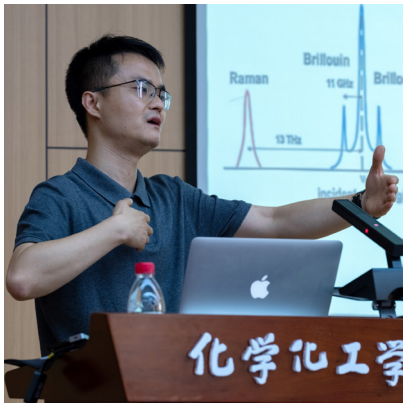
光子鼻与分子材料团队简报

Newsletter of Photonic Nose and Molecular Materials Group

9 / 2022



房喻院士做客“化学大家谈”做主题报告

Fang Yu speaks at “Chemistry Talks” Forum

2022 年 9 月 1 日上午 10:00–11:30，陕西师范大学教授、中国化学会常务理事、中国科学院院士房喻应邀作为“化学大家谈”——庆祝中国化学会 90 华诞系列高端学术论坛活动的第 20 期报告嘉宾，以“我所理解的化学”为主题，通过线上会议向大家分享了对化学学科的发展及未来科研方向的思考。本期学术论坛由中国科学院上海有机化学研究所研究员、中国化学会副秘书长游书力主持。

房喻院士提到，化学不能代替一切，但没有化学肯定没有一切；化学就是未来，没有化学就没有未来。化学能够为人们认识客观世界、改造客观世界提供独特的视角和手段，它作为一门基础学科，是支撑包括材料、能源、环境、生命、医药、农业、食品、航天、军事，乃至整个物质科学发展的最重要力量之一。除此之外，化学带给人的是一种思维习惯，做事习惯，即把每一个细节都能够想到，把每一个细节都能够做好。

On September 1, 2022, Shaanxi Normal University Prof. Fang Yu, member of Chinese Academy of Sciences and executive council member of Chinese Chemical Society, was invited to present a keynote report as the 20th speaker at the “Chemistry Talks” forum series in celebration of the CCS’s 90th anniversary.

Speaking on “Chemistry as I Understand It”, Fang Yu shared his thinking on the development and the future research direction of the discipline of Chemistry from 10:00 to 11:30 in the online report, which was hosted by CAS Shanghai Institute Of Organic Chemistry researcher and CCS deputy secretary general You Shuli.

Fang Yu said that Chemistry cannot replace everything, but without Chemistry there is certainly nothing; Chemistry is the future, and without Chemistry there is no future. Chemistry can provide people with a unique perspective and means to understand the objective world and transform the objective world, and as a basic discipline, Chemistry is one of the most important forces supporting the development of materials, energy, environment, life, medicine, agriculture, food, aerospace, military, and even the entire material science. In addition, Chemistry brings people a habit of thinking, a habit of doing things, that is, every detail can be thought of, and every detail can be done well.

学校学院领导看望房喻院士

School officials visit Fang Yu ahead of Teachers' Day

在第38个教师节来临之际，9月8日下午，学校党委常委、校长游旭群，来院看望慰问房喻院士，致以节日的问候和祝福。

游旭群校长询问了房喻院士的健康状况和工作生活情况，表示房院士是“西部红烛 两代师表”精神的塑造者、传承者、践行者，是学校的宝贵财富，并代表学校感谢房喻院士多年来为学校发展作出的突出贡献。

房喻院士对游校长及陪同慰问的处室负责人表示欢迎和感谢。

党委校长办公室主任、研究生院院长陈新兵，人事处处长胡波，人才工作处处长姚若侠，化学化工学院党委书记吴晋峰、院长薛东陪同慰问。

此外，9月9日上午，化学化工学院党委书记吴晋峰，院长薛东，党委副书记贾颖辉，副院长丁立平、刘成辉、肖新军、翟全国一行看望慰问了房喻院士。

On the eve of the 38th Teachers' Day, which falls on September 10, 2022, on the afternoon of September 8, You Xuqun, member of the Standing Committee of the CPC Committee and President of Shaanxi Normal University, visited Prof Fang Yu to extend festive greetings and blessings.

After inquiring about the health, work and life of Prof. Fang, You Xuqun said Prof. Fang was the shaper, inheritor and practitioner of the spirit of “Western Red Candle, Two Generations of Teachers”, and a precious treasure of the university. You thanked Fang for his outstanding contribution to the university over the years.

Fang Yu welcomed and thanked President You and the department heads who came to visit him.

SNNU Administrative Office director and Graduate School dean Chen Xinbing, Personnel Department director Hu Bo, Talent Work Office director Yao Ruoxia, School of Chemistry and Chemical Engineering CPC Committee secretary Wu Jinfeng and dean Xue Dong, joined You Xuqun in the visit.

Later on the morning of September 9, Wu Jinfeng, Xue Dong, SCCE CPC Committee vice secretary Jia Yinghui, vice deans Ding Liping, Liu Chenghui, Xiao Xinjun, and Zhai Quanguo, also visited Prof. Fang Yu.

团队获批 3 项国家自然科学基金项目

Fang Group's three projects granted by National Natural Science Foundation of China

9 月 8 日，国家自然科学基金委员会公布了 2022 年度国家自然科学基金申请项目评审结果，光子鼻与分子材料团队申报的三个项目获得资助。

房喻院士申报的科学传播类“‘化学 +’科学教育活动设计及实践”获专项项目资助，资助直接经费 15 万元；刘凯强研究员申报的“可逆剪切变硬凝胶构建中的动态共价化学”获面上项目资助，资助直接经费 54 万元；彭浩南教授申报的“薄膜荧光传感中‘传能’与‘传质’的结构基础”获面上项目资助，资助直接经费 54 万元。

On September 8, the National Natural Science Foundation of China announced the results of its 2022 application project review, and the three projects submitted by the Photonic Nose and Molecular Materials Group were funded.

Prof. Fang Yu's Project of "Chemistry +" Science Education Activity Design and Practice in the Science Communication category was funded for special projects, with a direct funding of 150,000 yuan; Researcher Liu Kaiqiang's project of Dynamic Covalent Chemistry in the Construction of Reversible Shear Hard Gel was funded for the general project, with a direct funding of 540,000 yuan; and Prof. Peng Haonan's project of Investigations on the Structural Bases of the Energy-Transfer and Mass-Transfer Processes in Film-based Fluorescence Sensing was funded by in general project, with a direct funding of 540,000 yuan.

