



# Chinese Journal of Catalysis

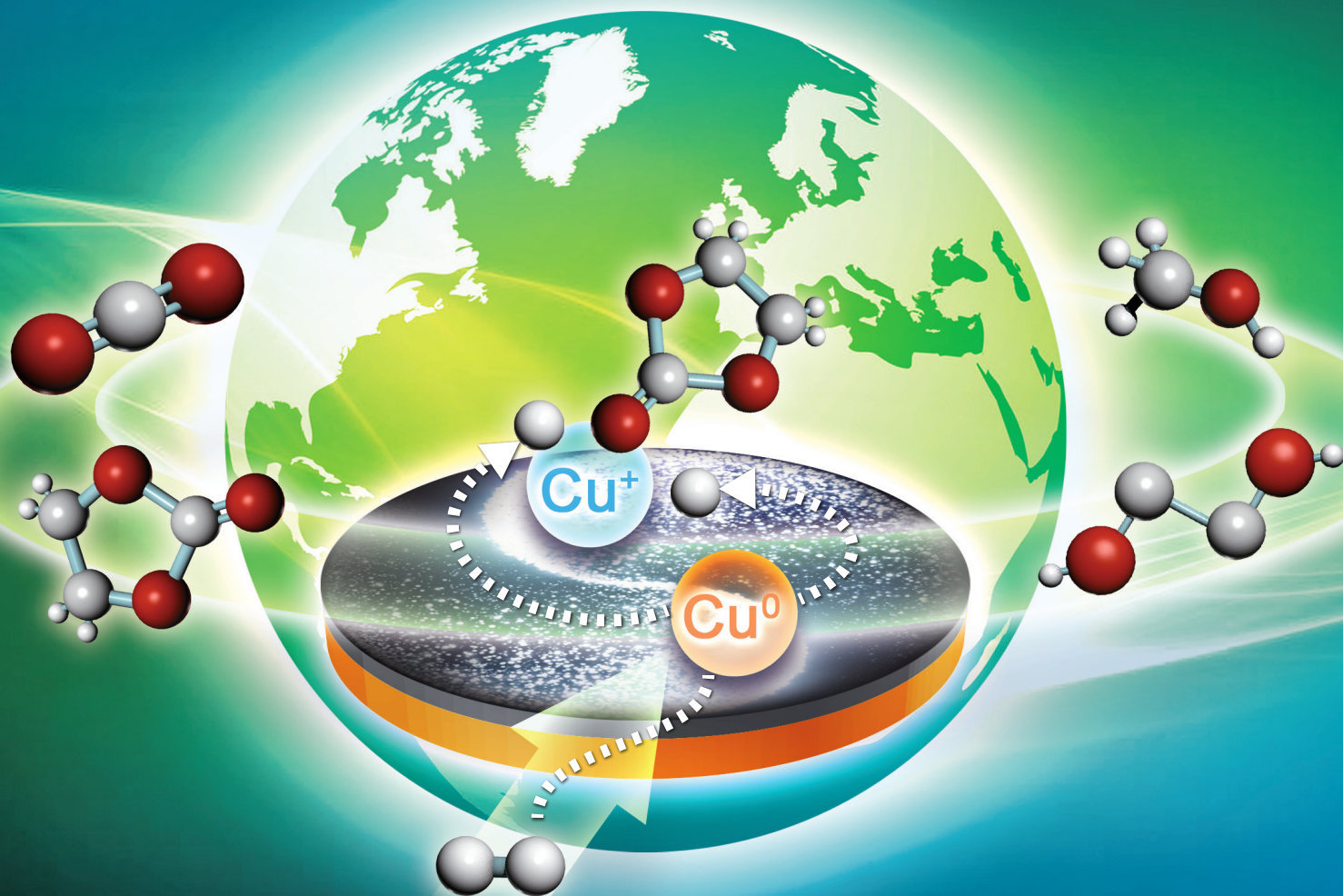
www.cjcatal.org

Volume 39 | Number 8 | August 2018

## 第十五届国际二氧化碳利用会议专栏

Special Column on the 15<sup>th</sup> International Conference on Carbon Dioxide Utilization (ICCDU XV)

