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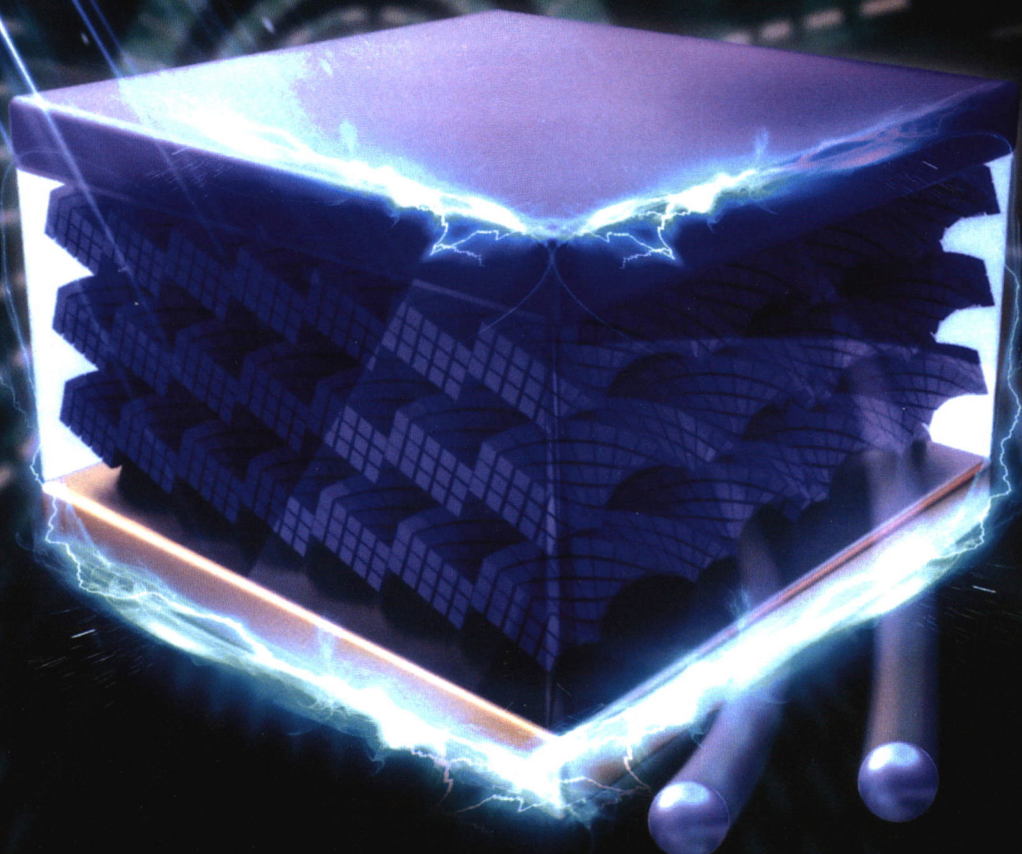
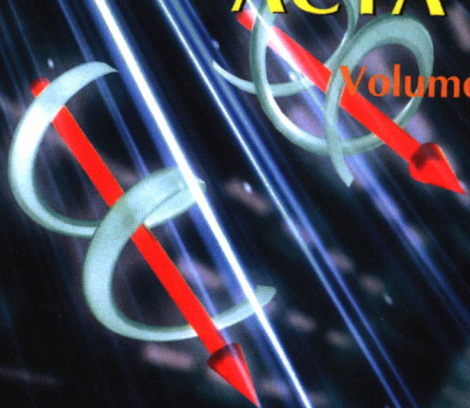


ISSN 0567-7351  
CN 31-1320/O6  
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# 化学学报

## ACTA CHIMICA SINICA

Volume 80 Number 7 July 2022



ISSN 0567-7351  
07>  
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中国化学会  
中国科学院上海有机化学研究所 主办

# 化学学报

Acta Chimica Sinica

(Huaxue Xuebao)

第 80 卷 第 7 期 2022 年 7 月 15 日

## 目次

### 研究通讯

基于 Li-N<sub>2</sub> 电池体系的“连续式”氮气还原合成氨……马行宇, 孙晖\*, 李江, 刘之洋, 周红军, 化学学报, 2022, 80(7), 861-866

### 研究论文

MOF 基 Pd 单位点催化 CO 酯化制碳酸二甲酯……谢晨帆, 徐玉平, 高明亮, 徐忠宁, 江海龙\*, 化学学报, 2022, 80(7), 867-873

<sup>15</sup>N 同位素标记的金属氮化物内嵌富勒烯的合成与表征……邱玲, 梁家艺, 张竹霞\*, 王太山\*, 化学学报, 2022, 80(7), 874-878

