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# 化学学报

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# 化学学报

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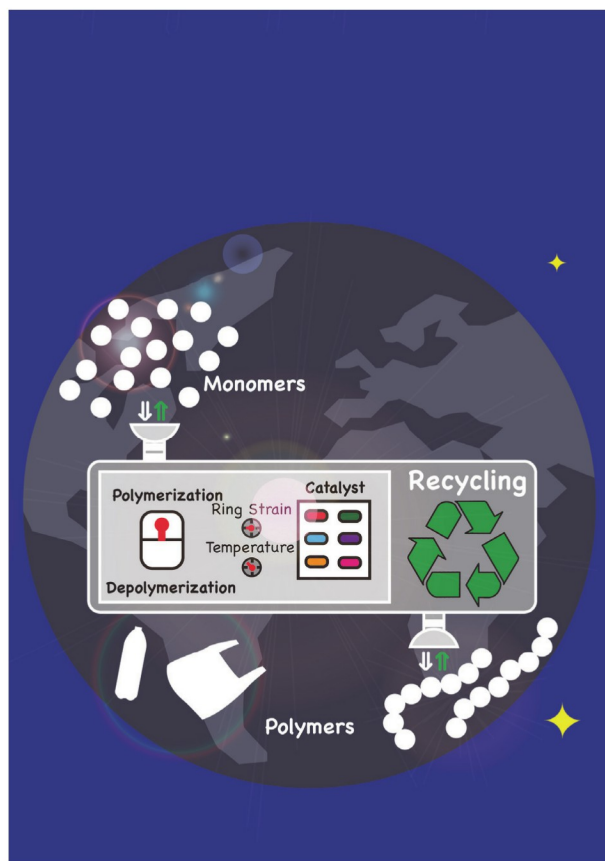
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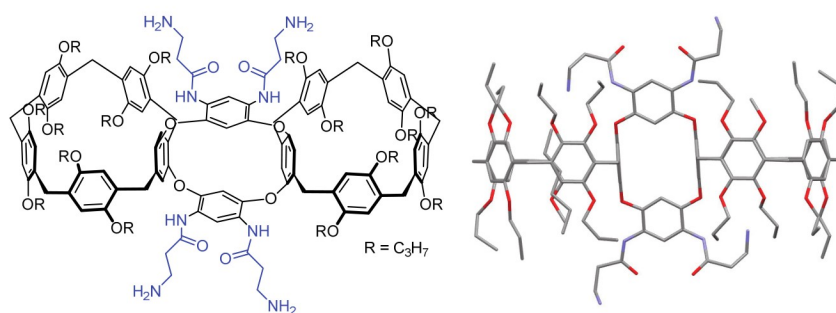
\* 通信联系人.

**On the cover:** The development of chemically recyclable polymers represents a circular plastics economy approach to address the alarming plastics problems associated with environmental pollution and energy crisis. Recent advances in monomer design have enabled the regulation of “polymerization-depolymerization” equilibrium and achieved the closed-loop recycling under mild conditions. This review will focus on the closed-loop recycling of polyesters, polycarbonates, sulfur-containing polymers, and poly(cyclic olefin)s, illustrate the challenges of this field, and provide a perspective on the future development direction. [Zhu, Jian-Bo *et al.* on page 1165-1182.]



### Communication

#### Tetraaminopillar[5]arene Dimers: Synthesis, Structure and Properties

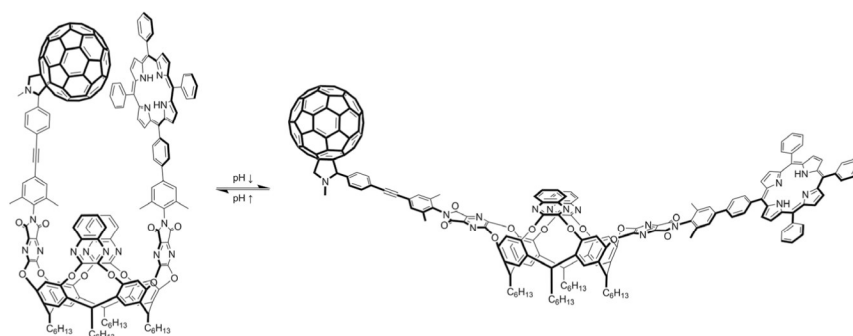


Wu, Minggang; Yang, Yong; Xue, Min\*  
*Acta Chim. Sinica* **2022**, 80(8), 1057-1060

Rigid tetraaminopillar[5]arene dimer was designed and synthesized. The tricyclic host with a pillar-calix-pillar structure has a shape of binoculars. It could associate with 1,4-dicyanobutane and form the complex of 2G⋮H with strong binding ability.



