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# 化学学报

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Continuous Digestion Using  
Non-specific Proteases

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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

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(Huaxue Xuebao)

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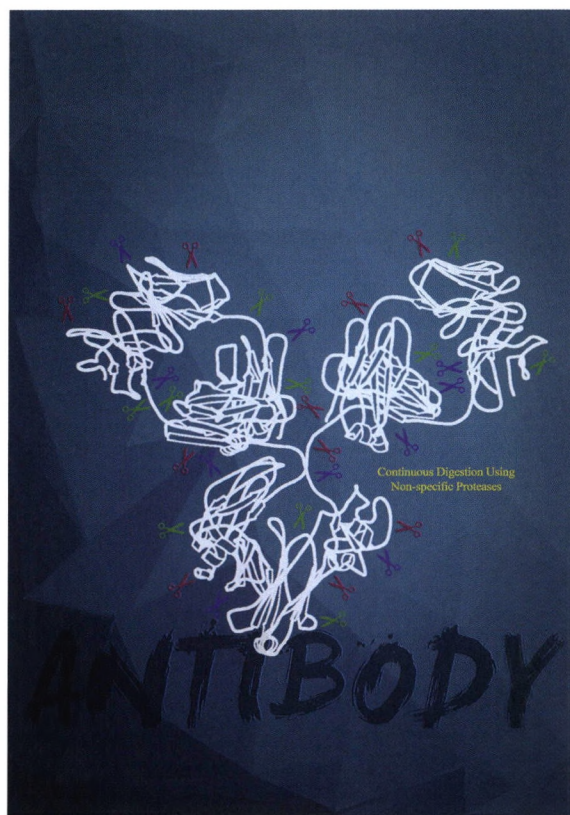
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\* 通信联系人.

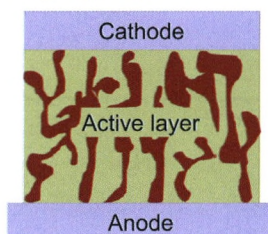
**On the cover:** To solve the problem of low accuracy and coverage of protein sequencing, a method of continuous digestion using various non-specific proteases has been developed. And a sequence assembly algorithm was developed to comprehensively score the amino acid to further improve the accuracy of sequence assembly. Using this method, the accurate sequencing of Herceptin was realized. [Yi-Chu Shan *et al.* on page 663-669.]



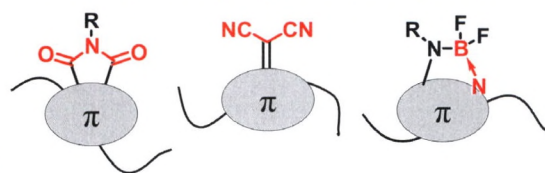
Review

Research Progress in Organic Solar Cells Based on Small Molecule Donors and Polymer Acceptors

$M_D/P_A$ -type OSCs



The type of polymer acceptors:

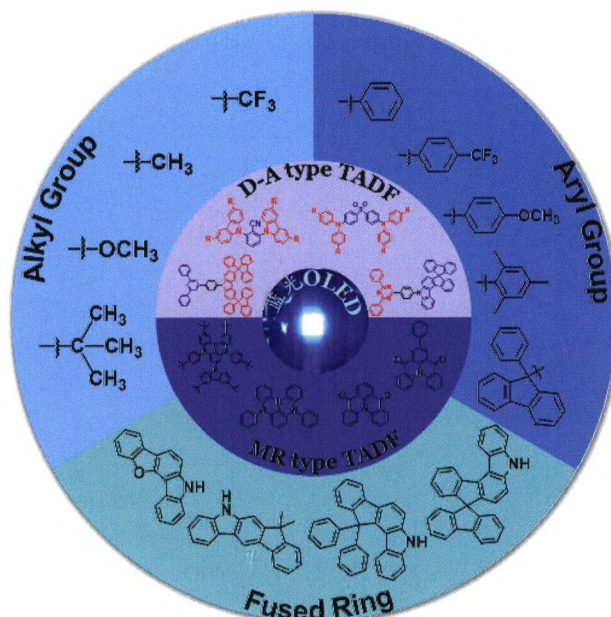


Junhui Miao, Zicheng Ding, Jun Liu\*, Lixiang Wang

*Acta Chim. Sinica* **2021**, 79(5), 545-556

Taking the different types of polymer acceptors in the active layer as the main line, the research progress of organic solar cells based on small molecule donors and polymer acceptors is summarized.

