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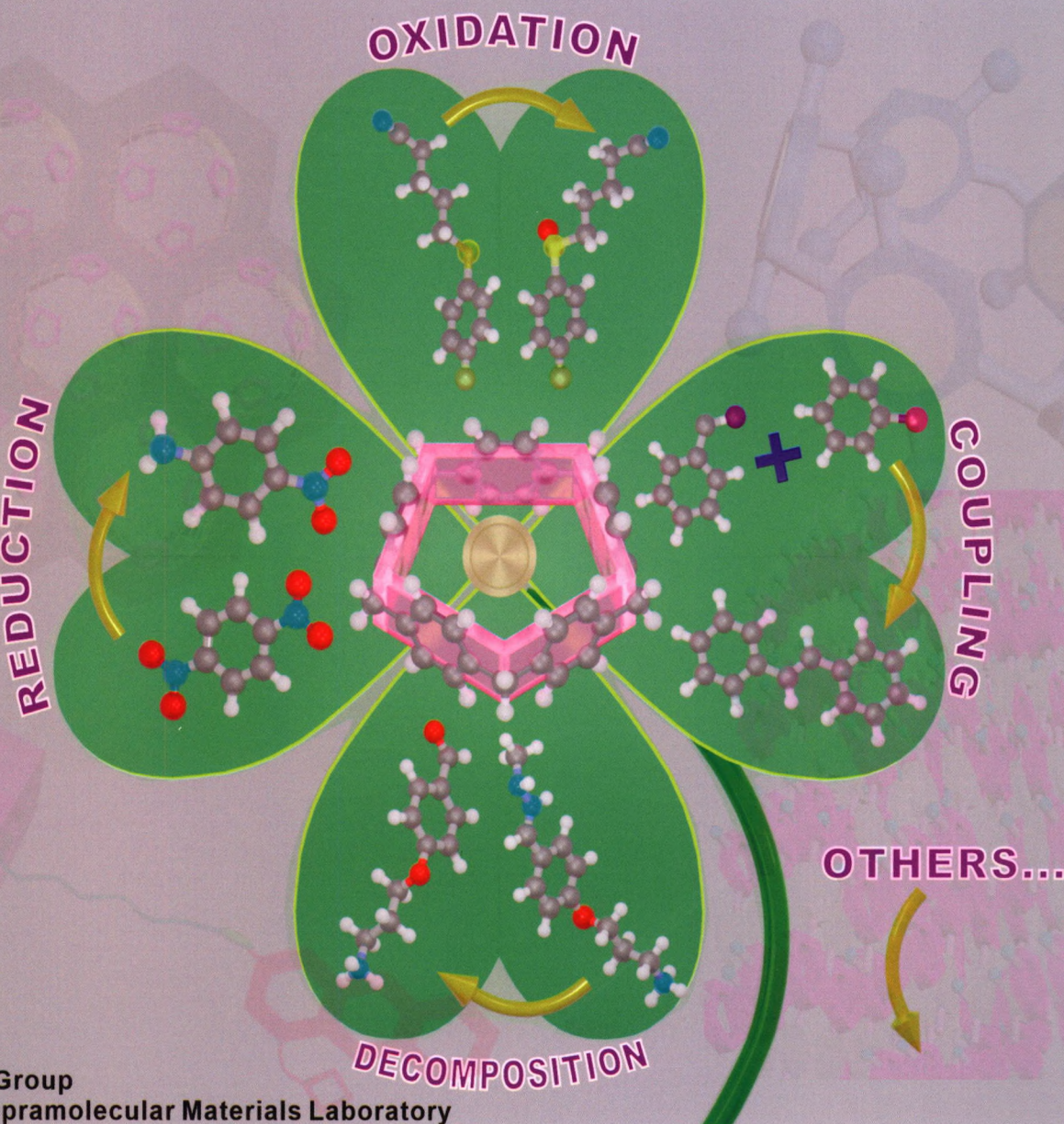
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## Chinese Chemical Letters (中国化学快报)

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### REVIEW

Shijie You, Yanbiao Liu et al.  
Engineering carbon nanocatalysts towards  
efficient degradation of emerging organic  
contaminants via persulfate activation: A  
review

### COMMUNICATION

Jiaobing Wang et al.  
Molecular assembly of a  
Pyridine functionalized janusarene

Chinese Chemical Society

万方数据 Institute of Materia Medica, Chinese Academy of Medical Sciences





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## Graphical Abstracts/Chin Chem Lett 33 (2022) iii–xxvi

## Reviews

**Engineering carbon nanocatalysts towards efficient degradation of emerging organic contaminants via persulfate activation: A review**Dongli Guo<sup>b</sup>, Shijie You<sup>a</sup>, Fang Li<sup>b</sup>, Yanbiao Liu<sup>b</sup><sup>a</sup>State Key Laboratory of Urban Water Resource and Environment, School of Environment, Harbin Institute of Technology, Harbin 150090, China<sup>b</sup>Textile Pollution Controlling Engineering Center of Ministry of Environmental Protection, College of Environmental Science and Engineering, Donghua University, Shanghai 201620, China

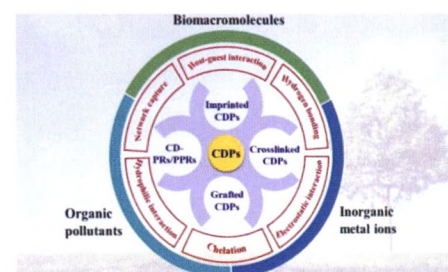
This review summarizes recent advances on the rational design of various metal-free carbon nanocatalysts towards decontamination of emerging organic contaminants (EOCs) from water via persulfate activation.

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**Advances in cyclodextrin polymers adsorbents for separation and enrichment: Classification, mechanism and applications**Binfen Zhao<sup>a</sup>, Liyan Jiang<sup>b</sup>, Qiong Jia<sup>a,b</sup><sup>a</sup>College of Chemistry, Jilin University, Changchun 130012, China<sup>b</sup>Key Laboratory for Molecular Enzymology and Engineering of Ministry of Education, School of Life Sciences, Jilin University, Changchun 130012, China

Applications of different types of CDPs adsorbents in separation and enrichment of various substances from complex systems are reviewed.

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**Recent advances in nanoscale metal-organic frameworks biosensors for detection of biomarkers**Qiu-Yang Xu<sup>a</sup>, Zheng Tan<sup>a</sup>, Xue-Wei Liao<sup>b</sup>, Chen Wang<sup>a,c</sup><sup>a</sup>Department of Chemistry, China Pharmaceutical University, Nanjing 211198, China<sup>b</sup>Analytical and Testing Center, Nanjing Normal University, Nanjing 210046, China<sup>c</sup>Jiangsu Key Laboratory of New Power Batteries, School of Chemistry and Materials Science, Nanjing Normal University, Nanjing 210023, China

This review article summarizes recent advances of nanoscale metal-organic frameworks biosensors for detection of biomarkers via four sensing technologies: Fluorescence, colorimetry, electrochemistry and surface-enhanced Raman scattering.

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## Porphyrin-based heterogeneous photocatalysts for solar energy conversion

Yuheng Zhang, Kang Ren, Lu Wang, Lin Wang, Zhuangjun Fan

State Key Laboratory of Heavy Oil Processing, School of Materials Science and Engineering, China University of Petroleum (East China), Qingdao 266580, China

Here, we emphasize the importance of introducing porphyrin molecular design into heterogeneous porphyrin-based hybrid photocatalysts. Additionally, we summarize the interface engineering in porphyrin inorganic photocatalysts and the spatial confinement effect in porphyrin organic framework photocatalysts from the kinetic process of photogenerated carrier separation and transport.

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## Systematic evaluation of advance in application and discharge mechanism of solution electrode glow discharge

Xiaoxu Peng<sup>a,b</sup>, Zheng Wang<sup>a,b</sup>

<sup>a</sup> Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China

<sup>b</sup> Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing 100049, China

Here we are devoted to providing an overview of the development of solution electrode glow discharge in various fields. More importantly, a systematic discussion on the discharge mechanism is conducted based on the research process in various fields for getting deeper insight into the solution electrode glow discharge.

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## Insoluble carbonaceous materials as electron shuttles enhance the anaerobic/anoxic bioremediation of redox pollutants: Recent advances

Ning Li<sup>a,b</sup>, Jin Jiang<sup>a,b</sup>, Yanbin Xu<sup>c</sup>, Hanping Pan<sup>a,b</sup>, Xiaonan Luo<sup>a,b</sup>, Yingbin Hu<sup>a,b</sup>, Jie Cao<sup>a,b</sup>

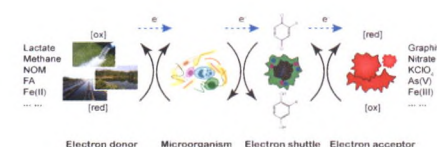
<sup>a</sup> Key Laboratory for City Cluster Environmental Safety and Green Development of the Ministry of Education, Institute of Environmental and Ecological Engineering, Guangdong University of Technology, Guangzhou 510006, China

<sup>b</sup> Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou), Guangzhou 511458, China

<sup>c</sup> School of Environmental Science and Engineering, Guangdong University of Technology, Guangzhou 510006, China

Carbonaceous materials could serve as electron shuttles to enhance microbial extracellular electron transfer and promote the bio-reduction of recalcitrant contaminants. This review summarized the state-of-art carbonaceous ESs and their conductive characteristics. The effects of ESs properties and environmental factors on electron transfer efficiency are analysed.

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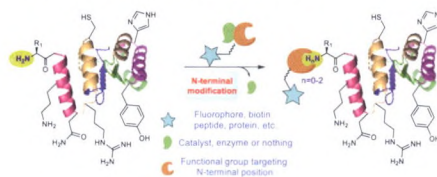
## Selective N-terminal modification of peptides and proteins: Recent progresses and applications

Hongfei Jiang, Wujun Chen, Jie Wang, Renshuai Zhang

The Affiliated Hospital of Qingdao University and Qingdao Cancer Institute, Qingdao 266071, China

Approaches for site-specific modification of N-terminal position of peptides and proteins represent novel biological tools. Here, recent N-terminal modification methodologies with potential for biological applications will be reviewed.

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## The emerging applications of pillararene architectures in supramolecular catalysis

Kaiya Wang<sup>a</sup>, Xueqi Tian<sup>a</sup>, Jacobs H. Jordan<sup>b</sup>, Krishnasamy Velmurugan<sup>a</sup>, Leyong Wang<sup>c</sup>, Xiao-Yu Hu<sup>a</sup>

<sup>a</sup> College of Materials Science and Technology, Nanjing University of Aeronautics and Astronautics, Nanjing 211106, China

<sup>b</sup> The Southern Regional Research Center, Agricultural Research Service, USDA, New Orleans, LA 70124, United States

<sup>c</sup> Key Laboratory of Mesoscopic Chemistry of MOE, School of Chemistry and Chemical Engineering, Nanjing University, Nanjing 210023, China

This review discusses progress in the emerging applications of pillararene architectures in catalysis based on various reaction genre including reduction, oxidation, coupling, decomposition and other important reactions.

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## Recent advances in the application of sulfinic acids for the construction of sulfur-containing compounds

Yufen Lv<sup>a,c</sup>, Huanhuan Cui<sup>a</sup>, Na Meng<sup>a</sup>, Huilan Yue<sup>b</sup>, Wei Wei<sup>a</sup>

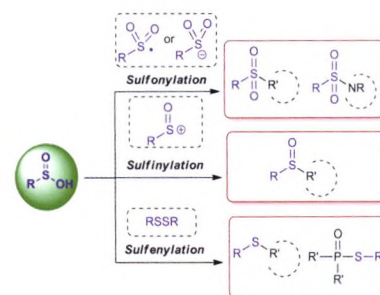
<sup>a</sup> School of Chemistry and Chemical Engineering, Qufu Normal University, Qufu 273165, China

<sup>b</sup> Qinghai Provincial Key Laboratory of Tibetan Medicine Research and CAS Key Laboratory of Tibetan Medicine Research, Northwest Institute of Plateau Biology, Xining 810008, China

<sup>c</sup> School of Chemistry and Chemical Engineering, Shihezi University, Shihezi 832000, China

This review summarizes the recent advances in the construction of various sulfur-containing compounds using sulfinic acids as versatile synthons. The reaction patterns of sulfinic acids and their corresponding reaction mechanism are focused.

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## Near-infrared absorbing (>700 nm) aza-BODIPYs by freezing the rotation of the aryl groups

Yanyan Wang<sup>a</sup>, Dongxiang Zhang<sup>a</sup>, Kangming Xiong<sup>b</sup>, Rong Shang<sup>c</sup>, Xin-Dong Jiang<sup>a</sup>

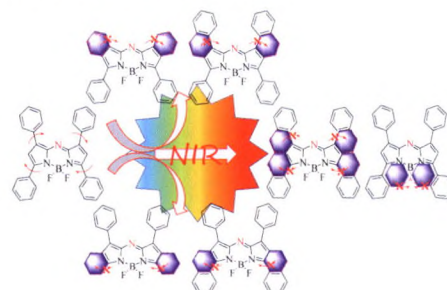
<sup>a</sup> Shenyang Key Laboratory of Functional Dye and Pigment, Shenyang University of Chemical Technology, Shenyang 110142, China

<sup>b</sup> CAS Key Laboratory of Separation Science for Analytical Chemistry, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, China

<sup>c</sup> Department of Chemistry, Graduate School of Science, Hiroshima University, Higashi-Hiroshima 7398526, Japan

This review summarizes the recent development of ring-fused aza-BODIPY dyes ( $\lambda_{\text{abs}} > 700$  nm) focusing on the design, synthesis, and potential applications in the NIR region since 2002.

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## Organic solar cells based on small molecule donor and polymer acceptor

Wanru Xu<sup>a,b</sup>, Yilin Chang<sup>b,c</sup>, Xiangwei Zhu<sup>b</sup>, Zhenhua Wei<sup>d</sup>, Xiaoli Zhang<sup>e</sup>, Xiangnan Sun<sup>a,b,d,e</sup>, Kun Lu<sup>b,c</sup>, Zhixiang Wei<sup>b,c</sup>

<sup>a</sup> College of Chemistry, Zhengzhou University, Zhengzhou 450001, China

<sup>b</sup> CAS Key Laboratory of Nanosystem and Hierarchical Fabrication, CAS Center for Excellence in Nanoscience, National Center for Nanoscience and Technology, Beijing 100190, China

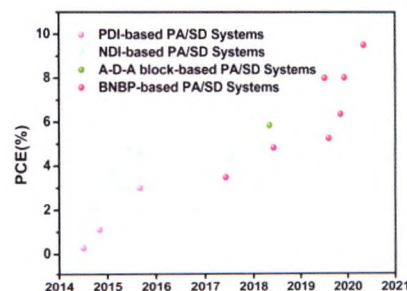
<sup>c</sup> University of Chinese Academy of Sciences, Beijing 100049, China

<sup>d</sup> Shandong First Medical University, Shandong Academy of Medical Sciences, Taian 271016, China

<sup>e</sup> School of Material Science and Engineering, Zhengzhou University, Zhengzhou 450001, China

Small molecule donor/polymer acceptor (SD/PA)-type organic solar cells (OSCs) recently have received increasing attention due to their excellent thermal stability and the potential for large-scale practical applications. The important factors that limit the photovoltaic performances of SD/PA type OSCs are briefly discussed, and the recent research progress on the SD/PA system is comprehensively summarized.

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## Silicon-substituted rhodamines for stimulated emission depletion fluorescence nanoscopy

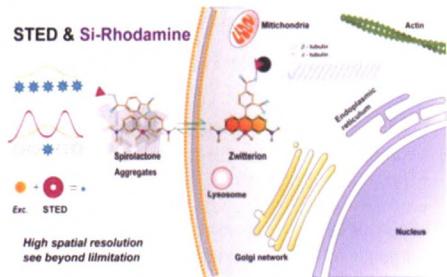
Ning Wang<sup>a</sup>, Yumeng Hao<sup>b</sup>, Xiaowei Feng<sup>a</sup>, Haidan Zhu<sup>a</sup>, Dazhi Zhang<sup>b</sup>, Ting Wang<sup>b</sup>, Xiaoyan Cui<sup>a</sup>

<sup>a</sup>Department of Chemistry, School of Chemistry and Molecular Engineering, East China Normal University, Shanghai 200241, China

<sup>b</sup>Department of Organic Chemistry, College of Pharmacy, Naval Medical University (Second Military Medical University), Shanghai 200433, China

The development of silicon-substituted rhodamine (SiR) has extensively prospered the super-resolution microscopy. We reviewed the application of carboxy-SiR in the application of stimulated emission depletion (STED) nanoscopy.