房喻院士致知讲堂第一期开讲“我理解的教育与化学”

Fang Yu speaks on "My Understanding of Education and Chemistry" at Zhizhi Lectures

9 月 21 日，房喻院士应邀在致知楼 1668 会议室作化学化工院致知讲堂首期报告，讲述“我理解的教育与化学”。

报告会由薛东院长主持，学院领导班子及全体教职工参会。

房喻院士通过杨振宁、邓稼先、姚期智、邱成桐、黄昆等著名的科学家、教育家的事迹，讲述了教育于社会而言的重要意义，提出只有完善培养体系、持

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续人才供给、坚持高质量发展，才能取得各个领域的进步和成功。他指出化学学科是基础学科的基础，社会民生、尖端领域的发展、突破都离不开化学学科的支撑；教育是现代化的基石和人才传承的桥梁，国家的发展离不开扎实的人才队伍，希望全体教师不忘育人初心，恪守育才使命。

薛东指出，学院开设“致知讲堂”旨在促进教师队伍发展，发扬学院“包容、务实、创新、精进”的文化精神，希望全体教师不忘初心，锤炼师德师风，争当“四有”教师。

On September 21, Prof. Fang Yu was invited to speak at the first session of School of Chemistry and Chemical Engineering’s Zhizhi Lectures in Conference Room 1668 of Zhizhi Building, telling his understanding of education and chemistry.

SCCE officials and faculty and staff attended the event presided over by its dean Prof. Xue Dong.

Fang Yu highlighted the significance of education in society through the deeds of famous scientists and educators such as Yang Zhenning, Deng Jiaxian, Andrew Chi-Chih Yao, Shing-Tung Yau, Huang Kun, and argued that only by improving the training system, continuing the supply of talents, and adhering to high-quality development could progress and success in various fields be achieved. He maintained that chemistry is the foundation of basic disciplines, and the development and breakthrough in the social function, people’s livelihood, as well as cutting-edge fields are inseparable from the support of the chemical discipline. He summarized that education is the cornerstone of modernization and the bridge for the inheritance of talents, and the development of the country is inseparable from a solid team of talents, and he hoped that all teachers would not forget the original intention of educating people and abide by the mission of educating talents.

Xue Dong explained that the purpose of the Zhizhi Lectures is to promote faculty development and carry forward SCCE’s cultural spirit of “Tolerance, Pragmatism, Innovation and Improvement”, and hoped that all teachers would not forget their original intentions, improve their morality, and strive to become good teachers with ideals and beliefs, moral sentiments, solid knowledge, and a benevolent heart.

团队华春霞完成博士后出站汇报

Hua Chunxia presents her postdoctoral report

9月29日上午，光子鼻与分子材料团队的华春霞博士在化工楼三层会议室完成了博士后出站汇报。

华春霞的科研工作汇报题为“苝二酰亚胺基荧光小分子电致变色研究”。汇报之后，5位校内外专家组成的评审组进行了提问，与华春霞就工作创新点、实验结果、报告内容格式等方面进行了讨论，并对相关工作的后续开展提出了建议。

On September 29, Dr. Hua Chunxia of the Photonic Nose and Molecular Materials Group presented her postdoctoral report in the conference room on the third floor of the chemical building.

Hua Chunxia’s research report is titled “Studies on the Electrochromic Behaviors of Perylene Diimide-Containing Fluorophores”. After the report, the five reviewers from Shaanxi Normal University and other institution asked questions to and discussed with her, concerning the innovation points, experimental results, and report format, and put forward suggestions for follow-up work.

团队2021级学术型研究生完成学位论文开题

Class of 2024 academic graduate students present their dissertation/thesis proposals

9月28日和29日下午，光子鼻与分子材料团队2021级4名博士研究生和22名学术型硕士研究生分三组在致知楼完成了学位论文开题。

丁南南、马亚男、张晶、张苗苗等四位博士研究生分别进行了题为“基于邻碳硼烷–苝单酰亚胺分子体系多重发光的光物理行为和传感应用研究”“基于

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廉价亚铜基金属配体 MOFs 的合成、结构及光催化 CO_2 还原的研究”“含金（III）荧光分子的设计合成、光物理性质及其传感应用研究”和“水系可充电电池中水的结构和超快动力学研究”的开题汇报。

刘倩倩、白亦敏、刘永康等 22 名硕士生也分别就其研究课题进行了开题汇报。

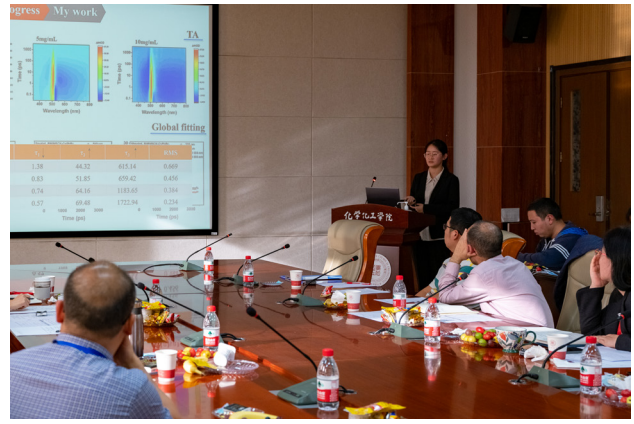
由 13 位校内专家组成的考核小组听取了同学们的汇报，对同学们进行了提问，与同学们讨论了相关问题，并就其论文课题提出了建议。

On the afternoons of September 28 and 29, Photonic Nose and Molecular Materials Group's four doctoral students and 22 academic master's students of Class of 2024 presented their dissertation/thesis proposals in three sessions in Zhizhi Building.

Four doctoral students Ding Nannan, Ma Yanan, Zhang Jing, and Zhang Miaomiao presented their dissertation proposals under the titles of *o*-Carborane-Perylene Monoimide-based Multiple Luminescence: Photophysical Behaviors and Sensing Applications, Synthesis, Structure and Photocatalytic CO_2 Reduction of Earth-Abundant Cuprous Metalloligand-Based Metal-Organic Frameworks, Design, synthesis, photophysics and sensing applications of Au(Ⅲ) luminophores, and Water Structure and Dynamics of Aqueous Rechargeable Batteries Investigated by Ultrafast Infrared Spectroscopy respectively.

Liu Qianqian, Bai Yimin, Liu Yongkang and other 19 master's students presented their thesis proposals.

The 13-member assessment team asked questions to and discussed relevant issues with the students, and made suggestions for their projects.



