上海大学 SHANGHAI UNIVERSITY

SHUGLØBAL SHANGHAI UNIVERSITY 上海大学国际部

NEWSLETTER

2024 MARCH

RESEARCH

Shanghai University (hereinafter referred to as SHU) is one of the top 40 Chinese universities, top 100 Asian universities, the premier university of Shanghai, and a member of China Project 211 Universities. It is a comprehensive university offering 101 undergraduate programs, 180 graduate programs, and 95 doctoral programs in various disciplines including science, humanities & social sciences, engineering, economics & management, art, etc.

SHU was founded in 1922, and has been developed into a university with profound academic traditions and outstanding research facilities, embracing students from various countries with its global outlook. Just like the city of Shanghai, SHU has undergone dramatic changes in the past few decadesturning into a multicultural community with tremendous opportunities and resources.

SHU is inspired to build a highly effective platform for "Developing Talent", "Conducting Science & Technology Research", and "Serving Society". Faculty and students can grow together in a supportive and pleasant learning environment. Through the continuous improvement of the "All-round and whole-person" education model, SHU aims at providing society graduates cultivated with global vision, citizenship consciousness, humanity mindset, innovative spirit and practical ability to meet future challenges. The university currently has 20026 graduate students, 19931 undergraduate students, and 2590 international students. Students graduated from SHU are widely welcomed by employers from various firms and companies.

There are currently 3508 faculty members working for the university. Based on the contribution of our top-level faculty and diligent students, SHU has achieved collaboration with 254 universities in 55 nations and regions, managing 5 Confucius Institutes with partners in South America, Europe, Asia, etc.

ShanghaiUniversity:https://en.shu.edu.cn/
SHU-Global:international@oa.shu.edu.cn

With a clear educational mission and objectives on talent cultivation, combined with global perspectives and creative awareness, Shanghai University(SHU) aims to become a key player in both the domestic and overseas education sectors.

Currently, Shanghai University is equipped with a National-Level University Science Park, a New and High-Tech Development Zone, and over 100 multi-disciplinary research institutes and research centers.

For the past five years, the amount of funding for SHU's scientific research has ranked around 25th among all the domestic universities and colleges; the total number of academic papers indexed by the three International Retrieval Systems (SCI, EI, and ISTP) has been rated approximately 30th, and the number of applied and authorized patents is about 20th.

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Reseach by Professor Cao Guixin' s Team at the Materials Genome Institute in Collaboration with Fudan University Published in "Advanced Functional Materials"

材料基因组工程研究院曹桂新教授團隊與復旦大學合作的研究成果在《Advanced Functional Materials》發表

Professor Cao Guixin' s team in collaboration with Professor Che Renchao' s team from Fudan University, published a research paper in the internationally renowned journal Advanced Functional Materials (impact factor: 19.0). The paper is titled "Manipulating the Magnetic Bubbles and Topological Hall Effect in 2D Magnet Fe5GeTe2".

曹桂新教授團隊與復旦大學車仁超教授團隊合作在國際著名期刊《Advanced Functional Materials》（影響因數：19.0）上發表題為"Manipulating the Magnetic Bubbles and Topological Hall Effect in 2D Magnet Fe5GeTe2"的研究論文。

This study, integrating Lorentz transmission electron microscopy and transport measurements, successfully manipulated magnetic bubbles and the topological Hall effect in high-quality FGT crystals. The research found that the magnetic anisotropy and dipolar interactions in FGT change with temperature and the thickness of the single crystals, thereby effectively regulating the density and size of magnetic bubbles. More importantly, by varying the thickness of FGT single crystals, researchers successfully controlled the spin configurations of the magnetic bubbles. They observed topological transitions between topological Skyrmion bubbles and topologically trivial magnetic bubbles, accompanied by changes in the topological Hall effect. This study demonstrates the potential for manipulating spin textures and the topological Hall effect in FGT, providing vital information for the design of two-dimensional van der Waals devices in spintronics and offering new insights for the development of novel magnetic storage devices.

該研究結合洛倫茲電鏡和輸運測量，成功地在高品質的 FGT 晶體中實現了對磁泡和拓撲霍爾效應的有效操縱。研究發現，隨著溫度和單晶厚度的變化，FGT 的磁晶各向異性和偶極相互作用發生改變，進而使得磁泡的密度和尺寸可以得到有效的調節。更為重要的是，通過改變 FGT 單晶厚度，研究者成功調控了磁泡的自旋構型。觀察到拓撲斯格明子磁泡和拓撲平庸磁泡之間的拓撲相變，伴隨著拓撲霍爾效應的變化。這項研究展示了在 FGT 中操縱自旋紋理和拓撲霍爾效應的可能性，為自旋電子學中二維范德華器件的設計提供了重要的資訊，為未來新型磁記憶體件的發展提供了新的思路。

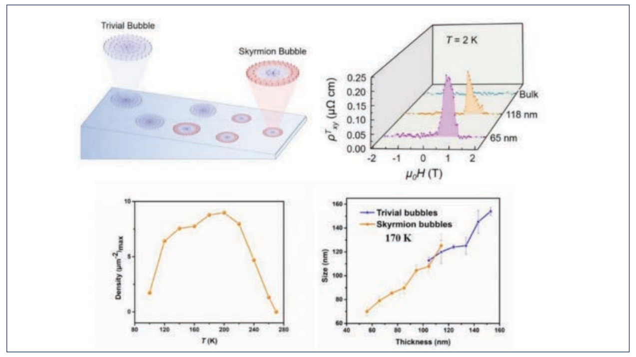

Figure 1: Manipulation of Spin Configurations and the Topological Hall Effect in Fe5GeTe2 single crystals through Varying Thicknesses
圖 1 通過不同厚度調控 Fe5GeTe2 單晶中的自旋構型和拓撲霍爾效應

Article link: https://doi.org/10.1002/adfm.202308560

Professor Feng Lingyan's research group at Materials Genome Institute published their latest findings in Advanced Materials

材料基因组工程研究院馮淩燕教授課題組在《Advanced Materials》發表最新研究成果

The research team led by Professor Feng Lingyan from the Material Genome Institute has recently unveiled their groundbreaking study in Advanced Materials. This pivotal work, entitled "Machine-Learning-Driven G-Quartet-Based Circularly Polarized Luminescence Materials," marks a notable advance in the rational design of circularly polarized luminescence (CPL) materials, propelled by the integration of machine learning.

CPL materials, coveted for their prospective roles in chiral functional devices, pose a daunting challenge in achieving a high asymmetry factor (glum). The intricacies involved in the supramolecular assembly during material fabrication, coupled with the opaque nature of materials synthesis data, further complicate the correlation of experimental parameters to desired outcomes. This research underlines the profound impact of machine learning in refining the design and enhancing the performance of chiral nanomaterials. Grounded in the principles of material genome research, this exploration signifies a transformative shift from the conventional trial-and-error approach in materials science, markedly elevating the efficiency in the development of innovative chiral functional materials and expediting their design and practical application.

材料基因組工程研究院馮淩燕教授團隊報導了機器學習輔助圓偏振發光材料理性設計的最新研究成果。相關工作以"Machine-Learning-Driven G-Quartet-Based Circularly Polarized Luminescence Materials"為題在《Advanced Materials》期刊發表。

圓偏振發光（CPL）材料因其在手性功能器件中的潛在應用而引起了人們的極大興趣。其中，合成具有高不對稱因數 (glum) 的 CPL 材料是一個巨大的挑戰。鑒於材料製備中超分子組裝系統的複雜性以及材料合成数据缺乏清晰度，構建實驗參數和目標值之間的關係同樣存在困難。本研究表明，機器學習可以極大地優化手性納米材料的設計和性能提升。相關工作是在材料基因組研究理念下，變革傳統的"試錯法"材料研發模式的一次探索，可以顯著提高新型手性功能材料的研發效率，加速新材料的設計和應用。

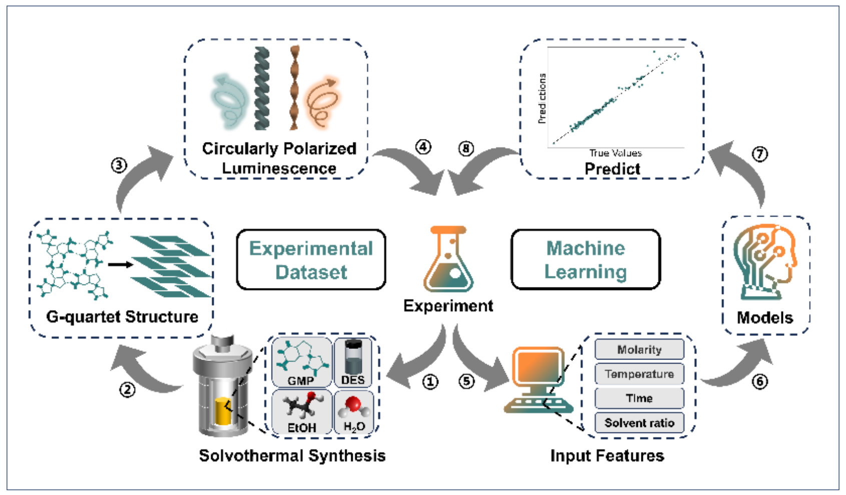

Figure 1: Framework for Data Collection and Machine Learning Design in Experiments
圖 1: 實驗数据集集獲取和機器學習的設計框架

