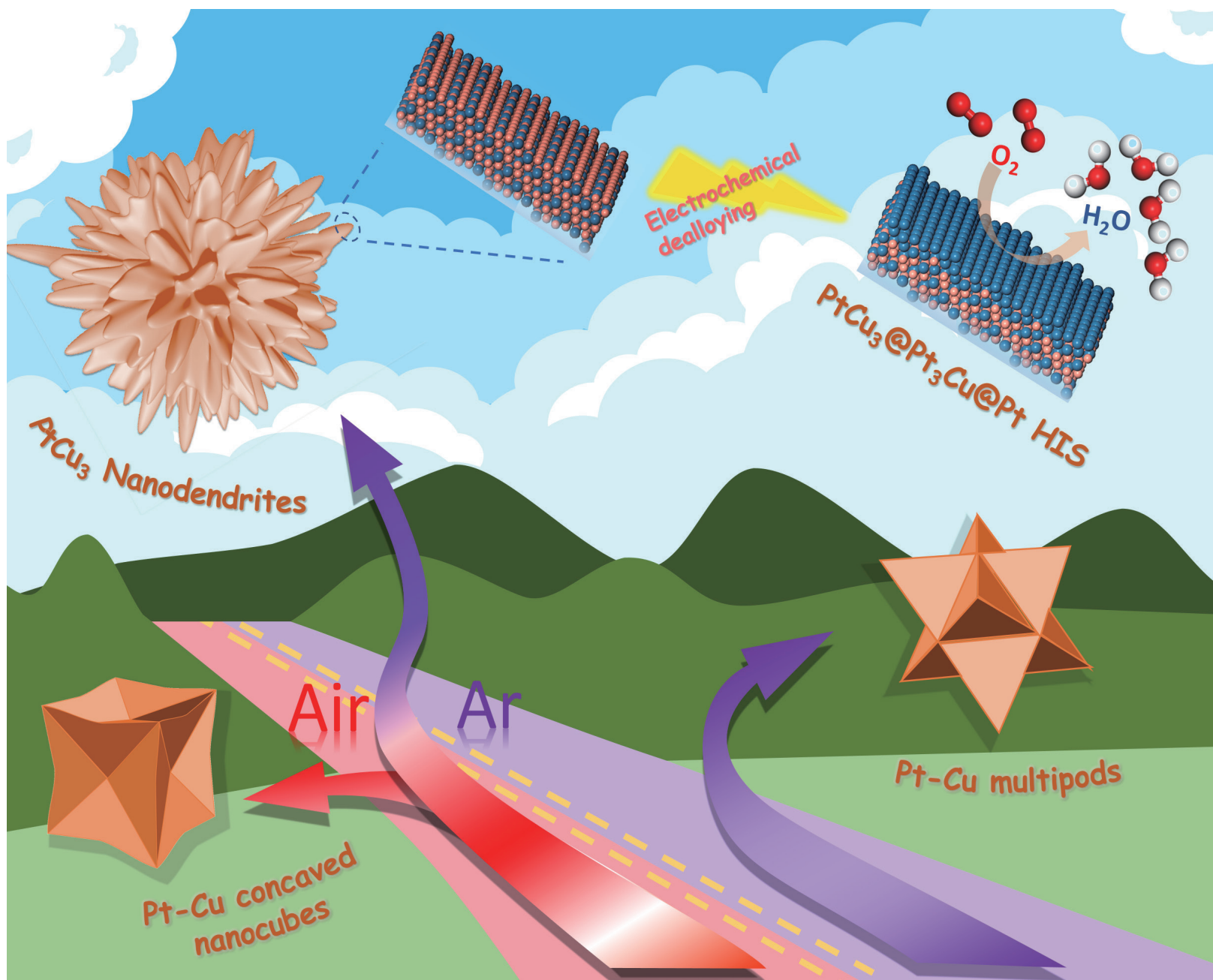




# Chinese Journal of Catalysis

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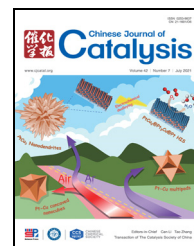
Volume 42 | Number 7 | July 2021



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## Chinese Journal of Catalysis