HCDs@MIL-100(Fe) 吸附剂的制备及其苯吸附性能研究……刘芳, 潘婷婷, 任秀蓉, 鲍卫仁, 王建成, 胡江亮\*, 化学学报, 2022, 80(7), 879-887

碱土金属 Be<sub>n</sub> (n=1~3) 对 B<sub>12</sub> 团簇结构的调控研究……李海茹\*, 张层, 李思殿, 化学学报, 2022, 80(7), 888-895

金属有机框架衍生的空心碳纳米笼的结构调控与锂硫电池性能研究……何家伟, 焦柳, 程雪怡, 陈光海, 吴强\*, 王喜章, 杨立军, 胡征\*, 化学学报, 2022, 80(7), 896-902

W 掺杂多级孔 SiO<sub>2</sub> 纳米球负载 Pt 用于催化甘油氢解制 1,3-丙二醇……曾杨, 姜兰, 张晓昕, 谢颂海, 裴燕, 乔明华\*, 李振华, 徐华龙, 范康年, 宗保宁\*, 化学学报, 2022, 80(7), 903-912

聚合诱导自组装制备多腔室囊泡以及成核链段中亲溶剂片段的影响……Kadir Khanov Jamshid, 钟峰\*, 张文建, 洪春雁\*, 化学学报, 2022, 80(7), 913-920

聚乙烯醇调控水溶性共轭聚噻吩的光学性质……齐子朋, 高冬, 朱志成, 贺志远\*, 白国英\*, 化学学报, 2022, 80(7), 921-928

基于联苯酚骨架的新型圆偏振发光材料的合成及性能探究……刘斌, 陈磅宽\*, 化学学报, 2022, 80(7), 929-935

基于吸收互补有机半导体本体复合薄膜的高性能柔性光突触晶体管……孙嘉贤, 刘禹廷, 尹志刚\*, 郑庆东, 化学学报, 2022, 80(7), 936-945

基于 ZIF-8/PAN 复合薄膜的柔性丙酮气体传感器……牛犇, 翟振宇, 郝肖柯, 任婷莉, 李从举\*, 化学学报, 2022, 80(7), 946-955

### 综述

芳基锡烷的合成研究进展……岳广禄, 魏婧瑶, 邱頔\*, 莫凡洋\*, 化学学报, 2022, 80(7), 956-969

手性有机光电功能材料及其圆偏振光发射与探测……刘丽萱, 杨扬, 魏志祥\*, 化学学报, 2022, 80(7), 970-992

有机太阳能电池性能衰减机理研究进展……刘彦甫, 李世麟, 荆亚楠, 肖林格, 周惠琼\*, 化学学报, 2022, 80(7), 993-1009

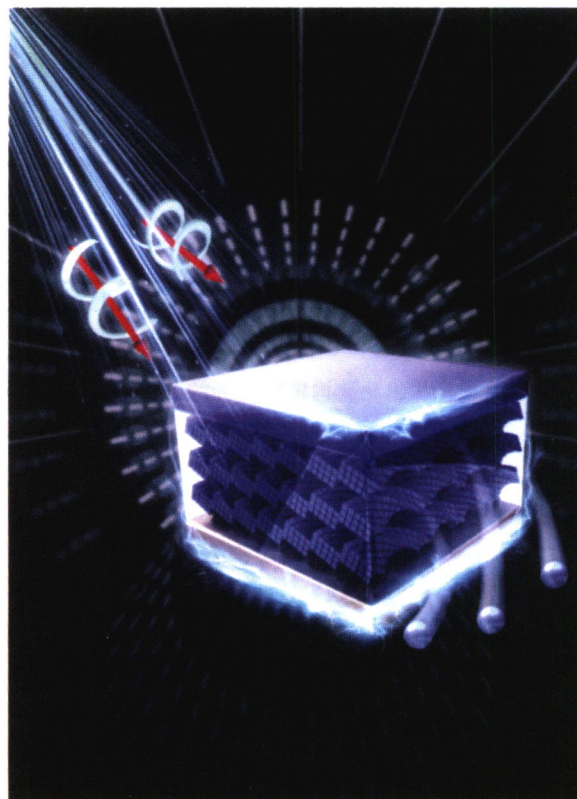
胶体粒子的机械性能调控及其在药物递送中的应用……高至亮, 李梦琦, 郝京诚, 崔基炜\*, 化学学报, 2022, 80(7), 1010-1020