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## Electrospun carbon nanofibers for lithium metal anodes: Progress and perspectives

Hongyang Chen<sup>a</sup>, Manxian Li<sup>a</sup>, Chuanping Li<sup>a</sup>, Xuan Li<sup>a</sup>, Yaling Wu<sup>b</sup>, Xiaochuan Chen<sup>c</sup>, Junxiong Wu<sup>a</sup>, Xiaoyan Li<sup>a</sup>, Yuming Chen<sup>a,d</sup>

<sup>a</sup>College of Environmental Science and Engineering, Fujian Normal University, Fuzhou 350007, China

<sup>b</sup>College of Life Science, Fujian Normal University, Fuzhou 350007, China

<sup>c</sup>School of Chemistry, Sun Yat-sen University, Guangzhou 510275, China

<sup>d</sup>State Key Laboratory of Structural Chemistry, Fuzhou 350000, China

In this review, the recent advances in electrospun CNF skeletons for LMAs, including pure CNFs and CNF-based composites are highlighted. The remaining challenges of electrospun CNF skeletons and the future directions are discussed.

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## Strain of 2D materials via substrate engineering

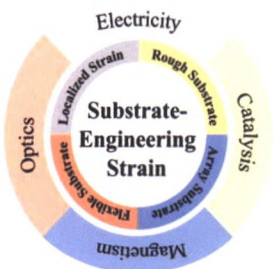
Yangwu Wu<sup>a</sup>, Lu Wang<sup>a</sup>, Huimin Li<sup>a</sup>, Qizhi Dong<sup>b</sup>, Song Liu<sup>a</sup>

<sup>a</sup>Institute of Chemical Biology and Nanomedicine (ICBN), State Key Laboratory of Chemo/Biosensing and Chemometrics, College of Chemistry and Chemical Engineering, Hunan University, Changsha 410082, China

<sup>b</sup>State Key Laboratory of Chemo/Biosensing and Chemometrics, College of Chemistry and Chemical Engineering, Hunan University, Changsha 410082, China

In this review, we start from the modulation of physical properties of two-dimensional (2D) materials based on the strain by the substrate-engineering. And we are introducing the way to modulation and methods to generation substrate strain and the latest application of 2D material.

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## Two-dimensional alloyed transition metal dichalcogenide nanosheets: Synthesis and applications

Haoxin Huang<sup>a</sup>, Jiajia Zha<sup>a</sup>, Shisheng Li<sup>b</sup>, Chaoliang Tan<sup>a,c</sup>

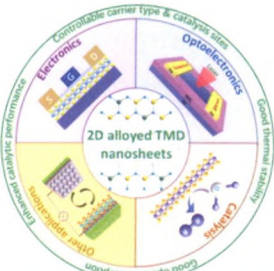
<sup>a</sup>Department of Electrical Engineering, City University of Hong Kong, Hong Kong, China

<sup>b</sup>International Center for Young Scientists (ICYS), National Institute for Materials Science (NIMS), Tsukuba 305-0044, Japan

<sup>c</sup>Shenzhen Research Institute, City University of Hong Kong, Shenzhen 518057, China

This review summarizes the recent progress in the preparation, characterization and applications of two-dimensional alloyed transition metal dichalcogenide nanosheets.

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## Oxidations of two-dimensional semiconductors: Fundamentals and applications

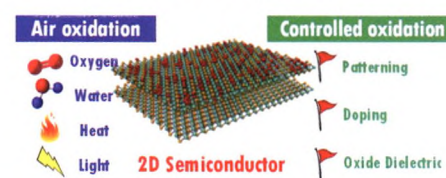
Junqiang Yang<sup>a</sup>, Xiaochi Liu<sup>a</sup>, Qianli Dong<sup>a</sup>, Yaqi Shen<sup>a</sup>, Yuchuan Pan<sup>a</sup>, Zhongwang Wang<sup>a</sup>, Kui Tang<sup>a</sup>, Xianfu Dai<sup>a</sup>, Rongqi Wu<sup>a</sup>, Yuanyuan Jin<sup>b</sup>, Wei Zhou<sup>b</sup>, Song Liu<sup>b</sup>, Jian Sun<sup>a</sup>

<sup>a</sup>School of Physics and Electronics, Central South University, Changsha 410083, China

<sup>b</sup>State Key Laboratory of Chemical Biosensing and Chemometrics, College of Chemistry and Chemical Engineering, Institute of Chemical Biology and Nanomedicine (ICBN), Hunan University, Changsha 410082, China

Here, we review the recent progress on the mechanisms, passivation techniques and applications of the oxidations of some representative 2D semiconductors.

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## Carbohydrate-derived porous carbon materials: An ideal platform for green organic synthesis

Yamei Lin<sup>a</sup>, Jie Yu<sup>b</sup>, Xing Zhang<sup>a</sup>, Jingkun Fang<sup>c</sup>, Guo-Ping Lu<sup>c</sup>, He Huang<sup>a</sup>

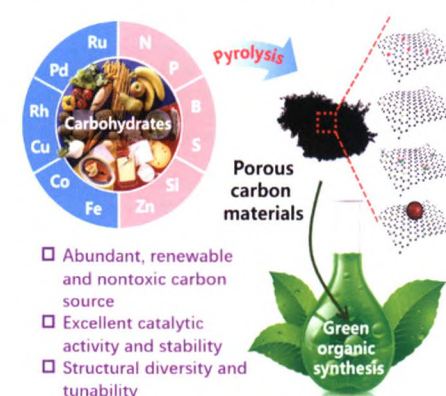
<sup>a</sup>School of Food Science and Pharmaceutical Engineering, Nanjing Normal University, Nanjing 210023, China

<sup>b</sup>School of Pharmaceutical Sciences, Nanjing Tech University, Nanjing 210009, China

<sup>c</sup>School of Chemical Engineering, Nanjing University of Science and Technology, Nanjing 210094, China

A brief overview and critical summary of investigations on organic reactions catalyzed by the carbohydrate-derived carbon materials is disclosed, which not only introduces the synthetic strategies of these materials, but also addresses the challenges and opportunities of organic synthesis over these sustainable materials.

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## Communications

### Regioselective 2-alkylation of indoles with $\alpha$ -bromo esters catalyzed by Pd/P,P=O system

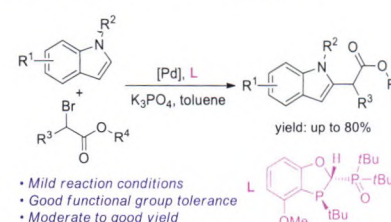
Wei Tian<sup>a</sup>, Bowen Li<sup>a,b</sup>, Duanshuai Tian<sup>a</sup>, Wenjun Tang<sup>a,b</sup>

<sup>a</sup>State Key Laboratory of Bio-Organic and Natural Products Chemistry, Center for Excellence in Molecular Synthesis, Shanghai Institute of Organic Chemistry, University of Chinese Academy of Sciences, Shanghai 200032, China

<sup>b</sup>School of Chemistry and Material Sciences, Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences, Hangzhou 310024, China

A palladium-catalyzed 2-alkylation of indoles with  $\alpha$ -bromo esters is developed by employing a P,P=O ligand. The method features excellent regioselectivities, mild reaction conditions, and good functional group compatibility. The employment of the P,P=O ligand as well as 4Å molecular sieves were crucial for the success of the transformation.

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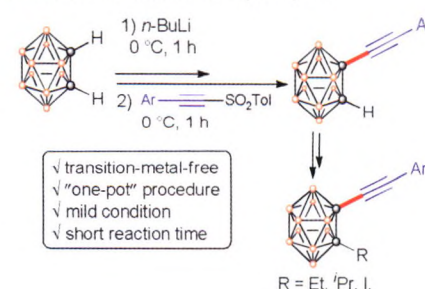
### A facile access to mono-C-alkynylated-o-carboranes from o-carboranes and arylsulfonylacetylenes

Mengyang Bai, Guanyu Tao, Zhenxing Liu, Lili Wang, Zheng Duan

College of Chemistry, Green Catalysis Center, International Phosphorus Laboratory, International Joint Research Laboratory for Functional Organophosphorus Materials of Henan Province, Zhengzhou University, Zhengzhou 450001, China

A facile access to mono-C-alkynyl-o-carboranes from o-carboranes and arylsulfonylacetylenes was developed. The obtained mono-C-alkynyl-o-carboranes can be easily derivatized to synthesize 1,2-difunctionalized o-carboranes. This work provides a useful tool for the functionalization of o-carboranes.

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## Selenization of cotton products with NaHSe endowing the antibacterial activities

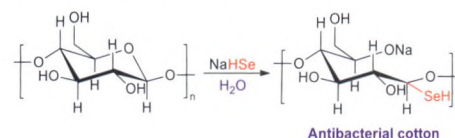
Mingxuan Liu<sup>a,b</sup>, Xiaoling Zhang<sup>b</sup>, Sainan Chu<sup>a</sup>, Yanyu Ge<sup>a</sup>, Tao Huang<sup>a</sup>, Yonghong Liu<sup>a</sup>, Lei Yu<sup>a</sup>

<sup>a</sup>School of Chemistry and Chemical Engineering, Yangzhou University, Yangzhou 225002, China

<sup>b</sup>School of Pharmacy, Nantong University, Nantong 226001, China

Selenization reaction with the *in situ* prepared NaHSe has been successfully developed to occur in aqueous solution. The technique affords a method to upload the bioactive Se element on cotton products in semi-industrial scale. This work discloses a practical method for preparing the selenium-containing antibacterial materials concisely and directly with industrial application potential.

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## Smart supramolecular vesicles based on glutathione-reactive pillar[6]arene and acid-labile prodrug: Dual drug loading and sequential release

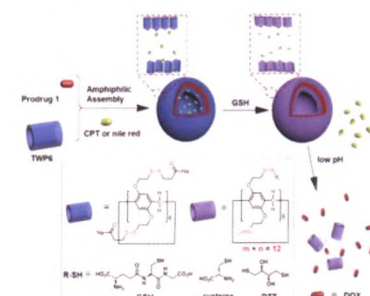
Yamin Liu<sup>b</sup>, Siyang Jiang<sup>b</sup>, Weipeng Mao<sup>b</sup>, Pintao Li<sup>b</sup>, Fang Zhou<sup>b</sup>, Da Ma<sup>a,b</sup>

<sup>a</sup>College of Chemistry, and Green Catalysis Center, Zhengzhou University, Zhengzhou, 450001, China

<sup>b</sup>Department of Chemistry, Fudan University, Shanghai 200433, China

Smart supramolecular vesicles based on thiol-reactive pillar[6]arene and acid-labile prodrug are used for dual drug loading and sequential release.

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## A reversible microarray immobilization strategy based on thiol-quinone reaction

Ling Feng<sup>a,b,c</sup>, Ping Wang<sup>b,c</sup>, Yi Feng<sup>d</sup>, Jie Zhang<sup>b,c</sup>, Qingxin Chen<sup>b,c</sup>, Yusheng Xie<sup>b,c</sup>, Jingdong Luo<sup>b,c</sup>, Jiang Xia<sup>e</sup>, Shao Q. Yao<sup>f</sup>, Hongyan Sun<sup>b,c</sup>

<sup>a</sup>Cancer and Aging Research Institution, School of Life Science, Shandong University of Technology, Zibo 255000, China

<sup>b</sup>Department of Chemistry and COSDAF (Centre of Super-Diamond and Advanced Films), City University of Hong Kong, Hong Kong, China

<sup>c</sup>Key Laboratory of Biochip Technology, Biotech and Health Centre, Shenzhen Research Institute of City University of Hong Kong, Shenzhen 518057, China

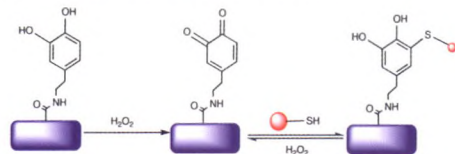
<sup>d</sup>College of Food Engineering, Qingdao Institute of Technology, Qingdao 266300, China

<sup>e</sup>Department of Chemistry, The Chinese University of Hong Kong, Hong Kong, China

<sup>f</sup>Department of Chemistry, National University of Singapore, Singapore 117543, Singapore

Through thiol-quinone reaction, a reversible and chemo-selective biochip was successfully designed and utilized to immobilize small molecules, peptides and proteins.

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## Synthesis, characterization and reactivity of thiolate-bridged cobalt-iron and ruthenium-iron complexes

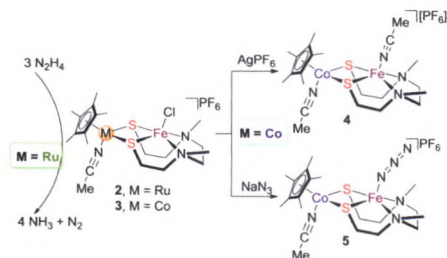
Chao Guo<sup>a</sup>, Linan Su<sup>a</sup>, Dawei Yang<sup>a</sup>, Baomin Wang<sup>a</sup>, Jingping Qu<sup>a,b</sup>

<sup>a</sup>State Key Laboratory of Fine Chemicals, Dalian University of Technology, Dalian 116024, China

<sup>b</sup>State Key Laboratory of Bioreactor Engineering, Shanghai Collaborative Innovation Centre for Biomanufacturing, Frontiers Science Center for Materiobiology and Dynamic Chemistry, East China University of Science and Technology, Shanghai 200237, China

Two novel cobalt-iron and ruthenium-iron complexes with the same coordination sphere were synthesized and characterized, which can serve as suitable scaffolds to probe into the potential influence exerted by heterometals. The obvious differences in electrochemical properties and spin distributions have a great impact on the reactivity of two heterobinuclear complexes.

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## Catalyst-free, direct electrochemical trifluoromethylation/cyclization of *N*-arylacrylamides using TfNHNHBoc as a CF<sub>3</sub> source

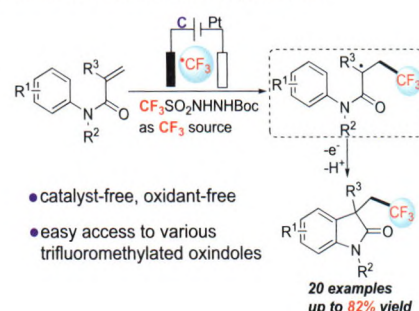
Han Wang<sup>a</sup>, Yongbin Xie<sup>a</sup>, Yicheng Zhou<sup>a</sup>, Nannan Cen<sup>a</sup>, Wenbo Chen<sup>a,b</sup>

<sup>a</sup> Shanghai Key Laboratory of Materials Protection and Advanced Materials in Electric Power, Shanghai University of Electric Power, Shanghai 200090, China

<sup>b</sup> CAS Key Laboratory of Energy Regulation Materials, Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, Shanghai 200032, China

A new electrochemical strategy for trifluoromethylation/cyclization using CF<sub>3</sub>SO<sub>2</sub>NHNHBoc as a CF<sub>3</sub> source was established. This approach was realized by the direct electrolysis of CF<sub>3</sub>SO<sub>2</sub>NHNHBoc under external oxidant-free and catalyst-free conditions, and afforded various trifluoromethylated oxindoles with good functional group compatibility and broad substrate scope.

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## Dearomative spirocyclization via visible-light-induced reductive hydroarylation of non-activated arenes

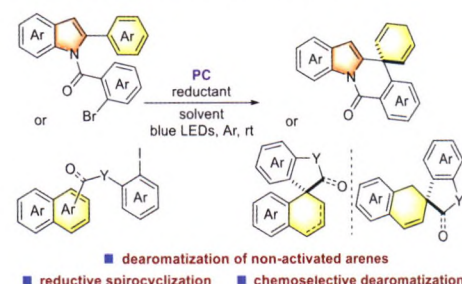
Zhuomin Chi<sup>a,b</sup>, Yuzhen Gao<sup>b</sup>, Lei Yang<sup>b</sup>, Chunlin Zhou<sup>b</sup>, Meng Zhang<sup>a,b</sup>, Peiming Cheng<sup>a</sup>, Gang Li<sup>b</sup>

<sup>a</sup> College of Chemistry and Materials Science, Fujian Normal University, Fuzhou 350117, China

<sup>b</sup> Key Laboratory of Coal to Ethylene Glycol and Its Related Technology, Center for Excellence in Molecular Synthesis, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou 350002, China

A visible-light-induced spirocyclization hydroarylation of a series of non-activated arenes is described. An intriguing chemoselective dearomative hydroarylation of 2-phenyl indoles is also presented.

