



Chinese Journal of Catalysis

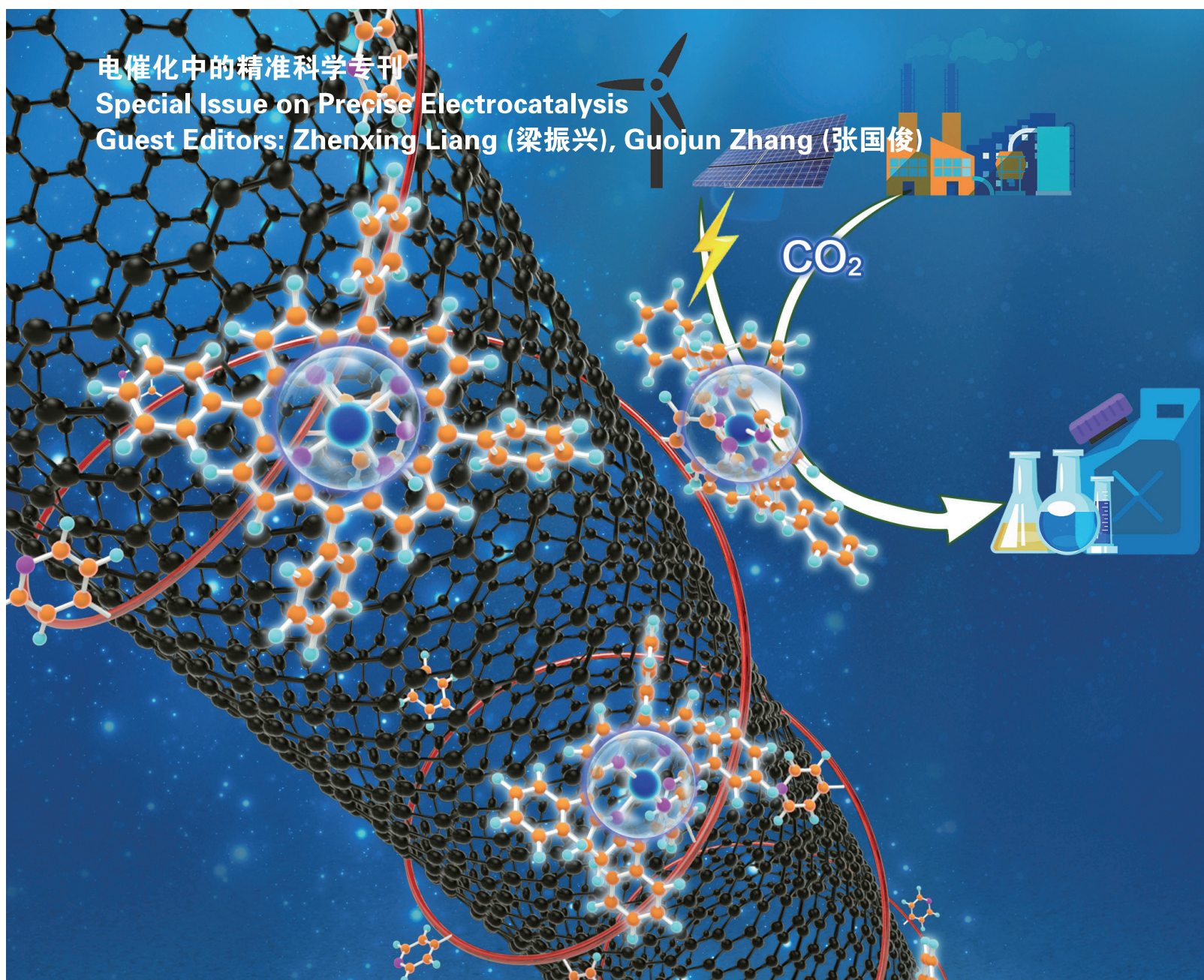
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电催化中的精准科学专刊

Special Issue on Precise Electrocatalysis

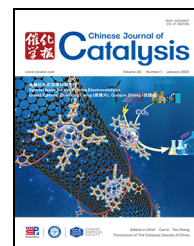
Guest Editors: Zhenxing Liang (梁振兴), Guojun Zhang (张国俊)



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Special Issue on Precise Electrocatalysis