类玻璃高分子的再加工……何恩健, 姚艳锦, 张宇白, 危岩, 吉岩\*, 化学学报, 2022, 80(7), 1021-1041

电子导电金属有机框架薄膜的研究进展……曹琳安\*, 魏敏, 化学学报, 2022, 80(7), 1042-1056

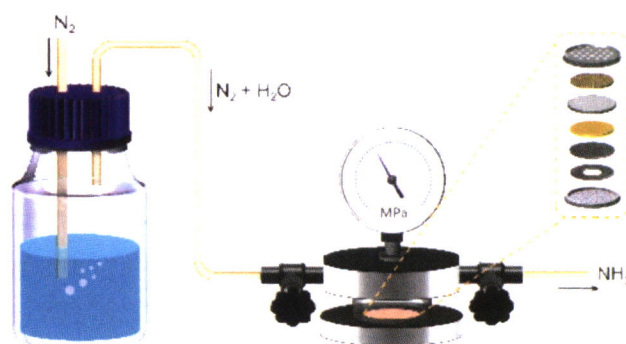
\* 通信联系人.

**On the cover:** The incorporation of chirality into organic semi-conducting materials can not only control their aggregation states by virtue of the unique non-covalent interactions among chiral molecules to regulate electronic/optoelectronic properties, but also facilitates the emergence and development of circularly polarized light direct luminescence and detection. This review summarizes the research progress of chiral organic optoelectronic materials and devices in recent years, aiming to promote the development of relevant research in the field of chiral optoelectronics. [Wei, Zhixiang *et al.* on page 970-992.]



### Communication

#### “Continuous” Nitrogen Reduction Synthesis of Ammonia Based on Li-N<sub>2</sub> Battery System

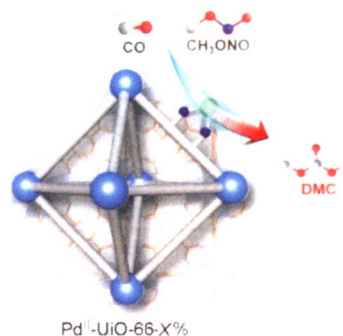


Ma, Xingyu; Sun, Hui\*; Li, Jiang; Liu, Zhiyang; Zhou, Hongjun

*Acta Chim. Sinica* **2022**, *80*(7), 861-866

This work, innovatively combining Li-N<sub>2</sub> battery and Li-mediated N<sub>2</sub> reduction, not only utilizes the discharge reaction to fix N<sub>2</sub>, but also co-reacts Li, N<sub>2</sub> and proton source (H<sub>2</sub>O here) to produce NH<sub>3</sub>. During the discharge process, NH<sub>3</sub> generates continuously when N<sub>2</sub> and H<sub>2</sub>O are fed together through the gas diffusion layer in the cathode, and the discharge potential in experiment is close to the theoretical value.

### MOF-Stabilized Pd Single Sites for CO Esterification to Dimethyl Carbonate

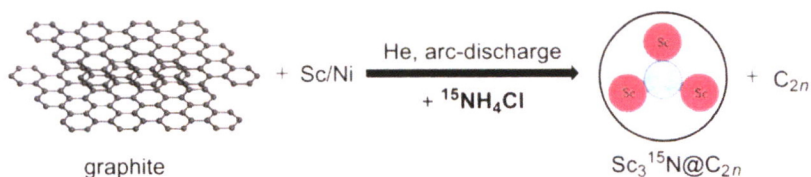


Xie, Chenfan; Xu, Yu-Ping; Gao, Ming-Liang; Xu, Zhong-Ning; Jiang, Hai-Long\*

*Acta Chim. Sinica* 2022, 80(7), 867-873

The Pd<sup>II</sup>-UiO-66-X% is fabricated and exhibits high dimethyl carbonate (DMC) selectivity and stability in the reaction of CO esterification reaction, thanks to the good dispersion and strong interaction of Pd(II) and the metal-organic framework (MOF) support.

