光子鼻与分子材料团队简报

Newsletter of Photonic Nose and Molecular Materials Group

2 / 2022









房喻教授受邀担任国家毒品实验室陕西分中心学术委员会主任委员

Fang Yu to serve as academic committee chairman of National Narcotics Lab Shaanxi Branch

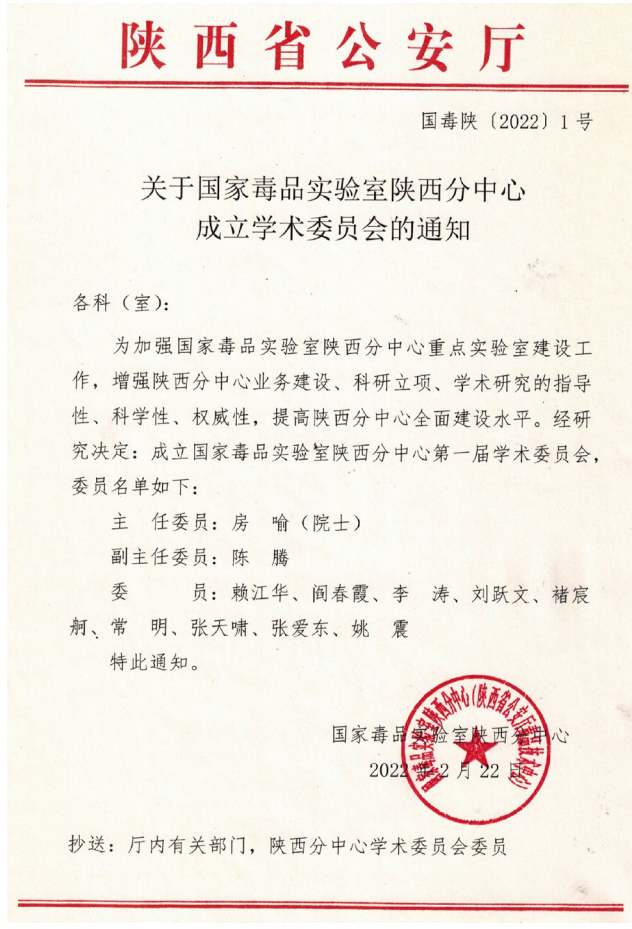
2022 年 2 月，国家毒品实验室陕西分中心学术委员会成立，房喻教授受邀担任主任委员。

近年来，芬太尼类物质等新型毒品非法制贩和滥用形势日益严峻。为加强芬太尼类物质整类管控，2019 年 4 月 2 日，按照习近平总书记的指示要求和党中央的决策部署，建设公安部中心毒品实验室和北京、浙江、广东、四川、陕西 5 个区域分中心毒品实验室。2021 年 5 月 31 日，国家毒品实验室陕西分中心建成竣工，并于 2021 年 6 月 22 日正式成立运行。

房喻教授长期从事薄膜基荧光传感和分子凝胶研究工作，先后主持科技部 863 重点、基金委重大科学仪器专项、重点国际合作等项目 30 余项。在科学研究中，坚持从基础研究到技术创新再到产业应用的全链条模式，主持研制了具有完全自主知识产权的隐藏爆炸物探测设备和国际首创的毒品探测传感器，是公认的“国际薄膜荧光传感领域的领军人物”。

国家毒品实验室陕西分中心服务西北五省区域，主要职责是在国家毒品实验室的统一规划和指导下负责西北区域内的禁毒技术工作，实施本区域内芬太尼类物质等毒品的制贩和滥用情况监测预警，研判毒情发展变化趋势，为本区域内重大涉毒案件的侦办提供技术支持，承担芬太尼类物质及各类毒品和易制毒化学品的疑难样品检验鉴定任务，针对本区域毒情特点开展有针对性的科学研究，推广先进禁毒技术成果的实战应用，承担国家毒品实验室交办的其他事项。

2022 年，拟依托陕西分中心成立陕西省毒品监测与禁毒戒毒关键技术重点实验室，以有机化学、分析化学和药物化学为核心，吸纳化学、环境、药物、生物、



陕西省公安厅

国毒陕〔2022〕1 号

关于国家毒品实验室陕西分中心成立学术委员会的通知

各科（室）：

为加强国家毒品实验室陕西分中心重点实验室建设工作，增强陕西分中心业务建设、科研立项、学术研究的指导性、科学性、权威性，提高陕西分中心全面建设水平。经研究决定：成立国家毒品实验室陕西分中心第一届学术委员会，委员名单如下：

主　任委员：房　喻（院士）

副主任委员：陈　腾

委　　员：赖江华、阎春霞、李　涛、刘跃文、褚宸舸、常　明、张天啸、张爱东、姚　震

特此通知。

国家毒品实验室陕西分中心

2022 年 2 月 22 日

抄送：厅内有关部门，陕西分中心学术委员会委员

心理学、社会科学等方面的学术力量，囊括毒品筛查溯源方法研究、多维毒情监测研究、毒品成瘾性及危害性研究、药物机制与生态毒理研究、毒品快速探测技术研究、毒品滥用市场监测研究以及毒情监测预警研究，为禁毒决策提供科学依据，为案件侦办提供全方位的技术支撑。

In February 2022, the Academic Committee of the Shaanxi Branch of the National Narcotics Laboratory was established, and Prof. Fang Yu was invited to serve as the chairman of the committee.

In recent years, the illegal production, trafficking and abuse of new narcotic drugs such as fentanyl-like substances have become an increasingly serious problem. In order to strengthen the control of the entire category of fentanyl-like substances, on April 2, 2019, in accordance with the instructions and requirements of CPC General Secretary Xi Jinping and the decision and arrangement of the CPC Central Committee, the construction of Central Narcotics Laboratory of the Ministry of Public Security and the Narcotics Laboratory of the five Regional Sub-centers in Beijing, Zhejiang, Guangdong, Sichuan and Shaanxi began. On May 31, 2021, the Shaanxi Branch Center of the National Narcotics Laboratory was completed and officially established and put into operation on June 22, 2021.

Prof. Fang Yu has long been engaged in the research of film-based fluorescence sensing and molecular gels, and has headed more than 30 projects, including Ministry of Science and Technology 863 Key Projects, China Scholarship Council major scientific instrument special project, and key international cooperation projects. In scientific research, adhering to the whole chain model from basic research to technological innovation to industrial application, he spearheaded the development of hidden explosive detection equipment with completely independent intellectual property rights and the world first narcotics detection sensor, and is recognized as the “international leader in the field of film fluorescence sensing”.

The Shaanxi Branch Center of the National Narcotics Laboratory serves five northwestern provinces in China, mainly responsible for the anti-narcotics technical work in the northwest region under the unified planning and guidance of the National Narcotics Laboratory, implementing the monitoring and early warning of the production, trafficking and abuse of fentanyl-like substances and other narcotics in the region, studying and judging the development and change trend of the narcotics situation, providing technical support for the investigation and handling of major narcotics-related cases in the region, and undertaking the inspection and identification of fentanyl-like substances and difficult samples of various narcotics and precursor chemicals. It also carries out targeted scientific research in light of the characteristics of the narcotics situation in the region, popularizes the practical application of advanced anti-narcotics technological achievements, and undertakes other works assigned by the National Narcotics Laboratory.

In 2022, Shaanxi Branch Center will establish the Shaanxi Provincial Key Laboratory of Narcotics Monitoring and Anti-Narcotics Detoxification Key Technology, using organic chemistry, analytical chemistry and medicinal chemistry as the core, to employ academic forces in chemistry, environment, medicine, biology, psychology, and social sciences, etc., and carry out narcotics screening traceability method research, multi-dimensional narcotics monitoring research, narcotics addiction and harmfulness research, medicine mechanism and ecological toxicology research, narcotics rapid detection technology research, narcotics abuse market monitoring research and narcotics situation monitoring and early warning research, so as to provide scientific basis for anti-narcotics decision-making and all-round technical support for case investigation.