Guest Editors: Yuhan Sun (孙予罕), Wei Wei (魏伟)



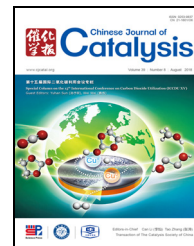
Editors-in-Chief Can Li (李灿) Tao Zhang (张涛)  
Transaction of The Catalysis Society of China



available at [www.sciencedirect.com](http://www.sciencedirect.com)



journal homepage: [www.elsevier.com/locate/chnjc](http://www.elsevier.com/locate/chnjc)



## Chinese Journal of Catalysis

### Graphical Contents

#### Editorial

*Chin. J. Catal.*, 2018, 39: 1281 doi: 10.1016/S1872-2067(18)63125-0

**The 2017 Impact Factor of *Chinese Journal of Catalysis* is 3.525**

Can Li, Tao Zhang

*Dalian Institute of Chemical Physics, CAS; Chinese Academy of Sciences, China*



#### Special Column on the 15<sup>th</sup> International Conference on Carbon Dioxide Utilization (ICCDU XV)

*Chin. J. Catal.*, 2018, 39: 1282 doi: 10.1016/S1872-2067(18)63126-2

**Preface to Special Column on the 15<sup>th</sup> International Conference on Carbon Dioxide Utilization (ICCDU XV)**

Yuhan Sun, Wei Wei (Guest Editors)

*Conversion Science & Engineering, Chinese Academy of Sciences; Shanghai Advanced Research Institute, Chinese Academy of Sciences*



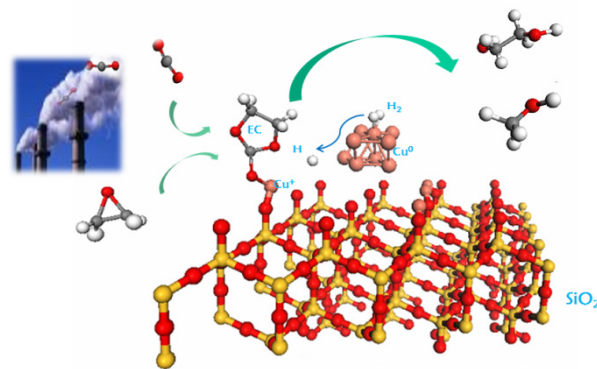


*Chin. J. Catal.*, 2018, 39: 1283–1293 doi: 10.1016/S1872-2067(18)63032-3 [Article]

**An efficient and stable Cu/SiO<sub>2</sub> catalyst for the syntheses of ethylene glycol and methanol via chemoselective hydrogenation of ethylene carbonate**

Jiaju Liu, Peng He, Liguang Wang\*, Hui Liu, Yan Cao, Huiquan Li\*  
*Institute of Process Engineering, Chinese Academy of Sciences;  
 Yancheng Institute of Technology;  
 Beijing University of Chemical Technology;  
 University of Chinese Academy of Sciences*

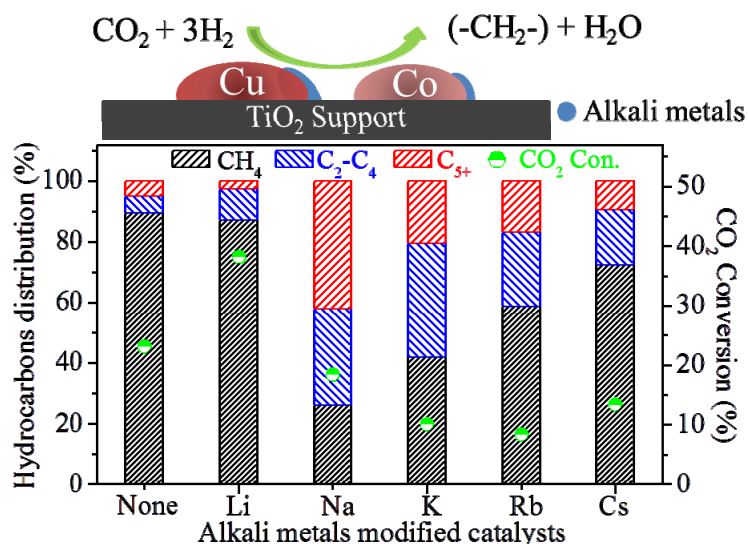
β-cyclodextrin modified Cu/SiO<sub>2</sub> catalysts were successfully prepared by ammonia evaporation method. They exhibited high efficiency with excellent stability for synthesizing methanol and ethylene glycol via chemoselective hydrogenation of ethylene carbonate derived from CO<sub>2</sub>.