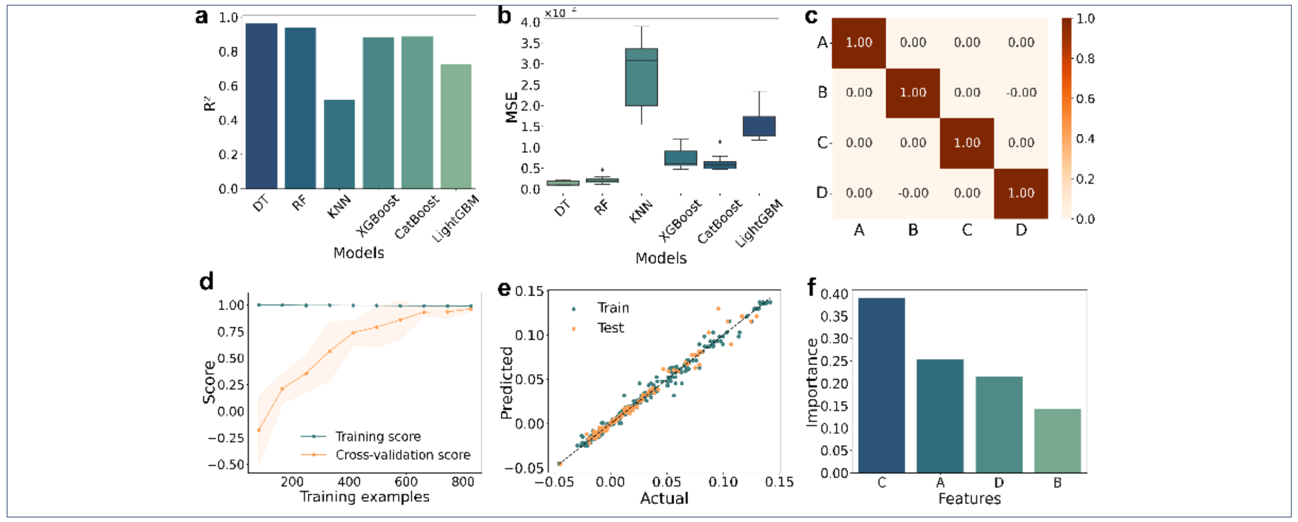

Figure 2. Machine learning regression model. (a) Determination coefficient histogram; (b) Mean square error box diagram of the model. c) The correlation heat map of the feature. d) The learning curve of the decision tree algorithm. e) Label and predict scatter plots drawn by the decision tree algorithm. f) Feature-sorted histogram.
圖 2. 機器學習回歸模型。（a）決定係數柱狀圖；（b）均方誤差箱線圖；（c）特徵的相關性熱圖；（d）決策樹算法的學習曲線；（e）訓練集和測試集的散點圖；（f）特徵的重要性排序

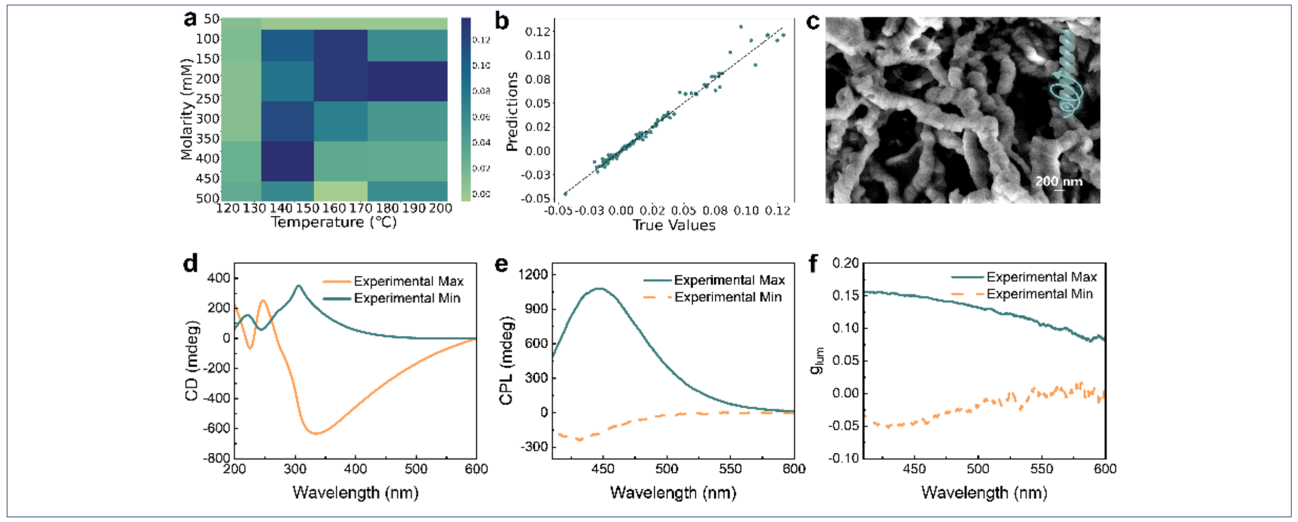

Figure 3. Prediction and verification results. a) A binary thermal map composed of the two most important features drawn by the decision tree model. b) Scatter plot of forecast results. c) SEM image of the chiral helix structure. Inset is a simulation diagram of a spiral structure. d) Circular dichroism (CD) spectrum verified by experiment. e) Circularly polarized luminescent (CPL) spectrum verified by experiment. f) The maximum/minimum glum value verified by the experiment.
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Article Link：https://onlinelibrary.wiley.com/doi/10.1002/adma.202310455

Collaborative Research by Professor Yang Jiong’s Team at Materials Genome Institute and Wuhan University Published in Energy & Environmental Science

材料基因组工程研究院楊炯教授團隊與武漢大學合作的研究成果在《Energy & Environmental Science》發表

Professor Yang Jiong’s team from the Materials Genome Institute (MGI) and Professor Liu Huijun’s team from Wuhan University, utilizing first-principles high-throughput computation and the Boltzmann transport theory, highlighted a long-overlooked approach: enhancing the thermoelectric performance of systems by manipulating the group velocity of electrons. Professors Yang Jiong and Liu Huijun, as co-corresponding authors, published their findings in the journal Energy & Environmental Science (latest impact factor: 32.5) under the title “Enhancing the electrical transport properties of two-dimensional semiconductors through interlayer interactions”. This collaborative research not only elucidates the role of interlayer interactions in modulating band structures but also underscores the crucial impact of group velocity in simultaneously boosting the Seebeck coefficient and electrical conductivity, offering a new perspective for improving the thermoelectric properties of materials.

材料基因組工程研究院楊炯教授團隊和武漢大學劉惠軍教授團隊等結合第一性原理高通量計算和玻爾茲曼輸運理論等指出了一個長期被忽視的方法，即通過操縱電子群速度來提升體系的澤貝克係數。楊炯教授與武漢大學劉惠軍教授為共同通訊作者，以 "Enhancing the electrical transport properties of two-dimensional semiconductors through interlayer interactions" 為題將該研究成果發表在《Energy & Environmental Science》（最新影響因數：32.5）期刊。本項合作研究工作不僅說明了層間相互作用調節能帶結構的作用，還強調了群速度對於同時增強澤貝克係數和電導率至關重要，為提升材料的熱電性能提供了新的視角。

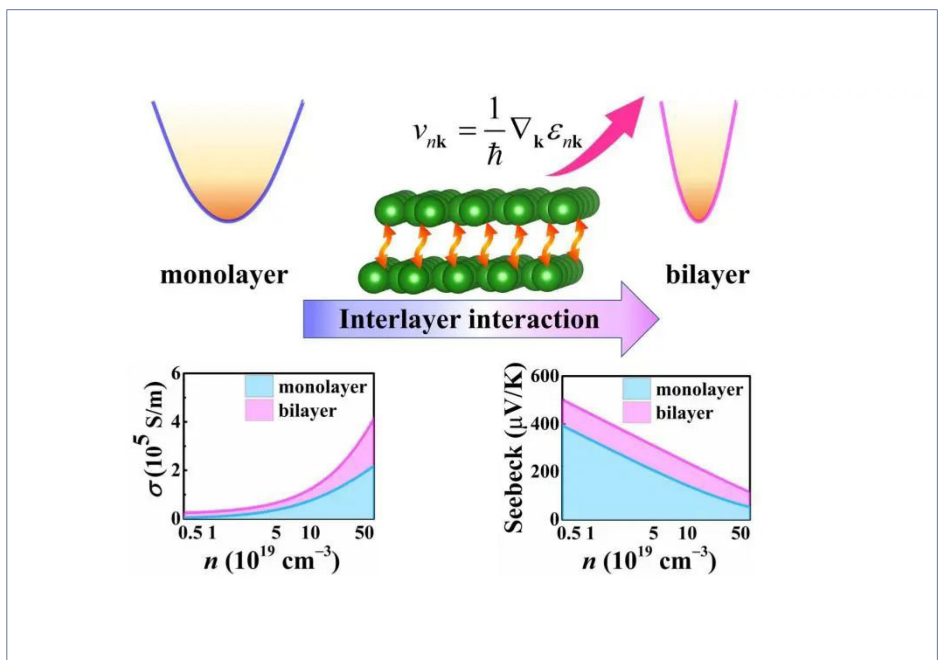
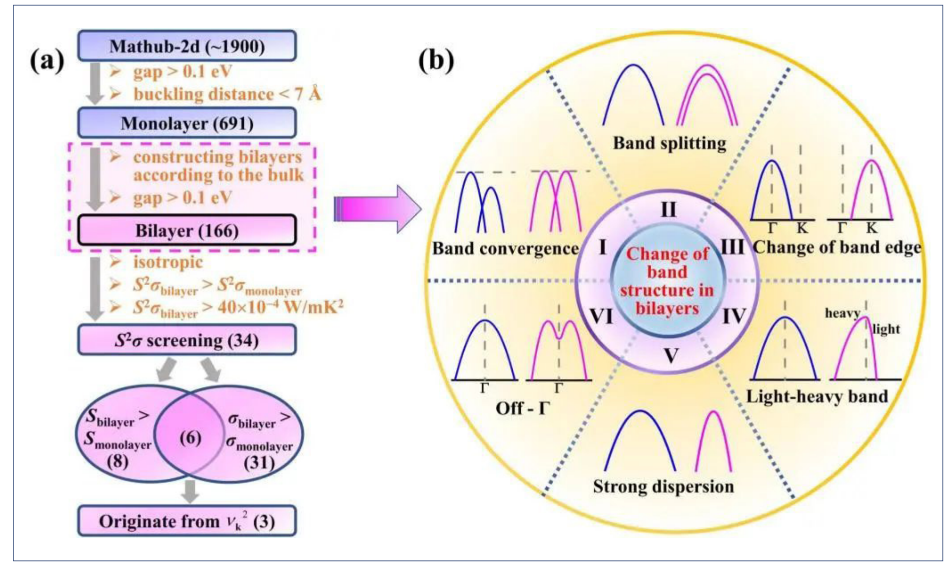