### Synthesis and Characterizations of <sup>15</sup>N Isotope Labeling Metal Nitride Clusterfullerene

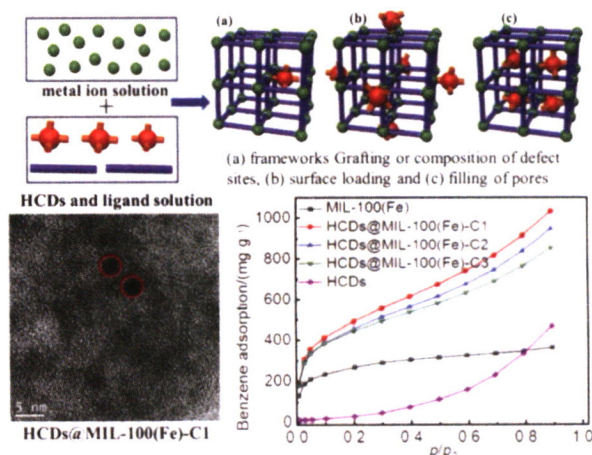


Qiu, Ling; Liang, Jiayi; Zhang, Zhuxia\*; Wang, Taishan\*

*Acta Chim. Sinica* 2022, 80(7), 874-878

<sup>15</sup>N-labeled metal nitride clusterfullerenes were prepared by the Krätschmer-Huffman arc-discharge method. The prepared <sup>15</sup>N-labeled metal nitride clusterfullerenes contain more than 98% of the <sup>15</sup>N isotope. In the preparation process, <sup>15</sup>NH<sub>4</sub>Cl is used as a solid nitrogen source. We separated and characterized Sc<sub>3</sub><sup>15</sup>N@C<sub>80</sub> by matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry, ultraviolet-visible (UV-Vis) absorption spectroscopy and carbon-13 nuclear magnetic resonance spectroscopy (<sup>13</sup>C NMR), demonstrating the existence of <sup>15</sup>N and I<sub>h</sub>-C<sub>80</sub> carbon cage for Sc<sub>3</sub><sup>15</sup>N@C<sub>80</sub>.

### Research on Preparation and Benzene Adsorption Performance of HCDs@MIL-100(Fe) Adsorbents



Liu, Fang; Pan, Tingting; Ren, Xiurong; Bao, Weiren; Wang, Jiancheng; Hu, Jiangliang\*

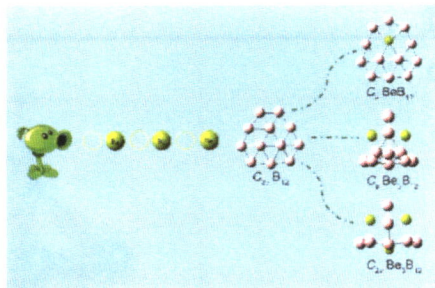
*Acta Chim. Sinica* 2022, 80(7), 879-887

Hydrophobic carbon dots (HCDs) interact with the metal sites of MIL-100(Fe), leading to the generation of defect sites; HCD is also loaded on the crystal surface to form a tight interfacial layer with the MIL-100(Fe) crystal. In addition, HCDs are packed into mesoporous channels. Through these interactions, HCDs successfully combined with MIL-100(Fe) to prepare hierarchical porous composite adsorbents with high specific surface area and high benzene adsorption capacity.

### Study on the Regulation of Alkali-earth Metal $Be_n$ ( $n = 1 \sim 3$ ) on the Structure of $B_{12}$ Clusters

Li, Hairu\*; Zhang, Ceng; Li, Sidian

*Acta Chim. Sinica* 2022, 80(7), 888-895

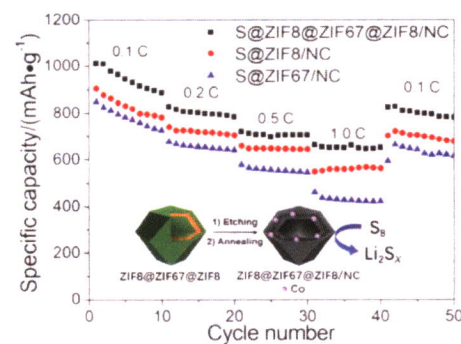


The quasi-planar  $C_{3v} BeB_{12}$  cluster gradually transformed into the quasi-planar  $C_s BeB_{12}$  and the cage-like structures  $C_s Be_2B_{12}$  and  $C_{2v} Be_3B_{12}$  with the increase of the number of Be atoms.

### Structural Regulation of Metal Organic Framework-derived Hollow Carbon Nanocages and Their Lithium-Sulfur Battery Performance

He, Jiawei; Jiao, Liu; Cheng, Xueyi; Chen, Guanghai; Wu, Qiang\*; Wang, Xizhang; Yang, Lijun; Hu, Zheng\*

*Acta Chim. Sinica* 2022, 80(7), 896-902



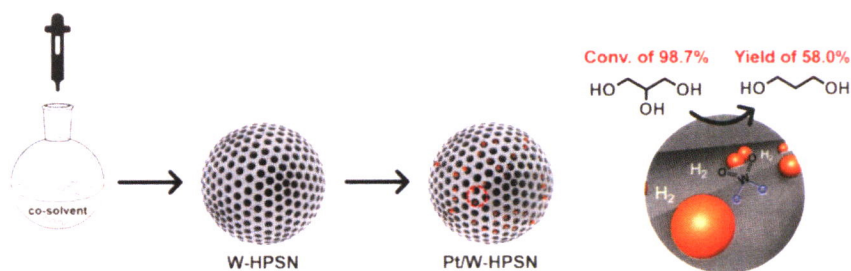
the sulfur utilization of the cathodes.

