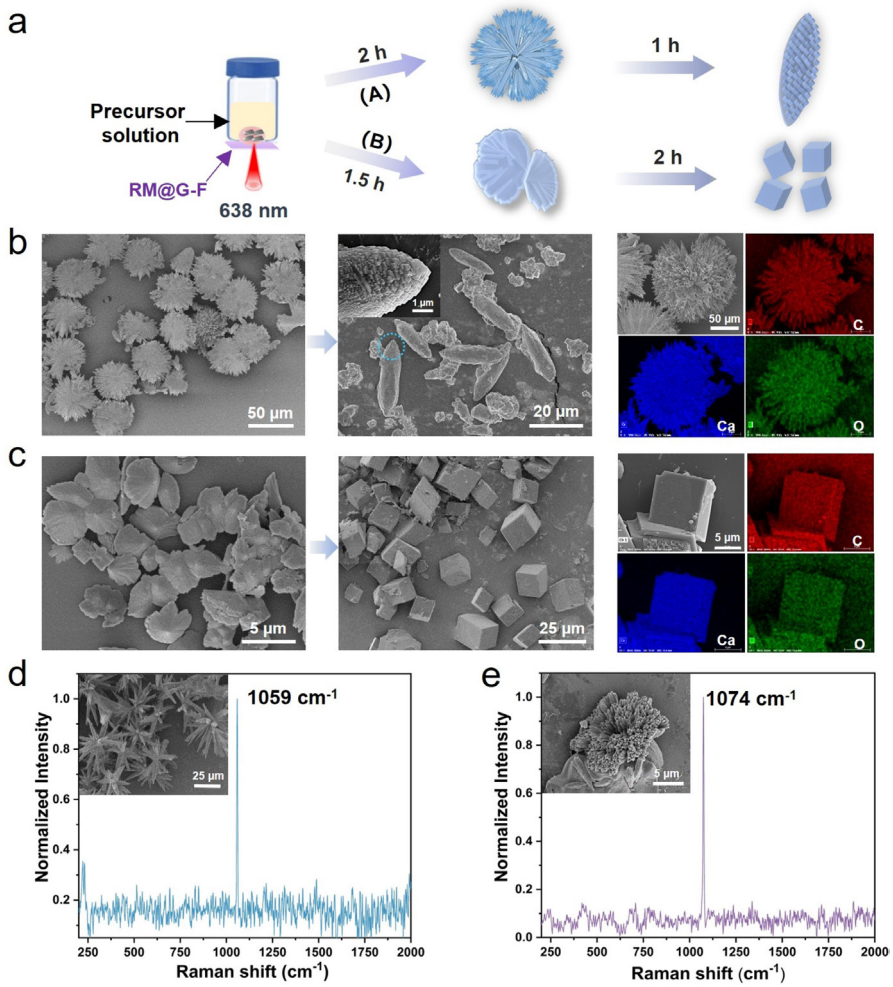

图 4. 光热诱导 CaCO3、BaCO3 和 SrCO3 晶体的合成。

Figure 4. Photothermally induced synthesis of CaCO3, BaCO3, and SrCO3 crystals.

even after 10 cycles.

To understand the outstanding photothermal conversion performance of the modified GNRs, we employed density functional theory (DFT) to calculate the excited-state conformation and frontier molecular orbitals of the designed molecules. The results revealed strong intramolecular charge transfer and an extremely low radiative transition probability in the designed molecules. Therefore, we concluded that the exceptional photothermal performance of the modified GNRs arises from the synergistic effect of plasmonic heating and non-radiative relaxation.

Leveraging the high photothermal conversion efficiency, outstanding stability, and reusability of the modified GNR-doped films, we successfully utilized them as energy converters to achieve controllable photothermal-induced crystallization and surface patterning of various mineral salts (NaCl, $CaCO_3$, $BaCO_3$, and $SrCO_3$). This research not only provides a novel technical pathway for the design and fabrication of high-performance photothermal materials but also expands their potential applications in energy conversion, micro/nano fabrication, and crystallization control.

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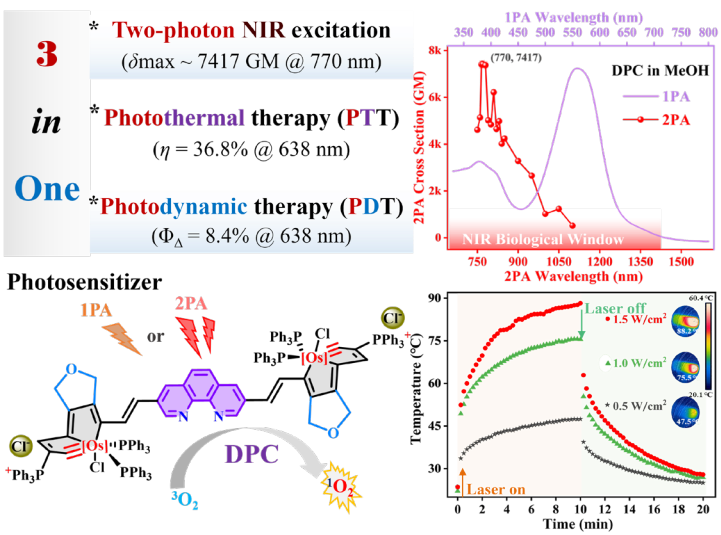
Ultrafast excited-state dynamics and “three-in-one” phototheranostic properties of a phenanthroline-carbolong photosensitizer

Haixia Chang, Jiang Feng, Xin-Ao Liu, Rong Miao, Taihong Liu, Liping Ding and Yu Fang

邻菲罗啉 – 碳龙配合物光敏剂的激发态动力学与“三合一”光疗性质

Haixia Chang, Jiang Feng, Xin-Ao Liu, Rong Miao,* Taihong Liu,* Liping Ding, and Yu Fang. Chem. Sci., 2025,
DOI: 10.1039/D5SC00013K



光动力疗法（PDT）和光热治疗（PTT）具有微创性、时空精确性和可控性等优点，在肿瘤治疗领域备受关注。二者均依赖于高效光敏剂，光敏剂经特定波长的光照射后产生热量或单线态氧活性物质以高效杀伤肿瘤细胞。相比于单光子吸收光敏剂，双光子吸收特性光敏剂具有更深的组织穿透能力、更小的光损伤和独特的局部激发特性。寻找具有优异双光子吸收特性、高效光热 / 光动力治疗效果以及良好的生物相容性的光敏剂仍是化学、材料和生物医学领域的研究热点。碳龙配合物因其独特的芳香性、多样的反应性、优异的热力学稳定性和突出的非线性光学性能而引起了广泛关注，探究它们的激发态动力学对于调控光物理性质和光敏特性应用开发具有重要的指导意义。

该工作系统比较考察了具有 A–π–D–π–A 结构的双邻菲罗啉 – 碳龙配合物 DPC 及其参比配合物 SPC 的线性光物理和双光子吸收性质。研究结果表明，随着 π – 共轭程度增大，二者的最大紫外可见吸收波长由配合物 SPC 的 538 nm 增大到 DPC 的 558 nm，分子内强电荷转移作用对其激发态跃迁机制影响较大。基于开孔 Z– 扫描技术表征，四偶极 A–π–D–π–A 结构的配合物 DPC 在 750 ~ 1100 nm 的光谱范围内表现出反饱和吸收 RSA 特性和较大的双光子吸收截面值，其在甲醇溶剂中的最大双光子吸收波长和最大双光子吸收截面值分别为 770 nm 和 7417 GM。超快瞬态吸收光谱（ns/fs–TA）清楚地揭示了 DPC 的激发态动力学弛豫和单线态 – 三线态跃迁过程。分析表明，DPC 分子在被光激发后产生了电荷分离态，该电荷分离态物种可以通过电荷重组和系间窜越进入三重态两种相互竞争机制返到基态，瞬态吸收光谱稳定的激发态吸收信号反映出 DPC 分子较长的三重态寿命。进一步研究表明，碳龙配合物 DPC 在 638 nm 单光子和飞秒 770 nm 双光子激发波长下，均可高效产生单线态氧。同时，在 638 nm 光激发下，DPC 展现出高达 36.8% 的光热转换效率。