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A high-performance formaldehyde luminescent tubular sensor enabled by a cyclometalated alkynyl-gold(III) complex-contained perylene bisimide derivative

Jing Zhang, Ke Liu, Gang Wang, Zhaolong Wang, Wenjun Xu, Nannan Ding, Simin Lin, Yu Fang *

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一种高性能甲醛管状传感器：基于金（III）-苝二酰亚胺衍生物发光分子

甲醛 (FA) 是国际癌症研究机构 (IARC) 公认的最危险的致癌物之一，如果人体长时间暴露在含甲醛的空气中，即使浓度很低，甲醛也会刺激眼睛、鼻子和喉咙，并导致打喷嚏、恶心、哮喘、肺水肿和过敏，更甚者会引起鼻咽癌、白血病等更严重的后果。因此，实时、准确、便捷的监测甲醛浓度能够帮助我们准确掌握生活环境质量并及时关注自身健康状况。虽然在过去几十年里已经开发出如分光光度法、气相色谱法、比色法、生物传感器、电传感器等监测甲醛的技术，然而这些技术通常需要笨重昂贵的仪器和训练有素的操作人员，这严重阻碍了它们的现场和实时应用性，该问题亟待解决。

据此，我们设计了一款全新的微型甲醛发光管状传感器（2.5 cm L × 3.0 cm W × 3.1 cm H），其实验检测限低于 0.01 mg/m^3，响应时间小于 5 s，恢复时间小于 20 s，大多数日常生活用品对检测没有明显的干扰，在连续检测 130 个周期后性能也几乎没有下降，同时可实现对被测场所中甲醛含量的准确监测。这些优越的传感性能主要归功于新型传感单元 (Au–PBI) 的应用，它是由苝二酰亚胺衍生物 (Ref–PBI) 与环金属化炔基金 (III) 配合物化学键合而成。与参比化合物 Ref–PBI 不同的是，非平面结构的 Au–PBI 在固态时具有很高的发光量子产率和光化学稳定性，从而规避了制膜后的分子堆积猝灭和光漂白等缺陷；理论模拟研究揭示了目标分子中的金原子对甲醛中的氧原子有特定的亲和力，致使他们之间的距离仅为 3.11 Å，这种弱相互作用使得 Au–PBI 在处于激发态时可以发生光致电子转移 (PET) 过程，进而导致其发光被猝灭，且该过程是可逆的，同时所制备的基于 Au–PBI 的传感材料对甲醛的快速、可逆猝灭型的实验现象进一步佐证了该传感机理。以上设计策略，不仅为构建高性能传感单元提供了新思路，而且真正实现了原位在线监测空气中的甲醛含量，为空气质量监测和自身健康管理作出贡献。

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全文链接：https://www.sciencedirect.com/science/article/pii/S0925400522013247?dgcid=coauthor

Formaldehyde (FA) is one of the most dangerous carcinogens recognized by the International Agency for Research on Cancer (IARC). When it is in the air, even at very low concentrations, FA can result in irritation of eyes, nose and throat, and cause sneezing, nausea, asthma, pulmonary edema and allergy. Moreover, nasopharyngeal cancer, leukemia and other more serious consequences may also be encountered. For this reason, various techniques, such as spectrophotometry, gas chromatography, colorimetric methods, biosensors, and electrical sensors, have been used or developed to monitor FA in the air over the last few decades. These techniques, however, generally need bulky and expensive instruments, and/or well-trained people which have impeded their on-site and real-time applications. The problem needs to be solved urgently.

Herein, we report a totally new miniaturized FA luminescent tubular sensor (2.5 cm L × 3.0 cm W × 3.1 cm H), which depicted an experimental detection limit lower than 0.01 mg/m^3, a response time less than 5 s, and a recovery time less than 20 s. Moreover, daily necessities showed no observable interference to the detection, and no decay in the sensor's performance was found after 130 cycles of successive detection. The superior sensing performance of the sensor as developed was mainly ascribed to the application of a new sensing luminophore (Au-PBI), which is a chemical combination of a perylene bisimide derivative (Ref-PBI) with a cyclometalated alkynyl-gold(III) complex. Unlike Ref-PBI, the non-planar structure of Au-PBI has high luminescence quantum yield and photochemical stability in the solid state, so as to avoid the defects of aggregation caused quenching (ACQ) and photobleaching after the film preparation. Theoretical simulation study revealed that the gold atom of target molecule has the specific affinity for the oxygen atom of formaldehyde, resulting in a distance of only 3.11 Å between them. As such, a photo-electron transfer (PET) process occurs, and led to quenching of the luminescence of the Au-PBI at an excited state. Owing to the weak interaction between Au-PBI and FA, the PET process is reversible. At the same time, the experimental phenomenon further supported the sensing mechanism. The above design strategies not only provide a new idea for building high-performance sensing units, but also realize in-situ detecting of FA, making contributions to air quality monitoring and health management

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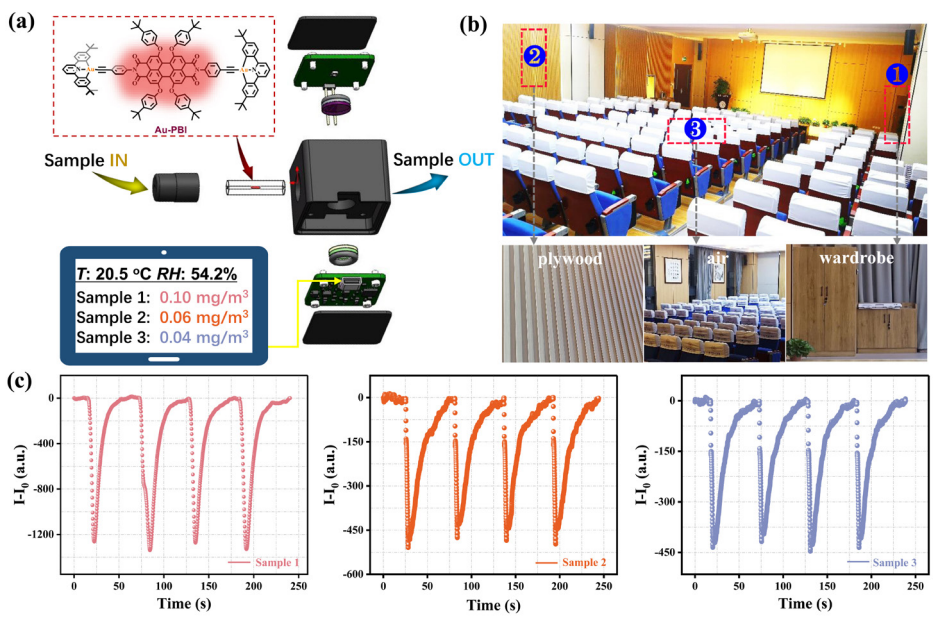

RESEARCH ARTICLE

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Spatially Confined Face-Selective Growth of Large-Area 2D Organic Molecular Crystals in a Supramolecular Gel for Highly Efficient Flexible Photodetection

