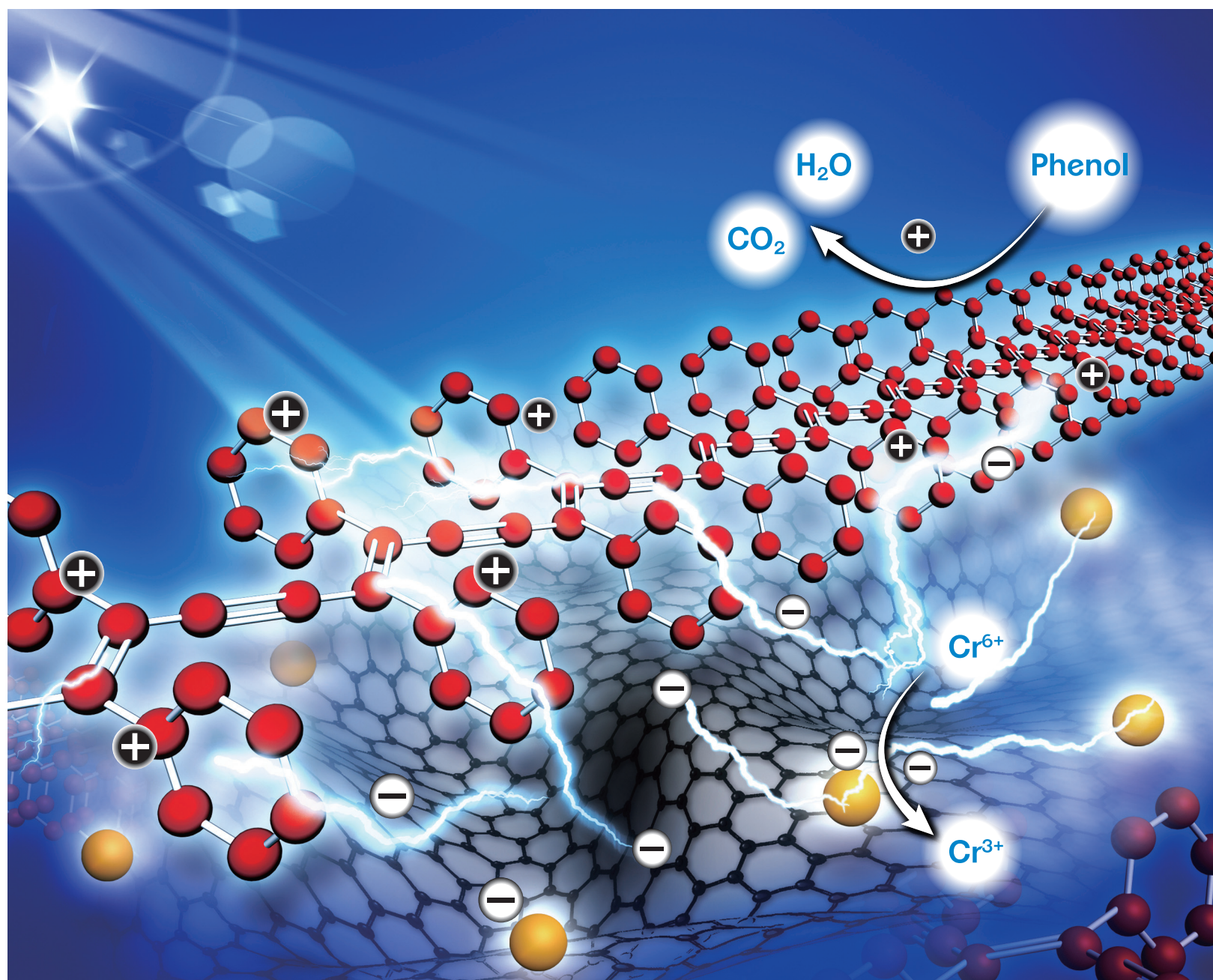




# Chinese Journal of Catalysis

www.cjcatal.org

Volume 39 | Number 1 | January 2018



Editors-in-Chief Can Li (李灿) Tao Zhang (张涛)  
Transaction of The Catalysis Society of China

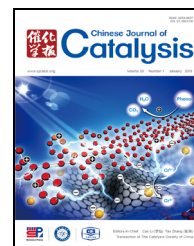
万方数据



available at www.sciencedirect.com



journal homepage: www.elsevier.com/locate/chnjc



## Chinese Journal of Catalysis

## Graphical Contents

## Highlights

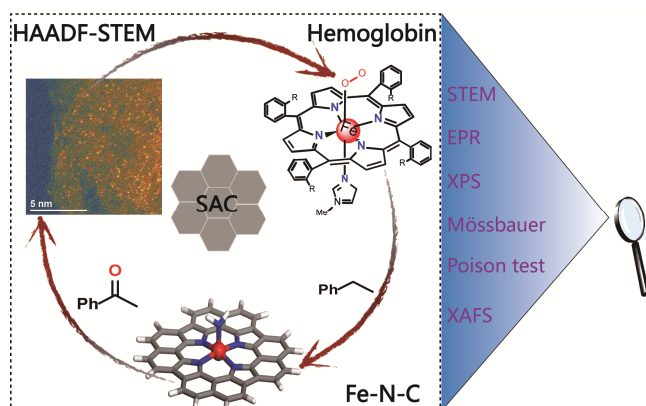
Chin. J. Catal., 2018, 39: 1–3 doi: 10.1016/S1872-2067(17)63002-X

**Selective oxidation of C–H bonds with Fe–N–C single-atom catalyst**

Xingwei Li \*

State Key Laboratory of Catalysis, Dalian Institute of Chemical Physics, Chinese Academy of Sciences

Fe–N–C single-atom catalyst with Fe–N<sub>5</sub> active sites can efficiently boost the selective oxidation of C–H bonds in hydrocarbons under room temperature.