最后，受双邻菲罗啉 – 碳龙配合

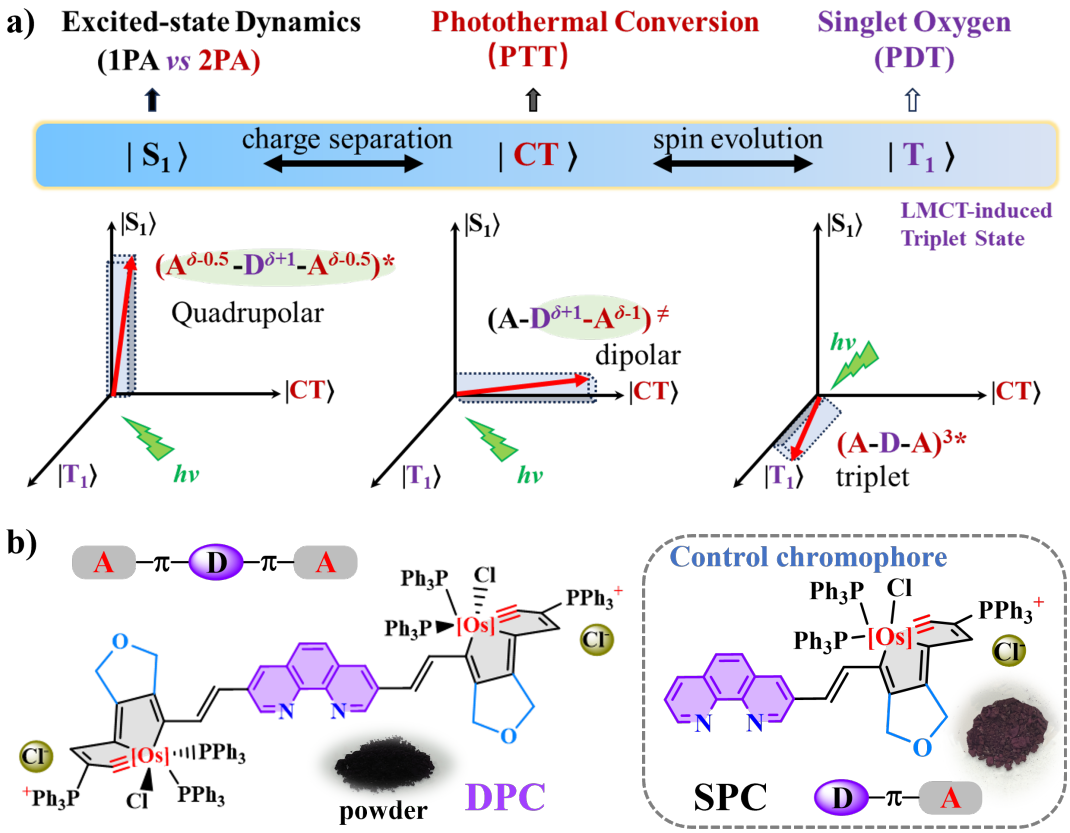


图 1.（a）四偶极金属芳族化合物的激发态动力学、单线态氧产生和光热转换途径的弛豫过程示意图；（b）双邻菲罗啉 – 碳龙配合物 DPC 和参比配合物 SPC 的分子结构式。

Figure 1. (a) Illustration of the plausible excited-state dynamics of quadrupolar metallaaromatic chromophores and plausible paths for singlet oxygen generation or photothermal conversion; (b) Molecular structures of the double-phenanthroline-carbolong DPC and the control chromophore single-phenanthroline-carbolong SPC.

物 DPC 具有 PDT 和 PTT 协同作用启发，该工作基于小鼠乳腺癌 4T1 细胞模型进行了体外细胞毒性和多模式治疗效果评估，阐明了近红外双光子激发、光动力治疗和光热治疗的“三合一”多模式光疗效果，为后续碳龙配合物在光谱学和生物学诊疗领域的应用提供了参考。

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Phototheranostics has been evoked as an emerging and promising approach toward cancer therapy because of the advantages such as minimal invasiveness, spatiotemporal accuracy, and precise controllability. The non-destructive photodynamic (PDT) and photothermal (PTT) therapies depend on photosensitizers that produce heat or reactive oxygen species when irradiated to destroy cancer cells. Compared to one-photon absorbing photosensitizers, two-photon exciting materials in the significant near-infrared (NIR) biological spectral window (650 ~ 1450 nm) show distinct advantages of deeper tissue penetration, minimal light loss, and improved phototheranostic properties. Two-photon absorption (2PA) enables the excitation of photosensitizers by longer spectral region with lower energy and allows higher spatial resolution via quadratic dependence of the 2PA rate on the incident laser light intensity. Searching for photosensitizers possessing large 2PA cross section (δ2PA), together with exceptional photostability, good biocompatibility, and high therapeutic efficacy remains a significant challenge in material science and biomedicine. The metallaaromatic chemistry has recently evoked considerable attention due to their Möbius and adaptive aromaticity, diverse reactivity, excellent thermodynamic stability, and outstanding nonlinear optical performances. Understanding their excited-state dynamics is crucial for manipulating their photophysical properties and developing related optoelectronic and phototheranostics materials.

Herein, we compared the linear photophysical behaviors and 2PA properties of dipole SPC and quadrupole DPC chromophores. The excited-state dynamics of quadrupole double-

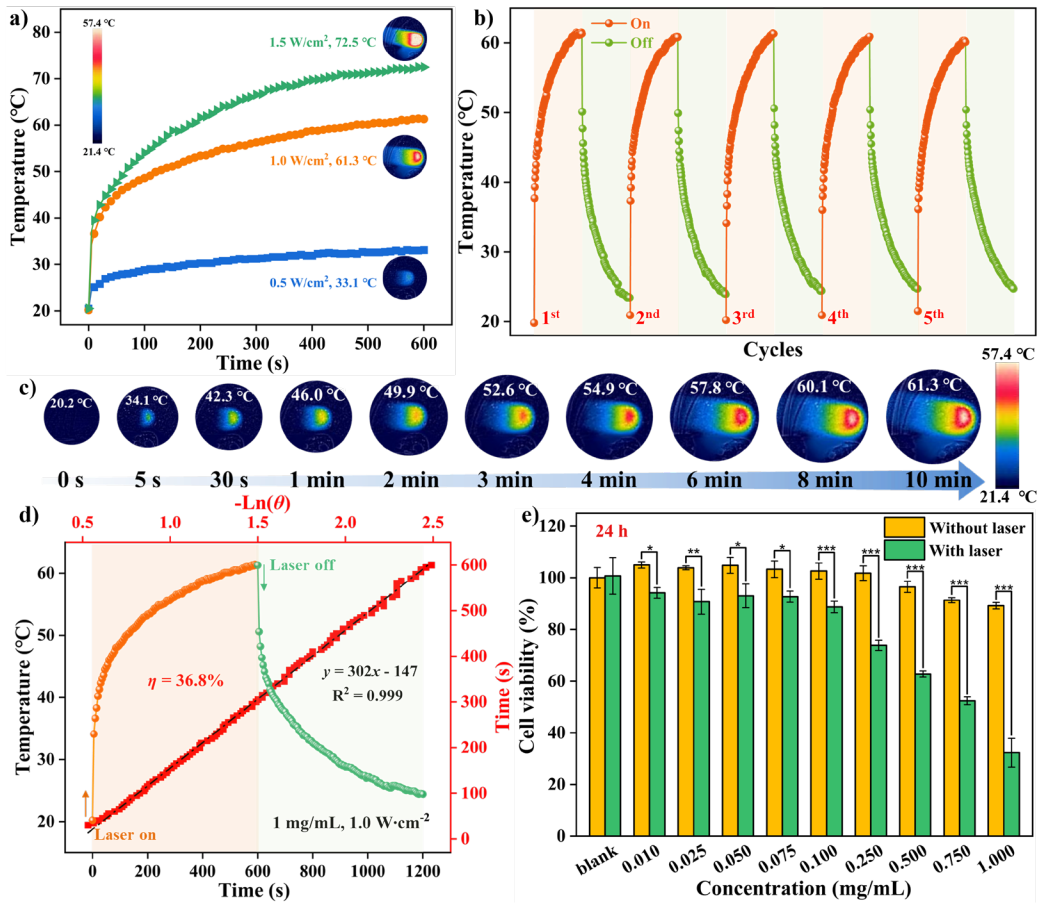

图 2.（a）双邻菲罗啉－碳龙配合物 DPC 在不同功率密度条件下的光热曲线；（b）DPC 的温度特性循环稳定测试曲线；（c）DPC 在水 −DMSO 溶液中不同时间点的红外热像图；（d）温度循环曲线以及冷却时间与 –ln(θ) 的关系图，θ 代表驱动力温度；（e）细胞与不同浓度的 DPC（0.01 ~ 1.00 mg/mL，孵育 24 h）、有 / 无激光照射下的细胞活力对比图。

Figure 2. (a) Photothermal heating curves of DPC (660 μL, 1.00 mg/mL) following exposure to 638 nm laser at various power densities; (b) Five photothermal heating curves for DPC under laser on-off irradiation. (c) Infrared thermographies of DPC in water-DMSO solution (9/1, v/v, 1.00 mg/mL, 660 μL) under laser irradiation at various time points; (d) Temperature rise/fall curves and the cooling time vs –ln(θ) plot. Notes: θ represents the driving force temperature for DPC. (e) Cell viability of 4T1 cells incubated with DPC at varying concentrations (0.01 ~ 1.00 mg/mL) for 24 h without or with laser irradiation. Notes: 638 nm laser, 1.0 W/cm^2.

phenanthroline-carbolong DPC were focused and elucidated properly. Its significant 2PA properties within the spectral range of 750 ~ 1100 nm were investigated using the open-aperture Z-scan instrument. Of particular interest on the excited-state photophysical dynamics, nonradiative relaxations and the intramolecular charge transfer (ICT) in DPC were comprehensively investigated. Ultrafast transient absorption spectra clearly unveiled the excited-state dynamics of DPC, including the originally occupied Franck−Condon state, rapid ICT, and ISC processes to the T1 state. The long T1 state lifetime was evident from the stable excited-state absorption. Interestingly, the singlet oxygen generation from DPC was endowed when irradiated at one-photon excitation wavelength of 638 nm and femtosecond 770 nm if considering the strong 2PA capability and large δ2PA values. In addition, DPC showed a photothermal conversion efficiency of up to 36.8% under the excitation NIR-wavelength of 638 nm.