Figure 1. Schematic Illustration of Enhancing Electron Group Velocity Through Interlayer Interactions to Simultaneously Improve the Seebeck Coefficient and Electrical Conductivity
圖 1. 通過層間相互作用增加電子群速度，實現澤貝克係數和電導率同時提升的示意圖



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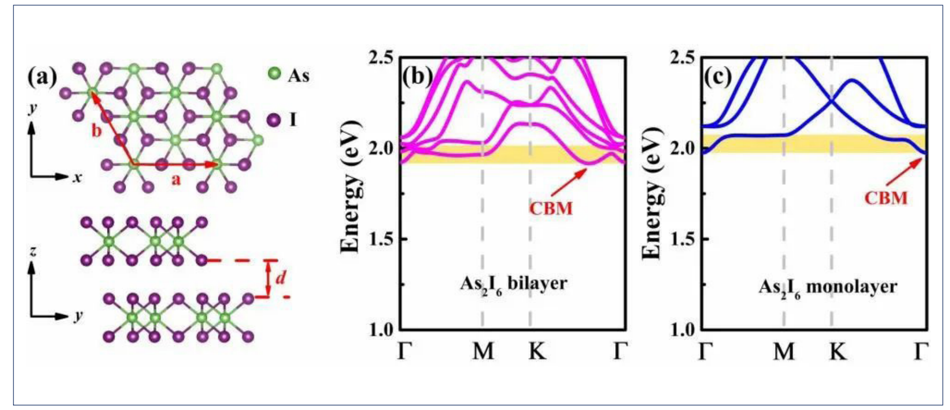

Figure 3. Crystal Structure of the As2I6 Bilayer, and the Electronic Band Structures of Both the As2I6 Bilayer and Monolayer
圖 3.As2I6 雙層的晶體結構，及 As2I6 雙層和單層的電子能帶結構

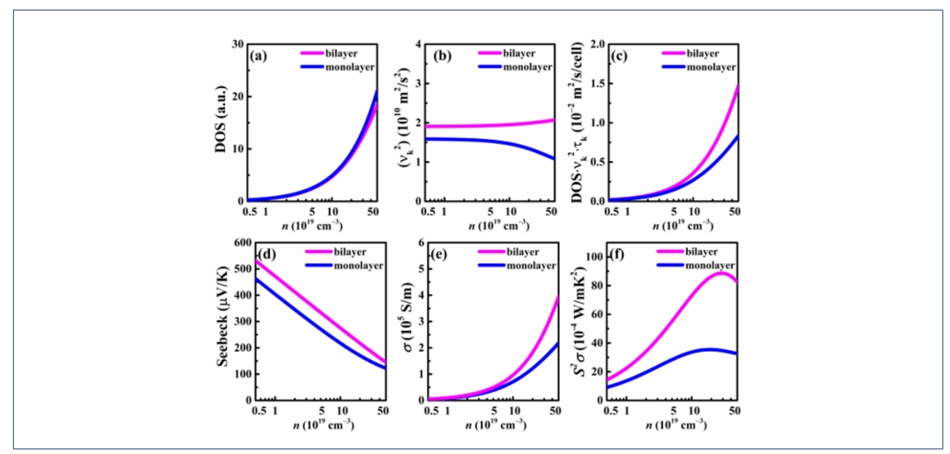

Figure 4. Relationship of Electrical Transport Coefficients with Carrier Concentration for Both the As2I6 Bilayer and Its Monolayer at 300K
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Article Link：
https://pubs.rsc.org/en/content/articlepdf/2023/ee/d3ee03454b

Professor Sun Qiang's Group at Materials Genome Institute Published New Results in Photo-Induced Surface Reactions in ACS Nano

材料基因院孫強教授課題組在《ACS Nano》發表光致表面化學反應的最新進展

Professor Sun Qiang's research group recently published a paper demonstrating the results of their study on photo-induced surface chemical reactions. Utilizing the polarized light excitations, they explored the mechanisms of photo-induced surface reactions. The paper, entitled "Unraveling the Mechanisms of On-Surface Photoinduced Reaction with Polarized Light Excitations," was published in ACS Nano (latest journal impact factor: 17.1).

孫強教授課題組發表最新論文，展示了光誘導的表面化學反應的研究結果，並利用鐳射的偏振性研究了光致表面化學合成的機理，論文發表於 ACS Nano（期刊最新影響因數：17.1），論文題目為“Unraveling the Mechanisms of On-Surface Photoinduced Reaction with Polarized Light Excitations”。

On-surface synthesis, achieved through the covalent coupling of organic molecules on surfaces, enables the creation of atomically precise nanostructures. The most common method for inducing on-surface reactions of precursor molecules is by thermal annealing. However, this increases the likelihood of side reactions and defect structures, limiting broader applications of surface synthesis. In contrast, light excitations offer the selectivity of chemical reactions and promise to lower the reaction temperatures, reducing the formation of defects and potentially opening new chemical reaction pathways. The potential of photo-induced chemistry in surface science is widely recognized, but its exploration remains relatively scarce. This study aims to delve into the capability of photochemical processes to induce surface chemical reactions, hoping to promote new chemistry as well as novel nanostructures and nanomaterials.

表面合成通過表面有機分子的共價偶聯來獲得原子級精確的納米結構。在表面上誘導前體分子的各種反應的最常見方式是熱退火。然而，這將增加形成副反應和缺陷結構的可能性，從而限制表面合成的更廣泛應用。而光觸發的方式則兼具化學反應的選擇性且可以顯著降低反應所需的溫度，從而減少缺陷的產生，打開新的化學反應路徑。光誘導化學在表面科學中的潛力已得到廣泛認可，但其探索仍相對滯後。該工作的研究旨在深入研究光化學過程誘導表面化學反應的能力，希望促進新化學以及新型納米結構和納米材料的實現。

In recent years, the Group lead by Prof. Qiang Sun has focused on using data mining, machine learning, and artificial intelligence methods, combined with high-throughput experimental approaches, to explore the integration of artificial intelligence in surface science. They are committed to nurturing talents with a focus on "Emphasize fundamentals, interdisciplinary, internationalization".

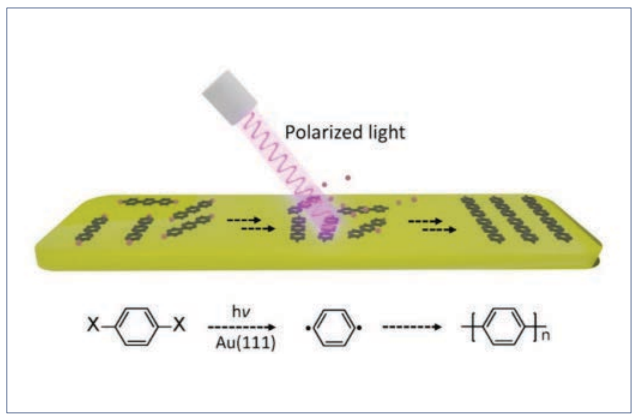


Figure 1: Schematic Illustration of Debrominated Coupling on a Metal Surface under Linearly Polarized Light Source, and the Chemical Equation
圖 1：線偏振光源照射下在金屬表面分子脫溴偶聯的示意圖與反應

MGI 表面科學課題組近年來聚焦于利用挖掘、機器學習和人工智能方法，結合高通量實驗手段探索人工智能在表面科學中的應用。致力於培養具備“重基礎、跨學科、國際化”理念的材料基因特色人才。