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## A novel conformationally adaptive macrocyclic tetramaleimide with flipping pyrene sidewalls

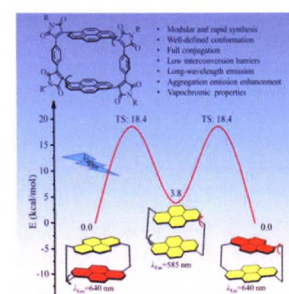
Lingyun Zhu<sup>a</sup>, Wei Zeng<sup>a</sup>, Menghua Li<sup>a</sup>, Meijin Lin<sup>a,b</sup>

<sup>a</sup> Key Laboratory of Molecule Synthesis and Function Discovery, and Fujian Provincial Key Laboratory of Electrochemical Energy Storage Materials, College of Chemistry, Fuzhou University, Fuzhou 350116 China

<sup>b</sup> College of Materials Science and Engineering, Fuzhou University, Fuzhou 350116, China

The conformationally adaptive macrocycles with two flipping aromatic pyrene walls have well-defined and their inter-transformations with obvious color changes could be induced by solvent vapors due to the low barriers.

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## Supported Pt-Ni bimetallic nanoparticles catalyzed hydrodeoxygenation of dibenzofuran with high selectivity to bicyclohexane

Pengyu Wu, Chun Cai

Chemical Engineering College, Nanjing University of Science and Technology, Nanjing 210094, China

Efficient bimetallic catalyst Pt<sub>1</sub>Ni<sub>4</sub>/MgO was prepared and applied in the hydrodeoxygenation of dibenzofuran. High yield of bicyclohexane was afforded, which could be ascribed to the "relay catalysis" effect inside the catalyst.

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## Accelerating the thermal fading rate of photochromic naphthopyrans by pillar[5]arene-based conjugated macrocycle polymer

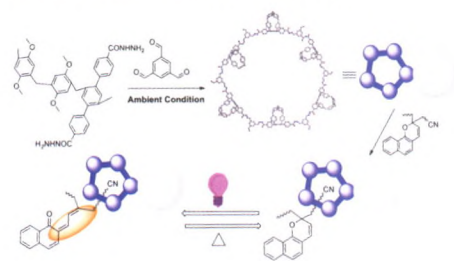
Shuangyan Liu<sup>a</sup>, Taishan Yan<sup>b</sup>, Qiuxia Wu<sup>b</sup>, Zheng Xu<sup>a</sup>, Jie Han<sup>a,b</sup>

<sup>a</sup>Key Laboratory of Advanced Energy Materials Chemistry (Ministry of Energy), College of Chemistry, Nankai University, Tianjin 300071, China

<sup>b</sup>State Key Laboratory of Elemento-Organic Chemistry, College of Chemistry, Nankai University, Tianjin 300071, China

The addition of pillar[5]arene-based conjugated macrocycle polymer to the composite PMMA film of photochromic naphthopyrans can dramatically accelerate the color fading rate by 12 times.

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## A micro-wave strategy for synthesizing room temperature phosphorescent materials

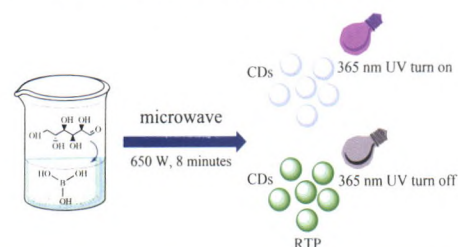
Ru Liang<sup>a</sup>, Lijun Huo<sup>a</sup>, Ao Yu<sup>a</sup>, Jinjing Wang<sup>a</sup>, Chunman Jia<sup>a</sup>, Jianwei Li<sup>a,b</sup>

<sup>a</sup>Hainan Provincial Key Laboratory of Fine Chemicals, College of Chemical Engineering and Technology, Hainan University, Haikou 570228, China

<sup>b</sup>MediCity Research Laboratory, University of Turku, Tykistökatu 6, Turku 20520, Finland

Boron-doped carbon quantum dots (CDs) with a long room temperature afterglow emission were conveniently and effectively synthesized in only 8 min using microwaves.

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## Two star-shaped small molecule donors based on benzodithiophene unit for organic solar cells

Jun Xu<sup>a,c</sup>, Jinsheng Zhang<sup>a,b</sup>, Daobin Yang<sup>a,b</sup>, Kuibao Yu<sup>a</sup>, Dandan Li<sup>a,b</sup>, Zihao Xia<sup>a</sup>, Ziyi Ge<sup>a,b</sup>

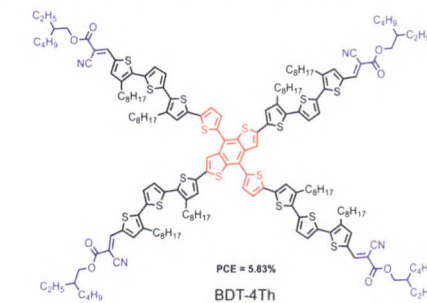
<sup>a</sup>Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Ningbo 315201, China

<sup>b</sup>Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing 100049, China

<sup>c</sup>Nano Science and Technology Institute, University of Science and Technology of China, Suzhou 215123, China

Two star-shaped small molecule donors with benzodithiophene (BDT) as a cross-like central unit, namely BDT-3Th and BDT-4Th, have been successfully designed and synthesized for high-performance organic solar cells.

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## TPE based aggregation induced emission fluorescent sensors for viscosity of liquid and mechanical properties of hydrogel

Na Wang<sup>a</sup>, Hang Yao<sup>a</sup>, Qi Tao<sup>a</sup>, Jing Sun<sup>a</sup>, Hao Ma<sup>a</sup>, Yang Wang<sup>a</sup>, Chengcheng Zhou<sup>a</sup>, Hongying Fan<sup>b</sup>, Hongxia Shao<sup>c</sup>, Aijian Qin<sup>c</sup>, Dawei Su<sup>d</sup>, Chenyin Wang<sup>a</sup>, Hui Chong<sup>a</sup>

<sup>a</sup>School of Chemistry and Chemical Engineering, Yangzhou University, Yangzhou 225009, China

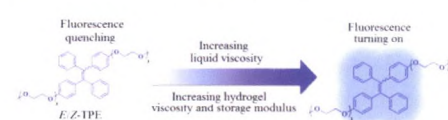
<sup>b</sup>Testing center of Yangzhou University, Yangzhou 225009, China

<sup>c</sup>Ministry of Education Key Lab for Avian Preventive Medicine, Key Laboratory of Jiangsu Preventive Veterinary Medicine, College of Veterinary Medicine, Yangzhou University, Yangzhou 225009, China

<sup>d</sup>Center for Clean Energy Technology, School of Mathematical and Physical Science, Faculty of Science, University of Technology Sydney, Sydney NSW 2000, Australia

Amphiphilic tetraphenyl ethylene molecules (E-TPE and Z-TPE) realized fluorescent sensing of liquid viscosity and mechanical properties (viscosity and storage modulus).

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## Reliable folding of hybrid tetrapeptides into short $\beta$ -hairpins

Xue-Yi Sun<sup>a</sup>, Yulong Zhong<sup>b</sup>, Yao-Hua Li<sup>a</sup>, Daniel P. Miller<sup>c</sup>, Sagar Buttan<sup>c</sup>, Xiang-Xiang Wu<sup>d</sup>, Yukun Zhang<sup>e</sup>, Quan Tang<sup>a</sup>, Hong-Wei Tan<sup>a</sup>, Jin Zhu<sup>e</sup>, Rui Liu<sup>a</sup>, Eva Zurek<sup>b</sup>, Zhong-Lin Lu<sup>a</sup>, Bing Gong<sup>b</sup>

<sup>a</sup> College of Chemistry, Beijing Normal University, Beijing 100875, China

<sup>b</sup> Department of Chemistry, University at Buffalo, The State University of New York, Buffalo, NY 14260, United States

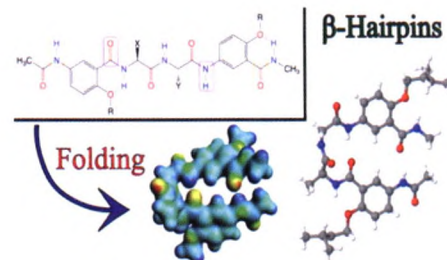
<sup>c</sup> Department of Chemistry, Hofstra University, Hempstead, NY 11549, United States

<sup>d</sup> Academy of Chinese Medical Science, Henan University of Chinese Medicine, Zhengzhou 450046, China

<sup>e</sup> Chengdu Institute of Organic Chemistry, Chinese Academy of Sciences, Chengdu 610041, China

Hybrid tetrapeptides consisting central segments of two  $\alpha$ -amino acid residues flanked by aromatic  $\gamma$ -amino acid residues fold into well-defined  $\beta$ -hairpins.

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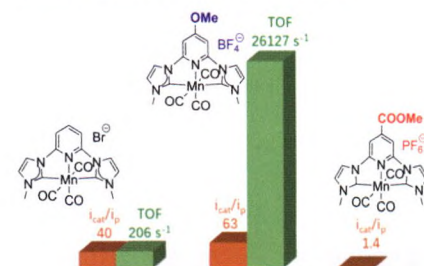
## Highly active electrocatalytic CO<sub>2</sub> reduction with manganese N-heterocyclic carbene pincer by *para* electronic tuning

Can Huang, Jiahao Liu, Hai-Hua Huang, Xianfang Xu, Zhuofeng Ke

School of Materials Science & Engineering, School of Chemistry, PCFM Lab, Sun Yat-sen University, Guangzhou 510275, China

The *para* electronic tuning strategy was used to design and synthesize N-heterocyclic carbene manganese complexes for highly active electrocatalytic CO<sub>2</sub> reduction. Complex **L2-Mn** with an electron-donating group could achieve excellent catalysis with a higher value of  $i_{cat}/i_p$ , Faradaic efficiency, and 127-fold maximum turnover frequency, while complex **L3-Mn** with an electron-withdrawing group inhibited the catalytic reactivity.

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## Selective C-C bonds formation, N-alkylation and benzo[d]imidazoles synthesis by a recyclable zinc composite

Guanxin Zhu<sup>a,b</sup>, Zheng-Chao Duan<sup>a,c</sup>, Haiyan Zhu<sup>a</sup>, Dongdong Ye<sup>a</sup>, Dawei Wang<sup>a,b</sup>

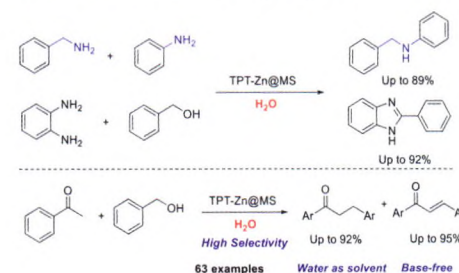
<sup>a</sup> The Key Laboratory of Synthetic and Biological Colloids, Ministry of Education, School of Chemical and Material Engineering, Jiangnan University, Wuxi 214122, China

<sup>b</sup> State Key Laboratory of Pulp and Paper Engineering, South China University of Technology, Guangzhou 510640, China

<sup>c</sup> School of Chemical and Environmental Engineering, Hubei Minzu University, Enshi 445000, China

TPT-Zn@MS could promote the reactions of amines with amines, and the reactions of ketones with alcohols, and the synthesis of 2-aryl-1H-benzo[d]imidazole derivatives in water under base-free conditions.

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## S/Se-embedded acenaphthylene-imide-containing polycyclic heteroaromatic hydrocarbon

Zhichao Wang<sup>a</sup>, Qianli Ma<sup>a</sup>, Xuan Huang<sup>a</sup>, Tian Zhang<sup>a</sup>, Jiawei Shao<sup>b</sup>, Xinglin Zhang<sup>a</sup>, Qian Shen<sup>a</sup>, Xiaochen Wang<sup>c</sup>, Jinjun Shao<sup>a</sup>

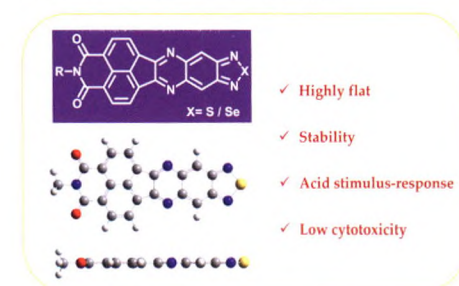
<sup>a</sup> Key Laboratory of Flexible Electronics (KLOFE) & Institute of Advanced Materials (IAM), Nanjing Tech University (NanjingTech), Nanjing 211800, China

<sup>b</sup> Department of Chemistry, National University of Singapore, Singapore 117543, Singapore

<sup>c</sup> School of Materials Science & Engineering, Shaanxi Normal University, Xi'an 710119, China

Sulfur and selenium-embedded AnI-containing polycyclic aromatic hydrocarbon molecules, AnI-SQ and AnI-SeQ, with [1,2,5]thiadiazolo[3,4-g]quinoxaline (SQ) and [1,2,5]selenadiazolo-[3,4-g]quinoxaline (SeQ) units are designed and synthesized. The absorption and emission of AnI-SQ and AnI-SeQ displayed bathochromic shift upon protonation of the C=N bond. Through self-assembly with polymeric Pluronic® F-127, corresponding hydrophilic nanoparticles (NPs) were prepared with low cytotoxicity. And AnI-SQ NPs could be applied for *in vitro* two-photon fluorescence imaging.

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## Synthesis of arylsulfonyl-substituted indolo[2,1-*a*]isoquinolin-6(5*H*)-one derivatives via a TBAI-catalyzed radical cascade cyclization

Shengxian Zhai<sup>a</sup>, Shuxian Qiu<sup>b</sup>, Shuai Yang<sup>a</sup>, Bingyan Hua<sup>a</sup>, Yongsheng Niu<sup>a</sup>, Chuchu Han<sup>a</sup>, Youzhu Yu<sup>a</sup>, Yuchao Li<sup>a</sup>, Hongbin Zhai<sup>c</sup>

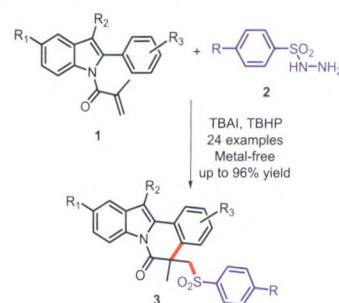
<sup>a</sup>College of Chemistry & Environmental Engineering, Anyang Institute of Technology, Anyang 455000, China

<sup>b</sup>Department of Chemistry, Guangdong University of Education, Guangzhou 510303, China

<sup>c</sup>State Key Laboratory of Chemical Oncogenomics and Key Laboratory of Chemical Genomics, Shenzhen Engineering Laboratory of Nano Drug Slow-Release, Shenzhen Graduate School of Peking University, Shenzhen 518055, China

A metal-free radical cascade reaction of *N*-substituted 2-aryl indoles with readily available sulfonyl hydrazides for the rapid construction of structurally diverse indolo[2,1-*a*]isoquinolin-6(5*H*)-one derivatives has been developed.

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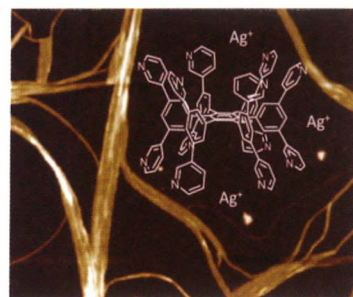
## Molecular assembly of a pyridine functionalized janusarene

Zhibo Yin, Luoyi Fan, Chaojun Lin, Haonan Shi, Bangyuan Xiong, Jiajian Gu, Yanpeng Zhu, Jiaobing Wang

School of Chemistry, Sun Yat-sen University, Guangzhou 510275, China

This work describes a pyridine functionalized janusarene derivative PyJ, which forms micrometer-scale one-dimensional metallo-supramolecular polymer through coordination driven self-assembly.

