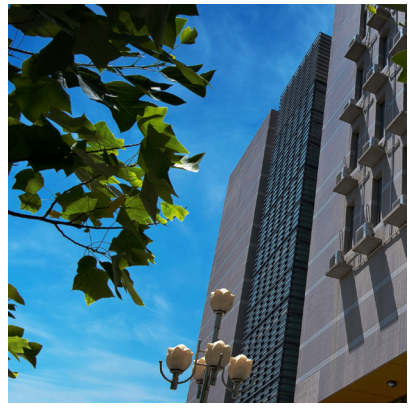
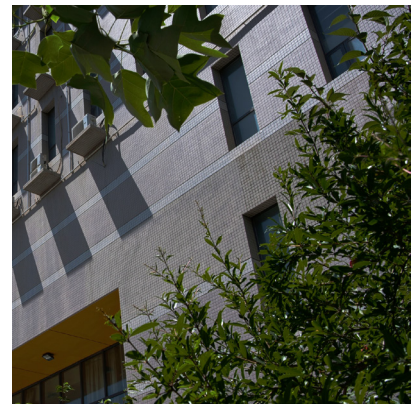
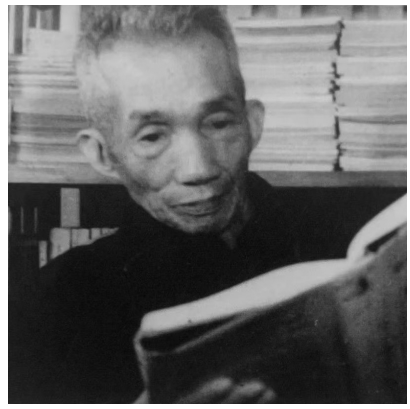
光子鼻与分子材料团队简报

Newsletter of Photonic Nose and Molecular Materials Group

7 / 2022







房喻院士在第三届国际聚合物发泡与多孔材料高峰论坛作报告

Fang Yu speaks at 3rd Polymer Foaming and Porous Materials Forum

7月26日，第三届聚合物发泡与多孔材料高峰论坛在西安举行，房喻院士受邀作题为“软模板基高品质泡沫聚苯乙烯”的大会报告。

房喻院士在报告中分享了其团队在轻质高强交联聚苯乙烯泡沫及其凝胶乳液模板制备技术、荧光传感器和探测装备等方面的相关研究成果、应用转化及未来发展趋势。

高峰论坛由SAMPE中国大陆总会聚合物发泡与多孔材料专业委员会主办，旨在贴合高速高质发展的新材料变革，共享先进聚合物发泡与多孔材料研究、制备技术、工程应用的最新进展。

近年来，聚合物发泡与多孔材料在智能传感、生物医药、环境能源、航空航天、船舶舰艇、国防军工等高端领域得到愈加广泛应用。先进聚合物发泡与多孔材料的高质量创新研发和应用，已成为高分子及其复合材料科学与工程领域的前沿热点。

On July 26, the Third International Polymer Foaming and Porous Materials Forum was held in Xi'an, and Prof. Fang Yu presented a report titled Soft Template-based Porous Polystyrene.

Fang Yu shared his group's research findings, industrialization and future trend in lightweight high-strength cross-linked polystyrene foam, its preparation technology of gel emulsion template, fluorescence sensor and detection devices.

Sponsored by the Polymer Foaming and Porous Materials Special Committee of China Mainland Region of The Society for the Advancement of Material and Process Engineering, the forum aims to follow the rapid transformation in new materials and share the latest development in the research, preparation and industrial application of polymer foaming and porous materials.

In recent years, polymer foaming and porous materials have found extensive applications in high-end fields such as smart sensors, bio-medicine, environment and energy, aviation and aerospace, marine vessels, national defense and military industry. The high-quality innovative research, development and application of advanced polymer foaming and porous materials have become a frontier and hot research area in the research and engineering of polymer and its composite materials.

Matter
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Preview

Real-time and wireless monitoring platforms for vital chemicals toward wearable applications

Taihong Liu [1], Liping Ding [1], Yu Fang [1]

邀请评述：面向可穿戴的重要化学物质监测平台

应《Matter》期刊之邀，发表了题为“Real-time and wireless monitoring platforms for vital chemicals toward wearable applications”的评述文章。文中指出，作为新一代微痕量物质气相检测技术，薄膜荧光传感器具有能耗低、结构相对简单、易于实现便携等优点。立足实验室多年研究经验，其传感性能优化主要考虑以下三个方面：1）光化学稳定和灵敏传感性能优异的荧光传感物质的理性设计与合成；2）薄膜涂层结构优化以提高传感速度、可逆性和信噪比；3）器件微型化以满足实时在线检测 / 监测要求。值得特别说明的是，敏感薄膜材料创制是获得高性能荧光传感器的关键，其核心又是优异荧光传感单元的设计合成。薄膜的微结构直接决定着气相待测分析物在薄膜中的传质效率，合适的活性层结构还有助于富集待分析物和屏蔽潜在干扰品，从而提高传感薄膜的灵敏度和选择性。最近，西班牙格拉纳达大学 Palma 教授等开发了一类可用于无线二氧化碳监测的智能口罩，该化学传感器的检出限为 140 ppm，响应时间和回复时间均低于 1 秒，并具有柔性可穿戴、实时检测及无线近场通讯等特点。同时，黄蓉蓉等首次报道了一种经由气相信号物质高效检测单核增生李斯特菌的薄膜荧光传感器，该传感器对气相 3– 羟基 –2– 丁酮响应迅速、恢复性好、选择性高，且稳定性优异，利用所发展传感器可以极为方便地确定肉、牛奶等食材是否存在单核增生李斯特菌。可以看出，随着相关技术的快速发展，未来荧光敏感薄膜的创制形式会愈发呈现多样化、柔性可穿戴和可定制特性，结合阵列化和数据智能分析技术优势，薄膜荧光传感器将在疾病早期诊断、环境监测等领域展现巨大的发展前景。