### Graphical Contents

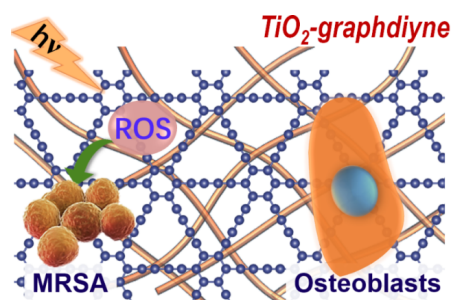
#### Highlight

*Chin. J. Catal.*, 2021, 42: 1051–1053 doi: 10.1016/S1872-2067(20)63742-1

#### Photocatalytic antibacterial and osteoinductivity

S. Wageh\*, Ahmed A. Al-Ghamdi, Lijun Liu\*  
 King Abdulaziz University, Saudi Arabia;  
 Wuhan Textile University, China

Graphdiyne-modified TiO<sub>2</sub> nanofibers, which could be incorporated into orthopedic implants, have impressive self-antibacterial and osteoinductive abilities due to their efficient ROS production, favorable osteoblast adsorption, and good biocompatibility.

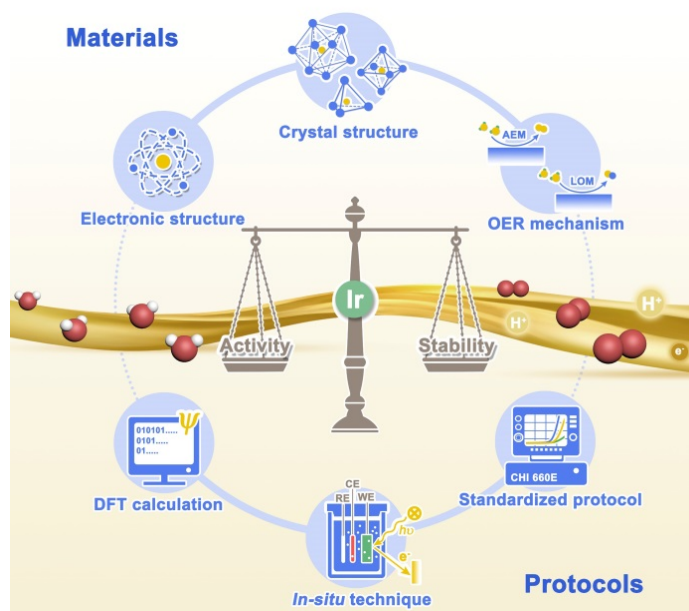


#### Reviews

*Chin. J. Catal.*, 2021, 42: 1054–1077 doi: 10.1016/S1872-2067(20)63722-6

#### Iridium-containing water-oxidation catalysts in acidic electrolyte

Yipu Liu, Xiao Liang, Hui Chen, Ruiqin Gao, Lei Shi, Lan Yang, Xiaoxin Zou\*  
 Jilin University; NingboTech University

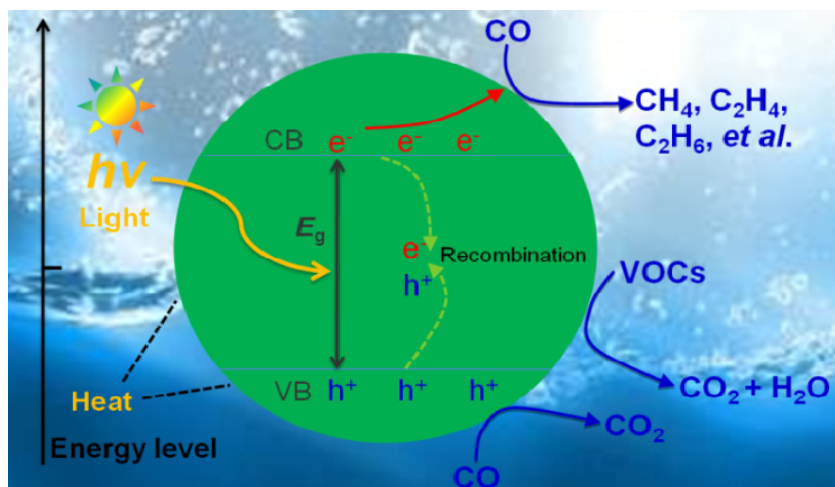


In an attempt to find effective strategies to balance the catalytic activities and stabilities of materials for acidic water oxidation, this review focuses on iridium-containing catalysts as examples, presenting recent representative advances in this field.