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## Cucurbit[6]uril functionalized gold nanoparticles and electrode for the detection of metformin drug

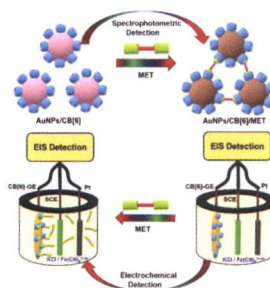
Yaqi Wang<sup>a</sup>, Ling Ding<sup>a</sup>, Hui Yu<sup>b</sup>, Feng Liang<sup>a</sup>

<sup>a</sup>The State Key Laboratory of Refractories and Metallurgy, School of Chemistry and Chemical Engineering, Wuhan University of Science and Technology, Wuhan 430081, China

<sup>b</sup>Department of Civil and Environmental Engineering, Temple University, Philadelphia, PA 19122, United States

Cucurbit[6]uril modified gold nanoparticles and gold electrode (CB[6]-GE) were prepared for effective spectrophotometric and electrochemical determination of metformin (MET) drug.

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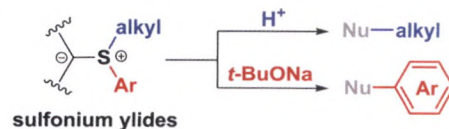
## Discriminating non-ylidic carbon-sulfur bond cleavages of sulfonium ylides for alkylation and arylation reactions

Jing Fang, Ting Li, Xiang Ma, Jiuchang Sun, Lei Cai, Qi Chen, Zhiwen Liao, Linghui Meng, Jing Zeng, Qian Wan

Hubei Key Laboratory of Natural Medicinal Chemistry and Resource Evaluation, School of Pharmacy, Huazhong University of Science and Technology, Wuhan 430030, China

A separated cleavage of non-ylidic C-S bond of sulfonium ylide allowed the selective arylation and alkylation reactions. Stable or *in situ* generated sulfonium ylides served as diverse alkylating reagents by cleavage of the non-ylidic alkyl C-S bond under weak acidic conditions. While under alkaline conditions, the cleavage of the non-ylidic aryl C-S bond provided an efficient transition-metal free arylation reaction.

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## MoS<sub>2</sub> nanosheets and bulk materials altered lipid profiles in 3D Caco-2 spheroids

Min Xie<sup>a,b,c</sup>, Chaobo Huang<sup>b</sup>, Yongqi Liang<sup>c</sup>, Shuang Li<sup>c</sup>, Liping Sheng<sup>a</sup>, Yi Cao<sup>d</sup>

<sup>a</sup>National Local Joint Engineering Laboratory for New Petro-chemical Materials and Fine Utilization of Resources, College of Chemistry and Chemical Engineering, Hunan Normal University, Changsha 410081, China

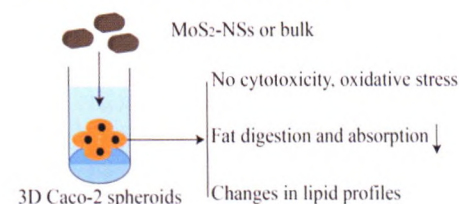
<sup>b</sup>College of Chemical Engineering, Nanjing Forestry University (NFU), Nanjing 210037, China

<sup>c</sup>Key Laboratory of Environment-Friendly Chemistry and Applications of Ministry Education, Laboratory of Biochemistry, College of Chemistry, Xiangtan University, Xiangtan 411105, China

<sup>d</sup>Hunan Province Key Laboratory of Typical Environmental Pollution and Health Hazards, School of Public Health, University of South China, Hengyang 421001, China

MoS<sub>2</sub>-NSs or MoS<sub>2</sub>-bulk materials were non-cytotoxic to 3D Caco-2 spheroids but impaired fat digestion and absorption. Consequently, MoS<sub>2</sub> materials altered lipid profiles.

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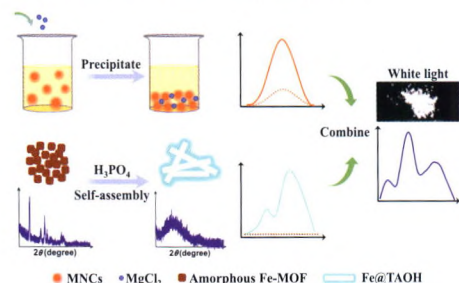
## Orange-emitting bimetallic nanoclusters combined with cyan-emitting Fe@TAOH as white light-emitting materials

Wenying Mi, Na Shao

College of Chemistry, Beijing Normal University, Beijing 100875, China

Solid highly luminescent orange-emitting nanoclusters were prepared via salt-mediated precipitation, and cyan-emitting phosphors were prepared through self-assembling of Fe-MOFs like materials induced by H<sub>3</sub>PO<sub>4</sub>, and their application in white light-emitting materials was investigated.

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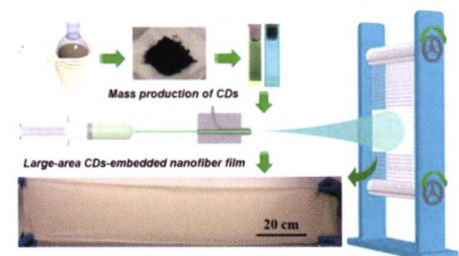
## Carbon dots embedded nanofiber films: Large-scale fabrication and enhanced mechanical properties

Chang Liu, Rui Cheng, Jiazhuang Guo, Ge Li, He Li, Hong-Gang Ye, Zhi-Bin Liang, Cai-Feng Wang, Su Chen

State Key Laboratory of Materials-Oriented Chemical Engineering, College of Chemical Engineering, and Jiangsu Key Laboratory of Fine Chemicals and Functional Polymer Materials, Nanjing Tech University, Nanjing 210009, China

Mass-produced carbon dots are used as nanofillers to fabricate large-area fluorescent nanofiber films with enhanced mechanical properties.

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## Green rapid synthesis of Cu<sub>2</sub>O/Ag heterojunctions exerting synergistic antibiosis

Feiyue Hu<sup>a</sup>, Bo Song<sup>a</sup>, Xiaohan Wang<sup>a</sup>, Shen Bao<sup>a</sup>, Siyang Shang<sup>a</sup>, Shupeì Lv<sup>a</sup>, Bingbing Fan<sup>a</sup>, Rui Zhang<sup>a,c</sup>, Jingguo Li<sup>a,b</sup>

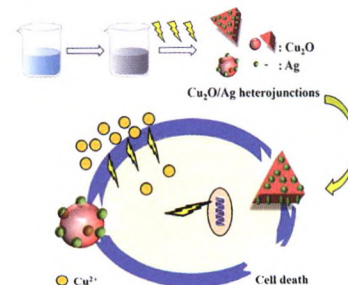
<sup>a</sup>School of Materials Science and Engineering, Zhengzhou University, Zhengzhou 450001, China

<sup>b</sup>People's Hospital of Zhengzhou University, Henan Provincial People's Hospital, Zhengzhou 450003, China

<sup>c</sup>School of Material Science and Engineering, Luoyang Institute of Science and Technology, Luoyang 471023, China

A green and rapid synthesis of Cu<sub>2</sub>O/Ag heterojunctions which exert notable synergistic antibacterial properties is developed via microwave-assisted method.

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## Aqueous-phase synthesis of upconversion metal-organic frameworks for ATP-responsive *in situ* imaging and targeted combinational cancer therapy

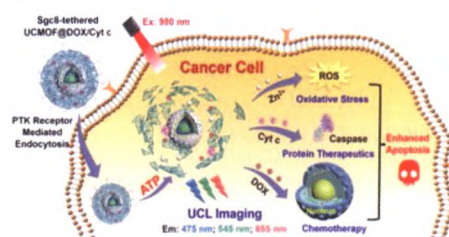
Lin Yang<sup>a</sup>, Shuaidong Zhu<sup>a</sup>, Zhimei He<sup>a</sup>, Xiangli Li<sup>a</sup>, Jiangning Chen<sup>a</sup>, Sai Bi<sup>b</sup>, Jun-Jie Zhu<sup>a</sup>

<sup>a</sup>State Key Laboratory of Analytical Chemistry for Life Science, School of Chemistry and Chemical Engineering, School of Life Sciences, Nanjing University, Nanjing 210023, China

<sup>b</sup>College of Chemistry and Chemical Engineering, Qingdao University, Qingdao 266071, China

Nanoscaled ATP-responsive upconversion metal-organic frameworks (UCMOFs) are rationally fabricated via an aqueous-phase synthesis approach for targeted co-delivery of chemodrugs and therapeutic proteins. The UCMOFs are degraded in response to intracellular ATP, resulting in the release of theranostic agents for combinational therapy of human cervical cancer and the restoration of UCL for *in situ* imaging in living cells.

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## Reactive nano-essential oils for sustained release of essential oils and application to wallpaper

Qjilian Hao<sup>a,b</sup>, Huan Peng<sup>b,d</sup>, Ruichen Zhao<sup>b,d</sup>, Jianze Wang<sup>a,b</sup>, Zhiguo Lu<sup>b,d</sup>, Jingwen Wang<sup>a,b</sup>, Jie Shen<sup>b,d</sup>, Yunwei Niu<sup>e,f</sup>, Zuobing Xiao<sup>e,f</sup>, Guiying Liu<sup>c</sup>, Jifu Hao<sup>a</sup>, Xin Zhang<sup>b</sup>

<sup>a</sup>School of Pharmaceutical Science, Shandong First Medical University & Shandong Academy of Medical Sciences, Taian 271016, China

<sup>b</sup>State Key Laboratory of Biochemical Engineering, Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, China

<sup>c</sup>Department of Pediatrics, Capital Medical University Affiliated Beijing Anzhen Hospital, Beijing 100029, China

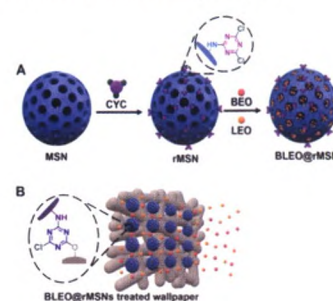
<sup>d</sup>School of Chemical Engineering, University of Chinese Academy of Sciences, Beijing 100049, China

<sup>e</sup>Shanghai Research Institute of Fragrance and Flavor Industry, Shanghai 200232, China

<sup>f</sup>School of Perfume and Aroma Technology, Shanghai Institute of Technology, Shanghai 200233, China

Reactive mesoporous silica nanoparticles were prepared to encapsulate bergamot essential oil (BEO) and lemon essential oil (LEO) for slow-releasing essential oils and application to wallpaper.

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## Self-assembled metal-organic frameworks nanocrystals synthesis and application for plumbagin drug delivery in acute lung injury therapy

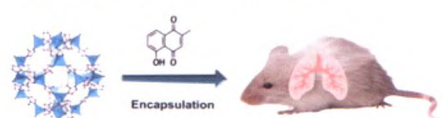
Yang Wang<sup>a,b</sup>, Qing Li<sup>a</sup>, Mengsheng Deng<sup>a</sup>, Kuijun Chen<sup>a</sup>, Jianmin Wang<sup>a</sup>

<sup>a</sup>State Key Laboratory of Trauma, Burns and Combined Injury, Department of Surgical Research, Daping Hospital, Army Medical University, Chongqing 400042, China

<sup>b</sup>School of Chemistry and Chemical Engineering, Yangzhou University, Yangzhou 225002, China

The fabrication of a three-dimensional porous nanoplatform for plumbagin encapsulation for acute lung injury therapy has been realized.

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## An *in situ* nanoparticle recombinant strategy for the enhancement of photothermal therapy

Xinxin Liu<sup>a,b,c,d,e</sup>, Cuixia Zheng<sup>b,c,d</sup>, Yueyue Kong<sup>b,c,d</sup>, Hao Wang<sup>b,c,d</sup>, Lei Wang<sup>a,b,c,d,e</sup>

<sup>a</sup>Luoyang Central Hospital Affiliated to Zhengzhou University, Luoyang, 471009, China

<sup>b</sup>School of Pharmaceutical Sciences, Zhengzhou University, Zhengzhou 450001, China

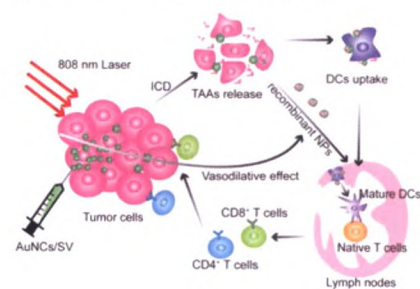
<sup>c</sup>Key Laboratory of Advanced Drug Preparation Technologies, Ministry of Education, School of Pharmaceutical Sciences, Zhengzhou University, Zhengzhou 450001, China

<sup>d</sup>Henan Key Laboratory of Targeting Therapy and Diagnosis for Critical Diseases, Zhengzhou University, Zhengzhou 450001, China

<sup>e</sup>Tumor Immunity and Biomaterials Advanced Medical Center, Zhengzhou University, Luoyang 471009, China

An *in situ* recombinant nanoparticle has been developed during photothermal therapy (PTT), which could target to lymph node effectively for enhancing host's immune responses to kill tumors. Collectively, the therapeutic strategy provided a new way for enhancing PTT-immunotherapy and facilitating the development of autologous anticancer vaccines.

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## Thermodynamics-guided two-way interlocking DNA cascade system for universal multiplexed mutation detection

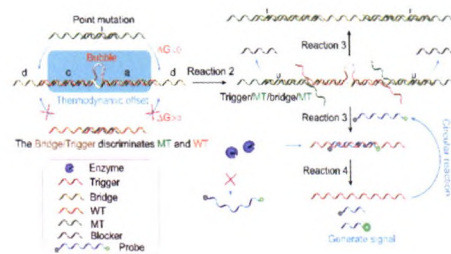
Wei Zhang<sup>a</sup>, Liqian Liu<sup>b</sup>, Yangwei Liao<sup>b</sup>, Wan Shu<sup>a</sup>, Xiaofeng Tang<sup>b</sup>, Kejun Dong<sup>a</sup>, Zhihao Ming<sup>b</sup>, Xianjin Xiao<sup>a,b</sup>, Hongbo Wang<sup>a</sup>

<sup>a</sup>Department of Obstetrics and Gynecology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China

<sup>b</sup>Institute of Reproductive Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China

In this study, we developed a thermodynamics-guided two-way interlocking DNA cascade system for universal multiplexed mutation detection (TTI-CS), which only changes two inexpensive trigger and bridge sequences, thereby replacing the specific and expensive nucleic acid probes. We performed the detection of synthetic single-stranded DNA for five mutation points and successfully detected PTEN R130Q in endometrial cancer specimens, the detection line of this method was 0.1%.

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## A series of simple curcumin-derived colorimetric and fluorescent probes for ratiometric-pH sensing and cell imaging

Guangjie Song<sup>a,b</sup>, Di Jiang<sup>a</sup>, Lei Wang<sup>b</sup>, Xiangzhong Sun<sup>b,c</sup>, Hongtian Liu<sup>b</sup>, Yanqing Tian<sup>b</sup>, Meiwan Chen<sup>a</sup>

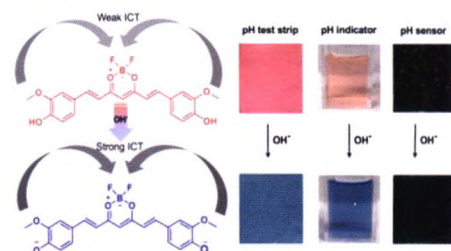
<sup>a</sup>State Key Laboratory of Quality Research in Chinese Medicine, Institute of Chinese Medical Sciences, University of Macau, Macao, China

<sup>b</sup>Department of Materials Science and Engineering, Southern University of Science and Technology, Shenzhen 518055, China

<sup>c</sup>School of Physics and Technology, Wuhan University, Wuhan 430072, China

The probe BFCUR based on the natural polyphenol curcumin was prepared for ratiometric pH sensing and cell imaging.

