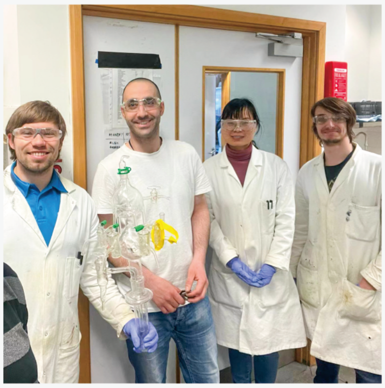
陕西师范大学
SHAANXI NORMAL UNIVERSITY

化学化工学院
School of Chemistry & Chemical Engineering

12 / 2023

光子鼻与分子材料团队 简 报

Photonic Nose and Molecular Materials Group Newsletter



目 录 Contents

十二月大事记 Events in December

研究亮点 Research Highlight

交流合作 Exchange & Cooperation

心绪感悟 Thoughts and Reflections

“普立瑞 健康中国”视频大赛颁奖仪式举行

Award ceremony of “Poliporous - Healthy China” video competition held

2023年12月6日下午，“普立瑞 健康中国”视频创意大赛颁奖仪式在新概念传感器与分子材料研究院报告厅举行。房喻院士、化学化工学院党委书记高玲香教授、贾颖辉副书记、陕西中造立成高分子材料有限公司副总经理王莉娟、研究院副院长丁立平教授、彭军霞副教授、办公室主任杨小刚及大赛入围、获奖团队学生约40人出席颁奖仪式。颁奖仪式由校团委副书记王蓓蓓主持。

王蓓蓓首先介绍了相关情况。为引导师大学子崇尚科学，热爱科学，培养科技创新精神，激发学生的创新潜能和创造活力，校团委联合新概念传感器与分子材料研究院，在陕西中造立成高分子材料有限公司支持下，启动了“普立瑞 健康中国”创意视频大赛，组委会收到来自全校17个学院学生团队的64件作品，经过资格审查、专家评审，共评选出获奖作品11件，其中入围奖5件、三等奖3件、二等奖2件和一等奖1件，分别奖励2000元、1000元、500元和200元奖金。

贾颖辉宣读了获奖名单，王莉娟和彭军霞为获得入围奖获奖团队颁奖，丁立平为为三等奖获奖团队颁奖，高

玲香为二等奖获奖团队颁奖，房喻院士为一等奖获奖团队颁奖。

随后，大家一起观看了一二三等奖获奖视频作品展示。

一等奖获奖团队代表、新闻与传播学院学生李柯漩发言，分享了她和团队伙伴一起开动脑筋想创意，拍摄剪辑成片的过程，以及从中得到的感悟、收获和成长。

高玲香在讲话中感谢了房喻院士对大赛的支持和指导，以及校团委对活动的重视，表示化学为我们的生活和未来创造了很多美好的条件，这次活动增加了同学们对化学学科和生活相结合的了解，希望今后更多开展有关化学学科的宣传活动，号召大家学习房喻院士的教育家精神，学会享受科研，努力奉献社会。

房喻院士在讲话中谈了自己对于师大的感情，分析了国际上的科技竞争形势，提出“世界上的发达国家没有哪一个不是因为重视教育而发达起来的”“有实力才有尊严”，指出教育是国家的未来、是民族的未来，寄语青年学生要勇于为国家和民族的发展承担起自己的责任，同时希望校团委多举办有利于青年学生成长，有利于学校发展的活动。

“普立瑞”系列消杀产品依托房喻院士团队研发的孔结构和表面化学可精确调控的控释膜制备技术与中造立成合作研发，实现了二氧化氯安全可控缓释，能高效杀灭病毒、去除致病微生物，目前已成功应用于酒店、食物制作间、宠物店等场所。

On December 6, 2023, the award ceremony of the “Poliporous - Healthy China” Creative Video Competition was held in the lecture hall of the Institute of New Concept Sensors and Molecular Materials, Shaanxi Normal University.

Prof. Fang Yu, School of Chemistry and Chemical Engineering Party Committee secretary Prof. Gao Lingxiang, deputy secretary Jia Yinghui, vice general manager Wang Lijuan of Shaanxi Zhongzao Licheng Polymer Materials Co., Ltd., INCSMM vice dean Prof. Ding Liping, Assoc. Prof. Peng Junxia, Administrative Office director Yang Xiaogang and students from the finalists and winning teams attended the award ceremony, which was presided over by Wang Beibei, deputy secretary of SNNU Youth League Committee.

Wang Beibei first gave a brief of the competition. In order to guide SNNU students to advocate science, love science, cultivate the spirit of scientific and technological innovation, and stimulate the students’ innovation potential and creativity, SNNU Youth League Committee and the Institute of New Concept Sensors and Molecular Materials, with the support of Shaanxi Zhongzao Licheng Polymer Materials,

jointly launched the “Poliporous - Healthy China” creative video competition, which attracted 64 works from the student teams of 17 schools of the university. After qualification examination and expert review, 11 winning works were selected, including 5 finalists, 3 third prizes, 2 second prizes and 1 first prize, with prizes of 2000 yuan, 1000 yuan, 500 yuan and 200 yuan respectively.

Jia Yinghui read out the list of winners, Wang Lijuan and Peng Junxia presented the finalists award, Ding Liping presented the third prize award, Gao Lingxiang presented the second prize award, and Fang Yu presented the first prize award.

Then, the first, second and third prize videos were displayed.

Li Kexuan, a student of the School of Journalism and Communications and a representative of the first prize winning team, shared the process of thinking creatively together with her team partners, shooting and editing the film, as well as the reflection and growth obtained from it.

Gao Lingxiang thanked Prof. Fang Yu for his support and guidance to the competition, as well as the good work done by the Youth League Committee, saying that chemistry has created a lot of beautiful conditions for our life and future, and this activity has increased students’ understanding of the combination of chemistry and life, and she hope more publicity activities related to chemistry could be carried out in the future. She also called upon the students to learn the educator spirit of Prof. Fang Yu, learn to enjoy research, and strive to contribute to society.

In his speech, Prof. Fang Yu talked about his feelings for the university, analyzed the international scientific and technological competition situation, and said that “all the developed countries in the world are developed because they attach importance to education” and “only strength guarantees dignity", pointing out that education is the future of the country and the Chinese nation, and called upon young students to have the courage to assume their own responsibilities for the development of the country and the nation. He also hoped that the Youth League Committee would hold more activities conducive to the growth of young students and the development of the university.

Based on the pore structure and surface chemistry precisely regulable controlled release preparation technology developed by Prof. Fang Yu’s group, the “Poliporous” series disinfection products have been developed in cooperation with Zhongzao Licheng to achieve safe and controllable release of chlorine dioxide, which can effectively exterminate viruses and pathogenic microorganisms, and have been applied in hotels, food preparation rooms, pet stores and other places.

房喻院士主持陕西省植物化学重点实验室 2021–2023 年度学术年会

Fang Yu presides over 2021-2023 Academic Conference of Shaanxi Provincial Key Laboratory of Phytochemistry

2023 年 12 月 8 日，陕西省植物化学重点实验室在宝鸡文理学院高新校区召开 2021–2023 年度学术年会，重点实验室学术委员会主任委员房喻院士主持会议。

房喻院士等学术委员会专家肯定了实验室过去三年取得的成绩和对地方经济发展的贡献，从实验室定位、研究方向凝练、项目培育和人才引进与培养等方面对实验室的发展提出了意见和建议。

重点实验室学术委员会副主任委员、西北农林科技大学高锦明教授、上海交通大学林厚文教授，学术委员会委员和实验室科研骨干及研究生参加会议。

On December 8, 2023, the 2021-2023 annual academic meeting of Shaanxi Provinccial Key Laboratory of Phytochemistry was held on the High-tech Campus of Baoji University of Arts and Sciences, and Prof. Fang Yu, chairman of the Academic Committee of the Key Laboratory, presided over the meeting.

Fang Yu and other experts of the Committee affirmed the achievements of the laboratory in the past three years and its contribution to the local economic development, and put forward opinions and suggestions on the development of the laboratory from the aspects of laboratory positioning, research direction enrichment, project cultivation and talent introduction and training.

Committee vice chairman, Prof. Gao Jinming of Northwest A&F University, Prof. Lin Houwen of Shanghai Jiao Tong University, members of the committee, laboratory researchers and graduate students attended the meeting.