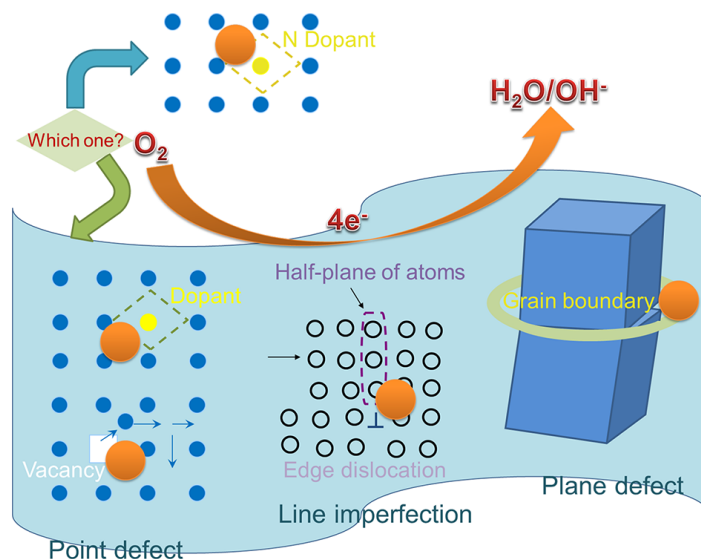


Chin. J. Catal., 2018, 39: 4–7 doi: 10.1016/S1872-2067(17)62944-9

**Pinpointing single metal atom anchoring sites in carbon for oxygen reduction: Doping sites or defects?**

Cai Zhang, Wei Zhang \*, Weitao Zheng \*

Jilin University, China; CIC Energigune, Parque Tecnológico de Álava, Spain; Ikerbasque, Basque Foundation for Science, Spain



Nitrogen species doped in carbon were previously identified as anchoring sites for single Pt/Fe atoms. Some clues, however, imply that various defects, rather than only N-doped sites, can confine single metal atoms, ultimately leading to improved ORR performance.



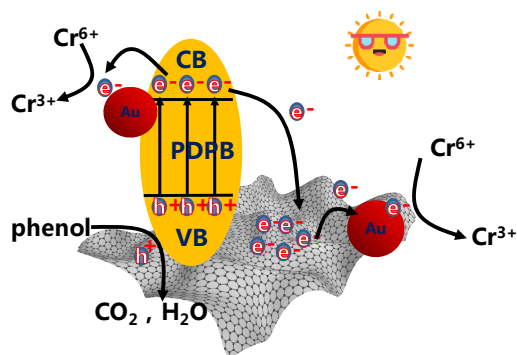
## Articles

*Chin. J. Catal.*, 2018, 39: 8–15 doi: 10.1016/S1872-2067(17)62933-4

### Gold-loaded graphene oxide/PDPB composites for the synchronous removal of Cr(VI) and phenol

Jun Liu, Wenzhang Fang, Yuhang Wang, Mingyang Xing \*,  
Jinlong Zhang \*  
*East China University of Science and Technology*

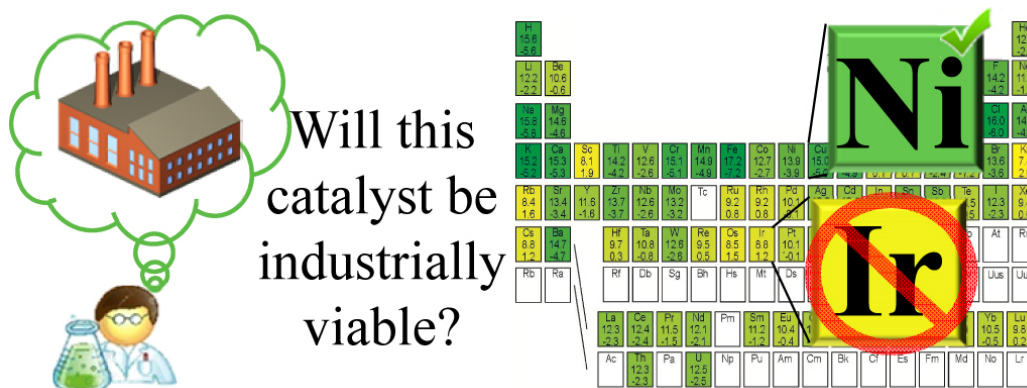
This work presents a simple way to prepare inorganic-organic Au-GO/PDPB composites, which exhibit enhanced photocatalytic activity compared with that of pure PDPB for the synchronous removal of Cr(VI) and phenol.



*Chin. J. Catal.*, 2018, 39: 16–26 doi: 10.1016/S1872-2067(17)62979-6

### Availability of elements for heterogeneous catalysis: Predicting the industrial viability of novel catalysts

Anders B. Laursen \*, Jens Sehested, Ib Chorkendorff, Peter C. K. Vesborg \*  
*Technical University of Denmark; Haldor Topsøe A/S*

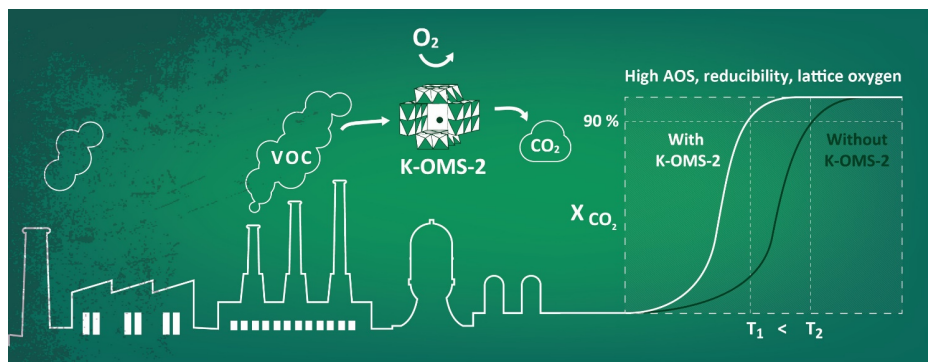


In a study of 11 industrial catalytic processes, we introduce two second-generation catalyst viability metrics, for both existing and new catalysts/processes. We further demonstrate a predictive methodology for evaluating the change in viability upon catalyst element substitution.