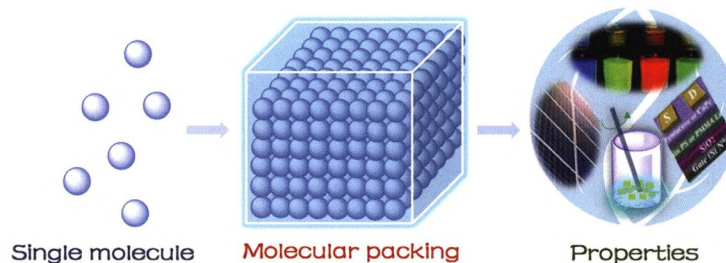
### Recent Advances in Substituent Effects of Blue Thermally Activated Delayed Fluorescence Small Molecules



Thermally activated delayed fluorescence (TADF) materials have attracted increasing attention for highly efficient organic lighting-emitting diodes due to their 100% internal quantum efficiency without the aid of noble metal atoms. Herein, the substituent effects of small-molecule D-A (donor-acceptor) type and multiple-resonance type blue TADF materials on their physicochemical properties and electroluminescence performance were summarized, in the hope of providing effective reference for the design and synthesis of high-efficiency and stable blue TADF molecules.

Tao Zhou, Yue Qian, Hongjian Wang, Quanyou Feng\*, Linghai Xie\*, Wei Huang  
*Acta Chim. Sinica* **2021**, 79(5), 557-574

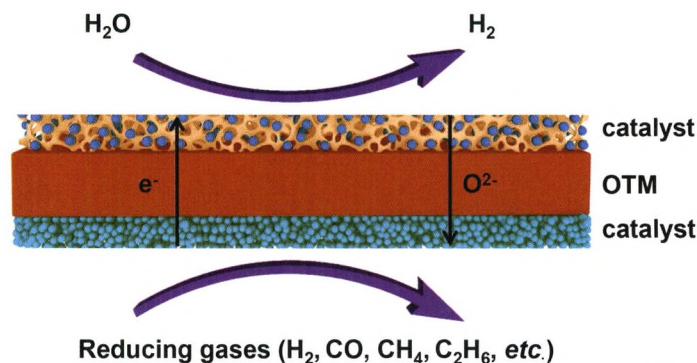
### Significant Influence of Molecular Packing in Aggregates on Optoelectronic Properties



Jinfeng Wang, Zhen Li\*

*Acta Chim. Sinica* **2021**, 79(5), 575-587

### Recent Progress on Mixed Conducting Oxygen Transport Membrane Reactors for Water Splitting Reaction

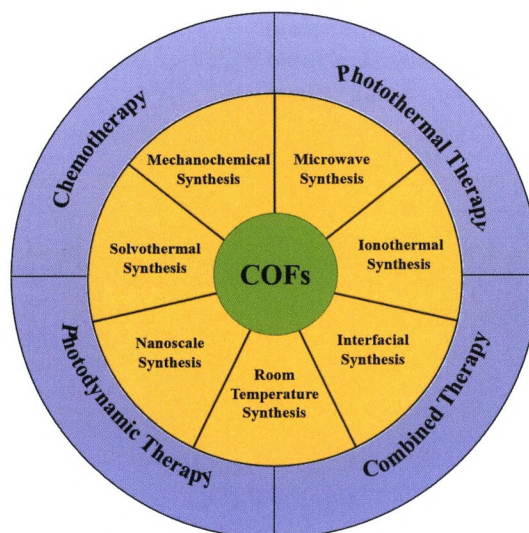


Lili Cai, Jingyi Wang, Xuefeng Zhu\*, Weishen Yang

*Acta Chim. Sinica* **2021**, 79(5), 588-599

The research progress on mixed conducting oxygen transport membrane (OTM) reactors for water splitting reaction is introduced in this review, including the effects of membrane materials, catalysts and operation conditions to the water splitting involved membrane reactors.