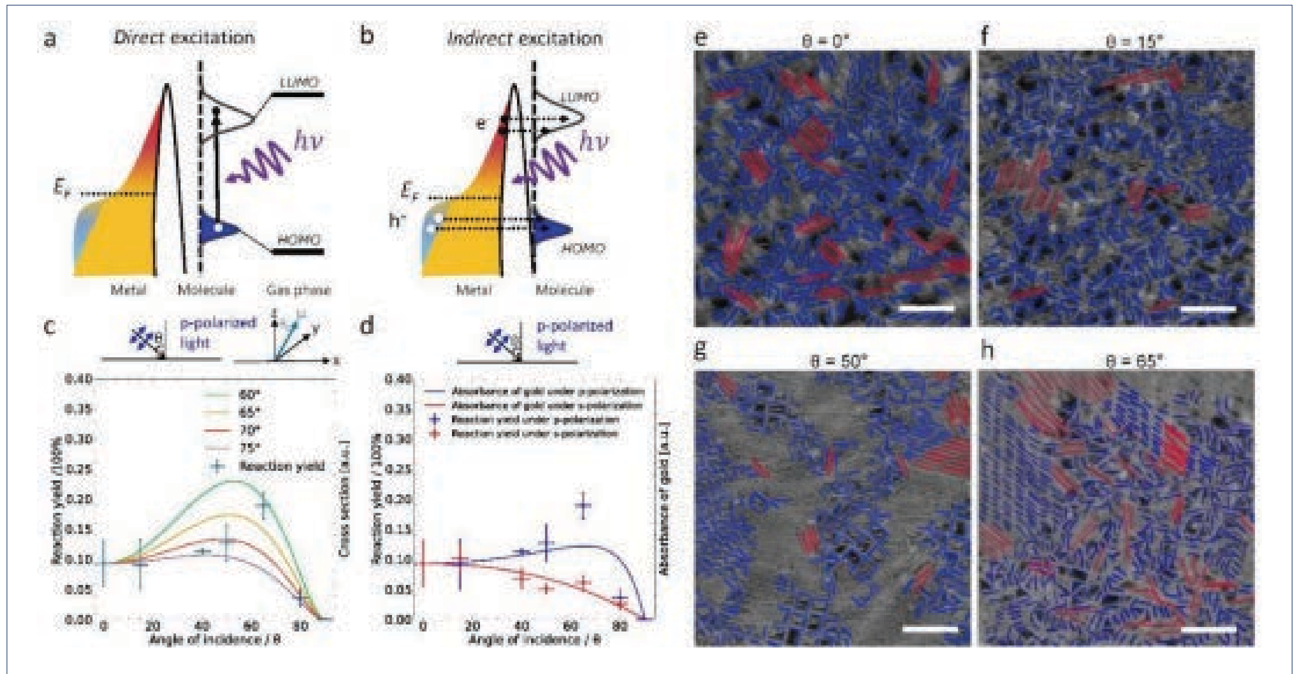


Figure 2: Schematic Diagram of the Mechanism of Photo-Induced Surface Chemical Reactions: (a) Direct Excitation, (b) Surface Hot Carrier Excitation. The Reaction Yields of Different Reaction Mechanisms Excited under Linearly Polarized Light at Different Angle of Incidence Compared with Experimental Data: (c) Direct Excitation, (d) Surface Hot Carrier Excitation. (e)-(h) Typical STM Images under p-Polarized Light Excitations at Different Incident Angles
圖 2 光誘導的表面化學反應機理示意圖（a）分子直接內激發、（b）表面熱載流子。線偏振光下不同反應機理的反應產率與入射角度的依賴性與實驗結果的比較（c）分子直接內激發，（d）表面熱載流子激發。（e）-（h）在 p- 偏振光下不同入射角度照射下的典型 STM 圖像

Group website：https://www.qiangsungroup.cn/
Article link：https://pubs.acs.org/doi/10.1021/acsnano.3c10690

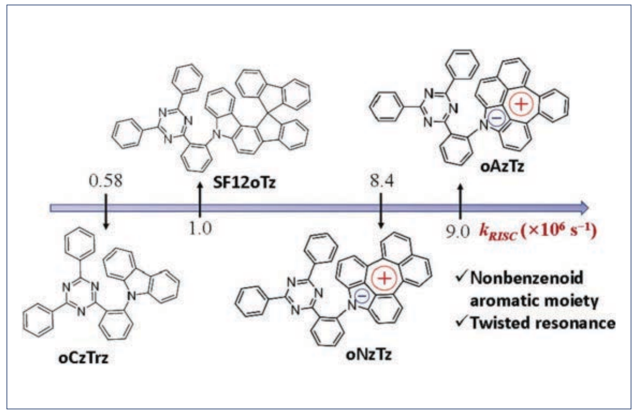
Research Team Led by Professor Zixing Wang at School of Mechatronic Engineering and Automation Published the Latest Findings in Chemical Engineering Journal

機自學院王子興研究員團隊在《Chemical Engineering Journal》發表最新研究成果

Professor Zixing Wang's team at the School of Mechatronic Engineering and Automation published a research paper in the Chemical Engineering Journal (impact factor: 15.1), titled "Twisted vibration of Aza-azulene promotes ultra-fast triplet-singlet up-conversion for extremely stable red electroluminescence".

王子興研究員團隊在期刊《Chemical Engineering Journal》（影響因數：15.1）發表題為"Twisted vibration of Aza-azulene promotes ultra-fast triplet-singlet up-conversion for extremely stable red electroluminescence"的研究論文。

Organic Light Emitting Diodes (OLEDs) are already used in smartphones and other smart devices. Thermally Activated Delayed Fluorescence (TADF) molecules enhance the utilization of triplet excitons by converting them into singlet states through Reverse Intersystem Crossing (RISC). However, the RISC rates of most TADF molecules are not high. The authors constructed two TADF molecules using non-benzene aromatic nitrogen heterocycle azulenes as donors. For the first time, it was discovered that the twisted structure of azulene resonance enhances the RISC process (k_{RISC}= 9.0×$10^6 s^{-1}$) and exhibits intramolecular/intermolecular charge transfer (CT) luminescence. Utilizing these findings, they developed a red phosphorescent top-emitting device achieving an External Quantum Efficiency (EQE) of 51.3% and a current efficiency of 68.2 cd A-1, with device lifetimes of LT95 = 52,350 hours and LT50 = 536,200 hours at 1000 nits. This research encompasses material design, luminescence mechanisms, and micro/nano-manufacturing of devices, is highly influential and offers promising applications.



有機發光二極體（OLED）已應用於手機等智慧設備中。熱活化延遲螢光（TADF）分子通過反向系間竄越（RISC）將三重態上轉換成單線態激子，可顯著提高三重態激子的利用率，但目前大多數 TADF 分子的 RISC 速率不高。團隊用非苯芳香氮雜薁作為給體構建了兩個 TADF 分子，首次發現氮雜薁的扭曲結構共振可增強 RISC 過程（k_{RISC}= 9.0×$10^6 s^{-1}$），並發現它們具有分子內 / 分子間電荷轉移（CT）發光。以此製備了紅色磷光頂發射器件實現了 51.3% 的外部量子效率（EQE）和 68.2 cd A-1 的電流效率，器件壽命 LT95 = 52,350 和 LT50 = 536,200 小時 @1000nits。該工作以材料設計、發光機制與器件微納製造的結合，具有重要指導意義和潛在應用前景。

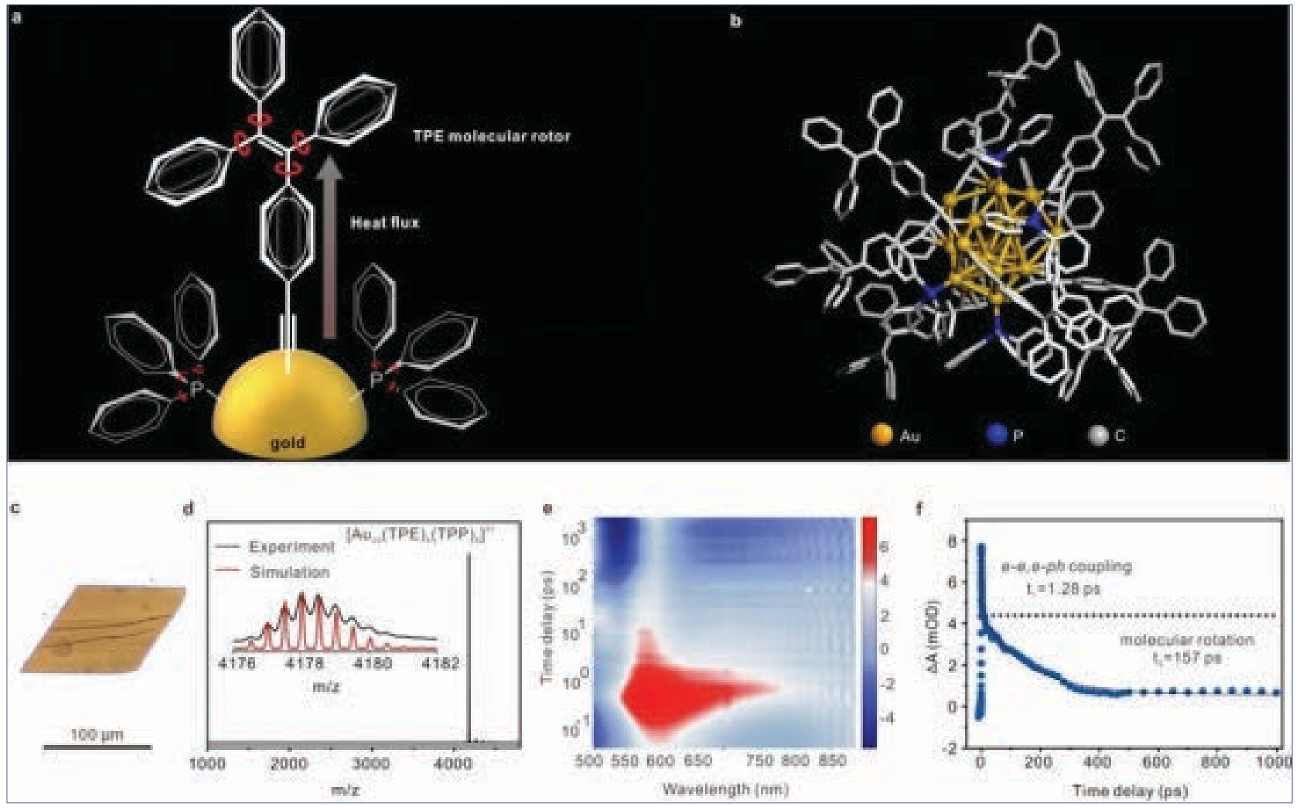
Article link：https://doi.org/10.1016/j.cej.2023.147562

College of Sciences Academic Team Made Significant Advances in the Field of Atomically Precise 'Ultra-Stable' Nanomachines

理學院學術團隊在原子精確的"超"穩定納米機器領域取得重要進展

The research team of Zhu Ying, Researcher, and Chen Jing, Associate Researcher, at the College of Sciences' Institute of Materiobiology, in collaboration with the team of Academician Fan Chunhai and Associate Professor Shen Jianlei from Shanghai Jiao Tong University, and the team led by Academician Tang Benzhong at The Chinese University of Hong Kong (Shenzhen), jointly developed an atomically precise nanomachine. By employing molecular interface engineering techniques, they successfully overcame the Kapitza resistance effect, which impedes thermal conduction at nano-interfaces, resulting in the creation of ultra-stable photothermal nanomachines. Their research results were recently published in the journal Nature Materials.