房喻院士获聘精密微纳制造技术全国重点实验室咨询委员会委员

Fang Yu appointed member of Advisory Committee of National Key Laboratory of Precision Micro-Nano Manufacturing Technology

2023 年 12 月 10 日，精密微纳制造技术全国重点实验室第一届学术委员会暨咨询委员会第一次会议在西安交通大学曲江校区召开，房喻院士应邀出席会议。在会上，房喻院士获聘咨询委员会委员，并接受了全国重点实验室主任、中国工程院蒋庄德院士颁发的证书。

精密微纳制造技术全国重点实验室成立于 2022 年，并在此次会议上揭牌，聚焦精密与微纳制造技术、工业母机与关键功能部件、增材与生物制造、智能传感系统、设备运行监测等方向，实现了精密与微纳制造的原理创新与关键设备研制，发展精密微纳制造创新方法、技术、装备和器件，构建完整技术链条，形成精密微纳制造的国家级平台。

On December 10, 2023, Prof. Fang Yu was invited to attend the first meeting of the first Academic Committee and the first Advisory Committee of the National Key Laboratory of Precision Micro-Nano Manufacturing Technology, which was held on Qujiang Campus of Xi’an Jiaotong University.

At the meeting, Fang Yu was appointed as a member of the Advisory Committee and received the certificate presented by Chinese Academy of Engineering academician Jiang Zhuangde, director of the Key Laboratory.

Established in 2022, the National Key Laboratory of Precision Micro-nano Manufacturing Technology was unveiled at this conference, focusing on precision and micro-nano manufacturing technology, industrial master machines and key functional components, additive and biological manufacturing, intelligent sensing systems, equipment operation monitoring and other directions, and realizing the principle innovation and key equipment development of precision and micro-nano manufacturing. Develop innovative methods, technologies, equipment and devices for precision micro and nano manufacturing, build a complete technology chain, and form a national platform for precision micro and nano manufacturing.

房喻院士出席西安交通大学仪器科学与技术学院揭牌仪式

Fang Yu attended the unveiling ceremony of XJTU School of Instrument Science and Technology

2023 年 12 月 10 日上午，西安交通大学仪器科学与技术学院揭牌仪式在曲江校区举行，房喻院士应邀出席仪式，并与西安交通大学党委书记卢建军，中国工程院院士、大连理工大学原校长郭东明，中国工程院院士、西北核技术研究院研究员欧阳晓平，中国科学院院士、北京航空航天大学原常务副校长房建成，中国工程院院士、西安交通大学仪器科学与技术学院名誉院长、学术委员会主任蒋庄德一起为仪器科学与技术学院揭牌。

On December 10, 2023, the unveiling ceremony of the School of Instrument Science and Technology of Xi’an Jiaotong University was held on its Qujiang Campus. Prof. Fang Yu was invited to attend the ceremony and unveiled the SIST plaque of the school together with Lu Jianjun, XJTU secretary of the Party Committee, Guo Dongming, CAE academician and former president of Dalian University of Technology, Ouyang Xiaoping, CAE academician and researcher of Northwest Institute of Nuclear Technology, Fang Jiancheng, CAS academician and former executive Vice president of Beijing University of Aeronautics and Astronautics, and Jiang Zhuangde, CAE academician and SIST honorary president and director of theAcademic Committee.

彭浩南教授指导本科生项目入选第十六届全国大学生创新创业年会

Undergraduate project coached by Peng Haonan selected in 16th National College Student Innovation and Entrepreneurship Conference

2023 年 12 月 8 至 10 日，第十六届全国大学生创新创业年会在海南大学举行，团队彭浩南教授指导的 2020 级本科生黄新宇主持的国家级大创项目《“肺癌雷达”—用于呼气诊断癌症的荧光薄膜传感器》入选本次年会改革成果项目。

本届年会由教育部主办、海南大学承办，共收到推荐项目 833 项，其中 250 项入选创新创业项目改革成果展示。

From December 8 to 10, 2023, at the 16th National College Student Innovation and Entrepreneurship Conference was held in Hainan University, the national innovation project “Lung Cancer Radar - Fluorescent Film Sensor for Breath Diagnosis of Cancer” hosted by Huang Xinyu, a Class 2024 undergraduate student under the guidance of Prof. Peng Haonan, was selected among Reform Achievements Project of the conference.

A total of 833 projects were recommended to the conference, which was sponsored by the Ministry of Education and hosted by Hainan University, and of which 250 were selected for reform achievements exhibition in innovation and entrepreneurship project .

房喻院士出席新材料陕西实验室组建方案专家咨询论证会

Fang Yu attends expert consultation meeting on establishment plan of New Materials Shaanxi Laboratory

2023 年 12 月 11 日，陕西省科技厅在西安召开新材料陕西实验室组建方案专家咨询论证会，房喻院士应邀出席会议并担任咨询论证专家。

论证会上，新材料陕西实验室牵头组建单位，西北有色金属研究院常务副院长李建峰向专家组汇报了实验室组建方案。

专家组经咨询答辩、研究讨论，认为实验室开展新材料科学研究以及关键核心技术攻关，定位明确、目标清晰，研究方向设置合理，具有较为显著的优势，同意实验室组建方案通过论证。

On December 11, 2023, the Science and Technology Department of Shaanxi Province held an expert consultation and demonstration meeting on the establishment plan of New Materials Shaanxi Laboratory in Xi’an. Prof. Fang Yu was invited to attend the meeting and served as an expert for consultation.

At the meeting, Li Jianfeng, executive vice president of Northwest Non-ferrous Metals Research Institute, the lead organization of the New Materials Shaanxi laboratory, reported the laboratory establishment plan to the expert group.

After consultation, defense, research and discussion, the expert group believed that the laboratory had a significant advantage in carrying out new material science research and key core technology research, with clear positioning and objectives, and reasonable research direction, and agreed to the laboratory establishment plan.

房喻院士为本科生讲授教学名师示范课

Fang Yu teaches Famous Teacher Demonstration Lesson for undergraduates

2023 年 12 月 16 日，房喻院士在陕西师范大学长安校区新勇学生活动中心学生剧场为化学化工学院 2020 级师范生和 2021 级全体学生讲授题为“化学和 CBRN 传感器——以薄膜荧光传感器为例”的教学名师示范课。

On December 16, 2023, Prof. Fang Yu gave a Famous Teacher Demonstration Lesson titled “Chemistry and CBRN Sensors - Taking Film-based Fluorescence Sensors as an Example” to the Class 2024 teacher-training students and all Class 2025 students of School of Chemistry and Chemical Engineering at the Student Theater of Xinyong Student Activities Center, Chang’an Campus, Shaanxi Normal University.

房喻院士出席 2023 典赞・科普三秦活动发布盛典

Fang Yu attends launch ceremony of 2023 Shaanxi Science Popularization Commendation activities

2023 年 12 月 28 日，房喻院士应邀出席在陕西广播电视台举办的“2023 典赞・科普三秦”活动发布盛典并致颁奖词。

活动由陕西省科学技术协会主办，中国工程院院士樊代明、中国科学院院士黄维出席并致颁奖词，省科协党组书记李豫琦出席并颁奖，省科协常务副主席李肇娥致辞。现场揭晓陕西省 2023 年度十大科普人物、年度十大科普作品、年度优秀科普场馆和年度品牌科普活动。

“典赞・科普三秦”是陕西省最有影响力的科普宣传推广品牌活动，旨在通过选树年度科普人物、科普作品、科普场馆、科普活动典范，创新科学传播理念，不断扩大科普工作的社会影响力，促进全民科学素质提升。

On December 28, 2023, Prof. Fang Yu was invited to attend and gave an award speech at the launch ceremony of the “2023 Science Popularization Commendation in Shaanxi” activities held at Shaanxi Radio and Television Station.

The event was sponsored by Shaanxi Science and Technology Association, Chinese Academy of Engineering academician Fan Daiming, Chinese Academy of Sciences academician Huang Wei also attended and gave award speeches. SSTA party secretary Li Yuqi presented awards, SSTA executive vice president Li Zhaoe gave a speech. The 2023 top ten popular science figures, the 2023 top ten popular science works, the 2023 excellent popular science venues and the 2023 brand popular science activities of Shaanxi Province were announced.

The activities are the most influential science popularization publicity and promotion brand activity in Shaanxi province, aiming to innovate the concept of science communication by selecting annual science popularization figures, science popularization works, science popularization venues, and model science popularization activities, constantly expanding the social influence of science popularization work, and promoting the improvement of the scientific quality of the whole people.