*Chin. J. Catal.*, 2018, 39: 27–36 doi: 10.1016/S1872-2067(17)62986-3

### Ethyl and butyl acetate oxidation over manganese oxides

Olívia Salomé G. P. Soares, Raquel P. Rocha, José J. M. Órfão, Manuel F. R. Pereira, José L. Figueiredo \*  
*University of Porto, Portugal*



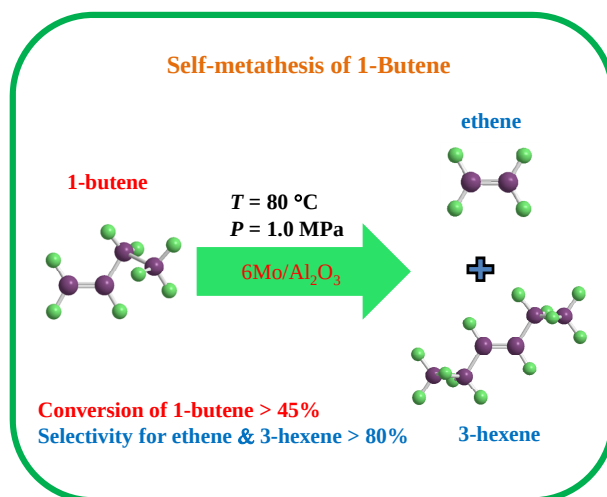
During trials involving the oxidation of ethyl acetate and butyl acetate over manganese oxide catalysts, samples containing a cryptomelane phase and synthesized by a novel solvent-free method showed higher catalytic performance.

*Chin. J. Catal.*, 2018, 39: 37–46 doi: 10.1016/S1872-2067(17)62918-8

### Self-metathesis of 1-butene to ethene and hexene over molybdenum-based heterogeneous catalysts

Ce Guo, Xiujie Li\*, Xiangxue Zhu, Weifeng Chu, Shenglin Liu, Yuzhong Wang, Peng Zeng, Shujing Guo, Longya Xu\*  
*Dalian Institute of Chemical Physics, Chinese Academy of Sciences;*  
*University of Chinese Academy of Sciences;*  
*China Huanqiu Contracting and Engineering Corporation;*  
*Shaanxi Yanchang Petroleum (Group) Co. Ltd.*

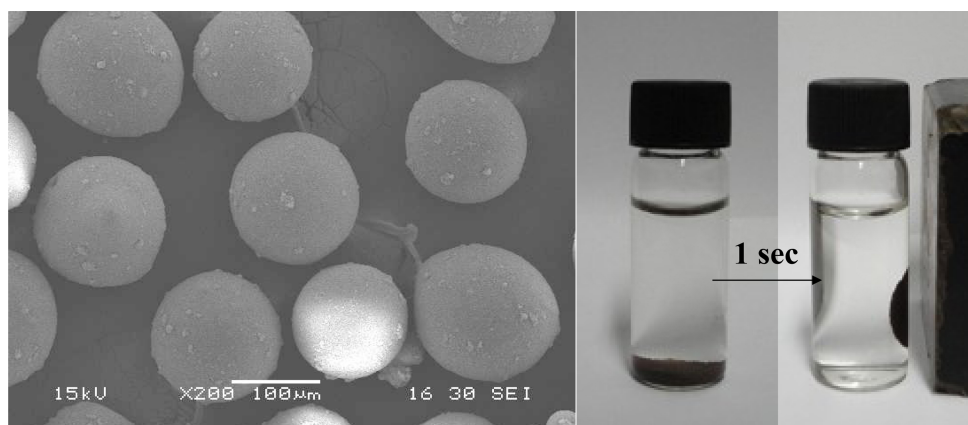
A novel route to produce ethene and hexene through self-metathesis of 1-butene over molybdenum-based catalysts was proposed.



*Chin. J. Catal.*, 2018, 39: 47–53 doi: 10.1016/S1872-2067(17)62934-6

### Immobilization of penicillin G acylase on paramagnetic polymer microspheres with epoxy groups

Xing Chen, Lu Yang, Wangcheng Zhan\*, Li Wang, Yun Guo, Yunsong Wang, Guanzhong Lu, Yanglong Guo\*  
*East China University of Science and Technology*



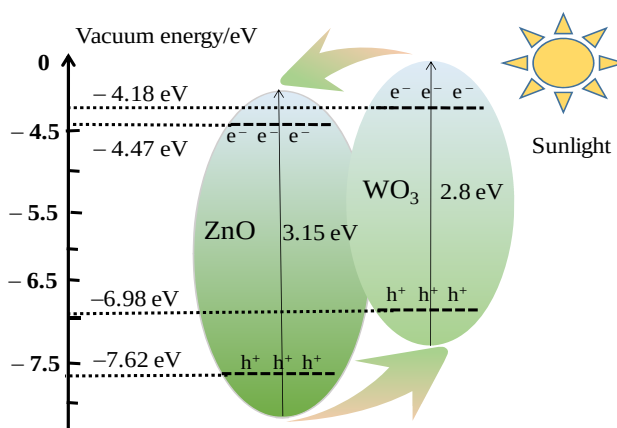
Penicillin G acylase (PGA) immobilized on paramagnetic polymer microspheres shows a high initial activity, operational stability, thermal stability, pH stability and excellent reusability. The material could be rapidly recycled with the aid of a magnet.

*Chin. J. Catal.*, 2018, 39: 54–62 doi: 10.1016/S1872-2067(17)62977-2

### High photocatalytic activities of zinc oxide nanotube arrays modified with tungsten trioxide nanoparticles

Yawen Li, Yuzhen Bu, Qian Liu, Xia Zhang, Junli Xu\*  
*Northeastern University*

ZnO nanotubes loaded with  $\text{WO}_3$  particles exhibited enhanced photocatalytic activity for the degradation of the herbicide chlorinated phenoxyacetic acid because of the improved separation of photo-generated charges and visible light absorption.