团队举行 2022 新学年汇报讨论会

Fang Group 2022 academic year report seminar held

2022 年 2 月 11 日，光子鼻与分子材料科研团队在化工楼三层会议室举行新学年汇报讨论会，材料科学与工程胡道道教授和物理学与信息技术学院辛云宏教授受邀出席，会议由丁立平教授主持。

各位成员汇报总结了过去一年中在科学研究、教育教学、人才培养等方面的成果和不足，重点讨论了团队新学年的科研工作计划和团队成员个人发展的中长期规划。团队负责人房喻教授及受邀专家对各位成员工作汇报进行了讨论点评，在给予肯定的同时也指出各位成员存在的不足，对他们的发展方向给予了建议。

On February 11, the Photonic Nose and Molecular Materials Group held its report seminar for the 2022 academic year.

Prof. Hu Daodao of School of Materials Science and Engineering and Prof. Xin Yunhong of School of Physics and Information Technology were invited to attend the meeting, which was presided over by Prof. Ding Liping.

Group members reported and summarized their achievements and shortcomings in research, teaching, and talent cultivation in the past year, focusing on the group's research work plan for the new academic year and the medium- and long-term planning of their personal development. Group leader Prof. Fang Yu and the invited experts discussed and commented on the work report of the members, and while affirming them, they also pointed out their weaknesses and gave suggestions for their progress.

团队举行国家基金撰写促进会

Fang Group holds National Natural Science Fund proposal writing seminars

国家自然科学基金是国家创新体系重要组成部分，在促进我国基础研究和应用基础研究水平提升、学科建设与发展、高水平科技人才培养等方面发挥了巨大作用，获得国家自然科学基金资助情况可以一定程度地反映出申请者基础研究的水平和竞争力。每一年的新年前后，是科研工作者钻研、打磨基金本子的最佳时间，可谓是“衣带渐宽终不悔，为伊消得人憔悴”。

为了提高 2022 年度自然科学基金申请项目的质量，光子鼻与分子材料研究团队通过线上、线下相结合的方式组织了两次基金申报讨论会。本年度申请基金的几位团队老师分别从研究背景、科学问题、创新性、研究内容等几方面进行了汇报。房喻院士和团队其他几位老师，对如何完善申请书提出了宝贵的建议，并发现了一些共性问题，例如摘要撰写表述不清、创新点不突出、科学问题凝练度低、实验设计不严谨、相关研究基础缺乏等等。经过会议讨论，大家纷纷表示，撰写基金本子的思路豁然开朗，促进会卓有成效。

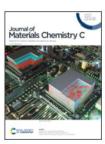
The National Natural Science Foundation of China is an important component of China’s national innovation system, which has played a huge role in promoting the improvement of the level of basic research and applied basic research in China, the construction and development of disciplines, and the cultivation of high-level scientific and technological talents. To a certain extent, the granting of the National Natural Science Fund reflects the level and competitiveness of an applicant’s basic research. Every year around the New Year, it is the best time for researchers to refine and polish the fund proposal, which can be described as “Even if my clothes grow loose I will not regret, as it’s worth while growing languid for the fund”.

In order to improve the quality of the 2022 Natural Science Fund application proposals, the Photonic Nose and Molecular Materials Group organized two fund proposal writing seminars, through a combination of online and offline methods. Member teachers who will apply for the fund this year reported their proposals from the aspects of research background, problems, innovation and content. Prof. Fang Yu and other member teachers made valuable suggestions on improving the application and found some common problems, such as unclear abstract writing, obscure innovation points, unfocused scientific problems, imprecise experimental design, and unsound related research foundations. After the discussion, the applying teachers said that the meeting was was very effective and they had opened up their train of thought in fund proposal writing.

近几年来，多重共振热活化延迟荧光材料（MR–TADF）以其特有的窄带发射、高光致发光量子效率、优异的光化学及热力学稳定性等突出优点而备受关注，在有机光电子器件领域展现出非常广阔的应用前景。截止目前，蓝色发光 MR–TADF 材料的研究已经取得了较大的进展，尤其是那些同时具有高效率、窄带发射和高色纯度的 MR–TADF 材料已被多位科学家报道。相比之下，绿光甚至更长波长发射的窄带 MR–TADF 材料的研究却相对滞后。此外，该类材料在荧光传感领域的研究尚未报道。因此，目前来讲，拓宽该类材料的应用领域和发展合成操作简单、具有长波长及窄带发射的 MR–TADF 材料是该领域存在的两大挑战。团队校友、河北师范大学祁彦宇副教授最近在相关领域取得了一些进展。

Since the first report in 2015, multiresonant thermally activated delayed fluorescent (MR-TADF) materials, have come to the fore as attractive hosts as well as emitters for organic light-emitting diodes (OLEDs).MR-TADF compounds typically show very narrow-band emission, high photoluminescence quantum yields, and small ΔEST values, coupled with high chemical and thermal stabilities. These materials properties have translated into some of the best reported deep-blue TADF OLEDs. By contrast, the narrow band MR-TADF materials emitting green light or even longer wavelengths are relatively backward. In addition, the research of this kind of materials in the field of fluorescence sensing has not been reported. Therefore, at present, the two major challenges in this field are to broaden the application field and to develop the synthesis of MR-TADF materials with simple operation and long wavelength and narrow band emission. Dr. Qi Yanyu, an alumnus of the Photonic Nose and Molecular Materials Group and currently an associate professor at Hebei Normal University, has made some progress in this field.

Issue 5, 2021



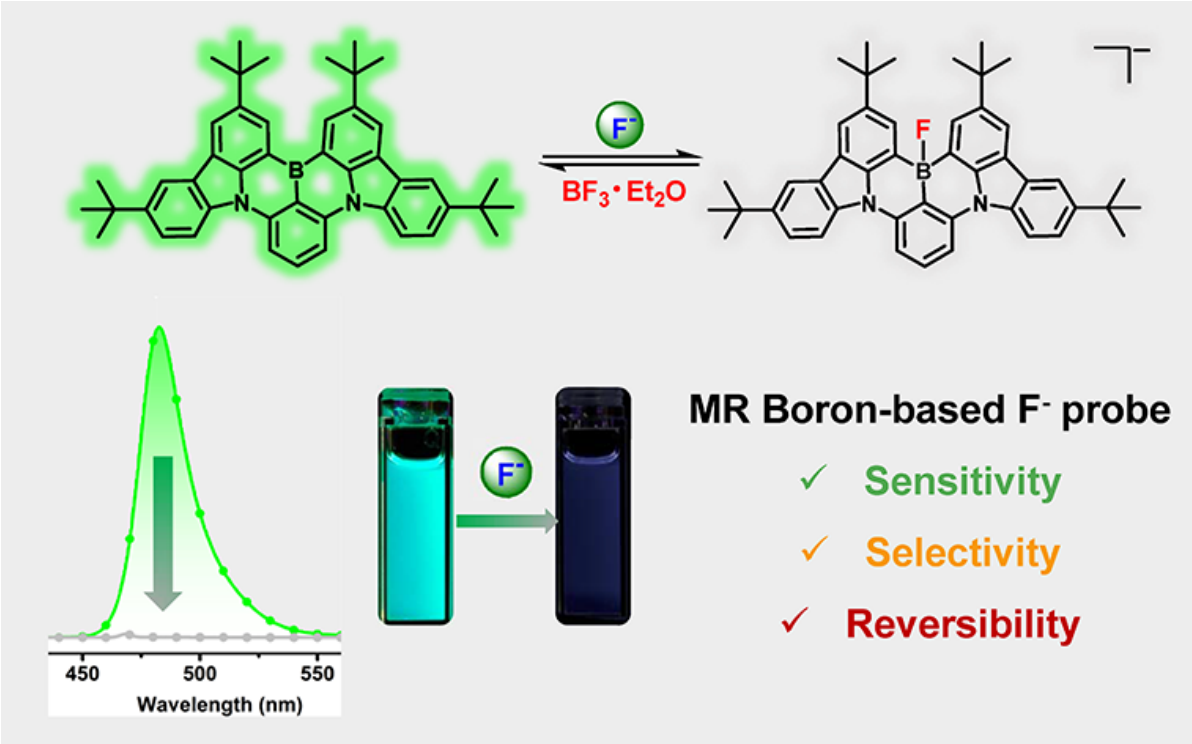
From the journal:
Journal of Materials Chemistry C