房喻院士获评陕西师范大学 2022 年研究生优秀导师

Fang Yu awarded 2022 SNNU Excellent Graduate Advisor

2023 年 12 月 28 日晚，“研途有道 师路无疆”2024 年研究生迎新晚会暨表彰典礼在长安校区终南音乐厅举行，房喻院士荣获 2022 年研究生优秀导师称号，校党委书记李忠军为获奖老师颁奖。

On the evening of December 28, 2023, Prof. Fang Yu was awarded the 2022 Excellent Graduate Advisor at the 2024 Graduate Student Welcome Gala and Commendation Ceremony held in Zhongnan Concert Hall, Chang’an Campus of Shaanxi Normal University, and SNNU Party Committee secretary Li Zhongjun presented the awards to the acclaimed teachers.

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

Research Article | Full Access

Photocatalytic Reduction of CO_2 to HCOOH and CO by a Phosphine-Bipyridine-Phosphine Ir(III) Catalyst: Photophysics, Nonadiabatic Effects, Mechanism, and Selectivity

Ling-Ya Peng, Guang-Ning Pan, Wen-Kai Chen, Xiang-Yang Liu, Wei-Hai Fang, Ganglong Cui

First published: 12 December 2023 | https://doi.org/10.1002/anie.202315300

铱配合物光催化二氧化碳还原反应机理的理论研究

将二氧化碳（CO_2）转化为高附加值的化学原料是解决全球能源危机、实现碳中和的最佳方案之一。尽管自然界可以通过光合作用将 CO_2 高效地转化为有机物，但是由于 CO_2 具有热力学稳定性和化学惰性，人工捕获和还原 CO_2 仍然是一项非常具有挑战性的工作。本工作采用了高精度的多参考 CASPT2 方法探索了铱（Ir）配合物催化剂 [Ir(III)H]$^+$ 的激发态性质和光物理过程，采用高效的 DFT 方法系统地研究了其后续生成 HCOOH 和 CO 的整个催化反应路径，同时还计算了辐射、无辐射和电子转移过程的相应速率，最终系统研究了 Mes–IrPCY2 光催化二氧化碳还原的微观反应机理，揭示了HCOOH高选择性的物理起源。

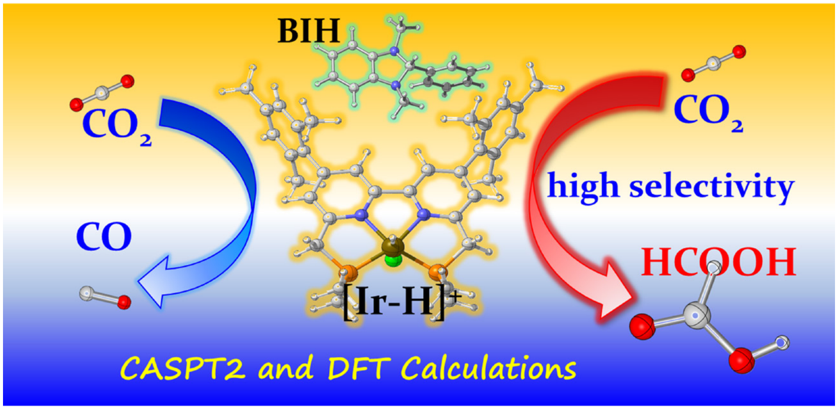


图 1. 铱配合物 [Ir–H]$^+$ 光催化 CO_2 还原。
Figure 1. Photocatalytic reduction of CO_2 by the Ir(III) complex [Ir-H]$^+$.

[Ir(III)H]$^+$ 初期的光物理过程可以用四态模型解释（S_0，^{1}MLCT，^{3}LE 和 ^{3}MLCT）。光激发后，体系首先弛豫到 Franck–Condon 区附近的 ^{1}MLCT 极小点，随后通过两条无辐射通道（直接的 ^{1}MLCT → ^{3}MLCT 通道和 ^{3}LE 介导的 ^{1}MLCT → ^{3}LE → ^{3}MLCT 通道）到达能量最低的 ^{3}MLCT 态，即后续光催化反应的前驱态。随后，[Ir(III)H]$^+$ 在 ^{3}MLCT 态可以与电子牺牲剂 BIH 发生单电子转移（SET）反应生成活性中间体 OERS 和 BIH$^{\cdot+}$，OERS 在 BIH$^{\cdot+}$ 协助下进一步与 CO_2 发生还原反应生成 HCOOH。除 SET 反应外，[Ir(III)H]$^+$ 在光激发到达 ^{3}MLCT 态后也可与溶剂分子发生脱质子反应，随后通过系间窜跃过程生成 Ir(I) 中间体，Ir(I) 中间体在 BIH$^{\cdot+}$ 协助与 CO_2 反应生成 CO。在光催化循环中，无辐射跃迁扮演着重要角色。此外计算表明 HCOOH 高选择性应来源于两个方面：HCOOH 活性中间体 OERS 的有效生成和 HCOOH 生成路径的速控步能垒更低。计算发现 SET 过程生成的 BIH$^{\cdot+}$ 通过提供质子或电子在关键的还原反应中显著降低了能垒。本研究表明，由于反应涉及电子激发态、多自旋态、开壳层中间体和显著的非绝热效应，高精度的

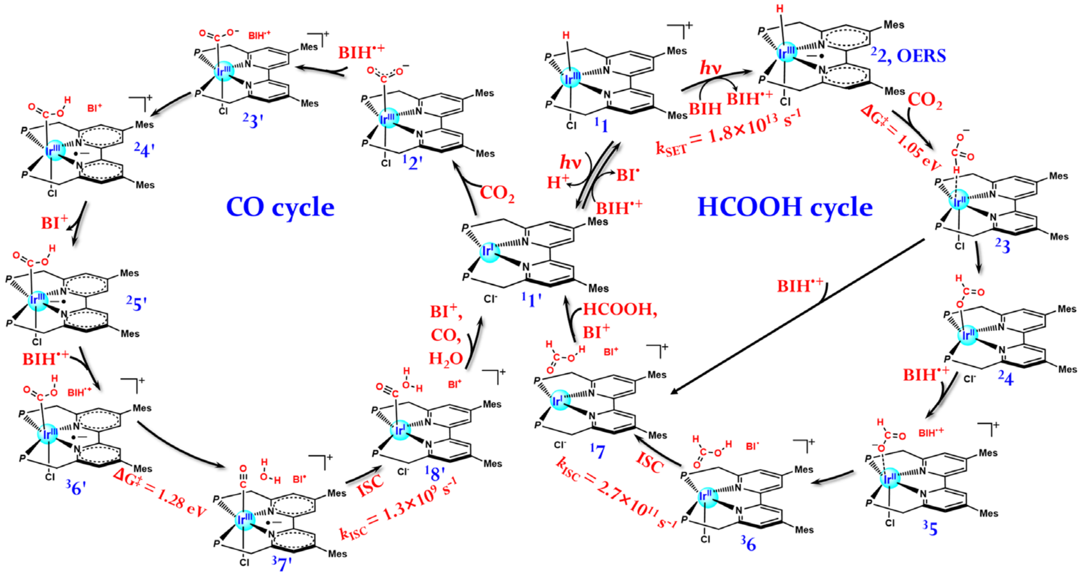


图 2. 计算推测的光催化 CO_2 还原生成甲酸和一氧化碳的反应机理。

Figure 2. Proposed photocatalytic reduction reaction mechanism for the HCOOH and CO formation.

多参考电子结构方法对于研究有机金属化合物光催化反应的部分阶段是不可或缺的。最后，所获得的机理有助于化学家进一步理解、调控和设计基于功能集成分子催化剂的光催化二氧化碳还原反应。

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全文链接：https://doi.org/10.1002/anie.202315300

The efficient conversion of excess CO_2 into various high-added value chemicals can solve the greenhouse effect caused by excessive CO_2 emissions and alleviate the energy crisis. Even though CO_2 can be efficiently converted into organic substances through photosynthesis in nature, the artificial capture and conversion of CO_2 is still very challenging due to its stability and kinetic inertness, which has attracted much research interest. In the present work we have employed the highly accurate multi-reference CASPT2 method to comprehensively explore the excited-state properties and photophysical processes of a PNNP-type Ir catalyst, namely $[Ir(III)H]^{+;}$ while, its subsequent reduction reactions to either HCOOH or CO are systematically studied using the efficient DFT method. The corresponding rates of radiative, nonradiative, and electron transfer processes are also calculated.