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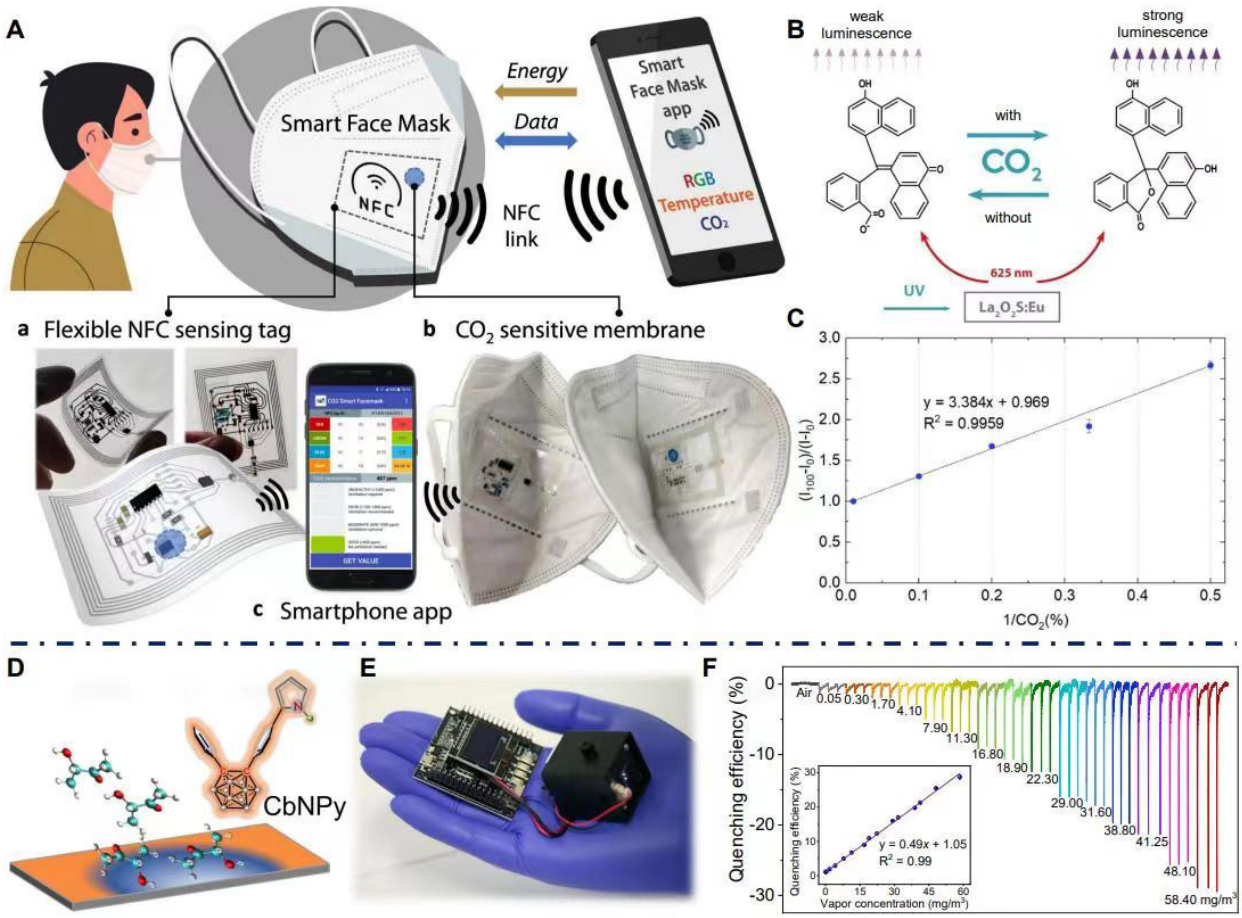
Portable and reliable detectors or smart sensors play important roles in modern life. Some traditional techniques offer high selectivity and sensitivity but suffer from high-cost, sophisticated instruments, time-consuming procedures, and highly trained personnel. It is promising to utilize compact gas sensors to construct geographically distributed



monitoring networks in the era of Internet-of-Things (IoTs). As revealed early, fabrication of high-performance fluorescence film sensors (FFSs) involves at least three aspects: (1) design and synthesis of photochemically stable and sensitive sensing fluorophores; (2) interfacial engineering aiming to regulate the adlayer structure of the films as it determines the features of sensing speed, sensing reversibility, and the signal-to-noise ratio; 3) system miniaturization to satisfy on-site and at real-time applications. Despite multidisciplinary researchers and cross-field engineers have synthesized such sensing fluorophores, fabricated sensing films with different strategies, created new sensor structures, and developed new sensors/arrays, real-life usable FFSs are very limited. Moreover, for the film-based fluorescence explosive detectors with Fido or Sred as their brands, which were commercialized many years ago, their performances at least in terms of sensor lifetime and environmental adaptability still need to be improved.

FFSs are a new generation of miniaturized high-performance analytical tools. Recently, Palma and co-workers reported a sensing platform consisting of a fluorescent CO2 film sensor combined with a flexible, battery-less, near-field-enabled tag and the related custom smartphone application. The system enables non-invasive, wearable quantification of CO2 at real-time, laying foundation for developing smart facemasks and potential applications in preclinical research and diagnostics.

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ACS APPLIED MATERIALS & INTERFACES

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Imidazolium-Modified Bispyrene-Based Fluorescent Aggregates for Discrimination of Multiple Anions in Aqueous Solution

Min Qiao, Ruowen Zhang, Shanshan Liu, Jing Liu, Liping Ding,* and Yu Fang

咪唑鎓修饰的双芘荧光聚集体用于在水溶液中区分多种阴离子

阴离子作为一种带负电荷的离子，普遍存在于生物系统和自然界中，具有不可替代的作用。常见的阴离子包括含硫阴离子、含磷阴离子等，并与人类的日常生活息息相关，对人类健康和环境有着非常重要的影响。与此同时，大多数阴离子往往具有两面性，在生物系统和人类日常生活中发挥着重要作用的同时，也会引起严重的疾病或环境污染问题。考虑到生物系统和环境中存在大量的各种阴离子，开发简单有效的传感器用来区分和识别相似或不同的阴离子具有重要意义。

本工作中，设计合成了一种咪唑鎓修饰的 Bola 型双芘衍生物 DPyDIM。其因带有正电荷，具有良好的水溶性和两亲性，在水溶液中可形成球形聚集体。荧光滴定实验表明，荧光聚集体对所检测的阴离子表现出两种不同形式的比例型响应：一种是对磷酸根阴离子（PPi、ATP、ADP 和 AMP）和含硫阴离子（$S_2O_8^{2-}$