Guest Editors: Zhenxing Liang, Guojun Zhang

Chinese Journal of Catalysis

Graphical Contents

Editorial

Chin. J. Catal., 2022, 43: 1 doi: 10.1016/S1872-2067(21)63959-1

Preface to special issue on precise electrocatalysis

Zhenxing Liang, Guojun Zhang

South China University of Technology; National Natural Science Foundation of China



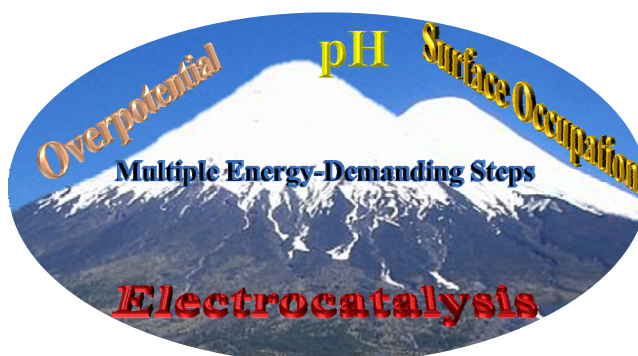
Perspective

Chin. J. Catal., 2022, 43: 2–10 doi: 10.1016/S1872-2067(21)63890-1

Electrocatalytic volcano relations: surface occupation effects and rational kinetic models

Yongting Chen, Junxiang Chen, Shengli Chen *

Wuhan University; Fujian Institute of Research on the Structure of Matter



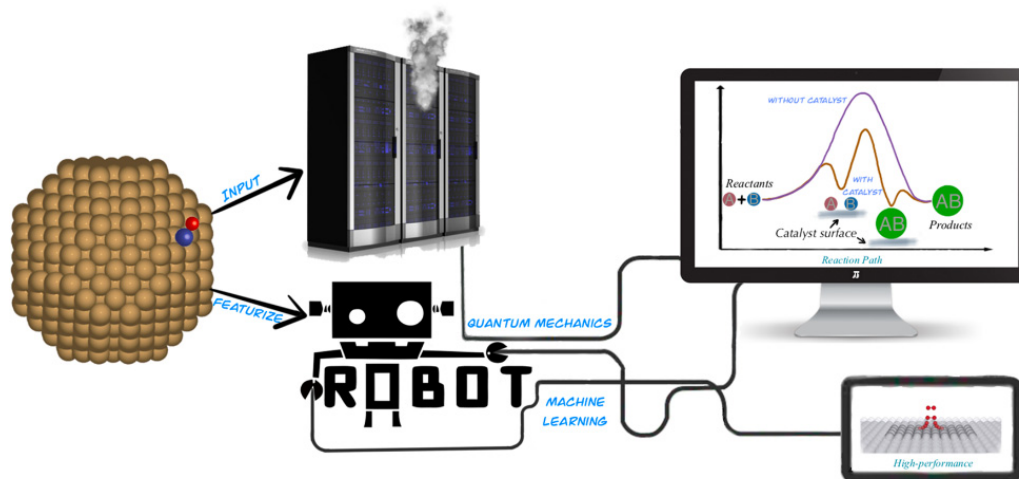
Electrocatalytic volcano relations are crucially impacted by diverse factors such as multiple energy-demanding steps, surface occupation, electrode potential, and electrolyte pH. New kinetic model indicates relative flat volcano tops.

Reviews

Chin. J. Catal., 2022, 43: 11–32 doi: 10.1016/S1872-2067(21)63852-4

Targeted design of advanced electrocatalysts by machine learning

Letian Chen, Xu Zhang *, An Chen, Sai Yao, Xu Hu, Zhen Zhou *
Nankai University; Zhengzhou University



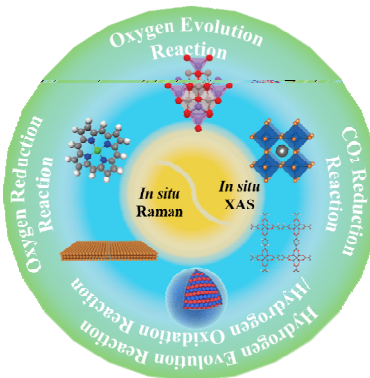
This review outlines the application of machine learning in electrocatalysis to achieve rapid prediction of electrocatalytic performance and mechanism and finally realize targeted design of advanced electrocatalysts.