Chaowen Shen, Pan Han, Zhi Zheng, Wenhe Jiang, Sheng Gao, Chunxia Hua, Cheng Lung Chen, Fan Xia, Tianyou Zhai, Kaiqiang Liu,* and Yu Fang*

超分子凝胶中二维分子晶体的晶面选择生长新进展

超分子凝胶结晶法是一种以超分子凝胶为介质实现有机或无机物晶体生长的新方法。房喻院士领衔的科研团队利用超分子凝胶网络结构的空间限域功能，实现了多种有机半导体晶体、金属晶体与无机氧化物晶体的控制生长，在无缺陷、高光电性能的超长一维富勒烯晶体方面获得重要突破，大大拓展了超分子凝胶的应用领域。

超分子凝胶结晶法所面临最具挑战性的难题之一是“如何明确超分子凝胶中分子晶体各晶面生长差异的作用机制，以期实现分子晶体生长维度的控制”。因此，在团队研究工作的基础上，本文发展了空间限域控制分子晶体晶面选择生长新策略，即以超分子凝胶为结晶介质，选择结晶十分困难的富勒烯为模型分子，辅之于反溶剂渗透诱导过饱和，首次实现了大面积、高质量二维富勒烯单晶的高效制备，丰富了二维分子晶体的生长途径。

值得指出的是，超分子凝胶的空间限域显著改变了富勒烯分子在不同晶面上的生长几率，这归因于凝胶网络结构对富勒烯结晶动力学及界面成核能垒高低的显著影响。透射电子显微技术与分子动力学模拟结果表明：超分子凝胶网络结构客观上抑制了富勒烯晶体沿（111）晶面的生长，大大提高了富勒烯在{220}

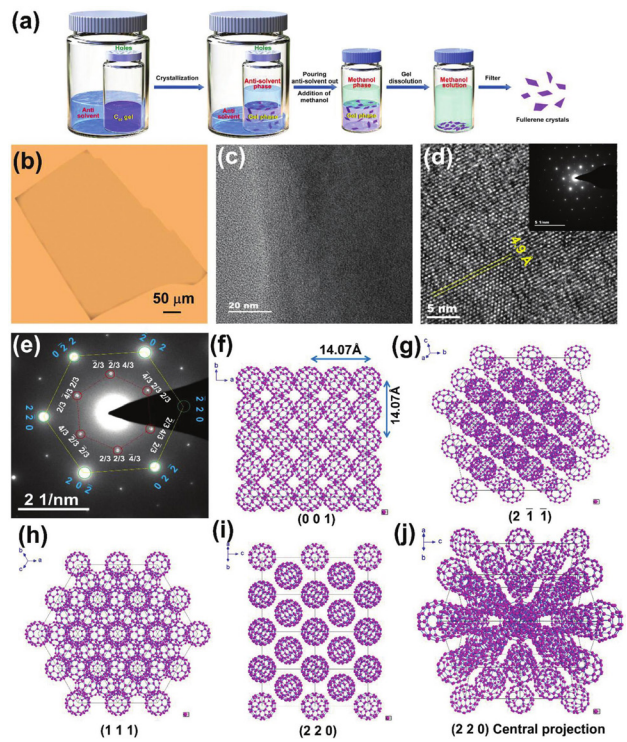

图 1. 二维富勒烯分子晶体的制备方法、形貌与结构
Figure 1. Preparation of 2D fullerene crystal and its morphology and structure

族晶面生长几率的优先性。

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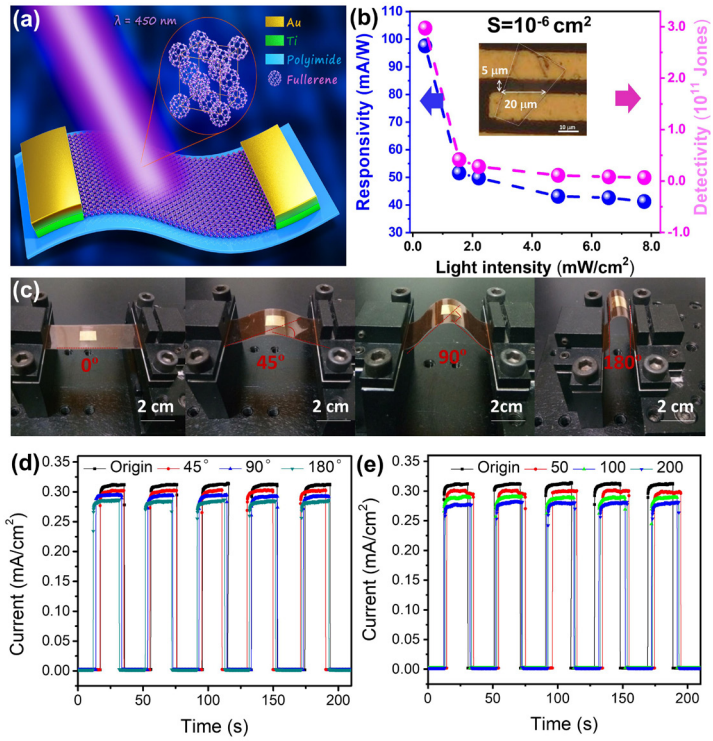

图 2. 二维富勒烯晶体的柔性器件及其弯曲耐受性
Figure 2. The flexible device derived from 2D fullerene single crystals during bending and its photodetection performance

Supramolecular gel crystallization (SGC) is a newly developed approach to grow organic or inorganic crystals, and has been utilized to achieve crystallization of organic semiconductors, metals and inorganic oxides, etc. In particular, one of the reviewers deemed that controllable growth of super-long crystalline fibers with high-performance photodetection from supramolecular gels could be considered as a breakthrough in the functionality of supramolecular gels derived from low molecular mass gelators.

As is well known, it is a great challenge to clarify the mechanism of face-selective growth of molecular crystals in supramolecular gels for control of crystal dimension, 1D, 2D or 3D. Herein, we for the first time proposed and realized the growth of large-area 2D molecular crystals using the SGC strategy with the assistance of anti-solvent vapor diffusion. To develop a general method for the growth of large-area 2DOMCs, we chose a typical cage-like organic semiconductor (C60), which used to be very difficult to grow into regular crystals, as a model molecule. In this case, supramolecular gel provided confined spaces for changing growth crystallization rates of fullerene molecules along various crystal faces. TEM examination and molecular dynamic simulation confirmed that 3D networks of supramolecular gels inhibited fullerene crystallization along (111) crystal face, resulting in dominated growth of fullerene along {220} planes towards large-area 2D crystals with a superlattice structure (~1.0 × 105 μm^2, Figure 1). More interestingly, its corresponding device on a flexible substrate exhibited ultra-high weak light detection ability (2.9 × 1011 Jones) at a 10 V bias upon irradiation with 450 nm incident light. Moreover, its photoelectric properties remain unchanged after 200 cycles of bending at angles of 45°, 90°, and 180° (Figure 2). These results could be extended to the growth of other 2DOMCs for potentially fabricating advanced organic (opto) electronics. All the findings will help us further reveal the mechanism of co-assembly or crystal dislocation in supramolecular gels.