*Chin. J. Catal.*, 2018, 39: 1294–1302 doi: 10.1016/S1872-2067(18)63086-4 [Article]

**Effect of alkali metals on the performance of CoCu/TiO<sub>2</sub> catalysts for CO<sub>2</sub> hydrogenation to long-chain hydrocarbons**

Zhibiao Shi, Haiyan Yang, Peng Gao\*, Xinqing Chen, Hongjiang Liu, Liangshu Zhong, Hui Wang\*, Wei Wei, Yuhua Sun  
*Shanghai University; Shanghai Advanced Research Institute, Chinese Academy of Sciences; ShanghaiTech University*



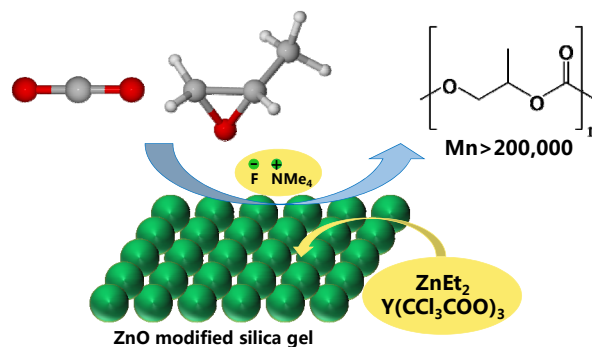
Among the alkali metals (Li, Na, K, Rb, and Cs), the Na-modified CoCu/TiO<sub>2</sub> catalyst exhibits the best performance because it shows the strongest basicity and reveals only a slight decrease in the amount of H<sub>2</sub> desorbed.

*Chin. J. Catal.*, 2018, 39: 1303–1310 doi: 10.1016/S1872-2067(18)63012-8 [Article]

**ZnO/SiO<sub>2</sub>-modified rare-earth-metal ternary catalyst bearing quaternary ammonium salts for synthesis of high molecular weight poly(propylene carbonate)**

Ruihua Cheng\*, Yujie Zhou, Qiaoli Hou, Boping Liu  
*East China University of Science and Technology*

A modified rare-earth-metal catalyst system combined with quaternary ammonium salts as cocatalyst was investigated in the alternating copolymerization of CO<sub>2</sub>/propylene oxide to produce poly(propylene carbonate) with high molecular weight.



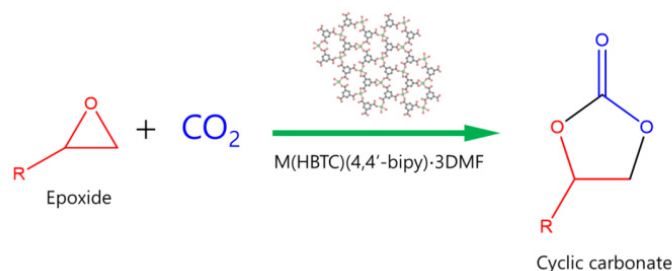
*Chin. J. Catal.*, 2018, 39: 1311–1319 doi: 10.1016/S1872-2067(17)63005-5 [Article]

### Cycloaddition of CO<sub>2</sub> and propylene oxide by using *M*(HBTC)(4,4'-bipy)·3DMF (*M* = Ni, Co, Zn) metal-organic frameworks

Seol-Hee Kim, Robin Babu, Dong-Woo Kim, Wonjoo Lee, Dae-Won Park \*

Pusan National University, Korea;

Korea Research Institute of Chemical Technology, Korea



Three pillar-layered metal-organic frameworks (MOFs) based on *M*(HBTC)(4,4'-bipy)·3DMF (*M* = Ni, Co, and Zn) were synthesized. Their structure consisted of honeycomb grid layers of M<sup>2+</sup> ions and BTC units to form a 3D porous framework. The MOFs displayed excellent catalytic activities in the cycloaddition of CO<sub>2</sub> with epoxides.