The photophysics of the $[Ir(III)H]^+$ can be well explained by a four-state model including S_0, ^{1}MLCT, ^{3}LE, and 3MLCT. The precursor 3MLCT state can be populated from the initially excited 1MLCT state via both the efficient direct and ^{3}LE-mediated intersystem crossings. Starting from this ^{3}MLCT state, the CO_2 reduction reactions diverge. In the presence of BIH, an electron sacrificial agent, an excited-state single electron transfer (SET) to the 3MLCT state of $[Ir(III)H]^+$ generates a one-electron-reduced species (OERS), which initiates a series of reduction reactions to HCOOH. In comparison, a cascade of reduction reaction to CO starts from a deprotonated Ir(I) species generated from $[Ir(III)H]^+$ in the ^{3}MLCT state. In the photocatalytic cycle, either to HCOOH or CO, nonadiabatic transitions are frequently seen and play an essentially nonnegligible role. We also found that the high selectivity to HCOOH should originate from two aspects, a relatively smaller free-energy barrier in the rate-limiting step and the pretty much efficient SET leading to OERS. More interestingly, in the reduction reaction to either HCOOH or CO, $BIH^{\bullet+}$ is found to effectively reduce energy barriers of several important reactions. Methodologically, the present work shows that highly accurate multi-reference electronic structure methods are indispensable for studying certain stages of photocatalytic reactions of organometallic compounds involving electronically excited states, multiple spin states, open-shell intermediates, and remarkable nonadiabatic effects. Finally, the gained mechanistic insights should help interested chemists to understand, regulate, and design photocatalytic CO2 reduction reaction of similar function-integrated molecular photocatalyst.

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Full Text Link: https://doi.org/10.1002/anie.202315300

ADVANCED FUNCTIONAL MATERIALS

Research Article | Full Access

Integrating Aggregation Induced Emission and Twisted Intramolecular Charge Transfer via Molecular Engineering

Wei Zhang, Jie Kong, Rong Miao, Hongwei Song, Yalei Ma, Meng Zhou, Yu Fang

First published: 05 November 2023 | https://doi.org/10.1002/adfm.202311404

荧光小分子中扭转分子内电荷转移和聚集诱导发光的调控

荧光属于激发态行为，激发态的性质通常伴随着构象变化，如扭转分子内电荷转移（TICT）。在 TICT 过程中，发色团从准平面的局域激发（LE）态或分子内电荷转移（ICT）态，通过分子内的键旋转形成几乎垂直的 TICT 态。由于电荷转移程度较强，所以 TICT 态荧光量子产率通常较低。尽管如此，TICT 态的荧光发射对微环境很敏感，如极性、粘度和温度，因此多用于定性和定量传感应用。聚集诱导发光（AIE）是一类发色团在良溶剂中显示弱荧光，而在聚集状态中由于分子内运动和振动的限制使荧光增强的一类分子。无论是 TICT 还是 AIE 体系，分子的扭转都发挥了重要的作用，而且在二者中扭转的作用往往相反，因

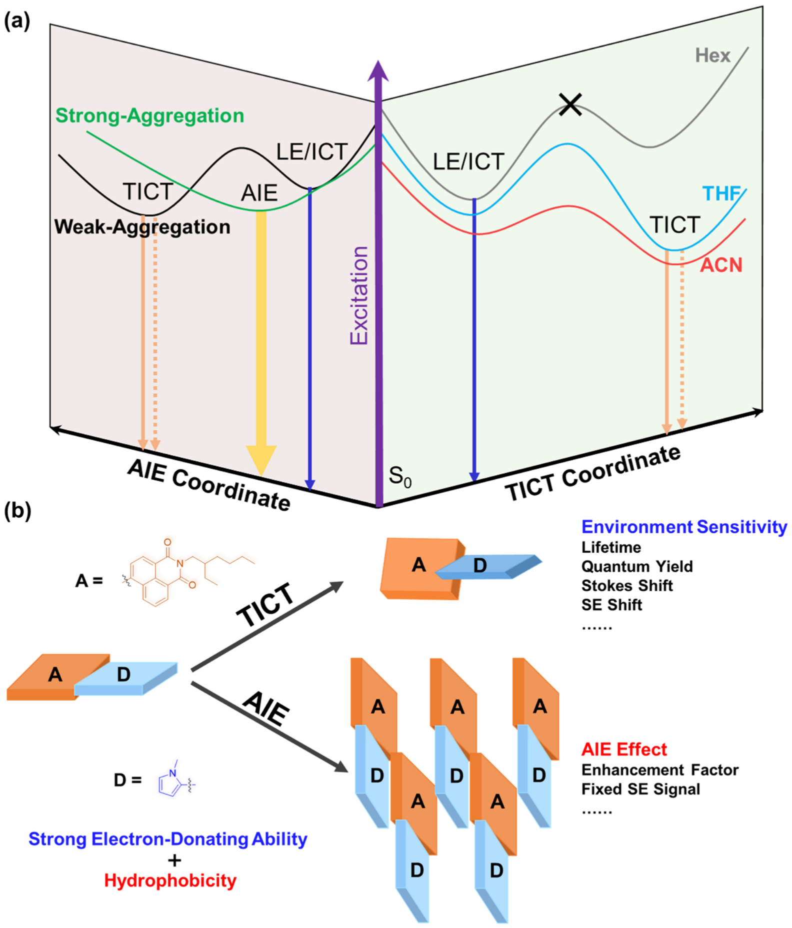

图 1. DMA-NAP 和 MP-NAP 在不同溶剂中的激发态过程，以及兼具 TICT 和 AIE 特性的荧光分子设计思路。

Figure 1. Schematic illustration of excited-state relaxation pathways of DMA-NAP and MP-NAP in different environments and the proposed molecular design strategy for integrating the TICT and AIE dual properties.

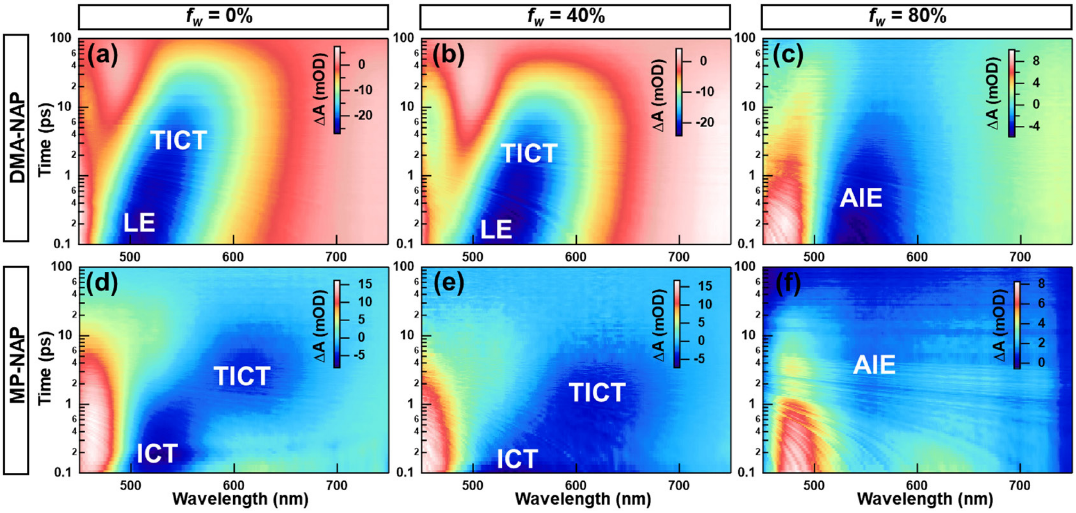

图 2. DMA−NAP 和 MP−NAP 在不同含水量的甲醇 / 水溶液中的飞秒瞬态吸收光谱。
Figure 2. The fs-TA spectra of DMA-NAP and MP-NAP in MeOH/H_2O mixtures with different water fraction.