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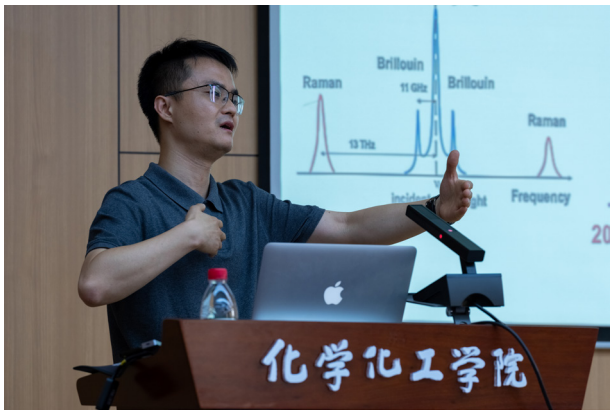
王若晖副教授、李晓辉教授受邀进行学术交流

Wang Ruohui and Li Xiaohui invited for academic exchange



为推动学科创新、交叉与融合，促进团队跨领域合作，9 月 7 日下午光子鼻与分子材料科研团队邀请西北大学物理学院王若晖副教授、我校物理学与信息技术院李晓辉教授在致知楼 1668 报告厅进行了学术交流。团队全体教师和研究生参加了此次交流会，会议由刘静教授主持。

王若晖副教授做了题为“油气资源光纤测井技术”的报告。王若晖首先对光纤传感的原理、特点、应用领域及发展前景等做了简要介绍，然后结合工程案列，重点介绍了光纤传感技术在油气勘探等领域的应用，并介绍了其课题组在光纤光栅地震检波、地震物理模型光纤超声成像、光纤光栅高温高压传感研究方面的最新进展。

李晓辉教授做了题为“低维材料的非线性光学特性及超快光纤激光技术研究”的报告。李晓辉介绍了基于过渡金属硫化物、金属氧化物，重氮金属单质材料、氮化物、金属有机框架材料、石墨炔等低维窄带隙材料的非线性光子器件的制备和非线性光学表征特性，探索了其在超快光子学中的应用，以及这些材料的超快光纤激光脉冲产生、脉冲的动力学行为及其特殊演化规律。

In order to promote disciplinary innovation, intersection and integration, and promote cross-field cooperation between research groups, on September 7, the Photonic Nose and Molecular Materials Group invited Assoc. Prof. Wang Ruohui of the School of Physics of Northwest University and Prof. Li Xiaohui of the School of Physics and Information Technology of Shaanxi Normal University for an academic exchange seminar in the Lecture Hall 1668 of Zhizhi Building. Teachers and graduate students of the group attended the exchange meeting, which was chaired by Prof. Liu Jing.

In his report titled “Optical Fiber Logging Technology for Oil and Gas Resources”, Wang Ruohui first presented a brief introduction of the principle, characteristics, application fields and development prospects of optical fiber sensing, and then used engineering cases to introduce the application of optical fiber sensing technology in oil and gas exploration and other fields, as well as the latest progress of his research group in the research of optical fiber grating seismic detection, seismic physical model optical fiber ultrasonic imaging, and fiber grating high temperature and high pressure sensing.

In his report titled “Nonlinear

Optical Properties of Low-dimensional Materials and Research on Ultrafast Fiber Laser Technology", Li Xiaohui introduced the preparation and nonlinear optical characterization characteristics of nonlinear photonic devices based on transition metal sulfides, metal oxides, diazo metal elemental materials, Mxene, metal-organic framework materials, graphene and other low-dimensional narrow bandgap materials, and explored their application in ultrafast photonics, as well as the generation of ultrafast fiber laser pulses, the dynamic behavior of pulses and the special evolutionary laws of these materials.

陕西环保集团与团队互访交流

Shaanxi Environmental Protection Industry and Fang Group exchange visits

9 月 16 日，陕西环保产业集团有限责任公司颜昊总工程师一行 9 人来光子鼻与分子材料研究团队参观访问，并与房喻院士及团队成员就危险废物、环境污染治理等议题进行了座谈交流。

颜昊介绍了陕西环保集团各业务板块的发展情况和取得的重大成果，并表示房喻院士团队具有很强的技术优势，希望与团队建立合作关系，加强交流，并获得技术指导。

陕西环保集团下属的三秦环保科技股份公司总经理田延生就其公司的主营业务、产业布局、服务优势、研究方向与定位、人才队伍培养及其未来建设目标做了介绍。

房喻院士对陕西环保集团一行的到来表示了欢迎，并介绍了团队各个成员的研究方向，及其团队的发展愿景，希望双方能够加强交流学习，为陕西环保事业的发展贡献力量。随后，双方就

相关领域事项进行了进一步的探讨。

团队核心成员，陕西环保集团科技部部长刘瑞、总工程师郭银明、技术中心主任刘炜，西安清源盈科总经理张扬、技术负责人王静妍参加座谈。

9 月 26 日，房喻院士带领团队对三秦环保股份公司进行回访，调研指导科技创新工作。

双方表示，要充分发挥各自优势，推动产学研结合，努力实现“科技创新助推企业发展、企业发展助力科技创新”的双赢目标。

陕西环保产业集团有限责任公司是陕西省人民政府发起组建的全国首家省属环保企业，共有 20 家子公司和 2 家区域分公司。

On September 16, Shaanxi Environmental Protection Industry Group Co., Ltd. chief engineer Yan Hao and eight colleagues visited the Photonic Nose and Molecular Materials Group, and discussed with Prof. Fang Yu and his group members on topics such as hazardous waste and environmental pollution control.

Yan Hao briefed about SEPIG's development and major achievements in various business sectors, and said that Prof. Fang Yu's group had strong technical advantages and hoped to establish cooperative relations and strengthen exchanges with Fang Group, and receive its technical guidance.

Tian Yansheng, general manager of Sanqin Environmental Protection Technology Co., Ltd., a subsidiary of Shaanxi Environmental Protection Group, briefed about his company's main business, industrial layout, service advantages, research direction and positioning, talent cultivation and its future construction goals.

