陕西师范大学 SHAANXI NORMAL UNIVERSITY

化学化工学院 School of Chemistry & Chemical Engineering

新概念传感器与分子材料研究院 INSTITUTE OF NEW CONCEPT SENSORS AND MOLECULAR MATERIALS

新概念传感器与分子材料研究院 简报 09 2024

Institute of New Concept Sensors and Molecular Materials Newsletter

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房喻院士出席教授接待日活动与学生交流

Fang Yu interacts with students at Professor Reception Day activity

2024 年 9 月 8 日下午，房喻院士参与了化学化工学院举办的“教授接待日”活动，并与化学笃学 2301 班、化学（师范）2301 班、化学（创新实验班）2301 班、应用化学 2301 班全体同学进行了互动交流。

同学们向房喻院士提出了关于专业选择、实验安全、学科交叉等方面的问题，房喻院士解答了同学们的问题，并回顾了自己在求学和学术上的经历和故事，希望同学们应更主动、全面地去认识化学学科，固本创新，综合发展。

此次“教授接待日”活动由马佳妮教授、薄鑫副研究员主持。

On September 8, 2024, Prof. Fang Yu participated in the “Professor Reception Day” activity held by the School of Chemistry and Chemical Engineering and interacted with the students of Chemistry Duxue Class 2301, Chemistry (Teacher’s Training Class) 2301, Chemistry (Innovative Experimental Class) 2301, and Applied Chemistry Class 2301.

The students put forward questions to Fang Yu about major selection, experimental safety, interdisciplinary research. Fang Yu answered the questions, and recalled his own experience and stories in study and research, hoping that the students should be more active and comprehensive to understand the chemistry discipline, consolidate the basis, dare to innovate, and go for comprehensive development.

This “Professor Reception Day” activity was hosted by Prof. Ma Jiani and A/Prof. Bo Xin.

研究院团队获中国国际大学生创新大赛（2023）铜奖

INCSMM team wins Bronze Award in China International Collegiate Innovation Competition 2023

近期，教育部公布了中国国际大学生创新大赛（2023）获奖名单，新概念传感器与分子材料研究院师生团队获得高教主赛道铜奖。

研究院团队的参赛作品为“‘膜’法控释消毒除菌——空间安全守护者”，参赛学生为李重洋、曾嘉琪、彭旭阳、马岩婷、董芯如、周文、张怡和杨可欣，指导教师为彭军霞、刘太宏、霍源源、房喻。

Recently, the team of Institute of New Concept Sensors and Molecular Materials won the bronze award in the High Education Main Track the China International Collegiate Innovation Competition (2023) sponsored by the Ministry of Education.

The team’s entry is “Membrane Controlled Release Disinfection and Sterilization - Guardian of Space Security”. The student members of the team are Li Chongyang, Zeng Jiaqi, Peng Xuyang, Ma Yanting, Dong Xinru, Zhou Wen, Zhang Yi and Yang Kexin, and the instructors are Peng Junxia, Liu Taihong, Huo Yuanyuan and Fang Yu.


获奖证书
CERTIFICATE OF AWARD
作品名称：“膜”法控释消毒除菌——空间安全守护者
在中国国际大学生创新大赛（2023）中荣获铜奖
参赛学生：李重洋、曾嘉琪、彭旭阳、马岩婷、董芯如、周文、张怡、杨可欣
指导教师：彭军霞、刘太宏、霍源源、房喻
主办单位：
教育部、中央统战部、中央网信办、国家发展改革委、工业和信息化部、人力资源社会保障部、农业农村部、中国科学院、中国工程院、国家知识产权局、国家乡村振兴局、共青团中央、天津市人民政府
中国国际大学生创新大赛组委会
二〇二三年
证书编号：202310192Z

房喻院士出席 2024 陕西青年科学家大会

Fang Yu attends 2024 Shaanxi Young Scientists Conference

2024 年 9 月 11 日下午，房喻院士在宝鸡文理学院出席 2024 陕西青年科学家大会。

在“院士与青年科学家对谈交流”环节，房喻院士与西安石油大学黄海教授、西北农林科技大学王宁教授等围绕科技创新、成果转化、青少年科普等话题进行了探讨。

房喻院士向与会的青年科技工作者讲道：“想好‘做什么’比‘怎么做’更重要。青年人要有等不起、慢不得、坐不住的紧迫感，在各自领域坚守初心、埋头攻关，为实现高水平科技自立自强贡献力量。”

房喻院士还向青年科技工作者和学生代表赠书《与研究生师生一席谈》和《“陕”耀光芒——在陕两院院士风华录》。

大会以“科学家精神薪火相传，新质生产力青年共创”为主题，由陕西省科协主办，宝鸡文理学院、宝鸡市科协等承办。陕西青年科技奖获奖代表、全省优秀青年科技工作者代表以及宝鸡市高校师生代表共 500 余人参加。

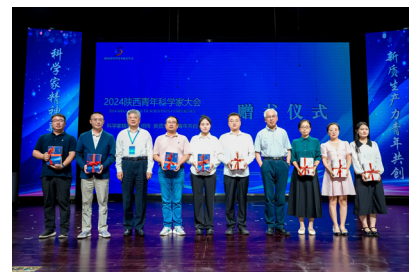
On September 11, 2024, Prof. Fang Yu attended the 2024 Shaanxi Young Scientists Conference at Baoji University of Arts and Sciences.

In the “Dialog Between Academician and Young Scientists” session, Fang Yu and Prof. Huang Hai of Xi’an Shiyou University and Prof. Wang Ning of Northwest A&F University discussed topics such as scientific and technological innovation, achievement transformation, and science popularization for young people.

Fang Yu said to the young scientific and technological workers at the meeting: “Knowing ‘what to do’ is more important than ‘how to do it’. Young people should have a sense of urgency that they cannot afford to wait, work slowly, or sit still, and they should stick to their original aspirations in their respective fields, immerse themselves in tackling key problems, and contribute to the realization of high-level scientific and technological self-reliance.”

Fang Yu also presented the books “A Talk with Graduate Students and Advisors” and “Shaanxi’s Shining Stars - Academicians in Shaanxi Province” to representatives of young scientists and students.

With the theme of “Passing on the spirit of scientists and creating new quality productivity among young people”, the conference was sponsored by Shaanxi Provincial Association for Science and Technology and organized by Baoji University of Arts and Sciences and Baoji Science and Technology Association. More than 500 delegates from Shaanxi Youth Science and Technology Award winners, provincial outstanding young science and technology workers, and Baoji university teachers and students attended the event.



房喻院士出席第三届陕西省科协年会

Fang Yu attends Third Annual Meeting of Shaanxi Provincial Association for Science and Technology

2024 年 9 月 11 日上午，房喻院士在宝鸡市出席第三届陕西省科协年会开幕式。

开幕式上，发布了《第三届陕西省科协年会专题调研成果》。中国工程院院士蒋庄德为新成立的陕西省传感器与物联网产业联盟授牌。

本届年会由陕西省科学技术协会和宝鸡市政府共同主办，围绕“培育新质生产力，赋能高质量发展”的主题，以国家战略需求为导向，立足推动陕西省科技创新，组织院士专家开展专题调研，在宝鸡市举行开幕式暨主旨报告和专项活动、弘扬科学家精神活动、产业论坛、科普活动等重点活动 15 项，在全省举办特色学术活动 26 项。全国学会代表，省内各高校、院所、企业，省级学会，以及宝鸡市各部门、相关企事业单位的领导和科技工作者代表等 700 余人参加会议。

On September 11, 2024, Prof. Fang Yu attended the opening ceremony of the Third Annual Meeting of Shaanxi Provincial Association for Science and

Technology in Baoji city.

At the opening ceremony, the Research Results of the Third Annual Meeting of the Shaanxi Science and Technology Association was released. Chinese Academy of Engineering academician Jiang Zhuangde presented the plaque of the newly established Shaanxi Province Industry Alliance for Sensor and Internet of Things.

Co-sponsored by Shaanxi Provincial Association for Science and Technology and Baoji Municipal Government, the annual meeting, which is themed "Cultivating new quality productivity, enabling high-quality development", aims to meet national strategic needs and promote scientific and technological innovation in Shaanxi Province. It also organizes academicians and experts to carry out special research, hold 15 key activities such as the opening ceremony, keynote reports, activities to promote the spirit of scientists, industrial forums and science popularization activities in Baoji City, and 26 featured academic activities in other places in the province.