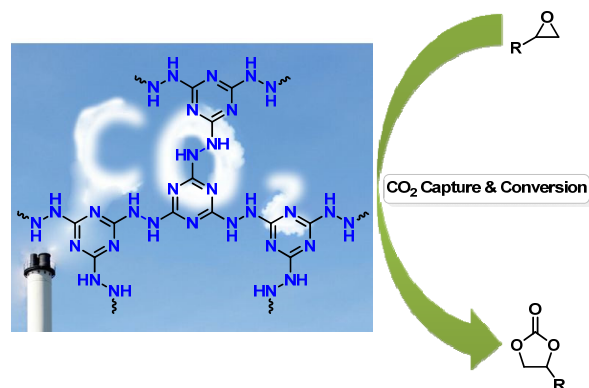
*Chin. J. Catal.*, 2018, 39: 1320–1328 doi: 10.1016/S1872-2067(18)63040-2 [Article]

### Novel hydrazine-bridged covalent triazine polymer for CO<sub>2</sub> capture and catalytic conversion

Anhua Liu \*, Jinju Zhang, Xiaobing Lv

Dalian University of Technology

A novel hydrazine-bridged covalent triazine polymer was synthesized by simple polymerization of cyanuric chloride with 2,4,6-trihydrazinyl-1,3,5-triazine, which can be employed as both a CO<sub>2</sub> adsorbent and heterogeneous organocatalyst for cyclo-addition of CO<sub>2</sub> with epoxides under solvent-free conditions.



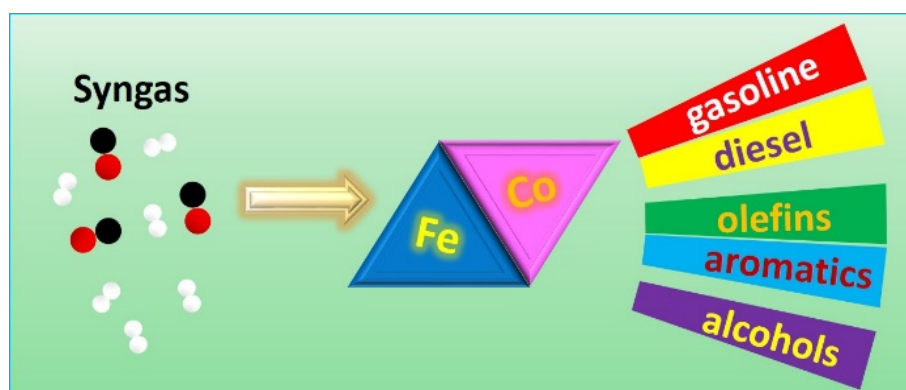
## Reviews

*Chin. J. Catal.*, 2018, 39: 1329–1346 doi: 10.1016/S1872-2067(18)63100-6

### New development in Fe/Co catalysts: Structure modulation and performance optimization for syngas conversion

Yinwen Li, Xin Zhang \*, Min Wei \*

Beijing University of Chemical Technology

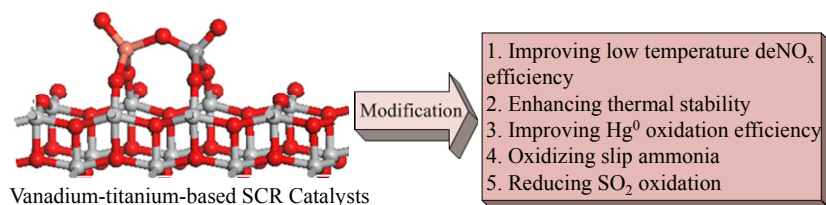


This review comprehensively overviews syngas conversion based on Fe/Co catalysts in three main reactions, highlights the advances recently made and the challenges that remain open, and will stimulate upcoming research activities.