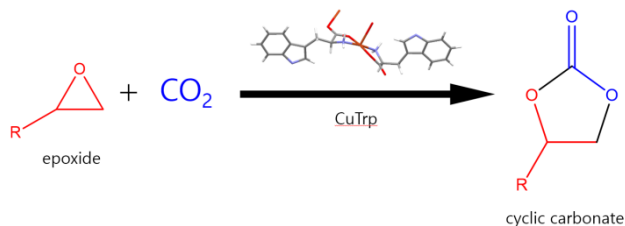


*Chin. J. Catal.*, 2018, 39: 63–70 doi: 10.1016/S1872-2067(17)62916-4

### Cycloaddition of CO<sub>2</sub> with epoxides by using an amino-acid-based Cu(II)-tryptophan MOF catalyst

Gyeong Seon Jeong, Amal Cherian Kathalikkattil, Robin Babu, Yongchul Greg Chung, Dae Won Park \*  
Pusan National University, Korea; University of Dublin, Ireland

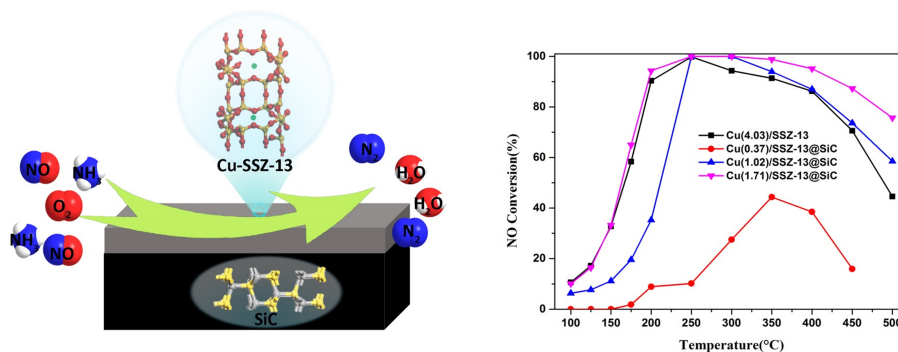
An amino-acid-based Cu-containing MOF, CuTrp (Trp = L-tryptophan) was synthesized by direct mixing in methanol. The CuTrp showed good catalytic activity and recyclability in the synthesis of cyclic carbonates from epoxides and CO<sub>2</sub>.



*Chin. J. Catal.*, 2018, 39: 71–78 doi: 10.1016/S1872-2067(17)62870-5

### Growth of Cu/SSZ-13 on SiC for selective catalytic reduction of NO with NH<sub>3</sub>

Tiaoyun Zhou, Qing Yuan, Xiulian Pan \*, Xinhe Bao \*  
Shanghai Advanced Research Institute Chinese Academy of Sciences; Dalian Institute of Chemical Physics Chinese Academy of Sciences; University of Chinese Academy of Sciences; Shanghai Tech University; Dalian Nationalities University

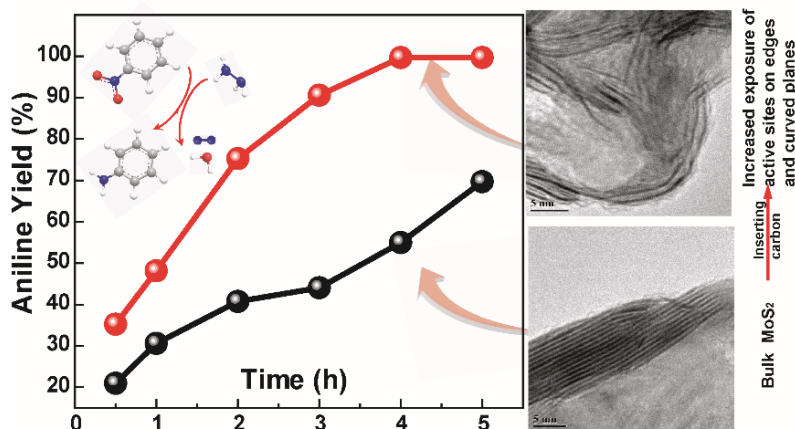


This study explores growth of SSZ-13 zeolite around the SiC support. The SiC enhanced the catalytic activity of Cu/SSZ-13 for selective catalytic reduction at high temperature and widened the active temperature window.

*Chin. J. Catal.*, 2018, 39: 79–87 doi: 10.1016/S1872-2067(17)62925-5

### A MoS<sub>2</sub> nanocatalyst with surface-enriched active sites for the heterogeneous transfer hydrogenation of nitroarenes

Jia Wang, Yajie Zhang, Jiangyong Diao, Jiayun Zhang, Hongyang Liu \*, Dangsheng Su \*  
Institute of Metal Research, Chinese Academy of Sciences; Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences; University of Science and Technology of China; Dalian Institute of Chemical Physics, Chinese Academy of Sciences

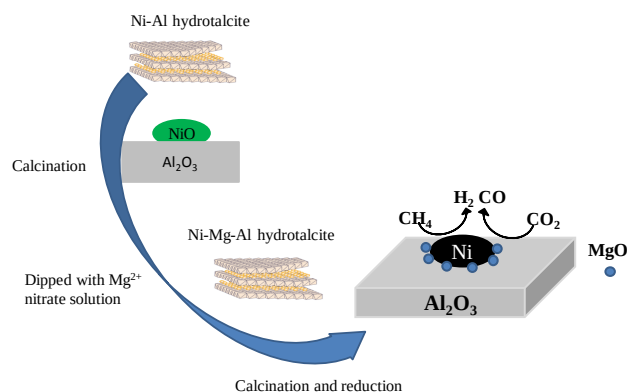


Interlayer-expanded and plane-curved MoS<sub>2</sub> obtained by carbon insertion exhibits highly catalytic performance for the transformation of nitrobenzene to aniline under mild conditions without base and pressure.