More than 700 people including representatives of the national association, officials of colleges and universities in the province, enterprises, provincial associations, as well as Baoji municipal departments, related enterprises and institutions, and representatives of scientific and technological workers, attended the meeting.

房喻院士主持省科普作协常务理事会会议并为南山中学师生作报告

Fang Yu presides over Shaanxi Popular Science Writers Association meeting and speaks at Nanshan Middle School

2024 年 9 月 10 日晚，房喻院士在宝鸡参加并主持陕西科普作家协会第七届一次常务理事会会议。

9月 11 日上午，房喻院士在宝鸡市南山中学参加了“指尖星火”主题科普活动，为 2024 年陕西省优秀科普作品征集活动一等奖获奖者颁奖，并为南山中学师生作了题为《从科学的发展和技术的进步看教育看学习》的报告。

On the evening of September 10, 2024, Prof. Fang Yu attended and presided over the first Standing Council meeting of the seventh Shaanxi Science Writers Association in Baoji city.

On the morning of September 11, Fang Yu participated in the "Fingertip Spark" science popularization activity at Baoji Nanshan Middle School, in which he presented awards to the first prize winners of the 2024 Shaanxi Provincial Outstanding Popular Science Works Collection, and gave a report titled "Education and Learning from the Development of Science and Technological Progress" for Nanshan Middle School teachers and students.

彭浩南教授作人工智能赋能高校发展报告

Peng Haonan shares thinking on AI-powered university development

2024 年 9 月 14 日，新概念传感器与分子材料研究院彭浩南教授应陕西师范大学实验室建设与管理处邀请，作了题为“AI+X（科研、教育…）的一点思考”的报告。

在报告中，彭浩南教授分析了当前人工智能技术的发展及其在高校建设中的重要性，强调了其在提升科研效率、教学质量、人才培养等方面的潜力。实验室建设管理处、财务处、教务处、科技处等多个学校行政部门的领导听取了报告。

On September 14, 2024, Prof. Peng Haonan of the Institute of New Concept Sensors and Molecular Materials was invited by the Laboratory Construction and Management Office of Shaanxi Normal University to present a report titled “A Little Thought on AI+X (Research, Education...)”.

In the report, Peng Haonan analyzed the current development of artificial intelligence technology and its importance in the construction of universities, emphasizing its potential in improving research efficiency, teaching quality, and talent cultivation. The officials of the Laboratory Construction and Management Office, the Finance Office, the Teaching Affairs Office, the Science and Technology Office and other school administrative departments attended the session.

房喻院士出席西农大化学与药学院高质量发展暨学术论坛并作报告

Fang Yu attends High Quality Development and Academic Forum of College of Chemistry and Pharmacy of Northwest A&F University

2024 年 9 月 20 日，房喻院士出席西北农林科技大学化学与药学院举办高质量发展暨学术论坛，并作题为《敏感材料创新与 CBRN 传感器——以薄膜荧光传感器为例》的报告。

房喻院士从传感器的研究意义入手，强调基础研究的重要性，介绍了课题组近年来在高性能薄膜荧光敏感材料方面开展的开创性研究工作。

房喻院士谈及与西农大的深厚渊源，现场作校庆贺辞一首：“九秩教嫁 传薪播火 培育英才 促民族文明之进步，兴农强国 除旧布新 繁荣学术创国家发展之伟业”。

张生勇院士、西农大马建华副校长及化学与药学院师生共四百余人参加了此次论坛。

On September 20, 2024, Prof. Fang Yu attended the High Quality Development and Academic Forum held by the College of Chemistry and Pharmacy of Northwest Agriculture and Forestry University, and gave a report titled “Sensitive Materials Innovation and CBRN Sensors - Taking Film-based Fluorescence Sensors as an Example”.

Starting with the research significance of sensors, Fang Yu emphasized the importance of basic research, and introduced the pioneering research work carried out by his research group in recent years in the field of high-performance film fluorescence sensitive materials.

Talking about the deep connection with NWAFU, and Fang Yu made a congratulatory poem on the scene: “Ninety years of teaching, spreading en-lighting fires to cultivate talents and promote the progress of national civilization, Rejuvenating agriculture to build the country, destroying old ground and sow new seeds, for academic prosperity and national development.”

Academician Zhang Shengyong, NWAFU vice president Ma Jianhua and teachers and students of College of Chemistry and Pharmacy attended the forum.

房喻院士出席空军军医大学药学创新融合发展论坛并作报告

Fang Yu attends the Forum on Pharmaceutical Innovation and Integration Development of Air Force Military Medical University

2024 年 9 月 21 日，房喻院士出席空军军医大学药学创新融合发展论坛并作主旨报告，探讨了基础科学研究对创新发展的驱动。

论坛期间还举行了张生勇院士从研从教 60 周年荣誉颁授仪式。

军地等 10 余位杰出专家学者现场交流报告。空军军医大学张思兵校长，药学系及相关单位领导，学科带头人、科研骨干、研究生和本科生代表共 200 余人参加论坛。

On September 21, 2024, Prof. Fang Yu attended the Forum on Pharmaceutical Innovation and Integration Development of Air Force Military Medical University and made a keynote report, discussing the driving force of basic research on innovation and development.

During the forum, the ceremony to honor Academician Zhang Shengyong for the 60th anniversary of his research and teaching was also held.

More than 10 experts and scholars presented reports at the forum. More than 200 people attended

the forum, including Air Force Military Medical University president Zhang Sibing, officials of the Department of Pharmacy and related units, discipline leaders, key researchers, and representatives of graduate and undergraduate students.

刘忠山副教授参加第十四届环境毒理学与化学学会亚太国际会议并作报告

Liu Zhongshan presents at SETAC Asia-Pacific 14th Biennial Meeting

2024 年 9 月 21 日至 24 日，新概念传感器与分子材料研究院刘忠山副教授参加了在天津社会山国际会议中心举行的第十四届环境毒理学与化学学会亚太国际会议，并作了题为 Rapid extraction of target analytes from water by monolithic adsorbents 的学术报告。

SETAC 亚太国际会议每两年举办一次，本次会议由环境毒理学与化学学会亚太分会主办，南开大学环境科学与工程学院承办。

From September 21 to 24, 2024, Assoc. Prof. Liu Zhongshan of the Institute of New Concept Sensors and Molecular Materials attended the 14th Asia Pacific International Conference

of the Society of Environmental Toxicology and Chemistry (SETAC Asia-Pacific 14th Biennial Meeting) held at the Tianjin Society Hill International Conference Center, and presented a report titled “Rapid extraction of target analytes from water by monolithic adsorbents”.

Held every two years, this year’s SETAC Asia Pacific meeting is sponsored by Society of Environmental Toxicology and Chemistry Asia-Pacific and hosted by the School of Environmental Science and Engineering of Nankai University.

2023 级博士生开题汇报暨研究生学术论坛举行

Class of 2026 Doctoral Proposal Report and Graduate Student Academic Forum Held

2024 年 9 月 22 日，新概念传感器与分子材料研究院在报告厅举办了 2023 级博士生开题汇报暨研究生学术论坛。汇报会分别由丁立平教授、刘静教授、马佳妮教授和边红涛教授主持，研究院科研团队教师及研究生等 40 余人参加。

来自研究院、计算机科学学院的 15 位博士研究生分别就自己的科研工作进展、取得成绩和未来毕业论文工作计划进行了汇报，其中有物理化学专业博士研究生李晶、邵洋涛、苟欣瑜、陈永、王百惠、闫珍、方永盛、李英杰、罗艳、苏怡帆、胡定芳，分析化学专业博士研究生母双，有机化学专业博士研究生孙亚军，以及计算机科学学院的博士研究生姚聪和宁晗阳。

开题汇报之后，研究生们回答了评委老师提出的问题，与老师讨论了相关问题，并对之后的研究和工作进行了探讨和展望。

房喻院士发表总结讲话，鼓励青年教师和学生再接再厉，在未来科研工作中做好自己的工作，努力为国家多做一些有意义的工作。

On September 22, 2024, the Institute of New Concept Sensors and Molecular


Multi-component Strategies
Poor Controllability
Low Reproducibility
Complex Synthesis and Processir
Unpredictable Molecular Compatib
2017, 139, 5164.
Angew. Chem. Int. E
The integration strat
Raman signal enhar
precise detectior
Applicant : Shu
Supervisor : Prof
Major : Ana
Fluorescent Film Sensors (FFSs)
Multiple
Low
Portable
Hardware
Rev. 2010, 39, 4258; Chem. Soc. Rev. 2015, 4
ROSGPT
Synthetic R
界面
ion of a model system for interfaci
nd study of interfacial nonlinear spe
Reporter：Baihui Wang
Supervisor：Prof. Hongtao

Materials held a proposal report and a graduate academic forum for Class 2026 doctoral students in the lecture hall. The meeting was moderated by Prof. Ding Liping, Prof. Liu Jing, Prof. Ma Jiani and Prof. Bian Hongtao in sections, and was attended by more than 40 research faculty and graduate students from the institute.