此深入理解荧光分子的激发态构象扭转行为，获得兼具 TICT 和 AIE 的分子，是一大挑战。

本工作中，我们尝试从分子结构设计出发，通过使用强给电子基团和增强分子的疏水能力，获得兼具 TICT 和 AIE 特性的荧光分子。不同溶剂中的飞秒瞬态吸收光谱结果显示，低介电常数溶剂中，分子主要以 LE 态形式存在，而在高介电溶剂 TICT 态为主导。在高介电溶剂中，激发态的分子快速从准平面构象的 LE 或 ICT 态，弛豫到具有垂直构象的 TICT 态。同时，我们监测了荧光分子聚集过程中的飞秒瞬态吸收光谱，发现随着水含量的增加，分子发生聚集，分子内旋转和振动受限，因此激发态的衰减过程也明显减慢。该部分研究，不仅有助于理解 TICT 和 AIE 体系的发光机制，也为后续荧光探针的设计合成提供了理论依据。

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全文链接：https://doi.org/10.1002/adfm.202311404

Fluorescence is an excited state-related behavior, and the properties of excited states are usually accompanied by conformational changes, such as twisted intramolecular charge transfer (TICT). In TICT process, fluorophore form an almost vertical TICT state from a quasi-planar local excitation (LE) state or an intramolecular charge transfer (ICT) state by rotating the bonds within the molecule. Because of the strong charge transfer, the fluorescence quantum yield of TICT state is usually low. Nevertheless, fluorescence emission from the TICT state is sensitive to microenvironments such as polarity, viscosity, and temperature, and is therefore used in both qualitative and quantitative sensing applications. Aggregation-induced luminescence (AIE) is a class of molecules in which chromophore exhibits weak fluorescence in a good solvent, but the fluorescence is enhanced in the aggregative state due to the restriction of intramolecular motion and vibration. In both TICT and AIE systems, molecular twisting plays an important role, and the twisting effect is often opposite in the two systems. Therefore, it is a challenge to deeply understand the excited state conformational twisting behavior of fluorescent molecules and obtain molecules with both TICT and AIE.

In this work, we report unequivocal evidence for manipulating the TICT and AIE via electron-donor engineering. The conjoint theoretical calculations and spectroscopies rationalized that using a strong electron-donating moiety with hydrophobic effect can integrate the TICT and AIE properties. The solvent polarity-dependent fs-TA measurements of DMA-NAP and MP-NAP reveal the ultrafast formation of TICT state in polar solvents, in contrast to the direct formation of LE state in nonpolar Hex. Molecular rearrangement of DMA-NAP and MP-NAP in the excited states transforms the initially populated quasi-planar structure (LE/weak ICT) into a perpendicular conformation with TICT character. By monitoring the fw-dependent fs-TA spectroscopy, we found that the excited state first decays faster with $f_w < 40\%$ because adding H_2O enhances the mixture polarity but then decays slower ($f_w = 80\%$) because of suppressing the intramolecular rotations and vibrations. Therefore, our findings provide an ideal molecular design rational for integrating the TICT and AIE.

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Full Text Link: https://doi.org/10.1002/adfm.202311404

THE JOURNAL OF PHYSICAL CHEMISTRY B
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Article

Comparative Observation of Distinct Dynamic Stokes Shifts in Diaryl BODIPY Triads with Broadband Two-Photon Absorption

Lu Liu,† Sheng Li,† Nan Zhang, Qiyuan Shi, Ke Liu, Taihong Liu,* Zhiyan Huang,* Liping Ding, and Yu Fang

Cite This: *J. Phys. Chem. B* 2023, 127, 10171−10178
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二芳基修饰 BODIPY 体系中独特的动态斯托克斯位移效应研究

激发态动力学研究手段升级和构效关系研究进展极大地推进了新型共轭荧光体系的设计与开发。在强供 – 受体电子共轭体系中普遍存在分子内电荷转移过程，近年来研究者们又相继提出了平面化分子内电荷转移（PICT）、动态斯托克斯位移（Dynamic Stokes Shift）、对称性破缺和跨空间电荷转移等新型光物理机制，为深入理解超快激发态过程奠定了理论基础。具体来讲，动态斯托克斯位移效应是一种受激荧光共轭单元自身构象扭转、电荷分离及其与环境相互作用引起荧光发射峰的特殊动态变化。系统研究激发态动力学、发现动态斯托克斯效应对于深入理解结构 – 光物理性质相关性和设计新型共轭荧光体系具有重要指导意义。

本工作设计合成了四种 2,6– 二芳基 BODIPY 衍生物，首先利用 UV–vis、荧光发射光谱系统考察了系列化合物的线性光物理性质，并利用开孔 Z– 扫描技术考察了该系列化合物的双光子吸收效应。随后基于瞬态吸收光谱技术，对比考察了四种衍生物的激发态动力学行为。研究结果表明，该类二芳基 BODIPY 衍生物受激辐射跃迁后，激发态分子内发生较大角度的结构扭转，导致辐射跃迁随时间发生特殊的动态光谱位移，我们将其理解为动态斯托克斯现象。随后该工作系统考察了激发态动力学时间演化、光谱位移和结构 – 性质相关性。特别需要指出的是，该工作提出了不同于常规的蓝移动态斯托克斯效应，理论上受制于超快分子扭转和电荷转移程度。

从该系列化合物的构效关系角度出发，在早期时间尺度内，具有较强供电子修饰基团和高效电荷分离能力的 AN–BDP 衍生物的受激辐射峰从

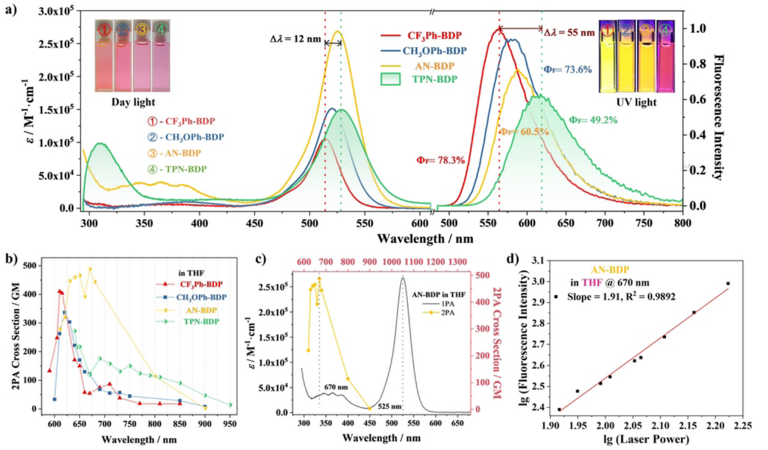

图 1. (a) 四种二芳基修饰 BODIPY 衍生物在 THF 溶剂中的 UV–vis 和归一化荧光发射光谱。(b) 四种化合物在 THF 溶剂中双光子吸收光谱。(c) 代表性衍生物 AN–BDP 在 THF 溶剂中的线性吸收和双光子吸收复合光谱。(d) 衍生物 AN–BDP 的双光子激发荧光强度与激发光功率的平方关系。

Figure 1. (a) UV−vis absorption and normalized emission spectra of the triads in THF ($c \sim 1.0 \times 10^{-6}$ M). (b) Summarized and comparative 2PA spectra of the triads in THF. (c) Combined 1PA and degenerate 2PA spectra of AN-BDP as an example in THF. (d) Quadratic dependence of the two-photon excited fluorescence intensity of AN-BDP in THF on the incident laser power at fs-670 nm.

597 nm 红移到 605 nm（图 2a）。在对比实验和量化计算结果基础上，我们理解认为该系列化合物激发态发生快速的结构弛豫、对称性破缺和电荷分离机制，存在典型的 PICT 现象。并且中间态 $PICT_2$ 能级略高于 CT 终态能级，支持发生红移动态斯托克斯位移效应。该类现象在同样具有供电子基团修饰的 TPN–BDP 衍生物中得到了证实。不同的是，具有弱电荷分离效应的 CF_3Ph–BDP 和 CH_3OPh–BDP 衍生物的受激辐射峰发生明显蓝移，蓝移波长分别为 25 nm 和 18 nm（图 2b）。我们理解认为中间态 $PICT_1$ 与 CT 状态之间可能发生能级高低的变化。此外，在极性 DMSO 和 DMF 中观察到更加显著的动态斯托克斯移动现象，表明了显著的溶剂化效应。总结而言，该系列二芳基修饰 BODIPY 衍生物体系中独特的动态斯托克斯位移效应的发现和理解，将有助于后期 BODIPY 衍生物的光电性质解析和新型结构设计。

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全文链接：https://doi.org/10.1021/acs.jpcb.3c06757

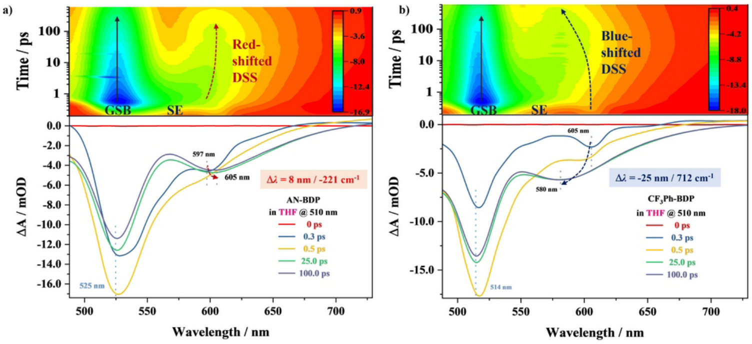

图 2. 衍生物 AN–BDP (a) 和 CF3Ph–BDP (b) 在 THF 溶剂中的动态斯托克斯特性，箭头方向分别指出蓝移和红移动态斯托克斯位移现象。

Figure 2. Time-resolved and wavelength-resolved DSS characteristics of AN-BDP (a) and CF3Ph-BDP (b) in THF. The arrows highlighted the time-dependent and shifted SE signals.