## Research Progress on the Synthesis of Covalent Organic Frameworks and Their Applications in Tumor Therapy

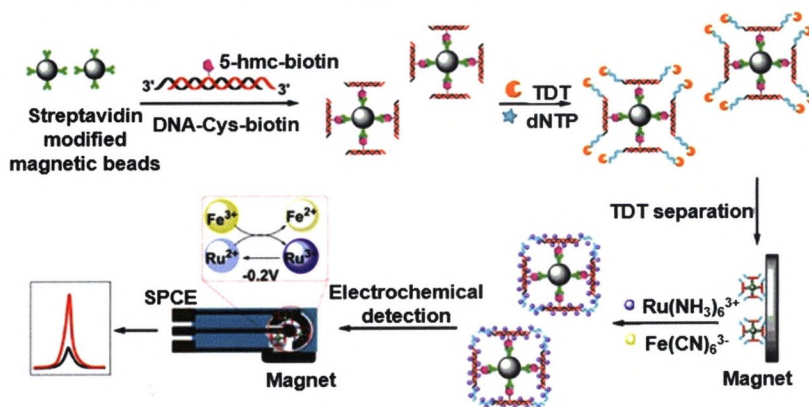


Tao Wang, Lu Zhao, Kewei Wang, Yunfeng Bai\*, Feng Feng\*

*Acta Chim. Sinica* **2021**, 79(5), 600-613

The synthesis methods of covalent organic frameworks (COFs) mainly include solvothermal synthesis, mechanochemical synthesis, microwave synthesis, ionothermal synthesis, interfacial synthesis, room temperature synthesis and nanoscale synthesis. Their applications in tumor therapy can be divided into chemotherapy, photothermal therapy, photodynamic therapy and combination therapy.

## Advances in Detection of Epigenetic Modification — 5-Hydroxymethylcytosine

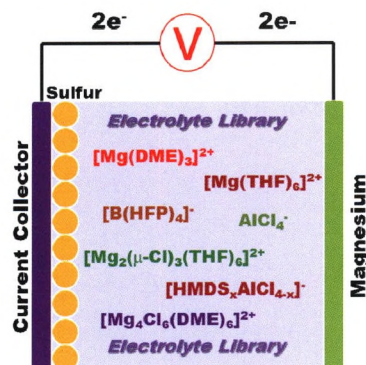


Chen-chen Li, Hui-yan Chen, Yue-hong Dong, Xiliang Luo\*, Juan Hu\*, Chun-yang Zhang\*

*Acta Chim. Sinica* **2021**, 79(5), 614-627

The recent advance in the detection of 5-hydroxymethylcytosine (5hmC) is reviewed in this paper, and the challenge and trends of this area is highlighted as well.

## Progress of Non-Nucleophilic Electrolytes for Magnesium/Sulfur Battery

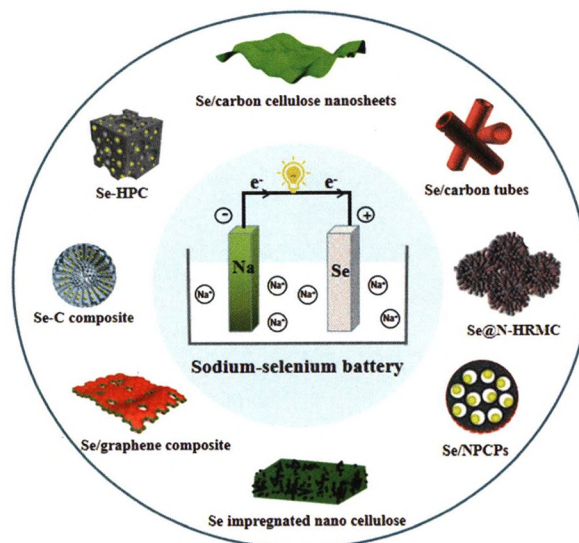


Wanfei Li\*, Xin Li, Haiyan Fan, Jianhua Xiao, Qianqian Liu, Miao Cheng, Jing Hu, Tao Wei, Zhengying Wu, Yun Ling, Bo Liu, Yuegang Zhang\*

*Acta Chim. Sinica* **2021**, 79(5), 628-640

Magnesium/sulfur (Mg/S) battery is a promising energy storage system due to its high energy density, low cost, and high safety. Development of non-nucleophilic electrolyte is critical for realizing high performance Mg/S batteries. The recent research progress on synthesis method, cation structure analysis, and electrochemical characterization of electrolytes with mononuclear, binuclear, and multinuclear Mg cations are summarized in this review.