### A Giant Donor-Acceptor Molecular Switch Compound: Synthesis and Properties



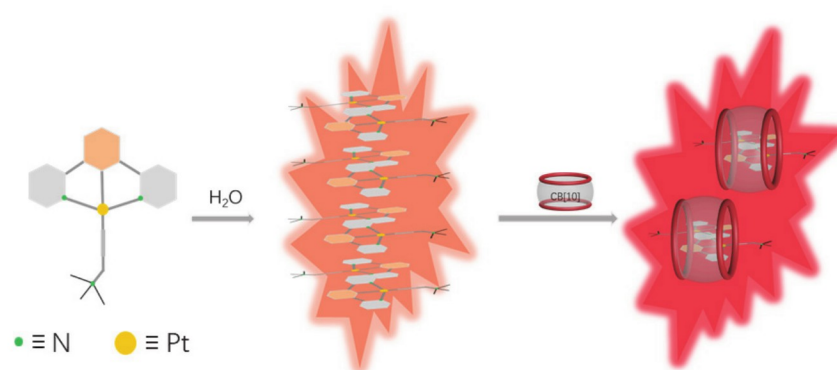
Sui, Yuguang; Zhou, Jinrong; Liao, Pan; Liang, Wenjie; Xu, Hai\*

*Acta Chim. Sinica* **2022**, 80(8), 1061-1065

A novel donor-acceptor (D-A) molecular switch compound (porphyrin as donor, fullerene as acceptor and resorcin[4]arene cavitand as the molecular switch parent) was designed and synthesized. It could undergo a conformational change, from the original contracted state (*vase*) to the expanded state (*kite*) under pH induction.

### Article

### Recognition and Luminescence Properties of N<sup>+</sup>C<sup>+</sup>N Pt(II) Complexes with Macrocyclic Host Cucurbit[10]uril

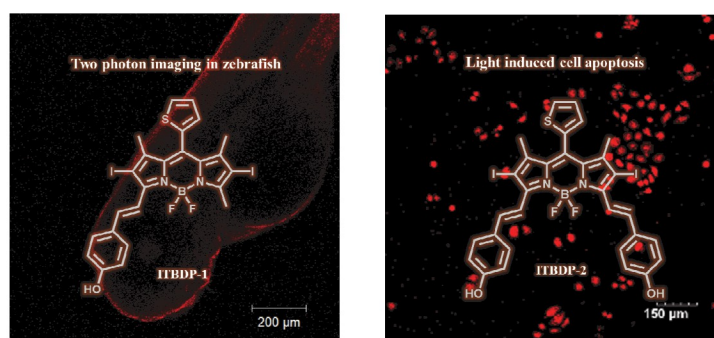


Zhu, Shimin; Huang, Xin; Han, Xie; Liu, Simin\*

*Acta Chim. Sinica* **2022**, 80(8), 1066-1070

Three different substituted water-soluble N<sup>+</sup>C<sup>+</sup>N ligand Pt(II) complexes were designed. The photophysical properties of these complexes upon complexation with cucurbit[10]uril host were investigated.