Chin. J. Catal., 2022, 43: 33–46 doi: 10.1016/S1872-2067(21)63874-3

In situ studies of energy-related electrochemical reactions using Raman and X-ray absorption spectroscopy

Heng-Quan Chen, Lie Zou, Di-Ye Wei, Ling-Ling Zheng *, Yuan-Fei Wu, Hua Zhang, Jian-Feng Li *
Xiamen University

This review summarizes recent applications of *in situ* Raman and X-ray absorption spectroscopy for investigating various energy-related electrochemical reactions. The challenges and perspectives for their further development within this field are also discussed.

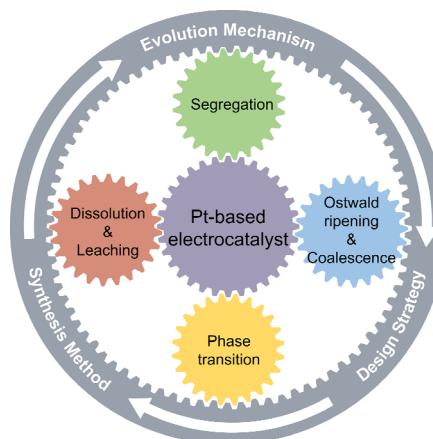


Chin. J. Catal., 2022, 43: 47–58 doi: 10.1016/S1872-2067(21)63896-2

Structural evolution of Pt-based oxygen reduction reaction electrocatalysts

Jiaheng Peng, Peng Tao, Chengyi Song, Wen Shang, Tao Deng, Jianbo Wu *
Shanghai Jiao Tong University

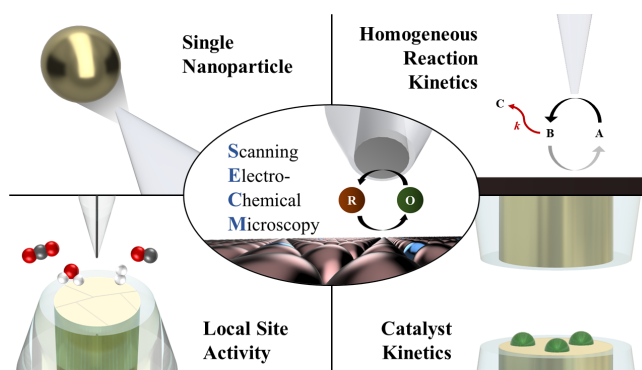
This review summarizes the recent advances in the structural evolution of Pt-based electrocatalysts during the ORR. The evolution mechanisms and applications in catalyst design and synthesis are reviewed.



Chin. J. Catal., 2022, 43: 59–70 doi: 10.1016/S1872-2067(21)63948-7

Modern applications of scanning electrochemical microscopy in the analysis of electrocatalytic surface reactions

C. Hyun Ryu, Yunwoo Nam, Hyun S. Ahn*
Yonsei University, Korea

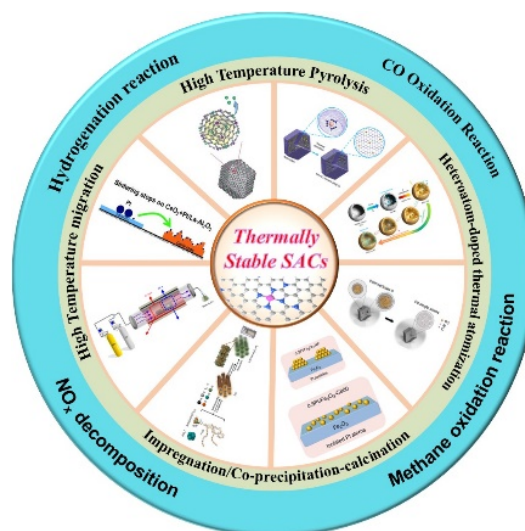


Scanning electrochemical microscopy (SECM) is a powerful tool for the interrogation of surface phenomena on electrocatalysts. In this review, we introduce significant examples in the literature that paved the foundation for electroanalytical examination of the electrocatalytic processes by SECM and discuss their implications in rational synthetic designs for electrocatalysts and detailed study of the reaction mechanism.