The hollow carbon nanocages host for lithium-sulfur batteries was prepared by etching ZIF8@ZIF67@ZIF8 particles followed by carbonization, which presented better rate and cycling performances than the counterparts derived from ZIF8 and ZIF67. The superior performance of the former was closely related to its unique porous structure and the coexisting electrocatalytically active Co species, which effectively suppressed the shuttle and polarization effects and thus improved

### W-doped Hierarchically Porous Silica Nanosphere Supported Platinum for Catalytic Glycerol Hydrogenolysis to 1,3-Propanediol

Zeng, Yang; Jiang, Lan; Zhang, Xiaoxin; Xie, Songhai; Pei, Yan; Qiao, Minghua\*; Li, Zhen-Hua; Xu, Hualong; Fan, Kangnian; Zong, Baoning\*

*Acta Chim. Sinica* 2022, 80(7), 903-912



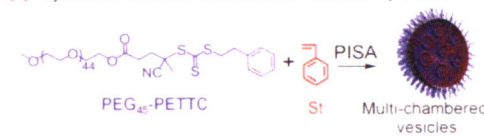
In glycerol hydrogenolysis, the Pt/W-HPSN (hierarchically porous  $SiO_2$  nanospheres) catalysts prepared from the W-HPSN synthesized with the addition of alcohols as the co-solvents afforded the improved 1,3-propanediol (1,3-PDO) yield of 58.0% at glycerol conversion of 98.7%. On the basis of characterization results, we propose that smaller Pt particle size and more *in-situ* generated Brønsted acid sites are conducive to a better catalytic performance of the Pt/W-HPSN catalyst.

### Preparation of Multi-chambered Vesicles by Polymerization-induced Self-assembly and the Influence of Solvophilic Fragments in the Core-forming Blocks

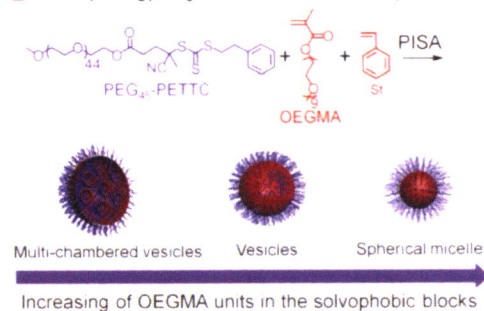
Kadir Khanov Jamshid; Zhong, Feng\*; Zhang, Wenjian; Hong, Chunyan\*

*Acta Chim. Sinica* 2022, 80(7), 913-920

#### A Synthesis of multi-chambered vesicles by PISA



#### B Morphology degradation of the nano-objects

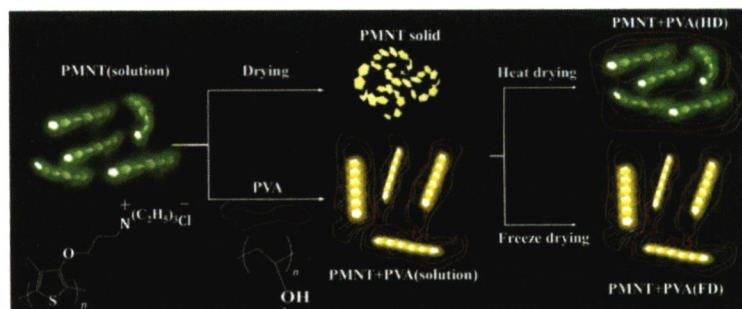


Multi-chambered vesicles were prepared by polymerization-induced self-assembly using styrene (St) as monomer. Morphology degradation of the resultant nano-objects from multi-chambered vesicles to vesicles and then to spherical micelles was observed by introducing solvophilic oligoethylene glycol methyl ether methacrylate (OEGMA) moieties in the core-forming blocks.