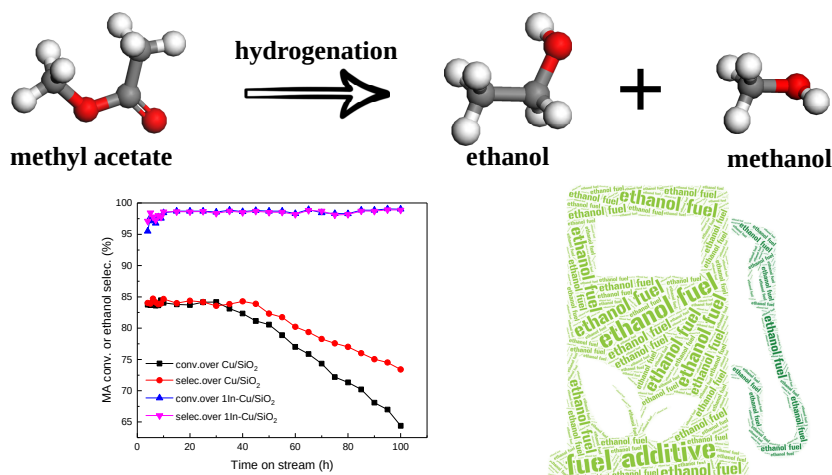
Chin. J. Catal., 2018, 39: 88–98 doi: 10.1016/S1872-2067(17)62928-0

**Insight into MgO promoter with low concentration for the carbon-deposition resistance of Ni-based catalysts in the CO<sub>2</sub> reforming of CH<sub>4</sub>**Xiangdong Feng, Jie Feng, Wenying Li \*  
Taiyuan University of Technology

A highly homogeneous distribution of MgO promoter on a Ni/Al<sub>2</sub>O<sub>3</sub> catalyst through the “memory effect” of hydrotalcite exhibits an excellent catalytic performance for CO<sub>2</sub> reforming of CH<sub>4</sub> owing to the promotion of CO<sub>2</sub> dissociation.

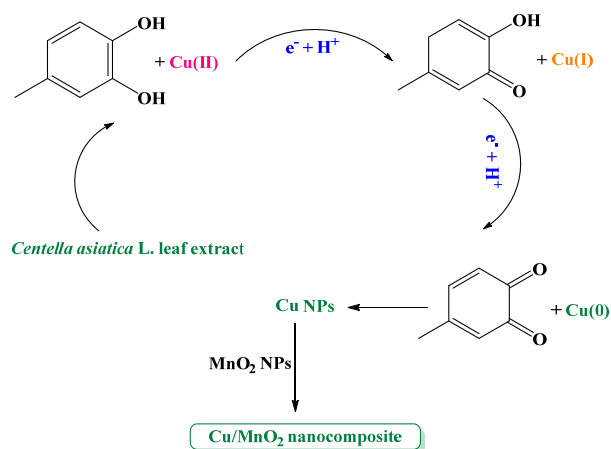


Chin. J. Catal., 2018, 39: 99–108 doi: 10.1016/S1872-2067(17)62932-2

**In<sub>2</sub>O<sub>3</sub>-modified Cu/SiO<sub>2</sub> as an active and stable catalyst for the hydrogenation of methyl acetate to ethanol**Yu Zhang, Chenliang Ye, Cuili Guo \*, Changna Gan, Xinnmeng Tong  
Tianjin University

In-Cu/SiO<sub>2</sub> catalyst containing 1 wt% indium oxide exhibits high performance and good stability in the hydrogenation of methyl acetate, making it a promising catalyst for ethanol production.

Chin. J. Catal., 2018, 39: 109–117 doi: 10.1016/S1872-2067(17)62915-2

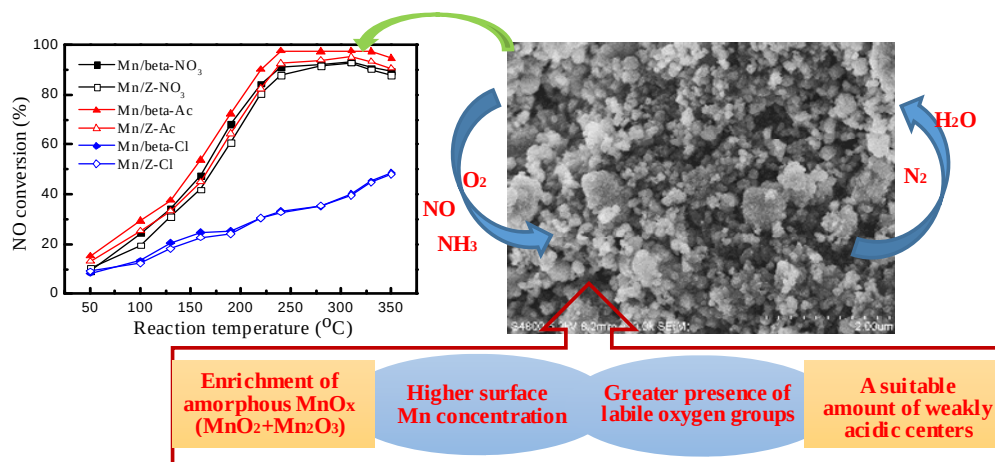
**Biosynthesis of copper nanoparticles supported on manganese dioxide nanoparticles using *Centella asiatica* L. leaf extract for the efficient catalytic reduction of organic dyes and nitroarenes**Mahmoud Nasrollahzadeh \*, Mohaddeseh Sajjadi,  
S. Mohammad Sajadi  
University of Qom, Qom 37185-359, Iran; Soran University, Soran, Iraq

A Cu/MnO<sub>2</sub> nanocomposite was prepared through reduction of Cu<sup>2+</sup> ions to Cu NPs using *Centella asiatica* L. leaf extract and applied to the reduction of organic dyes and nitro compounds in aqueous media.

