

QK2308217



ISSN 0567-7351
CN 31-1320/O6
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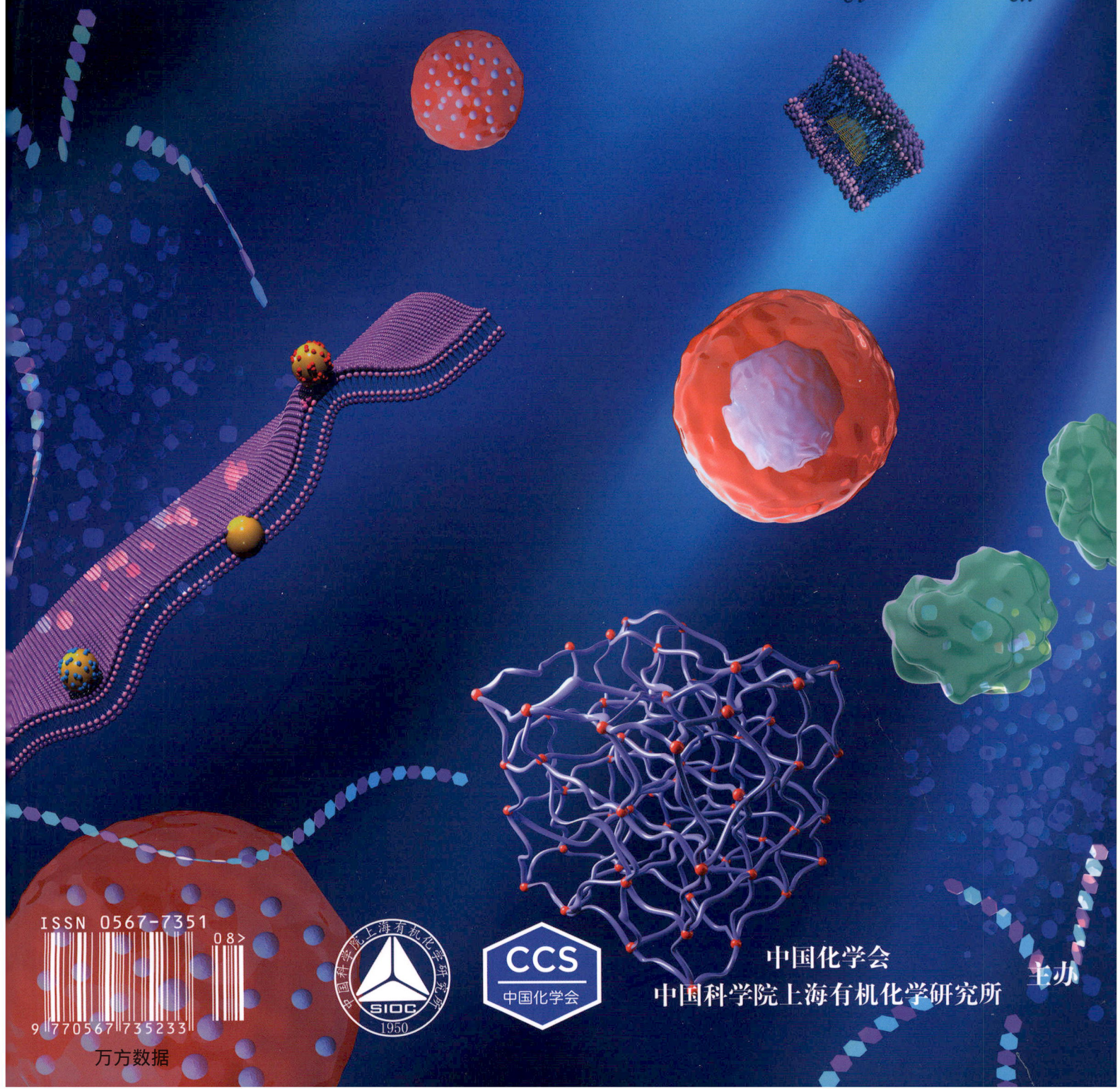
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化学学报

ACTA CHIMICA SINICA

Volume 81 Number 8 August 2023

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万方数据



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 81 卷 第 8 期 2023 年 8 月 15 日

目次

研究通讯

钉/石英滤纸: 可回收型 CO₂ 甲烷化光热催化膜 田茹心, 杨苗, 陈果, 刘虹汕, 袁梦梅, 原弘, 欧阳述昕*, 张铁锐, 化学学报, **2023**, 81(8), 869-873

研究论文

团簇 Au/CeO₂ 的制备及其催化 CO 氧化反应构效关系的研究 付信朴, 王秀玲, 王伟伟, 司锐, 贾春江*, 化学学报, **2023**, 81(8), 874-883

高稳定二维联吡啶 sp² 碳共轭共价有机框架材料用于高效电催化氧还原 刘建川, 李翠艳, 刘耀祖, 王钰杰*, 方千荣*, 化学学报, **2023**, 81(8), 884-890

新型双极传输特性橙光铽(III)配合物的设计、合成及其电致发光 陶鹏*, 郑小康, 王国良, 盛星浩, 姜贺, 李文桃, 靳继彪, 王瑞鸿, 苗艳勤*, 王华, 黄维扬*, 化学学报, **2023**, 81(8), 891-897

串联炔-异氰[3+2]环加成/Boulton-Katritzky 重排/扩环反应构建吡咯并[3,2-*d*]嘧啶-4-酮化合物 罗江浩, 马浩文, 张杰豪, 周伟*, 蔡倩*, 化学学报, **2023**, 81(8), 898-904

喹啉基粘度荧光探针的合成及其检测应用 武虹乐, 郭锐, 迟涵文, 唐永和, 宋思睿, 葛恩香, 林伟英*, 化学学报, **2023**, 81(8), 905-911

一种时序信号分类算法在纳米孔道离子电流信号识别中的应用 倪雪, 辛凯莉, 胡正利*, 蒋翠玲*, 万永菁, 应佚伦, 龙亿涛, 化学学报, **2023**, 81(8), 912-919