Multi-resonance organoboron-based fluorescent probe for ultra-sensitive, selective and reversible detection of fluoride ions†

Yanyu Qi,[ab] Xiaosong Cao,[a] Yang Zou*[a] and Chuluo Yang*[ac]

多重共振有机硼氮化合物的设计合成及氟离子传感应用

经两步反应，设计制备了叔丁基衍生的硼氮型多重共振热激活延迟荧光分子 BNCz，通过 1H NMR，13C NMR，11B NMR 和高分辨质谱等方法表征了中间体及目标分子结构。光物理性质研究表明，BNCz 表现出最大发射波长为 490 nm 的绿色窄带发光（半峰宽：22 nm），且在通用有机溶剂、有机溶剂与水混合体系中以及薄膜状态下均具有优异的光化学稳定性，2.5 小时的连续光照并未发现荧光强度的明显衰减，即成功地规避了光漂白现象。将其作为荧光探针，实现了对氟



化合物结构及传感过程示意图
Schematic diagram of compound structure and sensing process

离子的超灵敏（计算检出限：72 ppt）、高选择性及可逆性传感识别，论文发表时为文献报道最低值。将其制备成检测试纸，实现了对水相氟离子的灵敏可视化检测，可检测浓度在 10–4 mol/L 以上。晶体学数据及理论计算结果清楚地表明，氟硼配位键的形成与断开导致的多重共振结构的破坏与形成是实现传感的基本机理。该工作的创新之处在于，将具有多重共振热激活延迟荧光性质的发光材料首次用于对氟离子的检测识别，提出了氟离子检测新基理，拓宽了该类材料的应用范围，为同类其他材料的研究提供了新的思路。

第一作者：河北师范大学 祁彦宇
通讯作者：深圳大学邹阳、杨楚洛
全文链接：https://doi.org/10.1039/D0TC05496H

For the first time, a highly emissive MR-featured organoboron compound was used as a F- probe. This MR boron-centred F- probe exhibited excellent photochemical stability, good selectivity, reversibility and an ultralow detection limit of 72 ppt (part per trillion). The sensing mechanism was revealed by X-ray crystallography and DFT calculation to be based on a competing reaction: when the F- was added, the multiple resonance structure of BNCz was destroyed, resulting in fluorescence quenching. This work demonstrated a new approach for organoboron compounds with MR effect to be used as fluorescence sensors for F- with good sensitivity, selectivity and reversibility. Future work on developing water-soluble MR-featured organoboron compounds for F- detection in aqueous media is in progress.

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Full Text Link: https://doi.org/10.1039/D0TC05496H

ADVANCED FUNCTIONAL MATERIALS

Research Article | Full Access

Peripheral Decoration of Multi-Resonance Molecules as a Versatile Approach for Simultaneous Long-Wavelength and Narrowband Emission

Yanyu Qi, Weimin Ning, Yang Zou, Xiaosong Cao, Shaolong Gong, Chuluo Yang

First published: 13 May 2021 | https://doi.org/10.1002/adfm.202102017 | Citations: 38

同时具有长波长和窄带发射的多重共振发光材料的外围修饰通用方法

分别以咔唑基咔唑和二苯胺基咔唑为供体单元，硼氮结构作为受体单元，通过对称和不对称化学合成的方法，制备得到了三种硼氮型多重共振热激活延迟荧光材料 BN1、BN2 和 BN3。通过 1H NMR，13C NMR，11B NMR 和高分辨质谱等方法表征了中间体及目标分子结构。对其进行系统的光物理性质研究发现，BN1、BN2 和 BN3 在光激发下的最大发射波长分别为 496 nm、561 nm 和 582 nm，依次表现为绿光、黄光、橙红光的发光颜色，半峰宽（FWHM）依次为 23 nm、30 nm 和 30 nm，说明其均表现为窄带发射。在甲苯溶液中的光致发光量子效率均在 89% 以上。通过理论计算以及实验测试得到三个分子的单、三线态能量差分别为 0.11、0.11 和 0.08 eV，且瞬态发光光谱测试表明 BN1–3 均具有热激活延迟荧光特性，延迟寿命分别为 68.6、107.6 和 127.9 μs。分别以 BN1、BN2 以及 BN3 作为客体发光层，制备得到的电致发光器件的最大外量子效率分别为 24.3%，24.5% 和 24.7%，且均表现出较小的效率滚降。

本工作的创新之处在于，提出了该类分子设计的新策略，即可通过在原有蓝光硼氮核结构上引入给电子基团实现该类材料的光色调控，且不对称结构仍然可以表现出热激活延迟荧光的性质，以其作为发光层制备得到的电致发光器件性能优异，为该领域材料的设计提供了新的思路，有望在高效、廉价的 OLED 产品中得到广泛应用。

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通讯作者：深圳大学邹阳、杨楚洛，武汉大学龚少龙
全文链接：https://doi.org/10.1002/adfm.202102017

Three new MR emitters BN1–BN3 were designed and synthesized by peripherally decorating the parent BNCz molecule with carbazole and diphenylamine moieties. The PL spectra of the emitters could be versatilely tuned from bluish-green to yellow by changing the numbers and the electron-donating abilities of peripheries, meanwhile the properties of narrowband emission and small ΔEsts were well retained. With diphenylamine fully decorated, BN3 exhibited narrowband yellow emission with λem of 562 nm and FWHM of 30 nm. Accordingly, the exciplex-hosted OLED employing BN3 as the emitter displayed an

emission maximum of 568 nm and a small FWHM of 42 nm, which represents the first yellow OLED with narrowband emission ever reported. Moreover, the EQEmax of 24.7% was the highest for narrowband OLED with emission maxima over 550 nm. We believe this “peripheral decoration” approach would be enlightening for researchers to diversify the MR material library and further develop more colorful narrowband emitters.

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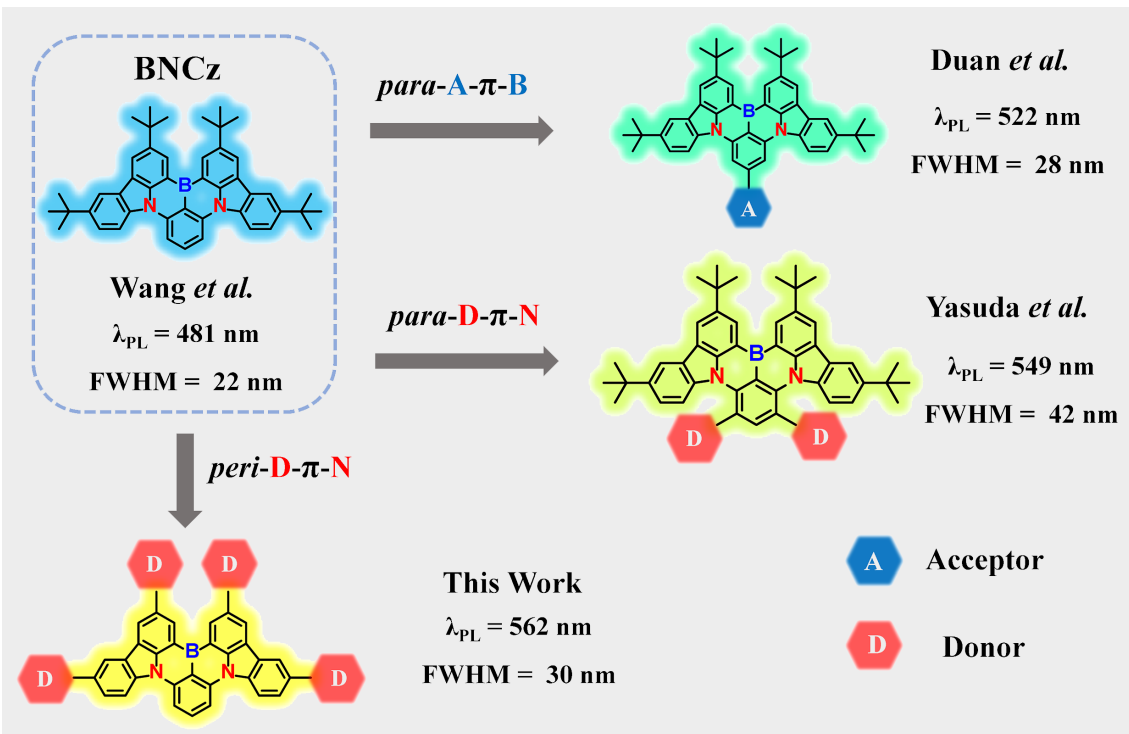
Full Text Link: https://doi.org/10.1002/adfm.202102017

