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GUEST EDITORIAL

Structural Chemistry in Energy Relevant-Catalysis Reaction

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Challenges are faced for rapid economic and social development including the global energy shortage, diversification in energy and chemical raw materials, and ecological environmental protection. The development of renewable energy has become a common concern for the current society. Energy relevant-catalysis reaction is the core of energy conversion and chemical processes, aiming to achieve high energy power sources, conversion of reaction feedstocks, and selectivity of target products under mild conditions. More than 85% of energy and chemical processes are closely related to catalysis reaction, that is, driven by highly effective catalysts. It is significant to establish the structural performance relationship by deciphering the atomic structure and electronic states of active sites, which provides new sights into the catalytic processes and promotes the development of novel catalyst materials. Therefore, as supported by *Chinese Journal of Structural Chemistry*, a special issue for the **Structural Chemistry in Energy Relevant-Catalysis Reaction** was organized by the Guest Editors.

This special issue contains 9 papers and 1 News, which are related to structural chemistry in energy-relevant electrocatalysis and photocatalysis reactions. We would like to express our faithful appreciation to all the authors for their contribution to this special issue which covers the hydrogen generation from water or sea water splitting reaction, the fuel cells reaction of methanol oxidation and oxygen reduction reaction as well the carbon dioxide electron-reduction for carbon cycling. In the news by Prof. Wang, the rational design of Fe-NCs by a template-guided strategy to break the limit of Fe site density with approaching industrial levels fuel cell performance was discussed, which would be helpful for novel non-precious catalyst development. In the hydrogen generation by water splitting technique, some novel non-precious catalysts, like P doped Ni_4Mo, Fe_4C/FeP and Co/MoN, were reported to exhibit high performance by revealing their structural-performance correlation to the catalysis process; the urea oxidation, an important reaction in energy conversion by fuel cells technique and urea-containing waste water handing, was evaluated by Phytate-coordination Triggered Enrichment of Surface NiOOH Species on Nickel Foam as reported by Prof. Li.; the novel catalyst of $CoWO_4/WO_3$ as efficient Pt co-catalysts for methanol oxidation and oxygen reduction in fuel cell technique was contributed by Prof. Zou, which reveals the special structure for the elimination of CO poisoning effect and the regeneration of Pt active sites. The role of metal centers in porphyrin-based MOFs for electrochemical reduction of CO_2 was studied by Prof. Dong, which shows high CO selectivity relevant to stronger antibonding π-strength and higher electron cloud density in M-N_4. Two reviews were given on the methanol oxidation for fuel cells catalyzed by PtRu-based electrocatalysts by Prof. Feng, and transition metal nitrides as oxygen and hydrogen electrocatalysts by Prof. Xu, which should be helpful for the progress survey and catalytic mechanism understanding.

We hope this special issue could provide the readers with representative results with the development of novel catalysts, and catalytic mechanisms for some important energy-relevant catalytic reactions. We realized some significant contributions were not covered in this issue due to some reasons, and sincere appreciation should also go to those authors. It is No Doubt the content of this issue is not in the perfect state but will do better for future issues, looking forward to our new contributions and seeing the growth of this journal. We do hope that readers will enjoy the scope of topics presented here and perhaps find inspiration to push their research to the next stage.

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