基于共价有机框架修饰电极的维生素 A 和 C 的选择性检测 杨蓉婕, 周璘*, 苏彬*, 化学学报, **2023**, 81(8), 920-927

研究评论

基于两亲性杯[4]芳烃的超分子二级组装及其生物应用 李永雪, 刘育*, 化学学报, **2023**, 81(8), 928-936

原位刻蚀调控多级孔分子筛策略及其应用进展 洪梅*, 高金强, 李彤, 杨世和*, 化学学报, **2023**, 81(8), 937-948

尖晶石氧化物在肿瘤诊疗应用领域研究进展 张媛, 郑贝宁, 符美春, 冯守华*, 化学学报, **2023**, 81(8), 949-954

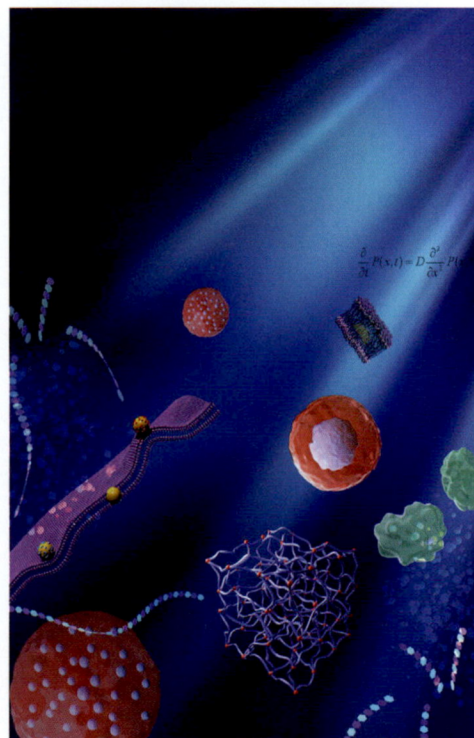
研究展望

铜催化的二醇类化合物对映选择性去对称化反应研究进展 鱼章龙, 李忠良, 杨昌江, 顾强帅*, 刘心元*, 化学学报, **2023**, 81(8), 955-966

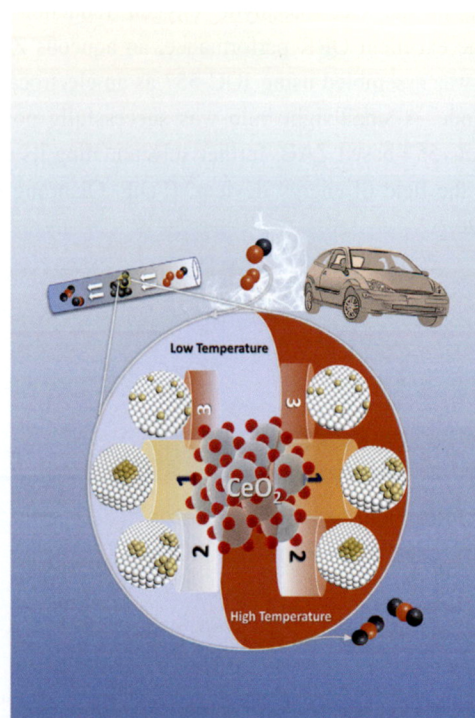
* 通信联系人.

生物大分子介质中的反常扩散动力学理论	魏文杰, 陈文龙, 戴晓彬, 燕立唐*, 化学学报, 2023 , 81(8), 967-978
电化学还原去除水中含氧酸根离子研究进展	侯威, 么艳彩*, 张礼知*, 化学学报, 2023 , 81(8), 979-989
冷冻电子显微镜技术进展及环境研究应用	杨宇洁, 巩宇锈, 顾天航*, 张伟贤*, 化学学报, 2023 , 81(8), 990-1001
单分子荧光成像研究单颗粒纳米催化机制	王晓*, 王星文, 肖乐辉*, 化学学报, 2023 , 81(8), 1002-1014
重氮化合物在分子合成化学中的应用进展	于乐飞, 姚兴奇, 王剑波*, 化学学报, 2023 , 81(8), 1015-1029
有机高价溴试剂的合成及其应用研究	甘绍艳, 钟晟昱, 王力廷, 史雷*, 化学学报, 2023 , 81(8), 1030-1042
纳米酶介导的炎症肠道疾病治疗研究进展	陈其文, 张先正*, 化学学报, 2023 , 81(8), 1043-1051
光热材料在海水淡化领域的近期研究进展与展望	杨地, 史潇凡, 张冀杰*, 卜显和, 化学学报, 2023 , 81(8), 1052-1063
离子聚合原位固态化构建高安全锂电池固态聚合物电解质的研究进展	苑志祥, 张浩, 胡思伽, 张波涛*, 张建军*, 崔光磊*, 化学学报, 2023 , 81(8), 1064-1080
CO ₂ 加氢制醇类催化剂的设计制备及性能研究进展	崔国庆*, 胡溢珩, 娄颖洁, 周明霞, 李宇明, 王雅君, 姜桂元, 徐春明*, 化学学报, 2023 , 81(8), 1081-1100

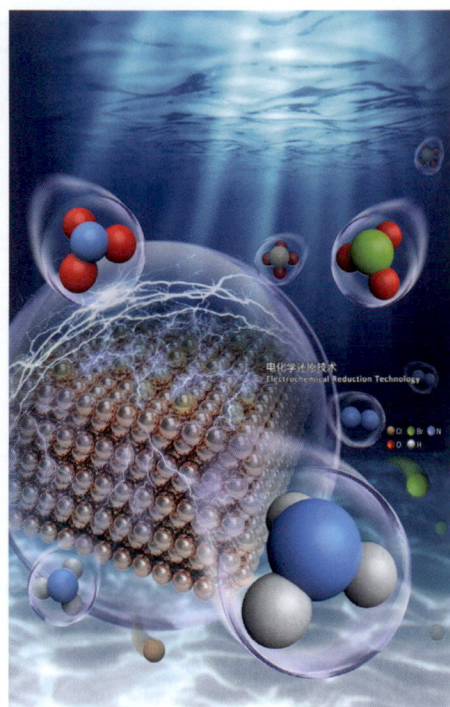
On the front cover: Anomalous diffusion, involving important living processes such as nutrient uptake and drug delivery, cannot be described simply based on the conventional diffusion constant equation. This paper uncovers the physical mechanism of anomalous diffusion from the theoretical aspect, summarizes the recent progress of anomalous diffusion in biomacromolecular systems, and outlooks the future research of anomalous diffusion. [Yan, Li-Tang *et al.* on page 967-978.]