Fifteen doctoral students from the institute and School of Computer Science reported on their research progress, achievements and future graduation thesis work plan, including Li Jing, Shao Yangtao, Gou Xinyu, Chen Yong, Wang Baihui, Yan Zhen, Fang Yongsheng, Li Yingjie, Luo Yan, Su Yifan, and Hu Dingfang in Physical Chemistry, Mu Shuang in Analytical Chemistry, Sun Yajun in Organic Chemistry, and the doctoral candidates Yao Cong and Ning Hanyang from the School of Computer Science.

After the proposal report, the graduate students answered the questions raised by the judges, discussed the relevant issues and the prospect of the future research and work with the teachers.

In his concluding speech, Prof. Fang Yu encouraged young teachers and students to make continuous efforts, do their own work well in the future research, and strive to do more meaningful work for the country.

团队科技创新故事入选首部产学研合作创新经典案例图书

Fang Group story featured in first book on industry-university-research cooperation and innovation

2024 年 9 月 25 日，首部聚焦产学研合作创新团队经典案例的《创新使命 担当——中国产学研百佳科技创新团队》在北京首发，光子鼻与分子材料团队的科技创新案例故事《独具特色的新概念传感器和分子材料研究——中国科学院院士房喻科技创新团队》入选此书。

本书遴选 60 位两院院士及 40 位科技领军人才等 100 位具有代表性的科学家、教育家、企业家为带头人的科技创新团队，展现了这 100 个创新团队跨学科、跨领域深度合作取得的成果和创新故事，涵盖生命科学、物质科学、空间科学、航空航天、集成电路、新一代信息技术、人工智能、智能制造、量子科技、新能源、新材料、生物医药、农业科技等多个领域。

本书由中国产学研合作促进会组织编写，旨在弘扬创新精神，激发产学研界及青少年对科技创新的浓厚兴趣与热情，鼓舞广大科技工作者奋勇拼搏、勇往直前，实现高水平的科技自立自强，在科技强国的建设征程中勇挑重担。

On September 25, 2024, "Innovation, Mission, Responsibility - China's top 100 Scientific and Technological Innovation Teams", the first book focusing on the classic cases of innovation teams in industry-university-research cooperation was launched in Beijing, and the innovation story of the Photonic Nose and Molecular Materials Group is featured in the book.

The chapter reflecting the group's innovation story is titled "Unique research on new concept sensors and molecular materials - CAS Academician Fang Yu's Science and Technology Innovation Team".

This book selects 100 representative scientific and technological innovation teams led by 60 academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering and 40 leading scientific and technological talents, showing the achievements and innovation stories of these 100 innovation teams' in-depth cooperation across disciplines and fields. It covers many fields such as life science, material science, space science, aerospace, integrated circuits, new generation information technology, artificial intelligence, intelligent manufacturing, quantum technology, new energy, new materials, biomedicine, and agricultural science and technology.

Compiled by China Association for the Promotion of Industry-University-Research Cooperation, this book aims to promote the spirit of innovation, stimulate the industry-university-research community and young people's strong interest in and enthusiasm for science and technology innovation, and inspire scientific and technological workers to strive bravely and courageously, to realize the high level of scientific and technological self-sustainability and self-reliance, and to take up the burden in the construction of a scientific and technological strong nation.

研究院开展跨频域 / 时域时间分辨光谱探测系统使用培训

Training on use of cross-frequency/time-domain time-resolved spectroscopy detection system held

2024 年 9 月 26 日下午，新概念传感器与分子材料研究院专职科研人员文瑞娟在研究院报告厅和超快实验室为研究生开展了跨频域 / 时域时间分辨光谱探测系统的使用培训，培训内容包括使用注意事项、预约方式、系统装置介绍、测试技巧等。研究院的邵洋涛等 12 名博士和硕士研究生参加了培训，并在文瑞娟的指导下先后进行了上机实操。

On September 26, 2024, Wen Ruijuan, a full-time research assistant of the Institute of New Concept Sensors and Molecular Materials, gave a training session on the use of the cross-frequency/time-domain time-resolved spectroscopy detection system to graduate students in the lecture hall and the Ultrafast Laboratory, covering topics such as usage tips, reservation method, system introduction, and testing techniques. Shao Yangtao and other 11 doctoral and master's students from the institute participated in the training and conducted hands-on practice under Wen Ruijuan's guidance.

研究院教师参加中国化学会第四届全国光功能材料青年学者研讨会

INCSMM teachers attend CCS 4th Photofunctional Materials Symposium for Young Scholars

2024 年 9 月 28 日至 30 日，房喻院士及新概念传感器与分子材料研究院多位教师参加了在陕西西安召开的中国化学会第四届全国光功能材料青年学者研讨会。

房喻院士主持了 9 月 30 日下午的大会报告。在分会场，丁立平教授作了题为“荧光功能材料创制及传感应用研究”的报告，刘静教授作了题为“铂配合物 (II) 自组装与发光性质调控研究”的报告，彭浩南教授作了题为“薄膜荧光传感表界面性质研究及毒剂探测应用”的报告，边红涛教授作了题为“典型半导体光功能材料界面光谱及超快动力学研究”的报告，刘太宏副教授作了题为“多偶极双光子荧光探针创制及激发态动力学”的报告。

本次会议主题为光功能材料与未来技术，由中国化学会光化学专业委员会及西安交通大学共同主办，西安交通大学前沿科学技术研究院承办。

From September 28 to 30, 2024, Prof. Fang Yu and teachers of the Institute of New Concept Sensors and Molecular Materials attended the 4th Chinese Chemical Society Symposium on Photofunctional Materials for Young Scholars held in Xi'an, Shaanxi Province.

Fang Yu chaired the plenary report session on the afternoon of 30 September. At the parallel sessions, Prof. Ding Liping presented a report titled “Research on Creation of Fluorescent Functional Materials and Their Sensing Applications”, Prof. Liu Jing presented a report titled “Research on Self-assembly of Platinum(II) Complexes and Regulation of Luminescent Properties”, Prof. Peng Haonan

presented a report titled “Research on Surface Interface Properties of Film Fluorescence Sensing and Toxic Agent Detection Application”, Prof. Bian Hongtao presented a report titled “Research on Typical Semiconductor Photofunctional Materials Interface Spectroscopy and Ultrafast Dynamics”, Assoc. Prof. Liu Taihong presented a report titled “Creation of Multi-dipole Two-photon Fluorescent Probes and Excited State Dynamics”.

Themed “Photofunctional Materials and Future Technologies”, the conference is co-sponsored by CCS Photochemistry Committee and Xi'an Jiaotong University, and hosted by XJTU's Institute of Frontier Science and Technology.

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Article

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Ultrathin near-infrared transmitting films enabled by deprotonation-induced intramolecular charge transfer of a dopant

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Dingfang Hu, Lingya Peng, Wenjun Xu, Shenghui Zhang, Zhongshan Liu & Yu Fang

去质子化诱导的分子内电荷转移实现的超薄近红外透过薄膜

Dingfang Hu, Lingya Peng, Wenjun Xu, Shenghui Zhang, Zhongshan Liu, Yu Fang. Nat. Commun. 2024, 15, 8197. DOI: 10.1038/s41467-024-52552-7

近红外（NIR）透过材料在许多领域有重要应用，但如何消除紫外–可见光区的光干扰以及解决吸收剂掺杂引起的薄膜厚度与透光率之间的权衡，仍是一个挑战。在此，我们报道了一种新型的近红外透过薄膜，该薄膜在厚度（16 μm）、截止波长（890 nm）和透光率（NIR 透光率 >90%，可见光透光率 <1%）方面表现出优异性能。薄膜的核心成分是含芘单酰亚胺单元的 C,N 螯合硼化合物（PMI–CBN）与有机碱 1,8– 二氮杂双环 [5.4.0] 十一碳 –7– 烯（DBU）形成的络合物。引入 DBU 后，PMI–CBN 的吸收波长从 709 nm 红移至 943 nm，这主要归因于增强的分子内电荷转移效应，导致 PMI–CBN 中 N–H 基团的去质子化。