More importantly, inspired by the efficient singlet oxygen generation and reliable photothermal conversion, the excellent phototherapeutic functions of DPC were also investigated using the mouse breast cancer cells (4T1) model. The “three-in-one” phototherapeutic effect of the NIR-wavelength 2PA excitation, photodynamic therapy, and photothermal therapy in the potential photosensitizer DPC was illustrated experimentally and theoretically.

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Crystallization-Induced Emission Enhancement or Quenching? Elucidating the Mechanism behind Using Single-Molecule-Based Versatile Crystals

Yutong Shang, Yalei Ma, Qiangbazhuoma, Baimaquzhen, Liping Ding, Jing Liu, Shiwei Yin, Rong Miao,* and Yu Fang

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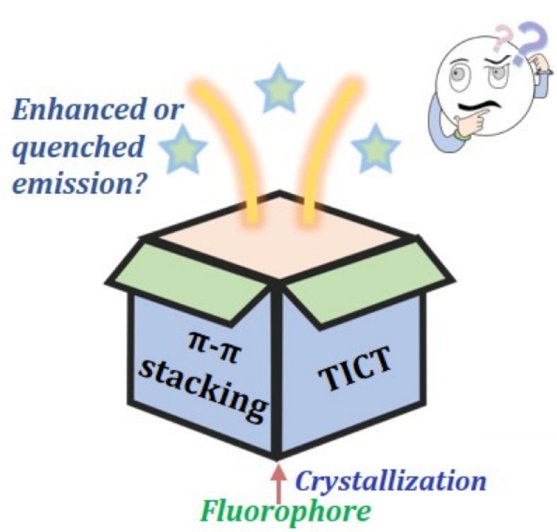
基于单一分子、不同构象晶体揭示结晶诱导荧光增强 / 猝灭机制

Yutong Shang, Yalei Ma, Qiangbazhuoma, Baimaquzhen, Liping Ding, Jing Liu, Shiwei Yin, Rong Miao*, and Yu Fang. J. Phys. Chem. Lett. 2025, 16, 3389−3396, DOI: 10.1021/acs.jpclett.5c00774



荧光分子材料因其优异的光电性能和结构可调特性，在传感、生物成像和光电器件等领域发挥着不可替代的作用。然而，由于分子间相互作用引发的强激子耦合效应，多数荧光分子在固态表现出荧光减弱甚至完全猝灭的现象。相较于溶液态，人们对于固态发光的理解还不够深入。这是因为，固态发光受分子结构、构象、堆积方式及非共价相互作用等多重因素的影响，要深入理解其机制，需从多维度开展系统研究。

扭转分子内电荷转移（Twisted Intramolecular Charge Transfer, TICT）荧光分子，是一类在激发态发生显著构象变化的荧光分子体系，激发态分子通过旋转从准平面构型转变为近垂直构型，并伴随荧光减弱。然而，分子内扭转，不仅会影响分子内电荷转移，还可能改变分子构象，从而影响分子间相互作用及聚集态堆积方式，最终导致荧光的变化。基于 TICT 荧光分子独特的发光特性，本研究设计合成了两种吡咯衍生物修饰的单苯环 TICT 荧光分子（Ph–HP 和 Ph–MP），通过系统研究其在溶液态和固态（包括粉末和晶体）的光物理性质，揭示了结晶诱导荧光增强或猝灭的物理化学机制。

Ph–HP 和 Ph–MP 在甲苯溶液中均发出明亮的荧光，但是，二者在粉末态荧光非常弱。有意思的是，这两种化合物分别可以形成两种荧光截然不同的晶体：一种晶体具有明亮的荧光（Q.Y. > 0.4），另一种晶体荧光极弱（Q.Y. < 0.07）。我们结合单晶测试结果和理论计算分析，系统研究了分子构象、分子堆积以及分子间相互作用对晶体荧光的影响。结果发现，虽然这两个分子属于同系物，且发光行为相似，但是它们在晶态的荧光增强或猝灭是基于完全不同的机制。Ph–HP 的晶体发光主要由 π – π 堆积决定，相比于溶液态，π – π 相互作用较弱的晶体荧光增强，π – π 作用强的晶体荧光猝灭。然而，Ph–MP 晶体的发光性质依赖于分子的 TICT 倾向，弱 TICT 倾向分子构成的晶体荧光增强，强 TICT 倾向分子构成的晶体荧光猝灭。该研究揭示了结晶过程影响荧光性质的两种不同机制，希望可以为新型高性能发光材料的设计和开发提供思路。

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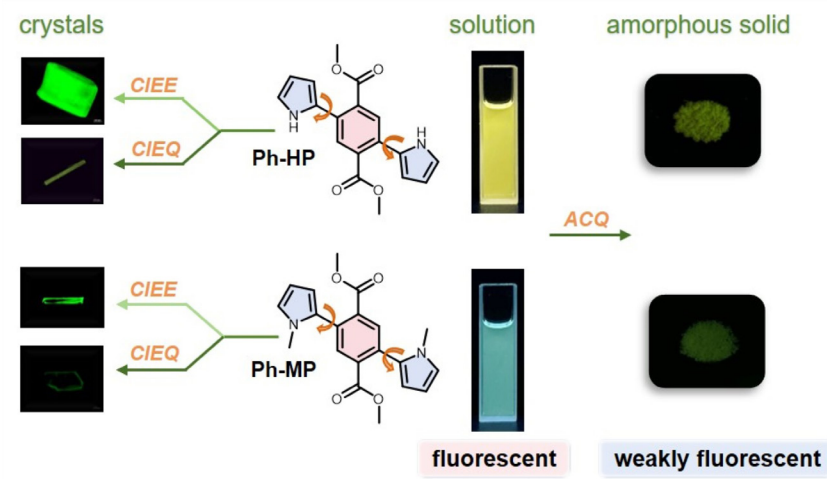

图 1. Ph−MP 和 Ph−HP 的分子结构及其在溶液、粉末和晶体中的荧光照片。
Figure 1. Molecular structures of Ph-MP and Ph-HP, as well as their fluorescence images in solution, powder and crystals.

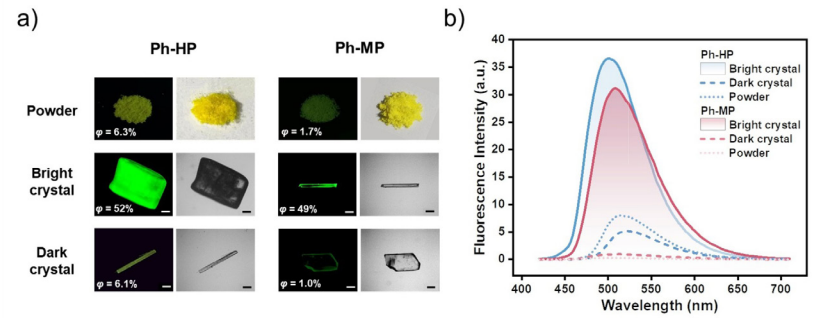

图 2.（a）紫外光和日光下的 Ph−HP 和 Ph−MP 图像，（b）固态 Ph−HP 和 Ph−MP 的荧光发射光谱。
Figure 2. (a) Images of Ph-HP and Ph-MP under UV light and sunlight. (b) Fluorescence emission spectra of Ph-HP and Ph-MP in solid state.

Fluorescent molecular materials play an indispensable role in sensors, bioimaging and optoelectronic devices because of their excellent photoelectric properties and tunable structural characteristics. However, most dyes lose their fluorescence and exhibit degraded or even quenched emission in solid state, owing to the strong exciton coupling as a result of intermolecular interactions. Unlike fluorescence in solution state, mature theories are lacked in solid state due to the complex influences of molecular structure, molecular conformation, molecular stacking as well as noncovalent interactions, and needs to be systematically studied from the dimension.