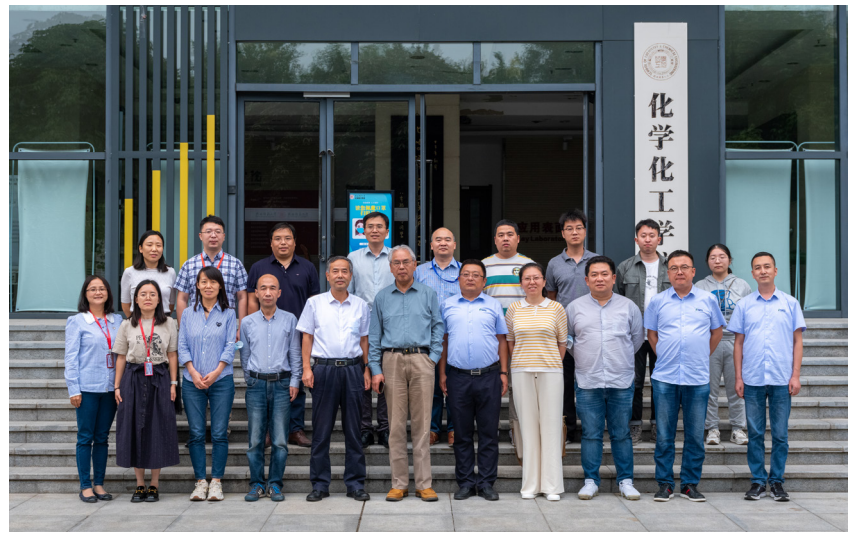
Fang Yu welcomed SEPIG guests, introduced the research direction of his group members and its development vision, and hoped that the two sides could strengthen exchanges so as to contribute to the development of Shaanxi's environmental protection cause. The two sides discussed relevant issues of interests afterwards.

Fang Group members, SEPIG Science and Technology Department director Liu Rui, chief engineer Guo Yinming, Technology Center director Liu Wei, Xi'an Qingyuan Yingke general manager Zhang Yang, and technical director Wang Jingyan attended the meeting.

On September 26, Fang Yu visited Sanqin Environmental Protection for exchange and cooperation in technological innovation.

The two sides said that they should give full play to their respective advantages, promote the combination of production, education and research, and strive to achieve the win-win goal of “scientific and technological innovation boosts the development of enterprises, and enterprise development helps scientific and technological innovation”.

Shaanxi Environmental Protection Industry Group Co., Ltd., the first provincial environmental protection enterprise in China, is initiated by the People's Government of Shaanxi Province, and it has 20 subsidiaries and 2 regional branches.



我的作业曾被作为“参考答案”

My homework was used as reference answer

文 / 房喻 by Fang Yu

1978 年，伴随着“科学的春天”来临，我作为恢复高考后的第一届大学生，考入了陕西师范大学化学系。

在此之前，我曾在高中毕业后做过三年多的小学和中学老师，也非常喜欢老师这份工作。因此在选择学校时，我的三个高考志愿填报的全都是陕西师范大学，由此也开启了我和这所学校近半个世纪的缘分。

特殊的“教学相长”

初入大学，那时的我们还没有什么远大的理想。我最初的打算也只是在学成毕业后，能到县里最好的中学教书。然而，这并不影响我们学习的热情。相反，随着“文革”的结束，人们压抑已久的学习热情在大学校园里被彻底点燃了。

那时候，我们的学习课程远没有现在那么繁多。每周 6 天的学习日中，课程时间最多不会超过一半，每天的上课时间也不会超过 4 个小时。这就给我们留出了大量自由支配的时间，我们将这些时间几乎全部用在了“泡图书馆”上。

房喻（第三排右数第 7 位）本科毕业合影
Graduation photo of Fang Yu (Seventh on the right in the third row) with his undergraduate classmates

无论在什么时候，学习都是一件自己的事情，外界压力会对一个人的成长产生作用，但归根结底还是要靠自觉。记得那几年，每天不管多晚就寝，我都要在睡觉前，将一天的学习内容在脑海中过一遍“思维导图”，每到周末，还会将本周的学习内容在脑海中做一个梳理。因为我们太珍惜这来之不易的学习机会了，不想有一丝一毫的浪费。

凭借刻苦的学习，我的成绩在班级中一直处于前列，以至于在一些课程中，如果我的作业没有收上来，老师们是不会批改作业的。

这是因为那时国内大学教育依然处于“恢复期”。很多老师也是仓促间回到教学岗位，以至于对某些课本上的知识，他们自己认识得也并不透彻，甚至在有些方面的理解程度还不及一些学生。这时，那些学习成绩优秀的学生的作业，也就在一定程度上

起到了“参考答案”的作用。

尽管如此，这些老师在教学上没有丝毫懈怠，而是将所有热情都投入其中。那时的老师不像如今这样承担大量科研任务，他们最主要的任务就是教好学生，同时与学生共同进步。这也就在当时的校园里形成了一种有些特别，但又十分浓厚的“教学相长”的氛围。

学好数学，学好英语

有年轻老师，当然也有德高望重的老先生。

在一篇文章中，我曾回忆过我们当时的系主任高鹏老师。记得一天中午，我们几个年轻学生偶遇高老师，并同行了一段路程。面对这样一位德高望重的老先生，我们当时的心情十分紧张，也不知道该说些什么。但老先生却很亲切，问我们是不是化学专业的。

当得到肯定的回答后，老先生说了几句至今都让我受益匪浅的话。

他告诉我们，将来要想在化学领域有出息，首先要把数学学好。否则，随着学习和科研的深入，在理论化学领域就会面临很大的困难；其次，要把英语学好，不然将来在学术领域也不会走得太远。

当时，这番话对我的触动并不大，然而随着时间的推移，以及自身对于化学学科理解的逐步深入，我越发明晰老先生这番话的意义所在，同时也体会到了他对于青年学生的深切期望。

斯人已逝，言犹在耳！

在如今的大学校园中，我们应该鼓励年轻的学子多跟老先生接触，并为此创造条件。要知道，也许老先生无意中的几句话，就可能在潜移默化中对学生，尤其是对有想法的学生产生重要影响。

有时，这种影响甚至不限于其内容本身。还记得在大学刚毕业时，我曾骑车到差不多十公里外的西北大学听了一场报告。主讲人是被誉为“无机化学之父”的美国西北大学教授巴索罗。那场报告中，尽管有当时在兰州大学工作的史启祯先生的翻译，巴索罗教授所讲的内容我还是几乎没有听懂，但他在讲座时，通过情绪所传达出的对于自己所从事学科的热爱与激情，却感染和影响了我几十年。