目前来讲，对 MR–TADF 材料的研究仍处于起步阶段，MR–TADF 材料的结构及类型还是比较有限，对其在其他领域的应用研究也存在探索较少的现状。因此，笔者认为后续对该领域的研究应聚焦在以下几个方面 :1）设计新结构及探索新的简便合成方法；2）发展新的长波发射 MR–TADF 材料的设计和制备策略；3）拓宽其应用领域；4）更具说服力和预测性的理论计算方法用以辅助分子设计和发光机理解释。

At present, however, the research on MR-TADF materials is still in its infancy, meanwhile, the molecular structures and types of MR-TADF materials were also very limited. Therefore, the particular focus of this research area in the next few years will be: 1) how to design and synthesize narrowband TADF emitters with novel structures and new methods; 2) how to construct novel design and preparation strategies for long wavelength emission MR-TADF materials; 3) how to expand applications of the MR-TADF materials in circularly optical sensing, and 4) a more persuasive theory with essential chemical explanation to computational results is also waiting for further development and the theory shall be helpful for the guidance of molecular design of narrowband MR-TADF emitters.



BNCz 衍生至长波发射的构筑策略示意图
Schematic diagram of the construction strategy derived from BNCz to long-wave emission

房喻教授一行访问麦克传感器西安分公司

Fang Yu visits MicroSensor Xi'an Branch

2022 年 2 月 24 日上午，房喻教授和化学化工学院薛东院长一行受邀参观访问了麦克传感器股份有限公司西安分公司，学院刘成辉副院长、团队丁立平教授、刘太宏副教授陪同参加了交流座谈。

麦克传感器有限公司王刚总经理介绍了公司发展历程、技术产品和自动化生产线等情况。双方均认同传感器产业作为前沿领先科技和“卡脖子”技术，在智慧城市、智慧生活等应用方面市场前景广阔，推进产学研合作对推动科技创新、加快产业转化和升级均具有重大意义。通过深入交谈，双方初步达成了合作共识。

3 月 1 日下午，王刚总经理及技术团队一行对光子鼻与分子材料团队进行回访，与学院领导、团队成员和部分学生进行了座谈。薛东院长对王总及技术团队表示欢迎，简要介绍了学院概况、人才培养、专业建设、产学研进展等方面情况。房喻教授团队结合团队在新概念传感器领域的研究进展与麦克传感器技术团队进行了深入交流。

双方均表示要加强技术交流与合作，并尽快建立校企合作协议，希望通过双方深度合作加快学校高新技术尽快实现成果落地，并促进企业的创新发展，从而更好地服务地方经济发展。

麦克传感器股份有限公司，作为中国半导体压阻式压力传感器的行业领袖，拥有数十年扩散硅压力传感器、变送器的设计研发和生产制造经验，为顾客提供

交流合作 Exchange and Cooperation

各种专用传感器与监测解决方案，产品覆盖压力传感器、变送器、电磁流量计、温度仪表、手持设备、物联网末端采集与无线传输装置。

On February 24, 2022, Prof. Fang Yu and School of Chemistry and Chemical Engineering Dean Xue Dong were invited to visit the Xi'an branch of MicroSensor Co., Ltd. They were accompanied by Vice Dean Liu Chenghui, Prof. Ding Liping and Associate Prof. Liu Taihong during the visit and meeting.

MicroSensor general manager Wang Gang briefed about the company's development history, technical products and automated production lines. Both sides agreed that the sensor industry, as a cutting-edge leading technology and "stranglehold" technology, had broad market prospects in smart cities, smart life and other applications, and promoting industry-university-research cooperation was of great significance to promoting scientific and technological innovation and accelerating industrial transformation and upgrading. Through in-depth talks, the two sides reached an initial consensus on cooperation.

On March 1, Wang Gang and MicroSensor technical team visited the Photonic Nose and Molecular Materials Group and met with SCCE deans, group members and students. Xue Dong welcomed the guests and briefed about SCCE's profile, talent cultivation, discipline construction, and industry-university-research cooperation. Fang Group had an in-depth exchange with MicroSensor MicroSensor on their research progress in the field of new concept sensors.

MicroSensor Co., Ltd., as the industry leader of semiconductor piezoresistive pressure sensors in China, has decades of experience in the design, development and manufacturing of diffusion silicon pressure sensors and transmitters, providing customers with a variety of special sensors and monitoring solutions, covering pressure sensors, transmitters, electromagnetic flow meters, temperature meters, handheld devices, Internet of Things terminal acquisition and wireless transmission devices.

众合创投和风润智能负责人来访

Zhonghe Venture Capital and Fengrun Intelligence visitors received

2022 年 2 月 15 日，众合创投合伙人聂矿与风润智能装备股份有限公司总经理刘飚、风润智能研究院院长李博前来团队进行参观访问。

团队负责人房喻院士介绍了自 1998 年以来团队的科研历程，概括了团队在基础研究到产业转化方面取得的重要成绩，包括从荧光传感到高端爆炸物、毒品检测仪的诞生，从试管实验的凝胶化学到凝胶推进剂、凝胶云爆弹、低密度高强度材料等领域的重要拓展。

在座谈会上，房喻院士携团队成员与来访人员就产业对接交换了意见，探讨了如何将现有的研究成果逐步转化为产业，以期建立校企联合经营模式，打破传感器与低密度材料创制等领域的国际垄断，服务于国家与社会。

On February 15, the Photonic Nose and Molecular Materials Group received visitors Zhonghe Venture Capital partner Mr. Nie Min, Fengrun Intelligent Equipment Co., Ltd. general manager Mr. Liu Biao, and Fengrun Intelligent Research Institute dean Mr. Li Bo.

Group leader Prof. Fang Yu briefed about his group's research progress and major achievements from basic research to industrial application since 1998, including fluorescent sensors to high-end explosives and narcotics detectors, and major developments from test-tube experiment gel chemistry to gel propellants, gel cloud bombs, and low-density high-strength materials.

At the meeting, Fang Yu and his group members exchanged views on research-industry cooperation with the visitors , and discussed how to gradually industrialize research findings, so as to establish a school-enterprise operation model, breaking the foreign monopoly in the fields of sensor and low-density material, in better service of the country and nation.

笑对生活 相信自己

Smile at life, Believe in yourself

文 / 范佳云 by Fan Jiayun

从高中到本科毕业，其实对于科研、对于搞研究的概念可以说是零，也不清楚什么是搞科研，怎么搞科研，只是单纯的感觉它很高大上。直到读了硕士，才对“科研“这个词有了一个初步、不完全的认知。依然记得当时硕士保送名额确定后，给房老师发的第一封邮件，说要加入实验室时元气满满的样子，很庆幸，也很荣幸如愿以偿。

我发现自己一直都很幸运，刚来的第一天刚下过雪，祁彦宇和常兴茂师兄到校门口迎接的我，自此我的硕士科研生活开始，并改变了我今后的生活。刚开始开展工作的时候，还十分有冲劲，那时候还不清楚科研从来都不是一劳永逸的事情，遇到很多困难，也一度的怀疑自己，幸运的是我遇上了好导师，也遇上了很好的师兄师姐。房老师有很多的学生，博士、硕士、还有本科生。每个学生都会有自己的课题，大小问题一堆，但是房老师从来都不会放弃对每一位学生的指导和关心：周末帮着改论文，周内时不时的一起讨论实验问题。组会上，我想房老师应该是最认真的听众，每一位学生的 PPT，从内容格式甚至到标点符号都会给予点评，事无巨细。师兄师姐们更是十分热心和无私，从不吝惜自己的宝贵时间来和我讨论实验课题。与其说这个团队是个十分出色的科研队伍，倒不如说是个有温度、有梦想、有希望的大家庭。在这样的大家庭里，同优秀的导师和伙伴们一道修行，怎能不会熏陶成为一样优秀的人？所以，当时即便遇到困难，也不会觉得科研有多苦，也不会觉得是个多大的事，因为背后总会有人帮自己一把度过难关。