Twisted intramolecular charge transfer (TICT) fluorophores are dyes that show drastic conformational change in excited state during the charge transfer process. The excited compound transforms from a quasi-planar conformation to an almost perpendicular conformation through bond rotation, accompanied by fluorescence decrease. The rotation not only affects the intramolecular charge transfer (ICT), but also influences the molecular conformation as well as stacking model in aggregated state. In this work, two TICT fluorophores (Ph-HP and Ph-MP) composed of dimethyl terephthalate and pyrrole/N-methylpyrrole are designed to elucidate the fluorescence mechanism in organic crystalline materials. Based on the unique luminescent properties of TICT fluorophores, this study designed and synthesized two pyrrole derivative-modified single benzene ring TICT fluorophores (Ph-HP and Ph-MP). Through systematic investigation of their photophysical properties in solution state and solid states (including powders and crystals), the physicochemical mechanisms underlying crystallization-induced fluorescence enhancement or quenching were revealed.

Both Ph-HP and Ph-MP exhibit bright fluorescence in toluene solution, yet

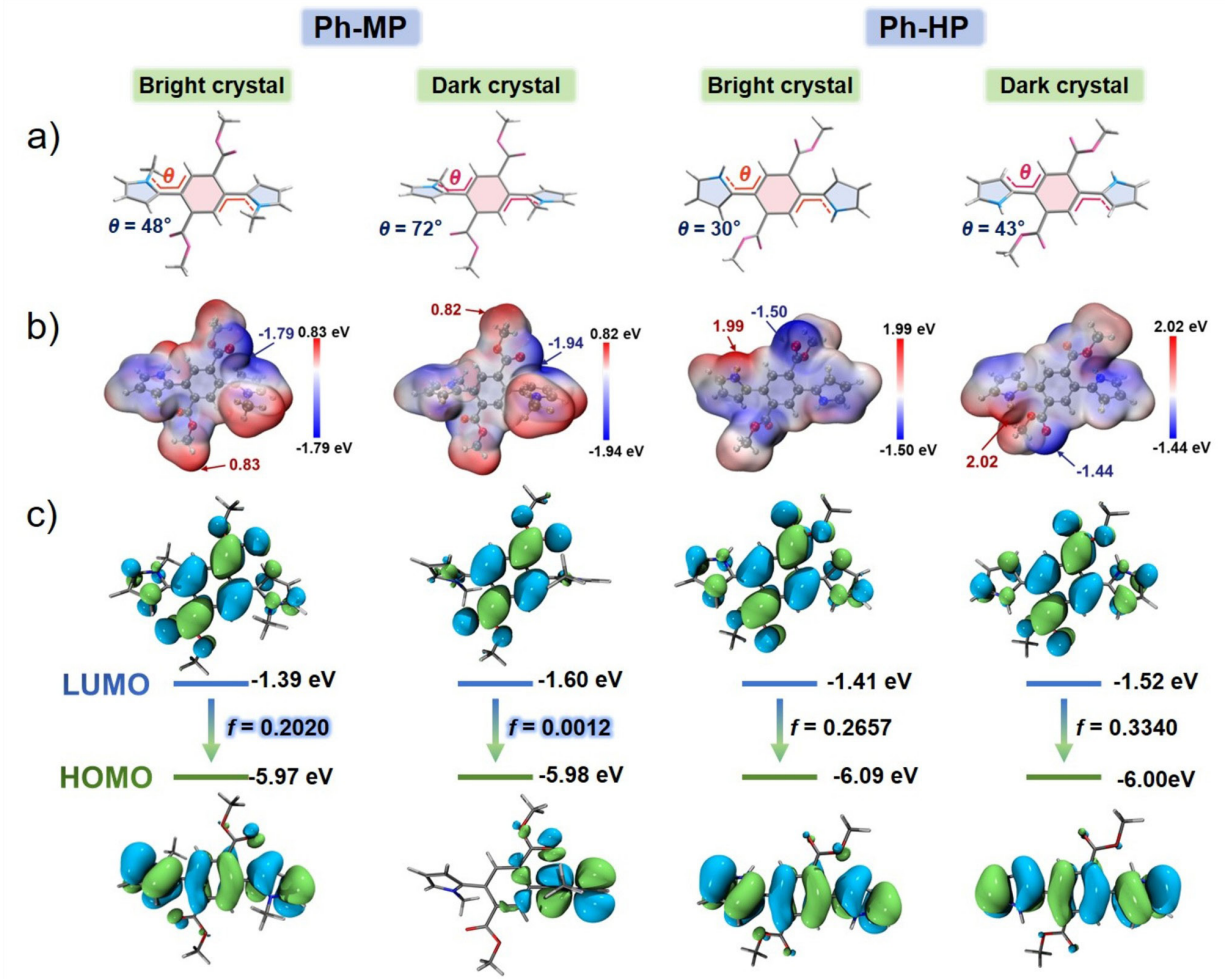

图 3.（a）Ph−HP 和 Ph−MP 单晶的分子构象；（b）不同构象下 Ph−HP 和 Ph−MP 分子的表面静电势图和（c）前线分子轨道示意图。

Figure 3. (a) Molecular conformation in the single crystals of Ph-HP and Ph-MP. (b) Molecular electrostatic potential surface and (c) Frontier molecular orbitals of Ph-HP and Ph-MP with different conformations.

demonstrate extremely weak fluorescence in their powder states. Interestingly, these two compounds can each form two types of crystals with strikingly distinct fluorescence: one type of crystal exhibits bright fluorescence (Q.Y. > 0.4), while the other shows extremely weak fluorescence (Q.Y. < 0.07). By combining single-crystal analysis results and theoretical calculations, we systematically investigated the effects of molecular conformation, packing arrangements, and intermolecular interactions on crystal fluorescence. The results revealed that although these two molecules are homologues with similar luminescence behaviors, their fluorescence enhancement or quenching in the crystalline state is governed by entirely distinct mechanisms. For Ph-HP, crystal fluorescence is predominantly determined by π-π stacking. Crystals with weaker π-π interactions exhibit fluorescence enhancement compared to the solution state, while those with stronger π-π interactions show fluorescence quenching. In contrast, the luminescence properties of Ph-MP crystals depend on molecular TICT propensity. Crystals formed by molecules with weak TICT propensity exhibit fluorescence enhancement, whereas those with strong TICT propensity demonstrate fluorescence quenching. This study uncovers two distinct mechanisms through which crystallization processes influence fluorescence properties, providing valuable insights for the design and development of novel high-performance luminescent materials.

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Research Article

Chiral Competition Reflected by Circularly Polarized Luminescence Signal Inversion in Supramolecular Assembly of Pyrene-Amino Acid Derivatives and γ-Cyclodextrin

Yijun Zhang, Yihuan Sun, Huajing Li, Huanhuan Dong, Min Dou, Ting Li, Jing Liu ✉, Jian Kong, Prof. Yuangang Li ✉

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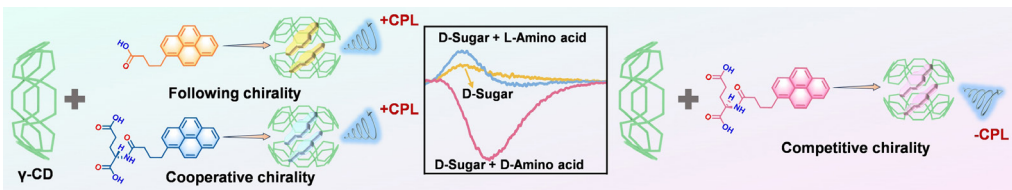
芘修饰的氨基酸衍生物与 γ－环糊精超分子组装中的手性竞争研究

Yijun Zhang, Yihuan Sun, Huajing Li, Huanhuan Dong, Min Dou, Ting Li, Jing Liu*, Jian Kong, Yuangang Li*. Chem. Eur. J. 2025, e202500804, DOI: org/10.1002/chem.202500804



在自然界中，生物体倾向于选择单一手性的分子来构建生命基础物质。一个典型的例子是地球上的所有已知生命几乎都采用 L- 氨基酸来合成蛋白质，同时选择 D- 糖来构建核酸和多糖。这种同手性现象是生命的重要特征之一，其起源仍是一个未解之谜，可能与手性选择过程中微小不平衡的累积有关。因此，研究多手性组分体系中的手性竞争现象，有助于促进对同手性的理解。本工作利用氨基酸修饰的芘衍生物与 γ－环糊精（γ-CD）相互作用精准调控主客体识别中超分子络合物的空间构像，实现了组装过程中圆偏振发光（CPL）信号的精准调控：非手性的芘丁酸与 γ-CD 结合后，由于体系中存在唯一的手性源（γ-CD）而表现跟随手性，发射出正的 CPL 信号；L 型氨基酸修饰的 Py-L-Glu 和 Py-L-Asp 与 γ-CD 结合后，由于 L 氨基酸和 γ-CD 的 D- 葡萄糖之间的手性协同而表现出增强的正 CPL 信号；而 D 型氨基酸修饰的 Py-D-Glu 和 Py-D-Asp 与 γ-CD 结合后，CPL 信号出现反转。这是由于 D- 氨基酸和 γ-CD 的 D- 葡萄糖之间存在手性竞争，最

