GUEST EDITORIAL

Chinese Journal of Structural Chemistry

# Preface to Crystalline Porous Materials

Jiandong Pang*, Ning Huang*, Shuai Yuan* and Jun-Sheng Qin*

Novel crystalline porous materials refer to porous materials constructed by linking organic molecule units with coordination bonds, covalent bonds, or supramolecular interactions, mainly including metal-organic frameworks (MOFs), covalent organic frameworks (COFs), metal organic cages (MOCs), and so on. Due to their predictable and designable long-range ordered structures, high surface areas, guest-accessible voids, and easily functionalized channels by pre- or post-modifications, novel crystalline porous materials have attracted much attention in the past two decades, which show potential applications in light emission, gas adsorption and separation, heterogeneous catalysis, and sensing. Recently, many efforts have been made to exploit novel crystalline porous materials with excellent properties, and various improvements and investigations are still highly required for the further development of this field.

The special issue "Crystalline Porous Materials" comprises a collection of original research and review articles on the synthesis, structure, and applications of novel crystalline porous materials. This special issue consists of seven reviews and one research article, reflecting recent developments on MOFs, COFs, and MOCs. The collected papers cover the broad applications of crystalline porous materials in the fields of gas separation, photocatalysis, electrocatalysis, sensing, and ion conduction. A brief summary of all papers in this issue is as follows.

First, in "A Water-Stable 3D Eu(III)-Organic Framework as a Bi-Functional Ratiometric Luminescent Sensor for Fast, Sensitive and Selective Detection of ODZ and $Hg^{2+}$ in Aqueous Media", a new luminescent Eu(III)-based MOF was designedly synthesized with an electron-rich π-conjugated organic linker, which shows good water stability and can be used for the efficient detection of ornidazole and $Hg^{2+}$ in aqueous solution.

The paper "Lithium Ion Conduction in Covalent Organic Frameworks" focused on the emerging developments of $Li^+$ conduction in COFs. The structures and properties of the $Li^+$ conduction COFs were summarized in the past years, the structure-property relationships were elucidated, and the remaining challenges as well as future research directions in the COF-based lithium conductive area were also provided.

The paper "A Review on the Progress of Metal-Organic Frameworks in Electrochemiluminescence Sensors" reviewed the recent progress of MOFs applied to electrochemiluminescence (ECL) for the sensing of metal ions, nucleic acids, proteins, bacteria, viruses, and other human health-related targets. The correlations between MOF structures and ECL properties were discussed, and potential opportunities and challenges for MOFs used for ECL sensing were also explored.

The paper "Recent Advances in $C_2$ Gases Separation and Purification by Metal-Organic Frameworks" emphasized on recent advances for MOFs applied to $C_2$ gases (mainly including acetylene/ethylene, ethane/ethylene, and acetylene/carbon dioxide) separation and purification. The structure-related separation mechanism of MOFs, future challenges faced by the field, and possible research directions were also discussed.

In "Recent Progresses in Lanthanide Metal-Organic Frameworks (Ln-MOFs) as Chemical Sensors for Ions, Antibiotics and Amino Acids", some representative research results reported in the past five years on lanthanide-based MOFs were introduced. The chemical sensing of Ln-MOFs on ions, antibiotics, and amino acids based on luminescent quenching or enhancing effects were carefully classified, and future research directions were also proposed.

The paper "A Review on Crystalline Porous MOFs Materials in Photocatalytic Transformations of Organic Compounds in Recent Three Years" summarized the recent research progress of MOFs for photocatalytic organic transformations. The preparation and synthesis strategies of MOF-based photocatalysts, the application of these photocatalysts on diverse types of organic transformation reactions, and the development opportunities and challenges in this field were all discussed in turn.

In "Recent Progress in Covalent Organic Frameworks (COFs) for Electrocatalysis", COF-based electrocatalysts used for hydrogen evolution reaction (HER), hydrogen oxidation reaction (HOR), oxygen evolution reaction (OER), oxygen reduction reaction (ORR), nitrogen reduction reaction (NRR) and carbon dioxide reduction reaction ($CO_2RR$) were well summarized. The design strategies of COF-based electrocatalysts, recent progress of COF-derived catalysts for specific electrocatalytic reactions, and future research directions/challenges were carefully discussed.

Finally, in "Recent Advances in Metal-Organic Cages-Based Composite Membranes", recent research advances of MOCs applied to membrane separation, including synthetic artificial channels, reverse osmosis, nanofiltration, pervaporation and gas separation, were carefully reviewed. Representative MOCs used for composite membrane fabrication were highlighted, while potential research directions and challenges were also deeply discussed.

We hope this special issue could provide the readers with an innovative recognition of relationship between structure and performance during the reaction. We have learned a lot about interesting *applications of novel crystalline porous materials* in this special issue. Undoubtedly, the contents in this issue are just a start, but we will do better in future issues, and look forward to our new contributions as this journal grows. We do hope that readers will enjoy the range of topics presented here and perhaps initiate ideas to push their research to the next stage.




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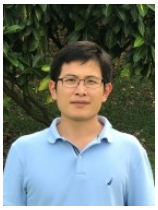
Prof. **Jiandong Pang** (Guest Editor)

School of Materials Science and Engineering, National Institute for Advanced Materials, TKL of Metal and Molecule-Based Material Chemistry, Nankai University, Tianjin 300350, China

Email: jdpang@nankai.edu.cn



Prof. **Ning Huang** (Guest Editor)

MOE Key Laboratory of Macromolecular Synthesis and Functionalization, State Key Laboratory of Silicon Materials, Department of Polymer Science and Engineering, Zhejiang University, Hangzhou 310027, China

Email: nhuang@zju.edu.cn

Prof. **Shuai Yuan** (Guest Editor)

State Key Laboratory of Coordination Chemistry, School of Chemistry and Chemical Engineering, Nanjing University, Nanjing 210023, China

Email: syuan@nju.edu.cn

Prof. **Jun-Sheng Qin** (Guest Editor)

State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, College of Chemistry and International Center of Future Science, Jilin University, Changchun 130012, China

Email: qin@jlu.edu.cn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