## Research Progress of Key Materials for Sodium-selenium Batteries



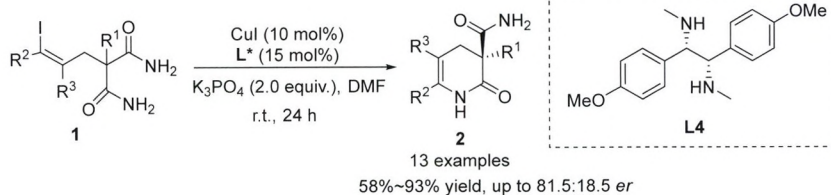
Bixia Lin, Yingshan Huang, Shuai Chen, Zhenyu Xing\*

*Acta Chim. Sinica* **2021**, 79(5), 641-648

Sodium-selenium batteries show some advantages in stationary energy storage. The use of carbon substrates for selenium cathode in Na-Se batteries have been studied, and acquired great progress in recent years. These carbon materials include Se/carbon tubes, Se/carbon cellulose nanosheets, Se/graphene composite, *etc.*

## Communication

## Copper(I)-Catalyzed Asymmetric Desymmetric Intramolecular Alkenyl C—N Coupling Reaction

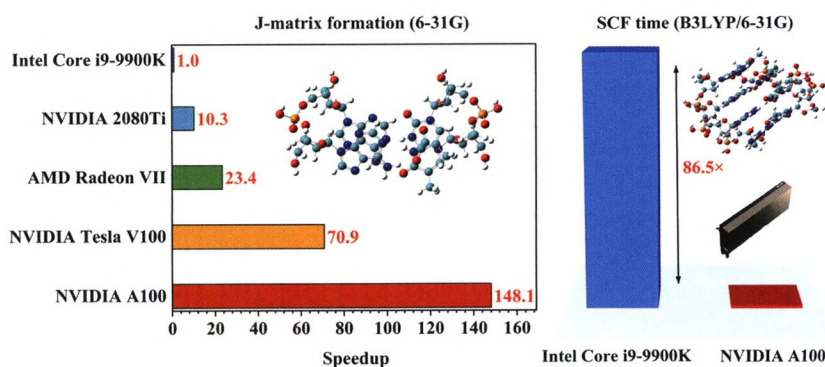


Zhuoji Deng, Yifan Ouyang, Yunlin Ao, Qian Cai\*

*Acta Chim. Sinica* **2021**, 79(5), 649-652

A copper-catalyzed asymmetric intramolecular C—N coupling of 2-(3-iodoallyl)-malonamides via desymmetrization is developed, affording chiral 2-oxo-1,2,3,4-tetrahydropyridine-3-carboxamide products in high yields (58%~93%) and moderate enantioselectivities (up to 81.5 : 18.5 *er*).

## Hartree-Fock and Density Functional Calculations on Graphics Processing Unit



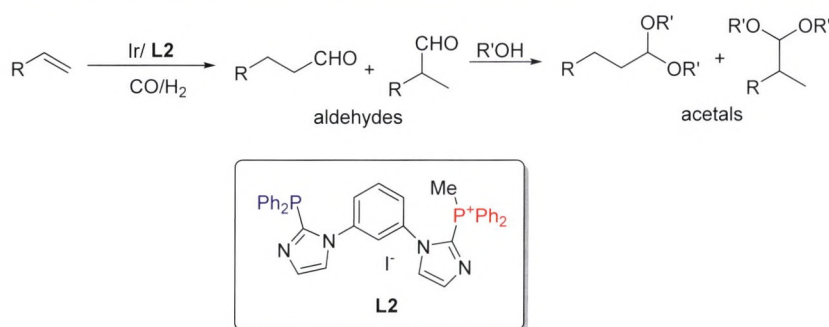
Yan Wang, Yingqi Tian, Zhong Jin\*, Bingbing Suo\*

*Acta Chim. Sinica* **2021**, 79(5), 653-657

The details of the graphics processing units (GPU)-accelerated Hartree-Fock and density functional theory (DFT) algorithms are presented. The program employs OpenCL platform, which can be executed on a variety of computing devices from different companies as AMD and NVIDIA GPUs. The benchmark calculation shows that the algorithm implemented on the GPU can achieve up to 148-fold speedup over a serial CPU implementation.