将所得的 PMI–CBN/DBU 络合物分散在聚甲基丙烯酸甲酯（PMMA）基质中，可以形成柔性、自支撑且厚度可调的复合薄膜。该薄膜具有优异的光化学稳定性、耐热性和耐湿性。作为应用展示，这种创新的近红外透过薄膜已成功用于夜视成像和信息加密。我们相信，这种近红外透过薄膜在柔性电子器件和可穿戴设备等领域

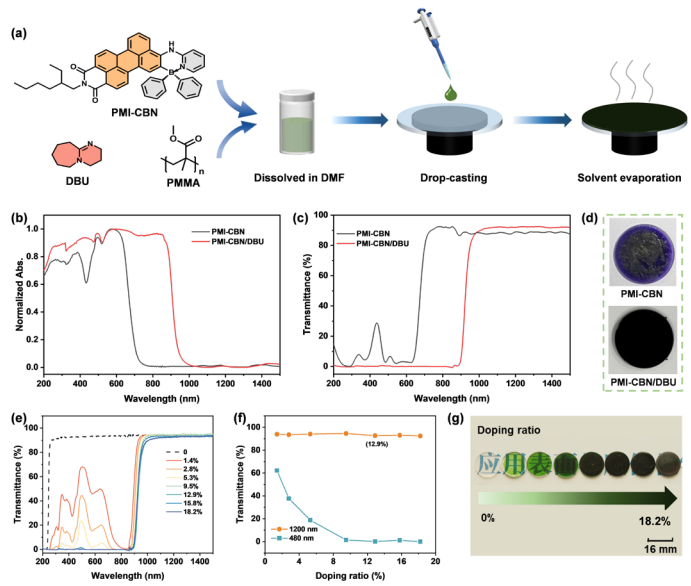

图 1. 近红外透过薄膜的制备及其光学特性；a）PMI−CBN/DBU/PMMA 薄膜制备的示意图；b）c）PMI−CBN/PMMA 和 PMI−CBN/DBU/PMMA 薄膜的紫外可见 – 近红外吸收和透过光谱；d）两种薄膜的照片；e）含不同 PMI−CBN 掺杂比的 PMI−CBN/DBU/PMMA 薄膜的透射光谱；f）分别在 480 nm 和 1200 nm 记录的透过率与 PMI−CBN 吸收剂掺杂比之间的关系图；g）PMI−CBN 的掺杂含量从 0 到 18.2 wt.% 变化时的薄膜照片。

Figure 1. Preparation and optical properties of NIR transparent film. a Schematic representation of the preparation of the PMMA films of PMI-CBN/DBU. b, c UV-vis-NIR absorption and transmittance spectra of the PMMA films of PMI-CBN and PMI-CBN/DBU. d Photographs of the two films as prepared. e Transmittance spectra of the PMI-CBN/DBU/PMMA films with varying doping ratios of PMI-CBN absorber. f Plots of the transmittances recorded at 480 and 1200 nm versus PMI-CBN absorber doping ratios. g Photographs of the PMI-CBN/DBU/PMMA films with doping contents varied from 0 to 18.2 wt.%.

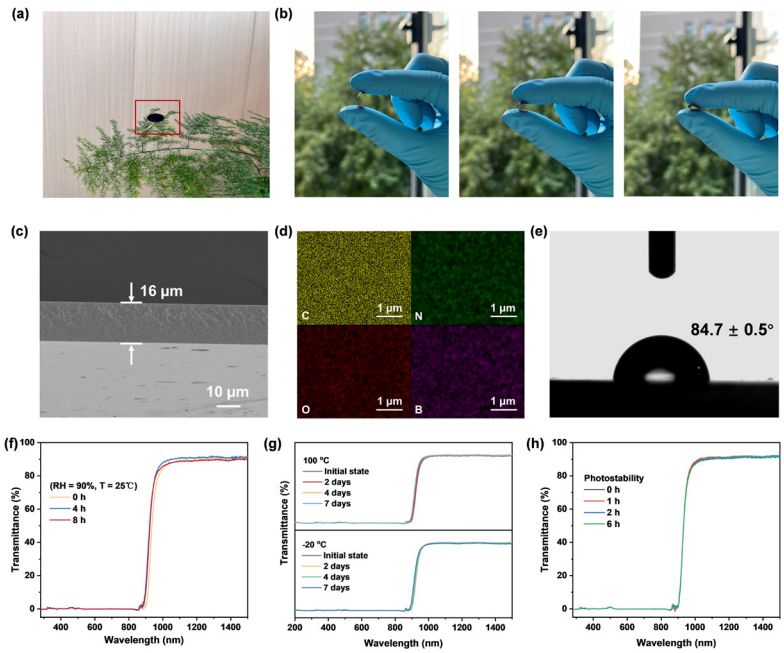

图 2. 薄膜的柔性、均匀性以及稳定性测试。a）自支撑 PMI−CBN/DBU/PMMA 薄膜的照片；b）不同弯曲程度的 PMI−CBN/DBU/PMMA 薄膜；c）薄膜的截面扫描电子显微镜（SEM）图像；d）薄膜的能量色散 X 射线（EDX）元素分布图，其中 C、N、O、B 分别代表碳、氮、氧和硼元素；e）PMI−CBN/DBU/PMMA 薄膜的接触角测试；f）g）h）PMI−CBN/DBU/PMMA 薄膜的湿度、温度以及光稳定性测试，光照条件为 1 kW·m^{-2}。

Figure 2 Flexibility, uniformity and stability tests for NIR transparent film. a Photograph of the self-standing PMI-CBN/DBU/PMMA film. b PMI-CBN/DBU/PMMA film of different bending angles. c Cross-sectional SEM image of the PMI-CBN/DBU/PMMA films. d EDX mapping images of the PMI-CBN/DBU/PMMA films, where the capital letters of C, N, O, and B represent carbon, nitrogen, oxygen, and boron elements, respectively. e Water contact angle test for the PMI-CBN/DBU/PMMA film. f and g Humidity and temperature stability of the PMI-CBN/DBU/PMMA film. h Photostability of the PMI-CBN/DBU/PMMA film under 1 kW·m^{-2} illumination.

有广阔的应用前景。

第一作者：陕西师范大学博士研究生胡定芳

通讯作者：陕西师范大学房喻院士、刘忠山副教授

全文链接：https://rdcu.be/dUo8I

Near-infrared transparent films demonstrate important applications in many fields, but how to eliminate light interference from ultraviolet-visible region and how to tackle the trade-off effect between film thickness and transmittance remain as challenges. Herein, we report a near-infrared transparent film that achieves high-efficient combination of thin thickness (16 μm), suitable cut-off wavelength (890 nm), and ideal transmittance (TNIR>90%, TVis<1%). The key component of the film is a complex of a specially designed boron compound containing a perylene monoimide unit (PMI-CBN) with an organic base 1,8-diazabicyclo[5,4,0] undec-7-ene. The complex depicts red-shifted absorption from 709 to 943 nm owing to deprotonation of the N-H group of PMI-CBN.

The obtained PMI-CBN/DBU complex was dispersed in a polymethyl methacrylate (PMMA) matrix, forming a flexible, self-standing composite file with adjustable thickness. This film exhibits excellent photochemical stability, heat resistance, and moisture resistance. As an application demonstration, this innovative near-infrared transparent film has been successfully used in night vision imaging and information encryption. We believe that this near-infrared transparent film has broad application prospects in fields such as flexible electronic devices.