### Regulating Optical Properties of Water-Soluble Conjugated Polythiophene with Polyvinyl Alcohol

Qi, Zipeng; Gao, Dong; Zhu, Zhicheng; He, Zhiyuan\*; Bai, Guoying\*

*Acta Chim. Sinica* 2022, 80(7), 921-928

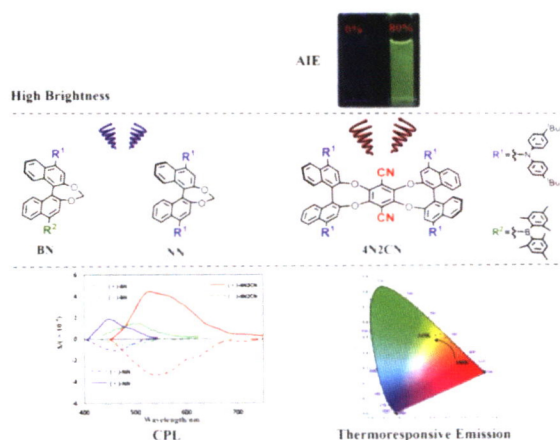


To solve the problem of aggregation-caused quenching of luminescent conjugated polymer dilute solution during drying, this work regulates the aggregation behavior and backbone conformation of a water-soluble conjugated polythiophene (PMNT) in solution with polyvinyl alcohol (PVA) by intermolecular interactions. Further combined with control of dry methods, we obtained PMNT films of tunable light absorption/emission properties.

### Synthesis and Properties of Novel Circularly Polarized Luminescence Materials Based on Binaphthol Skeleton

Liu, Bin; Chen, Pangkuan\*

*Acta Chim. Sinica* 2022, 80(7), 929-935

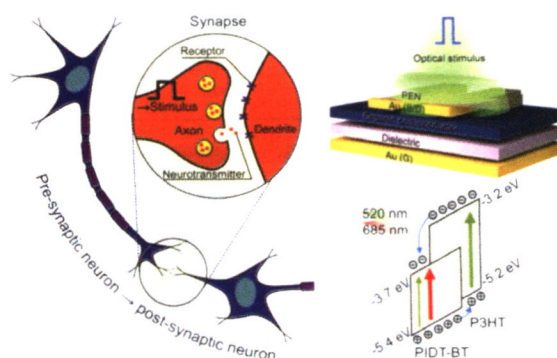


Three examples of new binaphthol-based chiral compounds (BN, NN and 4N2CN) have been designed and synthesized. Compounds BN and 4N2CN exhibit unique temperature response. 4N2CN shows a stronger circular polarized luminescence (CPL) signal than the other two molecules and exhibits aggregation-induced emission (AIE) properties.

### High-Performance Flexible Photonic Synapse Transistors Based on a Bulk Composite Film of Organic Semiconductors with Complementary Absorption

Sun, Jiaxian; Liu, Yuting; Yin, Zhigang\*; Zheng, Qingdong

*Acta Chim. Sinica* 2022, 80(7), 936-945

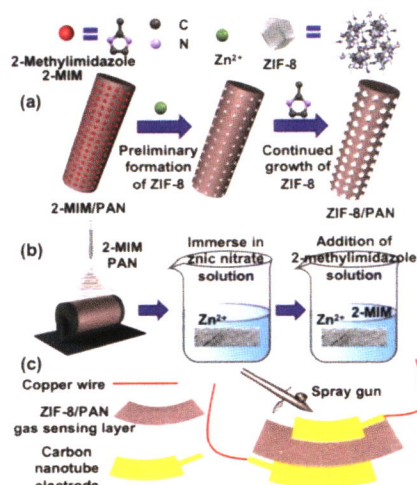


Flexible low-voltage photonic synapse transistors have been developed by using a bulk composite film of poly(3-hexylthiophene) (P3HT) and poly(indacenodithiophene-co-benzothiadiazole) (PIDT-BT) semiconductors with complementary optical absorption as a novel photoactive channel layer. Good synaptic characteristics including the high excitatory postsynaptic current, paired-pulse facilitation, and frequency-dependent properties with the tunable synaptic plasticity are demonstrated for the device. Benefiting from the semiconductor heterostructure of such a PIDT-BT:P3HT film, the response in excitatory postsynaptic current of the device stimulated by two beams with different wavelengths together (520 nm green laser and 685 nm red laser) is much better than the sum of the responses stimulated by each beam alone.

### Flexible Acetone Gas Sensor based on ZIF-8/Polyacrylonitrile (PAN) Composite Film

Niu, Ben; Zhai, Zhenyu; Hao, Xiaoke; Ren, Tingli; Li, Congju\*

*Acta Chim. Sinica* 2022, 80(7), 946-955



Seed embedding method and secondary growth method were used to prepare ZIF-8/polyacrylonitrile (PAN) composite materials, which was used as the flexible gas sensing layer to prepare flexible acetone gas sensor. In addition to the good performance of the conventional acetone sensor, the sensor also has excellent flexibility to keep the sensing performance stable under 180° bending state and 200 times large deformation (180° bending-recovery).