Emerging excited-state dynamics and structure–property correlations have driven the efforts to develop novel chromophores incorporating various electron-donating and electron-accepting moieties. Basically, an attractive photophysical phenomenon is intramolecular charge transfer (ICT) throughout the conjugated molecular skeleton. Various models for the ICT dynamics have been proposed to verify distinguishable spectral features such as dynamic Stokes shift (DSS), fluorescence lifetime change, and varied emission ratios. The DSS reflects the evolving frequency shift between absorption and emission maxima of a chromophore and its surrounding microenvironment. Therefore, related charge redistribution altered by electronic excitation and the ensuing adjustment of the configuration could be unveiled in the time-dependent DSS. The BODIPYs tend to reorganize and generate new conformations possessing narrow energy gaps. The corresponding change normally results in a time-resolved spectral shift, which is dependent on the surrounding solvent polarity and relaxation time scale. Therefore, it is important to understand the structure-property correlations and its influence on the dynamics of excited states through BODIPY derivatives.

This work designed and synthesized a series of diaryl BODIPY derivatives with 2,6 different substituents. Based on the spectral shifts that change with time when the new conformation of these molecules from the ground state to the excited state, they extracted the dynamic Stokes shifts. Strikingly, evolution dynamics in high spatial and temporal resolutions of the excited states and structure-property correlation of the triads were first obtained systematically and comprehensively. Especially, the blue-shifted DSS and the structure–property correlations were elucidated comparatively. Specifically speaking, at the early excited stage, AN-BDP and TPN-BDP with strong electron donating and efficient charge separation capabilities, the SE band at 597 nm of AN-BDP in THF red-shifted considerably to 605 nm after a time constant of 100 ps (Δλ ~ 8 nm/-221 cm^{-1}) (Figure 2a). A similar and enlarged red shift (Δλ ~ 25 nm/-652 cm^{-1}) for TPN-BDP was confirmed. This work held that the energy level of PICT2 was slightly higher than that of the final CT state. By contrast, that of CF3Ph-BDP blue-shifted from early 605–580 nm (Δλ ~ −25 nm/712 cm^{-1}) with a small blue-shift value for CH3OPh-BDP (Δλ ~ −18 nm/507 cm^{-1}) with a relatively weak CT character. Therefore, the blue-shifted DSS was rationalized to be the sequence conversion between the corresponding $PICT_1$ and CT states controlled by structural planarization, which was confirmed by the theoretical calculations mentioned above. Besides, much more red-shifted values for AN-BDP in polar DMSO and DMF were observed, consistent with the typical DSS measurements in terms of the polar solvations. They speculated that the population of the PICT state was strongly affected by its stabilized conformations, and the main contribution to ultrafast dynamics stemmed from the ultrafast rearrangement and CT degree. The significant findings in the present work will further deepen the exploration of the optoelectrical properties and technological applications of such BODIPY derivatives.

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Full Text Link: https://doi.org/10.1021/acs.jpcb.3c06757

Macromolecular Rapid Communications

Research Article | Full Access

Ultrabright Acrylic Polymers with Tunable Fluorescence Enabled by Imprisoning Single TICT Probe

Yalei Ma, Qiuping Wang, Jia Deng, Xudong Yan, Jing Liu, Liping Ding, Rong Miao ✉, Yu Fang

First published: 13 November 2023 | https://doi.org/10.1002/marc.202300592

基于单一荧光探针的高亮度多色发光聚合物

荧光聚合物，由于具有易于制备、可加工性好和组成 / 发光性能可调，是一类备受关注的功能材料，在众多关键领域都发挥着重要的作用，如发光二极管，信息加密，化学传感，生物成像和治疗等。目前，虽然可以通过物理吸附或者化学键合的将一种或者多种荧光分子引入到聚合物结构中，获得单色或者多色荧光聚合物，然而，利用单一荧光分子获得发光波长可调且荧光量子产率高的荧光聚合物，仍然极具挑战。

本工作中，我们设计合成了一种含有可聚合双键的微环境敏感型荧光探针（MAP–NAP），该化合物在溶液中表现出优异的溶剂区分能力和粘度敏感性。以此化合物作为探针，我们尝试利用高分子的侧链效应模拟溶剂效应，将溶液态的溶致变色效应引入固态，从而实现了基于单一荧光分子的多色聚合物。由于所设计化合物具有较高的荧光量子产率和固态发光性能，所制备的荧光聚合物不仅荧光可调（发射波长从 481 到 543 nm），而且亮度非常高，多种聚合物的荧光量子产率接近 100%。同时，该方法还适用于多色共聚物的制备，通过控制共聚物中带有不同侧链单体的比例，可以实现共聚物发光波长的大幅调控，所获共聚物的发光波长随着高极性单

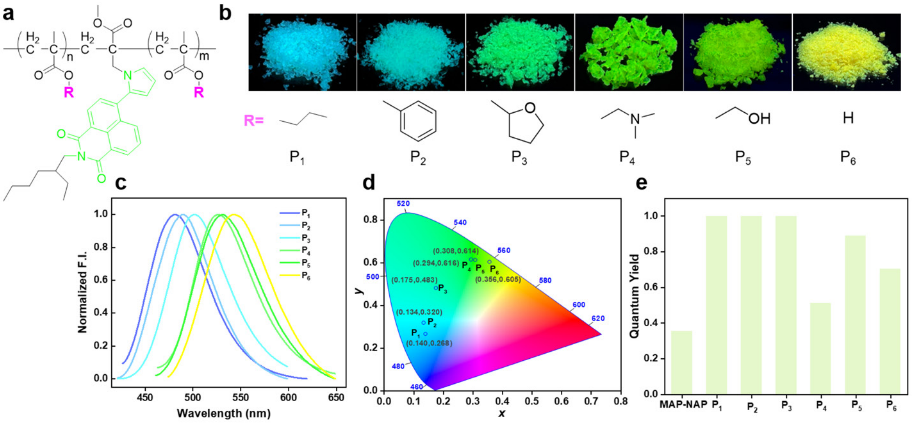

图 1. MAP–NAP 探针标记的多色荧光聚合物。

Figure 1. Multicolor acrylic polymers labelled with MAP-NAP probe.

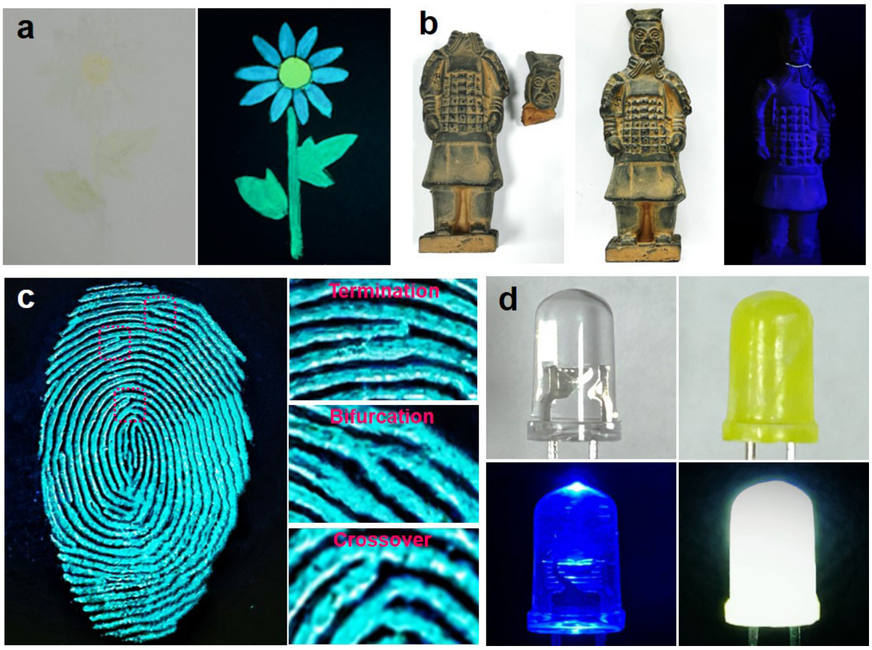

图 2. 基于单一探针标记的多色荧光聚合物的应用。
Figure 2. Application of the single probe-based multicolor acrylic polymers.