*Chin. J. Catal.*, 2021, 42: 1078–1095 doi: 10.1016/S1872-2067(20)63721-4

### Recent advances in VOCs and CO removal via photothermal synergistic catalysis

Longfu Wei, Changlin Yu \*, Kai Yang, Qizhe Fan, Hongbing Ji \*  
Guangdong University of Petrochemical Technology; Jiangxi University of Science and Technology



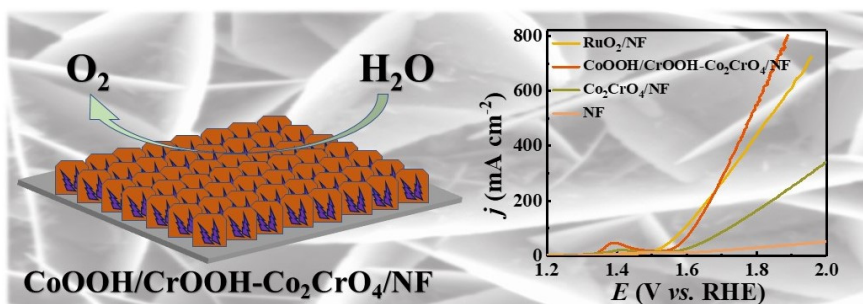
This review summarizes the design and fabrication of nanomaterials and their recent progresses with the photothermal synergistic catalysis for efficient removal of VOCs and CO. Furthermore, the typical reactor and mechanism are also analyzed.

## Communications

*Chin. J. Catal.*, 2021, 42: 1096–1101 doi: 10.1016/S1872-2067(20)63730-5

### In situ evolution of surface $\text{Co}_2\text{CrO}_4$ to $\text{CoOOH}/\text{CrOOH}$ by electrochemical method: Toward boosting electrocatalytic water oxidation

Jinxiu Zhao, Xiang Ren, Xu Sun, Yong Zhang, Qin Wei, Xuejing Liu \*, Dan Wu \*  
Jinan University



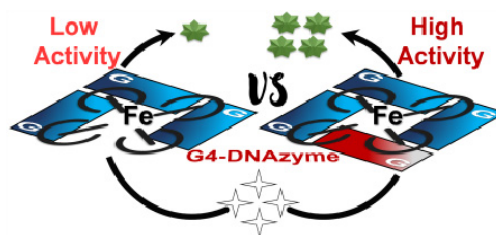
$\text{CoOOH}/\text{CrOOH}-\text{Co}_2\text{CrO}_4/\text{NF}$  behaves as an efficient electrochemical catalyst for the oxygen evolution reaction. In 1.0 M NaOH, an overpotential of 244 mV was required to obtain a current density of  $20 \text{ mA cm}^{-2}$ , with a turnover frequency of  $0.536 \text{ s}^{-1}$  and long-term electrochemical durability.

*Chin. J. Catal.*, 2021, 42: 1102–1107 doi: 10.1016/S1872-2067(20)63744-5

### The catalytic properties of DNA G-quadruplexes rely on their structural integrity

Jielin Chen, Mingpan Cheng, Jiawei Wang, Dehui Qiu,  
David Monchaud, Jean-Louis Mergny, Huangxian Ju \*, Jun Zhou \*  
Nanjing University, China; Université de Bourgogne, France;  
Institut Polytechnique de Paris, France

The catalytic properties of DNA G-quadruplex/hemin DNAzyme rely on its structural integrity, especially the 3'-end G-quartet, and completed via a "guanine surrogate insertion" strategy.



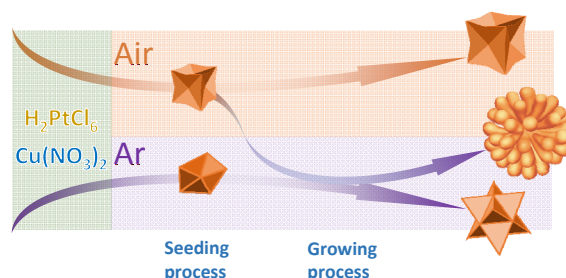
## Articles

*Chin. J. Catal.*, 2021, 42: 1108–1116 doi: 10.1016/S1872-2067(20)63735-4

### High index surface-exposed and composition-graded PtCu<sub>3</sub>@Pt<sub>3</sub>Cu@Pt nanodendrites for high-performance oxygen reduction

Yuxiang Liao, Jun Li, Shiming Zhang\*, Shengli Chen\*  
Wuhan University; Shanghai University

Atmosphere-modulated synthesis followed by electrochemical dealloying produces exposed high index surfaces on the composition-graded nanodendrites of PtCu<sub>3</sub>@Pt<sub>3</sub>Cu@Pt to achieve mass and area activities of Pt that are respectively 14 and 24 times higher than that of pure Pt catalyst.