*Chin. J. Catal.*, 2018, 39: 118–127 doi: 10.1016/S1872-2067(17)62983-8

### Mn/beta and Mn/ZSM-5 for the low-temperature selective catalytic reduction of NO with ammonia: Effect of manganese precursors

Wenjin Xu, Guangxu Zhang\*, Hanwei Chen, Guomeng Zhang, Yang Han, Yichuan Chang, Peng Gong  
Wuhan University of Technology; Shanghai Hengyuan Marine Equipment Co., Ltd.



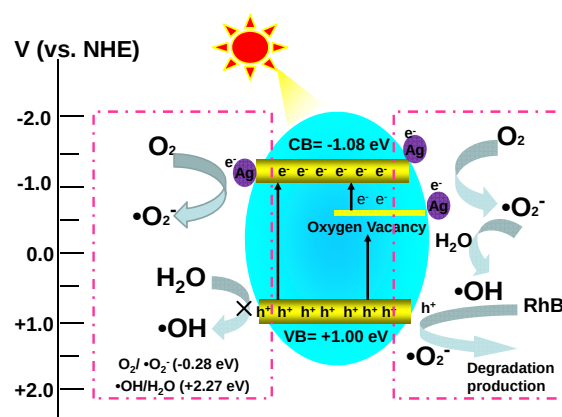
Mn/beta-Ac showed excellent low-temperature NH<sub>3</sub>-SCR performance attributed to a combination of enriching the amorphous MnO<sub>x</sub> (MnO<sub>2</sub> and Mn<sub>2</sub>O<sub>3</sub>) content, higher surface manganese concentration and labile oxygen groups, and a suitable number of weakly acidic centers.

*Chin. J. Catal.*, 2018, 39: 128–137 doi: 10.1016/S1872-2067(17)62990-5

### Ag nanoparticles deposited on oxygen-vacancy-containing BiVO<sub>4</sub> for enhanced near-infrared photocatalytic activity

Chunjing Shi, Xiaoli Dong\*, Xiuying Wang, Hongchao Ma, Xiufang Zhang  
Dalian Polytechnic University

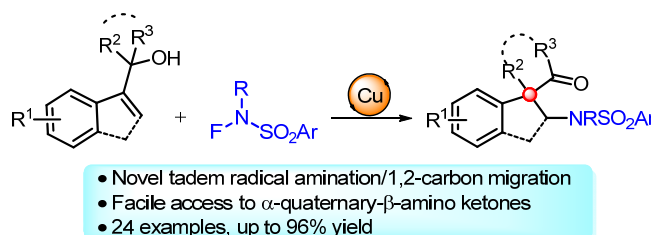
Ag nanoparticles are deposited on BiVO<sub>4</sub> containing oxygen vacancies, which increases the photocatalytic efficiency of the resulting composite compared to the corresponding single component samples. Oxygen vacancies and surface plasmon resonance collectively contribute to electron-hole separation and charge transfer, enhancing the photocatalytic performance.



*Chin. J. Catal.*, 2018, 39: 138–145 doi: 10.1016/S1872-2067(17)62915-2

### Copper-catalyzed tandem radical amination/1,2-carbon migration of allylic alcohols: Direct access to α-quaternary-β-amino ketones

Jiaqiong Sun, Guangfan Zheng, Yongmei Fu, Qiao Zhang, Yimin Wang, Qian Zhang, Yan Li\*, Qian Zhang\*  
Northeast Normal University



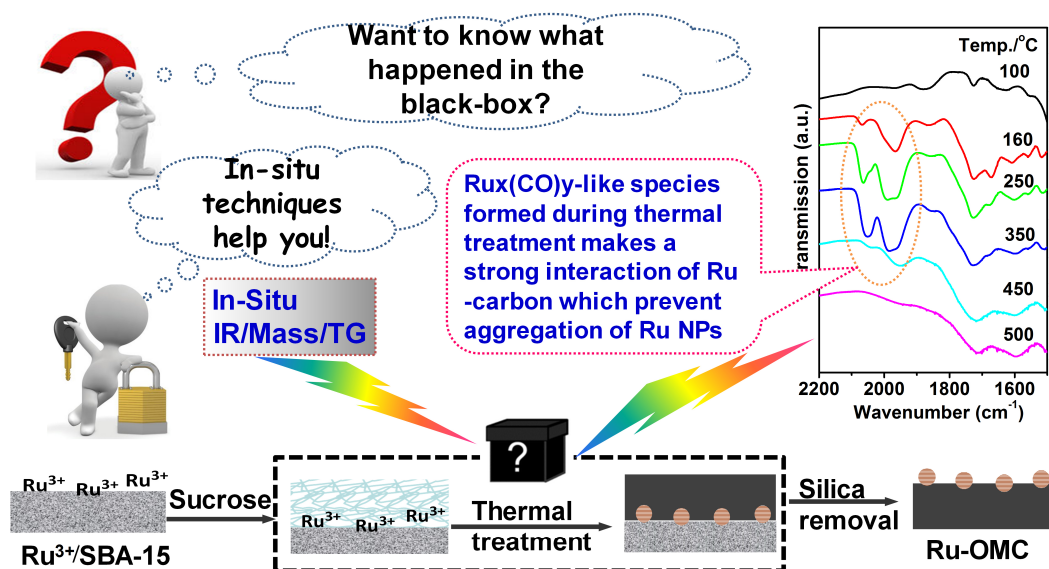
A novel nitrogen-centered radical-induced 1,2-carbon migration reaction of allylic alcohols was developed for the synthesis of a variety of α-quaternary-β-amino ketones under mild reaction conditions. The reaction has a wide substrate scope and operational simplicity.