### Review

### Recent Advances in the Synthesis of Arylstannanes

Yue, Guanglu; Wei, Jingyao; Qiu, Di\*; Mo, Fanyang\*

*Acta Chim. Sinica* 2022, 80(7), 956-969

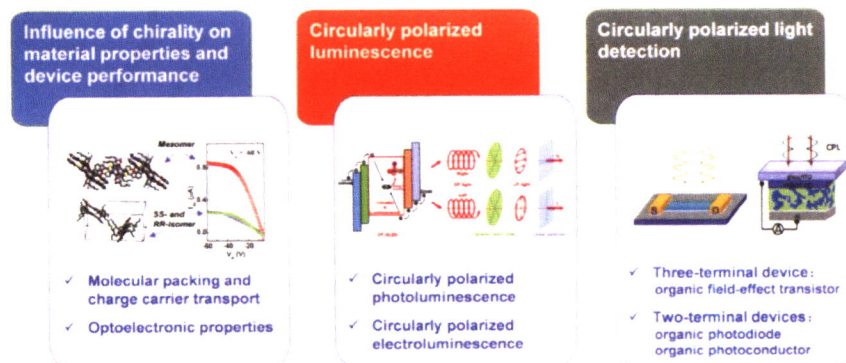


Arylstannanes are highly valuable synthetic intermediates in constructing aryl carbon-carbon bonds and carbon-heteroatom bonds in functional molecules. Due to the synthetic value, development of efficient and novel methods to synthesize arylstannanes is of significant importance. According to the type of reaction mechanism, this content will illustrate the methods for synthesizing arylstannanes in recent years including (1) stannylation of aromatic nucleophiles; (2) stannylation of aromatic electrophiles; (3) transition-metal-catalyzed stannylation coupling reactions; (4) stannylation reactions mediated by aryl radical intermediates; (5) cyclization of alkynes and tandem stannylation.

### Chiral Organic Optoelectronic Materials and Circularly Polarized Light Luminescence and Detection

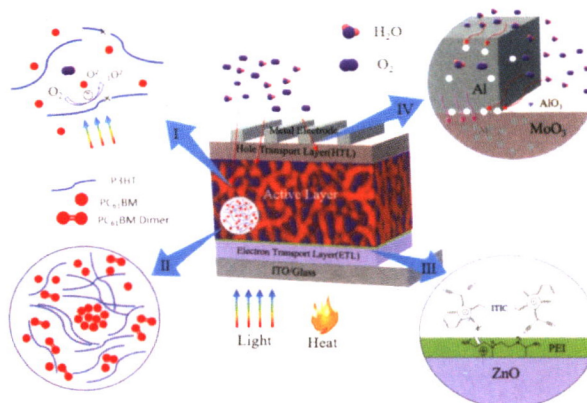
Liu, Lixuan; Yang, Yang; Wei, Zhixiang\*

*Acta Chim. Sinica* 2022, 80(7), 970-992



The incorporation of chirality into organic semiconducting materials can not only regulate electronic/optoelectronic properties by fine-tuning the aggregation states, but also facilitate the emergence and development of circularly polarized light luminescence and detection.

### Research Progress in Degradation Mechanism of Organic Solar Cells



The literature of organic solar cells (OSCs) device degradation in recent years is reviewed and several factors that cause performance degradation in OSCs devices are summarized. Firstly, the device performance attenuation caused by the change of active layer; the photooxidation reaction caused by chemical molecule changes, photochemical reaction, and device aging process; the morphological changes in active layers caused by photothermal stresses and their effects on device performance are introduced. Then the influence of the changes at the interface and transporting layer degradation is introduced. Finally, the multi-directional strategies for improving the stability of OSCs and how to improve the stability of organic solar cells are stated.

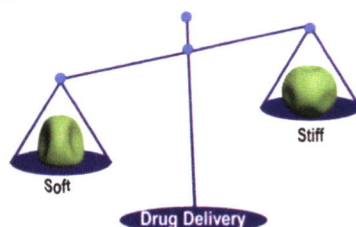
Liu, Yanfu; Li, Shilin; Jing, Yanan; Xiao, Linge; Zhou, Huiqiong\*