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## Nitrogen and boron co-doped graphene nanoribbons as peroxidase-mimicking nanozymes for enhanced biosensing

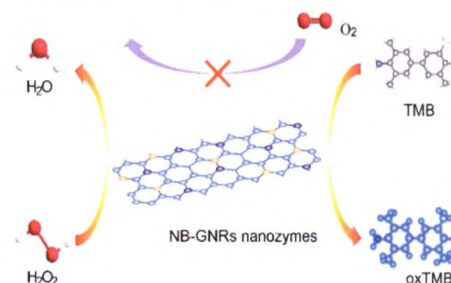
Siyu Luo<sup>a</sup>, Meng Sha<sup>b</sup>, Fei Tian<sup>a</sup>, Xialian Li<sup>a</sup>, Lijie Fu<sup>a</sup>, Yingqiu Gu<sup>a</sup>, Lu-Lu Qu<sup>a</sup>, Guo-Hai Yang<sup>a</sup>, Chengzhou Zhu<sup>b</sup>

<sup>a</sup>School of Chemistry & Materials Science, Jiangsu Normal University, Xuzhou 221116, China

<sup>b</sup>Key Laboratory of Pesticide and Chemical Biology of Ministry of Education, International Joint Research Center for Intelligent Biosensing Technology and Health, College of Chemistry, Central China Normal University, Wuhan 430079, China

Nitrogen and boron co-doped graphene nanoribbons (NB-GNRs) possessing superior and selective peroxidase-like activity with a strong affinity for  $\text{H}_2\text{O}_2$  and 3,3',5,5'-tetramethylbenzidine are successfully prepared. NB-GNRs act as the novel carbon nanozymes exhibit a high performance for biosensing, showing great promise in the biomedical area.

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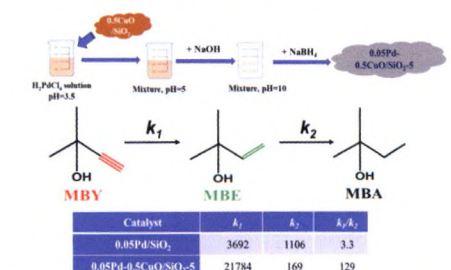
## Influence of Pd deposition pH value on the performance of Pd-CuO/SiO<sub>2</sub> catalyst for semi-hydrogenation of 2-methyl-3-butyn-2-ol (MBY)

Jiamin Xu, Xiaowen Guo, Yejun Guan, Peng Wu

Shanghai Key Laboratory of Green Chemistry and Chemical Processes, East China Normal University, Shanghai 200062, China

The deposition pH value of the Pd precursor onto CuO influences the structure of PdCu alloy structure and thereby affects the performance of PdCu catalyst for semi-hydrogenation of 2-methyl-3-butyn-2-ol (MBY).

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## Self-assembly of a new 3D platelike ternary-oxo-cluster: An efficient catalyst for the synthesis of pyrazoles

Guoping Yang<sup>a</sup>, Yufeng Liu<sup>a</sup>, Xiaoling Lin<sup>a</sup>, Bangming Ming<sup>b</sup>, Ke Li<sup>a</sup>, Changwen Hu<sup>c</sup>

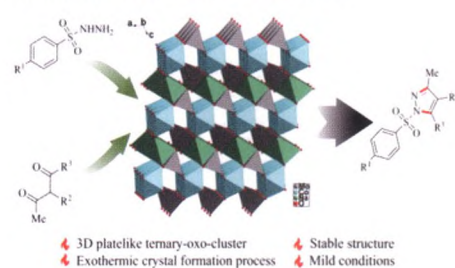
<sup>a</sup>Jiangxi Province Key Laboratory of Synthetic Chemistry, Jiangxi Key Laboratory for Mass Spectrometry and Instrumentation, East China University of Technology, Nanchang 330013, China

<sup>b</sup>Jiangxi Engineering Technology Research Center of Nuclear Geoscience Data Science and System, East China University of Technology, Nanchang 330013, China

<sup>c</sup>Key Laboratory of Cluster Science of Ministry of Education, School of Chemistry and Chemical Engineering, Beijing Institute of Technology, Beijing 100081, China

A new 3D platelike ternary-oxo-cluster  $[\text{NaCo}_2\text{Mo}_2\text{O}_7(\text{OH})_3]_n$  was synthesized, characterized as well as calculated using density functional theory and was found to be an efficient catalyst for the construction of pyrazoles under moderate conditions via the condensation cyclization reaction.

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## Mechanism of water oxidation catalyzed by vitamin B<sub>12</sub>: Redox non-innocent nature of corrin ligand and crucial role of phosphate

Ying-Ying Li, Rong-Zhen Liao

Key Laboratory of Material Chemistry for Energy Conversion and Storage, Ministry of Education, Hubei Key Laboratory of Bioinorganic Chemistry and Materia Medica, Hubei Key Laboratory of Materials Chemistry and Service Failure, School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, Wuhan 430074, China

The critical role of  $\text{HPO}_4^{2-}$  in water oxidation catalyzed by vitamin B<sub>12</sub> was emphasized in this work.

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## A ferric citrate derived Fe-N-C electrocatalyst with stepwise pyrolysis for highly efficient oxygen reduction reaction

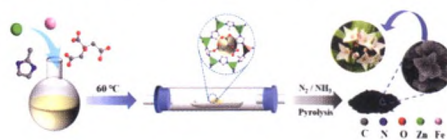
Min Zhang<sup>a</sup>, Bolong Yang<sup>a</sup>, Ting Yang<sup>b</sup>, Yahui Yang<sup>b</sup>, Zhonghua Xiang<sup>a</sup>

<sup>a</sup>State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, Beijing 100029, China

<sup>b</sup>College of Chemistry and Chemical Engineering, Hunan Normal University, Changsha 410081, China

A Fe/N co-doped catalyst with a flower-like morphology was prepared by  $\text{NH}_3$  heat treatment, which can expose more accessible active sites and forming a hierarchical porous structure, leading to notably increased intrinsic activity with excellent ORR performance in acid media.

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## Tuning photoresponse of graphene-black phosphorus heterostructure by electrostatic gating and photo-induced doping

Yanpeng Liu<sup>a</sup>, Ming Yang<sup>b</sup>, Junpeng Lu<sup>c</sup>, Ying Liu<sup>d</sup>, Hongwei Liu<sup>e</sup>, Erwen Zhang<sup>a</sup>, Wei Fu<sup>f</sup>, Junyong Wang<sup>f</sup>, Zhenliang Hu<sup>c</sup>, Jun Yin<sup>a</sup>, Goki Eda<sup>f</sup>, Shijie Wang<sup>g</sup>, Jiabao Yi<sup>h</sup>, Ajayan Vinu<sup>h</sup>, Kian Ping Loh<sup>f</sup>

<sup>a</sup>Key Laboratory for Intelligent Nano Materials and Devices of the Ministry of Education, State Key Laboratory of Mechanics and Control of Mechanical Structures, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, China

<sup>b</sup>Department of Applied Physics, The Hong Kong Polytechnic University, Hong Kong, China

<sup>c</sup>School of Physics, Southeast University, Nanjing 211189, China

<sup>d</sup>College of Jincheng, Nanjing University of Aeronautics and Astronautics, Nanjing 211156, China

<sup>e</sup>School of Physics and Technology, Nanjing Normal University, Nanjing 210023, China

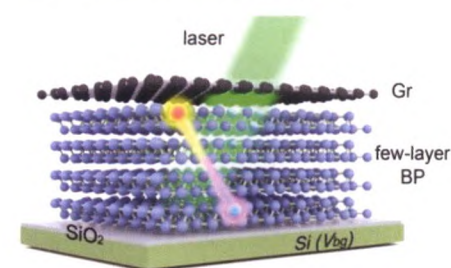
<sup>f</sup>Department of Chemistry, National University of Singapore, Singapore 117543, Singapore

<sup>g</sup>Institute of Materials Research and Engineering, Agency for Science, Technology and Research (A\*STAR), Innovis 138634, Singapore

<sup>h</sup>Global Innovative Centre for Advanced Nanomaterials, College of Engineering, Science and Environment, The University of Newcastle, Newcastle NSW, 2308, Australia

By supposing graphene onto multilayer black phosphorus flake, unprecedented photoresponse behavior is found and finely tuned by electrostatic gating and photo-induced doping, demonstrating Gr/BP heterostructure a fresh platform for multifunctional optoelectronic devices.

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## Ir nanoclusters confined within hollow MIL-101(Fe) for selective hydrogenation of $\alpha,\beta$ -unsaturated aldehyde

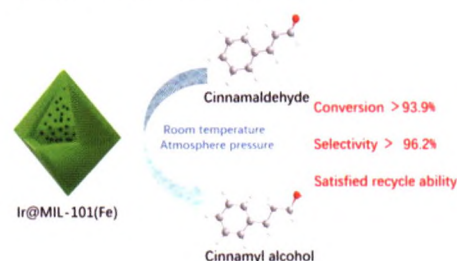
Qinglin Liu<sup>a</sup>, Qian Liu<sup>a</sup>, Yurong Chen<sup>a</sup>, Yinle Li<sup>a</sup>, Hui Su<sup>b</sup>, Qinghua Liu<sup>b</sup>, Guangqin Li<sup>a</sup>

<sup>a</sup>MOE Laboratory of Bioinorganic and Synthetic Chemistry, Lehn Institute of Functional Materials, School of Chemistry, Sun Yat-Sen University, Guangzhou 510275, China

<sup>b</sup>National Synchrotron Radiation Laboratory, University of Science and Technology of China, Hefei 230026, China

Hollow Ir@MIL-101(Fe) composite is synthesized via in-situ growth of MIL-101(Fe) with Ir NCs in the precursor solution. The obtained Ir@MIL-101(Fe) exhibits high activity, selectivity as well as great recyclability for the hydrogenation of CAL to COL, due to electropositive Ir NCs and the Lewis acid sites in MIL-101(Fe).

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## Engineering surface oxygen vacancy of mesoporous CeO<sub>2</sub> nanosheets assembled microspheres for boosting solar-driven photocatalytic performance

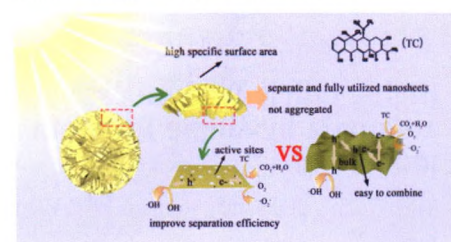
Decai Yang<sup>a</sup>, Yachao Xu<sup>a</sup>, Kai Pan<sup>a</sup>, Chuanxin Yu<sup>a</sup>, Jiaxing Wu<sup>a</sup>, Mingxia Li<sup>a</sup>, Fan Yang<sup>a</sup>, Yang Qu<sup>a</sup>, Wei Zhou<sup>a,b</sup>

<sup>a</sup>School of Chemistry and Materials Science, Key Laboratory of Functional Inorganic Material Chemistry, Ministry of Education of the People's Republic of China, Heilongjiang University, Harbin 150080, China

<sup>b</sup>Shandong Provincial Key Laboratory of Molecular Engineering, School of Chemistry and Chemical Engineering, Qilu University of Technology (Shandong Academy of Sciences), Ji'nan 250353, China

Mesoporous CeO<sub>2</sub> nanosheets assembled microspheres with engineered surface oxygen vacancy are fabricated and exhibit excellent photocatalytic degradation performance, which can be attributed to engineered surface oxygen vacancy defect and special mesoporous assembly structure increasing surface active sites and favoring the mass transfer and spatial charge separation.

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## Nitrogen-doped Co<sub>3</sub>O<sub>4</sub> nanowires enable high-efficiency electrochemical oxidation of 5-hydroxymethylfurfural

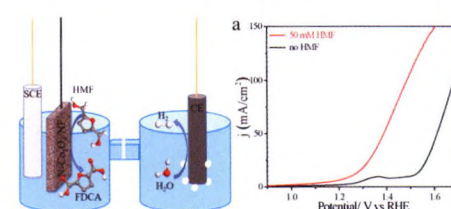
Mengxiao Sun<sup>a</sup>, Yue Wang<sup>a</sup>, Chunsen Sun<sup>a</sup>, Yan Qi<sup>a</sup>, Jia Cheng<sup>a</sup>, Yumei Song<sup>b</sup>, Lixue Zhang<sup>a</sup>

<sup>a</sup>College of Chemistry and Chemical Engineering, State Key Laboratory of Bio-fibers and Eco-textiles, Qingdao University, Qingdao 266071, China

<sup>b</sup>Guangdong Provincial Key Laboratory of Emergency Test for Dangerous Chemicals, Institute of Analysis, Guangdong Academy of Sciences, Guangzhou 510070, China

In this work, we report a controllable N-doping strategy to significantly improve the electrocatalytic activity of Co<sub>3</sub>O<sub>4</sub> nanowires for highly selective oxidation of HMF into FDCA.

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## Highly selective conversion of methane to ethanol over CuFe<sub>2</sub>O<sub>4</sub>-carbon nanotube catalysts at low temperature

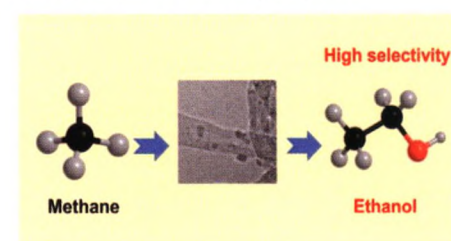
Xinqun Shen<sup>a,b</sup>, Dan Wu<sup>a</sup>, Xian-Zhu Fu<sup>a</sup>, Jing-Li Luo<sup>a</sup>

<sup>a</sup>Shenzhen Key Laboratory of Polymer Science and Technology, Guangdong Research Center for Interfacial Engineering of Functional Materials, College of Materials Science Engineering, Shenzhen University, Shenzhen 518071, China

<sup>b</sup>Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province, College of Optoelectronic Engineering, Shenzhen University, Shenzhen 518060, China

The high selectivity of ethanol can be obtained from methane in a single process over CuFe<sub>2</sub>O<sub>4</sub>/CNT catalysts at low temperature of 150 °C.

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## Low-overpotential electrochemical ammonia synthesis using BiOCl-modified 2D titanium carbide MXene

Yu Wang<sup>a</sup>, Munkhbayar Batmunkh<sup>b</sup>, Hui Mao<sup>a</sup>, Hui Li<sup>a</sup>, Baohua Jia<sup>c</sup>, Shuyao Wu<sup>a</sup>, Daliang Liu<sup>a</sup>, Ximing Song<sup>a</sup>, Ying Sun<sup>a</sup>, Tianyi Ma<sup>c</sup>

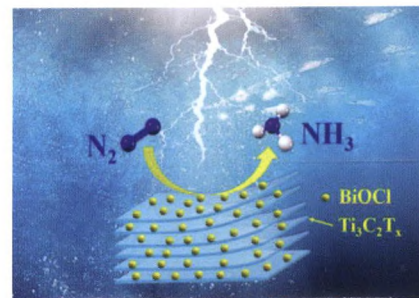
<sup>a</sup> Key Laboratory for Green Synthesis and Preparative Chemistry of Advanced Materials of Liaoning Province, College of Chemistry, Liaoning University, Institute of Clean Energy Chemistry, Shenyang 110036, China

<sup>b</sup> Centre for Catalysis and Clean Energy, School of Environment and Science, Griffith University, Gold Coast, Queensland 4222, Australia

<sup>c</sup> Centre for Translational Atomaterials, School of Science, Swinburne University of Technology, Hawthorn VIC 3122, Australia

A noble-metal free electrocatalytic system of BiOCl@Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub> has been fabricated via *in-situ* hydrothermal growth of BiOCl on the Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub>, showing significantly enhanced electrocatalytic nitrogen reduction reaction performance at low overpotential.

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## Highly efficient photocatalytic reduction of nitrogen into ammonia by single Ru atom catalyst supported by BeO monolayer

Saifei Yuan<sup>a</sup>, Beixi Xu<sup>a</sup>, Shujuan Li<sup>b,c</sup>, Wenbiao Zhu<sup>b</sup>, Shulai Lei<sup>b</sup>, Wenyue Guo<sup>a</sup>, Hao Ren<sup>a</sup>

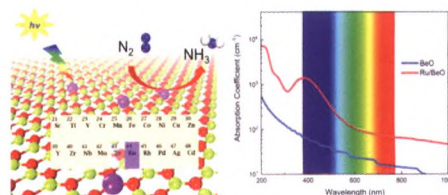
<sup>a</sup> School of Materials Science and Engineering, China University of Petroleum (East China), Qingdao 266580, China

<sup>b</sup> Hubei Key Laboratory of Low Dimensional Optoelectronic Materials and Devices, Hubei University of Arts and Science, Xiangyang 441053, China

<sup>c</sup> Institute of Mathematics, Free University of Berlin, Arnimallee 6, D-14195 Berlin, Germany

*Ab-initio* simulations of optical adsorption spectra of single Ru atom catalyst supported by BeO monolayer predict a promising photocatalytic nitrogen reduction reaction (NRR) single atom catalyst (SAC) for highly efficient N<sub>2</sub> activation and fixation under visible light.