*Chin. J. Catal.*, 2018, 39: 146–156 doi: 10.1016/S1872-2067(17)62958-9

# Formation mechanism of highly dispersed semi-embedded ruthenium nanoparticles in porous carbon matrix determined by in situ temperature-programmed infrared spectroscopy

Guojun Lan, Yaping Zhou, Hangjia Shen, Haodong Tang, Ying Li \*  
Zhejiang University of Technology

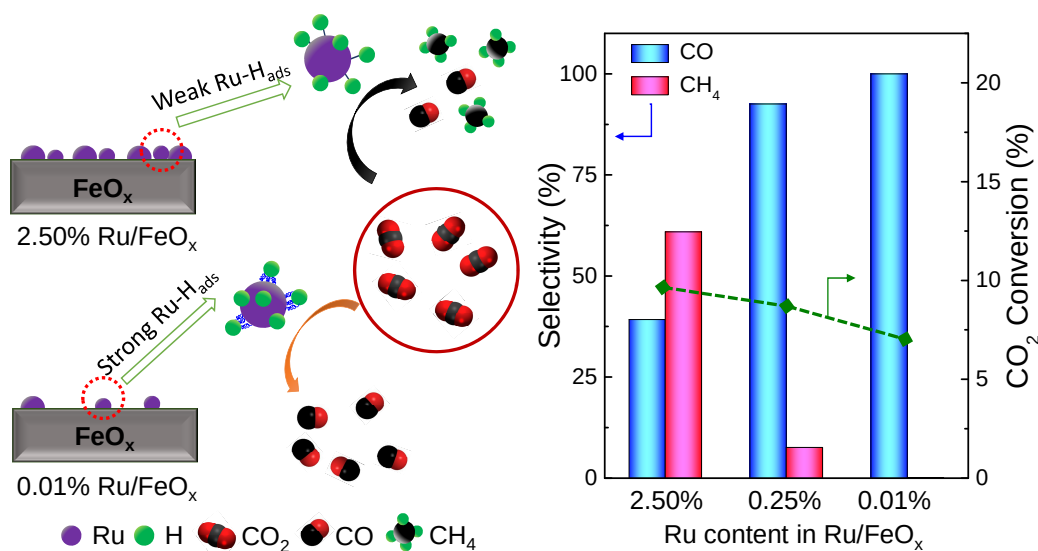


In situ spectroscopy was applied to the carbonization of a sucrose-RuCl<sub>3</sub>/SBA-15 composite towards a Ru-containing ordered mesoporous carbon catalyst to identify the stabilization role of organic carbon precursors during the formation of highly dispersed Ru nanoparticles.

*Chin. J. Catal.*, 2018, 39: 157–166 doi: 10.1016/S1872-2067(17)62967-X

## Ru/FeO<sub>x</sub> catalyst performance design: Highly dispersed Ru species for selective carbon dioxide hydrogenation

Di Zhang, Jingjie Luo \*, Jiajie Wang, Xin Xiao, Yuefeng Liu, Wei Qi, Dang Sheng Su, Wei Chu \*  
Sichuan University;  
Institute of Metal Research, Chinese Academy of Sciences;  
Dalian Institute of Chemical Physics, Chinese Academy of Sciences



Ru/FeO<sub>x</sub> catalysts were prepared for the selective hydrogenation of CO<sub>2</sub> to CO. The 0.01% Ru-loaded FeO<sub>x</sub> catalyst exhibited 100% selectivity toward CO. Lower Ru surface coverage resulted in strong Ru-H<sub>ads</sub> interactions to directly form CO.

*Chin. J. Catal.*, 2018, 39: 167–180 doi: 10.1016/S1872-2067(17)62984-X

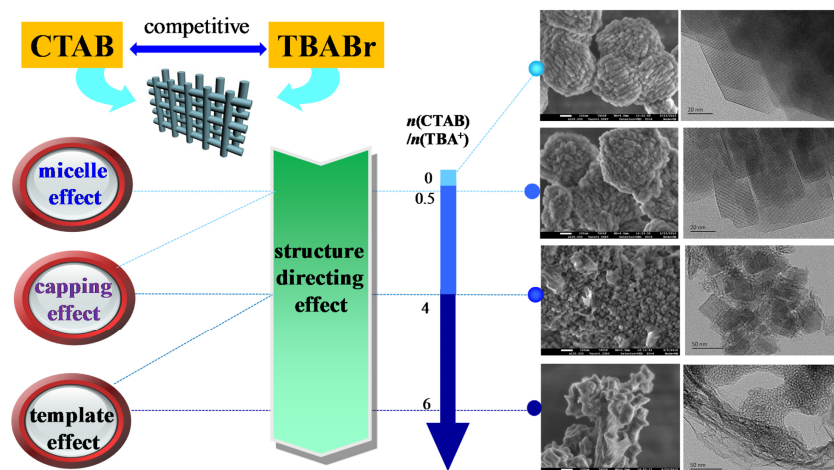
### Synthesis, characterization, and catalytic performance of hierarchical ZSM-11 zeolite synthesized via dual-template route

Hui Liu \*, Shuang Zhang, Sujuan Xie, Wanshuo Zhang, Wenjie Xin, Shenglin Liu, Longya Xu \*

Dalian Institute of Chemical Physics, Chinese Academy of Sciences;

Sinochem Quanzhou Petrochemical Co., Ltd;

Harbin Normal University



The porosity, structure, morphology, and textural properties of a hierarchical ZSM-11 zeolite were tailored by changing the CTAB/TBABr molar ratio. A mechanism for formation of the hierarchical materials was proposed.