硕士毕业，因为很多原因并没有直接读博士，而是去企业工作了一年，期间更是怀念硕士阶段的学习和生活，和工作比起来，还是上学阶段的生活最美好。其实心里一直没有放弃过读博士的想法，是因为别人有自己没有的博士学位？是因为自己热爱科研？还是为了出国而读博士？我想无论是哪一种原因都不再重要了，重要的是我想要去做。越来越觉得，世上没有后悔药，想做的事情现在不去做，那心里的遗憾只会增加不会减少。尽管结合自己的情况，就业应该是当时最好的选择，可是最后我还是出来了，还选择了一个和自己背景相差很大的课题。在新的团队里，没有人会手把手的传授科研经验，对于新设备的学习，通常只会给一个大概的讲解，剩下的都是自己去摸索，去感受，真的很有可能因为一个很小的细节操作，要花上一周甚至更久。最初的两年，真的感受到了科研的无力感，感觉是一个人在战斗，感觉没有尽头。现在想想，这也锻炼了自己独立思考的能力。现在离毕业还有将近一年的时间，回顾过去的日子，科研一直在思考中摸索着，成果并没有 Top 期刊，但是也却坚持着，我也得到了多方面的回报和收获，不会遗憾！

想说的话太多了，还真不容易组织出清晰而有逻辑的语言概括出来，因为每个阶段的感受和想法都会发生变化，但是还是想引用房老师说过的讲几句话谈谈感受：1）笑对生活，无论发生任何困难，都要乐观面对，因为它终将会过去。2）要知其然，也要知其所以然。其实这是很久以前房老师提醒我的，一直铭记

于心。掌握实验数据及其研究的道理，才能走得更远更踏实，不仅是科研，生活也是一样！ 3）不要强求，做最大的努力，不留遗憾就好。每次看着别人发各种 Top 期刊，自己就会有压力，其实就做现在能做的，并做好就可以了，因为科研靠的不仅仅是努力，有时候还需要运气，还需要契机。4）要相信自己。就算被科研卡住了脖子，也不要怀疑自己，就算天才可能也解决不了你现在的问题，因为问题客观存在，学会换个角度思考问题。

最后，还是想表达感恩及感谢之情：非常感恩并感激房老师对我科研上的支持，生活上的鼓励。在我困难的时候，总是能够想起您的谆谆教诲！非常感谢实验室的小伙伴们，因为有你们的陪伴和帮助，让我拥有了无比珍贵的回忆！希望大家科研顺利，在各自的人生路上锦上添花！

范佳云，女，黑龙江省佳木斯市人。本科就读于哈尔滨师范大学，材料化学专业；于 2014 年加入房老师课题组进行硕士阶段的学习，主修物理化学专业，并围绕“薄膜荧光传感”这一课题进行展开研究。毕业后第一年在深圳砺剑防卫技术有限公司工作，围绕荧光传感薄膜设计、优化、维护等开展工作。随后在荷兰阿姆斯特丹大学攻读博士学位，主修物理化学专业，围绕“相高分辨气相激光光谱学 – 天然防晒霜的研究”展开研究，将于 2022 年 12 月份毕业。

When I was a high school and undergraduate student, I literally had no concept for doing scientific research. The concept of research itself or how to do research was not clear to me at all, but I simply feel that it is very high-end, high-level and classy. It was not until I was in the master’s program that I had a preliminary, incomplete understanding of the word “research”. I still remember how I looked full of vitality when I sent the first email to Prof. Fang after I had been admitted to the program

on recommendation, saying that I wanted to join his laboratory, and I was very fortunate and honored to become a student at his laboratory.

I found myself lucky all the time. It snowed the day before the first day of my arrival, two senior fellow students Qi Yanyu and Chang Xingmao greeted me at the school gate. Since then my master's research has begun and my life changed. When I first started working, I was still very motivated. At that time I did not know that research was never a once and for all thing, until I encountered many difficulties. I once doubted myself, but fortunately I met a good mentor, and I also met very good fellow students. Prof. Fang has many students, from doctoral, master's, to undergraduate students. Each student will have their own topic, a bunch of big and small problems, but Prof. Fang will never neglect the guidance and care for each student, reviewing their papers on weekends, and discussing experimental problems with them from time to time during the week. I think Prof. Fang must be the most earnest and meticulous listener at group meetings, correcting and commenting on student's PowerPoint presentation, from content, format and even to punctuation. The fellow students were very enthusiastic and selfless, never grudging their precious time to discuss experimental topics with me. This group is not so much an excellent research team, but rather a big family with warmth, dream and hope. In such a big family, how can one not become equally excellent people with such excellent mentors and partners? Therefore, even if I encountered difficulties at that time, I would not feel how bitter research was, nor would I feel that it was a big deal, because there would always be someone behind you to help you get through the difficulties.

After graduation from master's program, for many reasons I did not directly continue to study for a doctorate, but went to work at an enterprise for a year. I missed the research life during master's program, and compared with work, I think the student life is the the best ever. In fact, I have never given up the idea of studying for a doctorate in my heart. Is it because others have a doctorate that I do not have? Is it because I love research? Or do I study for a doctorate just in order to go abroad? I guess it doesn't matter anymore for either reason, for what matters is that I want to do it. More and more I feel that there is no regret medicine in the world, and if I don't do what I want to do now, the regret in my heart will only increase and not decrease. Although keeping a job should have been the best choice at the time, I came abroad in the end and chose a topic that was very different from my background. In the new group, no one will teach you research experience hand-in-hand, usually only giving a general explanation for the operation of new equipment, leaving the rest for yourself to explore, which could really take a week or even longer because of a small detail in operation. In the first two years, I really felt the powerlessness in research, feeling that I was fighting alone and there was no end. Now when I look back at, it has also exercised my ability to think independently. Now there is nearly a year before graduation, looking back on the past days, I have been groping while thinking in my research, though I have not published in top journals, but I persisted, and I have also got many returns and gains, so I will not regret!

There are too much that I want to say, and it is really not easy to organize a clear and logical language to summarize, because the feelings and ideas at each stage will change, but I still want to quote Prof. Fang's words to express my feelings: (1) Smile at life. No matter what difficulties you are faced with, be optimistic, because they will eventually go away. (2) To know what it is, but also to know why it is so. In fact, this is what Prof. Fang reminded me a long time ago, and I have always remembered it. Only by mastering the experimental data and the can we go further and more steadily, not only in research, but also in life. (3) Don't force it, do your best, and leave no regrets. Every time you see others publish

in top journals, you will have pressure, but actually what you need to do is to just do what you can do now, and do it well, because research does not rely only on hard work, sometimes you need luck and opportunities. 4) Believe in yourself. Even if you are stuck in the neck in your research, do not doubt yourself. Even a genius may not be able to solve your current problem, because the problem exists objectively, so learn to deal with the problem from another angle.

Finally, I want to express my gratitude: I am very thankful and grateful to Prof. Fang for his support in my research and his encouragement in my life. In my difficult times, I can always think of your earnest teachings! Thankful to the friends in the laboratory, because your company and help let me have invaluable memories! I hope that everyone's research will be smooth and successful, and every will have a splendid life!

Fan Jiayun, female, native of Jiamusi city of Heilongjiang province. She graduated with a bachelor's degree from Harbin Normal University, majoring in Materials Chemistry, before joining Fang Group in 2014 for her master's degree in Physical Chemistry on the research topic "Film Fluorescence Sensing". In the first year after graduation, she worked in Shenzhen SRED Security and Surveillance Technology Co., Ltd., working on the design, optimization and maintenance of fluorescent sensing films. She then began to study for a doctorate at the University of Amsterdam in the Netherlands, majoring in Physical Chemistry and focusing on "Phase High Resolution Gas Phase Laser Spectroscopy - Research on Natural Sunscreens", and will graduate in December 2022.