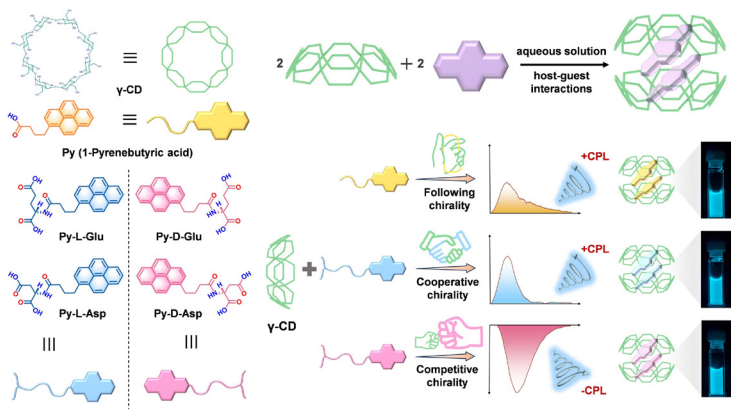


图 1. 芘的氨基酸衍生物与 γ-CD 超分子组装实现手性信号的精准调控

Figure 1. The schematic diagram of the binding of different pyrene derivatives to γ-CD molecules to regulate the supramolecular chirality.

终由 D– 氨基酸决定了超分子手性信息。等温量热滴定（ITC）和核磁滴定结果表明，芘衍生物与 γ–CD 的结合比例是 1:1，而荧光光谱中 482 nm 处的发射峰证明了芘二聚体的存在，所以芘衍生物与 γ–CD 以 2:2 的比例结合，其中两个芘衍生物被包裹在两个 γ–CD 大环中（图 1）。

本研究成果不仅有助于理解多组分系统中手性竞争与合作的关系，还为探索手性多组分系统中的手性调控提供了新思路。

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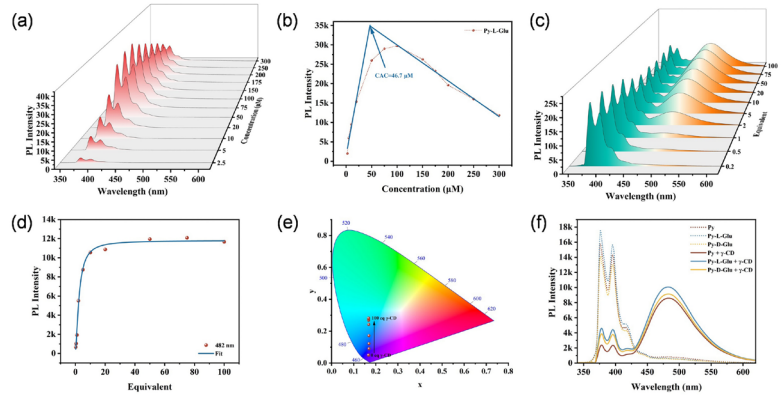

图 2. 芘的氨基酸衍生物与 γ–CD 超分子组装对荧光发射的调控

Figure 2. The binding of different pyrene derivatives to γ-CD molecules to regulate the fluorescence emission properties

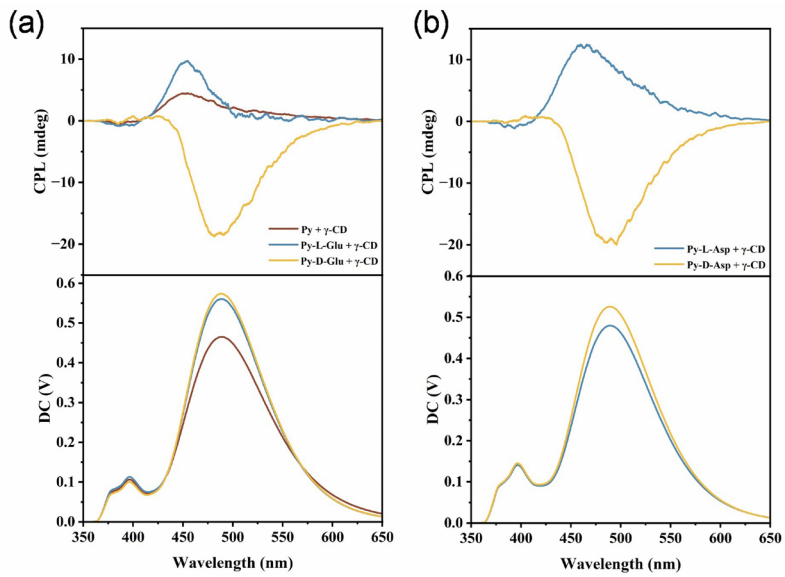

图 3. 芘的氨基酸衍生物与 γ–CD 超分子组装对圆偏振发光的调控

Figure 3. The binding of different pyrene derivatives to γ-CD molecules to regulate the CPL properties.

Chirality refers to the property that an object cannot coincide with its mirror image in space, which is a fundamental characteristic of living matter and nature. All known life forms are homochiral, with DNA and RNA composed of D-sugars and proteins made from L-amino acids. The reason for homochirality in evolution may lie in the preferential selection of specific chiral molecular properties during the origin and evolution of life. Accordingly, studying the chiral competition phenomenon in multiple component system is crucial for understanding the homochirality in nature.

In this study, the chiral competitive effect between carbohydrates and amino acids through the host-guest complex formation was investigated by employing amino acid modified pyrene derivatives and naturally occurring γ-cyclodextrin (γ-CD) as chiral sources, the circularly polarized luminance (CPL) as indicator. Supramolecular complexes of achiral 1-pyrenebutyric acid and L-amino acid-pyrene derivatives with γ-CD exhibited positive CPL signals, with chirality derived from γ-CD's stereochirality. In contrast, supramolecular complexes formed by D-amino acid-pyrene derivatives with γ-CD showed a negative CPL signal, reflecting chiral competition between D-amino acids and D-glucose in γ-CD.

Fluorescence spectroscopy and ITC measurements show that the chiral pyrene derivatives bind strongly to γ-CD in a 2: 2 ratio, with the pyrene moiety encapsulated in the cavities of two γ-CD molecules in a dimeric form (Figure 1). Mechanism exploration showed that the depth of insertion and stacking arrangement of the guest molecules within the γ-CD cavity played an essential role for the CPL inversion. Interestingly, chiral competition only occurred between D-amino acids and D-carbohydrates, while cooperation was observed between L-amino acids and D-carbohydrates, which were consistent with the natural chirality bias. This work not only advances our understanding of chiral competition and cooperation in multicomponent systems but also provides an inspiring starting point for exploring chirality regulation in chiral multicomponent systems, with potential applications in molecular recognition, sensing and other fields.

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Macromolecular Rapid Communications

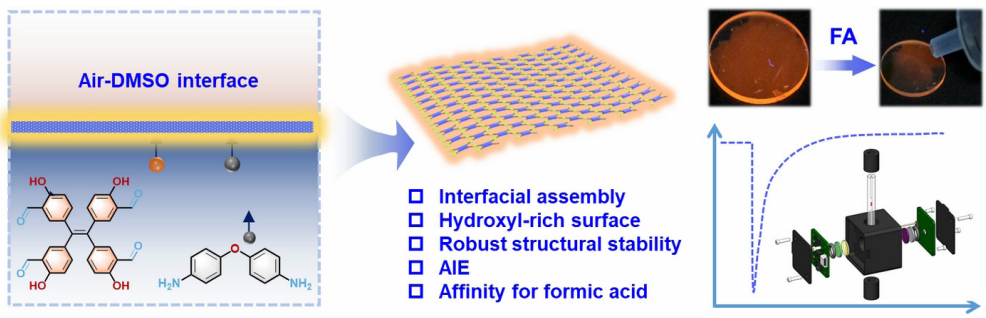
Research Article | Full Access

Interfacially Assembled Fluorescent Nanofilm for Ultra-Sensitive Formic Acid Detection via Hydrogen Bonding Affinity and Recognition

Linxuan Huang, Xinxiang Gao, Xinyao Mao, Ishfaq Ullah, Zhijie Zhou, Ejaz Hussain, Yinghui Xiao, Haonan Peng, Yu Fang