Chin. J. Catal., 2022, 43: 71–91 doi: 10.1016/S1872-2067(21)63888-3

Rational construction of thermally stable single atom catalysts: From atomic structure to practical applications

Hongwei Lv, Wenxin Guo, Min Chen, Huang Zhou*, Yuen Wu*
University of Science and Technology of China;
Dalian National Laboratory for Clean Energy

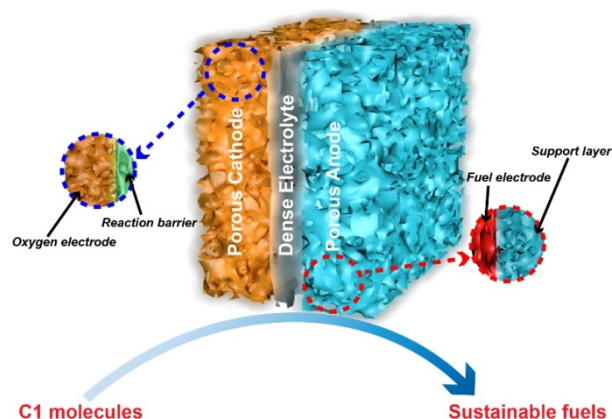


In this review, we mainly discuss the recent works about synthesis methods and practical applications of thermally stable single-atom catalysts. We also summarize the challenges and development opportunities in the field of single atom catalysis.

Chin. J. Catal., 2022, 43: 92–103 doi: 10.1016/S1872-2067(21)63838-X

Electrochemical conversion of C1 molecules to sustainable fuels in solid oxide electrolysis cells

Ximeng Lv, Menghuan Chen, Zhaolong Xie, Linping Qian,
Lijuan Zhang, Gengfeng Zheng*
Fudan University



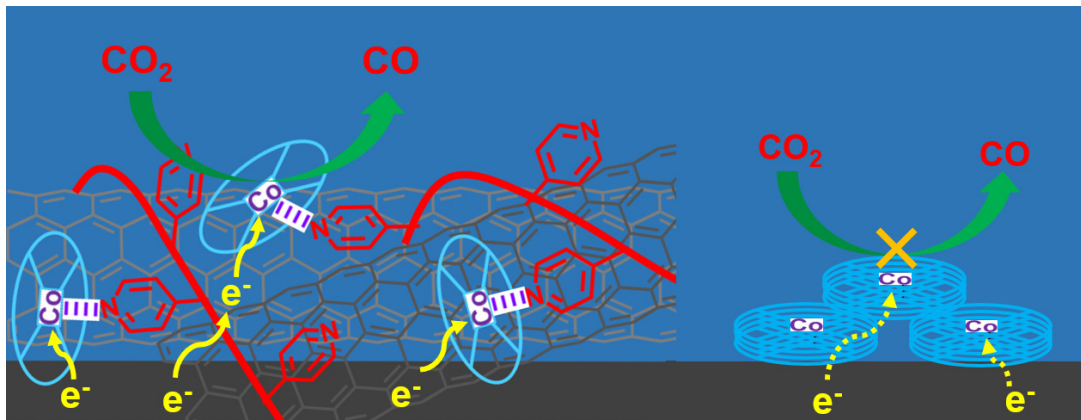
This review focuses on recent progress in C1 molecule conversion in solid oxide electrolysis cells, as well as the challenges and prospects of electrolysis technologies for sustainable fuel production in the near future.

Communications

Chin. J. Catal., 2022, 43: 104–109 doi: 10.1016/S1872-2067(21)63880-9

Cobalt-N₄ macrocyclic complexes for heterogeneous electrocatalysis of the CO₂ reduction reaction

Zhichao Lin, Zhan Jiang, Yubo Yuan, Huan Li, Hongxuan Wang, Yirong Tang, Chunchen Liu, Yongye Liang *
Southern University of Science and Technology of China