### Synthesis, Two-photon Fluorescence Imaging and Photodynamic Therapy of Near Infrared Thienyl-BODIPY Photosensitizer

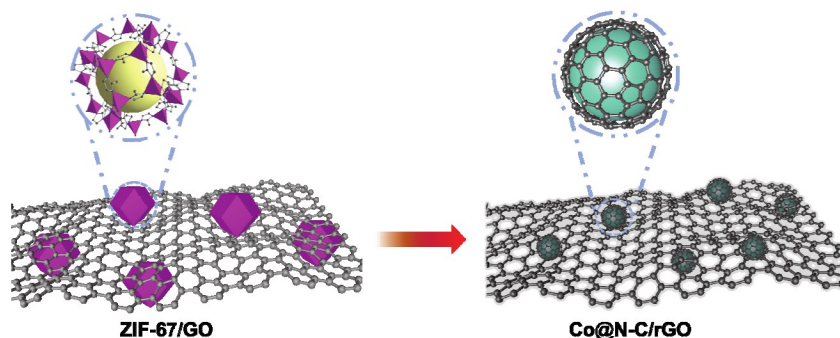


Liu, Badi; Wang, Chengjun; Qian, Ying\*

*Acta Chim. Sinica* **2022**, 80(8), 1071-1083

Two novel near infrared (NIR) thienyl boron dipyrromethene (thienyl-BODIPY) photosensitizers ITBDP-1 and ITBDP-2 were designed and synthesized. These two photosensitizers can be used for two-photon fluorescence imaging in zebrafish and singlet oxygen can be rapidly generated in tumor cells within 20 s under NIR light irradiation. These results suggest that photosensitizers ITBDP-1 and ITBDP-2 could realize two-photon imaging guided photodynamic therapy in tumor cells and are potential two-photon photosensitizers for photodynamic therapy (PDT).

### Pyrolysis of ZIF-67/Graphene Composite to Co Nanoparticles Confined in N-Doped Carbon for Efficient Electrocatalytic Oxygen Reduction

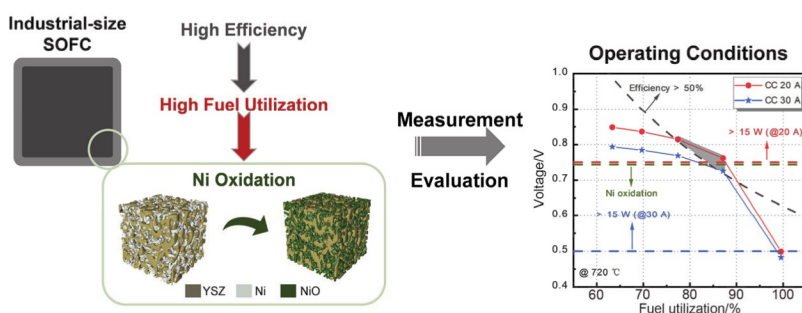


Yan, Shaobing; Jiao, Long; He, Chuanxin\*; Jiang, Hailong\*

*Acta Chim. Sinica* **2022**, 80(8), 1084-1090

The Co@N-C/rGO (reduced graphene oxide) catalyst is fabricated based on ZIF-67/GO (graphene oxide) composite. Thanks to the highly dispersed active site, porous structure and the favorable electrical conductivity, Co@N-C/rGO displays excellent ORR (oxygen reduction reaction) performance with superior activity and stability.

### Study of Operating Conditions for High Efficiency and Anode Safety of Industrial-size Solid Oxide Fuel Cell

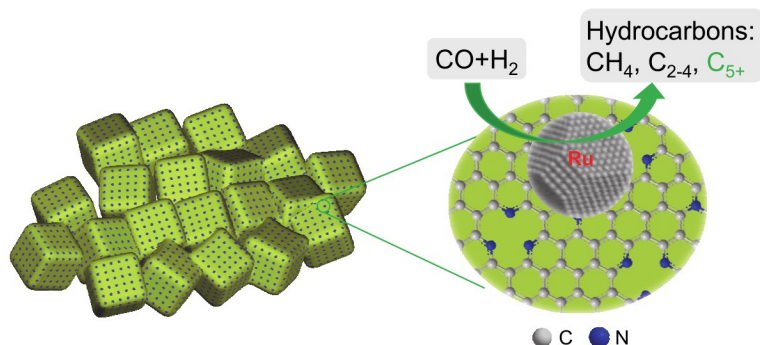


Wang, Yige; Li, Hangyue; Lyu, Zewei; Han, Minfang\*; Sun, Kaihua

*Acta Chim. Sinica* **2022**, 80(8), 1091-1099

The variations of voltage and electrical efficiency with fuel utilization under different currents were analyzed. Besides, the cell output voltage higher than the critical electromotive force of Ni oxidation was proposed as the safe operating condition to prevent the local oxidation of anode. Thus, operating conditions of industrial-size solid oxide fuel cell (SOFC) for high efficiency and anode safety can be determined.