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## The InSe/g-CN van der Waals hybrid heterojunction as a photocatalyst for water splitting driven by visible light

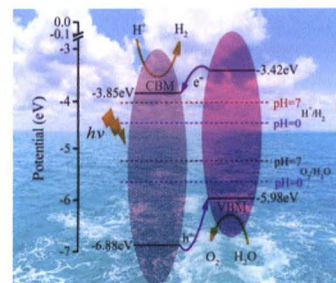
Cheng He<sup>a</sup>, Fusheng Han<sup>a</sup>, Wenxue Zhang<sup>b</sup>

<sup>a</sup> State Key Laboratory for Mechanical Behavior of Materials, School of Materials Science and Engineering, Xi'an Jiaotong University, Xi'an 710049, China.

<sup>b</sup> School of Materials Science and Engineering, Chang'an University, Xi'an 710064, China

The InSe/g-CN heterostructure realizes the transition of the electrons from the valence band to the conduction band by absorbing photon energy. The hydrogen evolution reaction occurs in the g-CN layer, and the oxygen evolution reaction occurs in the InSe layers.

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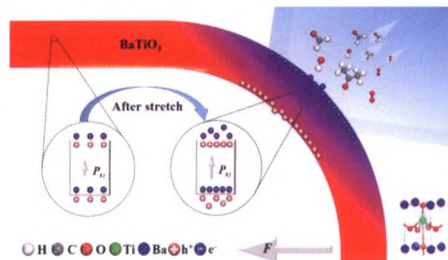
## Photo-piezoelectric synergistic degradation of typical volatile organic compounds on BaTiO<sub>3</sub>

Qin Liu, Weina Zhao, Zhimin Ao, Taicheng An

Guangzhou Key Laboratory of Environmental Catalysis and Pollution Control, Guangdong Key Laboratory of Environmental Catalysis and Health Risk Control, School of Environmental Science and Engineering, Institute of Environmental Health and Pollution Control, Guangdong University of Technology, Guangzhou 510006, China

The synergistic mechanism, atomic and electronic properties of typical piezoelectric and photocatalytic material BaTiO<sub>3</sub> were initially investigated and the adsorption of volatile organic compounds (VOCs) on the BaTiO<sub>3</sub> (001) surface was determined during the piezoelectric process.

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## Effective *E. coli* inactivation of core-shell ZnO@ZIF-8 photocatalysis under visible light synergize with peroxymonosulfate: Efficiency and mechanism

Yanni Jiang<sup>a,b</sup>, Zhaokun Xiong<sup>a,b</sup>, Jianbo Huang<sup>c</sup>, Feng Yan<sup>c</sup>, Gang Yao<sup>b,d</sup>, Bo Lai<sup>a,b</sup>

<sup>a</sup>State Key Laboratory of Hydraulics and Mountain River Engineering, College of Architecture and Environment, Sichuan University, Chengdu 610065, China

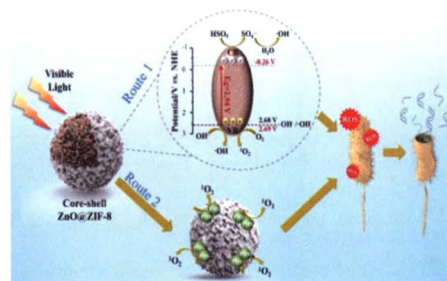
<sup>b</sup>Sino-German Centre for Water and Health Research, Sichuan University, Chengdu 610065, China

<sup>c</sup>Department of Ultrasound, Laboratory of Ultrasound Imaging Drug, West China Hospital, Sichuan University, Chengdu 610041, China

<sup>d</sup>Institute of Environmental Engineering, RWTH Aachen University, Aachen 52072, Germany

In this study, a core-shell ZnO@ZIF-8 was synthesized to inactivate *E. coli* synergizing with a small amount of peroxymonosulfate under visible light. The results indicate that thorough disinfection in water can be completed in the vis/PMS/ZnO@ZIF-8 system within 50 min.

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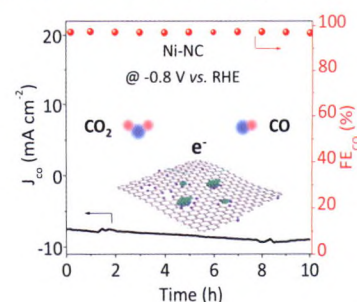
## Constructing low-valent Ni nanoparticles for highly selective CO<sub>2</sub> reduction

Kuanda Xu, Shisheng Zheng, Yang Li, Honghao Chu, Qi Xiong, Zongwei Mei, Qinghe Zhao, Luyi Yang, Shunning Li, Feng Pan

School of Advanced Materials, Peking University Shenzhen Graduate School, Shenzhen 518055, China

Low-valent Ni-based nanoparticles within N-doped carbon were prepared via a simple two-step pyrolysis, which can effectively boost the selectivity for CO<sub>2</sub>-to-CO electroreduction, reaching a specific Faradaic efficiency of 98% at a mild overpotential of 0.8 V.

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## The role of NiFe<sub>2</sub>O<sub>4</sub> nanoparticle in the anaerobic digestion (AD) of waste activated sludge (WAS)

Lihong Zhou<sup>a</sup>, Xueqian Yan<sup>b</sup>, Xiangjun Pei<sup>a,c</sup>, Jie Du<sup>d</sup>, Rui Ma<sup>b</sup>, Jin Qian<sup>b</sup>

<sup>a</sup>College of Ecology and Environment, Chengdu University of Technology, Chengdu 610000, China

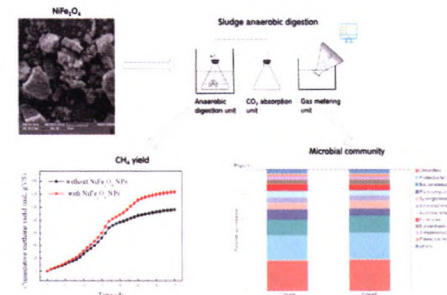
<sup>b</sup>School of Chemistry and Chemical Engineering, Northwestern Polytechnical University, Xi'an 710072, China

<sup>c</sup>State Key Laboratory of Geohazard Prevention and Geoenvironment Protection, Chengdu University of Technology, Chengdu 610000, China

<sup>d</sup>Jiuzhaigou Administration Bureau, Aba 623402, China

In this study, the NiFe<sub>2</sub>O<sub>4</sub> nanoparticles (NPs) were fabricated and used to enhance AD process. And the microorganisms associated with hydrolysis and acidogenesis were more abundant in the presence of NiFe<sub>2</sub>O<sub>4</sub>, and the methanogenic archaea were enriched to a larger extent, resulted in the higher methanogenesis activities.

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## Regulation of mixed Ag valence state by non-thermal plasma for complete oxidation of formaldehyde

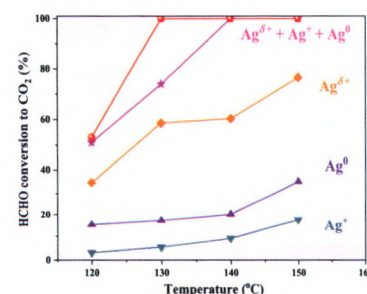
Kai Li<sup>a,b</sup>, Jian Ji<sup>a,b</sup>, Yanling Gan<sup>a,b</sup>, Haibao Huang<sup>a,b</sup>

<sup>a</sup>School of Environmental Science and Engineering, Sun Yat-sen University, Guangzhou 510006, China

<sup>b</sup>Guangdong Indoor Air Pollution Control Engineering Research Center, Guangzhou 510006, China

Ag valence state was regulated by plasma activation for complete oxidation of formaldehyde. A close relationship between Ag valence state and the activity for HCHO oxidation was established, and the activity of different Ag species follows the order: Ag<sup>δ+</sup> + Ag<sup>0</sup> + Ag<sup>+</sup> > Ag<sup>δ+</sup> > Ag<sup>0</sup> > Ag<sup>+</sup>.

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## Prediction of second-order rate constants between carbonate radical and organics by deep neural network combined with molecular fingerprints

Peizhe Sun<sup>a</sup>, Huixin Ma<sup>a</sup>, Shangyu Li<sup>b</sup>, Hong Yao<sup>c</sup>, Ruochun Zhang<sup>d,e</sup>

<sup>a</sup>School of Environmental Science and Engineering, Tianjin University, Tianjin 300072, China

<sup>b</sup>School of Civil Engineering, Tianjin University, Tianjin 300072, China

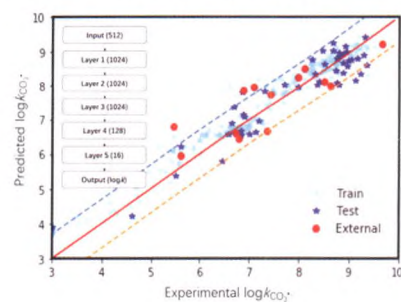
<sup>c</sup>Beijing Key Laboratory of Aqueous Typical Pollutants Control and Water Quality Safeguard, Department of Municipal and Environmental Engineering, School of Civil Engineering, Beijing Jiaotong University, Beijing 100044, China

<sup>d</sup>Institute of Surface-Earth System Science, School of Earth System Science, Tianjin University, Tianjin 300072, China

<sup>e</sup>Tianjin Key Laboratory of Earth Critical Zone Science and Sustainable Development in Bohai Rim, Tianjin University, Tianjin 300072, China

This work combined deep neural network combined with molecular fingerprints to develop a QSAR model which successfully predicted the second-order rate constants between carbonate radical and organics.

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## Sunlight photocatalytic degradation of ofloxacin using UiO-66/wood composite photocatalysts

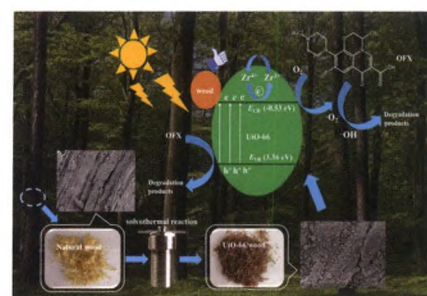
Linhong Shi<sup>a</sup>, Xue Zou<sup>a</sup>, Tengfei Wang<sup>a</sup>, Dongmei Wang<sup>a</sup>, Meikun Fan<sup>a,b</sup>, Zhengjun Gong<sup>a,b</sup>

<sup>a</sup>Faculty of Geosciences and Environmental Engineering, Southwest Jiaotong University, Chengdu 611756, China

<sup>b</sup>State-province Joint Engineering Laboratory of Spatial Information Technology of High-Speed Rail Safety, Chengdu 611756, China

UiO-66/wood was prepared and its catalytic performance for the ofloxacin (OFX) photodegradation under simulate sunlight was explored. Not only the possible photocatalytic mechanism and degradation pathways of the photocatalytic process were studied, but also the product toxicity was analyzed.

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## Unrecognized role of humic acid as a reductant in accelerating fluoroquinolones oxidation by aqueous permanganate

Yang Zhou<sup>a,b</sup>, Jianpeng Hu<sup>a,b</sup>, Yuan Gao<sup>a,b,c</sup>, Yang Song<sup>c</sup>, Su-Yan Pang<sup>d</sup>, Jin Jiang<sup>a,b</sup>

<sup>a</sup>Key Laboratory for City Cluster Environmental Safety and Green Development of the Ministry of Education, Institute of Environmental and Ecological Engineering, Guangdong University of Technology, Guangzhou 510006, China

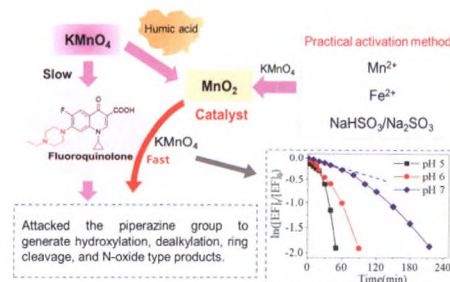
<sup>b</sup>Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou), Guangzhou 511458, China

<sup>c</sup>School of Civil and Transportation Engineering, Guangdong University of Technology, Guangzhou 510006, China

<sup>d</sup>Key Laboratory of Songliao Aquatic Environment, Ministry of Education, School of Municipal and Environmental Engineering, Jilin Jianzhu University, Changchun 130118, China

The transformation of fluoroquinolones by permanganate was greatly enhanced in the presence of humic acid or reducing agents where *in situ* formed manganese dioxide played catalytic role.

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## Phosphate-induced interfacial electronic engineering in VPO<sub>4</sub>-Ni<sub>2</sub>P heterostructure for improved electrochemical water oxidation

Kun Chen<sup>a,b</sup>, Keke Mao<sup>c</sup>, Yu Bai<sup>a</sup>, Delong Duan<sup>a</sup>, Shuangming Chen<sup>a</sup>, Chengming Wang<sup>a</sup>, Ning Zhang<sup>d</sup>, Ran Long<sup>a</sup>, Xiaojun Wu<sup>a</sup>, Li Song<sup>a</sup>, Yujie Xiong<sup>a,b</sup>

<sup>a</sup>Hefei National Laboratory for Physical Sciences at the Microscale, Frontiers Science Center for Planetary Exploration and Emerging Technologies, School of Chemistry and Materials Science, National Synchrotron Radiation Laboratory, and CAS Center for Excellence in Nanoscience, University of Science and Technology of China, Hefei 230026, China

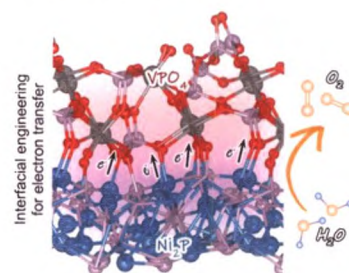
<sup>b</sup>Institute of Energy, Hefei Comprehensive National Science Center, Hefei 230031, China

<sup>c</sup>School of Energy and Environment Science, Anhui University of Technology, Maanshan 243032, China

<sup>d</sup>Department of Applied Physics, The Hong Kong Polytechnic University, Hong Kong, China

In this work, we construct a VPO<sub>4</sub>-Ni<sub>2</sub>P heterostructure electrocatalyst on nickel foam to achieve the electron transfer from Ni<sub>2</sub>P to VPO<sub>4</sub> through interfacial engineering. This electronic manipulation rationalizes the chemical affinities of various oxygen intermediates, thus enhancing the electrochemical oxygen evolution activity.

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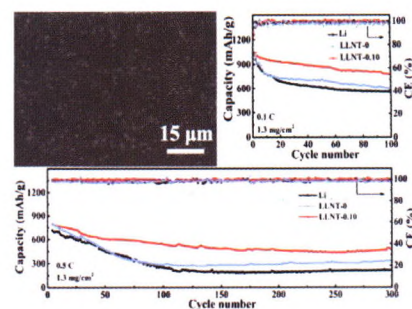
## Mitigating side reaction for high capacity retention in lithium-sulfur batteries

Yong Cai, Qi Jin, Kaixin Zhao, Xinzhi Ma, Xitian Zhang

Key Laboratory for Photonic and Electronic Bandgap Materials, Ministry of Education, School of Physics and Electronic Engineering, Harbin Normal University, Harbin 150025, China

The protective film being consisted of Nafion and  $\text{TiO}_2$  was designed to suppress the side reaction and achieve a Li anode with high capacity retention in Li-S battery.