学会成为“反派”
Learn to be a “villain”

文 / 杨经纶 by Yang Jinglun

正做着实验，突然手机一震，我心生不妙肯定有啥事，赶紧停下实验，低头一看，原来是丁南南让我写个感悟！那么既然是感悟，想必也是给低年级的同学看的。这些同学在四年“艰苦”的大学生活中，喝着小酒，吃着火锅，唱着情歌，“活蹦乱跳”地抱着毕业后年薪百万的梦想踏入了研究生的大门。他们早已对模板式的文章司空见惯，也厌恶了赤裸裸的煽情，也在大学的社会中学得了皮笑肉不笑的功夫。所以对于这个随笔，我是一点不装。写到这里，做一个自我介绍，我叫杨经纶，是房喻老师 2020 届硕士毕业生，目前在香港城市大学材料科学与工程学院攻读博士学位。今天这篇随笔，没有苦尽甘来也没有奋斗精神，相比起实验室的几位大师兄我也不够资格，那么简单围绕这两点去说：1. 我所理解的科研与英语学习；2. 学会成为“反派”。

化学、材料这类学科本质还是属于发现性学科，大的突破比如导电高分子、超导材料等通常是偶然的发现，是有心栽花花不开，无心插柳柳成荫的代表学科。所以在主线实验进行的同时善于观察副线实验的现象以及主线实验出现的反常现象才是一个正确思路。以我个人为例，我进组是在 2017 年，最开始的主线实验是动态共价键凝胶，在 2018 年下半年，我意外发现干裂的凝胶表面存在亮晶晶的脆片，在扫描电子显微镜下，这些碎片呈现透明的薄膜状态。随后的一段时间，

我是辗转反侧忐忑不安但同时又有着对未知事物的好奇和兴奋，虽然每一步走得很艰难但又很享受这种被虐的快感。当时薄膜要不就是中间出现孔洞，要么就是一批成一批不成，属于那种给你希望的同时又折磨你的东西。就这么过了几周，开始有点烦躁，有点累，于是乎查看笔记本，确定每次配比和溶剂的当量都没问题以后，还是找不到问题。当天回到宿舍躺在床上胡思乱想：是不是天气问题？是不是嘉琪师兄在旁边说话口水飞进去了？是不是飞流师兄扭动蛮腰引起的气流波动？亦或者是李敏用紫外灯照我溶液上了？哎，对奥，那几天是七月份下了好几场雨！第二天，抱着试一试的态度将环境达到了饱和湿度，发现成膜的好坏跟湿度有非常大的关系。随后的几个月我通过成熟的条件，制备了超大高强度薄膜，并且该材料还被成功应用于各类物质的传感。

还记得刚进入实验室，房老师会要求我们每个人学习一学期的MOOC，提高我们的英文能力。这也是我要说的第二点，我们现在所学的科学技术都来自于西方，因而英文直接理解往往可以获得更准确的意思。到了二十一世纪，英语已经不是一两个国家的语言，而是全世界共有的语言，学好英语不仅是为了看懂文章更是可以给予你更多的选择机会。就海外博士申请来说，大多数全球前 100 的高校至少对雅思的要求是总分 6.5，往往因为竞争激烈需要达到总分 7。

坦白点说，我一直都不是一个优秀的学生，因为我总是喜欢担任“反派”这一角色，以至于我在大学中没有获得过任何一个奖项。我认为每个人都有最适合自己的道路，如果不能选择自己的道路而去迎合一个观点，那如何让思维百家争鸣，百花齐放。叔本华说：“最强有力的阻碍人们发现真理的障碍，并非是事物表现出的、使人们误入迷途的虚幻假象，甚至也不直接地是人们推理能力的缺陷。相反，是在于人们先前接受的观念，在于偏见。这些虚假的先验之物——对抗着真理。它们就好像是把船只吹往与惟一的陆地相反方向的逆风。对此，船橹和风帆是无能为力的。”

人们通常在有了既定的意识以后，会对不一样的观点在心理上进行排斥，这也往往阻碍了我们的进步。实验是认识到这一哲学的过程之一，在实验中任何事物都是辩证的具有两面性的，导电高分子的诞生是因为一次失败

的实验，但在原有评价体系的失败，却在另外一个评价体系得到了成功。所以在此，我希望各位同学不要信守教条，不要非黑即白，在听到了不一样的观点以后仔细听完并思考对比，这样往往可以在不同的观点中发现自己的盲点。

最后，我也明白，不能强求每个人都热爱实验，毕竟人各有各的的难处。尤其对于师范大学的学生来说，很多人需要毕业后去就业缓解家庭压力。虽然人的成功跟选择、运气、努力都有关系，甚至前两者可能是决定性因素，但我坚信只要尽力，生活不会亏待你！

此时我看了一眼柱子，流过了……

Chemistry, materials and similar disciplines are essentially discovery disciplines, and major breakthroughs such as conductive polymers and superconducting materials are usually accidental discoveries, so representative that it may be described as “intentionally planted and flowers do not bloom, inadvertent twig cuttings grow to willow woods”. Therefore, it is a correct idea to observe sideline experiments and any abnormalities in the mainline experiment while the mainline experiment is carried out. In my own case, after I joined Fang Group in 2017, the first mainline experiment was dynamic covalent bond gel, and in the second half of 2018, I accidentally found that there were bright crystalline chips on the surface of the dry cracked gel, appearing in a transparent film state under the scanning electron microscope. For some time afterwards, I was tossing and turning nervously but at the same time curious and excited about the unknown, and although each step was very difficult, I enjoyed the pleasure of being tormented. Either there was holes in the middle of the film, or I got a unsuccessful batch after a successful one, giving you hope and torturing you at the same time. After a few weeks, I became a little irritated and tired. I checked my notebook but still couldn’t find out the problem after determining that each ratio and solvent dose were correct. Back in the dormitory that day, I lay in bed and wondered: Is it a weather problem? Is it Jiaqi who was talking next to me and his saliva flew in? Is it the fluctuation of the air flow caused by Feiliu’s twisting of waist? Or maybe Li Min illuminated my solution with a UV lamp? Oh, yes, there had been several rains in those July days! The next day, I tried to make the environment to reach the saturated humidity, and found that the quality of the film formation was very much related with humidity. In the following months, I prepared a very large high-strength film under mature conditions, and the material was successfully applied to the sensing of various substances.

I remember that when I first joined the Fang lab, Prof. Fang asked each of us to study MOOCs for a semester to improve our English skills. This is the second point I would like to make, that the science and technology we are learning now comes from western countries, so we can often obtain a more accurate understanding when reading directly in English. In the 21st century, English is no longer the language of one or two countries, but a lingua franca of the world, and learning English well not only enables you to understand the article but also gives you more opportunities. In the case of overseas doctoral program applications, most of the world’s top 100 universities require at least an IELTS score of 6.5, and often 7 due to fierce competition.

Frankly, I have never been a good student because I always enjoyed the role of “villain” that I didn’t win a single award in college. I think everyone has the path that suits them best, and if you can’t choose your own path but pander to others, how can we achieve the state of a hundred schools of thought contending and a hundred flowers blooming. Arthur Schopenhauer said “The discovery of truth is prevented more effectively, not by the false appearance things present and which mislead into error, not directly by weakness of the reasoning powers, but by preconceived opinion, by prejudice. The false transcendental things --- that stand in the way of our discovery of the

truth, they are like a headwind that blows a ship against the land, for which neither the scull nor the sail can do anything."

People usually have a given consciousness and will psychologically reject different views, which often hinders our progress. Experiment is one of the processes of realizing this philosophy, in which everything is dialectically two-sided. Conductive polymers were born because of a failed experiment, but the failure in the original evaluation system turned out a success in another. Therefore, I hope that all fellow students will not be bound by dogma, do not view the world as either black or white, and listen carefully after hearing different views and then think and compare, so that you can often find your own blind spots in these different views.

Finally, I also understand that we can't force everyone to love experiments. After all, people have their own difficulties, especially for students of Normal Universities, they need to get a job after graduation to alleviate family pressure. Although people's success is related to choice, luck, and effort, and the first two may be the decisive factors, but I firmly believe that as long as you try your best, life will not treat you unfairly!