*Chin. J. Catal.*, 2018, 39: 1347–1365 doi: 10.1016/S1872-2067(18)63090-6

### Review on the latest developments in modified vanadium-titanium-based SCR catalysts

Chuanmin Chen \*, Yue Cao, Songtao Liu, Jianmeng Chen, Wenbo Jia  
North China Electric Power University



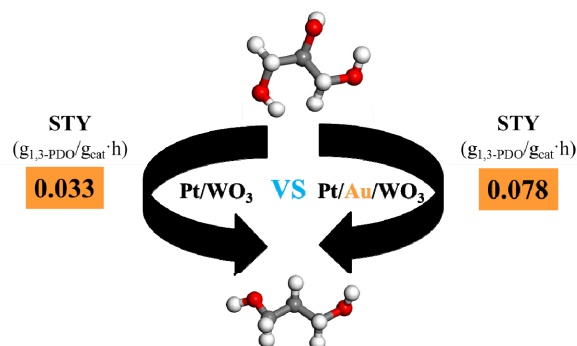
Commercial vanadium-titanium-based SCR catalysts were doped with some modified components to obtain higher thermal stability, low-temperature NH<sub>3</sub>-SCR and Hg<sup>0</sup> oxidation activity, and reduce slip ammonia and SO<sub>3</sub> generation.

## Articles

*Chin. J. Catal.*, 2018, 39: 1366–1372 doi: 10.1016/S1872-2067(18)63103-1

### Understanding the promotional effect of Au on Pt/WO<sub>3</sub> in hydrogenolysis of glycerol to 1,3-propanediol

Chaojun Yang †, Fan Zhang †, Nie Lei, Man Yang, Fei Liu, Zhili Miao, Yunnan Sun, Xiaochen Zhao, Aiqin Wang \*  
Dalian Institute of Chemical Physics, Chinese Academy of Sciences;  
University of Chinese Academy of Sciences

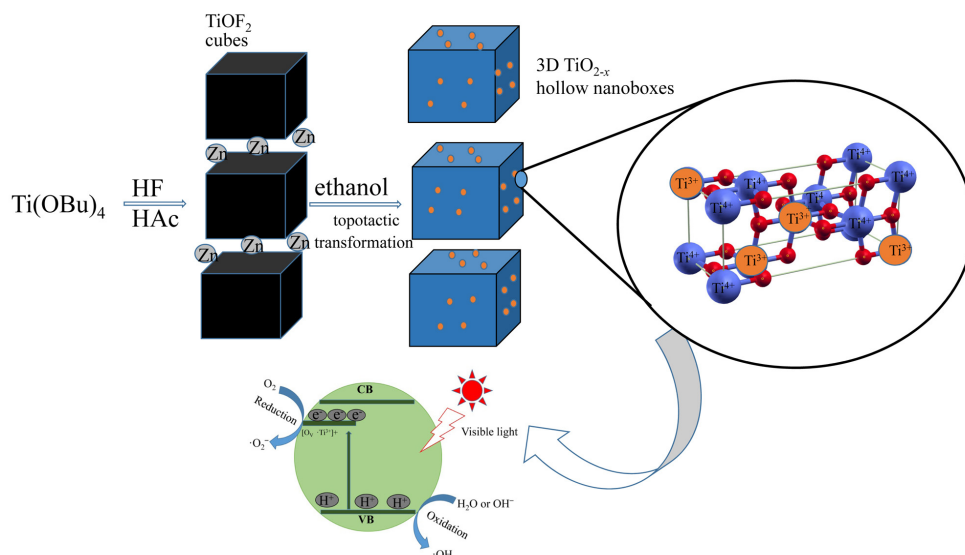


In selective hydrogenolysis of glycerol to 1,3-propanediol, the Pt/Au/WO<sub>3</sub> catalyst affords almost 2.4-fold STY of 1,3-propanediol than the Pt/WO<sub>3</sub> catalyst due to Au doping.