体比例的升高明显增加。

此外，该方法还具有较好的普适性，通过合理设计分子结构，我们合成了另外一种带有可聚合单体的微环境敏感型荧光分子，MAP–PHA，并尝试其在多色荧光聚合物制备的应用。实验结果表面，MAP–PHA 修饰的含不同侧链的聚合物也表现出很好的多色发光性能。得益于其优异的光物理性质，所制备的聚合物在信息加密、文物保护、指纹识别、白光器件等方面表现出很好的应用潜力。

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Bright and colorful fluorescent polymers are ideal materials for a variety of applications. Although polymers could be made fluorescent by physical doping or chemical binding of fluorescent units, it is a great challenge to get colorful and highly emissive polymers with a single fluorophore.

In this work, we report the development of a general and facile method to synthesize ultrabright and colorful polymers using a single twisted intramolecular charge transfer (TICT) probe. In the method, polymerizable and environmental sensitive TICT probe, MAP-NAP, was designed and incorporated into acrylic polymers. Similar to the solution state, side chain of the polymer serves as solvent for the incorporated probe. Accordingly, fluorescence emission of the labeled polymers could be tuned by varying the structure of side chains and a series of colorful polymers were synthesized. Fluorescence emission of the polymers could be adjusted from blue to yellow (from 481 to 543 nm) by increasing side chain polarity, which could be realized either by choosing monomers with different functional group or by varying the composition of the copolymers. High fluorescence quantum yield and sensitive environmental response of the probes guaranteed low probe concentration (0.1 wt%) in the polymers. This avoids ACQ of the probe and avails high fluorescence brightness of the polymers in solid state. Meanwhile, undesired influence on the properties of the parent polymer can be ignored under low probe concentration. In addition, copolymerization was also found to be an effective way to adjust the emission color of the polymers. Variation in the ratio of selected monomers produced polymers with different side chain constituents, which provide the imprisoned probe different microenvironment and lay basis for fluorescence tunability. Fluorescence emission of the copolymers showed obvious red-shift with the increasing in side chain polarity.

In addition, this method also has good universality. Based on rational design of molecular structure, another polymerizable microenvironment-sensitive fluorophore, MAP-PHA, was synthesized. As expected, MAP-PHA labelled polymers showed colorful fluorescence upon the variation in side chain. Simple synthesis and outstanding fluorescence properties endow the as-prepared polymers wide application prospects, such as white LED bulb making, fingerprint identification, cultural relics protection, and encryption.

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Full Text Link: https://doi.org/10.1002/marc.202300592

西安中易建科技集团张成宇董事长一行来访

Xi’an UPM Technology Group visitors received

2023年12月14日，西安中易建科技集团董事长张成宇一行到访、参观了新概念传感器与分子材料研究院，并与房喻院士进行了会谈交流。西安中易建科技集团有限公司合伙人、技术总监刘壮，董事长助理余志昆，西安市学会科技服务中心主任张婷婷、副主任闫嵬嵬陪同来访。

On December 14, 2023, a group of visitors headed by Zhang Chengyu, chairman of Xi’an UPM Technology Group Co., Ltd., visited the Institute of New Concept Sensors and Molecular Materials and held talks with Prof. Fang Yu. Accompanying Mr. Zhang during the visit were Xi’an UPM partner and technical director Liu Zhuang, chairman assistant Zhang Tingting, Xi’an Society Science and Technology Service Center director Zhang Tingting and deputy director Yan Weiwei.

西安交通大学仪器科学与技术学院来访

XJTU School of Instrument Science and Technology visitors received

2023年12月28日，西安交通大学仪器科学与技术学院党委书记韦学勇、党委副书记、执行院长赵立波和副院长景蔚萱一行到访、参观了新概念传感器与分子材料研究院，并与房喻院士进行了会谈交流。

On December 28, 2023, Prof. Fang Yu met and talked with visitors from the School of Instrument Science and Technology of Xi’an Jiaotong University, party secretary Wei Xueyong, deputy party Secretary and executive dean Zhao Libo and vice dean Jing Weixuan, and showed them in a tour of the Institute of New Concept Sensors and Molecular Materials.

西安金沃泰环保科技有限公司来访

Xi’an Jinwotai Environmental Protection Technology visitors received

2023 年 12 月 29 日，西安金沃泰环保科技有限公司郭东前总经理、邓宁工程师一行到访、参观了新概念传感器与分子材料研究院，并与房喻院士进行了会谈交流。

On December 28, 2023, Prof. Fang Yu met and talked with general manager Guo Dongqian and engineer Deng Nin of Xi’an Jinwotai Environmental Protection Technology Co., Ltd., and showed them in a tour of the Institute of New Concept Sensors and Molecular Materials.

薄鑫副研究员访问重塑澎湃新材料科技有限公司

Dr. Bo Xin visits Refire Surge New Material Technology

2023 年 12 月 29 至 30 日，新概念传感器与分子材料研究院薄鑫副研究员应邀赴重塑澎湃新材料科技有限公司访问，参观了其半自动化电解水制氢阴极、阳极电极生产线，并与谭荣波经理、陈红辉高级工程师等就材料研发、喷涂技术进行了座谈交流。

From December 29 to 30, 2023, Dr. Bo Xin of the Institute of New Concept Sensors and Molecular Materials visited the Refire Surge New Material Technology Co., Ltd. He visited its semi-automatic electrolytic water hydrogen cathode and anode electrode production line, and had a discussion with manager Tan Rongbo and senior engineer Chen Honghui on material research and development and spraying technology.

优秀的人其实都很像

Excellent people are actually very much alike

文 / 苗 荣

by Miao Rong

大学时期，选择读研是因为觉得自己还没有做好工作的准备，想着读研应该是一件很有意思的事情，每天在实验室里做实验、摆弄各种瓶瓶罐罐、跟形形色色的物质打交道。懵懵懂懂的博士生涯中，只想着做好实验，顺利毕业，从未思考过科研在我们成长中的作用。

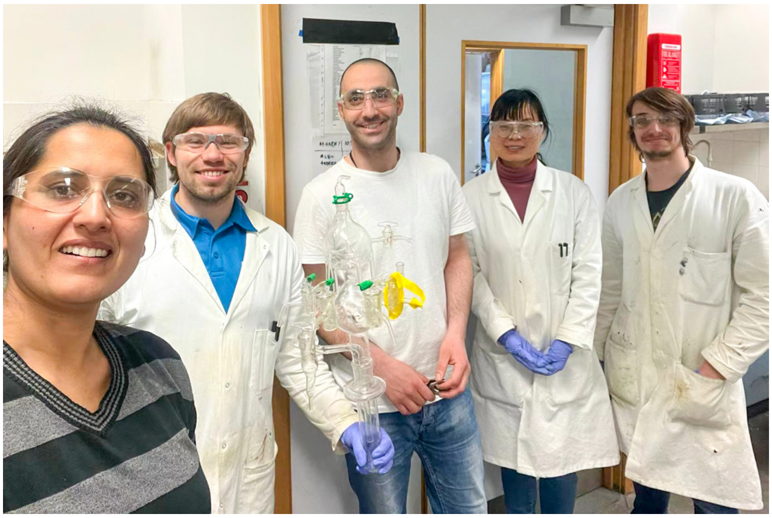
回到师大，房老师经常在组会的时候跟我们说：“科研是锻炼人、培养人最好的途径”。起初，我并不理解这句话的深刻含义。直到看着一届届师弟师妹，经过严谨的科研训练，逐渐从一个个小孩成长为能够独当一面的小伙子、大姑娘，我才慢慢开始理解这句话。同时，我也不禁会去反思自己在科研中的成长，是否也像他们一样实现了蜕变？细想在组里学习的这些年，我的确学到了很多，也正是这些收获与成长给了我鼓舞，让我有了继续学习的动力。