Chinese Chemical Letters 33 (2022) 456



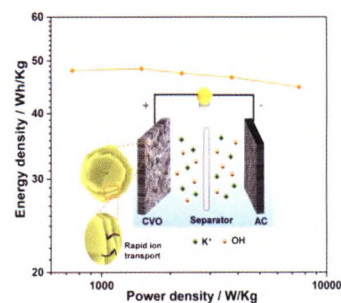
## Three-dimensional $\text{Co}_2\text{V}_2\text{O}_7 \cdot n\text{H}_2\text{O}$ superstructures assembled by nanosheets for electrochemical energy storage

Nan Li, Xiaowen Guo, Xinru Tang, Yichen Xing, Huan Pang

School of Chemistry and Chemical Engineering, Yangzhou University, Yangzhou 225009, China

Three-dimensional  $\text{Co}_2\text{V}_2\text{O}_7 \cdot n\text{H}_2\text{O}$  superstructures assembled by nanosheets were prepared by a facile hydrothermal method. And the  $\text{Co}_2\text{V}_2\text{O}_7 \cdot n\text{H}_2\text{O}$  hierarchical structure exhibits good electrochemical performance, which probably is that the hierarchical structures with sufficient interior space preserves the original sheet-like dimensional components and results in sufficient active sites and efficient mass diffusion.

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## A benzo[ghi]perylene triimide based double-cable conjugated polymer for single-component organic solar cells

Dan Wang<sup>a,b</sup>, Zhaofan Yang<sup>b</sup>, Feng Liu<sup>a,c</sup>, Chengyi Xiao<sup>b</sup>, Yonggang Wu<sup>a</sup>, Weiwei Li<sup>b</sup>

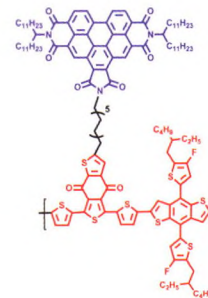
<sup>a</sup> College of Chemistry and Environmental Science, Hebei University, Baoding 071002, China

<sup>b</sup> Beijing Advanced Innovation Center for Soft Matter Science and Engineering & State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, Beijing 100029, China

<sup>c</sup> College of Basic Medicine, Hebei University, Baoding 071002, China

A double-cable conjugated polymer based on benzo[ghi]perylene triimide as side units has been developed for single-component organic solar cells, in which an efficiency of 2.15% was obtained.

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## SbPS<sub>4</sub>: A novel anode for high-performance sodium-ion batteries

Miao Yang<sup>a,b</sup>, Zhonghui Sun<sup>c</sup>, Ping Nie<sup>d</sup>, Haiyue Yu<sup>b</sup>, Chende Zhao<sup>b</sup>, Mengxuan Yu<sup>b</sup>, Zhongzhen Luo<sup>e</sup>, Hongbo Geng<sup>a</sup>, Xinglong Wu<sup>b,f</sup>

<sup>a</sup> School of Materials Engineering, Changshu Institute of Technology, Changshu 215500, China

<sup>b</sup> Faculty of Chemistry, Northeast Normal University, Changchun 130024, China

<sup>c</sup> Center for Advanced Analytical Science, School of Chemistry and Chemical Engineering, Guangzhou University, Guangzhou 510006, China

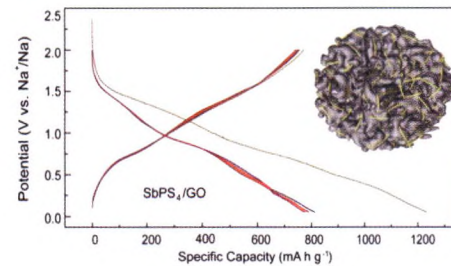
<sup>d</sup> Key Laboratory of Preparation and Application of Environmental Friendly Materials (Jilin Normal University), Ministry of Education, Changchun 130103, China

<sup>e</sup> Key Laboratory of Eco-materials Advanced Technology, College of Materials Science and Engineering, Fuzhou University, Fuzhou 350108, China

<sup>f</sup> Key Laboratory for UV Light-Emitting Materials and Technology, Northeast Normal University, Ministry of Education, Changchun 130024, China

In this study, the SbPS<sub>4</sub> tube cluster has been prepared by the method of sealing tube calcination. The nanometerization of SbPS<sub>4</sub> tube composite with graphene oxide exhibits excellent Na-storage performance. This study provides a strategy for the application of thiophosphate as an advanced anode for sodium-ion batteries.

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## One-step synthesis of hierarchical Ni<sub>3</sub>Se<sub>2</sub> nanosheet-on-nanorods/Ni foam electrodes for hybrid supercapacitors

Fangshuai Chen<sup>a</sup>, Yanan Chen<sup>c</sup>, Qing Han<sup>a</sup>, Liangti Qu<sup>b</sup>

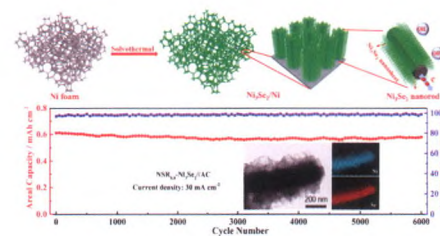
<sup>a</sup>Key Laboratory of Cluster Science Ministry of Education of China, Key Laboratory of Photoelectronic/Electrophotonic Conversion Materials, School of Chemistry and Chemical Engineering, Beijing Institute of Technology, Beijing 100081, China

<sup>b</sup>The Key Laboratory of Organic Optoelectronics & Molecular Engineering of Ministry of Education, Department of Chemistry, Tsinghua University, Beijing, 100084 China

<sup>c</sup>School of Materials Science and Engineering, Key Laboratory of Advanced Ceramics and Machining Technology of Ministry of Education, Tianjin Key Laboratory of Composite and Functional Materials, Tianjin University, Tianjin 300072, China

A hierarchical Ni<sub>3</sub>Se<sub>2</sub> nanosheet-on-nanorods core-shell structure functioning as a freestanding electrode material for hybrid supercapacitors was fabricated by a facile three-dimensional Ni foam substrate-assisted confinement assembly method, which showed efficient and robust capacitor performance.

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## B-incorporated, N-doped hierarchically porous carbon nanosheets as anodes for boosted potassium storage capability

Yu Hu<sup>a</sup>, Cheng Tang<sup>b</sup>, Haitao Li<sup>a</sup>, Aijun Du<sup>b</sup>, Wei Luo<sup>d</sup>, Minghong Wu<sup>c</sup>, Haijiao Zhang<sup>a</sup>

<sup>a</sup>Institute of Nanochemistry and Nanobiology, Shanghai University, Shanghai 200444, China

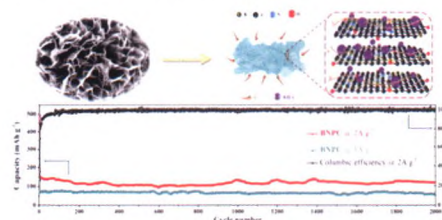
<sup>b</sup>School of Chemistry, Physics and Mechanical Engineering, Science and Engineering Faculty, Queensland University of Technology, Brisbane QLD 4001, Australia

<sup>c</sup>School of Environmental and Chemical Engineering, Shanghai University, Shanghai 200444, China

<sup>d</sup>State Key Laboratory for Modification of Chemical Fibers and Polymer Materials, College of Materials Science and Engineering, Donghua University, Shanghai 201620, China

B,N co-doped hierarchically porous carbon nanosheets (BNPC) have been ingeniously designed via a facile hard-templating route and simple carbonization process. Thanks to unique structural advantages, the as-prepared BNPC anode shows an excellent electrochemical performance for potassium storage, as verified by the density functional theory calculations and experimental results.

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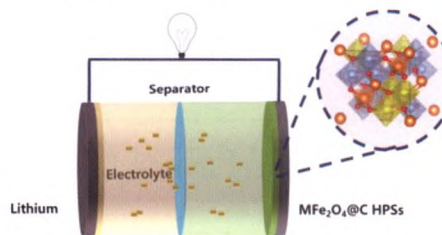
## Mixed transition-metal oxides@carbon core-shell nanostructures derived from heterometallic clusters for enhanced lithium storage

Yanting Chu, Shenglin Xiong

School of Chemistry and Chemical Engineering, State Key Laboratory of Crystal Materials, Shandong University, Ji'nan 250100, China

A general strategy is developed to fabricate hierarchical porous structure (HPS) composed of MFe<sub>2</sub>O<sub>4</sub> nanoparticles encapsulated by carbon shell (M = Co, Mn, Ni, Zn) (denoted as MFe<sub>2</sub>O<sub>4</sub>@C HPS) through pyrolysis of the bifunctional heterometallic Fe<sub>2</sub>M clusters. The MFe<sub>2</sub>O<sub>4</sub>@C HPS showed outstanding rate performance and cycling stability as anodes for lithium-ion batteries (LIBs).

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## Ru single atoms induce surface-mediated discharge in Na-O<sub>2</sub> batteries

Xin Jin<sup>a</sup>, Yangyang Li<sup>a</sup>, Shuo Zhang<sup>a</sup>, Jiangwei Zhang<sup>b</sup>, Zihan Shen<sup>a</sup>, Chenlin Zhong<sup>a</sup>, Ziqiang Cai<sup>a</sup>, Chaoquan Hu<sup>c,d</sup>, Huigang Zhang<sup>a,c</sup>

<sup>a</sup>National Laboratory of Solid State Microstructures, Collaborative Innovation Center of Advanced Microstructures, College of Engineering and Applied Sciences, Nanjing University, Nanjing 210093, China

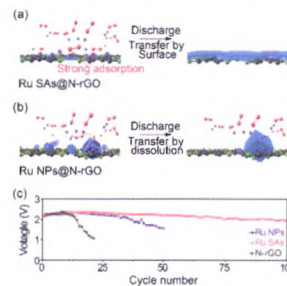
<sup>b</sup>Dalian National Laboratory for Clean Energy & State Key Laboratory of Catalysis, Dalian Institute of Chemical Physics, Chinese Academy of Sciences (CAS), Dalian 116023, China

<sup>c</sup>State Key Laboratory of Multiphase Complex Systems, Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, China

<sup>d</sup>Nanjing IPE Institute of Green Manufacturing Industry, Nanjing 211100, China

Abundant Ru single atoms induce the co-deposition of the products via a surface-mediated mechanism, which helps Na-O<sub>2</sub> batteries to be cycled reversibly more than 100 times.

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## Automated and remote synthesis of poly(ethylene glycol)-mineralized ZIF-8 composite particles via a synthesizer assisted by femtosecond laser micromachining

Miao Wu<sup>a,b,c</sup>, Lingling Xia<sup>a</sup>, Yucen Li<sup>a</sup>, Difeng Yin<sup>d,e</sup>, Jianping Yu<sup>d,e</sup>, Wenbo Li<sup>d,e</sup>, Ning Wang<sup>f</sup>, Xin Li<sup>a</sup>, Jiwei Cui<sup>f</sup>, Wei Chu<sup>a,c</sup>, Ya Cheng<sup>a,b,c,d,e</sup>, Ming Hu<sup>a</sup>

<sup>a</sup>School of Physics and Electronic Science, East China Normal University, Shanghai 200241, China

<sup>b</sup>State Key Laboratory of Precision Spectroscopy, School of Physics and Electronic Science, East China Normal University, Shanghai 200241 China

<sup>c</sup>XXL – The Extreme Optoelectromechanics Laboratory, School of Physics and Electronic Science, East China Normal University, Shanghai 200241 China

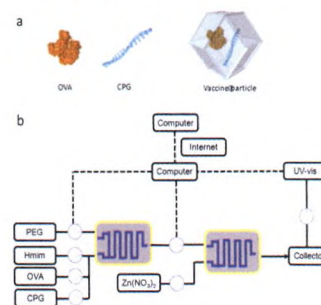
<sup>d</sup>State Key Laboratory of High Field Laser Physics and CAS Center for Excellence in Ultra-intense Laser Science, Shanghai Institute of Optics and Fine Mechanics (SIOM), Chinese Academy of Sciences (CAS), Shanghai 201800, China

<sup>e</sup>University of Chinese Academy of Sciences, Beijing 100049, China

<sup>f</sup>Key Laboratory of Colloid and Interface Chemistry of the Ministry of Education, School of Chemistry and Chemical Engineering, Shandong University, Ji'nan 250100, China

Automated and remote synthesis of poly(ethylene glycol)-mineralized ZIF-8 composite particles has been realized.

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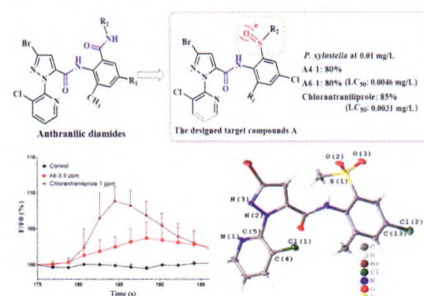
## Synthesis and insecticidal evaluation of novel sulfide-containing amide derivatives as potential ryanodine receptor modulators

Yan Zhang, Yuxin Li, Huan Li, Junfeng Shang, Zhengming Li, Baolei Wang

State Key Laboratory of Elemento-Organic Chemistry, College of Chemistry, Nankai University, Tianjin 300071, China

Novel sulfide-containing amide derivatives were synthesized via a strategy of modifying the "amide" structure of anthranilic diamide insecticides, and exhibited favorable insecticidal activities and potential ryanodine receptor (RyR) modulating actions.

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## (±)-Pyriindolin with a 2,2'-bipyridine-spiro[furan-3, 3'-indoline] chimeric skeleton from the endophytic *Streptomyces albolongus* EA12432

Mengmeng Lan<sup>a</sup>, Tongxu Cui<sup>a</sup>, Kaichun Xia<sup>a</sup>, Guodong Cui<sup>a</sup>, Yiwen Chu<sup>c</sup>, Peng Fu<sup>a,b</sup>, Weiming Zhu<sup>a,b</sup>

<sup>a</sup>Key Laboratory of Marine Drugs, Ministry of Education of China, School of Medicine and Pharmacy, Ocean University of China, Qingdao 266003, China

<sup>b</sup>Laboratory for Marine Drugs and Bioproducts, Pilot National Laboratory for Marine Science and Technology (Qingdao), Qingdao 266237, China

<sup>c</sup>School of Pharmacy, Chengdu University, Chengdu 610106, China

(±)-Pyriindolin (**1**) with a rare molecular backbone formed by fusing a 2,2'-bipyridine nucleus into a spiro[furan-3,3'-indoline] skeleton was isolated from the *Streptomyces albolongus* EA12432. (+)- and (−)-Pyriindolins displayed moderate cytotoxicity against HCT-116 cell line with the IC<sub>50</sub> values of 2.89 ± 0.17 μmol/L and 4.47 ± 0.26 μmol/L, respectively.

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## Discovery of daspyromycins A and B, 2-aminovinyl-cysteine containing lanthipeptides, through a genomics-based approach

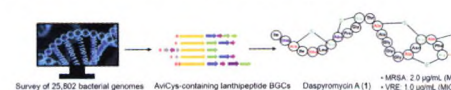
Jing Shi<sup>a</sup>, Jia-Qi Ma<sup>a</sup>, Yong-Chao Wang<sup>a</sup>, Zi-Fei Xu<sup>a</sup>, Bo Zhang<sup>a</sup>, Rui-Hua Jiao<sup>a</sup>, Ren-Xiang Tan<sup>a</sup>, Hui-Ming Ge<sup>a,b</sup>

<sup>a</sup>State Key Laboratory of Pharmaceutical Biotechnology, Institute of Functional Biomolecules, School of Life Sciences, Nanjing University, Nanjing 210023, China

<sup>b</sup>Chemistry and Biomedicine Innovation Center (ChemBIC), Nanjing University, Nanjing 210023, China

Two new 2-aminovinyl-cysteine (AviCys)-containing lanthipeptides were discovered and characterized through survey of 25,802 bacterial genomes. Both compounds exhibit potent antibacterial activities against a spectrum of bacteria including methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococci* (VRE).

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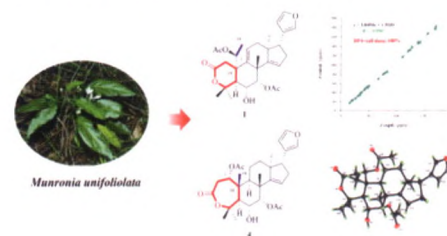
## Mufolinin A, an unprecedented ring A-seco 10-ethylimonoid from *Munronia unifoliolata*

Yunpeng Sun, Letian Cui, Qirong Li, Pengfei Tang, Yongyi Li, Wenjun Xu, Jun Luo, Lingyi Kong

Jiangsu Key Laboratory of Bioactive Natural Product Research and State Key Laboratory of Natural Medicines, School of Traditional Chinese Pharmacy, China Pharmaceutical University, Nanjing 210009, China

An unprecedented ring A rearranged limonoid with a unique ethyl group at C-10 and novel 6/6/6/5 fused-ring skeleton, mufolinin A (**1**), together with three new potential precursors (ring A-seco limonoids, **2-4**) were isolated from *Munronia unifoliolata*.