*Chin. J. Catal.*, 2018, 39: 1373–1383 doi: 10.1016/S1872-2067(18)63106-7

### One-pot topotactic synthesis of Ti<sup>3+</sup> self-doped 3D TiO<sub>2</sub> hollow nanoboxes with enhanced visible light response

Chengjiang Zhang, Lijun Tian, Lianqin Chen \*, Xiaofang Li, Kangle Lv, Kejian Deng  
South-Central University for Nationalities; Wuhan University of Science and Technology



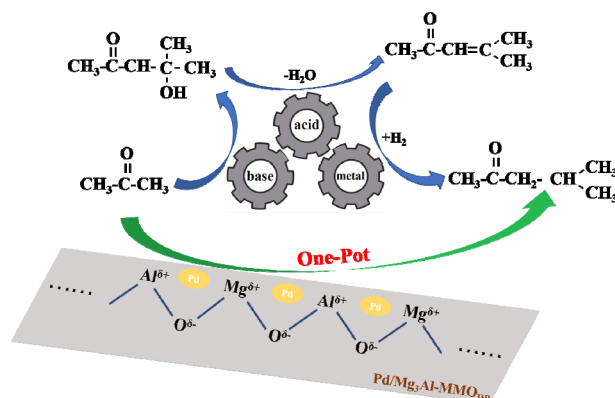
Ti<sup>3+</sup> self-doped anatase TiO<sub>2</sub> catalysts, with 3D hollow nanobox structure, were prepared via a template-engaged topological transformation process by a one-pot hydrothermal method. The introduction of Ti<sup>3+</sup> and oxygen vacancies greatly enhanced the visible photocatalytic activity.

*Chin. J. Catal.*, 2018, 39: 1384–1394 doi: 10.1016/S1872-2067(18)63092-X

### Fabrication of Pd-based metal-acid-alkali multifunctional catalysts for one-pot synthesis of MIBK

Rui Ma, Yunpeng Li, Guandong Wu, Yufei He \*, Junting Feng, Yingying Zhao \*, Dianqing Li  
Beijing University of Chemical Technology

For multifunctional catalysts, the catalytic properties are more than just a collection of active sites, and the Pd/Mg<sub>3</sub>Al-MMO multifunctional catalyst containing intimate acidic/basic/metallic sites exhibits excellent performance in the one-pot synthesis of MIBK from acetone.

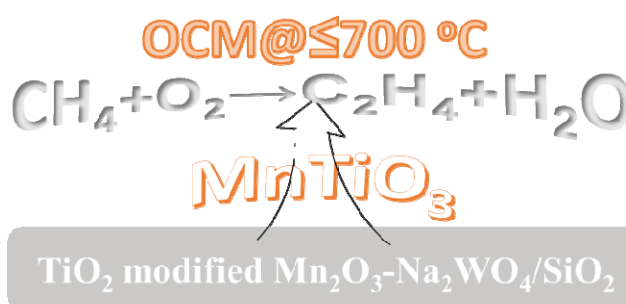


*Chin. J. Catal.*, 2018, 39: 1395–1402 doi: 10.1016/S1872-2067(18)63076-1

### Oxidative coupling of methane: MO<sub>x</sub>-modified (M = Ti, Mg, Ga, Zr) Mn<sub>2</sub>O<sub>3</sub>-Na<sub>2</sub>WO<sub>4</sub>/SiO<sub>2</sub> catalysts and effect of MO<sub>x</sub> modification

Pengwei Wang, Xin Zhang, Guofeng Zhao \*, Ye Liu, Yong Lu \*  
East China Normal University

A Mn<sub>2</sub>O<sub>3</sub>-Na<sub>2</sub>WO<sub>4</sub>/SiO<sub>2</sub> catalyst is modified using TiO<sub>2</sub>, MgO, Ga<sub>2</sub>O<sub>3</sub>, and ZrO<sub>2</sub>; among the synthesized catalysts, the TiO<sub>2</sub>-modified one shows markedly improved low-temperature OCM performance due to the formation of the MnTiO<sub>3</sub> phase and of the MnTiO<sub>3</sub>-dominated catalyst surface.