### Ruthenium Nanoparticles Anchored on Nitrogen-Doped Carbon Nanocages for Fischer-Tropsch Synthesis

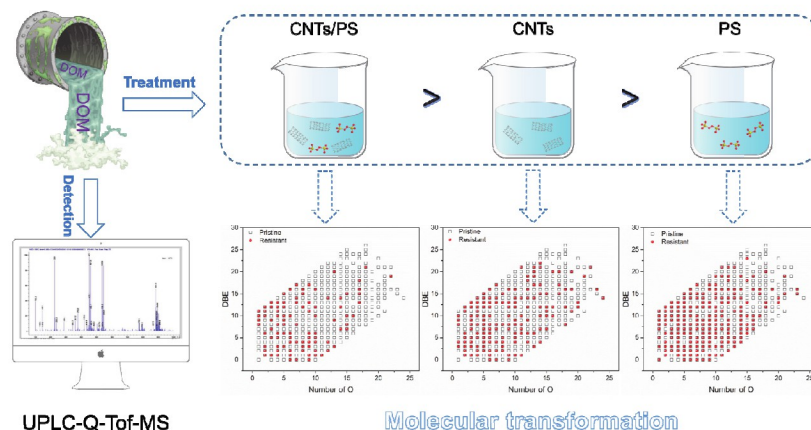


Qi, Zhihao; Gao, Fujie; Zhou, Changkai; Zeng, Yu; Wu, Qiang\*; Yang, Lijun; Wang, Xizhang\*; Hu, Zheng

*Acta Chim. Sinica* **2022**, 80(8), 1100-1105

Ru nanoparticles anchored on nitrogen-doped carbon nanocages (Ru/NCNC) present excellent Fischer-Tropsch performance under mild conditions of 220 °C and 0.5 MPa, including good catalytic activity, high C<sub>5+</sub> selectivity (55.7%), low CH<sub>4</sub> selectivity (13.5%) and high stability (60 h, CO conversion of ca. 33%), evidently surpassing Ru catalyst anchored on undoped carbon nanocages. Such excellent catalytic performance of Ru/NCNC is mainly ascribed to nitrogen doping.

# Molecular Insights into the Transformation Mechanisms of Dissolved Organic Matter Based on Ultrahigh Resolution Mass Spectrometry



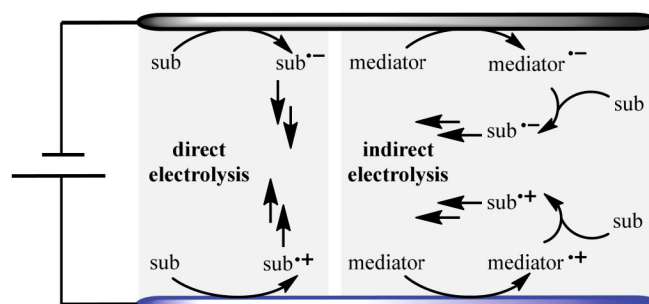
The transformation mechanisms of dissolved organic matter (DOM) molecules in aquatic environment during potassium persulfate (PS), carbon nano tubes (CNTs) and CNTs/PS processes were systematically investigated by excitation-emission matrix fluorescence (EEM), total dissolved carbon (TOC), Zeta potential and ultra-high resolution liquid chromatography-Q-TOF-mass spectrometry (UPLC-Q-TOF-MS) technologies. DOM molecules were removed by PS process through electrostatic polymerization and oxidation, and by CNTs process via adsorption, while CNTs/PS process degraded DOM by combining adsorption, electron transfer and the generation of strongly oxidizing singlet oxygen ( $^1\text{O}_2$ ), which was a complement and enhancement to the separate CNT and PS treatment processes.

Cheng, Shouming; Zhou, Bo\*

*Acta Chim. Sinica* **2022**, 80(8), 1106-1114

## Review

# Advances in Organic Electrochemical Synthesis

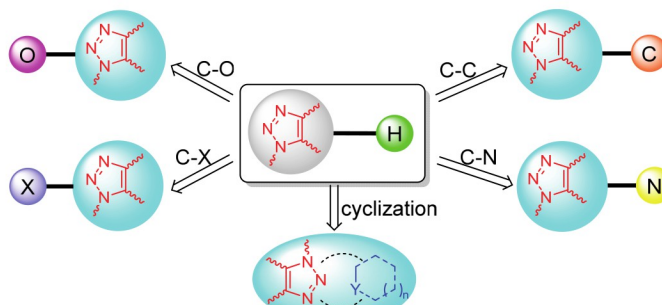


With the increasing awareness of energy efficiency and environmental protection, organic electrochemical synthesis has attracted much attention in recent years. However, electrochemical synthesis faces several challenges including electrode passivation, limited reaction types, the difficulty of controlling reactivity and selectivity, and so on. This review focuses on electrochemical synthesis in organic solution system, and it summarizes recent efforts in addressing these challenges through direct electrolysis and indirect electrolysis.