认真学习，掌握方法

如今，距离我的大学生活已过去整整四十年，回想起当初的那段岁月，颇有时光流逝之感。对于刚刚踏入大学校门的年轻学子，我希望我的一些感悟能够对他们有所启示。

大学时光看似漫长，其实转眼就会逝去。在这段时间里，做什么永远要比怎么去做更重要，既然选择了进入大学深造，不管是在什么专业、哪个领域，都要秉持认认真真、踏踏实实的态度去学习。在大学，学习永远是第一要务。

当然，在学习的过程中还是需要注意方式、方法。比如，要多注意和老师以及同学之间的沟通与交流。特别是相比于过去，如今的大学研究生教育已经相当普及，如果条件允许，就要抽出一些时间旁听他们的组会。正如前文中所说，即便是听不懂组会上的内容，但组会成员之间的讨论交流也会对你的成长起到潜移默化的作用。

此外，对于数学、物理、化学等基础学科的学生，我建议他们在大一、大二时，要踏踏实实地把基础课程学好，把英语学好，特别是那些主干课程，一定要努力做到融会贯通。到大三、大四阶段，则一定要想办法进入老师的实验室，尽量多地接触研究生，从中获得在研究中学习的经历和体验。

大学四年，请珍惜时间。

《**中国科学报**》（2022-08-30 第 3 版 大学观察）

In 1978, with the advent of the “Spring of Science”, as one of the first college students after the

resumption of the college entrance examination, I was admitted to the Department of Chemistry of Shaanxi Normal University.

Before that, I had been a primary and secondary school teacher for more than three years after graduating from high school, and I really liked the job of a teacher. Therefore, when I filed my intention for my dream college, all my three options were Shaanxi Normal University, thus beginning my relationship with this school for nearly half a century.

A Special "teaching benefits teachers as well as students"

When we first entered the university, we didn't have any lofty ideals at that time. My initial plan was to go back and teach at the best middle school in my county after graduation. However, this does not affect our enthusiasm for learning. On the contrary, with the end of the Cultural Revolution, people's long-suppressed enthusiasm for learning was completely ignited on university campuses.

At that time, the courses we studied were far less numerous or onerous than they are now. In our six study days each week, the maximum number of class days would not exceed three, and the class time each day would not exceed 4 hours. This left us with a lot of discretionary time, and we spent almost all of this time studying in libraries.

No matter at what time, learning is a matter of one's own. External pressures can have an effect on a person's growth, but in the end, what matters is still self-discipline. I remember in those years, no matter how late it was, I would go through the "mind map" of what I had learned during the day in my mind before going to bed. Every weekend, I would sort out the learning content of this week in my mind. Because we all cherished this hard-won learning opportunity too much, and we could not afford to waste a single bit.

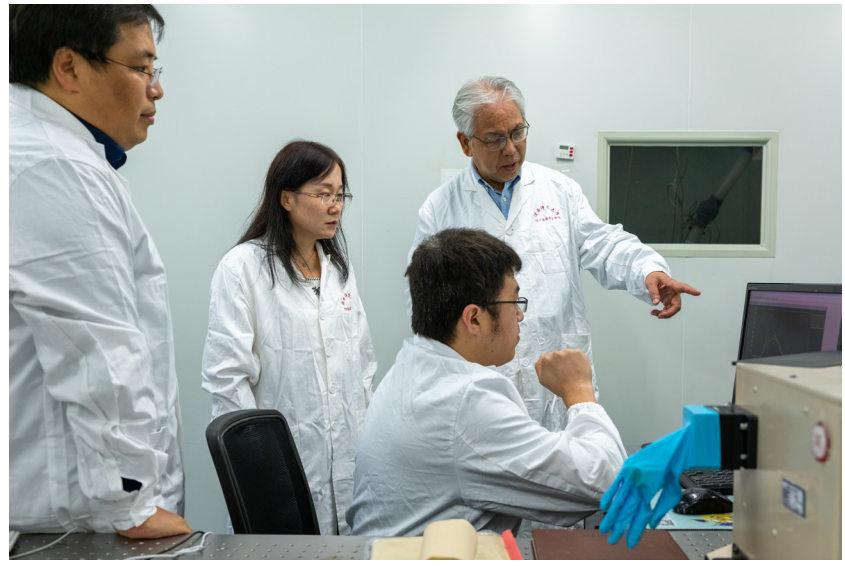
With this hard work, my grades were always at the forefront of the class, so much so that in some courses, if my homework was not collected, the teachers would not begin correcting other students' homework.

This is because at that time, university education in China was still in the "recovery period". Many teachers returned to teaching in a hurry, so that they were not thoroughly acquainted with the knowledge in some textbooks, and in some aspects their understanding was even not as good as some students. At this time, the homework of those students with excellent academic performance played the role of "reference answer" to a certain extent.

Nevertheless, these teachers did not slack off in teaching in the slightest, but put all their enthusiasm into it. At that time, teachers did not undertake a lot of research tasks like today, and their main task was to teach students well and make progress together with students. This also formed a somewhat special, but very strong atmosphere of "teaching benefits teachers as well as students" on the campus at that time.

Learn mathematics well and learn English well

As there were young teachers, of course there were senior teachers with a lofty virtue worthy



of respect.

In an article, I recalled Mr. Gao Peng, then head of our department. I remember that one day at noon, a few of our young students met Mr. Gao on the way and we walked together for a while. Meeting such a respected old gentleman, we were very nervous and did not know what to say. But Mr. Gao was very kind and asked us if we were chemistry majors.

Getting a positive answer, he said a few words that have benefited me a lot to this day.

He told us that if we ever wanted to make a difference in the field of chemistry in the future, we must first learn mathematics well. Otherwise, when we go deeper in learning and research, we would face great difficulties in the field of theoretical chemistry. Secondly, we must learn English well, otherwise we would not be able to go too far in the academic field in the future.

At that time, these words did not have much immediate impact on me, but as time went on, and my understanding of chemistry gradually deepened, the more I discovered the significance of Mr. Lao's words, and I also realized his deep expectations for young students.

The respected man is gone, but his wise words are still in our ears.

In today's university campuses, we should encourage young students to have more contact with senior teachers and create conditions for this. Maybe a few words of the senior teachers may have an important impact on students, especially students with ideas for career development.

Sometimes, this kind of impact is not even limited to the content itself. When I first graduated from college, I rode my bike to Northwestern University, almost ten kilometers away, to attend a lecture. The speaker of the lecture was Prof. Fred Basolo of Northwestern University in the U.S., who is known as the "Father of American Inorganic Chemistry". Despite with the translation by Mr. Shi Qizhen, who was working at Lanzhou University at that time, I hardly understood Prof. Basolo's lecture, but the love and passion for his discipline conveyed through his emotional lecture have infected and influenced me for decades.