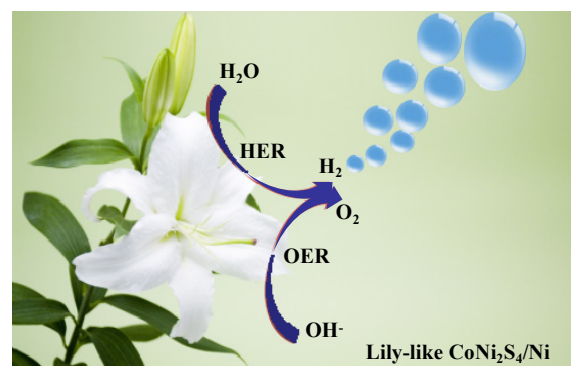


*Chin. J. Catal.*, 2018, 39: 1403–1410 doi: 10.1016/S1872-2067(18)63053-0

### Three-dimensional lily-like CoNi<sub>2</sub>S<sub>4</sub> as an advanced bifunctional electrocatalyst for hydrogen and oxygen evolution reaction

Jingwei Li †, Qiuna Zhuang †, Peiman Xu, Dawei Zhang, Licheng Wei, Dingsheng Yuan \*  
Jinan University

Three-dimensional lily-like CoNi<sub>2</sub>S<sub>4</sub> has been successfully synthesized on Ni foam. Lily-like CoNi<sub>2</sub>S<sub>4</sub>/Ni can be an efficient and stable bifunctional electrocatalyst. It possesses excellent characteristics for both hydrogen evolution reaction and oxygen evolution reaction, and its performance is comparable to that of most of the electrocatalysts reported in the literature.

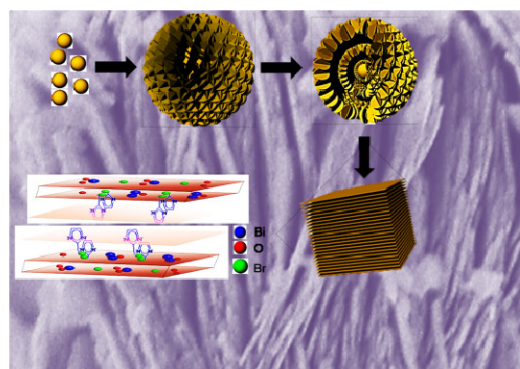


*Chin. J. Catal.*, 2018, 39: 1411–1417 doi: 10.1016/S1872-2067(18)63080-3

### Microwave-assisted ionothermal synthesis of hierarchical microcube-like BiOBr with enhanced photocatalytic activity

Yingchun Miao \*, Zichao Lian, Yuning Huo, Hexing Li \*  
Qijing Normal University; Shanghai Normal University

BiOBr with hierarchical morphologies and hydrogen bond-co- $\pi$ - $\pi$  stacking was successfully synthesized via microwave-assisted ionothermal self-assembly, and it exhibited high activity owing to the enhanced light absorbance and narrow bandgap.