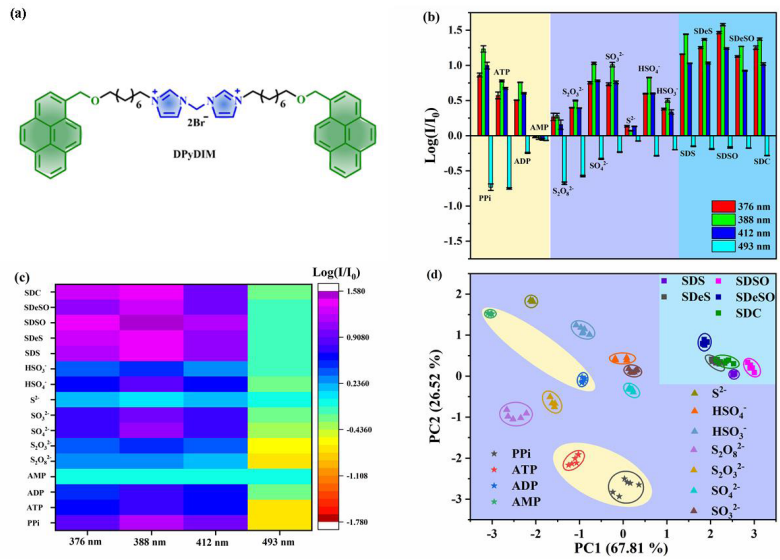

图 1. (a) 咪唑鎓修饰的双芘探针 DPyDIM 的结构；(b) 通过收集 DPyDIM (10 μM) 在水溶液中四个特征波长的荧光荧光强度变化得到对 5 μM 的 16 种阴离子响应的指纹图谱；(c) 通过收集四个特三个特征波长处的荧光强度变化得到 DPyDIM (10 μM) 对 5 μM 的 16 种阴离子的热图；(d) DPyDIM (10 μM) 在水溶液中对 5 μM 的 16 种阴离子的 PCA 区分图。

Figure 1. (a) Chemical structure of imidazolium-modified bispyrene probe, DPyDIM; (b) Fingerprint recognition patterns of 16 anions at 5 μM by collecting fluorescence variation data at four characteristic wavelengths of DPyDIM (10 μM) in aqueous solution; (c) Heat map of DPyDIM (10 μM) to 16 anions at 5 μM by collecting fluorescence variation data at four characteristic wavelengths; (d) PCA score plots for the DPyDIM (10 μM) in aqueous solution to recognize 16 anions at 5 μM.

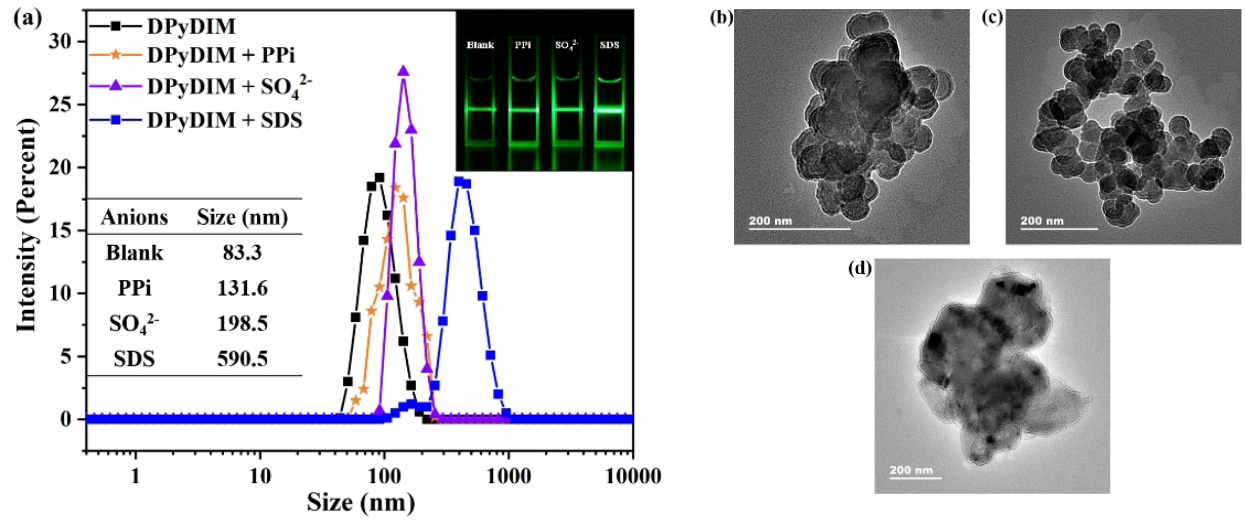

图 2. (a) 在 DPyDIM (10 μM) 水溶液中添加各种阴离子 (10 μM) 前后的尺寸分布（插图：DPyDIM (10 μM) 在添加各种阴离子水溶液前后的丁达尔效应）；存在阴离子分析物 (10 μM) 时 DPyDIM (10 μM) 聚集体的 TEM 图像；(b) PPi；(c) SO_4^{2-} 和 (d) SDS。

Figure 2. (a) Size distribution of DPyDIM (10 μM) before and after addition of various anions (10 μM) in aqueous solution (Inset: Tyndall effect of DPyDIM (10 μM) in before and after addition of various anions aqueous solution); TEM images of DPyDIM aggregates in the presence of anion analytes (10 μM): (b) PPi, (c) SO_4^{2-}, and (d) SDS.

, $S_2O_3^{2-}$, SO_4^{2-}, SO_3^{2-}, S^{2-}, HSO_4^- and HSO_3^-）表现出的明显的 excimer 发射猝灭和微弱的单体增强响应；另一种是对阴离子表面活性剂（SDS、SDeS、SDSO、SDeSO 和 SDC）表现出的明显的 excimer 发射猝灭和较强的单体增强响应。

与此同时，该荧光聚集体对不同类型阴离子的比例型响应具有多波长交互响应性。热图和 PCA 分析结果表明该单一荧光传感体系可以有效、灵敏地实现对三种类型的阴离子定量和定性区分。DLS、TEM 和变温荧光测定实验表明不同阴离子和聚集体之间相互作用的差异性是能够实现对多种阴离子交互响应的主要原因。本工作通过使用咪唑鎓修饰的具有多个发射带的荧光两亲聚集体提供了一种简单有效的检测和区分多种阴离子的方法，该方法有望扩展到其他类型的分析物。

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Anions are a kind of negatively charged ions ubiquitous in biological systems and in nature and are irreplaceable. Common anions include well-known sulfur-containing anions, and phosphorus-containing anions, etc. They are closely related to human's daily life and have an important impact on human health and environment. Clearly, most anions tend to have two sides, playing important roles in biological systems and human daily life, while causing serious diseases or environmental problems. As there are a great number of various anions existing in the biological systems and environments, it is necessary to develop simple and effective sensors to differentiate and identify those similar or different anions.