理學院材料生物學研究所諸穎研究員 / 陳靜副研究員團隊聯合上海交通大學樊春海院士 / 沈建磊副教授團隊，香港中文大學（深圳）唐本忠院士等團隊，共同研發了一種原子精確的納米機器合成策略，通過分子介面工程技術成功克服了納米介面熱傳導的卡皮查熱阻（Kapitza resistance）效應，構建了超穩定的光熱納米機器。該研究成果近期發表在《自然 · 材料》（Nature Materials）雜誌上。

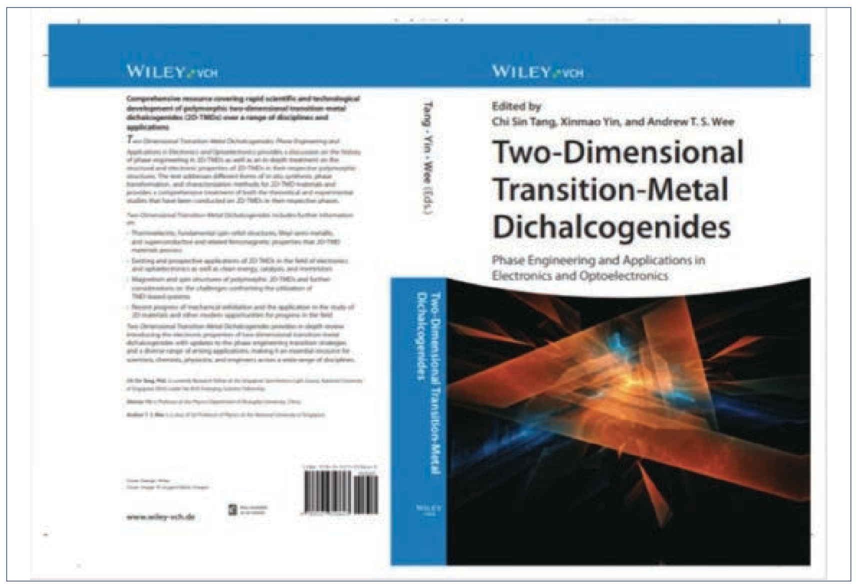


Article link：https://www.nature.com/articles/s41563-023-01721-y

Professor Yin Xinmao at College of Sciences Co-Edits Scholarly Volume Published by Wiley

理學院尹鑫茂教授在 Wiley 出版學術專著

In a significant academic contribution, Professor Yin Xinmao of the Physics Department at the College of Sciences, as a lead editor, collaborated with esteemed academicians like Professor Andrew Wee of the Singapore Academy of Science, to publish a scholarly volume. The book, titled "Two - Dimensional Transition - Metal Dichalcogenides: Phase Engineering and Applications in Electronics and Optoelectronics", is published by Wiley, renowned as one of the top three academic publishers globally. This work, bearing the print ISBN 9783527350643 and DOI 10.1002/9783527838752, delves into the advanced realm of material science.



物理系尹鑫茂教授作為主編之一，與新加坡科學院院士 Andrew Wee 教授等合作者在國際著名出版集團威利(Wiley，世界三大學術出版商之一)出版專著：Two - Dimensional Transition - Metal Dichalcogenides: Phase Engineering and Applications in Electronics and Optoelectronics。

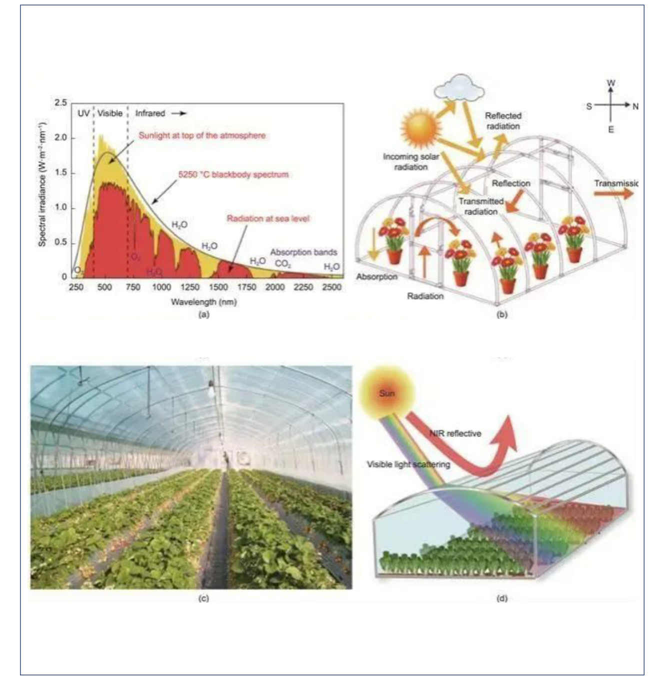
該書的 print ISBN 號為 9783527350643，DOI 為 10.1002/9783527838752。

Book link：
https://onlinelibrary.wiley.com/doi/book/10.1002/9783527838752

Professor Gao Yanfeng at the School of Materials Science and Engineering Published the Research Results in Engineering

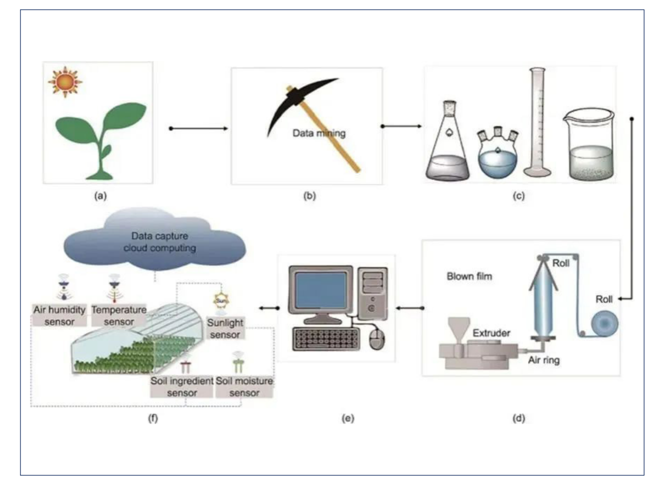
材料學院高彥峰教授在《Engineering》發表高水準論文

Professor Gao Yanfeng from the School of Materials Science and Engineering has published a comprehensive review paper titled "Photothermal-Management Agricultural Films toward Industrial Planting: Opportunities and Challenges" in the top journal Engineering in the field of engineering technology (impact factor 12.8).



材料科學與工程學院高彥峰教授在工程技術領域頂級期刊《Engineering》(影響因數 12.8)上發表題為"Photothermal-Management Agricultural Films toward Industrial Planting: Opportunities and Challenges" 的綜述論文。

Professor Gao's has lead his team in remarkable innovations in the field of functional agricultural films in recent years. They have invented a series of specialized agricultural films, including Black/Silver reflective agricultural film, Scatter light- agricultural film, and thermal insulation agricultural film. These innovations, protected by six patents, have been successfully demonstrated and utilized at a agricultural site in Tianping Village, Baoshan District, Shanghai. Their research signifies a breakthrough in the development of functional agricultural films and offers substantial technological support to enhance agricultural productivity and quality.



近年來，高彥峰教授帶領團隊在功能型農膜的研究中取得多項成果，開發了 Black/Silver 反射透氣功能型地膜、Scatter 光散射棚膜、隔熱棚膜等一系列功能型農膜，申請了 6 項發明 / 實用新型專利，相關研究成果在上海市寶山區天平村農業種植基地開展示範應用，旨在通過多學科研究，實現功能農膜研發的突破，為農業提質增效提供科技支撐。

Article link：
https://www.sciencedirect.com/science/article/pii/S2095809923004241

Research Team Led by Professors Li Wen and Zhang Afang at the School of Materials Science and Engineering Published Breakthrough Study in the Journal of J Am Chem Soc

材料學院李文 / 張阿方教授團隊在《J Am Chem Soc》發表最新研究成果

The team of Professors Li Wen and Zhang Afang from the Bionic and Intelligent Polymer International Joint Laboratory at the School of Materials Science and Engineering has made significant progress in the field of thermoresponsive helical polymers. Their research has been published in the internationally renowned journal Journal of the American Chemical Society (impact factor: 15.0), with the paper titled "Thermoresponsive Helical Dendronized Poly(phenylacetylene)s: Remarkable Stabilization of Their Helicity via Photo-Dimerization of the Dendritic Pendants." Shanghai University is credited as both the first author and the corresponding author, with the University of Queensland, Australia, as a collaborating institution.

材料學院仿生與智慧高分子國際聯合實驗室李文 / 張阿方教授團隊在溫敏螺旋聚合物領域取得重要進展，研究成果發表於國際著名期刊《Journal of the American Chemical Society》（影響因數：15.0），論文題目為"Thermoresponsive Helical Dendronized Poly(phenylacetylene)s: Remarkable Stabilization of Their Helicity via Photo-Dimerization of the Dendritic Pendants"。上海大學為第一作者和第一通訊作者單位，澳大利亞昆士蘭大學為合作單位。

The team reported a strategy for stabilizing the dynamic helical conformation of helical polymers through intramolecular photo-crosslinking. They synthesized a class of thermoresponsive dendronized helical polyphenylacetylenes, whose dendritic alkoxy ether side chains contain cinnamic acid ester units capable of undergoing photo-dimerization upon irradiation. Prior to the photo-addition reaction, these dendronized polyphenylacetylenes exhibited typical dynamic helical characteristics, adopting a contracted racemic helical conformation in low-polarity solvents and an extended right-handed helix in high-polarity solvents. The helicity of the polymer could be reversibly enhanced through thermally induced thermoresponsive aggregation. However, following the photo-cyclization reaction of the dendritic side chains, the helicity of the polymer was significantly stabilized. Post photo-dimerization, the polymer maintained a stable chiral conformation in lower polarity solvents and above the phase transition temperature. Various spectroscopic characterizations and atomic force microscopy analyses indicated that the side chain cinnamic acid ester units selectively added in a tt-hh-a configuration, and the photo-addition reaction was confined to a single molecular chain scale, enhancing the rigidity of the polymer chains. This effectively inhibited the photodegradation of the polyphenylacetylene main chain. Molecular dynamics calculations further revealed that the helical arrangement of the side chains along the rigid main chain predisposes the cinnamic acid esters to undergo photo-dimerization reactions within the same helical pitch.