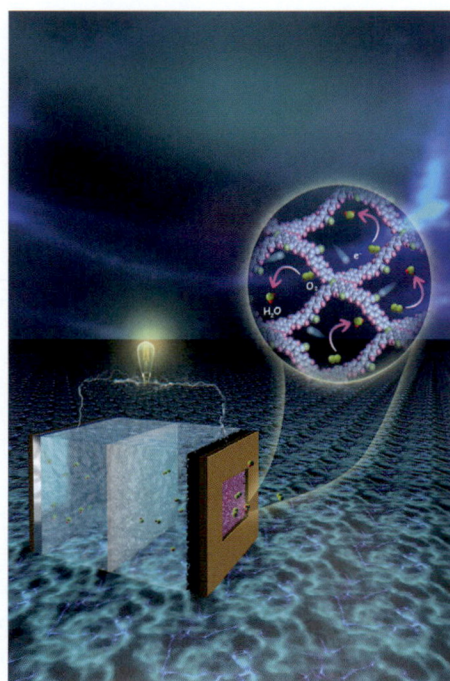
On the inside front cover: Various Au species (Au^{n+} ($n > 1$), $\text{Au}^{\delta+}$ ($0 < n < 1$) and Au^0) were located onto the CeO_2 support via a facile strategy, which demonstrated distinct catalytic performance toward the CO oxidation reaction within different temperature ranges. [Jia, Chunjiang *et al.* on page 874-883.]



On the inside back cover: Electrochemical reduction technology exhibits great potential for environmental applications, especially for oxyanions reduction. [Zhang, Lizhi *et al.* on page 979-989.]



On the back cover: We have reported a highly stable two-dimensional bicarbazole-based sp^2 carbon conjugated covalent organic framework (JUC-557), which exhibits outstanding catalytic performance in the electrocatalytic oxygen reduction reaction. Based on the excellent ORR performance, an aqueous Zn-air battery (ZAB) was assembled using JUC-557 as an electrocatalyst for the air cathode. A small light bulb was successfully powered up using the JUC-557-based ZAB, further substantiating its enormous potential in the field of energy devices. [Fang, Qianrong *et al.* on page 884-890.]

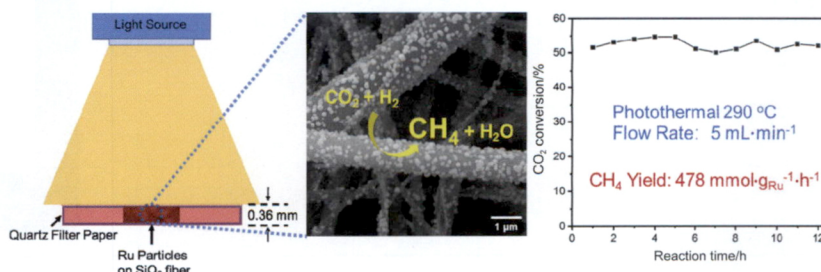


Communication

Ru/Quartz Filter Paper: A Recyclable Photothermocatalytic Film for CO_2 Methanation

Tian, Ruxin; Yang, Miao; Chen, Guo; Liu, Jiangshan; Yuan, Mengmei; Yuan, Hong; Ouyang, Shuxin*; Zhang, Tierui

Acta Chim. Sinica **2023**, 81(8), 869-873



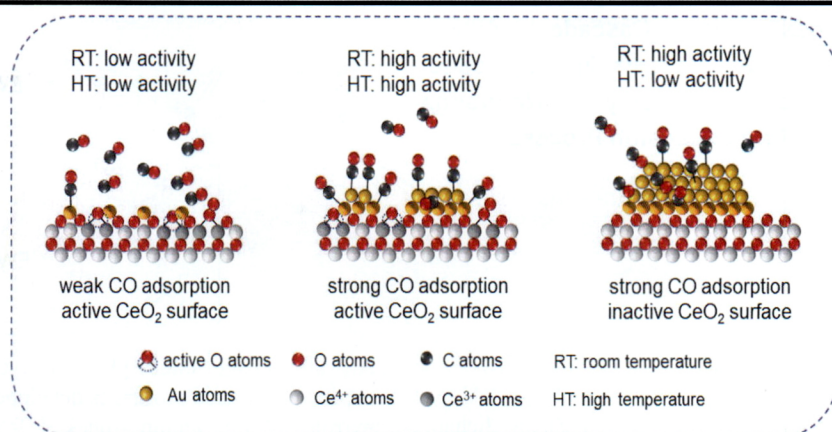
A photothermocatalytic film of Ru/quartz filter paper was developed, in which the Ru particles were confined within a thickness as thin as 0.36 mm to effectively convert light to thermal and then to drive CO_2 methanation. An optimal sample delivered a CH_4 yield as high as $478.1 \text{ mmol} \cdot \text{g}_{\text{Ru}}^{-1} \cdot \text{h}^{-1}$ in the flow-type reaction system.

Article

Fabrication and Mechanism Study of Clustered Au/CeO₂ Catalyst for the CO Oxidation Reaction

Fu, Xinpu; Wang, Xiuling; Wang, Weiwei; Si, Rui; Jia, Chunjiang*

Acta Chim. Sinica **2023**, 81(8), 874-883

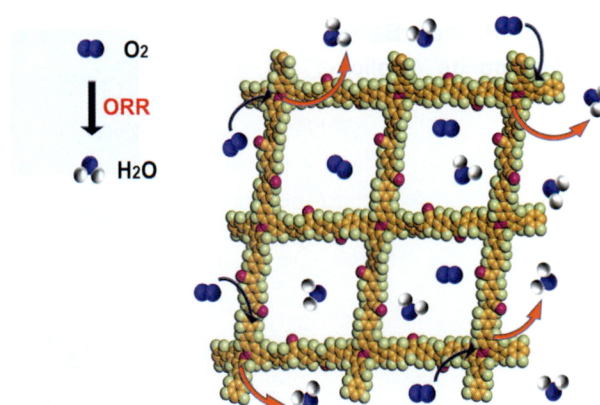


The clustered Au/CeO₂ catalyst comprising of Au^{δ+} atoms and abundant surface active O atoms displayed best catalytic performance for CO oxidation reaction.