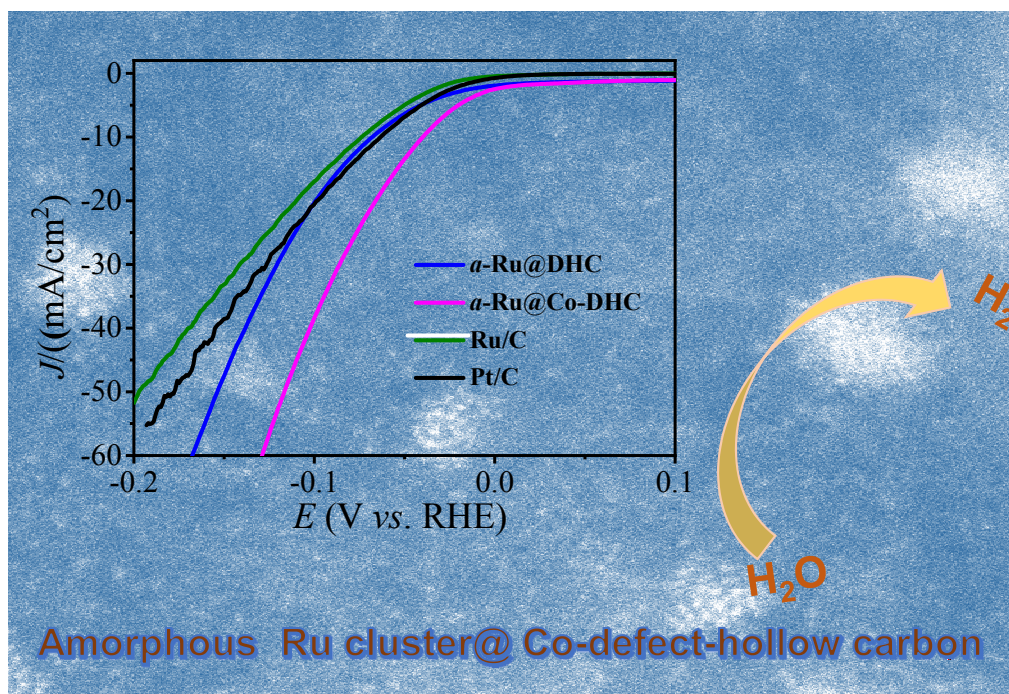


Molecule/substrate interactions significantly affect the electrocatalytic performance of cobalt-N₄ macrocyclic complexes for the heterogeneous CO₂ reduction reaction. Herein, methods to enhance such interactions are developed to afford high electrocatalytic activities for CO₂ reduction to CO.

Chin. J. Catal., 2022, 43: 110–115 doi: 10.1016/S1872-2067(21)63921-9

Amorphous Ru nanoclusters onto Co-doped 1D carbon nanocages enables efficient hydrogen evolution catalysis

Wenxiu Yang, Weiyu Zhang, Rui Liu, Fan Lv, Yuguang Chao, Zichen Wang, Shaojun Guo *
Peking University; Beijing Institute of Technology



A novel kind of amorphous Ru clusters@Co-doped defect-rich hollow carbon nanocage (a-Ru@Co-DHC) catalyst has been developed for efficient electrocatalysis of hydrogen evolution reaction in basic media due to synergistic effect of edge defect, atomic Co doping and dispersed amorphous Ru clusters.

Articles

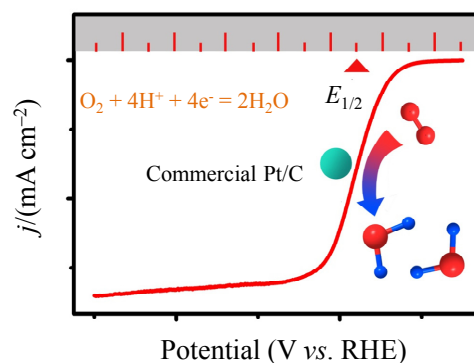
Chin. J. Catal., 2022, 43: 116–121 doi: 10.1016/S1872-2067(21)63854-8

Meta-analysis of commercial Pt/C measurements for oxygen reduction reactions *via* data mining

Mingbo Ruan, Jing Liu, Ping Song, Weilin Xu *

Changchun Institute of Applied Chemistry, Chinese Academy of Science;
University of Science and Technology of China

Even for the same type of commercial Pt/C with the same Pt loadings, measurements from different labs could lead to different “apparent” activities, as indicated by the half-wave potential ($E_{1/2}$). Herein, by conducting a meta-analysis of the ORR performance of commercial Pt/C *via* data mining from a large amount of literature, we reveal the optimal testing conditions of commercial Pt/C with the most repeatable ORR performance as a reference for the evaluation of other ORR catalysts.