Study earnestly and master the method

Now, forty years have passed since my university life, and looking back on those years, I can't help but feel how time has gone by. For young students who have just stepped into the university, I hope that some of my insights will enlighten them.

College time may seem like a long time, but in fact, it will pass in the blink of an eye. During this time, what you do is always more important than how you do it. Since you have chosen to enter the university for further study, no matter what major or field, you must uphold a serious and down-to-earth attitude to study. In college, learning is always the number one priority.

Of course, in the process of learning, we still need to pay attention to approaches and methods. For example, communicate more with teachers and classmates. Especially compared to the past, today's university graduate education has become quite popular, and if conditions permit, it is necessary to take some time to observe their group meetings. As mentioned earlier, even if you can't understand what is discussed at the group meeting, the discussion and communication between group members will play a subtle role in your growth.

In addition, for students of basic subjects such as mathematics, physics, and chemistry, I suggest that when you are freshmen and sophomores, you should learn these basic courses well and learn English well. For these core courses in particular, you must strive to achieve mastery. In the third and fourth years, you must find a way to enter the teacher's laboratory, communicate with as many graduate students as possible, and get the experience of learning in research.

There are only four years of college, so please cherish the time.

Chinese Science News
(University Observation, Page 3, August 8, 2022)

想只有困难，做才有答案

Thinking alone only brings difficulties, but doing brings the answer

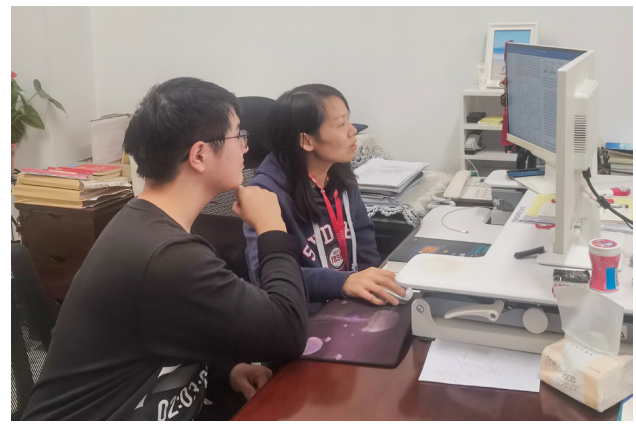
文 / 逯昊文 by Lu Haowen

对一个初出茅庐的本科生而言，科研这个神秘的词语究竟意味着什么呢?

刘静老师是我的物理化学老师，她鼓励学有余力的同学早日进入科研实验室，在实践中认识，在认识中实践，知行合一。怀着对科研的向往，我加入到了刘静老师课题组进行学习。

我谨记刘老师的教诲：一定要跟上课题组的进度，做“自己”的实验，而不是漫无目的地进行合成和表征。为了让我和同门能一起参加实验室组会，刘老师特意调整了组会时间。在将近一个半学期组会的耳濡目染后，我对课题组研究方向有了更深入的认识，也为我后续进入实验室开展科研工作打下了理论基础。

今年暑假我申请留校，真正走进了 1627 这个大家庭，做起了“真正”的研究。从第一次合成、第一次表征，到第一次性能测定，每一小步前进都是激动和成就感共存的。然而，我很快就发现实验不是一帆风顺的，我遇到了困惑和难题，遍阅文献亦无解决之法。刘老师和我一起研读相关文献，纠正我的错误，为我指点迷津，让我对 PICT 和 TICT 等知识点有了更加深入的认识。



一次因为操作不当我弄坏了老师实验室的一台旋蒸仪，小小的一个部件损坏带来了近千元的损失。我很忐忑地把这件事告诉了老师，没想到老师莞尔一笑，“科研就是有消耗的，这都是正常情况”。老师仿佛看出了我的紧张，又讲起了自己在研究生就读期间的趣事。不知不觉间，损坏仪器的阴郁和紧张在欢声笑语中烟消云散，随之而来的又是一个精神饱满投入科研战斗的夜晚。

何为科研，一言以蔽之：《桃花源记》中“初极狭才通人”是科研的过程和困难，“豁然开朗”与否，还取决于吾辈的努力和学习。“想只有困难，做才有答案”，这是我送给还在实验室门口踌躇的本科学弟学妹们的一句话。

道路虽是曲折的，前途却是光明的，纵有困难万千重，吾自欣然往之。

What does the mysterious phrase “scientific research” mean to an undergraduate?

Prof. Liu Jing was my physical chemistry teacher during my undergraduate study. As early as in the undergraduate course study, she encouraged those students who had the spare capacity to learn to enter research laboratory as soon as possible, to learn in practice and practice in learning. With the expectation of doing research, I joined her research group.

I always keep Prof. Liu Jing’s instruction in mind: Keep up with your research group and do your own experiments instead of synthesizing and characterizing

aimlessly. She even adjusted the time of the weekly laboratory meeting in order to meet my and my classmates' schedule, making it possible for us to participate. After attending group meetings for nearly one and a half semesters, I have had a deeper understanding of the group's research direction and laid a theoretical foundation for me to begin my own research work.

During this summer vacation, I applied to stay on campus and really entered the big family of 1627, and began my "real" research. From the first synthesis, the first characterization, to the first performance measurement, every small step forward was filled with excitement and a sense of accomplishment. However, I soon discovered that the experiment was not always running smoothly. I could not solve the problems I encountered by reviewing the literature. Prof. Liu discussed the relevant literature with me, corrected my mistakes and pointed out the right directions to me, which enabled me to have a deeper understanding of knowledge points such as PICT and TICT.

Once I carelessly broke a rotary evaporator in Prof. Liu's laboratory, and the damage of a small component of which should bring about a loss of nearly one thousand yuan. I was very uneasy but had to tell her about this. Unexpectedly, she just smiled softly and said "Scientific research entails consumption. This is not unusual." It seemed she understood I was nervous, so she told me some interesting anecdotes during her postgraduate study. Before I was aware, the gloom and tension of damaging equipment dissipated into laughter, and another night of research work with full spirit and energy ensued.

Scientific research could be summarized in one sentence in analogy to the "The Peach Blossom Spring": "At the beginning, the entrance was very narrow and could barely allow one person to squeeze through" is the process of scientific research and difficulties, and if "Then the path abruptly opened up" or not depends on our efforts and learning. "Thinking alone only brings difficulties, but doing brings the answer", this is the words I want to say to the undergraduate students who still hesitate at the laboratory door.

Although the road is tortuous, but the future is bright; Despite the difficulties, I am happy to go meet them.

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