Highly-Stable Two-Dimensional Bicarbazole-based sp²-Carbon-conjugated Covalent Organic Framework for Efficient Electrocatalytic Oxygen Reduction

Liu, Jianchuan; Li, Cuiyan; Liu, Yaozu; Wang, Yujie*; Fang, Qianrong*

Acta Chim. Sinica **2023**, 81(8), 884-890



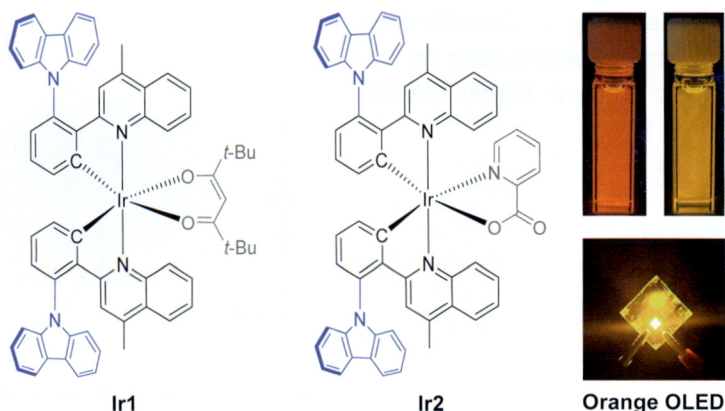
A highly stable sp²-carbon-linked two-dimensional conjugated covalent organic framework (COF) (JUC-557) was constructed by a bicarbazole building unit for cathodic oxygen reduction reaction (ORR) of fuel cells. This material shows a high specific surface area (870.64 m²·g⁻¹), high stability, and excellent catalytic performance (E_{onset} = 0.80 V vs. RHE, $E_{\text{half-wave}}$ = 0.68 V vs. RHE, and Tafel slopes only 62.20 mV·dec⁻¹) in the ORR catalysis.

Novel Bipolar Orange Emissive Iridium(III) Complexes: Design, Synthesis, and Electroluminescence

Tao, Peng*; Zheng, Xiaokang; Wang, Guoliang; Sheng, Xinghao; Jiang, He; Li, Wentao; Jin, Jibiao; Wong, Sui-Hung; Miao, Yanqin*; Wang, Hua; Wong, Wai-Yeung*

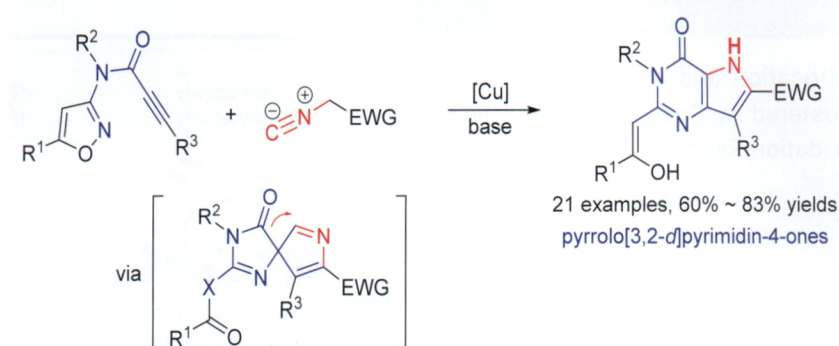
Acta Chim. Sinica **2023**, 81(8), 891-897

Novel Bipolar Orange Iridophosphors for EL



By incorporating carbazole moiety with hole-transport ability into iridium(III) complexes with a large torsion angle, a pair of highly efficient orange iridophosphors showing bipolar transport ability are designed for electroluminescence.

Synthesis of Pyrrolo[3,2-*d*]pyrimidin-4-ones via Cascade Alkyne-isocyanide [3 + 2] Cycloaddition/Boulton-Katritzky Rearrangement/Ring Expansion Process

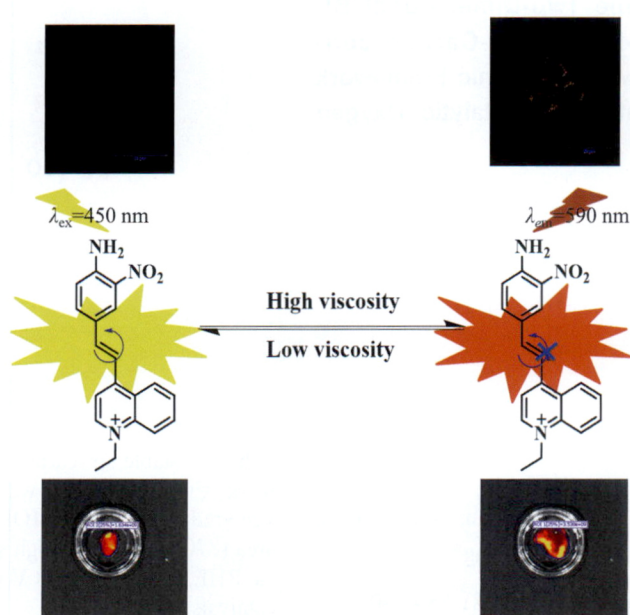


Luo, Jianghao; Ma, Haowen; Zhang, Jiehao; Zhou, Wei*; Cai, Qian*

Acta Chim. Sinica **2023**, 81(8), 898-904

An alkyne-isocyanide [3 + 2] cycloaddition/Boulton-Katritzky rearrangement/ring expansion cascade process is developed. It provides a facile method for the synthesis of pyrrolo[3,2-*d*]pyrimidin-4-ones from isoxazole-derived propiolamides and isocyanacetates. The method features readily available starting material, good functional group tolerance, short reaction steps, 100% atom efficiency, and structural diversification.

Viscosity Fluorescent Probes Based on Quinoline Group and Its Applications

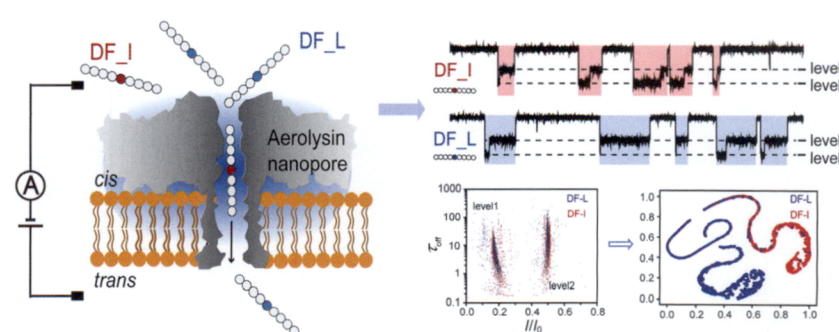


Wu, Hongyue; Guo, Rui; Chi, Hanwen; Tang, Yonghe; Song, Sirui; Ge, Enxiang; Lin, Weiying*

Acta Chim. Sinica **2023**, 81(8), 905-911

A new purified viscosity fluorescent probe can detect viscosity abnormalities in organisms for pneumonia-related applications.