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Interfacially Fabricated Covalent Organic Framework Membranes for Film-based Fluorescence Humidity Sensors and Moisture Driven Actuators

Xiangquan Liu, Rongrong Huang, Lingya Peng, Jinglun Yang, Junbao Yan, Binbin Zhai, Yan Luo, Chi Zhang, Shuwen Tan, Xiaoyan Liu, Liping Ding, Yu Fang

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界面聚合 COF 膜实现超低湿度检测和构建湿度致动器

Xiangquan Liu, Rongrong Huang, Lingya Peng, Jinglun Yang, Junbao Yan, Binbin Zhai, Yan Luo, Chi Zhang, Shuwen Tan, Xiaoyan Liu, Liping Ding, Yu Fang. Angew. Chem. Int. Ed. 2024, e202414472. DOI: /10.1002/anie.202414472

超低湿度的检测在半导体制造业、核工业、电力输送系统和航空航天领域具有重要意义。然而，现有的探测方法通常利用大型仪器测试，存在核心材料难以制备、设备庞大、昂贵、系统复杂的缺点。因此，开发尺寸小、结构相对简单、可原位在线监测超低湿度的传感器具有重要意义。

薄膜荧光传感器基于荧光物种在激发态丰富光物理过程对外界环境的高度敏感性而具有灵敏度高、可设计性强、易于制备、硬件结构简单、选择性好等优势。此外，COF 材料由于其具有结晶性好、孔道丰富、结构明确、稳定性好等优点被广泛的应用于催化、分离、传感和光电探测等领域。本研究工作通过液液界面聚合的方法合成了湿度敏感的 COF 膜（图 1），并基于该 COF 膜构建了新型超低湿度荧光传感器。FT-IR、XRD、SEM、TEM 表征表明了该 COF 膜的成功合成（图 2）。

基于该 COF 膜对低湿度表现出荧光猝灭响应，作者构建了超低湿度荧光传感器（图 3）。该传感器的检出限可低至 0.005 ppm，并具有快速响应 / 恢复速度 (2.2 s/2.0 s)。传感器的性能在超过 7000 次的连续测试后并没有表现出明显的变化。此外，该传感器能够实现对手套箱内超低湿度的原位在线监测，其输出的信号与手套箱内置的商用传感器信号保持同步。在湿度低于 0.01 ppm 时，该传感器仍具有区分能力。

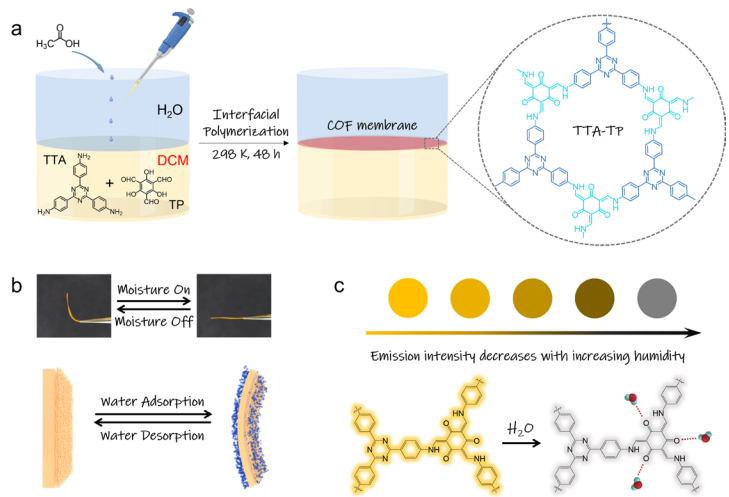

图 1. TTA−TP COF 膜的制备及其湿度响应示意图

Figure 1. Schematic representation of the β-ketoenamine linked TTA-TP COF membrane and its shape deformation and fluorescence response to humidity stimulus.

此外，该 COF 膜还在水蒸气刺激

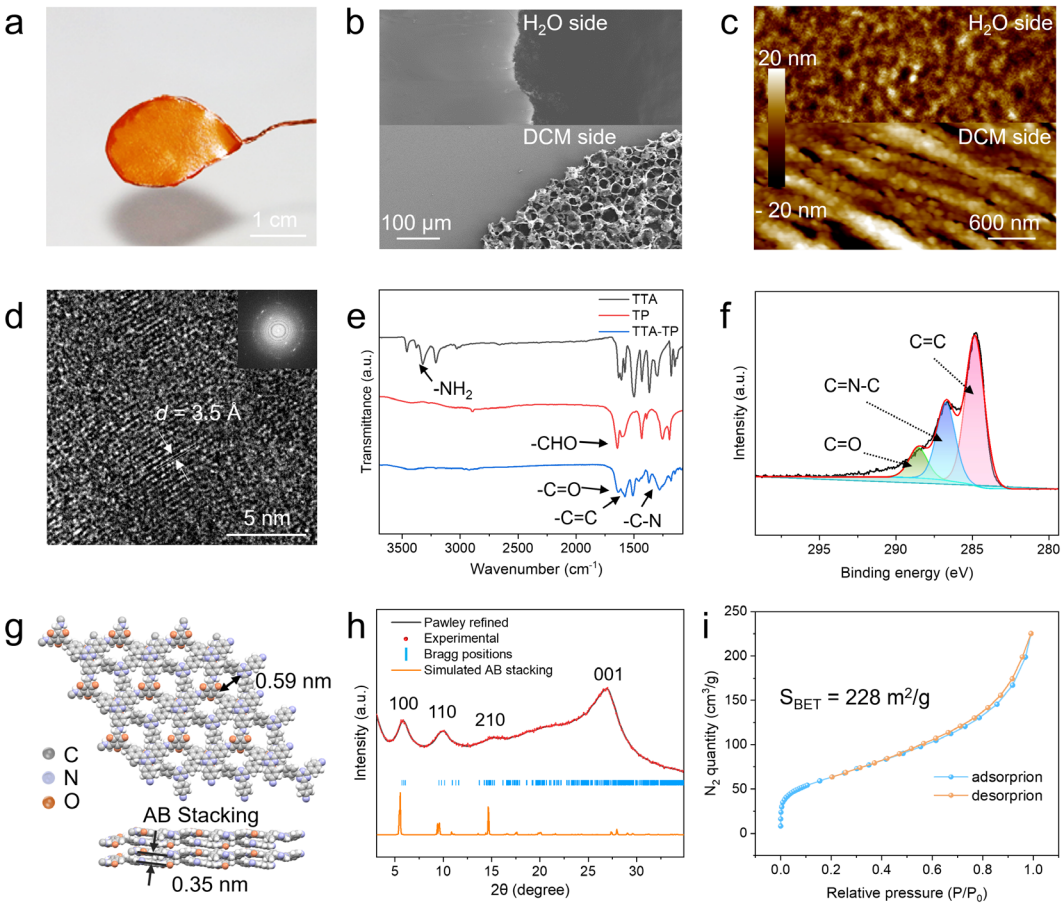

图 2. TTA−TP COF 膜的照片、形貌和结构表征

Figure 2. Photograph and characterization of the TTA-TP COF membrane.

下具有快速形变和恢复的能力。基于此作者设计了在湿度驱动下能够定向爬行的软体机器人和能实现对小灯泡亮灭的无接触控制的智能开关（图 4）。另外，该 COF 薄膜能在不同湿度下呈现出不同形态，因此可实现对湿度的可视化探测。

作者对该薄膜的湿度响应机理进行了研究（图 5），红外光谱研究表明膜内的亲水羰基结构会与水分子形成氢键，理论计算发现氢键的形成使得 COF 膜结构由平面变为扭曲，降低了其吸收和荧光发射强度。

这项研究为利用 COF 材料开发超灵敏薄膜荧光传感器和高性能致动器提供了新思路。

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通讯作者：陕西师范大学刘小燕副教授、丁立平教授、房喻院士

全文链接：https://doi.org/10.1002/anie.202414472

Ultra-low humidity (< 100 ppm) measurement is essential in semiconductor production, nuclear industry, aerospace field, fuel storage, organic synthesis, etc. Several sophisticated techniques have been developed for ultra-low moisture determination, such as mirror-based dew point hygrometers, atmospheric pressure ionization mass spectrometry, cavity ring-down spectroscopy, special capacitive sensing system. Although these methods can achieve measurement of humidity at ppm-level, they typically require costly instruments, which will no doubt restrict their broad applications. Therefore, it necessitates to explore novel materials and develope new humidity sensing mechanism sensors that can portablely, reliablely and rapidly detect ultralow humidity.