At this point I glanced at the column in my column chromatography procedure, and it over-eluted .....

让每个阶段的自己都是崭新的自己

Make yourself a new person in each life stage

文 / 赖发燕 by Lai Fayan

2021 年 9 月，带着不安与不舍交织的心情，我踏上了异国他乡的求学之路。至今，我已在这个陌生的国度生活学习了将近五月，回想这段时间的点点滴滴，内心颇有感慨。

犹记得飞往法国的那天，黑夜好像无比的漫长，经历了整整 15 个小时的黑夜，终于看到了法国的天空。当飞机降落，走出机场那一刻，才真正意识到我真的离开了祖国。放眼望去再也不是熟悉的汉字，而是一串串的字母，周围全是听不懂的法语或者法式英语，二十多年生活在黄皮肤的世界里，现在却满眼都是陌生的欧洲面孔……那一刻，原先的憧憬忽然全变成了慌张，我不知道要怎么去适应怎么去开始，但还是极力克制，一遍遍告诉自己，不要害怕，不要着急，慢慢来，你可以的。

来接机的老师带着我们直接去了研究所，不同于恢弘大气的致知楼，研究所的化学楼更像短小精悍的居民楼，整个所也显得很寂寥。实验室比想象中更小旧一点，或许是因为人少的缘故，反而显得有些空旷，当时脑海里第一个想法是，这要是在我们实验室，现在这个时间应该都忙的热火朝天吧。

匆匆见过课题组的老师及同伴之后，便去办理入住手续。所幸住的地方距离研究所并不远，这在一定程度上给了我些许安全感。收拾好房间整理好一切，吃过张莉君师姐热心准备的晚饭，再次回到寝室躺在床上，看着窗外，心想从现在开始要一个人生活了呢。来不及伤感太多，便在过度疲惫中沉沉睡去……

后来便是按部就班的办理各种手续，这其中因为语言障碍，遇到很多困难，却也发生了很多暖心的故事。去打疫苗问路时候，我们听不懂法语，对方又不会英语，便直接带着我们去找，结果那个地方是临时设的点，已经更换了。于是，她便跑去问其他人，还找来会英语的人和我们沟通，

整个过程，遇到的所有人都非常耐心，非常友善。这对异国他乡的我们而言，无异是冬日暖阳，非常温暖和感动。而这样的温暖一直发生着，我们虽然国籍不同，语言不通，可是都有一颗善良的心。

课题开始的很快，几乎没有太多时间去适应，便开始了实验室生活。提起实验，真的无比感恩研究生三年在我们实验室学习到的知识和技能，让我在即使没有人带领的情况下也可以立即开始独立实验，并且十分享受这种过程。相比下班回家，我仿佛更喜欢待在实验室的生活。因为下班回到家里，一个人做饭，吃饭，然后面对的便是和国内七个小时时差带来的深深孤独感……夜深人静，无人说话，仿佛只有放点音乐或者视频，才能赶走这一屋子的孤独。

当初来乍到的新奇感褪去后，迎接的便是浓的化不开的思念。图卢兹傍晚的天空很美，粉色的天空和星星点点的路灯融到一起，格外的柔和。飞机在头顶飞过时候，我总在想，如果我能搭着这架飞机飞往国内该多好……但我深知，只有把思念埋在心里，当作动力，不忘初心，每天更努力一点，更投入一点，仿佛尽快做完课题，回家的日子便更近了。

一生很短，活法千般，而我想的，不过是世界很大，我要我自己都去经历一遍，涨些见识，看些地方，学些东西，让每个阶段的自己都是崭新的自己，永远走在勇往直前的路上。凡心所向，素履以往，生如逆旅，一苇以航。

In September 2021, with a mixture of uneasiness and reluctance, I embarked on the road of studying overseas. So far, I have been living and studying in this foreign country for nearly five months, and I have a lot of emotions thinking back on the bits and pieces of this time.

I still remember the night on the day I flew to France seemed to be endlessly long. After a full 15 hours of darkness, I finally saw the French sky. When the plane landed and I walked out of the airport, I realized that I had really left my homeland. Looking around me, I could no longer see

familiar Chinese characters, but a string of alphabets, and I was surrounded by unintelligible French or French English, amid strange European faces after living in a yellow-skinned world for more than twenty years ..... At that moment, the original expectations suddenly turned into panic, and I didn't know how to adapt myself, how to start a new life here, but still I tried to compose myself, telling myself over and over again not to be afraid, not to worry, to go slow, and that I could do this.

The teacher who came to pick me up took me directly to the institute. Unlike the magnificent Zhizhi Building, the chemical building of the institute is more like a small residential building, and the whole institute is also very lonesome. The laboratory is a little smaller and older than I expected and seems a little empty, perhaps because of the small number of people. The first thought popping up in my mind at that moment was that if this were in our laboratory back in China, everybody should be busy at full swing at this time of the day.

After briefly meeting the teachers and students of the research group, I went to check in. Fortunately, I live not far from the institute, which gives me a sense of security to some extent. After cleaning up the room and tidying up everything, and after eating the dinner my senior fellow student Zhang Lijun cooked for me, I went back to the bedroom and lay on the bed, looking out the window, and told myself that from now on I was on my own. Before feeling too much sadness, I felt asleep in exhaustion .....

Then it was the step-by-step process of various procedures, during which, I encountered many difficulties because of the language barrier, but there were also many heart-warming stories. When we asked for directions on our way to get vaccination, we didn't understand French, and the person we asked for help didn't speak English, so she took us directly to the location, but it turned out that it was a temporary station and had been removed. So she went to ask other people and found someone who spoke English to communicate with us, and all the people we met were very patient and friendly during the whole process. For the two of us on a foreign land, it was like a winter sun, warm and touching, and this kind of warmth has always been there. Although we have different nationalities and speak different languages, we all have a kind heart.

The project started quickly. There was not much time for me to adapt, before I began to work in the laboratory. Talking about experiments, I am really grateful to the knowledge and skills we have learned in our laboratory during three years of master's program, so that I can immediately start independent experiments even without anyone leading me, and I enjoy the process very much. I seem to prefer staying in the lab to coming home from work. Because when I come home from work, I cook and eat alone, and then I am faced with the deep loneliness brought about by the seven-hour time difference with China ..... In the dead of night, there is no one to speak with. It is as if only some music or video could drive away the loneliness filling the room.

After the fresh-off-the-plane novelty faded, what greeted me is indissolvable homesickness. The evening sky in Toulouse is beautifully gentle, with the pink sky and the dotted street lights blending together. When a plane flew overhead, I would think, how nice it would be if I could fly in this plane back to China ..... But I know very well that only by burying my thoughts in my heart, using it as a driving force, not forgetting my original aspiration, and working harder and more invested every day, the day of returning home would come sooner, as if I finished the project in the soonest possible way.

Life is short, and there are a thousand ways of living. What I think is that I want myself to experience the big world myself, expanding my vision, seeing some places, learning some things, so that I will become a new person in each stage, always striding ahead on the road. Wherever the heart yearns, even if you wear straw shoes, you must go; Life is like a retrograde journey, even a flat leaf boat must set sail forward.