我访学所在的学校是英国南安普顿大学，合作导师是 Steve Goldup 教授，研究方向是机械互锁分子（Mechanically interlocked molecule）。机械互锁分子属于目前化学领域非常前沿的研究内容，该类分子的合成也极具挑战。无论从研究课题的相关性，还是实验技能的需要方面来看，我都不具备胜任这个课题的能力。因此，我又非常开心的成了一名“研究生”，在导师的指导下和实验室的伙伴们一起学习、做实验，架反应、过柱子的生活每天都非常充实。

细心观察就会发现，优秀的人其实都很像。在师大，房老师是我们的榜样，特别佩服房老师永远都是那么的精力充沛。在南安普顿大学，Steve 也是一样，雷打不动的早七点到晚六点，见面的“How are you ? ”之后肯定是“How’s chemistry?”虽然午饭只有一个简单的三明治，但是他每次都会约一个人边讨论实验边吃。Steve 似乎不像大多数人眼里的英国教授，因为他真的太“卷”了。这也勾起了我对“卷”这个词的重新思考，也许“卷”更多的是从旁观者的角度来评价当事人的行为，原本当事人的愉悦和享受，在旁观者眼中就变成了痛苦和煎熬的“卷”。我在想，这也许是就是成功者都散发着乐观向上正能量的原因吧！

新的实验环境里，需要学习的东西很多，周围的人都成了我的老师。尤其是热心肠的 Andrea，一个来自意大利的三年级博士生。虽然口头禅是“I am a loser”，但是 Andrea 几乎每天都是第一个到实验室并最后一个离开的人，他也是实验室里知识最扎实的研究生。所以，我觉得用“说最消极的话，做最积极的事”来形容他，最

合适不过了。印象特别深刻的是2023年元月底的一天，早上刚到实验室，Andrea就特别沮丧地过来跟我倾诉，说他做了一年的一个课题dead了，当时气氛瞬间凝固。我试图绞尽脑汁地去想怎么安慰他，但始终想不到合适的语言，因为我很清楚，他的前驱体合成需要经历20多个反应步骤，这个打击对他来说太大了。沉默片刻之后，Andrea跟我说，他需要尽快找导师讨论。从导师办公室出来之后，我特意去找他了解情况，他说老师跟他一起分析了结果，然后说了一句“Fine, we are learning”。下午，Andrea又开始了自己忙碌的实验……



访学期间实验室的小伙伴们，从左到右分别是Mandeep博士后，Martin博士后，Abed博士后，我，Andrea博士生。

My labmates at Soton, Postdoc Mandeep, Postdoc Martin, Postdoc Abed, me, and PhD student Andrea, from left to right.

仔细想想，其实也正常，因为失败本来就是科研的常态，任何一项伟大的成果都是经历了无数次失败之后的结晶。我们都知道“失败是成功之母”，也都听过伟人们面对一次次失败，坚持不懈，最终成功的故事。但是，当真正面对失败的时候，我们却很难做到不气馁、不放弃，因为这需要很强的意志力。我想，Andrea课题的失败，也只是课题组遇到的众多失败中的一个，与其花精力郁闷、颓废，还不如重新整理思路、换一种方法继续做事情。这件事情，也让我体会到团队“铁人精神、阿Q精神、办法总比困难多”科研文化的另一层含义，但问耕耘，莫问收获，努力做好自己的事情，不要太在意结果，更不要因为不好的结果而影响前进的步伐。

虽然相距8000多公里、研究方向迥然不同，但是两个团队其实很像，都有“Live for Science”的leader、勤奋的学生和积极向上的科研氛围。在南安普顿大学化学学院，每次有人问我从哪里来、做什么研究方向的时候，我都会立刻打开团队的网站，给他们一一介绍。尤其是有一次，楼上一位做荧光的波兰博士后告诉我，他读过房老师的文章，还跟周围人说我们团队在传感方面做出了很多出色的工作，那个时候真的无比开心。

很庆幸自己遇到了这么多好的老师和实验伙伴，能有机会在科研的道路上学习、成长。读不完的文献，做不完的实验，解决不完的问题，都将帮助我们成为更好的自己！

When I was in college, I chose to go on to a graduate program because I thought I was not ready to work, and I thought it should be a very interesting thing to do experiments in the lab, fiddling with bottles and jars and dealing with substances every day. During my doctoral studies, I only thought about doing experiments well and graduating successfully, and I never thought about the role of research in our growth.

Back at Shaanxi Normal University, Prof. Fang Yu often told us during group meetings, “Research is the best way to train and cultivate people.” At first, I did not understand the profound meaning of this statement. It was not until I watched my junior fellow students gradually grow up from young students to adult men and women who could take charge of their own lives through rigorous research training that I slowly began to understand this statement. At the same time, I can’t help but reflect on my own growth in scientific research, whether I have also realized the metamorphosis like them? When I think about the years of study in the group, I have indeed learned a lot, and it is these gains and growth that have given me encouragement and motivation to continue my study.

The university I visited as a visiting scholar is the University of Southampton in the UK, and my supervisor is Prof. Steve Goldup, whose research interest is on mechanically interlocked molecules. Mechanically interlocked molecules are currently at the forefront of chemistry, and the synthesis of these molecules is extremely challenging. I was not capable of doing this research in terms of the relevance of the topic or the need for experimental skills. Therefore, I was very happy to become a “graduate student” again, studying and doing experiments with my labmates under the guidance of my supervisor, and the life of setting up reactions and doing columns every day was very fulfilling.

Careful observation will reveal that excellent people are actually very much like. At SNNU, Prof. Fang is our role model, and I especially admire him for being always so energetic. At Soton, Steve is the same, always there at the lab from 7am to 6pm, saying “How are you?” followed by “How’s chemistry?” Although he only had a simple sandwich for lunch, he would always meet someone at lunch while discussing experiments, Steve doesn’t seem to be like the typical British professors in most people’s eyes, because he is really too hardworking. This also provoked me to rethink the word hardworking, that perhaps hardworking is more from the perspective of bystanders to evaluate the behavior of the person concerned, so the pleasure and enjoyment of the person concerned become pain and suffering in the eyes of the bystanders. I wonder if this is the reason why successful people radiate with optimism and positive energy!

There was a lot to learn in the new lab environment, and the people around me became my teachers. Especially Andrea, a third-year PhD student from Italy, was a warm-hearted person. Although his catchphrase is “I am a loser”, Andrea is the first one to come to the lab and the last one to leave almost every day, and he is also the most knowledgeable graduate student in the lab. I think the best way to describe him is “saying the most negative things while doing the most positive things”. One day at the end of January 2023, when I arrived at the lab in the morning, Andrea came over and told me that a project he had been working on for a year was “dead”, and the atmosphere instantly froze. I tried to rack my brain to think of a way to comfort him, but I could not think of the right words, because I knew very well that his precursor synthesis needed to go through more than 20 reaction steps, and this blow was too big for him. After a few moments of silence, Andrea told me that he needed to talk to his supervisor as soon as possible. When he came out of the supervisor’s office, I went to him to find out more about the situation, and he said that the supervisor had analyzed the results with him, and then said “Fine, we are learning”. In the afternoon, Andrea started his busy experiment again ......

In fact, it is normal, because failure is the norm in scientific research, and a great achievement is the crystallization of countless failures. We all know that “failure is the mother of success”, and we have heard the stories of great people who faced failure again and again, and ultimately succeeded through perseverance. However, when we really face failure, it is difficult for us not to be discouraged and not to give up, because it requires strong willpower. I think the failure of Andrea’s project was just one of the many failures encountered by the group. Instead of indulging in being depressed and disillusioned, it would be better to reorganize our thoughts and continue to do things in a different way. This incident also made me realize another meaning of the group’s research culture of “Ironman Spirit, AhQ spiritual victory method, and There are Always More Solutions Than Difficulties”. Just keep on the cultivation and not asking about the harvest. Do your own work well, don’t care too much about the result, and don’t let the bad result affect the pace of your progress.

Despite being more than 8,000 kilometers apart and having very different research directions, the two research groups are actually very similar in that they both have a “Live for Science” leader, hardworking students and a positive research atmosphere. At the School of Chemistry of Soton, every time someone asked me where I was from and what my research interests were, I would immediately open the group’s website and give them an introduction. I was really incredibly happy when a Polish postdoc doing fluorescence studies told me that he had read Prof. Fang’s articles and told people around him that our group had done a lot of excellent works in sensing.

I feel so lucky that I have met so many good teachers and lab partners, so I can make my way to learn and grow on the road of scientific research. The endless literature reading, experimenting and problem solving will help us to become better!

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