In this work, we designed and synthesized a bola-type imidazolium-modified bispyrene derivative, DPyDIM. The fluorescent amphiphilic probe can form sphere-shape aggregates in aqueous solution. Fluorescence titration experiments revealed that the fluorescent aggregates exhibit two different types of ratiometric responses to the examined anions:

one is with weak enhanced monomer emission as observed for phosphate anions (PPi, ATP, ADP, and AMP) and sulfur-containing anions ($S_2O_8^{2-}$, $S_2O_3^{2-}$, SO_4^{2-}, SO_3^{2-}, S^{2-}, HSO_4- and HSO_3-) with the distinct excimer reduction; the other is with more effective enhanced monomer emission as found for anionic surfactants (SDS, SDeS, SDSO, SDeSO and SDC).

At the same time, the ratiometric responses to different types of anions are featured with multiple-wavelength cross-reactivity. The single sensor system can both quantitatively and qualitatively well differentiate the three types of anions by recognizing heat map and PCA plots. The measurements from DLS, TEM, and temperature-dependence fluorescence reveal that the difference in interaction between anions and the assembly is the main reason for the cross-reactive response to multiple anions. The present work provides a simple and effective method for the detection and discrimination of multiple anions by using fluorescent amphiphilic aggregates exhibiting multiple emission bands, which can be expanded to other types of analytes.

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Interfacially confined preparation of fumaronitrile-based nanofilms exhibiting broadband saturable absorption properties

Yan Luo [a], Min Li [a], Jiaqi Tang [a], Jianyang Zang [a], Yonggang Wang [b], Taihong Liu [a] ✉, Yu Fang [a] ✉

界面限域聚合制备具有宽带可饱和吸收特性的富马腈基纳米膜

非线性光学材料因其在光学领域，如光开关、逻辑器件、光限幅、图像传输和锁膜激光器系统等方面的潜在应用而备受关注。随着非线性光学现象和理论研究的日益深入，非线性光学材料的研究也蓬勃发展起来，开发新型三阶非线性光学材料已经成为非线性光学研究领域的一个重要课题。目前已报道的材料体系可分为无机材料和有机材料两大类。与无机材料相比，有机材料优势在于：（1）非线性吸收系数相对较高：有机材料的非线性效应来源于材料中共轭 π 电子，外加电场对电子的分布产生明显的扰动并诱导分子内的电子（电荷）转移，产生显著的非线性极化；（2）响应速率快：有机非线性材料的响应是靠 π 电子云的离域，通常在几十到几百飞秒量级，而无机材料的非线性响应来源于晶格振动，为毫秒或者微秒量级；（3）可加工性好：可在任意衬底成膜，与现有的半导体工艺兼容性好；（4）可选择性佳：有机材料可以通过分子工程设计对材料的性能进行优化和提高，以满足不同器件需求。目前，有机非线性材料的研究已经日渐成熟，许多非线性性质优异的有机分子也随之产生。但是，这些材料大多是粉末，具有较大的散射，一般需将其配成溶液或者掺杂于高分子聚合物中使用。这样就不可避免的会受到溶剂的

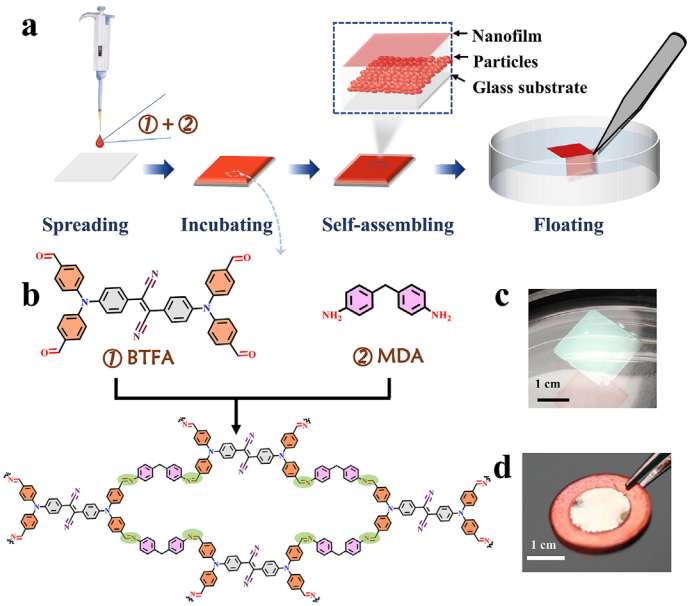

图 1. (a) 空气 /DMSO 界面自组装制备纳米膜的示意图；(b) 亚胺键连接纳米膜的制备；(c, d) 纳米膜漂浮在水面上以及转移至铜环上的照片

Fig. 1. (a) Schematic description of preparing the nanofilm by air/DMSO interfacial self-assembly; (b) Fabrication of imine-linked nanofilm; (c, d) Photographs of the nanofilm floating on the water as well as transferred to a copper collar.

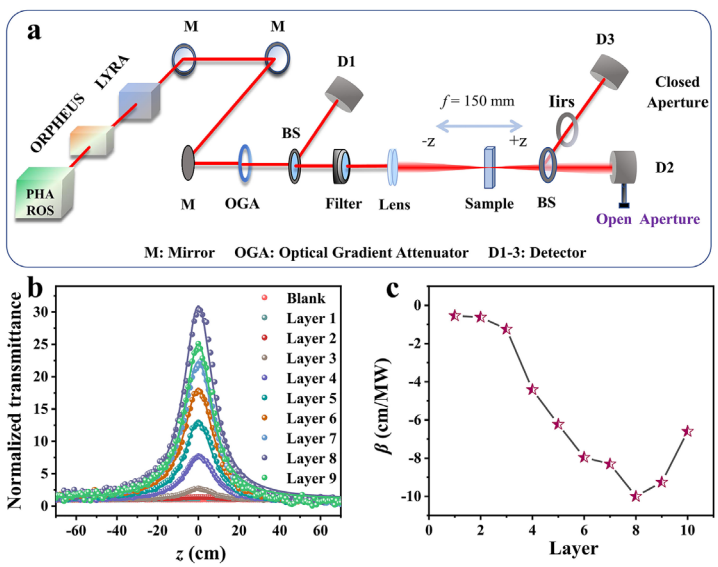

图 2. (a) Z− 扫描装置示意图；(b) 不同层数纳米膜的 Z 扫描曲线；(c) 非线性吸收系数 β 与纳米膜层数的关系

Fig. 2. (a) Schematic of the open-aperture Z-scan experimental arrangement; (b) Normalized Z-scan curves of the nanofilms with different layers excited by fs-800 nm laser at an incident pulse intensity of 135.5 GW/cm^2 (200 fs, 1.0 wt%); (c) Coefficient β as a function of the nanofilm layers.