基于氢键亲和与识别的超灵敏甲酸检测界面组装荧光纳米膜

Linxuan Huang, Xinxiang Gao, Xinyao Mao, Ishfaq Ullah, Zhijie Zhou, Ejaz Hussain,* Yinghui Xiao, Haonan Peng,* and Yu Fang. Macromol. Rapid. Commun. 2025. DOI: 10.1002/marc.202401048



甲酸（FA）广泛应用于化学工业，但同时也对空气污染、全球酸化和环境退化产生重要影响。由于其腐蚀性及对健康的潜在危害，包括呼吸道问题和皮肤烧伤，因此需要敏感且实时的 FA 检测技术，以便及时采取应对措施并确保符合相关法规。基于荧光薄膜的传感器被认为是检测挥发性有机化合物（VOC）的一类重要技术，具备高灵敏度、直观的视觉信号输出以及实时现场监测的潜力。其中，基于有机分子的荧光传感器尤为引人注目，因为其具有结构的通用性、可调的光学特性，以及易于功能化以识别特定分析物的优势。

本工作通过羟基修饰的四苯乙烯衍生物与 4,4′ – 二氨基二苯醚在气液界面上的动态缩合制备了一类聚合物纳米膜，展现出优异的发光性能、柔韧性和可调的表面形貌。其明亮的荧光主要是由于聚集诱导发射（AIE）性质和薄膜结构内丰富的氢键网络结构。以该纳米膜制备的传感器实现了对甲酸蒸汽的 550 ppt 超低检测限，0.3 s 的快速响应时间，以及出色的可逆性。它对甲酸的选择性也高于其他 VOCs，适合于实时监测。此外，纳米膜的多模态传感能力，包括对 HCl 和 NH3 的响应，突出了其在各种环境和工业应用中的潜力。

通过核磁、荧光寿命等手段研究了荧光纳米膜感应甲酸的机制：甲酸分子与纳米膜中的亚胺键相互作用，形成弱氢键，破坏氢键网络。这种相互作用改变了亚胺基的电子环境，阻断了质子供体（— OH），促进了非辐射衰变途径，导致荧光猝灭。

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Formic acid (FA) is widely used in the chemical industry but also has significant impacts on air pollution, global acidification, and environmental degradation. Due to its corrosiveness and potential health hazards, including respiratory issues and skin burns, sensitive and real-time FA detection technologies are needed to allow for timely mitigation measures and ensure compliance

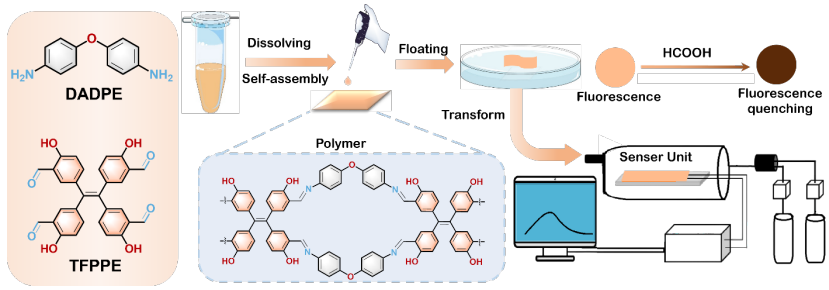

图 1. 前驱体和连接子化学结构，聚合物纳米薄膜的制备过程，将其集成到功能性甲酸检测系统中的步骤，以及其在甲酸响应下的荧光猝灭行为。

Figure 1. Illustration of the chemical structures of the precursor and linker, the process of polymer nanofilm fabrication, integration into a functional formic acid detection system, and its fluorescence quenching behavior in response to formic acid.

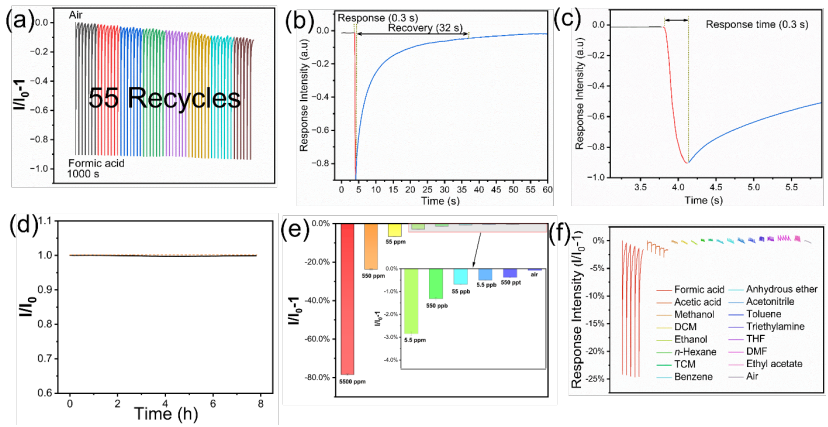

图 2. 传感器性能研究：a) 传感器响应的可逆性 b) 响应及恢复时间 c) 响应时间展开图 d) 光化学稳定性 e) 响应灵敏度和 f) 传感选择性。（λ ex = 440 和 λ em = 620 nm）。

Figure 2. Sensor performance studies: a) Reproducibility of the sensor response. b) Recovery and response time. c) Expanded graph of response time. d) Photochemical stability e) sensitivity and, f) selectivity of fluorescent nanofilm. (λex = 440 nm, and λem = 620 nm).

with relevant regulations. Film-based fluorescent sensors are considered an important technology for detecting volatile organic compounds (VOCs), offering high sensitivity, intuitive visual signal output, and the potential for real-time on-site monitoring. Among them, organic molecule-based fluorescent sensors are particularly notable due to their structural versatility, tunable optical properties, and ease of functionalization to selectively detect specific analytes. In this work, a polymer nanofilm was synthesized through the dynamic condensation of a hydroxyl-modified tetraphenylethylene derivative with 4,4′-diaminodiphenyl ether at the air-liquid interface. The resulting nanofilm exhibits excellent luminescent properties, flexibility, and tunable surface morphology. Its bright fluorescence is primarily attributed to aggregation-induced emission (AIE) properties and the rich hydrogen bonding network within the film structure. The sensor fabricated from this nanofilm achieves an ultra-low detection limit of 550 ppt for formic acid vapor, a rapid response time of 0.3 s, and excellent reversibility. It also demonstrates higher selectivity for formic acid over other VOCs, making it ideal for real-time monitoring. Additionally, the nanofilm's multimodal sensing capabilities, including responses to HCl and NH3, highlight its potential for diverse environmental and industrial applications.

The mechanism of formic acid sensing by the fluorescent nanofilm was investigated using techniques such as NMR and fluorescence lifetime measurements. Formic acid molecules interact with the imine bonds in the nanofilm, forming weak hydrogen bonds that disrupt the hydrogen bonding network. This interaction alters the electronic environment of the imine groups, blocks proton donors (─OH), and promotes non-radiative decay pathways, leading to fluorescence quenching.

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中国科学院大连化学物理研究所冯亮研究员应邀作报告

Researcher Feng Liang of CAS Dalian Institute of Chemical Physics invited to give a report

2025 年 3 月 21 日上午，中国科学院大连化学物理研究所冯亮研究员应邀访问新概念传感器与分子材料研究院，并作题为“薄膜基化学传感器研究及应用”的学术报告。

冯亮研究员团队长期致力于传感器敏感膜的表界面调控及待分析物分子的高效捕获研究，在纸基传感器快速检测方面进行了深入探究并部分取得了产业化应用。报告重点阐述了光化学比色和荧光传感器阵列对各种有毒有害物质、农药残留的快速、微量、便携式检测策略，基于待分析物的交互响应信号构建待分析物的特征“指纹图谱”，以及利用数理统计分析和大数据智能运算提升光学传感器的综合性能。此外，报告还介绍了团队在新型微型化、便携式光学传感器领域的研究进展。

报告会由丁立平教授主持，研究院师生等 50 余人参加了报告会，并与冯亮研究员在薄膜基化学传感器研究及应用方面进行了讨论。

On March 21, 2025, Feng Liang, a researcher from Dalian Institute of Chemical Physics, Chinese Academy of Sciences, was invited to visit the Institute of New Concept Sensors and Molecular Materials, and gave a report titled “Research and Application of Film-based Chemical Sensors”.

Feng Liang’s team has been committed to the surface and interface regulation of sensor sensitive films and the efficient capture of analytes molecules, and has conducted in-depth research in the rapid detection of paper-based sensors and some of them have achieved industrial applications. The report focuses on the rapid, trace and portable detection strategies of photochemical colorimetry and fluorescence sensor arrays for various toxic and harmful substances and pesticide residues, the construction of the characteristic “fingerprint” of analytes based on the interactive response signals of analytes, and the use of mathematical statistics analysis and big data intelligent operation to improve the comprehensive performance of optical sensors. In addition, the report also describes the team’s research progress in the field of new miniaturized, portable optical sensors.