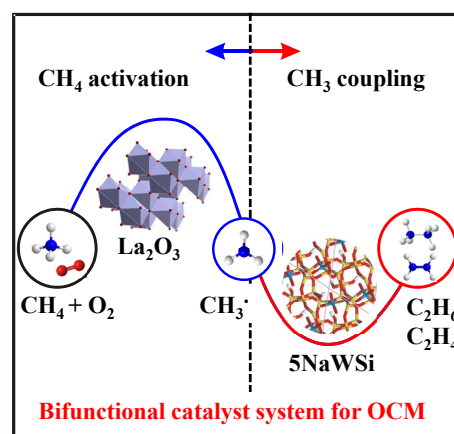


*Chin. J. Catal.*, 2021, 42: 1117–1125 doi: 10.1016/S1872-2067(20)63756-1

### Surface coupling of methyl radicals for efficient low-temperature oxidative coupling of methane

Shihui Zou\*, Zhinian Li, Qiuyue Zhou, Yang Pan, Wentao Yuan, Lei He, Shenliang Wang, Wu Wen, Juanjuan Liu, Yong Wang, Yonghua Du, Jiuzhong Yang, Liping Xiao, Hisayoshi Kobayashi\*, Jie Fan\*  
Zhejiang University, China;  
University of Science and Technology of China, China;  
Hangzhou Dianzi University, China;  
Brookhaven National Laboratory, USA;  
Kyoto Institute of Technology, Japan

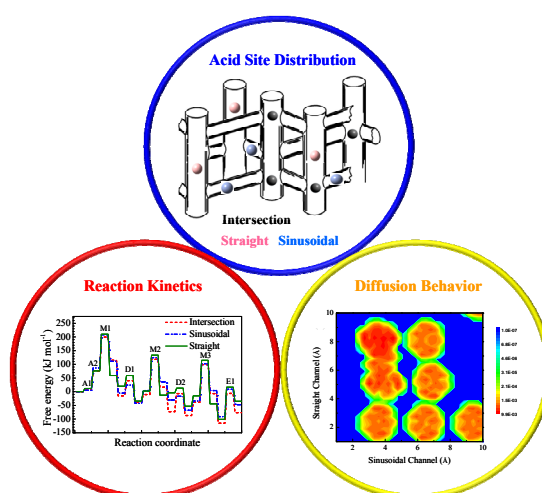
Methyl radicals generated by La<sub>2</sub>O<sub>3</sub> can selectively couple on the surface of 5 wt% Na<sub>2</sub>WO<sub>4</sub>/SiO<sub>2</sub>. The controllable surface coupling against overoxidation barely changes the activity of La<sub>2</sub>O<sub>3</sub> but boosts the C<sub>2</sub> selectivity by three times and achieves a C<sub>2</sub> yield as high as 10.9% at bed temperature of only 570 °C.



*Chin. J. Catal.*, 2021, 42: 1126–1136 doi: 10.1016/S1872-2067(20)63732-9

### Catalytic roles of the acid sites in different pore channels of H-ZSM-5 zeolite for methanol-to-olefins conversion

Sen Wang, Zhikai Li, Zhangfeng Qin\*, Mei Dong, Junfen Li, Weibin Fan\*, Jianguo Wang\*  
Institute of Coal Chemistry, Chinese Academy of Sciences; University of the Chinese Academy of Sciences



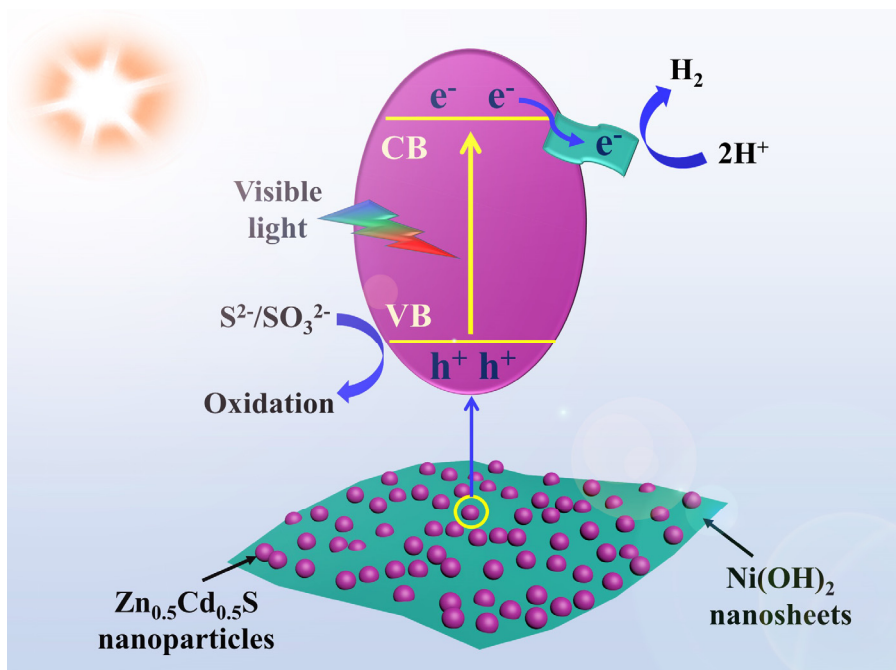
The aromatic cycle and aromatization reaction of MTO conversion over H-ZSM-5 zeolite occurred preferentially in the intersection cavities, whereas the alkene cycle occurred with the same probability in the intersection cavities, straight channels, and sinusoidal channels.