影响以及引起活性单元利用不充分等问题。

目前，薄膜形式的有机材料三阶非线性光学性质的研究相对较少，但它们对实际应用极为重要。因此，为了利于器件化，便于实际应用，亟待发展新型的薄膜材料。虽然很多方法已经被用来获得具有非线性性质的薄膜，如物理涂覆或者掺杂于高分子聚合物等，但它们在仍存在很多缺陷，阻碍其进一步的扩展和实际应用。自组装膜透过率高，具有平整均一的表面，可以相对充分的利用活性单元，在许多领域显示出良好的应用前景。

受界面限域纳米薄膜的独特性能和富马腈衍生物的优良非线性性能的启发，我们通过界面限域聚合的方式制备了一种纳米薄膜。它具有平整均匀、无缺陷、柔性和自支撑的特性。通过简单地折叠过程即可得到具有不同非线性吸收系数的纳米薄膜，以满足超快锁膜激光器的各种需求。八层纳米薄膜的非线性吸收系数在 800 nm 时达到 −10.1cm/MW，这与之前报道的结果相当。此外，与常用的半导体可饱和吸收镜和传统的层状二维材料相比，制备的纳米薄膜表现出宽带的 SA 性能，范围从 720 nm 到 1700 nm。总而言之，纳米薄膜易于化学修饰，具有宽频带操作带宽和高非线性吸收系数，使纳米薄膜成为的新一代有潜力的高性能非线性光学材料。

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Nonlinear optical materials have attracted much attention for their potential applications in optical fields, such as optical switches, logic devices, optical limiting, image transmission, and film-locked laser systems. With the increasing research on nonlinear optical phenomena and theories, the study of nonlinear optical materials has also flourished, and the development of new third-order nonlinear optical materials has become an important topic in the field of nonlinear optics research. The reported material systems can be divided into two categories: inorganic materials and organic materials. Compared with inorganic materials, the advantages of organic materials are: (1) Relatively high nonlinear absorption coefficient: the nonlinear effect of organic materials originates from the conjugated π electrons in the material, and the applied electric field produces significant perturbation on the distribution of electrons and induces electron (charge) transfer within the molecule, producing significant nonlinear polarization; (2) Fast response rate: the response of organic nonlinear materials relies on the off-domain of π electron clouds, usually in fast response rate: the response of organic nonlinear materials relies on the off-domain of π-electron clouds, usually on the order of tens to hundreds of femtoseconds, while the nonlinear response of inorganic materials originates from lattice vibrations on the order of milliseconds or microseconds. (3) Good processability: film formation on any substrate, good compatibility with existing semiconductor processes; (4) Good selectivity: organic materials can be optimized and improved by molecular engineering design to meet different device requirements. At present, the research of organic nonlinear materials has become increasingly mature, and many organic molecules with excellent nonlinear properties have been produced. However, most of these materials are powders with large scattering and generally need to be formulated into solutions or doped into polymers for use. This will inevitably be affected by the solvent and cause problems such as underutilization of active units.

At present, relatively few studies have been carried out on the third-order NLO properties of organic materials in the form of thin films, but they are extremely important for practical applications. Therefore, there is an urgent need to develop new types of thin-film materials in order to facilitate device fabrication and practical applications. Although many methods have been used to obtain thin films with nonlinear properties, such as physical coating or doping with polymers, they still have many drawbacks that hinder their further expansion and practical applications. Self-assembled films with high permeability, flat and homogeneous surfaces, and relatively full utilization of active units show promising applications in many fields.

Inspired by the unique properties of interface-limited nanofilms and the excellent nonlinear properties of fumar nitrile derivatives, we prepared a nanofilm by interface-limited polymerization. It has flat and uniform, defect-free, flexible and self-supporting properties. Nanofilms with different nonlinear absorption coefficients can be obtained by a simple folding process to meet the various requirements of ultrafast film-locked lasers. The nonlinear absorption coefficient of the eight-layer nanofilms reaches -10.1 cm/MW at 800 nm, which is comparable to the previously reported results. In addition, the prepared nanofilms exhibit broadband SA performance ranging from 720 nm to 1700 nm compared with commonly used semiconductor saturable absorber mirrors and conventional layered 2D materials. in conclusion, the nanofilms are easy to chemically modify, have a broadband operating bandwidth and high nonlinear absorption coefficient, making them a new generation of promising high-performance nonlinear optical materials.

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One Fluorophore-Two Sensing Films: Hydrogen-Bond Directed Formation of a Quadruple Perylene Bisimide Stack

Xinyu Gou, Zhaolong Wang, Qiyuan Shi, Ke Liu, Qingwei Jiang, Simin Lin, Rong Miao, Yu Fang

氢键、π－π 作用协同构建稳定的苝二酰亚胺四聚体及其多功能传感应用

众所周知，具有特定尺寸和几何形状的光活性分子聚集体的可控构建对于调控荧光物质的光物理行为，深入理解激发态过程具有重要意义，并可为荧光传感、有机太阳能电池和有机场效应晶体管等功能分子系统的设计提供理论指导。分子内与分子间弱键作用，特别是氢键、π－π、n－π、卤键等的运用是实现这种调控的重要手段。包含苝二酰亚胺在内的多环芳烃 (polycyclic aromatic hydrocarbons，PAHs) 衍生物是一类重要的光活性物质，由其形成的有序聚集结构在功能材料中具有巨大的应用潜力。但是由于核心片段间 π－π 作用的存在，往往导致聚集作用不可控，聚集结构不理想。这些问题的存在极大地制约着具有精准结构的多环芳烃聚集体的制备。因此，将具有不同特点的超分子相互作用在分子内和分子间协同是获得具有特定结构分子聚集体的有效途径。