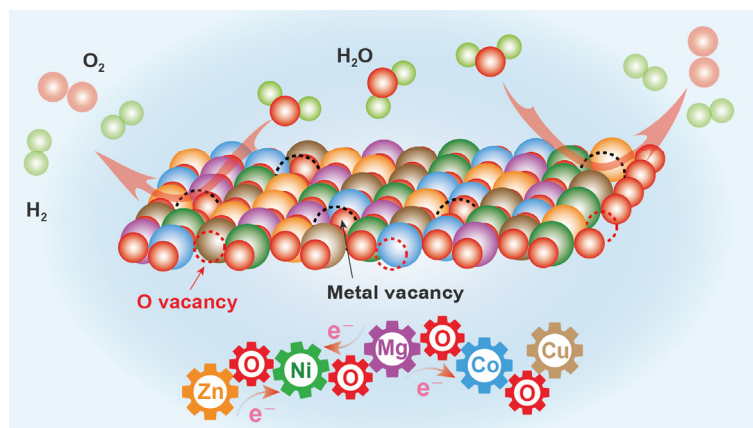


Chin. J. Catal., 2022, 43: 122–129 doi: 10.1016/S1872-2067(21)63794-4

Defective high-entropy rocksalt oxide with enhanced metal-oxygen covalency for electrocatalytic oxygen evolution

Fangming Liu, Meng Yu, Xiang Chen, Jinhan Li, Huanhuan Liu, Fangyi Cheng *

Nankai University



A rocksalt-type high-entropy oxide $\text{Mg}_{0.2}\text{Co}_{0.2}\text{Ni}_{0.2}\text{Cu}_{0.2}\text{Zn}_{0.2}\text{O}$ featuring enhanced Co/Ni–O covalency and enriched metal and oxygen vacancies was prepared as high-activity and low-cost OER electrocatalyst.

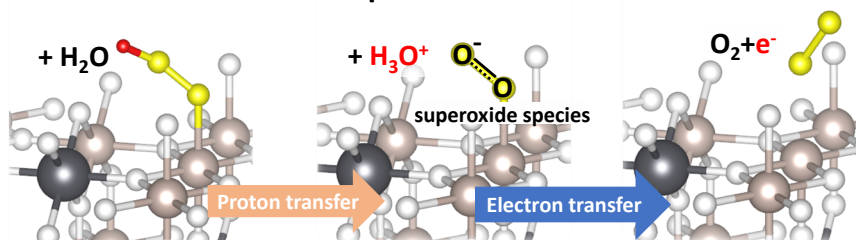
Chin. J. Catal., 2022, 43: 130–138 doi: 10.1016/S1872-2067(21)63856-1

Improved kinetics of OER on Ru–Pb binary electrocatalyst by decoupling proton-electron transfer

Rui Huang, Yunzhou Wen, Huisheng Peng, Bo Zhang *

Fudan University

Non-concerted proton-electron transfer

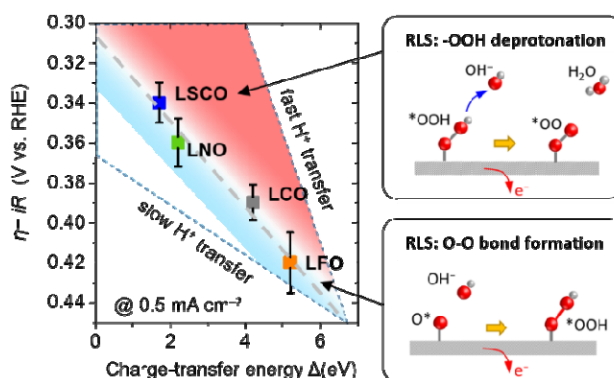


A RuPbO_x electrocatalyst was developed for the acidic OER. Pb incorporation enhanced the charging capability of the catalyst surface and improved the OER kinetics through a non-concerted proton-electron pathway.

Chin. J. Catal., 2022, 43: 139–147 doi: 10.1016/S1872-2067(21)63909-8

The role of proton dynamics on the catalyst-electrolyte interface in the oxygen evolution reaction

Huiyan Zeng, Yanquan Zeng, Jun Qi, Long Gu, Enna Hong, Rui Si, Chunzhen Yang*
Sun Yat-sen University; Institute of Advanced Science Facilities



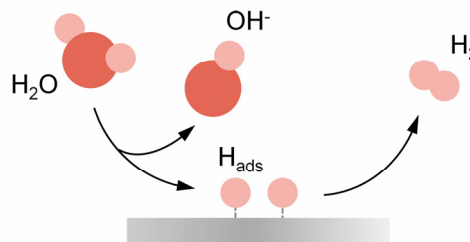
A systematic study was conducted to probe the role of proton dynamics in the multiple PCET steps during OER on the catalyst-electrolyte interfaces using perovskite oxides as model catalysts.