A Time-Series Signal Classification Algorithm and Its Application to Nanopore Ionic Current Signal Identification



Ni, Xue; Xin, Kaili; Hu, Zhengli*; Jiang, Cuiling*; Wan, Yongjing; Ying, Yi-Lun; Long, Yi-Tao

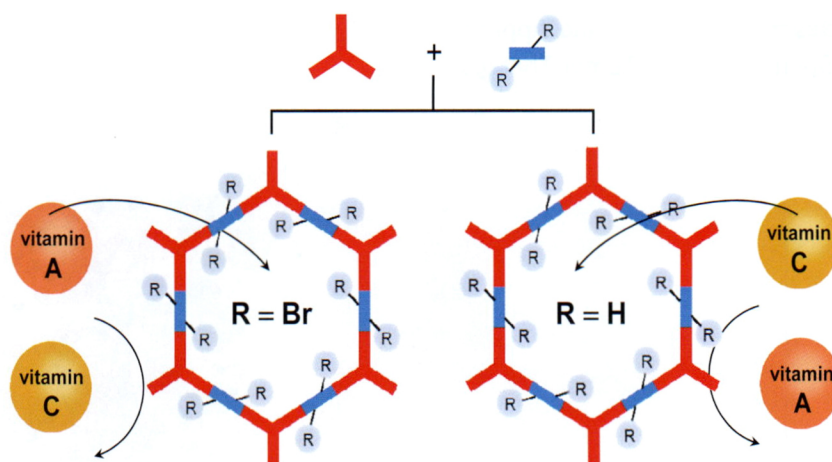
Acta Chim. Sinica **2023**, 81(8), 912-919

Nanopore-based single molecular analysis technique usually uses the time-domain features such as time-current scatter plots of blocking currents for event recognition. However, the time-domain features of DF_L and DF_I peptides overlap with each other, the analytes with extremely similar molecular structures are difficult to be accurately discriminated using traditional nanopore recognition methods. By using the algorithm proposed in this paper, deep feature information with differentiation is effectively mined.

Selective Detection of Vitamins A and C based on Covalent Organic Framework Modified Electrodes

Yang, Rongjie; Zhou, Lin*; Su, Bin*

Acta Chim. Sinica **2023**, 81(8), 920-927



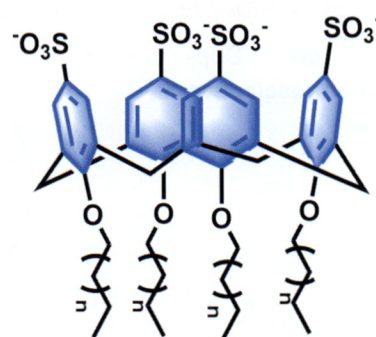
The hydrophobic covalent organic frameworks (COF) membrane and hydrophilic COF membrane were prepared by liquid/liquid interfacial polymerization and then transferred to the surface of indium tin oxide glass electrode, which enabled selective electrochemical detection of hydrophobic vitamin A and hydrophilic vitamin C, respectively.

Account

Supramolecular Secondary Assembly Based on Amphiphilic Calix[4]arenes and Its Biological Applications

Li, Yongxue; Liu, Yu*

Acta Chim. Sinica **2023**, 81(8), 928-936

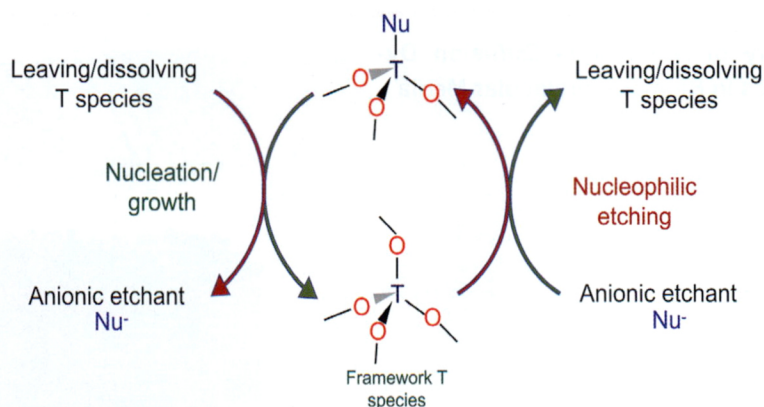


Sulfonated calixarenes have a wide range of applications in life science research because of their amphiphilic nature, specific recognition of polycations and neutral molecules, and low or no toxicity in both *in vitro* and *in vivo*. In conjunction with the work of our group, we mainly review the secondary supramolecular assembly of amphiphilic calixarenes and their applications in biology, chemistry and materials.

In-situ Etching Strategy for Manipulation of Hierarchical Zeolite and Its Application

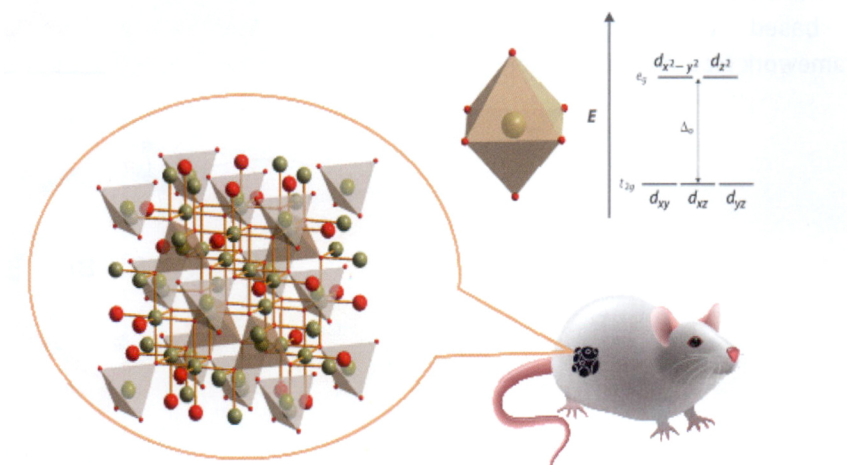
Hong, Mei*; Gao, Jinqiang; Li, Tong; Yang, Shihe*

Acta Chim. Sinica **2023**, 81(8), 937-948



Nucleophilic etching growth of zeolite materials can finely control over crystallinity, size, morphology, composition, and mesoporosity. Based on a dynamic equilibrium between etching and growth, it is widely applicable to various synthetic conditions using rich selection of organic etchants. By applying mild etching on nuclei of diminishing size, nucleophilic etching growth could potentially bridge the gap between “bottom-up” and “top-down” strategies for preparing hierarchical zeolites.