*Acta Chim. Sinica* **2022**, *80*(7), 993-1009

### Tuning the Mechanical Properties of Colloid Particles for Drug Delivery

Gao, Zhiliang; Li, Mengqi; Hao, Jingcheng; Cui, Jiwei\*

*Acta Chim. Sinica* **2022**, *80*(7), 1010-1020

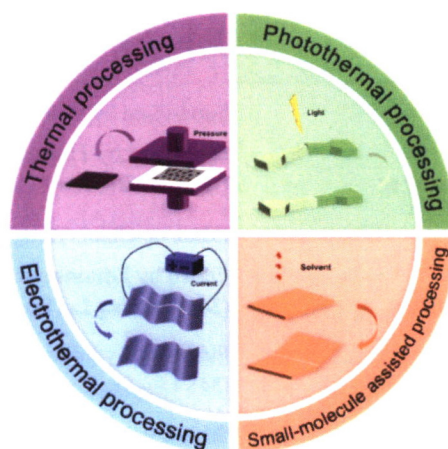


Mechanical properties of colloidal particles play an important role in drug delivery processes, including blood circulation, tumor accumulation and penetration as well as cell internalization.

### Reprocessing of Vitriimer

He, Enjian; Yao, Yanjin; Zhang, Yubai; Wei, Yen; Ji, Yan\*

*Acta Chim. Sinica* **2022**, *80*(7), 1021-1041

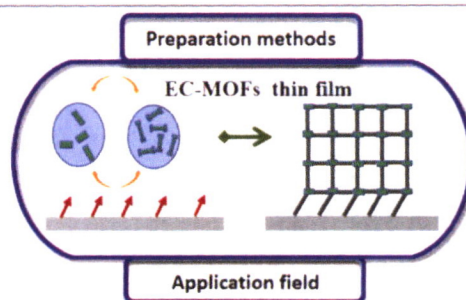


This review is aimed to classify the reprocessing methods of vitrimers, including thermal processing, photothermal processing, electrothermal processing and small-molecule assisted processing. Then, the principle, characteristics and applications of each reprocessing method are summarized, and the development of vitriimer reprocessing is prospected.

### Recent Progress of Electric Conductive Metal-Organic Frameworks Thin Film

Cao, Linan\*; Wei, Min

*Acta Chim. Sinica* **2022**, *80*(7), 1042-1056

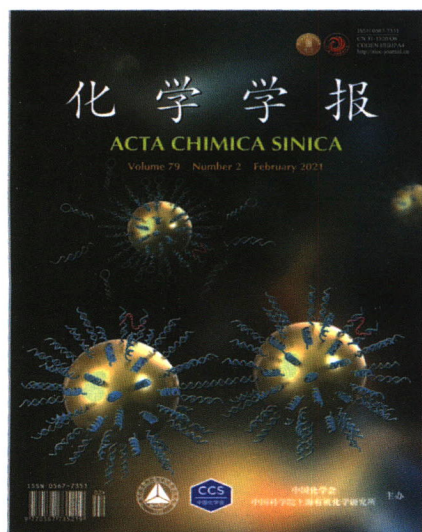


Latest research progress of electric conductive metal-organic frameworks (EC-MOFs) thin film is summarized including the preparation methods of EC-MOFs thin film and their applications in the field of electricity.



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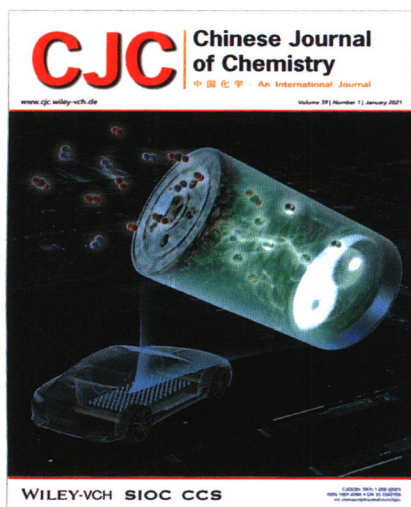
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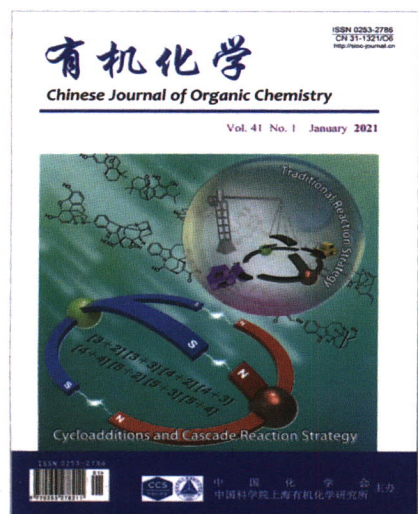
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- SCI收录、入选卓越计划
- 1983年创刊(原名 *Acta Chimica Sinica English Edition*)
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