The report was moderated by Prof. Ding Liping, and attended by more than 50 people, including teachers and students of the Institute, who discussed with Feng Liang in issues of the research and application of film-based chemical sensors.

中国二氧化氯学会黄志明会长来访

China Chlorine Dioxide Association chairman Huang Zhiming received

2025 年 3 月 28 日下午，中国二氧化氯学会黄志明会长到访新概念传感器与分子材料研究院，并与房喻院士及团队成员进行了座谈交流。

丁立平副院长先向黄志明会长介绍了研究院基本情况、发展理念，并与彭军霞教授一起陪同来宾参观了综合展厅。

在随后的座谈交流中，研究院专职科研人员王佩作了题为《“膜”法控释消毒除菌净化产品》的专题报告。随后，双方就二氧化氯消杀产品的国内外现状进行了交流，黄会长对研究院二氧化氯缓释消杀关键技术表示高度赞赏和认可。

研究院对外联络与行政办公室主任杨小刚及秘书左振男参加了座谈交流。

同日上午，房喻院士与黄志明会长赴临潼区调研考察西安伊利泰普克饮品有限公司，参观了伊利泰普克公司产区，与企业负责人就乳制品生产运输过程中的细菌消杀等问题进行了交流。临潼区科协主席牛志峰陪同调研考察。

On the afternoon of March 28, 2025, Huang Zhiming, chairman of China Chlorine Dioxide Society, visited the Institute of New Concept Sensors and Molecular Materials and had a discussion with Prof. Fang Yu and his team members.

INCSMM vice dean Prof. Ding Liping first introduced the basic situation and development concept of the Institute to Mr. Huang, and accompanied the guests to visit the exhibition room together with Prof. Peng Junxia.

In the ensuing discussion, Ms Wang Pei, a full-time research assistant of the Institute, presented a report titled “‘Membrane’ controlled-release disinfection and bacteriological purification products”. Subsequently, the two sides exchanged views on the status quo of chlorine dioxide disinfection products at home and abroad, and Mr. Huang highly appreciated and recognized INCSMM’s key technologies of chlorine dioxide controlled-release disinfection.

INCSMM Liaison and Administrative Office director Yang Xiaogang and secretary Zuo Zhenan participated in the discussion.

On the morning of the same day, Prof. Fang Yu and Mr. Huang Zhiming went to Lintong District to visit Xi’an Yilitaipu Beverage Co., Ltd., surveying its production area and communicating with its management on the bacteria elimination in the production and transportation of dairy products. Lintong District Science and Technology Association chairman Niu Zhifeng accompanied the visit.

缅怀史启祯先生：一位智者，一盏明灯

Remembering Prof. Shi Qizhen: A Sage, A Beacon

文 / 房 喻 by Fang Yu

上周五下午，我正在忙碌中，突然接到王尧宇老师的电话，得知史启祯先生已经离我们而去。这个消息如同一记重锤，击中了我的内心，让我深感震惊与悲痛。就在不久前，我还在与尧宇老师和新军院长的交谈中，多次询问史先生的身体状况。他们告诉我，史先生只是腿脚有些不便，身体并无大碍。当时，我与尧宇老师还商量着，找个合适的时间一起去深圳探望史先生和他的夫人曾先生。然而，世事无常，史先生竟突然驾鹤西去，留下了我们永远的遗憾。

回想起 2012 年 4 月，西北大学化学学科为庆祝史启祯先生从教 55 周年，举办了一场隆重的纪念活动。我有幸受邀参加，并在会后撰写了题为《假如他是一位将军》的短文，回顾了我与史先生的相识、相知，以及回国后与他的交往点滴。那篇文章不仅记录了史先生对我的深刻影响，也表达了我对他无尽的敬意与感激。如今，史先生已经离世，我心中充满了无尽的追思。在此，我想在十多年前那篇短文的基础上，补充一些内容，以表达对史先生的深切怀念。

史启祯先生作为首届国家级教学名师，不仅在学术上造诣深厚，更在人才培养、教育教学改革和教材建设等方面树立了典范。尤其是在他晚年，史先生将更多的精力投入到教学改革和教材建设中。他提出并实践的无机化学与分析化学教材体系重构，不仅具有深刻的内在逻辑和周密的顶层设计，更有着扎实的实践安排。这一体系真正体现了一位学界大家在教学改革、教材建设领域的高瞻远瞩和精准务实的战略思维，值得后辈深入研究和学习。

史先生最令人敬佩的，是他思想永不僵化、对新事物异常敏感的独特品质。在我多年的管理工作中，我接触过许多高校教师，其中大多数人，尤其是年事已高的教授，往往以年龄为由，拒绝接触新事物、学习新技术、掌握新能力。然而，史先生却始终保持着对知识的渴望和对创新的追求。他不仅自己不断学习，还鼓励学生和同事们勇于探索、敢于创新。正是这种精神，使得他在教育和科研领域始终走在前列。

在当今这个创新驱动发展的时代，中华民族的现代化建设正处于关键节点。创新已经成为国家发展的核心动力，而学校教育则肩负着培养具有创新思维和能力的人才的重任。在这样的背景下，史先生的创新思维品质显得尤为重要。他不仅是一位杰出的学者，更是一位具有前瞻性思维的教育家。他的教育理念和实践，为我们提供了宝贵的经验和启示。

史先生的离去，让我感到一种深深的失落，仿佛一盏指引前路的明灯突然熄灭。他的离开，不仅是教育界和学术界的巨大损失，更是像我这样曾深受他影响的人心中难以填补的空缺。每当想起他，我的脑海中总会浮现出他那温和的笑容、睿智的语言，以及他对学生、对后辈、对同事无微不至的关怀。我想，缅怀史先生最好的方式，就是像他一样，脚踏实地地工作，用心去培养每一个学生，用行动去推动每一份进步。史先生的一生，是对“师者，传道授业解惑”的最好诠释。他的离世，让我更加意识到，作为教师的责任。

史先生的离世，是我们教育界，特别是化学界的巨大损失。然而，他的精神和思想将永远激励着我们。让我们以努力工作来缅怀先生，继承遗志，以卓越的工作业绩告慰他的在天之灵。

天堂没有痛苦，愿史先生一路走好。我们将永远怀念他，铭记他对教育、对学术、对社会的巨大贡献。他的精神，如同不灭的星光，将继续照亮我们前行的道路。

2025 年 3 月 23 日

于陕西师范大学长安校区

Last Friday afternoon, I was in the middle of a busy day when I suddenly received a phone call from Mr. Wang Yao Yu and learned that Prof. Shi Qizhen had left us. This news hit me like a hammer, leaving me deeply shocked and saddened. Just a short time ago, I had asked about Prof. Shi’s health many times in my conversations with Yaoyu and dean Luan Xinjun. They told me that Prof. Shi was only having some difficulty with his legs and feet, and that his health was not in any serious condition. At that time, I also discussed with Yaoyu about scheduling a suitable time to visit Prof. Shi and his wife, Mrs. Zeng, in Shenzhen. However, as fate would have it, Prof. Shi suddenly passed away, leaving us with eternal regrets.

I recalled that in April 2012, the Chemistry Department of Northwestern University held a grand commemorative event to celebrate the 55th anniversary of Prof. Shi Qizhen’s teaching career. I was honored to be invited to participate in the event, and after the event, I wrote a short article titled “If he were a general”, which recalled my acquaintance with Prof. Shi and my interactions with him

after I returned to China from studying abroad. That article not only recorded the profound influence of Prof. Shi on me, but also expressed my endless respect and gratitude to him. Now that Prof. Shi has passed away, my heart is filled with endless memories. Here, I would like to add some contents on the basis of the short article written more than ten years ago, in order to express my deep remembrance of Prof. Shi.

As the first national teaching master, Prof. Shi Qizhen not only made profound academic attainments, but also set an example in talent cultivation, education and teaching reform and teaching materials construction. Especially in his later years, Prof. Shi devoted more energy to teaching reform and textbook construction. The reconstruction of the textbook system of inorganic and analytical chemistry proposed and practiced by Prof. Shi not only has a profound internal logic and thorough top-level design, but also has a solid practical arrangement. This system truly reflects the farsightedness and precise and pragmatic strategic thinking of a great scholar in the field of teaching reform and textbook construction, which is worthy of in-depth study and learning by younger generations.

What is most admirable about Prof. Shi is his unique quality of never being rigid in his thinking and being unusually sensitive to new things. In my many years of management, I have come into contact with many university teachers, most of whom, especially the elderly professors, often refuse to get in touch with new things, learn new technologies and master new abilities on the grounds of age. However, Prof. Shi has always maintained his desire for knowledge and pursuit of innovation. He not only kept learning himself, but also encouraged his students and colleagues to explore and dare to innovate. It is this spirit that makes him always at the forefront in the field of education and research.