Research Progress in the Application of Spinel Oxides in Tumor Therapy



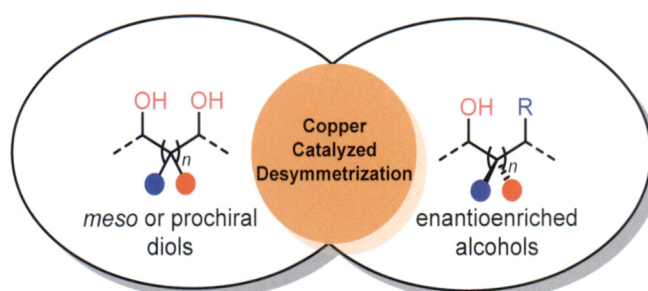
Zhang, Yuan; Zheng, Beining; Fu, Meichun; Feng, Shouhua*

Acta Chim. Sinica **2023**, 81(8), 949-954

As an important inorganic nano tumor diagnostic agent, spinel oxide has great potential in establishing clear structure-activity-relationship between electronic states and biomedical properties.

Perspective

Research Progress on Copper-Catalyzed Enantioselective Desymmetrization of Diols



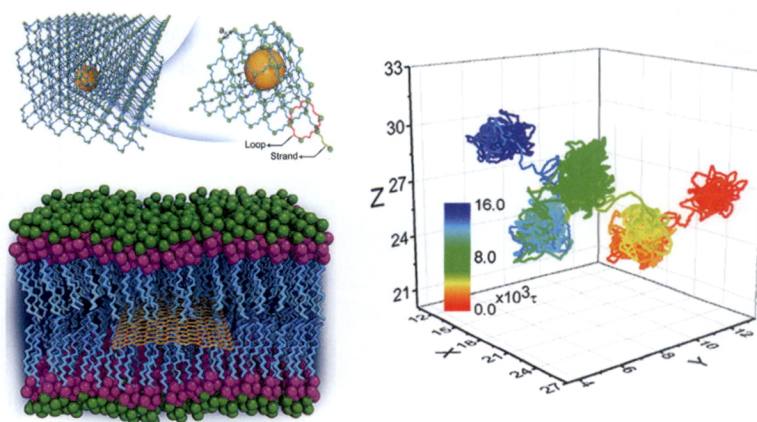
Yu, Zhanglong; Li, Zhongliang; Yang, Changjiang; Gu, Qiangshuai*; Liu, Xinyuan*

Acta Chim. Sinica **2023**, 81(8), 955-966

Copper-catalyzed enantioselective desymmetrization of diols has progressed rapidly in recent years, providing a series of new strategies for synthesis of complex enantioenriched alcohols. This review summarizes the research progress in this field according to the types of diols (*meso* diol and prochiral diol) and reactions together with a brief perspective.

Review

Theory of Anomalous Diffusion Dynamics in Biomacromolecular Media

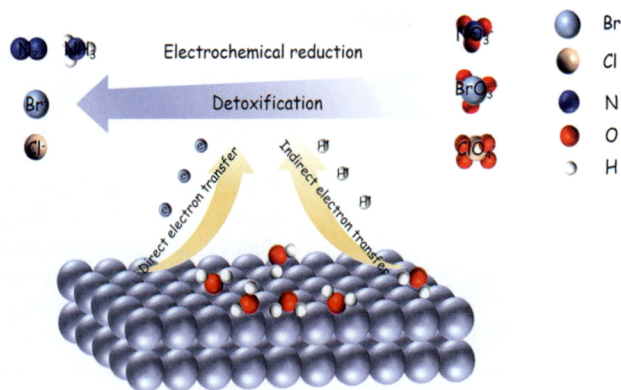


Wei, Wenjie; Chen, Wenlong; Dai, Xiaobin; Yan, Li-Tang*

Acta Chim. Sinica **2023**, 81(8), 967-978

This review summarizes the characteristics and theories of anomalous diffusion in the biomacromolecular media, aiming to provide readers with a preliminary understanding of diffusion dynamics research in complex media.

Advances in Electrochemical Reductive Removal of Oxyanions in Water

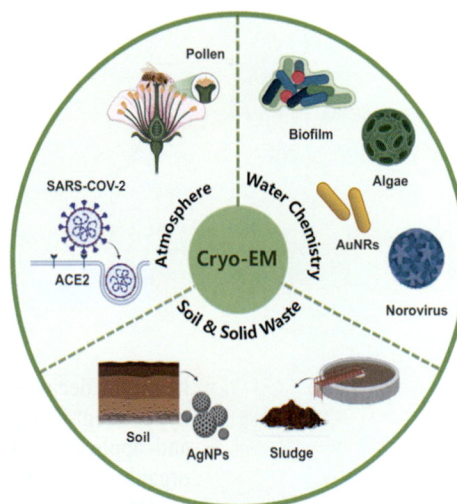


Hou, Wei; Yao, Yancai*; Zhang, Lizhi*

Acta Chim. Sinica **2023**, 81(8), 979-989

The mechanisms of electrochemical reduction method are mainly discussed, the advancements of electrochemical reduction of nitrate, bromate and perchlorate are summarized and finally the possible challenges of electrochemical reduction technology to remove oxyanions are prospected.

Progress and Environmental Research Applications of Cryo-Electron Microscopy

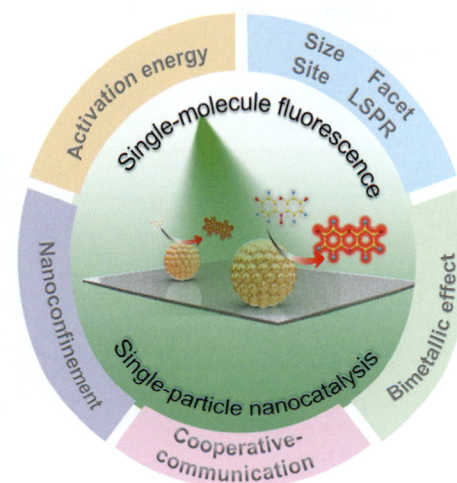


Yang, Yujie; Gong, Yuxiu; Gu, Tianhang*; Zhang, Wei-xian*

Acta Chim. Sinica **2023**, 81(8), 990-1001

Cryo-electron microscopy (Cryo-EM) is widely used in materials, biology, and other fields because of its advantages of high-resolution observation of the native state of hydrated samples. Considering that most environmental samples are hydrated, this paper highlights the applications of Cryo-EM in environment such as atmosphere, water, and soil, deepening the understanding of the structure and interrelationship of environmental micro- and nano-particles. We expect Cryo-EM to bring breakthrough contributions to environmental chemistry research.