Wang, Zhenhua; Ma, Cong; Fang, Ping; Xu, Haichao\*; Mei, Tiansheng\*

*Acta Chim. Sinica* **2022**, 80(8), 1115-1134

# Transition-metal Catalyzed 1,2,3-Triazole-assisted C—H Functionalization Processes



Liu, Xia\*; Kuang, Chunxiang\*; Su, Changhui

*Acta Chim. Sinica* **2022**, 80(8), 1135-1151

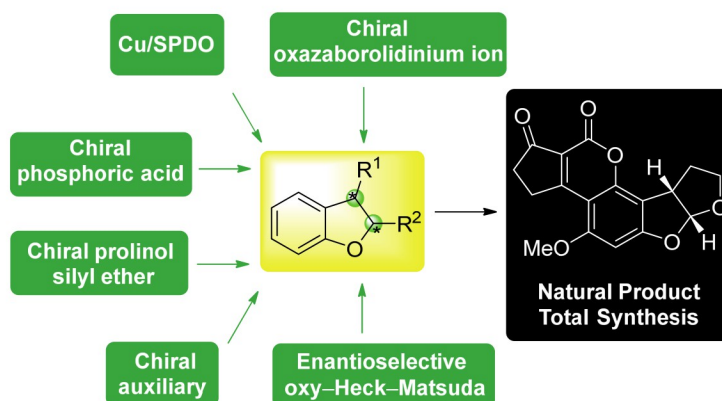
We briefly summarize the advance in the field of transition-metal catalyzed 1,2,3-triazole-assisted C—H functionalization according to the bonding type, including carbon-carbon bond, carbon-heteroatom bond and annulation.



# Recent Advances on the Construction of Chiral Dihydrobenzofurans by Asymmetric [3+2] Cyclization Reactions of Phenols (Quinones) and Alkenes

Zhang, Lai; Xiao, Jian\*; Wang, Yawen; Peng, Yu\*

*Acta Chim. Sinica* **2022**, 80(8), 1152-1164

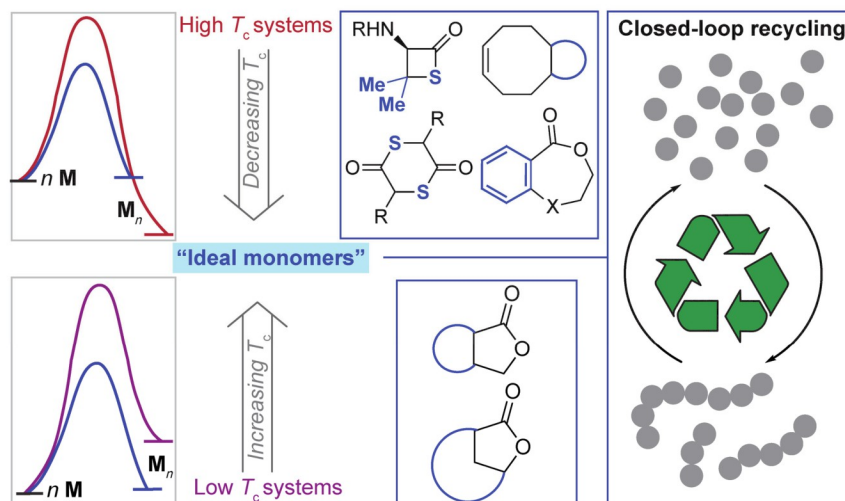


The divergent construction of chiral dihydrobenzofurans via asymmetric [3+2] cyclization reactions are reviewed, and the corresponding stereocontrol mechanisms are focused especially.

# Recent Advances in Monomer Design for Recyclable Polymers

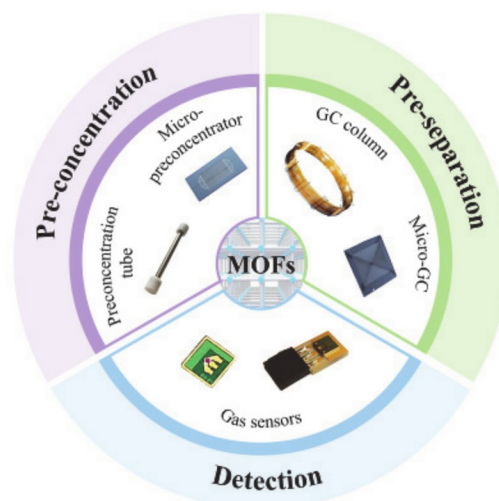
Cai, Zhongzheng\*; Liu, Ye\*; Tao, Youhua\*; Zhu, Jian-Bo\*