In today's innovation-driven development era, the modernization of the Chinese nation is at a critical juncture. Innovation has become the core driving force of national development, while school education shoulders the important task of cultivating talents with innovative thinking and ability. Against this background, Prof. Shi's quality of innovative thinking is particularly important. He is not only an outstanding scholar, but also a forward-thinking educator. His educational philosophy and practice provide us with valuable experience and inspiration.

Prof. Shi's departure made me feel a deep sense of loss, as if a bright light guiding the way forward had suddenly gone out. His departure is not only a great loss to the educational and academic circles, but also an unfillable void in the hearts of people like me who had been deeply influenced by him. Whenever I think of him, his gentle smile, wise words, and his unfailing care for his students, juniors, and colleagues always come to my mind. I think the best way to remember Prof. Shi is to be like him, to work on the ground, to train every student with your heart and to push every progress with action to promote every progress. Prof. Shi's life is the best interpretation of the saying "Teachers should teach and solve problems". His passing away makes me realize even more my responsibility as a teacher.

Prof. Shi's passing is a great loss to our educational community, especially the chemistry community. However, his spirit and ideas will inspire us forever. Let us honor Prof. Shi's memory with hard work, carry on his legacy, and console his soul in heaven with outstanding work performance.

There is no pain in heaven, and may Prof. Shi have a good journey. We will always miss him and remember his great contributions to education, academia and society. His spirit, like an indestructible starlight, will continue to illuminate our path ahead.

March 23, 2025
At Chang'an Campus of Shaanxi Normal University

假如他是一位将军（序）

If He Were a General (Preface)

文 / 房 喻 by Fang Yu

前些天，西北大学王尧宇老师给我打电话，说要为史启祯先生出一本纪念性的册子，希望我能写几句话，共同庆贺史先生从教 55 周年。

早在上世纪八十年代中期，我就有幸目睹过史先生的风采，领略过他的学问。记得那是在西北大学老校区化学楼一间普通的教室，闻名世界的著名无机化学家，美国西北大学教授 Basolo 先生应邀讲学，史先生作陪并任翻译。闻讯我早早赶到，聆听了那场令人印象深刻，影响了我几十年的报告。正是那场报告让我知道了兰州大学有那样一位教授，学问了得，英语了得！ 1987 年下半年，我有幸到兰州大学进修，对史启祯先生开始有了更多的了解。当然，真正认识、了解史先生，乃至成为忘年交还是在 1998

年之后。1998 年秋天，我在国外学习工作多年之后回到母校陕西师范大学。那时先生已经调到西北大学工作，他的好友高世扬院士也来到西安，并受聘陕西师范大学化学学院。我当时尚年轻，又刚刚回国，对国内学界的很多规矩都不清楚，高先生和夫人夏树屏研究员给予了太多的教诲和帮助。正是为了让我尽快融入省内化学界，高先生和夏先生在我回国之初，就将我介绍给了他们的共同好友史启祯先生。至此以后，我和史先生的交往再没有间断过。

我和史先生虽说是忘年交，但每次交往几乎都是“索取”，这就是他对我思想观念更新、认识水平提升的不断帮助。后来我才知道，凡是与史先生有过较多交往的人都深有体会，史先生绝不是一位普通的、曾经出任过高校重要党政职务的教授。他是一位思想者，观察事物想问题总是较之一般人更加深刻，更加全面；史先生还是一位智者，他坦荡幽默，大智若愚，举重若轻。在做人上，先生是谦谦君子，与人交往，无论对方是学者还是学生，是官员还是百姓，是年长者还是年轻人，他都与之为善，平等相待。除了这些之外，史先生思想开明，观念前瞻，总是以积极的态度，饱满的热情对待新事物，学习新知识。只要你是有心人，就一定会从与他的交往中丰富知识，汲取营养，增长智慧。我时常在想，人和人的职业可以不同，承担的责任可以不同，但优秀的人一定会有一些共同的优秀品质。例如，优秀的人一定是有心人；优秀的人一定是善于学习，勤于思考的人；优秀的人也一定是独立思考，不简单人云亦云的人。

这些特点史先生都具备了。我相信，就是做一个将军，史先生也一定会常打胜仗。当然，史先生的成功离不开夫人曾克慰老师的默默奉献和支持，她那友善、豁达和贤惠的品格同样给我留下极为深刻的印象。在此，我由衷地祝愿她永远年轻。

时光荏苒，不经意间史先生已年近八十。我在感叹人生如梦、白驹过隙，红了樱桃、绿了芭蕉的同时，真的为能在过了不惑之年之后，还能结交一位像史先生这样不断给予我帮助，而又从不索取的忘年交朋友而感到幸运。我想，陕西的教育界、陕西的化学界也因有了一位这样优秀的长者、学者而使事业受益。让我们共同为史先生献上最衷心的祝愿，恭祝他与快乐健康永远结伴！

2012 年 4 月

A few days agp, Mr. Wang Yaoyu of Northwestern University called me and said that they wanted to publish a commemorative book for Prof. Shi Qizhen, and hoped that I could write a few words to celebrate Prof. Shi’s 55th anniversary of teaching career.

As early as the mid-1980s, I had the honor of witnessing Prof. Shi’s elegance and appreciating his knowledge. I remember that it was in an ordinary classroom in the Chemistry Building on the old campus of Northwestern University, where Prof. Basolo, a world-famous inorganic chemist at Northwestern University, was invited to give a lecture, accompanied by Prof. Shi, who also acted as an interpreter. I arrived early at the news and listened to that impressive lecture, which influenced me for decades. It was that report that let me know that Lanzhou University has that kind of a professor, with profound learning and skillful English! In the second half of 1987, I was fortunate enough to go to Lanzhou University for further study, and began to have a better understanding of Prof. Shi. Of course, I really knew and understood Prof. Shi, and even became a friend with him after 1998, when I returned to my alma mater, Shaanxi Normal University, after studying and working abroad for several years. At that time, Prof. Shi had already been transferred to Northwest University, and his good friend Chinese Academy of Sciences Academician Gao Shiyang had also come to Xi’an and began to work for the School of Chemistry of Shaanxi Normal University. I was still young and had just returned to China, so I was not clear about the rules of the domestic academic world, and Prof. Gao and his wife, Prof. Xia Shuping, gave me a lot of advice and help. In order to help me integrate into the chemistry community in the province as soon as possible, Prof. Gao and Prof. Xia introduced me to their mutual friend, Prof. Shi Qizhen, at the very beginning of my return to China. Since then, my interaction with Prof. Shi has never been interrupted.

Although Prof. Shi and I are friends through the years, but each interaction is almost always my “request” from him, which is his constant help in updating my thinking and concept and enhancing my cognitive level. Later I realized that anyone who has had more interactions with Prof. Shi has a deep understanding that he is by no means an ordinary professor who once held important party and government positions in universities. He is a thinker, observing things and thinking more deeply and comprehensively than the average person. Also a wise, frank and humorous man, Prof. Shi’s profound wisdom manifests in an unassuming demeanor, while his effortless ease in handling tasks reflects a rare blend of insight and composure. In terms of personal conduct, Prof. Shi is a modest gentleman, and he treats people with equality. No matter whether the other party is a scholar or a student, an official or a citizen, an elder or a young man, he treats them with goodness and equality. In addition to these, Prof. Shi is open-minded and forward-looking, always has a positive attitude, full of enthusiasm for new things, learning new knowledge. As long as you are a person with aspirations and determination, you will surely enrich your knowledge, draw nourishment and grow in wisdom from the interaction with him. I often think, people’s occupations can be different, their responsibilities can be different, but excellent people must

have some common excellent quality. For example, an excellent person must be a person with aspirations and determination; an excellent person must be a person who is good at learning and thinking; an excellent person must also be a person who thinks independently and does not simply think like others.

Prof. Shi has all these characteristics. I believe that even as a general, Prof. Shi will always win battles. Of course, Prof. Shi's success could not have been achieved without the silent dedication and support of his wife, Mrs. Zeng Kexin, whose friendly, open-minded and virtuous character also left a deep impression on me. Here, I sincerely wish her eternal youth.

Time flies, and before I knew it, Prof. Shi was nearly eighty years old. While sighing that life is like a dream, time passing quickly like a white pony's shadow across a crevice, as crimson cherries blush and emerald plantains sway, I really feel fortunate that I can make a friend like Prof. Shi after I turned forty, who keeps giving me help and never requests anything from me. I think that the academic cause of education and chemistry in Shaanxi have also benefited from having such an outstanding elder and scholar. Let us all offer Prof. Shi our most heartfelt wishes for a happy and healthy life forever!

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