該團隊報導了一種通過分子內光交聯穩定動態螺旋聚合物螺旋構象的策略。合成了一類溫敏樹枝化螺旋聚苯乙炔，其樹枝化烷氧醚側基內含有可進行光輻照二聚反應的肉桂酸酯基元。光環加成反應前，樹枝化聚苯乙炔表現出典型的動態螺旋特性，在低極性溶劑中採取收縮的消旋化螺旋構象，而在高極性溶劑中採取伸展的右手螺旋構象，聚合物的螺旋度還可通過熱誘導的溫敏聚集實現可逆增強。但通過樹枝化側基間的光環化反應後，聚合物的螺旋性被高度穩定化。光二聚反應後，聚合物在較低極性溶劑中及相變溫度以上均呈現穩定的手性構象。多種波譜表徵和原子力顯微鏡分析表明，側基肉桂酸酯基團選擇性加成為 tt-hh-a 構型，且光環加成反應被限定在單分子鏈尺度，提高了聚合物分子鏈的剛性，這有效的抑制了聚苯乙炔主鏈的光降解。分子動力學計算進一步揭示了側基沿剛性主鏈的螺旋排布使肉桂酸酯傾向與同一螺距內的肉桂酸酯發生光二聚反應。

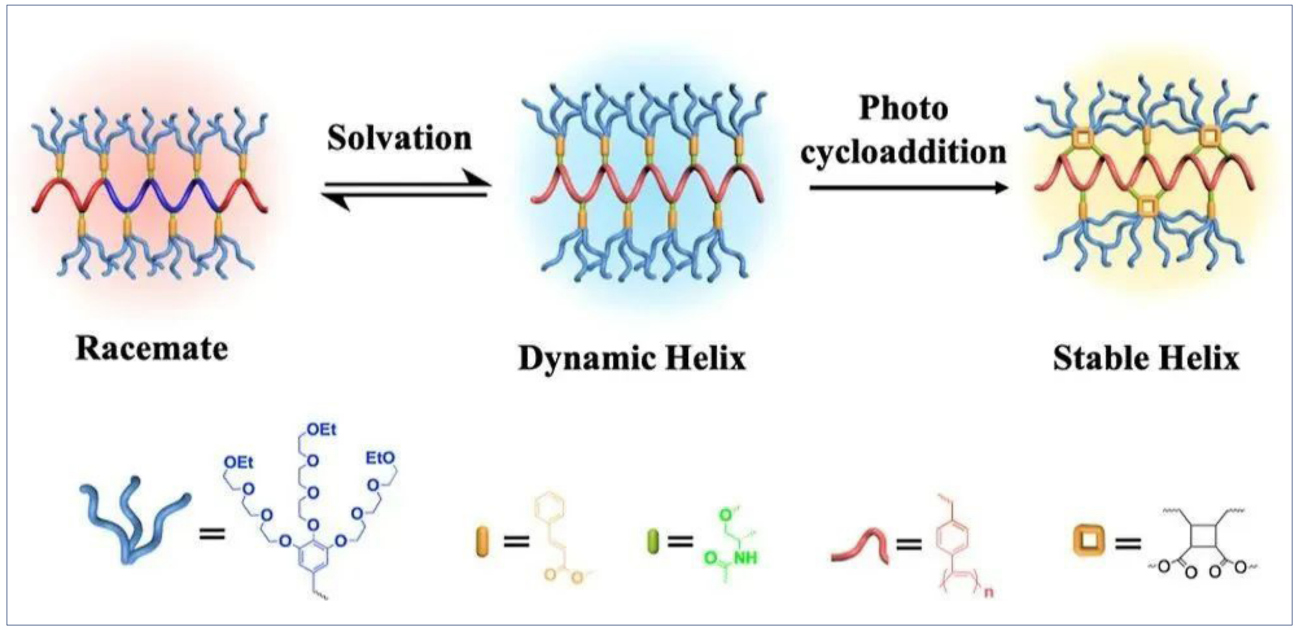


Figure 1: Dendronized Helical Polyphenylacetylene Stabilizing Helical Conformation through Intramolecular Photo-Cyclization Between Adjacent Side Groups
圖 1 樹枝化螺旋聚苯乙炔通過相鄰側基間分子內光環加成穩定螺旋構象

Article link：https://doi.org/10.1021/jacs.3c09333

Professor Li Qian's Team at the School of Materials Science and Engineering Published Latest Research in Advanced Materials

材料學院李謙教授團隊在《Advanced Materials》上發表最新研究成果

The team of Prof. Li from the School of Materials Science and Engineering, proposed a controllable and universal hydrophobic strategy for zinc anodes. Their research was published in the internationally renowned journal Advanced Materials (impact factor: 29.4), with the paper titled "Lotus Effect Inspired Hydrophobic Strategy for Stable Zn Metal Anodes." Shanghai University is listed as the primary corresponding institution, with Chongqing University as the collaborative institution. The corresponding authors are Professor Li Qian (currently a professor at the School of Materials Science, Chongqing University) and Associate Professor Yi Jin. Han Lishun, a master's student at Shanghai University's School of Materials Science and Engineering, is the first author.

材料學院李謙教授等人提出一種用於鋅負極的可控且通用的疏水策略，研究成果發表在國際著名期刊《Advanced Materials》（影響因數：29.4），論文題目為"Lotus Effect Inspired Hydrophobic Strategy for Stable Zn Metal Anodes"，其中上海大學為第一通訊單位，重慶大學為合作單位，通訊作者為李謙教授（現為重慶大學材料學院教授）和易金副教授，上海大學材料學院碩士研究生韓禮舜為第一作者。

Zinc metal, widely used as the anode material in aqueous zinc-ion batteries, is favored for its environmental friendliness, safety, and abundance. However, due to the standard electrode potential of Zn2+/Zn at -0.76 V vs. SHE, zinc anodes in aqueous electrolytes inevitably suffer from corrosion and hydrogen evolution reactions, exacerbating dendritic growth and leading to premature battery failure. Therefore, controlling interface wettability to reduce contact between the zinc anode and the electrolyte is key to suppressing interface side reactions.

金屬鋅因其環保、安全、豐度高等特點，廣泛用作水系鋅離子電池的負極材料。但由於 Zn2+/Zn 的標準電極電位為 -0.76 V vs. SHE，在水系電解液中鋅負極不可避免地遭受腐蝕和析氫反應，並加劇枝晶生長，導致電池過早失效。因此，合理調控介面潤濕性，減少鋅負極與電解液接觸是抑制介面副反應的關鍵。

ADVANCED MATERIALS

Research Article | Full Access

Lotus Effect Inspired Hydrophobic Strategy for Stable Zn Metal Anodes

Lishun Han, Yiming Guo, Fanghua Ning, Xiaoyu Liu, Jin Yi, Qun Luo, Baihua Qu, Jili Yue, Yangfan Lu, Qian Li

First published: 13 October 2023 | https://doi.org/10.1002/adma.202308086

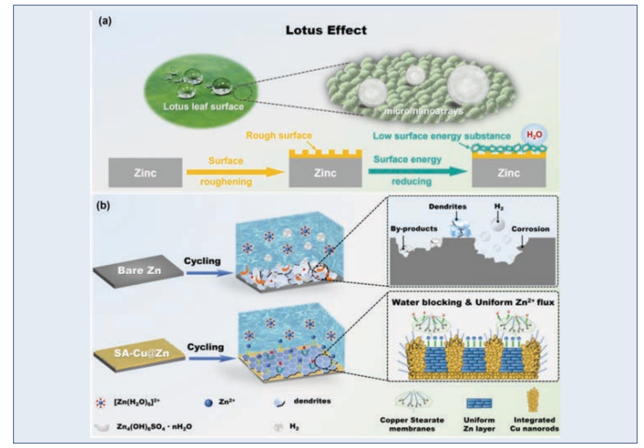


Figure 1: (a) Hydrophobic strategy inspired by the lotus effect; (b) Schematic illustration of zinc deposition on bare Zn and SA-Cu@Zn anodes

圖 1 (a) 受蓮花效應啟發的疏水策略；(b) 鋅在 bare Zn 和 SA-Cu@Zn 負極上的沉積示意圖

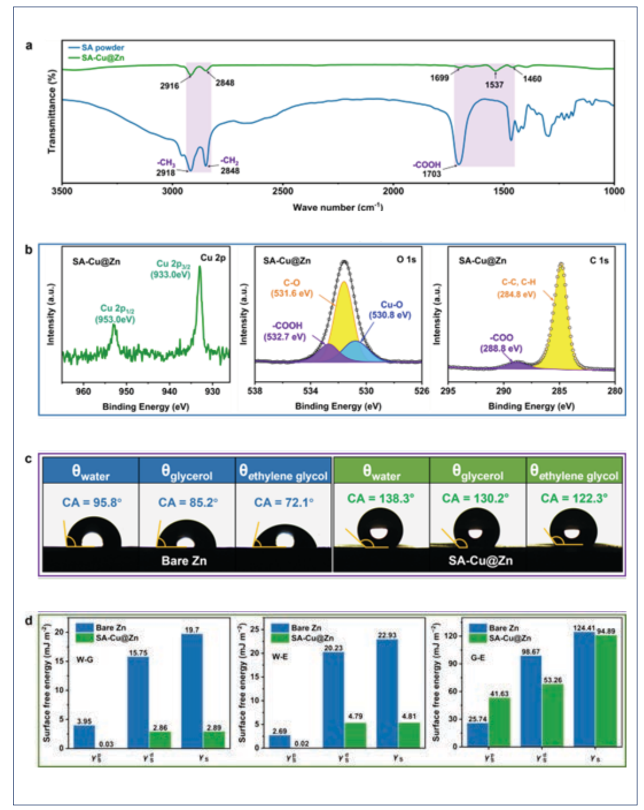


Figure 2: Composition and hydrophobic characteristics of the metal-organic composite interface layer

圖 2 金屬 - 有機金屬複合介面層的成分及疏水特性

Inspired by the lotus effect, this work constructs a metal-organic composite (MOC) interface layer in situ on the zinc anode surface, achieving both hydrophobic and zincophilic interfaces. The fabricated SA-Cu@Zn anode demonstrates a "hydrophobic-zincophilic" effect, where the hydrophobic alkyl chains on the exterior of the MOC layer and the extensive array of Cu nanorods inside provide both hydrophobicity and ordered channels for zinc affinity. Experimental results combined with theoretical calculations confirm the SA-Cu@Zn anode's weak water adsorption and strong zincophilicity.