## Article

## Co-catalysis over Bi-functional Ligand Based Ir-catalyst for Tandem Hydroformylation-acetalization Reaction

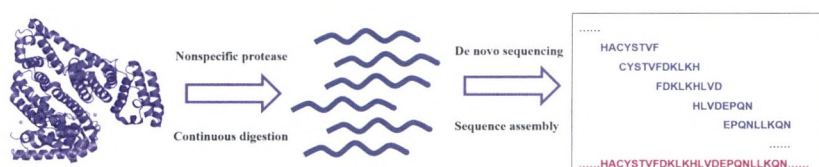


“Phosphino-phosphonium” bi-functional ligand **L2** based  $[\text{Ir}(\text{COD})\text{Cl}]_2$ -catalyst efficiently accelerated the tandem hydroformylation-acetalization reaction. In **L2**, the phosphonium group not only acted as a Lewis acid organocatalyst to drive the sequential acetalization of aldehydes, but also contributed to the synergetic catalysis for the preceding hydroformylation through stabilizing the Ir-acyl intermediate with the phosphine group cooperatively.

Da Yang, Longli Zhang\*, Huan Liu\*,  
Chaohe Yang

*Acta Chim. Sinica* **2021**, 79(5), 658-662

## Full-length Protein Sequencing Based on Continuous Digestion Using Non-specific Proteases

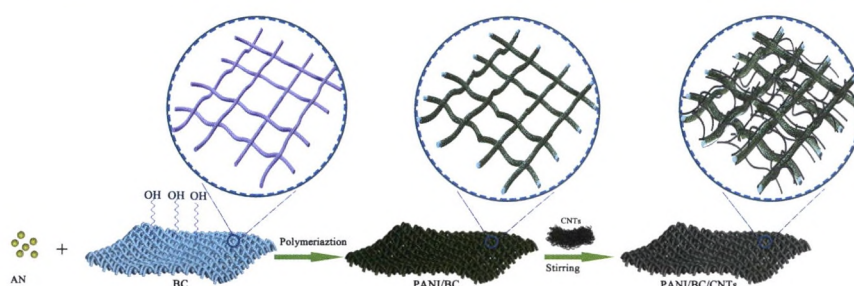


A full-length protein sequencing method based on continuous digestion using non-specific proteases was developed. A continuous enzymatic digestion device was constructed, and a variety of non-specific proteases were used to continuously digest the proteins. Taking advantage of the non-specific cleavage sites of non-specific proteases, the complementarity of peptides produced at different time and by different kinds of proteases, the type and overlapping degree of digested peptides were improved. Finally, a sequence assembly algorithm was developed to assemble the peptide sequence. The developed method was applied to the sequencing of bovine serum albumin (BSA) and monoclonal antibody Herceptin. Excluding leucine and isoleucine, full-length de novo sequencing was achieved with 100% accuracy for BSA and Herceptin light chain. Accuracy of the sequenced Herceptin heavy chain was 99.7%.

Chao Yang, Yi-Chu Shan\*, Wei-Jie Zhang,  
Zhong-Peng Dai, Li-Hua Zhang\*, Yu-Kui  
Zhang

*Acta Chim. Sinica* **2021**, 79(5), 663-669

## Study on the Construction and Properties of Bacterial Cellulose-Based Cathode for Flexible Zn-Ion Batteries



The bacterial cellulose/polyaniline/carbon nanotubes (BC/PANI/CNTs) electrode was prepared via a simple *in-situ* polymerization with subsequent vacuum filtration. The BC/PANI/CNTs possesses a three-dimensional (3D) porous structure. As a flexible cathode for Zn-ion batteries (ZIBs), the BC/PANI/CNTs delivers high specific capacity of 157 mAh/g and 1.148 mAh/cm<sup>2</sup>. The assembled quasi-solid-state ZIB exhibits a specific capacity of 109 mAh/g, and over 90% of the capacity is retained after 200 cycles. The BC/PANI/CNTs electrode has high flexibility and electrochemical performance, and therefore provides a feasible scheme for the scalable application of flexible ZIBs.