Chin. J. Catal., 2022, 43: 148–157 doi: 10.1016/S1872-2067(21)63821-4

The possible implications of magnetic field effect on understanding the reactant of water splitting

Chao Wei, Zhichuan J. Xu*
*Nanyang Technological University, Singapore;
 Campus for Research Excellence and Technological Enterprise, Singapore*

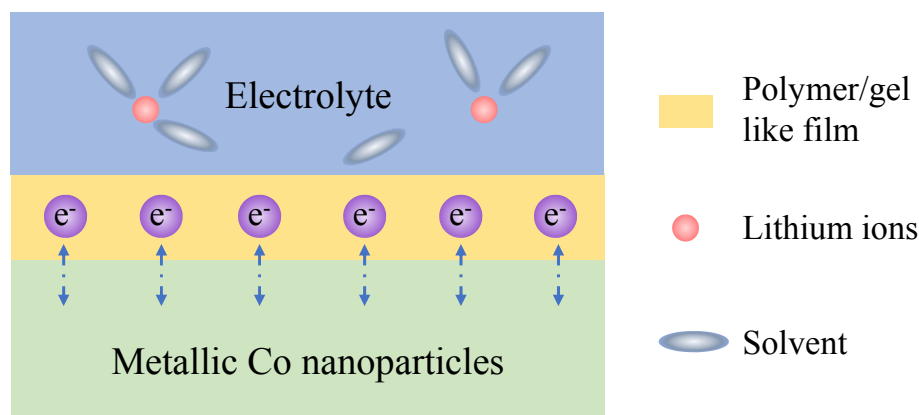
The observation that magnetic field does not affect hydrogen or oxygen evolution reaction, and the knowledge of Grotthuss mechanism, collectively suggest the reactant for these two reactions is H₂O, possibly not H⁺ or OH⁻.



Chin. J. Catal., 2022, 43: 158–166 doi: 10.1016/S1872-2067(21)63867-6

Transition metal catalysis in lithium-ion batteries studied by *operando* magnetometry

Xiangkun Li, Zhaohui Li, Yan Liu, Hengjun Liu, Zhiqiang Zhao, Ying Zheng, Linyuan Chen, Wanneng Ye, Hongsen Li, Qiang Li*
Qingdao University



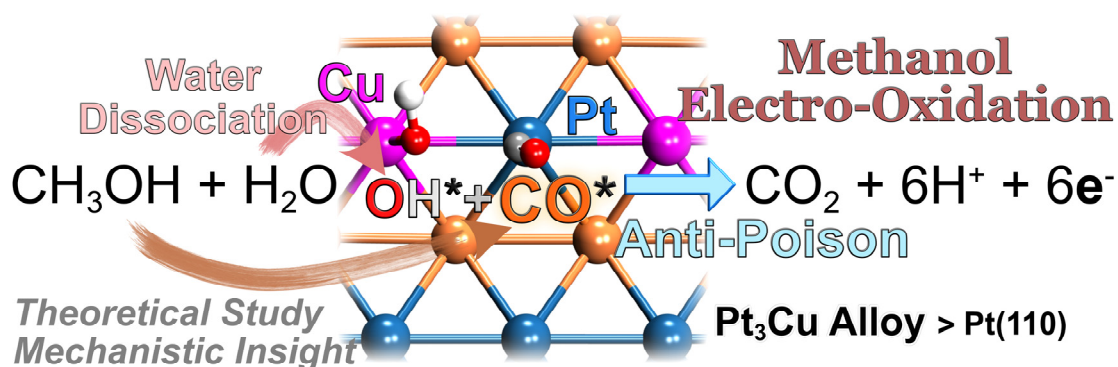
Co transition metal plays a catalytic role in assisting the reversible formation and dissolution of electrolyte-derived polymer/gel-like films.

Chin. J. Catal., 2022, 43: 167–176 doi: 10.1016/S1872-2067(21)63886-X

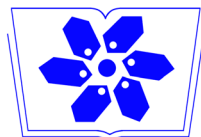
Mechanistic insight into methanol electro-oxidation catalyzed by PtCu alloy

Wei Zhang, Guang-Jie Xia *, Yang-Gang Wang *

Southern University of Science and Technology; Zhejiang University of Water Resources and Electronic Power



In methanol electro-oxidation reaction, theoretical calculation shows alloying the Pt with Cu could promote the anti-poison reaction of binding between CO^* and OH^* , which makes it more active than the pure Pt electrode.



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客座主编：梁振兴，张国俊

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