該工作受蓮花效應啟發，在鋅負極表面原位構築金屬 - 有機金屬複合介面層（MOC），同時實現了疏水和親鋅介面。製備的 SA-Cu@Zn 負極具有"疏水 - 親鋅"作用，MOC 層外部的疏水烷基鏈和內部的大規模 Cu 納米棒陣列同時提供了疏水性和親鋅有序通道。實驗結合理論計算結果證明了 SA-Cu@Zn 負極具有弱的水吸附和強的親鋅性。

Article link: https://doi.org/10.1002/adma.202308086

Professor Zhang Kunxi and Professor Yin Jingbo's Research Group at the School of Materials Science and Engineering Published Latest Findings in Advanced Functional Materials

材料學院張坤璽、尹靜波教授課題組在《Advanced Functional Materials》上發表最新研究成果

The research team of Associate Professor Zhang Kunxi and Professor Yin Jingbo from the Department of Polymer Materials, School of Materials Science and Engineering at Shanghai University, has made notable advancements in the field of decellularized extracellular matrix (dECM). dECM retains bioactive components to mimic tissue-specific microenvironments and stimulate tissue regeneration. Incorporating dECM microparticles into 3D printing inks maximizes the preservation of these active components. However, the addition of rigid particles like cartilage and bone in high amounts severely affects the extrusion printability. Overcoming the challenge of 3D printing with high-content dECM microparticles is significant. Drawing inspiration from the principles of particle lubrication and joint lubrication, the team developed an efficient, universal method for preparing high-content dECM microparticle-based heterogeneous granular inks suitable for 3D printing. Their groundbreaking work is published in the prestigious journal Advanced Functional Materials (impact factor: 19.000), with the paper titled "Lubricating Micro-Interface Assisted General Strategy for Preparing dECM-Microparticle - Based Heterogeneous Granular Inks toward 3D Printing".

脫細胞基質（dECM）保留生物活性成分以類比組織特異性微環境、刺激組織再生。將dECM微顆粒添加進3D列印墨水中可最大限度保留活性組分，然而軟骨、骨等剛性顆粒的添加量較高時會嚴重影響擠出列印性。如何實現dECM微顆粒在高含量下的3D列印是一項挑戰。根據顆粒潤滑和關節潤滑的原理，上海大學材料科學與工程學院高分子材料系的張坤璽副教授、尹靜波教授團隊建立了一種高效、通用的、可用於3D列印的高含量dECM微顆粒基異質性顆粒墨水的製備方法，研究成果發表在高水準期刊《Advanced Functional Materials》（影響因數：19.000），論文題目為"Lubricating Micro-Interface Assisted General Strategy for Preparing dECM-Microparticle - Based Heterogeneous Granular Inks toward 3D Printing"。


ADVANCED FUNCTIONAL MATERIALS

Research Article | Full Access

Lubricating Micro-Interface Assisted General Strategy for Preparing dECM-Microparticle–Based Heterogeneous Granular Inks toward 3D Printing

Kunxi Zhang, Yinan Zhu, Tao Wang, Dawei Niu, Zijie Xiahou, Hongzhong Wang, Peiliang Fu, Haiyan Cui, Jingbo Yin

First published: 11 December 2023 | https://doi.org/10.1002/adfm.202307886

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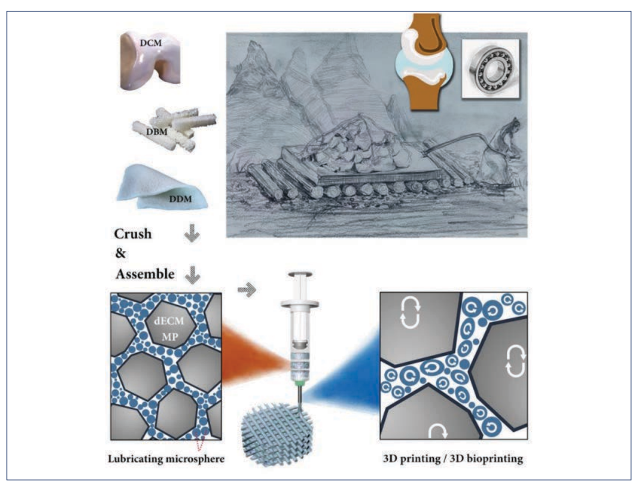
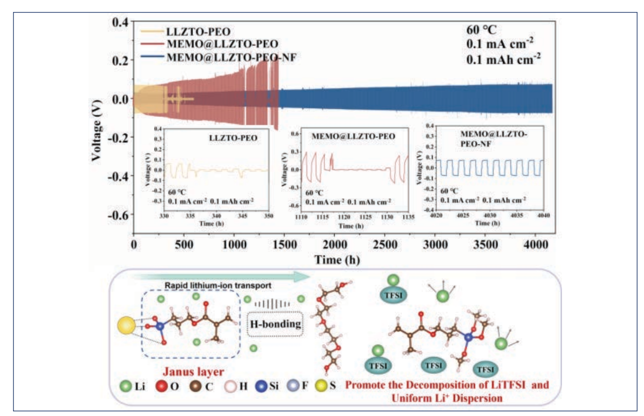


Article link: https://doi.org/10.1002/adfm.202307886

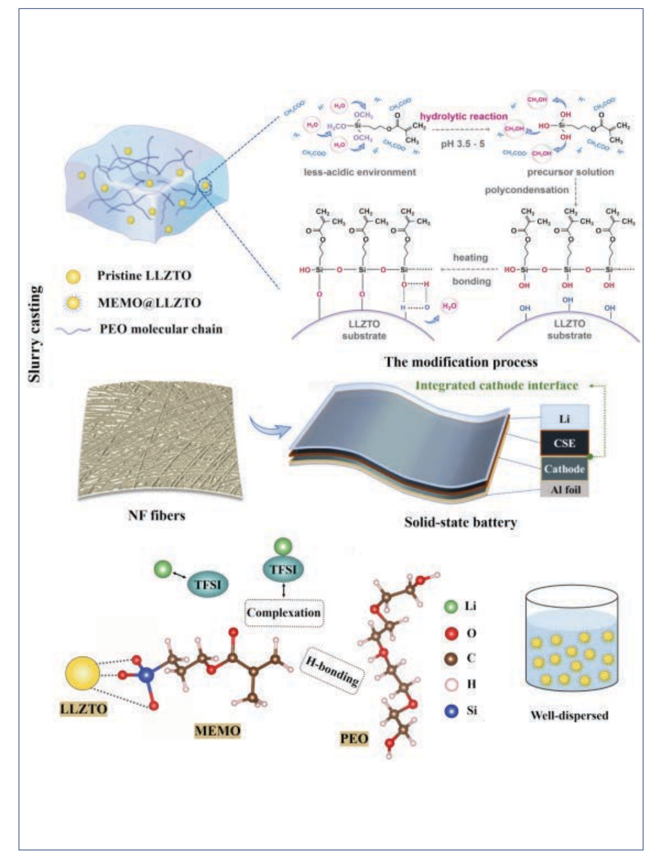
Doctoral Candidate Duan Tong's Published the latest Research Results in Energy Storage Materials

材料學院博士生段彤在《Energy Storage Materials》上發表最新研究成果

In a significant stride within the domain of material sciences, doctoral candidate Duan Tong has innovatively applied a 3-(trimethoxysilylpropyl methacrylate) (MEMO) Janus layer to the surface of the active filler Li6.4La3Zr1.4Ta0.6O12 (LLZTO), which is part of a Polyethylene Oxide (PEO) based polymer matrix. This advancement has markedly enhanced the dispersion of inorganic fillers within the matrix, culminating in the creation of a composite solid-state electrolyte, MEMO@LLZTO-PEO, with superior interfacial compatibility. To further augment the mechanical robustness and safety profile of the electrolyte membrane, Duan integrated a featherlight nonwoven fabric (NF), yielding a composite with elevated ionic conductivity and transference number, MEMO@LLZTO-PEO-NF CSE. This pioneering research work, entitled "A Multifunctional Janus Layer for LLZTO/PEO Composite Electrolyte with Enhanced Interfacial Stability in Solid-State Lithium Metal Batteries", has been featured in the prestigious journal Energy Storage Materials, which prides itself on an impressive impact factor of 20.4 as of 2023.