*Chin. J. Catal.*, 2021, 42: 1137–1146 doi: 10.1016/S1872-2067(20)63728-7

### Ultrathin Ni(OH)<sub>2</sub> nanosheets decorated with Zn<sub>0.5</sub>Cd<sub>0.5</sub>S nanoparticles as 2D/0D heterojunctions for highly enhanced visible light-driven photocatalytic hydrogen evolution

Xueyou Gao, Deqian Zeng\*, Jingren Yang, Wee-Jun Ong, Toyohisa Fujita, Xianglong He, Jieqian Liu, Yuezhou Wei  
Guangxi University; Shanghai Jiao Tong University; Xiamen University Malaysia

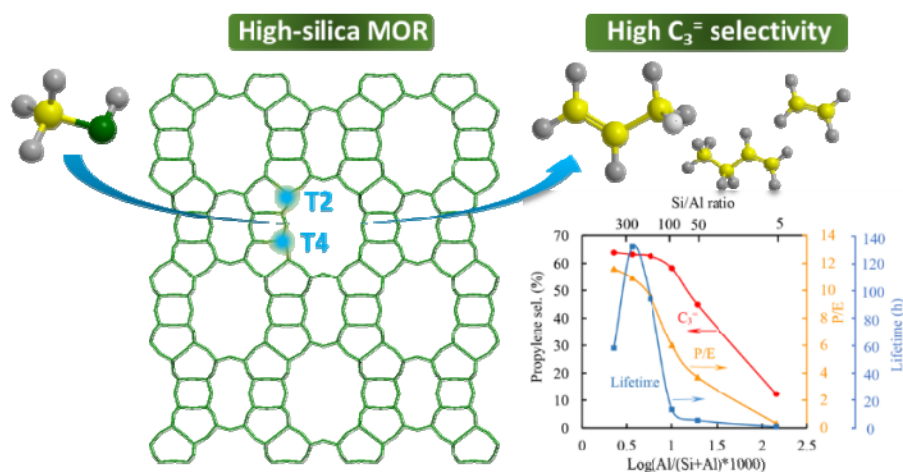


Ultrathin two-dimensional (2D) Ni(OH)<sub>2</sub> nanosheets serve as efficient cocatalysts and excellent substrates to host uniform zero-dimensional (0D) Zn<sub>0.5</sub>Cd<sub>0.5</sub>S nanoparticles, achieving a considerable improvement in the photocatalytic H<sub>2</sub> evolution.

*Chin. J. Catal.*, 2021, 42: 1147–1159 doi: 10.1016/S1872-2067(20)63726-3

### Selective conversion of methanol to propylene over highly dealuminated mordenite: Al location and crystal morphology effects

Li Ren, Bowen Wang, Kun Lu, Rusi Peng, Yejun Guan\*, Jin-gang Jiang, Hao Xu\*, Peng Wu\*  
East China Normal University

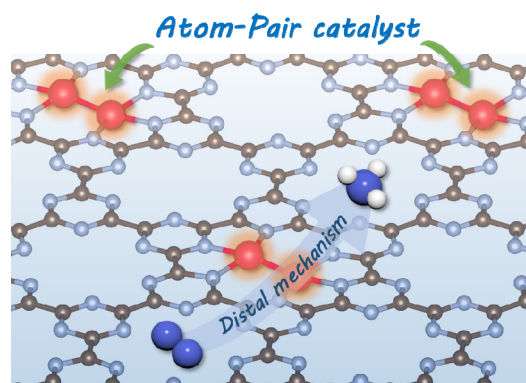


The high-silica MOR catalysts (Si/Al >150) selectively catalyzed the methanol conversion in the methanol to propylene (MTP) way, providing a high propylene selectivity of 63% and a long lifetime of ~130 h. The excellent performance of highly dealuminated MOR is ascribed to the mesopores formed upon dealumination and the scarce Al sites located in the T sites shared by the 8-MR side pockets and 12-MR pore channels as well as the weakened acid strength.