基于这一思想，我们将分子内氢键与分子间 π－π 作用协同，设计合成了具有定向组装能力的苝二酰亚胺二聚体，HDPP–PBI，系统研究了其在溶液中的聚集行为和光物理过程。结果表明由于双吡啶吡咯的刚性结构、反应性基团的空间隔离（7 Å）、分子内的双重氢键作用，以及苝酐片段间的 π－π 堆积等因素的共同存在，导致以 H 型苝二酰亚胺四聚体为核心结构的 HDPP–PBI 二聚体的形成，室温聚集常数高达 ~ 5.56 × 10^6 M^{-1}。有趣的是，氢键破坏试剂的加入能够引起 HDPP–PBI 二聚体向单体的动态转变，并伴随显著的荧光增强。以两种不同聚集态 HDPP–PBI 溶液铸膜，得到了两种性质截然不同的荧光薄膜。其中，荧光暗态薄膜对丙酮表现出敏化作用，亮态薄膜则因三乙胺的存在而荧光猝灭。由此发展了响应快、灵敏度高、可逆性好的丙酮和三乙胺两种概念性薄膜荧光传感器。该项研究是通过溶液聚集结构调控发展不同功能表界面材料的有益尝试，对丰富荧光敏感薄膜设计思路具有重要的意义。

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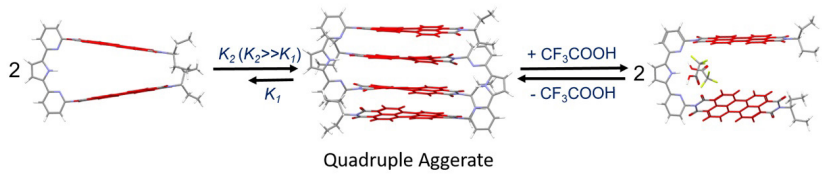

图 1. 氢键诱导的苝二酰亚胺四聚体的形成及解聚
Figure 1. Formation of the double hydrogen bonds directed quadruple PBI aggregate and its subsequent dissociation

As well known, the controllable construction of photoactive molecular aggregates with defined size and geometry is of great significance for the regulation of the photophysical behavior and gaining fundamental insights on photoexcited processes of molecular systems, which would provide theoretical guidance for the design of functional molecular systems, including sensing, solar cells and organic field effect transistors, etc. Intramolecular and intermolecular weak bonds, especially hydrogen bonds, π-π, n-π and halogen bonds, endow them with potential applications in functional materials. Polycyclic aromatic hydrocarbons (PAHs) derivatives, including derivatives of perlyene bisimide, are important photoactive substances. The ordered aggregate structures formed by PAHs have great potential for application in functional materials. However, the existence of π-π interaction between core fragments often results in uncontrollable aggregation or undefined aggregates, which greatly restrict the synthesis of polycyclic aromatic hydrocarbon aggregates with precise structure. Therefore, the combination of the intramolecular and intermolecular of supramolecular interactions with different characteristics is an effective approach to develop molecular aggregates with defined structures.

Herein, a PBI dimer, HDPP-PBI, was designed and synthesized by synergizing intramolecular hydrogen bonding with intermolecular π-π interaction. The aggregation behavior and photophysical process of HDPP-PBI in solution were systematically studied. The results showed that dimerization of HDPP-PBI in suitable solvents resulted in a PBI quadruple stack with H-type structure due to the rigid structure of dipyridyl pyrrole (HDPP), the proper distance between the two pyridine units groups (7 Å), the double intramolecular hydrogen bond interaction, and the π-π stacking between perylene bisimide. The dimerization constant at room temperature was ~ 5.56 × 10^6 M^{-1}. Interestingly, the addition of hydrogen bond-breaking reagents was able to induce a dynamic transition from dimer to monomer of HDPP-PBI, accompanied by a remarkable emission enhancement. Two distinct fluorescent films were prepared by drop-casting of the dimerized or the monomeric HDPP-PBI onto a substrate surface. The less-emissive PBI quadruple stack-based film showed a turn on response to acetone vapor, while the highly emissive HDPP-PBI based film exhibited fluorescence quenching upon exposure to triethylamine vapor. Two conceptual film-based fluorescence sensors for detecting acetone and triethylamine, with fast response, high sensitivity and good reversibility, were realized. This work is a beneficial attempt to develop different functional interfacial materials through solution aggregation structure regulation. Meanwhile, the study is of great significance to facilitating the design of multifunctional fluorescence sensitive films.

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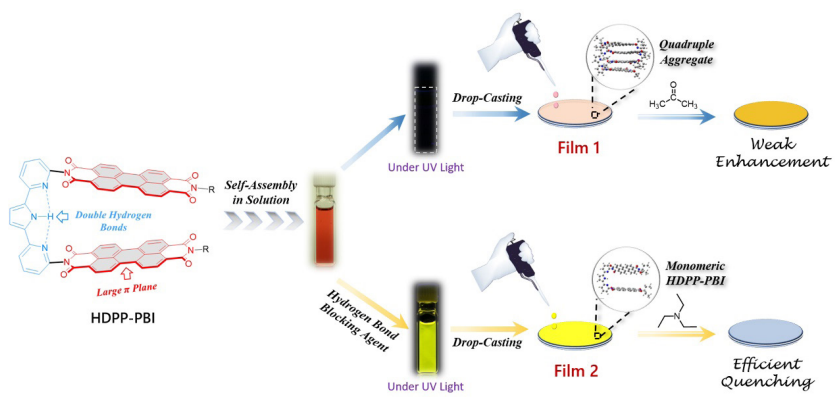


图 2. 两种荧光薄膜制备过程示意图

Figure 2. Schematic representation of the implementation for 'one-fluorophore-two distinct fluorescent sensing films'

陕西省科技厅副厅长白崇军一行来访

Shaanxi Sci-tech Dept vice director Bai Chongjun visits to boost high-level talents work

7月25日下午，陕西省委科技工委委员、省科技厅副厅长白崇军一行赴陕西师范大学看望中国科学院院士房喻教授，并调研高层次人才工作。

白厅长一行首先调研了陕西师范大学材料性能评价与原型设备研制共享平台，房喻院士详细介绍了光子鼻与分子材料团队研究成果和产业应用情况。

随后，在调研座谈会上，陕西师范大学副校长杨祖培汇报了学校科研平台、引才引智基地运行和高层次人才引进情况。房喻院士强调，要克服新冠肺炎疫情等因素影响，坚持开放创新，开门搞科研，在开放合作中提升自主创新能力，培养高层次科技创新人才，实现高水平科技自立自强，发挥引才引智在促进创新驱动高质量发展中的作用。

白崇军对陕西师范大学高层次人才引进和培养工作给予充分肯定，他强调，要积极融入国际交流与合作，发挥好高校人才基地平台作用，多方联动做好引才留才用才工作，加快自主创新人才培养；要用好秦创原引用高层次创新创业人才和科技成果转化“三项改革”等政策，加大人才引育力度，助推我省高质量发展。

On July 25, Mr. Bai Chongjun, Shaanxi Provincial Science and Technology Working Committee member and Shaanxi Provincial Department of Science and Technology vice director Bai Chongjun visited Shaanxi Normal University to meet with CAS academician Fang Yu and investigate its high-level talents work.