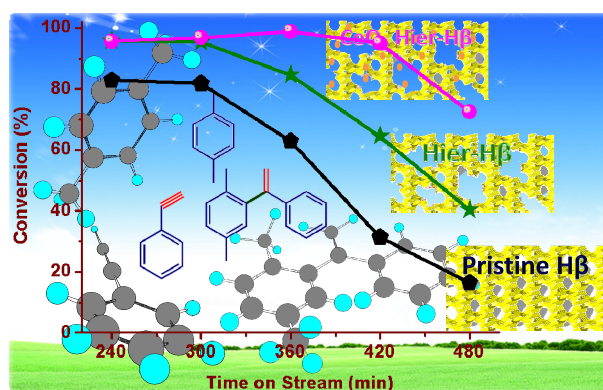
*Chin. J. Catal.*, 2018, 39: 181–189 doi: 10.1016/S1872-2067(17)62985-1

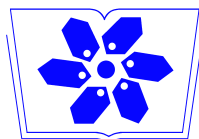
### Ceria-modified hierarchical H $\beta$ zeolite as a robust solid acid catalyst for alkenylation of *p*-xylene with phenylacetylene

Yongle Guo, Yu Zhang, Zhongkui Zhao \*

Dalian University of Technology

Aceria-modified hierarchical pore H $\beta$  zeolite was prepared by a desilication-dealumination procedure with subsequent ceria modification and demonstrated good catalytic performance for alkenylation of *p*-xylene with phenylacetylene.





中国科学院科学出版基金资助出版



Chinese Journal of  
**Catalysis**

月刊 SCL, EI收录 2018 年 1 月 第 39 卷 第 1 期



## 目次

### 亮点

1

**Fe-N-C单原子催化剂的C-H键选择性氧化反应**  
李兴伟

4

**掺杂位点与缺陷,谁是金属单原子在碳材料中的锚固位点及氧还原的活性中心?**  
张彩,张伟,郑伟涛

### 论文

8

**金负载氧化石墨烯/PDPB复合材料用于同步去除六价铬离子和苯酚**  
刘俊,方文章,王宇航,邢明阳,张金龙

16

**用于多相催化元素的可利用性:新型催化剂工业适用性的预测**  
Anders B. Laursen, Jens Sehested, Ib Chorkendorff, Peter C. K. Vesborg

27

**氧化镁上乙酸乙酯和乙酸丁酯氧化反应**  
Olívia Salomé G. P. Soares, Raquel P. Rocha, José J. M. Órfão, Manuel F. R. Pereira, José L. Figueiredo

37

**高效钼基催化剂上正丁烯自歧化生成乙烯和己烯**  
郭策,李秀杰,朱向学,楚卫锋,刘盛林,王玉忠,曾蓬,郭淑静,徐龙仔

47

**青霉素G酰化酶在含环氧基团的顺磁性聚合物微球上的固定化**  
陈星,杨露,詹望成,王丽,郭耘,王筠松,卢冠忠,郭杨龙

54

**WO<sub>3</sub>纳米颗粒修饰ZnO纳米管的光催化性能**  
李亚文,布玉珍,刘倩,张霞,徐君莉

63

**基于氨基酸的Cu(II)-色氨酸MOF催化剂上环氧化物与CO<sub>2</sub>环加成反应**  
Gyeong Seon Jeong, Amal Cherian Kathalikkattil, Robin Babu, Yongchul Greg Chung, Dae Won Park

71

**碳化硅上生长Cu/SSZ-13分子筛及其NH<sub>3</sub>-SCR催化性能**  
周调云,苑青,潘秀莲,包信和

79

**表面暴露活性位点的MoS<sub>2</sub>纳米催化剂催化硝基化合物的非均相氢转移反应**  
王嘉,张雅洁,刁江勇,张家云,刘洪阳,苏党生

88

**甲烷二氧化碳重整反应中微量氧化镁助剂对Ni基催化剂抗积碳性能的影响**  
冯向东,冯杰,李文英

99

**In-Cu/SiO<sub>2</sub>催化剂用于醋酸甲酯加氢反应制乙醇**  
张豫,叶陈良,郭翠梨,甘长娜,佟昕檬

109

**采用积雪草树叶提取物生物合成氧化镁纳米粒子负载的铜纳米颗粒用于高效催化还原有机染料和芳香硝基化合物**  
Mahmoud Nasrollahzadeh, Mohaddeseh Sajjadi, S. Mohammad Sajadi

118

**Mn/beta与Mn/ZSM-5催化剂对氨选择性催化还原NO的低温催化活性比较:锰前驱体的影响**  
许文晋,张光旭,陈晗炜,张国孟,韩洋,常意川,龚鹏

128

**银纳米粒子沉积含有氧空位的钒酸铋能够提高其近红外光催化性能**  
石春景,董晓丽,王秀英,马红超,张秀芳

138

**铜催化的烯丙醇自由基胺化/1,2-碳迁移串联反应:一步构建含 $\alpha$ -季碳中心的 $\beta$ -胺基酮**  
孙佳琼,郑光范,付永梅,张乔,王义敏,张茜,李燕,张前

146

**原位红外光谱法研究中孔炭限域钨纳米催化剂的形成机理**  
蓝国钧,周亚萍,沈行加,唐浩东,李璞

157

高分散Ru/FeO<sub>x</sub>催化剂在二氧化碳选择加氢反应中的应用及其催化活性的调控

张迪, 罗靖洁, 王佳杰, 肖鑫, 刘岳峰, 齐伟, 苏党生, 储伟

167

利用双模板剂的多级孔ZSM-11分子筛的合成、表征和催化性能

刘惠, 张爽, 谢素娟, 张琬铄, 辛文杰, 刘盛林, 徐龙伢

181

氧化铈改性多级孔H $\beta$ 分子筛催化对二甲苯与苯乙炔烯基化反应

郭永乐, 张钰, 赵忠奎

## 相关信息

180 《催化学报》为被国际期刊退稿的高质量论文开辟绿色通道

189 《催化学报》进入中科院SCI期刊分区工程技术大类2区

190 《催化学报》第五届编辑委员会

194 Guide for Authors

201 《催化学报》作者指南

英文全文电子版(国际版)由Elsevier出版社在ScienceDirect上出版

<http://www.sciencedirect.com/science/journal/18722067>

<http://www.elsevier.com/locate/chnjc>

[www.cjcatal.org](http://www.cjcatal.org)

在线投审稿网址

<https://mc03.manuscriptcentral.com/cjcatal>