*Chin. J. Catal.*, 2021, 42: 1160–1167 doi: 10.1016/S1872-2067(20)63745-7

### Transition-metal-atom-pairs deposited on g-CN monolayer for nitrogen reduction reaction: Density functional theory calculations

Bin Huang, Yifan Wu, Bibo Chen, Yong Qian, Naigen Zhou \*, Neng Li \*  
*East China University of Technology; Wuhan University of Technology; Nanchang University;  
 Shenzhen Research Institute of Wuhan University of Technology; Zhengzhou University*



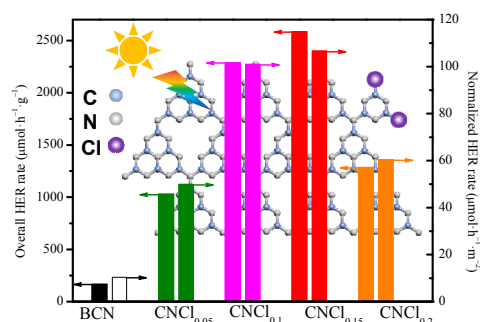
A series of atom pairs supported in g-CN were explored as electrocatalysts for  $N_2$  fixation based on DFT calculations. A stable  $Co_2@CN$  may be a strongly competitive material for the electroreduction of nitrogen with high selectivity and a relatively low overpotential.

*Chin. J. Catal.*, 2021, 42: 1168–1175 doi: 10.1016/S1872-2067(20)63733-0

### Donor-acceptor carbon nitride with electron-withdrawing chlorine group to promote exciton dissociation

Jing-Wen Zhang, Lun Pan, Xiangwen Zhang, Chengxiang Shi \*,  
 Ji-Jun Zou \*  
*Tianjin University;  
 Collaborative Innovative Center of Chemical Science and Engineering  
 (Tianjin)*

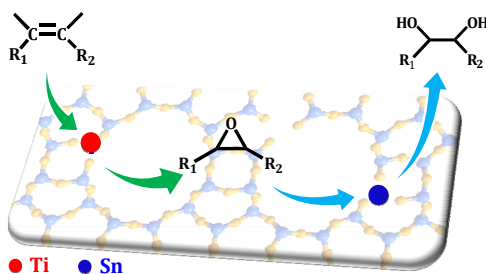
Compared with bulk  $C_3N_4$ , donor-acceptor carbon nitride catalysts exhibit much higher photocatalytic performance by incorporating electron-withdrawing  $-Cl$  group as terminal group, which can build internal electric field to promote the exciton dissociation and charge carrier transfer.



*Chin. J. Catal.*, 2021, 42: 1176–1184 doi: 10.1016/S1872-2067(20)63734-2

### Tandem Lewis acid catalysis for the conversion of alkenes to 1,2-diols in the confined space of bifunctional TiSn-Beta zeolite

Qifeng Lei, Chang Wang, Weili Dai \*, Guangjun Wu, Naijia Guan, Michael Hunger, Landong Li  
*Nankai University, China; University of Stuttgart, Germany*



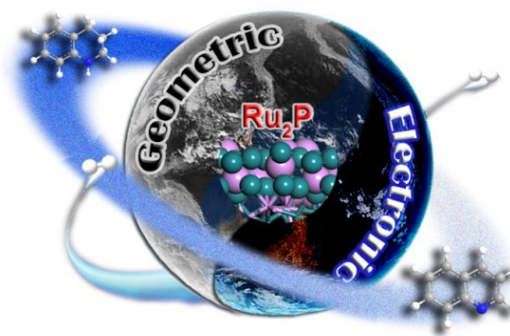
Bifunctional TiSn-Beta zeolite was fabricated using a simple and scalable post-synthesis approach, and it was employed as an efficient catalyst for the tandem conversion of alkenes to 1,2-diols. The isolated Lewis acid Ti and Sn sites within the TiSn-Beta zeolite could efficiently integrate alkene epoxidation and epoxide hydration in tandem to achieve the selective conversion of alkenes into 1,2-diols with a high selectivity of >90%.