In this work, we fabricated a few micro-meter thick, defect-free COF membranes via interfacial (CH2Cl2/H2O) condensation of 1,3,5-tris-(4-aminophenyl)triazine (TTA) with 1,3,5 triformylphloroglucinol (TP) (Figure 1). The membrane was characterized by using FT-IR, XRD, SEM, and TEM, indicating the successful synthesis of the COF membrane (Figure 2). Based on the super-sensitive and reversible response of the COF membrane to water vapor, we

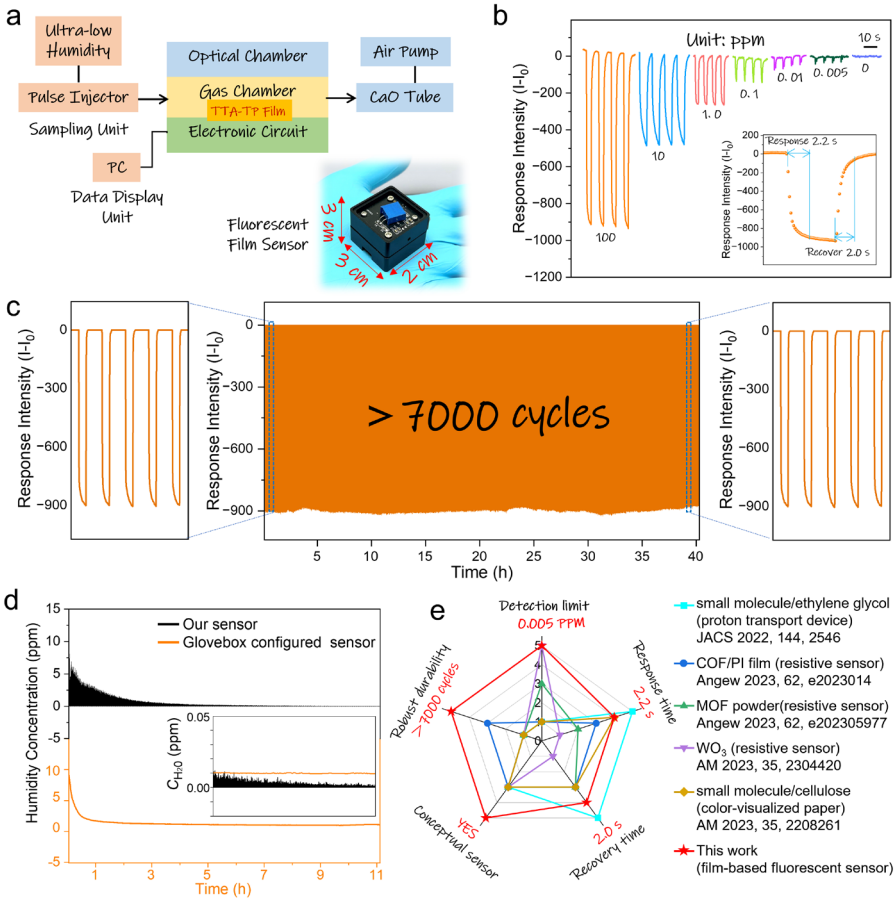

图 3. 荧光传感器的超低湿度检测性能

Figure 3. Humidity sensing performance of the TTA-TP COF membrane.

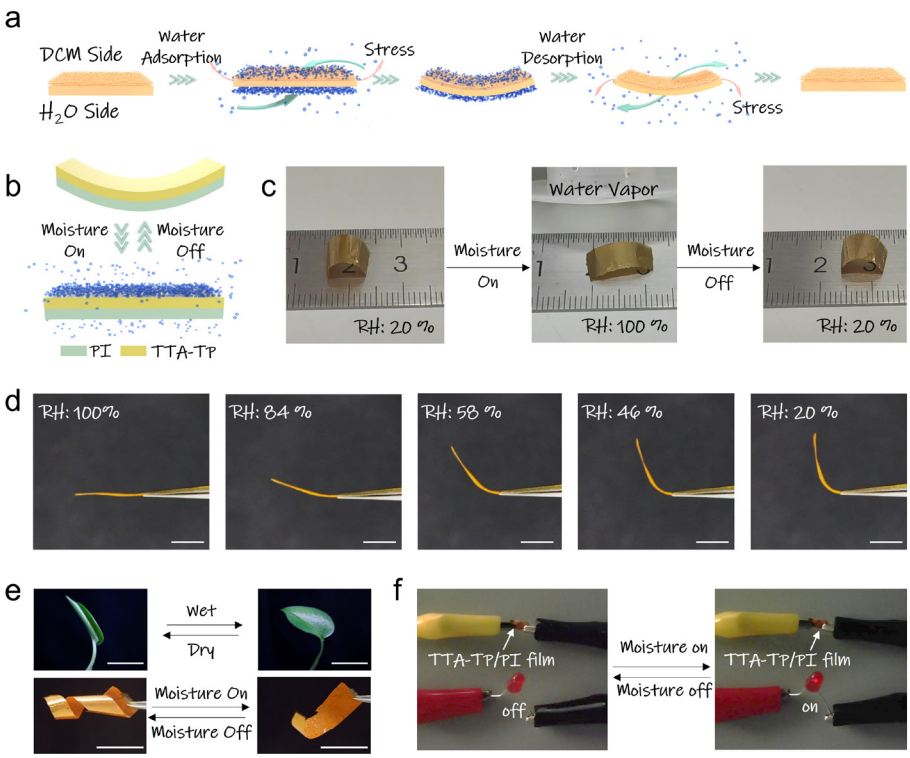

图 4. 基于 TTA–TP COF 膜致动器的湿度变形行为

Figure 4. Humidity-responsive behaviors of the TTA-TP COF membrane-based actuators.

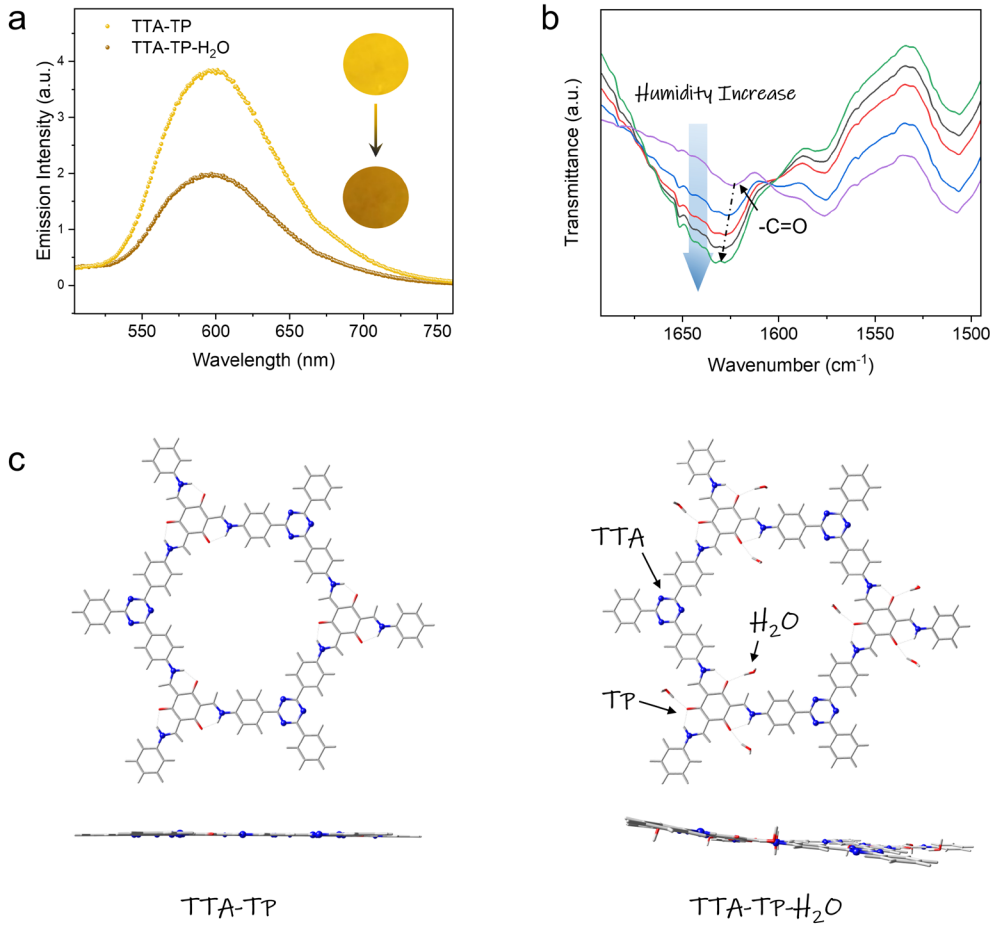

图 5. TTA−TP COF 膜湿度响应机理

Figure 5. Investigation of the fluorescence quenching mechanism of the TTA-TP COF membrane to water.

developed a high-performance film-based fluorescence humidity sensor (Figure 3), depicting unprecedented detection limit of 0.005 ppm, fast response/recovery (2.2 s/2.0 s), and a detection range from 0.005 to 100 ppm. Remarkably, more than 7,000-time continuous tests showed no observable change in the performance of the sensor. The applicability of the sensor was verified by on-site and real-time monitoring of humidity in a glovebox. The sensor still exhibits distinguishing capability when the humidity is below 0.01 ppm.