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## In-situ monitoring of nitrile-bearing pesticide residues by background-free surface-enhanced Raman spectroscopy

Guorui Wu<sup>a,c</sup>, Wenshuai Li<sup>c</sup>, Weijun Du<sup>a</sup>, Aiqin Yue<sup>a</sup>, Jinzhong Zhao<sup>b</sup>, Dingbin Liu<sup>c</sup>

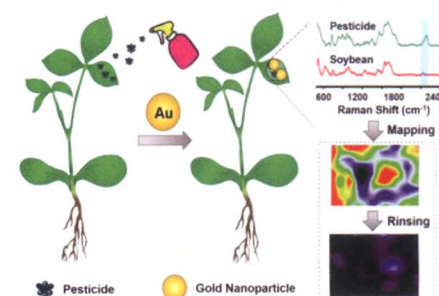
<sup>a</sup> College of Agronomy, Shanxi Agricultural University, Taigu 030801, China

<sup>b</sup> College of Arts and Sciences, Shanxi Agricultural University, Taigu 030801, China

<sup>c</sup> State Key Laboratory of Medicinal Chemical Biology, Research Center for Analytical Sciences, and Tianjin Key Laboratory of Biosensing and Molecular Recognition, College of Chemistry, Nankai University, Tianjin 300071, China

This study proposed a background-free surface-enhanced Raman spectroscopy (bf-SERS) system to non-destructively monitor the dynamic accumulation of nitrile-bearing pesticides in soybean leaves.

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## Quantum interference enhanced thermopower in single-molecule thiophene junctions

Hang Chen<sup>a</sup>, Yaorong Chen<sup>a</sup>, Hewei Zhang<sup>a</sup>, Wenqiang Cao<sup>a</sup>, Chao Fang<sup>a</sup>, Yicheng Zhou<sup>b</sup>, Zongyuan Xiao<sup>a</sup>, Jia Shi<sup>a</sup>, Wenbo Chen<sup>b</sup>, Junyang Liu<sup>a</sup>, Wenjing Hong<sup>a,c</sup>

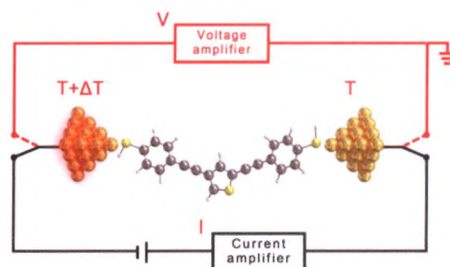
<sup>a</sup> State Key Laboratory of Physical Chemistry of Solid Surfaces, iChem, College of Chemistry and Chemical Engineering, Xiamen University, Xiamen 361005, China

<sup>b</sup> Shanghai Key Laboratory of Materials Protection and Advanced Materials in Electric Power, Shanghai University of Electric Power, Shanghai 200090, China

<sup>c</sup> Beijing National Laboratory for Molecular Sciences, Beijing 100190, China

The charge and heat transport through single-molecule thiophene junctions were studied using the scanning tunneling microscope break junction technique. The results suggest that the quantum interference effect can enhance thermopower in molecular junctions.

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## Defect engineering for high-selection-performance of NO reduction to NH<sub>3</sub> over CeO<sub>2</sub> (111) surface: A DFT study

Chaozheng He<sup>a,b</sup>, Risheng Sun<sup>a,b</sup>, Ling Fu<sup>c</sup>, Jinrong Huo<sup>d</sup>, Chenxu Zhao<sup>a,b</sup>, Xiuyuan Li<sup>a,b</sup>, Yan Song<sup>a,b</sup>, Sumin Wang<sup>a,b</sup>

<sup>a</sup> Shaanxi Key Laboratory of Optoelectronic Functional Materials and Devices, School of Materials Science and Chemical Engineering, Xi'an Technological University, Xi'an 710021, China

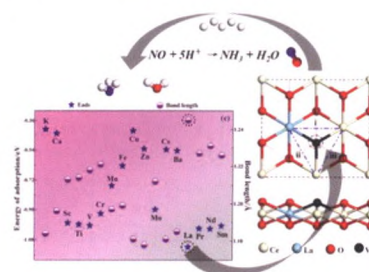
<sup>b</sup> Institute of Environmental and Energy Catalysis, School of Materials Science and Chemical Engineering, Xi'an Technological University, Xi'an 710021, China

<sup>c</sup> College of Resources and Environmental Engineering, Tianshui Normal University, Tianshui 741001, China

<sup>d</sup> School of Sciences, Xi'an Technological University, Xi'an 710021, China

In our work, the rational regulation of doping-vacancy defects synergistically affects the capturing NO molecule and effectively reduces the energy barrier of ammonia synthesis.

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## Epitaxial etching of organic single crystals

Cong Zhang<sup>a,b</sup>, Daizong Ji<sup>a,b</sup>, Lang Jiang<sup>c</sup>, Yunqi Liu<sup>b</sup>, Dacheng Wei<sup>a,b</sup>

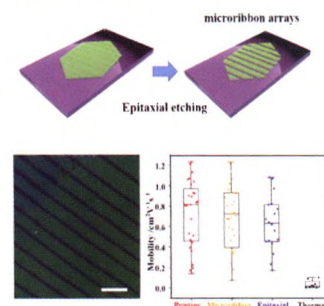
<sup>a</sup>State Key Laboratory of Molecular Engineering of Polymers, Department of Macromolecular Science, Fudan University, Shanghai 200433, China

<sup>b</sup>Institute of Molecular Materials and Devices, Fudan University, Shanghai 200433, China

<sup>c</sup>Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China

In this work, an epitaxial etching strategy to subtractively manufacture the OSCs into microribbon arrays has been developed. After the etched, a fine crystallinity and the electrical performance of resulting materials have still maintained.

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## Near UV luminescent Cs<sub>2</sub>NaBi<sub>0.75</sub>Sb<sub>0.25</sub>Cl<sub>6</sub> perovskite colloidal nanocrystals with high stability

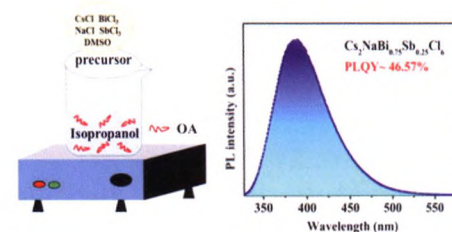
Huixian Yang<sup>a</sup>, Yanmei Guo<sup>a</sup>, Guoning Liu<sup>a</sup>, Ruowei Song<sup>a</sup>, Jinxi Chen<sup>a</sup>, Yongbing Lou<sup>a</sup>, Yixin Zhao<sup>b</sup>

<sup>a</sup>School of Chemistry and Chemical Engineering, Jiangsu Key Laboratory for Science and Application of Molecular Ferroelectrics, Jiangsu Engineering Laboratory of Smart Carbon-Rich Materials and Devices, Southeast University, Nanjing 211189, China

<sup>b</sup>School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai 200240, China

Cs<sub>2</sub>NaBiCl<sub>6</sub> and Cs<sub>2</sub>NaBi<sub>0.75</sub>Sb<sub>0.25</sub>Cl<sub>6</sub> nanocrystals were firstly synthesized using a room temperature ligand-assisted reprecipitation method with high PLQY and stability.

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## Highly selective and turn-on fluorescence probe with red shift emission for naked-eye detecting Al<sup>3+</sup> and Ga<sup>3+</sup> based on metal-organic framework

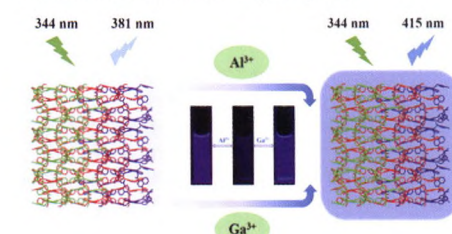
Linhui Wu<sup>a</sup>, Shuli Yao<sup>a</sup>, Hui Xu<sup>a</sup>, Tengfei Zheng<sup>a</sup>, Suijun Liu<sup>a</sup>, Jinglin Chen<sup>a</sup>, Na Li<sup>b</sup>, Herui Wen<sup>a</sup>

<sup>a</sup>School of Chemistry and Chemical Engineering, Jiangxi University of Science and Technology, Ganzhou 341000, China

<sup>b</sup>School of Materials Science and Engineering, Tianjin Key Laboratory of Metal and Molecule-Based Material Chemistry, Nankai University, Tianjin 300350, China

A novel Zn<sup>II</sup>-based MOF could selectively and sensitively recognize Al<sup>3+</sup> and Ga<sup>3+</sup> through fluorescence enhancement effect along with a relatively large red shift. Significantly, the MOF is the second turn-on MOF fluorescent sensor toward Ga<sup>3+</sup>.

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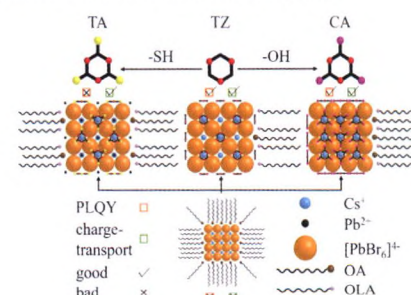
## Molecular engineering of s-triazine and its derivatives applied in surface modification strategy for enhancing photoelectric performance of all-inorganic perovskites

Yifei Yue, Shengnan Liu, Ning Zhang, Zhongmin Su, Dongxia Zhu

Key Laboratory of Nanobiosensing and Nanobioanalysis at Universities of Jilin Province, Department of Chemistry, Northeast Normal University, Changchun 130024, China

The s-triazine (TZ) as conjugated organic ligand can enhance the luminescence performance of all-inorganic perovskites (AIP) by reducing the surface defects and increasing the exciton binding energy, and improve the charge-transport property of AIP via intermolecular  $\pi$ - $\pi$  interaction and lowering the density of oleic acid (OA) and oleylamine (OLA) on the surface of AIP. Meanwhile, the completely different surface modification results of cyanuric acid (CA) and trithiocyanuric acid (TA) has shown the effectiveness of the improving the photoelectric performances and also indicated the potential risk of reducing PLQY of AIP based on conjugated organic ligands either at the same time.

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## Indium-organic framework CPP-3(In) derived Ag/In<sub>2</sub>O<sub>3</sub> porous hexagonal tubes for H<sub>2</sub>S detection at low temperature

Sihan Li<sup>a,b</sup>, Lili Xie<sup>c</sup>, Guifang Luo<sup>c</sup>, Yutong Han<sup>a</sup>, Ming Zhou<sup>c</sup>, Rawat Jaisutti<sup>d,e</sup>, Zhigang Zhu<sup>a,c</sup>

<sup>a</sup>School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology, Shanghai 200093, China

<sup>b</sup>Shanghai Normal University Tianhua College, Shanghai 201815, China

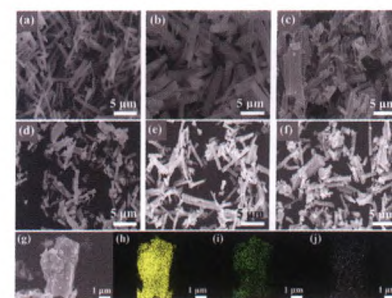
<sup>c</sup>School of Environmental and Materials Engineering, College of Engineering, Shanghai Polytechnic University, Shanghai 201209, China

<sup>d</sup>Department of Physics, Faculty of Science and Technology, Thammasat University, Pathumthani 12120, Thailand

<sup>e</sup>Thammasat Research Unit in Innovative Sensor and Nanoelectronic Devices, Thammasat University, Pathumthani 12120, Thailand

A novel Ag/In<sub>2</sub>O<sub>3</sub> porous hexagonal tubes were designed and synthesized by calcining Ag<sup>+</sup>-impregnated CPP-3(In) precursors. The response of Ag/In<sub>2</sub>O<sub>3</sub> (2.5 wt%) sensor to 5 ppm H<sub>2</sub>S has highest response of 119, and the optimal operating temperature is only 70 °C.

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## Ultrathin Ti<sub>3</sub>C<sub>2</sub> nanowires derived from multi-layered bulks for high-performance hydrogen evolution reaction

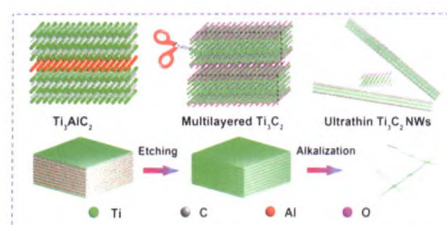
Weiwei Zhao<sup>a</sup>, Beibei Jin<sup>a</sup>, Longlu Wang<sup>b</sup>, Chengbo Ding<sup>a</sup>, Mengyue Jiang<sup>a</sup>, Tiantian Chen<sup>a</sup>, Shuaihang Bi<sup>a</sup>, Shujuan Liu<sup>a</sup>, Qiang Zhao<sup>a,b</sup>

<sup>a</sup>Key Laboratory for Organic Electronics and Information Displays & Jiangsu Key Laboratory for Biosensors, Institute of Advanced Materials (IAM) Nanjing University of Posts & Telecommunications (NUPT), Nanjing 210023, China

<sup>b</sup>College of Electronic and Optical Engineering & College of Microelectronics, Institute of Flexible Electronics (Future Technology) Nanjing University of Posts & Telecommunications (NUPT), Nanjing 210023 China

The ultrathin and monodispersed Ti<sub>3</sub>C<sub>2</sub> nanowires (NWs) were synthesized through a facile alkalization strategy. The scissor role of OH<sup>-</sup> can rationally tailor the multilayer Ti<sub>3</sub>C<sub>2</sub> (m-Ti<sub>3</sub>C<sub>2</sub>) bulks into 1D NWs under stirring forces, in which the improved defect sites and ion accessibility can indirectly facilitate the interaction between Ti<sub>3</sub>C<sub>2</sub> NWs and H<sup>+</sup>, and thus delivering an enhanced hydrogen evolution reaction activity.

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## A synergy establishment by metal-organic framework and carbon quantum dots to enhance electrochemical water oxidation

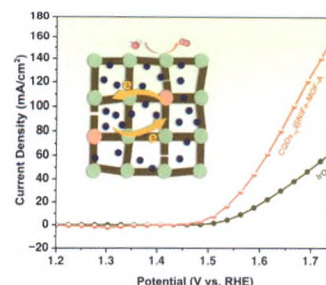
Qiuxiang Mou<sup>a</sup>, Xuan Wang<sup>a</sup>, Zhenhang Xu<sup>b</sup>, Pnur Zul<sup>a</sup>, Erlei Li<sup>a</sup>, Pingping Zhao<sup>a</sup>, Xinghai Liu<sup>a</sup>, Houbin Li<sup>a</sup>, Gongzhen Cheng<sup>b</sup>

<sup>a</sup>School of Printing and Packaging, Wuhan University, Wuhan 430072, China

<sup>b</sup>College of Chemistry and Molecular Sciences, Wuhan University, Wuhan 430072, China

A strategy of integrating porous NiFe-MOF with conductive carbon quantum dots (CQDs) was employed to enhance conductivity of the catalysts. The as-prepared CQDs<sub>10</sub>@NiFe-MOF-A exhibited outstanding OER performances with high mass activity of 91.6 A/g and robust durability of 10000 cycles in 1 mol/L KOH, which outperformed that of noble catalyst IrO<sub>2</sub> of 25.2 A/g.

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## Rational construction and triethylamine sensing performance of foam shaped α-MoO<sub>3</sub>@SnS<sub>2</sub> nanosheets

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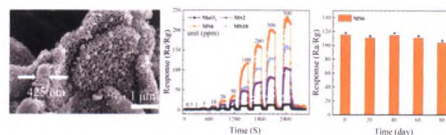
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Herein, foam shaped α-MoO<sub>3</sub>@SnS<sub>2</sub> composites were obtained via a two-step hydrothermal method wherein the thickness of the SnS<sub>2</sub> shells was manipulated by controlling the second hydrothermal reaction time. The sensor based on α-MoO<sub>3</sub>@SnS<sub>2</sub> nanosheets displays a high response of 114.9 towards 100 ppm triethylamine (TEA) at the working temperature of 175 °C.

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