*Chin. J. Catal.*, 2021, 42: 1185–1194 doi: 10.1016/S1872-2067(20)63747-0

### Geometric and electronic effects on the performance of a bifunctional Ru<sub>2</sub>P catalyst in the hydrogenation and acceptorless dehydrogenation of *N*-heteroarenes

Fangjun Shao, Zihao Yao, Yijing Gao, Qiang Zhou, Zhikang Bao, Guilin Zhuang, Xing Zhong, Chuan Wu, Zhongzhe Wei\*, Jianguo Wang\*  
Zhejiang University of Technology;  
Hangzhou Normal University

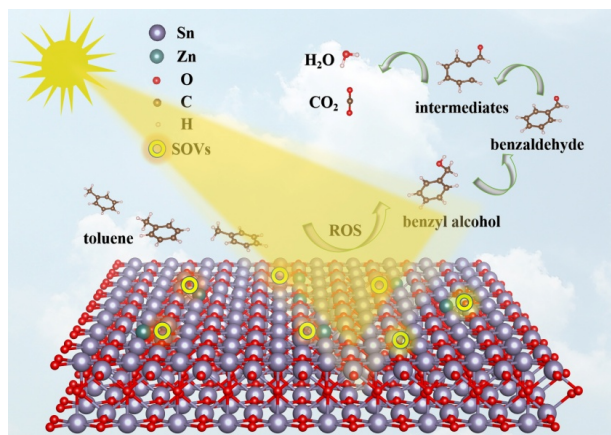
The P element is the decisive factor! Ru<sub>2</sub>P/AC allowed for efficient reversible transformations between unsaturated and saturated *N*-heterocycles. The P atom finely modified the geometric and electronic structures, leading to a balance between reaction and diffusion, and boosting the hydrogenation and dehydrogenation processes.



*Chin. J. Catal.*, 2021, 42: 1195–1204 doi: 10.1016/S1872-2067(20)63737-8

### Zn-doping mediated formation of oxygen vacancies in SnO<sub>2</sub> with unique electronic structure for efficient and stable photocatalytic toluene degradation

Huizhong Wu, Jiadong Wang, Ruimin Chen, Chaowei Yuan, Jin Zhang, Yuxin Zhang, Jianping Sheng\*, Fan Dong\*  
Chongqing Technology and Business University; University of Electronic Science and Technology of China; Chongqing University;  
Zhengzhou University



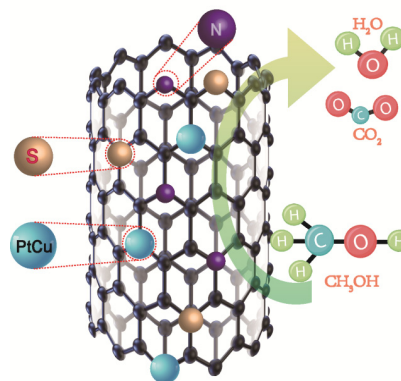
The synergistic effects of Zn-doping and surface oxygen vacancies on SnO<sub>2</sub> can boost the charge transfer and reactants activation, shorten the pathway of toluene degradation, and significantly inhibit the toxic intermediates formation.

*Chin. J. Catal.*, 2021, 42: 1205–1215 doi: 10.1016/S1872-2067(20)63748-2

### New strategy of S, N co-doping of conductive-copolymer-derived carbon nanotubes to effectively improve the dispersion of PtCu nanocrystals for boosting the electrocatalytic oxidation of methanol

Jingping Zhong, Kexin Huang, Wentao Xu, Huaguo Tang, Muhammad Waqas, Youjun Fan\*, Ruixiang Wang, Wei Chen\*, Yixuan Wang\*  
Guangxi Normal University, China;  
Albany State University, USA;  
Qilu University of Technology (Shandong Academy of Sciences), China;  
Guangxi Medical University, China