博士生段彤在活性填料Li6.4La3Zr1.4Ta0.6O12 (LLZTO)表面引入了3-（甲基丙烯醯胺）丙基三甲氧基矽烷（MEMO）作為Janus層應用於PEO聚合物基質中，有效改善了無機填料在聚合物基質中的團聚現象，製備了具有良好界面相容性的複合固態電解質MEMO@LLZTO-PEO。同時，為了提高電解質膜的機械強度和安全性，引入了超薄無紡布（NF）得到高離子電導率和遷移數的MEMO@LLZTO-PEO-NF CSE。該最新研究成果以"A Multifunctional Janus Layer for LLZTO/PEO Composite Electrolyte with Enhanced Interfacial Stability in Solid-State Lithium Metal Batteries"為題，在國際能源材料知名期刊《Energy Storage Materials》上發表，該期刊2023年影響因數為20.4。



Article link: https://doi.org/10.1016/j.ensm.2023.103091

Dr. Yangqing Liu at the School of Mechanics and Engineering Science Awarded Marie Curie Fellowship Fund

力學與工程科學學院柳揚清獲瑪麗居裡學者基金

Following a rigorous evaluation by the European Research Council, Yangqing Liu, a promising young faculty member from the Department of Civil Engineering at the School of Mechanics and Engineering Science, has been awarded funding under the European Union's "Marie Skłodowska-Curie Actions" (MSCA) program. The grant, totaling € 199,694 for a period of 24 months, will support Dr. Liu's collaborative research entitled "A new CCU composite structure with a novel demountable connection towards CO2 sequestration and material recyclability". This pioneering project seeks to develop a new composite structure utilizing magnesium oxide-based composites and an efficient, detachable connection to achieve high carbon capture, self-healing properties, and material recyclability. Dr. Liu will be working jointly with Prof. Weiwei Lin from Aalto University in Finland and Prof. Jishen Qiu from the Hong Kong University of Science and Technology (HKUST).

經過歐洲研究委員會的嚴格評審，力學與工程科學學院土木工程系青年教師柳揚清獲得歐盟"瑪麗·居裡學者計畫"專案資助，資助金額 199694 歐元，資助期 24 個月。柳揚清博士將與芬蘭阿爾托大學（Aalto University）的 Prof. Weiwei Lin、香港科技大學（HKUST）的 Prof. Jishen Qiu 開展主題為"A new CCU composite structure with a novel demountable connection towards CO2 sequestration and material recyclability"的聯合研究。該專案旨在基於氧化鎂水泥基複合材料和一種高效可拆卸連接構造，開發一種高固碳、自癒合、材料可迴圈利用的新型組合結構。

Named after the twice Nobel Prize-awarded scientist, Marie Curie, the MSCA enjoys a prestigious reputation internationally. Alongside the Newton Fellowship of the United Kingdom and the Humboldt Fellowship of Germany, it stands as one of the top three distinguished talent programs in Europe, and it is one of the highest individual research awards funded by the EU, known for its competitive selection process and application difficulty.

"瑪麗·居裡學者計畫"以兩次榮獲諾貝爾獎的科學家"居里夫人"命名，在國際上享有很高的聲譽。該專案與英國的牛頓學者和德國洪堡學者並列為歐洲三大傑出人才計畫，是歐盟資助個人科研的最高獎項之一，以競爭激烈、申請難度大著稱。

EUROPEAN RESEARCH EXECUTIVE AGENCY (REA)

Weiwei LIN
AALTO KORKEAKOULUSAATIO SR
OTAKAARI 1
02150 ESPOO
FINLAND

Subject: Horizon Europe (HORIZON)
Call: HORIZON-MSCA-2022-PF-01
Project: 101105930 — CCU Structure
GAP invitation letter (from reserve list)

Dear Applicant,

I am writing in connection with your proposal for the above-mentioned call.

As mentioned in our previous letter, your proposal was put on the reserve list. We are pleased to inform you that we are now in a position to propose your proposal for grant preparation.

Invitation to grant preparation

Grant preparation will be based on the following:

1. Project:

   Project number and name: 101105930 — CCU Structure

   Topic: HORIZON-MSCA-2022-PF-01-01 — MSCA Postdoctoral Fellowships 2022

   Type of action: HORIZON TMA MSCA Postdoctoral Fellowships - European Fellowships

   Requested grant amount (proposal): 199 694.40 EUR

   Maximum grant amount (after evaluation): 199 694.40 EUR

   Project duration: 24 months

2. Timetable and deadlines:

   Preparation of grant data and annexes: 2 weeks after receiving this letter

   Declaration of honour (DoH): 3 weeks after receiving this letter

   Signature: within 4 weeks after receiving this letter (planned date)

   The grant agreement data and annexes (description of the action, estimated budget, etc.) must be based on the proposal you submitted and the clarifications we requested (if any). You may normally NOT make changes to the

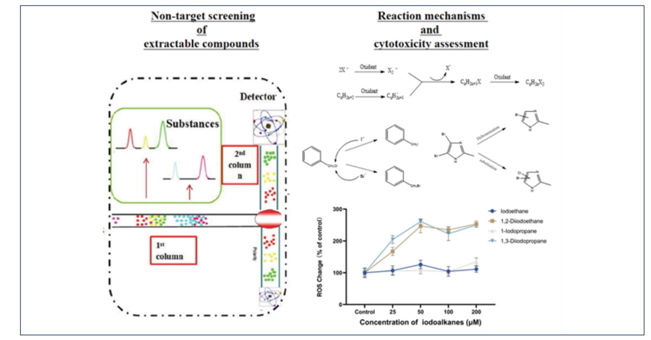
European Research Executive Agency (REA), B-1049 Brussels, Belgium

| Scholar Profile: https://smes.shu.edu.cn/info/1166/2764.htm

Associate Research Fellow Ren Guofa's Team at the School of Environmental and Chemical Engineering Continuously Published Latest Research Findings in Renowned International Environmental Journals

環化學院任國發副研究員團隊連續在國際環境領域知名期刊上發表最新研究成果

Shale gas extraction, an emerging industry, is known to release a significant number of new pollutants that were "previously unrecognized or unregulated and pose potential or actual threats to human health and the ecological environment." Focusing on this cutting-edge issue, Associate Research Fellow Ren Guofa's team has developed a no-targeted screening analytical technique suitable for trace/ultra-trace organic pollutants in environmental samples, and successfully realized the screening of various organic pollutants in different samples related to shale gas extraction without reference standards. In a screening of organic pollutants in the effluent water from a shale gas wastewater treatment plant in Nanchuan, Chongqing, China, a total of 115 compounds were identified, some of which were detected for the first time in shale gas-related samples. Notably, the discovery of a large number of halogenated organic compounds in effluent samples, some of which were detected for the first time in environmental samples related to shale gas, prompts concern. Based on the types of point source pollutants and the results of semi-quantitative concentration analysis, it is proposed that organic halides are a class of uncontrolled pollutants that require immediate attention during shale gas extraction. Structural analysis and the deduction of formation mechanisms of organic halides suggest that the accumulation of halide ions in flowback liquids is a key factor in the formation of these pollutants, and the unique geological conditions and extraction processing technologies facilitate the formation of iodinated organic pollutants. The findings of this study were published in Environmental Chemistry Letters.



葉岩氣開採屬新興產業，會釋放大量"之前未確認或未受法規規範，對人體健康及生態環境具有潛在或實質威脅"的新污染物。團隊聚焦這一前沿熱點問題，開發了適合環境樣品中微量/痕量有機污染物的非靶向分析篩查技術，在沒有參考標準的條件下，成功實現了不同葉岩氣開採相關樣品中多種有機污染物的篩查。通過對我國重慶南川葉岩氣開採汙水處理廠外排水中有機污染物的篩查，共篩選出 115 種化合物，其中部分污染物是首次在葉岩氣相關樣品中檢出；值得注意的是，在外排水樣品中發現了大量鹵化有機物，部分本實驗檢測出的鹵化有機物是首次在與葉岩氣相關的環境樣品中發現。根據點源污染物類型以及半定量濃度解析結果，提出有機鹵化物是葉岩氣開採過程中急需引起重視的一類未受控污染物；通過對有機鹵化物的結構分析以及形成機理推導，指出返排液中鹵素離子濃度積聚是形成該類污染物的重要直接因素，而特殊的地質環境條件和開採處理工藝使碘系有機污染物更易於形成，上述研究結果發表在《Environmental Chemistry Letters》上。

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PAN-Shanghai University Tech Park and Shanghai University Training Center Jointly Established the First Proof of Concept Center in Shanghai

環上大科技園區與上海大學工訓中心共同建設並成立上海市首個環上大智慧製造概念驗證中心

The Proof of Concept Center is intended to be a new type of innovative platform designed to bridge the gap for emerging enterprises transforming university research outcomes into market applications. The Center facilitates early-stage translation of scientific research by providing services such as financial support, business and technical consulting, entrepreneurial education, and innovative talent development. This process accelerates the transition from innovative ideas to commercialization and iterates and optimizes early-stage scientific results through an integrated innovation chain.

“概念驗證中心”作為一種新型創新形態，主要針對新創企業在大學研究投入與市場化之間的空白，通過資金支持、商業技術諮詢、創業教育和創新人才培養等加速科研成果初期轉化，以一體化的創新鏈條，反覆運算和優化初期科研成果，快速實現從創新想法到商業化的跨越。

Serving as a Hi-Tech service institution, the PAN-SHU Proof of Concept Center at the PAN-SHU Tech Park aims to forge a link between technical R&D and market applications for universities, research institutions, and high-tech enterprises. By leveraging the innovative entrepreneurial ecosystem of the PAN-SHU Tech Park and the research equipment resources of Shanghai University’s Training Center, the Center offers services like technical feasibility assessments, commercial evaluations, and prototyping. These services are designed to conduct a comprehensive validation of innovative technological achievements to ensure their reliability and commercial viability.

作為一家面向高校、科研機構和高新技術企業的新型科技服務機構，環上大智慧製造概念驗證中心致力於搭建技術研發與市場應用之間的橋樑，依託園區的科創生態和上海大學工訓中心的科研設備，通過技術可行性評估、商業化評價、工程樣機試製等方式，對創新性技術成果進行全面驗證，驗證其技術可靠性和商業應用價值。

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上海大学
SHANGHAI
UNIVERSITY

Shanghai University Website:https://en.shu.edu.cn/

International Exchange and Academic Cooperation:
Email: international@oa.shu.edu.cn

Innovation, Entrepreneurship and Technology Transfer
Email: zhouxinyu@huanshda.com