In addition, the COF membrane exhibits rapid deformation and recovery capabilities under water vapor stimuli. Based on this, we designed a soft robot that can crawl directionally driven by humidity, as well as an intelligent switch that enables contactless control of the on/off state of a small light bulb (Figure 4). Furthermore, the COF membrane can display different shapes under varying humidity levels, allowing for visual detection of humidity.

Furthermore, we studied the humidity response mechanism of the membrane (Figure 5). FT-IR spectroscopy studies indicated that the hydrophilic carbonyl groups within the membrane form hydrogen bonds with water molecules. Theoretical calculations revealed that the formation of hydrogen bonds causes the structure of the COF membrane to transition from a planar to a distorted state, resulting in a decrease in its absorption and fluorescence emission intensity.

This study develops a new method to the design of ultra-sensitive film-based fluorescent sensors (FFSs) and high performance actuators.

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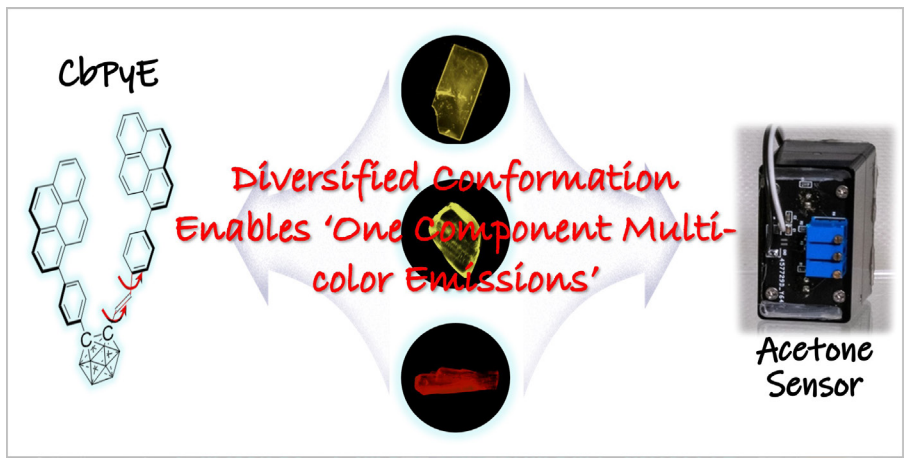
Multicolor Emission in *o*-Carborane Derivatives Induced by Conformation Diversity through C–C Double Bond Substitution

Jing Li, Lingya Peng, Simin Lin, Xubin Wang, Rong Miao,* and Yu Fang*

Cite This: *J. Phys. Chem. Lett.* 2024, 15, 9247–9254 Read Online

通过碳 – 碳双键调控分子构象多样性构筑多色发光邻碳硼烷衍生物

Jing Li, Lingya Peng, Simin Lin, Xubin Wang, Rong Miao* and Yu Fang*. J. Phys. Chem. Lett. 2024, DOI: 10.1021/acs.jpclett.4c02113



发光材料在传感器、光电器件、发光二极管、信息加密等许多领域都是必不可少的。近年来，基于单一荧光团的多色发光材料因其丰富的光学性质和对外部刺激的智能响应而备受关注。基于单荧光团的多色发光材料的研究不仅有利于在相关领域的应用，而且可以促进对荧光的更深入的认识。

在这项工作中，我们报告了一种基于双臂邻碳硼烷衍生物的不对称性来开发单组分多色发光材料的新策略（图 1）。该方法利用 C–C 双键将芘基团与邻碳硼烷连接，构成具有之字形臂的化合物 (CbPyE)。之字形臂可以固定为向内或向外的形式，不对称性有效地增加了 CbPyE 的构象多样性（图 2）。两臂之间的位阻是向外的有效调制，这有利于分子内旋转，并导致晶体具有不同的发射颜色。CbPyE 的多构象也有利于制备多色荧光薄膜，使丙酮蒸汽检测的响应可调。这项工作强调了小的结构变化对分子构象和光致发光性质的巨大影响。

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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/acs.jpclett.4c02113

Luminescent materials are indispensable in many fields, such as sensors, optoelectronic devices, light emitting diodes and information encryption. In recent years, multi-color luminescent materials based on a single fluorophore have attracted considerable attention because of their abundant optical properties and smart response to external stimulus. Study on single fluorophore-based multi-color luminescent materials not only favors the applications in related areas, but also promote more in-depth understanding of fluorescence.

In this work, we report a new strategy to develop single-component

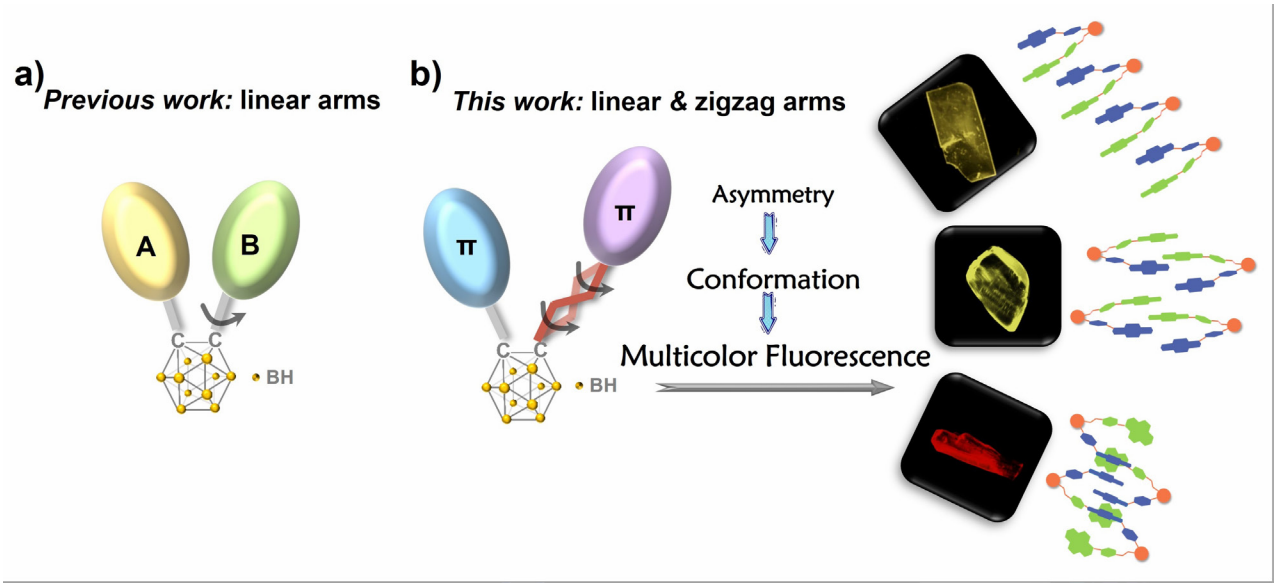

图 1. (a) 邻碳硼烷衍生物的传统分子结构；(b) 当前具有之字形臂的分子设计与可错位旋转导致晶体中不同的堆积模式。
Figure 1. Conventional molecular structures of o-carborane derivates (a) and present molecular design (b) featuring misalignment rotation with the zigzag arm induced different packing modes in crystal.

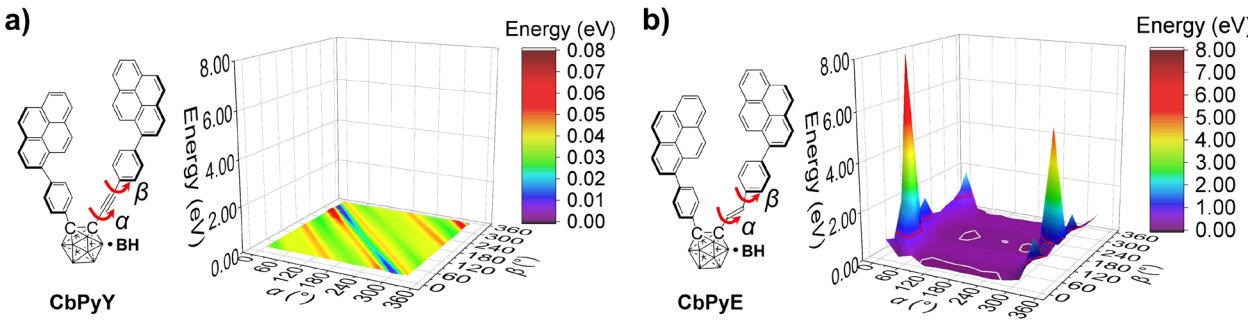

图 2. 通过计算旋转两个二面角 (α 和 β) 得到的 CbPyY (a) 和 CbPyE (b) 基态势能面图，其中 (b) 中的白线和红线分别是 0.1 eV 和 0.9 eV 的等值线。
Figure 2. Illustration of the defined dihedral angles (α and β) and ground state potential energy surfaces of CbPyY (a) and CbPyE (b) calculated via rotation of the two angles, where the white and red lines in (b) are the contours at 0.1 eV and 0.9 eV, respectively.

multi-color emissive materials based on bringing asymmetry in double-armed o-carborane derivatives (Figure 1). In the method, C-C double bond is utilized to connect pyrene group to o-carborane, producing a compound with a zigzag arm (CbPyE). Layout of the zigzag arm could be inward or outward and conformation diversity of CbPyE has been effectively increased as a result of the asymmetry of the zigzag arm (Figure 2). The steric hinderance between the two arms is effective modulation in the outward form, which facilitates intramolecular rotation and leads to crystals with different emission colors. Versatile conformation of CbPyE also facilitated the preparation of multi-color fluorescence films, enabling tunable response in acetone vapor detection. This work highlights the great influence of small structural variation on molecular conformation as well as photoluminescence properties.