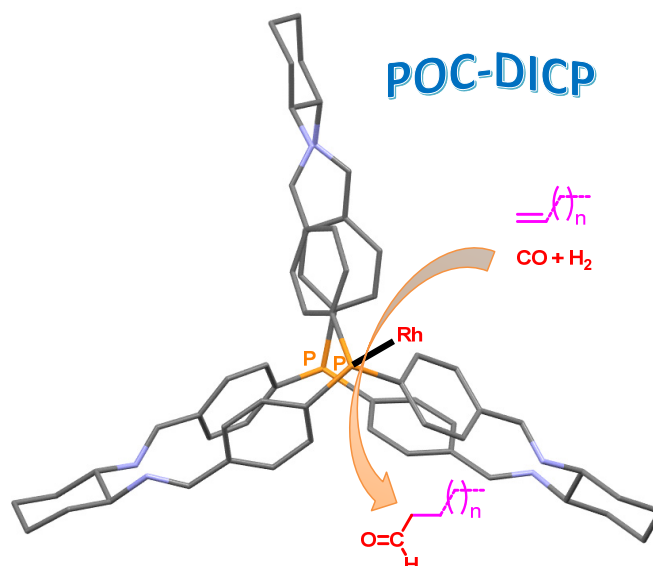
A conductive copolymer pyrolysis strategy is developed for preparing S,N co-doped carbon nanotubes, which can effectively improve the dispersion of PtCu nanocrystals and the subsequent methanol electrocatalytic oxidation.



*Chin. J. Catal.*, 2021, 42: 1216–1226 doi: 10.1016/S1872-2067(20)63746-9

### Enhancing the activity, selectivity, and recyclability of Rh/PPh<sub>3</sub> system-catalyzed hydroformylation reactions through the development of a PPh<sub>3</sub>-derived quasi-porous organic cage as a ligand

Wenlong Wang, Cunyao Li, Heng Zhang, Jiangwei Zhang, Lanlu Lu, Zheng Jiang, Lifeng Cui, Hongguang Liu \*, Li Yan \*, Yunjie Ding \*  
*Dalian Institute of Chemical Physics, Chinese Academy of Sciences; Dongguan university of Technology; Shanghai Institute of Applied Physics, Chinese Academy of Sciences*

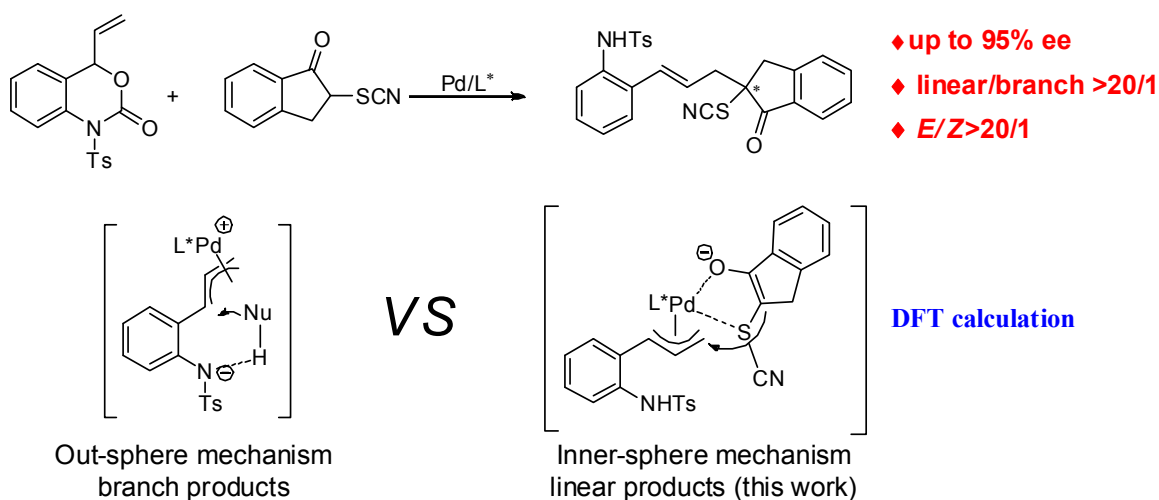


A PPh<sub>3</sub>-derived porous organic cage (POC-DICP) was applied as an efficient and recyclable organic molecular cage ligand for Rh-catalyzed homogeneous hydroformylation reactions.

*Chin. J. Catal.*, 2021, 42: 1227–1237 doi: 10.1016/S1872-2067(20)63751-2

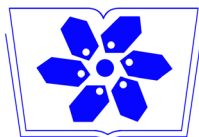
### Palladium-catalyzed enantioselective linear allylic alkylation of vinyl benzoxazinones: An inner-sphere mechanism

Kai Wang, Binli Wang, Xianghui Liu, Hongjun Fan \*, Yan Liu \*, Can Li \*  
*Dalian Institute of Chemical Physics, Chinese Academy of Sciences; University of Chinese Academy of Sciences*



A unique inner-sphere mechanism for the palladium-catalyzed asymmetric allylic alkylation of vinyl benzoxazinones characterized with extremely high linear-selectivity, *E*-selectivity and stereoselectivity.





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