Bai Chognjun and his colleagues first visited SNNU's

Sharing Platform for Material Performance Evaluation and Prototype Equipment Development, where Fang Yu briefed them about the research findings and industrial applications of his Photonic Nose and Molecular Materials Group.

At the meeting afterwards, SNNU vice president Yang Zupei briefed about the school's research platforms, talent introduction bases and high-level talents work. Fang Yu urged researchers to overcome the impact of the COVID-19, insist on opening-up and innovation, improve the capacity for independent innovation, cultivate high-level innovative talents, and bring into full play of talent introduction in promoting innovation-driven high-quality development, so as to realize high-level self-reliance in science and technology.

Bai Chongjun affirmed SNNU's efforts in high-level talent introduction and cultivation and hoped the school would engage deeper in international exchange and cooperation, make better use of its talent base platforms, make concerted efforts in talent introduction, talent retention and talent use, and accelerate the cultivation of independent innovative talents. He also recommended Qinchuangyuan Innovation Platform's policies in high-level innovative and entrepreneurial talents and commercialization of research findings, and urged SNNU to intensify its efforts in talent introduction and cultivation, so as to help boost the high-quality development of Shaanxi province.

物理学与信息技术学院李青教授、林海平教授受邀进行学术交流

Profs. Li Qing and Lin Haiping invited to present their research

为推动学科创新、交叉与融合，促进团队跨领域合作，7 月 12 日下午光子鼻与分子材料团队邀请物理学与信息技术学院李青教授和林海平教授在致知楼 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。

李青教授围绕 C–H 键活化反应的扫描隧道显微镜研究等内容对其课题组近期的科研进展作了详细介绍，并对有机分子在固体表面的自组装和芳烃在金属单晶表面的 C–H 键活化及其机理研究面临的困难和相关领域的发展与机遇进行了系统分析。

林海平教授介绍了自己在催化机理的探索与催化中心的构建领域展开的系列工作。围绕新能源催化剂材料和碳中和反应等领域的关键科学问题，运用第一性原理的计算模拟、人工智能的数据分析和创新性的催化剂设计，进行研究并提出解决方案。利用密度泛函理论计算研究光、电和加热条件下的基元催化过程和反应机理，通过机器学习对纳米材料的薄膜生长、分子组装和催化过程进行理论计算与模拟，进一步系统介绍了光、电催化的水解反应机理以及纳米催化剂的相关研究。

在提问环节，李青教授和林海平教授与在座师生进行了交流和讨论。

On July 12, the Photonic Nose and Molecular Materials Group invited Prof. Li Qing and Prof. Lin Haiping of Shaanxi Normal University's School of Physics and Information Technology to share their research findings at the Lecture Room No. 1668 in Zhizhi Building.

Members and graduate students of the group attended the lectures, which were part of a series for the promotion of disciplinary innovation and interdisciplinary integration, and interdisciplinary collaboration between groups.

Li Qing presented a detailed introduction of the recent progress of his research group in the C-H bond activation by scanning tunneling microscope, and analyzed the difficulties,

development and opportunities and the mechanisms in the self-assembly of organic molecules on solid surfaces and C-H bond activation of aromatics on metal single crystal surfaces.

Lin Haiping presented an introduction of his research work in catalytic mechanism and construction of catalytic center. Focusing on key scientific problems in new energy catalyst materials and carbon neutral reaction, he used first-principle computational simulation, AI data analysis and innovative catalyst design to carry out his research and proposed solutions. He used Density Functional Theory to calculate the elemental catalytic processes and reaction mechanism under light, electricity and heating conditions, and used Machine Learning to perform theoretical calculation and simulation of thin film growth, molecular assembly and catalytic process of nanomaterials. He also presented relevant research in the mechanism of photocatalytic and electrocatalytic hydrolysis reaction and nano-catalysts.

During Q&A session, Li and Lin answered questions from the audience and discussed topics of mutual interest.

虞宏正先生的贡献需要铭记

Mr. Yu Hongzheng's contribution needs to be remembered

文 / 房喻 Fang Yu

我与中国化学会结缘还得感谢“虞宏正教授奖励基金委员会”。

虞宏正先生 1897 年 10 月 5 日出生于福建闽侯，1933 年加入中国化学会，并当选为中国化学会北京分会理事，1951 年出任中国化学会理事、陕西省化学会理事长，1955 年当选为中国科学院学部委员。虞宏正先生是我国胶体化学和土壤化学的主要奠基人。虞宏正先生扎根西北几十年，为我国西北地区教育科学事业发展，科学人才培养做出了卓越贡献。因长期积劳成疾和文革初期遭受迫害，虞宏正先生于 1966 年 11 月 11 日在西安不幸逝世。

据资料记载，在生命垂危之际，虞宏正先生依然关心着我国西北地区教育科学事业的发展，并留下遗嘱将自己珍藏的 7000 余册图书全部捐献给他一手创立的中国科学院西北水土保持研究所。1985 年，虞宏正先生女儿决定将先生 7 万多元遗款上交党费。

为缅怀虞宏正先生为我国教育科学事业，特别是我国西北地区化学和土壤科学事业发展做出的杰出贡献，中国化学会会同陕西省化学会等单位于 1987 年 10 月 5 日在陕西杨陵农科城举行了“虞宏正教授诞辰九十周年纪念大会”，有关单位和虞宏正先生的学生出资在中科院西北水土保持研究所院内为他建塑了铜像，时任中国科学院院长卢嘉锡为铜像题字。