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丁立平教授受邀赴宁夏师范大学交流并作报告

Prof. Ding Liping presents at Ningxia Normal University

2024 年 9 月 5 日，新概念传感器与分子材料研究院丁立平教授受邀赴宁夏师范大学进行学术交流，并作了题为“交互响应性荧光聚集体传感器的构建与区分性能”的报告。

报告会在宁夏师范大学图书馆报告厅举行，由宁师大化学化工学院副院长周生学主持，宁师大化学化工学院师生参加了报告会。

On September 5, 2024, Prof. Ding Liping of the Institute of New Concept Sensors and Molecular Materials was invited to Ningxia Normal University for academic exchange and gave a report titled “Construction and performance differentiation of interactive responsive fluorescent aggregate sensor”.

The report session was held in the lecture hall of the Library of Ningxia Normal University, presided over by Zhou Shengxue, deputy dean of NNU’s School of Chemistry and Chemical Engineering and attended by SCCE teachers and students.

中国科学技术大学江俊教授应邀作报告

USTC Prof. Jiang Jun invited to give a report

2024 年 9 月 23 日上午，中国科学技术大学江俊教授受邀访问新概念传感器与分子材料研究院，并作题为“理实交融的机器化学家探索”的学术报告。

江俊教授介绍了其团队研发的数据智能驱动“机器化学家”平台，整合移动机器人、智能化学工作站、高通量计算系统等工具，实现科研全流程的智能化探索。报告中提到的机器化学家在开发高熵催化剂等研究中的表现引起了在场师生的浓厚兴趣。

报告会由边红涛教授主持，房喻院士、化学化工学院薛东院长以及研究院部分教师及研究生参加了此次报告会，并与江俊教授围绕机器化学技术的应用及其对教育和社会的潜在影响展开了讨论。

On September 23, 2024, Prof. Jiang Jun from the University of Science and Technology of China was invited to visit the Institute of New Concept Sensors and Molecular Materials, and gave a report titled “Exploration of Machine Chemist Integrating Theory and Practice”.

Prof. Jiang Jun introduced the data-driven intelligent “Machine Chemist” platform developed by his team, which integrates mobile robots, intelligent chemistry workstations, high-throughput computing systems and other tools to realize intelligent exploration of the entire research process. The performance of machine chemist in the development of high entropy catalysts and other research mentioned in the report aroused great interest of teachers and students present.

The report was moderated by Prof. Bian Hongtao. Prof. Fang Yu, School of Chemistry and Chemical Engineering dean Dong Xue, and INCSMM faculty members and graduate students attended the report and discussed with Prof. Jiang on the application of machine chemistry technology and its potential impact on education and society.

陕师大雁塔第二实验学校师生来院科普参观学习

Yanta No. 2 Experimental School teachers and students received for science popularization tour

2024 年 9 月 23 日上午，陕西师范大学雁塔第二实验学校 70 余名二年级学生在老师带领下前来新概念传感器与分子材料研究院进行科普参观学习。

张荷兰高级工程师为师生们作了题为《神奇的马兰戈尼效应》的科普讲座。

刘太宏副教授向同学们介绍了研究院基本情况和发展理念，带领他们参观了研究院成果展厅，讲解了房喻院士团队研发的爆炸物探测仪、毒品探测仪等科研成果转化产品。

On September 23, 2024, more than 70 grade two students and their teachers from Yanta No. 2 Experimental School of Shaanxi Normal University visited the Institute of New Concept Sensors and Molecular Materials for a science popularization tour.

Senior engineer Zhang Helan gave the visitors a science lecture titled “The Magic Marangoni Effect”.

Assoc. Prof. Liu Taihong introduced the basic situation and development concept of the institute to the students, led them to visit the achievements exhibition hall of the institute, and explained the industrialized products of research results such as explosive detector and illicit drug detector developed by Prof. Fang Yu’s group.

陕西省人社厅孟小瓒副厅长看望慰问房喻院士

Shaanxi Department of Human Resources and Social Security visits Prof. Fang Yu

2024 年 9 月 24 日上午，陕西省人力资源和社会保障厅党组副书记、副厅长孟小瓒到访新概念传感器与分子材料研究院，看望慰问房喻院士，并与房喻院士进行了座谈交流。人社厅政策法规处副处长张率华陪同慰问。

On September 24, 2024, Meng Xiaozan, deputy director of the Human Resources and Social Security Department of Shaanxi Province, visited and had a meeting with Prof. Fang Yu at the Institute of New Concept Sensors and Molecular Materials. Zhang Shuaihua, deputy director of the Policy and Regulations Division of the Department, accompanied the visit.

中国仪器仪表学会一行来院调研考察

China Instrument and Control Society guests received for survey and cooperation visit

2024 年 9 月 24 日，中国仪器仪表学会国际部主任单惠敏率学会传感器领域会员企业来新概念传感器与分子材料研究院调研考察，共商合作前景。

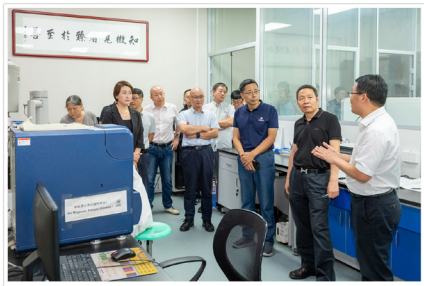
学会人员及传感器领域 13 家会员企业代表先后参观了陕西师范大学大型科学仪器共享平台和新概念传感器与分子材料研究院，听取了陕西师范大学、化学化工学院学院和研究院科研工作情况汇报，并就加强联络沟通、校企合作、成果转化等进行了座谈交流。

学会国际部项目主管张梦雨、韩子昕，中国科学院房喻院士，化学化工学院党委书记高玲香教授，科学技术处副处长席政军，化学化工学院副院长刘成辉教授，研究院副院长丁立平教授以及研究院相关人员出席了会议。

On September 24, 2024, Ms Shan Huimin, director of the International Department of the China Instrument and Control Society, and Project Managers Zhang Mengyu and Han Zixin, led a delegation of member enterprises in the sensor field of the society to the Institute of New Concept Sensors and Molecular Materials in a survey visit for prospective cooperation.

Representatives of the society and 13 member enterprises in the field of sensors visited Shaanxi Normal University's Large Scientific Instrument Sharing Platform and the Institute of New Concept Sensors and Molecular Materials, listened to reports on the research work of Shaanxi Normal University, School of Chemistry and Chemical Engineering and the Institute, and had discussions with SNNU officials and faculty on strengthening communication and exchange, school-enterprise cooperation, and achievement transformation.

CICS International Department project managers Zhang Mengyu and Han Zixin, Prof. Fang Yu, SCCE Party Committee secretary Prof. Gao Lingxiang, SNNU Science and Technology Department vice director Xi Zhengjun, SCCE vice dean Prof. Liu Chenghui, INCSMM vice dean Prof. Ding Liping, and relevant faculty and staff of the Institute attended the meeting.

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中国仪器仪表学会、国际智能感
传感器企业调研考察
主办单位：中国仪器仪表学会、国际智能感知学会
承办单位：陕西师范大学新概念传感器与分子材料
2024年09月24日


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2024年09月2


中国仪器仪表学会、国际智能感知学会（筹）
传感器企业调研考察交流会
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2024年09月24日


凝胶乳液软模板
新型硬质防水透气膜
厚德 积学
励志 笃行


新概念BTEX
薄膜荧光传感器

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