*Acta Chim. Sinica* **2022**, 80(8), 1165-1182



Progressive usage and accumulation of polymer products posed severe environmental issues. The development of chemical recycling polymers which could transform the polymers back to monomers and repolymerize to produce polymer materials without value loss is an attractive and important strategy to address the plastic pollution. In recent years, significant advances in the design of "ideal monomers" have enabled the regulation of "polymerization-depolymerization" equilibrium and achieved the closed-loop recycling under mild conditions. This review will focus on the closed-loop recycling of polyesters, polycarbonates, sulfur-containing polymers, and poly(cyclic olefin)s, illustrate the challenges of this field, and provide a perspective on the future development direction.

### Application of Metal-Organic Frameworks in Gas Pre-concentration, Pre-separation and Detection

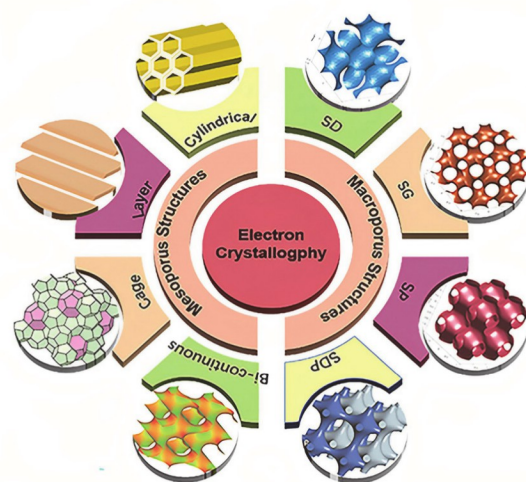


Yan, Xu; Qu, Hemi; Chang, Ye; Duan, Xuexin\*

*Acta Chim. Sinica* **2022**, 80(8), 1183-1202

As a new type of porous materials, metal-organic frameworks (MOFs) are widely used in gas detection system for the pre-concentration, pre-separation and detection of target gas.

### Structural Solution of Porous Materials on the Mesostructural Scale by Electron Microscopy



Deng, Quanzheng; Mao, Wenting; Han, Lu\*

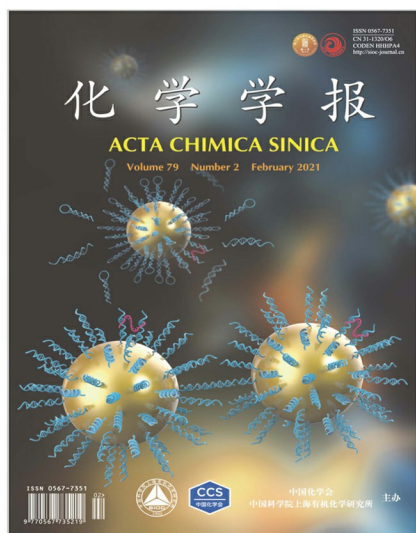
*Acta Chim. Sinica* **2022**, 80(8), 1203-1216

Ordered porous materials on the mesostructural scale have widespread application prospects in many fields due to their unique structures. The electron microscopy has great advantages in the structure solution of these porous solids through diffractometry and imaging. The structural solution of porous materials on the mesostructural scale by using electron microscopy for last decades was outlined, which shows great advantages in the structural solution of the porous solids through electron crystallography. Several representative examples including ordered mesoporous materials and macroporous scaffolds, have been solved by electron microscopy.



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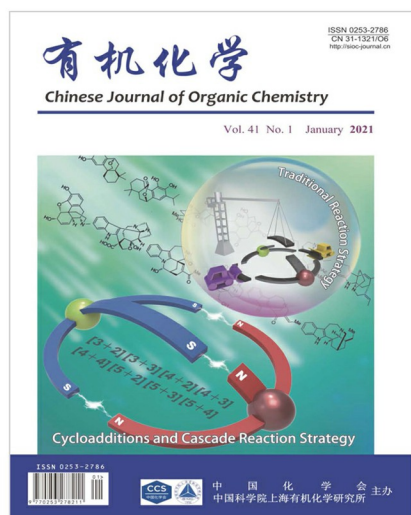
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