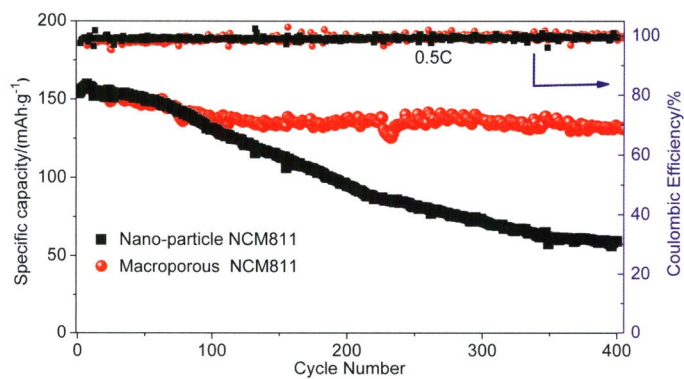
Xinxin Zhang, Rong Liu\*, Lei Wang\*,  
Honggang Fu

*Acta Chim. Sinica* **2021**, 79(5), 670-677

### Preparation and Electrochemical Performance of Macroporous Ni-rich $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ Cathode Material

Tongxin Li, Donglin Li\*, Qingbo Zhang, Jianhang Gao, Xiangze Kong, Xiaoyong Fan, Lei Gou

*Acta Chim. Sinica* **2021**, 79(5), 678-684



The macroporous  $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$  exhibits superior cycling stability compared with the nanoparticle  $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ .



## 《化学学报》2021编辑委员会会议成功召开

2021年4月20日晚,《化学学报》2021编辑委员会会议在珠海召开。唐勇、周其林、冯小明、孙世刚、田禾、王利祥、帅志刚、陈鹏、游书力等60余位老师出席了会议。

周其林主编首先致辞,他感谢大家一直以来对《化学学报》的支持和贡献,同时也对《化学学报》近年来取得进步表示了肯定,并点明了这次会议的主旨。编辑部杨侠介绍了《化学学报》的历史、改版历程,汇报了期刊及编委会近年工作情况。随后,举行了《化学学报》编委会换届仪式。换届仪式上,唐勇代表主办单位中科院上海有机化学研究所、中国化学会对上一届编委会的工作给予了高度赞扬,同时对周其林主编表示了衷心感谢,并向其颁发了荣誉证书和奖杯。游书力代表主办单位中科院上海有机化学研究所、中国化学会、《化学学报》编委会、编辑部向新任主编唐勇颁发了聘书,并表示祝贺。唐勇主编向冯小明、孙世刚、田禾、王利祥、帅志刚、陈鹏等出席本次会议的副主编颁发了聘书,并表示祝贺。随后,唐勇主编及各位副主编向到会编委颁发了聘书。接下来,唐勇、周其林、冯小明、孙世刚、田禾、王利祥、帅志刚、陈鹏、游书力、龚流柱、黄培强、卜显和、胡文浩、张万斌、俞飏、焦宁、张先正、焦宁、张俊良、吴劼、王剑波、邵学广、曹荣、胡征等各位老师相继发言,对期刊的发展建言献策,进行了热烈的讨论。

会议肯定了改版以来的成绩,总结了工作经验和上一届编委会的工作情况,完成了编委换届工作,确立了以唐勇主编为首的新一届编委会,制定了期刊发展的新目标,探讨了提高期刊学术质量、影响力的措施和办法,强调了与时俱进、加强期刊宣传、提高编委活跃度等措施的重要性,为《化学学报》今后的发展指明了方向。

会议期间还举行了《化学学报》2019年最有影响力论文奖颁奖典礼,李迪、樊春海、姚英明、朱晨、刘育、王贵领、陈传峰、雷爱文、廖春阳、周剑等作者的9篇文章分别获奖,周其林、田禾、孙世刚、王利祥向到会获奖作者颁奖并合影留念。



换届仪式



大会现场



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