进步的道路永无止境

The path to progress is endless

文 / 张苗苗 by Zhang Miaomiao

在陕西师范大学化学化工学院学习的日子里，我感受到学院浓郁的学术氛围，耳濡目染着老师们对于科研的热情，看着大家充满干劲的样子，我下定决心认真学习，努力实验。在这学习的过程中，我经历过各种不同的情感，有迷茫和怀疑，有坚持和努力，也有付出后收到回报的感动和快乐。

目前来看，我在陕师大这几年的学习，是我最宝贵和最值得回忆的经历。我非常感谢化学化工学院的各位老师，他们求真务实的精神，让我们能够踏踏实实，认真实验，勤于探索；也非常感谢老师们的关心和帮助，让独在异乡的我们感到温暖。同时，我也非常感谢我的优秀的同学们和师兄师姐们，一直以来你们都是我学习的榜样，跟着你们一起学习，让我收获了很多。

“细节决定成败”——注重细节与规范。科研工作有时也许并不像想象的那么精彩，可能需要面对大量繁重且琐碎的书面工作。学习工作中要以审慎的态度对待每一个研究报告撰写、每一次实验、每一个数据分析，甚至是每一个标点符号、图表、文献标注等等，以确保数据来源可靠，数据分析翔实，格式规范，不犯低级错误。

“思想的深度决定行动的高度”——多看多思多想。文献阅读是科研的基础和起点，要广泛阅读，尤其高质量期刊论文，同时要积极关注国家政策和社会发展热点，明确研究领域前沿方向与重点难点。在掌握专业领域基础知识的前提下，针对研究课题多加思考、善于总结、敢于创新，开拓科研思路，形成自己的思考逻辑与架构。

“三人行，必有我师焉”——善于倾听交流。听他人意见，虚心接受批评；听重点，学习研究方法、研究思想。与老师、与学长学姐、与同学进行有效沟通，事先准备好问题、设想方案，多方沟通、吸收观点，最终得到解决方案。

“为之须恒，不恒则不成”——长期作战，持之以恒。坚持学习，保证每天的有效学习时长；利用零散时间学习 Origin、Chemdraw、Gaussian 等专业软件，不断提升自身专业技能。

回顾过去几年的研究生生活，我清晰认识到进步的道路永无止境，没有任何一个成功是偶然的，它需要长时间的准备，只有十分努力，才能看起来毫不费力。我们在岁月底的沉默，从来都不是对煎熬的耐受；我们在岁月中的静候，无一不是在为腾飞而蓄力。时光如流，磨平幼稚的棱角。光阴悄然溜走，留下的都是奋斗着的、最好的我们。

Studying in the School of Chemistry and Chemical Engineering of Shaanxi Normal University, I am immersed in the rich academic atmosphere, touched by teachers' enthusiasm for scientific research, and felt the vigor and energy of everybody here, so I made up my mind to study seriously and work hard in experiments. In the process, I experienced a variety of different emotions --- there were confusions and doubts, persistence and effort, and also moving moments and joys of receiving rewards after making efforts.

So far, these several years at Shaanxi Normal University are my most valuable and memorable experience. I am very grateful to the teachers of the School of Chemistry and Chemical Engineering, for their truthfulness and pragmatism makes us experiment rigorously,

explore diligently, and being thoroughgoing in everything we do. I am also thankful to them for their care and help, so that we feel warm in a place away from home. At the same time, I would also like to thank my excellent classmates and senior fellow students, for you have always been my role models, and learning together with you has made me gain a lot.

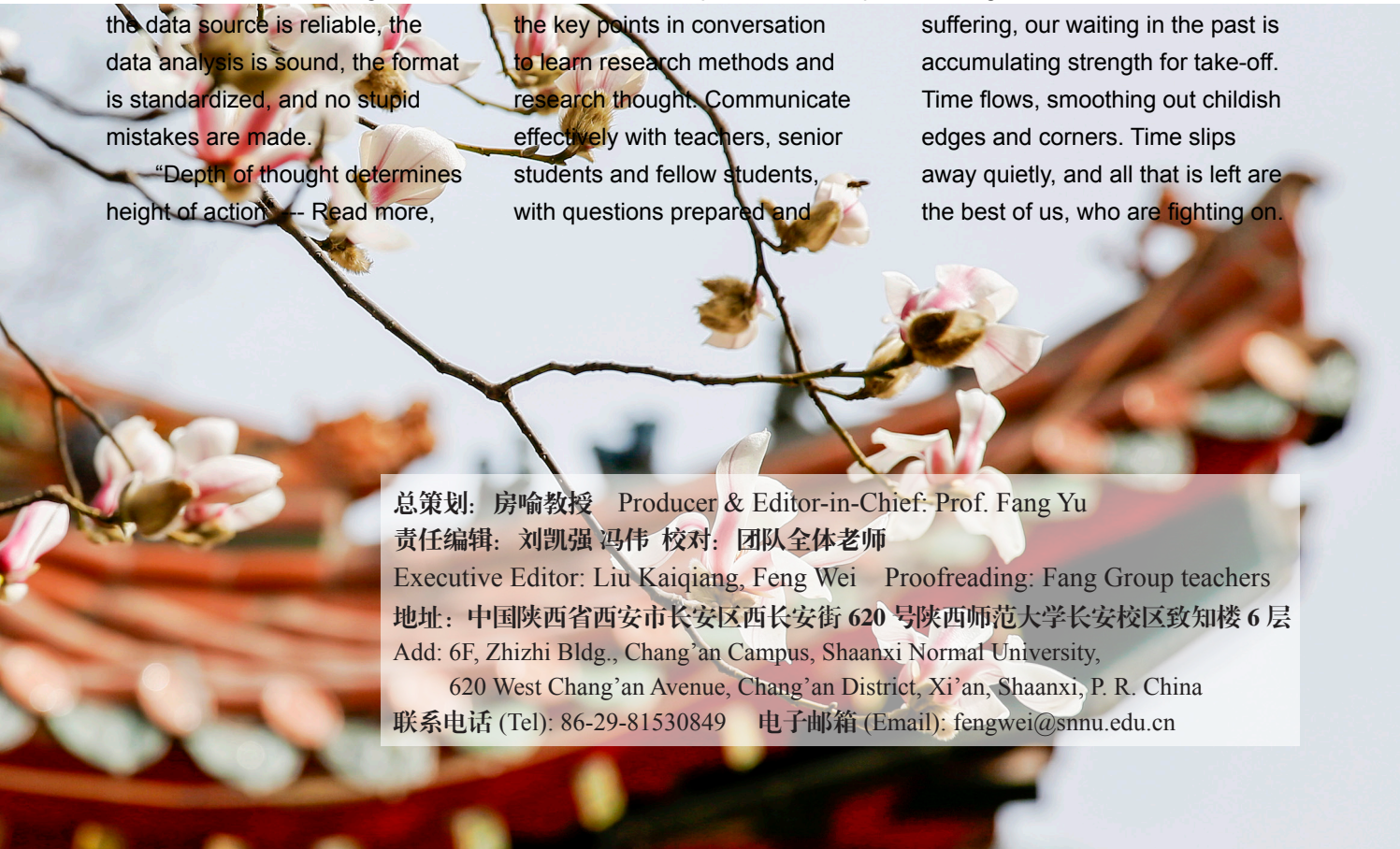
"Details determine success or failure" --- Pay attention to details and norms. Scientific research may not be as exciting as imagined, as you may need to face a lot of tedious and trivial writing work. You must be prudent in writing every research report, conducting every experiment, analyzing every set of data, paying attention even to every punctuation, chart, citation and annotation, so as to guarantee the data source is reliable, the data analysis is sound, the format is standardized, and no stupid mistakes are made.

"Depth of thought determines height of action" --- Read more, think more. Literature reading is the foundation and starting point of scientific research. Read extensively, especially high-quality journal papers. At the same time, pay cloase attention to national policies and hot social topics, to delineate the frontiers, focuses and difficulties in the research field. After mastering the basic knowledge of a professional field, we should think more about the research topics, summarize periodically, dare to innovate, so as to expand our research ideas and form our own thinking logic and structure.

" There must be one out of three who can be your teacher" --- Be a good listener and communicator. Listen to the opinions of others and accept criticism with an open mind. Grasp the key points in conversation to learn research methods and research thought. Communicate effectively with teachers, senior students and fellow students, with questions prepared and plans conceived in advance. Communicate with multiple parties and absorb their views, and finally find your own solution.

"Persevere in doing things, otherwise you cannot succeed." --- Persevere and get ready for long-time fight. Persevere in studying and ensure effective learning hours every day. Use your fragmented time to learn professional software such as Origin, Chemdraw and Gaussian, constantly improving your professional skills.

Looking back on my graduate student life over the past few years, I am clearly aware that the path to progress is endless, that no success is accidental, that it takes a long time to prepare, and that it takes very hard work to look effortless. Our silence for so long is never an endurance to suffering, our waiting in the past is accumulating strength for take-off. Time flows, smoothing out childish edges and corners. Time slips away quietly, and all that is left are the best of us, who are fighting on.



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