Nanocatalytic Mechanisms Investigated by Single Molecule Fluorescence Imaging at the Single-Particle Level



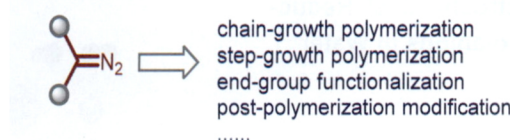
Wang, Xiao*; Wang, Xingwen; Xiao, Lehui*

Acta Chim. Sinica **2023**, 81(8), 1002-1014

With high sensitivity and high spatiotemporal resolution, single-molecule fluorescence imaging has been widely applied in investigating nanocatalysis.

Recent Advance of Diazo Compounds in Polymer Synthesis

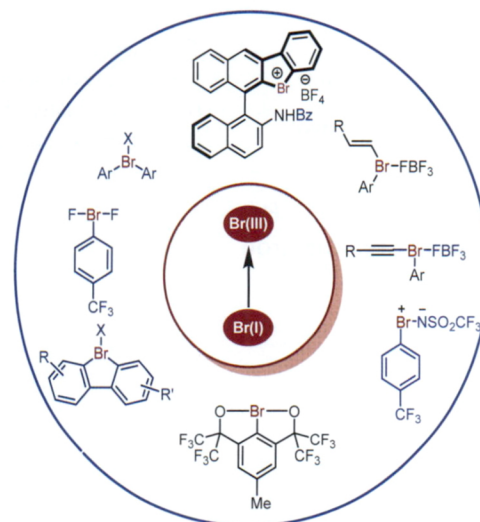
Yu, Lefei; Yao, Xing-Qi; Wang, Jianbo*
Acta Chim. Sinica **2023**, 81(8), 1015-1029



The recent advancements of polymer synthesis with diazo compounds have been highlighted in this review. The application of diazo compounds in polymer chemistry includes chain-growth polymerization, step-growth polymerization, end-group functionalization and post-polymerization modification. The exploration of diazo compounds in polymer chemistry provides new opportunities to access various polymers with unique structure feature.

Synthesis and Application of Organic Hypervalent Bromine Reagents

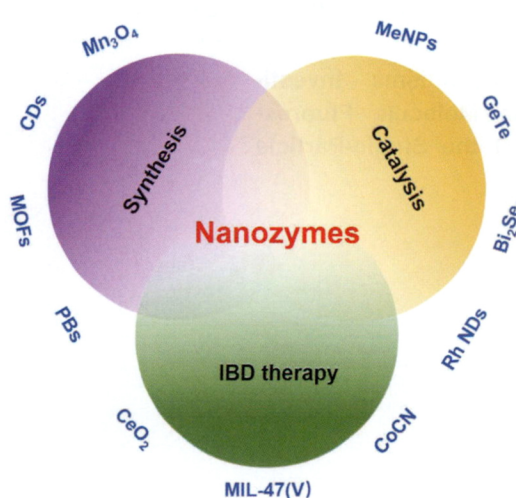
Gan, Shaoyan; Zhong, Shengyu; Wang, Liting; Shi, Lei*
Acta Chim. Sinica **2023**, 81(8), 1030-1042



In recent decades, with the rapid development of organic synthetic chemistry, organic hypervalent halogen reagents have drawn considerable research interest on the synthesis and application of organic hypervalent bromine reagents. Compared with traditional organic hypervalent iodine reagents, organic hypervalent bromine reagents have stronger oxidation capacity and reactivity, thus enabling their important application potential in organic synthesis. On the basis of different substituents of organic hypervalent bromine reagents, the diaryl- λ^3 -bromanes, dialkyl- λ^3 -bromanes, alkenyl- λ^3 -bromanes, alkyne- λ^3 -bromanes and heteroatomic- λ^3 -bromanes are summarized and discussed successively. The synthetic methods of different types of hypervalent bromine reagents and their applications in organic reactions are also reviewed.

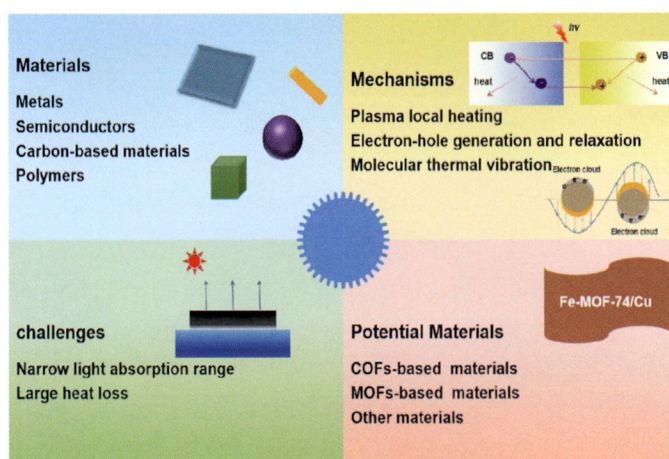
Reserach Advances on Nanozyme-Guided Therapy of Inflammatory Bowel Diseases

Chen, Qiwen; Zhang, Xianzheng*
Acta Chim. Sinica **2023**, 81(8), 1043-1051



Nanozymes have stable structures and excellent catalytic properties, thereby attracting wide attention in biomedical applications. This review summarizes the current advances of nanozymes in the treatment of inflammatory bowel diseases, aiming to guide rational fabrication of next-generation nanozymes for inflammatory diseases therapy.

Recent Research Progress and Prospect of Photothermal Materials in Seawater Desalination

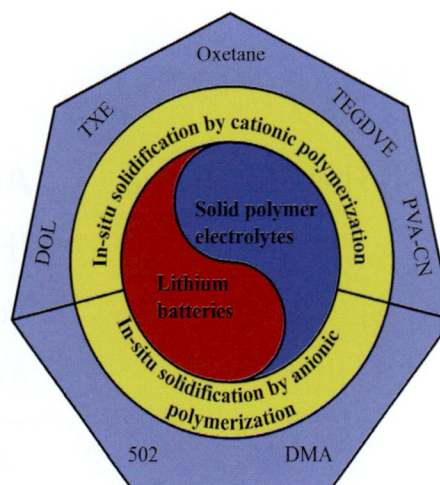


There is an urgent need for transitioning water treatment processes to become more environmentally friendly. Based on this, this review summarizes the research status and progress of photothermal materials in the field of seawater desalination in recent years, emphasizes the important role of photothermal materials in solving the shortage of water resources, discusses the potential of covalent-organic frameworks (COFs) based photothermal materials and metal-organic frameworks (MOFs) based photothermal materials in seawater desalination, and provides a feasible scheme for the rational design and development of high-efficiency photothermal materials in the field of seawater desalination.