当天，大会还宣布成立“虞宏正教授奖励基金委员会”，以先生 7 万多元遗款作为“化学奖学金”，奖励陕西省每年高考考

虞宏正先生中国科学院学部委员证书
Mr. Yu Hongzheng's certificate of CAS academician

入化学专业成绩最好的前三名学生，陕西省在校化学系优秀大学生，以及有优秀论文发表的陕西省有关单位青年科技工作者。作为青年教师代表，我有幸参加了纪念活动，也在后来（1989 年）获得了首届虞宏正青年科技工作者奖。

这个奖项可能影响并不大，奖金也不多，但却给了我一个更多地了解中国化学会，了解中国化学界先贤们为民族解放、区域发展和国家建设而不懈奋斗的机会。也促使我更加认识到化学学科的重要性，认识到化学人的专业责任和社会责任所在。

值此中国化学会 90 华诞之际，留此印记，以铭记先贤，告慰逝者，启迪来者。

2022 年 7 月 24 日于陕西师范大学长安校区

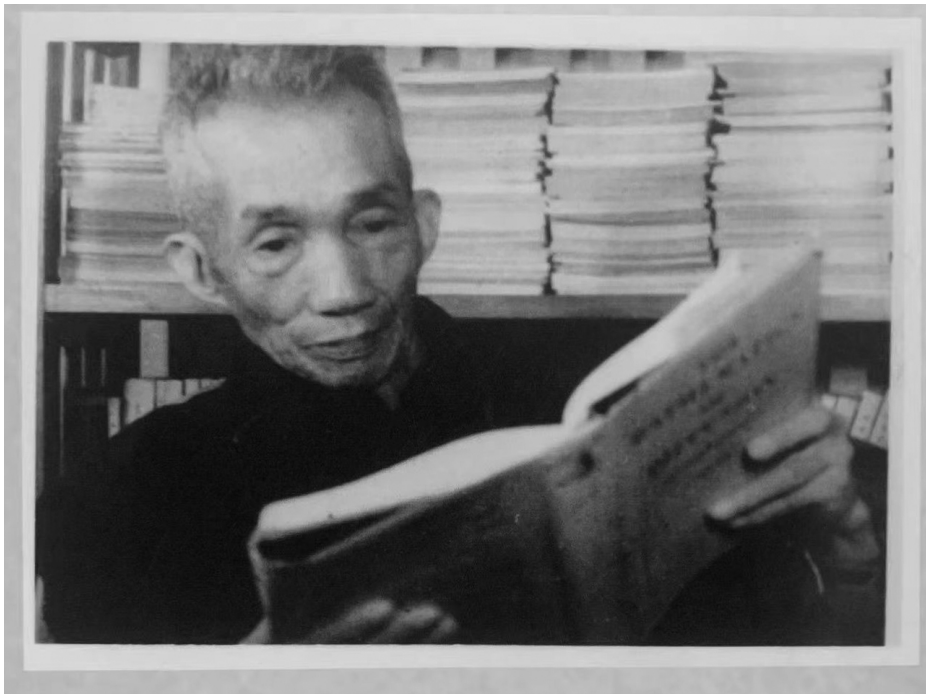
中国化学会 90 华诞专题活动“我的学会故事”约稿

I became associated with the Chinese Chemical Society thanks to the “Prof. Yu Hongzheng Award Fund Committee”.

Mr. Yu Hongzheng was born on October 5, 1897 in Minhou, Fujian. He joined the Chinese Chemical Society in 1933 and was elected a board member of Beijing Branch of Chinese Chemical Society. In 1951, he was elected a CCS board member and the board chairman of Shaanxi Chemical Society. He was elected an academician of the Chinese Academy of Sciences.

Mr. Yu Hongzheng was the major founder of colloid chemistry and soil chemistry in China. Rooted in northwest China for decades, he made outstanding contributions to the development of education and scientific research and the cultivation of scientific talents in northwest China. Due to long-term overwork and persecution in the early days of the Cultural Revolution, he died in Xi’an on November 11, 1966.

According to historical records, Mr. Yu Hongzheng, careing about the development of education and scientific research in northwest China when he was critically ill, left a will to donate his collection of more than 7,000 books to the Northwest Institute of Soil and Water Conservation of the Chinese Academy of Sciences, which he founded. In 1985, his daughter donated the more than CNY 70,000 yuan legacy he left behind as his Party membership fee.



虞宏正先生工作照
Mr. Yu Hongzheng at work

（照片均由西北农林科技大学高锦明教授提供，特表示感谢）
(Photos courtesy of Prof. Gao Jinming of Northwest A&F University)

In order to commemorate Mr. Yu Hongzheng's outstanding contributions to the cause of education and science in China, especially the development of chemistry and soil science in northwest China, the Chinese Chemical Society, together with the Shaanxi Chemical Society and other institutions, held the "90th Anniversary Commemorative Conference of Prof. Yu Hongzheng's Birth" in Yangling Agricultural Science City, Shaanxi Province on October 5, 1987. A bronze statue of Mr. Yu Hongzheng was erected in commemoration of him at the Northwest Institute of Soil and Water Conservation, which was funded by relevant institutions and his students. Lu Jiaxi, then president of the Chinese Academy of Sciences, wrote the inscription for the bronze statue.

The Prof. Yu Hongzheng Award Fund Committee was established at the conference and his CNY 70,000 yuan legacy was set as Chemistry scholarship, to be used as awards for the top three students in Shaanxi province's college entrance exams who were enrolled in Chemistry majors, outstanding Shaanxi province college students majoring in Chemistry, and young science and technology workers in Shaanxi province who had published noticeable papers. As a representative of young teachers, I had the privilege to participate in the commemorative event, and received the first Yu Hongzheng Award for Young Science and Technology Workers in 1989.

This award may not have had much impact and not much prize money, but it gave me a chance to learn more about the Chinese Chemical Society, and learn about the unremitting struggle of the pioneers of China's chemical researchers for national liberation, regional development and national construction. It also made me more aware of the importance of the discipline of Chemistry and the professional and social responsibilities of chemical researchers.

On the occasion of the 90th anniversary of the Chinese Chemical Society, I write this piece to remember the sages, comfort the deceased, and enlighten newcomers on our path.

Written on July 24, 2022 at the Chang'an Campus of Shaanxi Normal University, at the request of the special event "My Story with CCS" on the 90th birthday of Chinese Chemical Society

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