Yang, Di; Shi, Xiaofan; Zhang, Jijie*; Bu, Xian-He

Acta Chim. Sinica **2023**, 81(8), 1052-1063

Research Progress of Ion-initiated in situ Generated Solid Polymer Electrolytes for High-safety Lithium Batteries

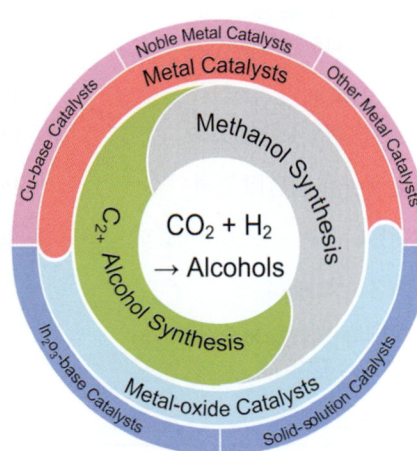


Ion-initiated in situ generated solid polymer electrolytes have made a series of significant research progress, which are crucial for the development of high-energy and high-safety solid-state lithium batteries.

Yuan, Zhixiang; Zhang, Hao; Hu, Sijia; Zhang, Botao*; Zhang, Jianjun*; Cui, Guanglei*

Acta Chim. Sinica **2023**, 81(8), 1064-1080

Research Progress on the Design, Preparation and Properties of Catalysts for CO₂ Hydrogenation to Alcohols



The design and preparation of heterogeneous catalysts for CO₂ hydrogenation to alcohols are summarized.

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Acta Chim. Sinica **2023**, 81(8), 1081-1100



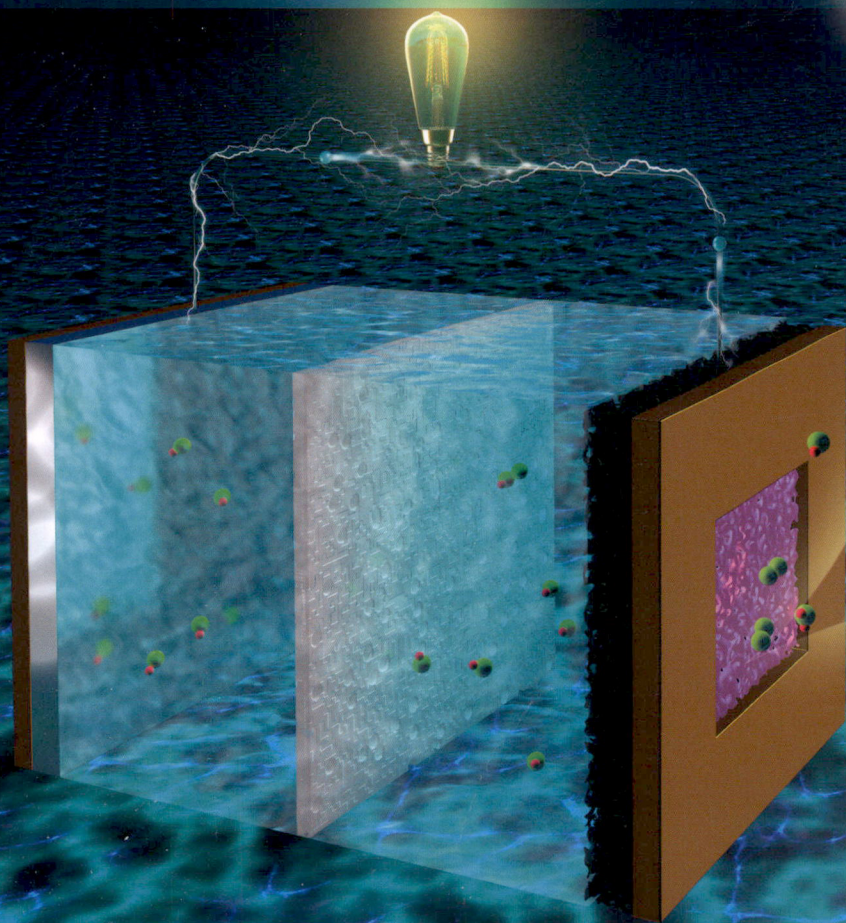
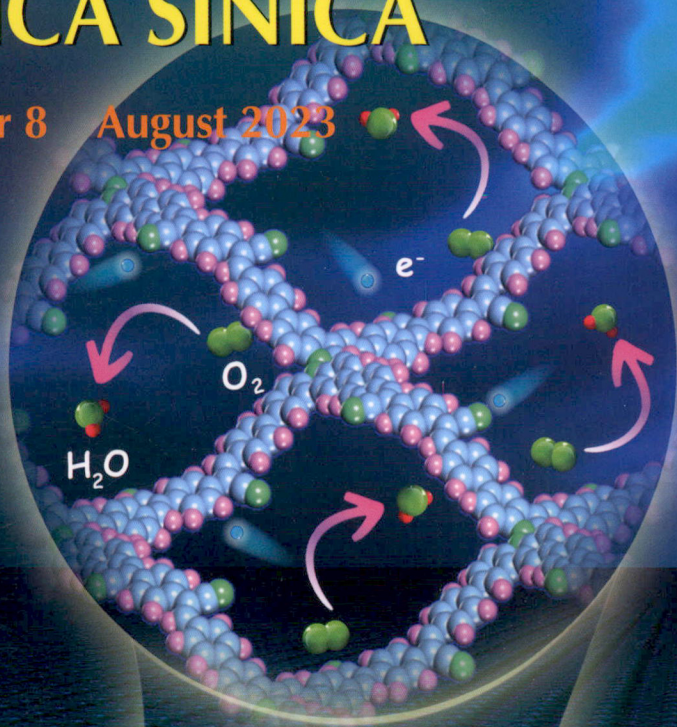
ISSN 0567-7351
CN 31-1320/O6
CODEN HHHPA4
<http://sioc-journal.cn>

90^{Years}
1933-2023

化学学报

ACTA CHIMICA SINICA

Volume 81 Number 8 August 2023



中国化学会
中国科学院上海有机化学研究所 主办

万方数据

中国标准连续出版物号: ISSN 0567-7351
CN 31-1320/O6

国内邮发代号: 4-209 国外发行代号: M56