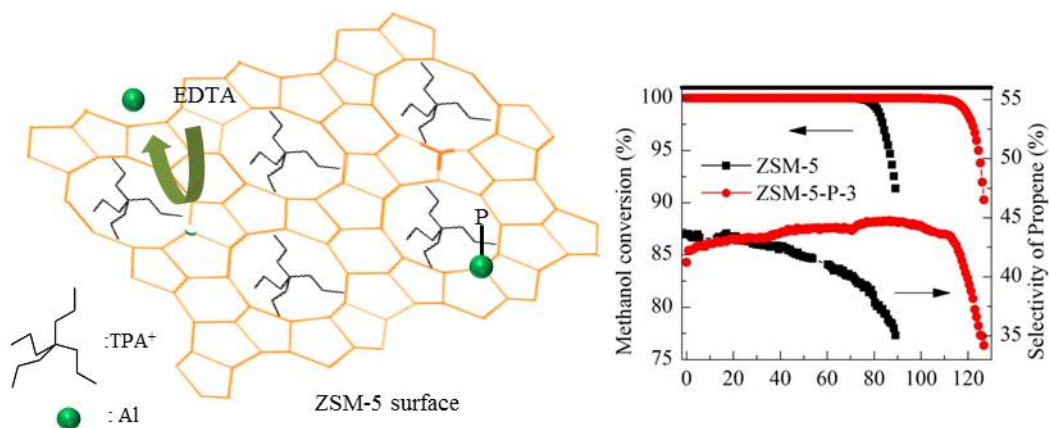


*Chin. J. Catal.*, 2018, 39: 1418–1426 doi: 10.1016/S1872-2067(18)63117-1

### External surface modification of as-made ZSM-5 and their catalytic performance in the methanol to propylene reaction

Xuebin Zhao, Yang Hong, Linying Wang, Dong Fan, Nana Yan, Xiaona Liu, Peng Tian\*, Xinwen Guo\*, Zhongmin Liu\*

Dalian University of Technology; Dalian Institute of Chemical Physics, Chinese Academy of Sciences; University of Chinese Academy of Sciences



Post-synthetic treatment of as-made ZSM-5 with Na<sub>2</sub>H<sub>2</sub>EDTA or H<sub>3</sub>PO<sub>4</sub> solution can prolong the MTP reaction lifetime of ZSM-5. The H<sub>3</sub>PO<sub>4</sub> modification can further enhance the propene selectivity due to the depressed external coke deposition rate (reduced side reactions).

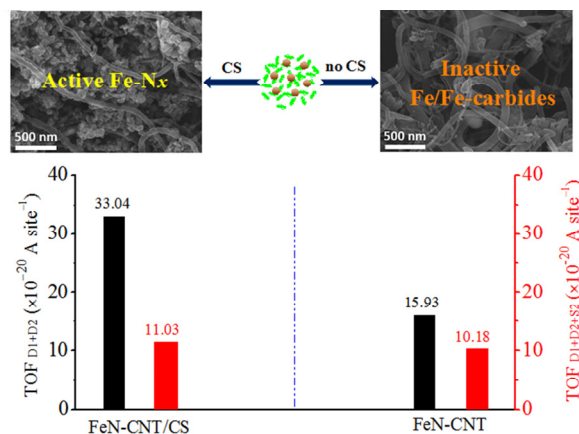
*Chin. J. Catal.*, 2018, 39: 1427–1435 doi: 10.1016/S1872-2067(18)63107-9

### Induced growth of Fe-N<sub>x</sub> active sites using carbon templates

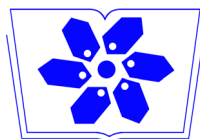
Shiming Zhang, Heyou Zhang, Weimin Zhang, Xianxia Yuan, Shengli Chen\*, Zi-Feng Ma\*

Shanghai Jiao Tong University; Wuhan University; Shanghai Sinopoly Jiahua Battery Technology Co., Ltd

Introduction of a carbon nanosphere template (CS) into a melamine/Fe-salt mixture resulted in the *in situ* growth of uniform nanotubes on the skin of the CS. Using this method, we successfully constructed binary FeN-CNT/CS in which the formation of highly dense Fe-N<sub>x</sub> active sites is promoted instead of Fe and Fe-carbides in FeN-CNT. Importantly, the intrinsic ORR activities of the Fe-N<sub>x</sub> sites were also improved.







中国科学院科学出版基金资助出版



Chinese Journal of  
**Catalysis**

月刊 SCI 收录 2018 年 8 月 第 39 卷 第 8 期



## 目次

### 编者语

#### 1281 (主编寄语)

《催化学报》2017 年影响因子为 3.525

李灿, 张涛

### 第十五届国际二氧化碳利用会议专栏

#### 1282 (专栏前言)

第十五届国际二氧化碳利用会议专栏前言

孙予罕, 魏伟 (客座主编)

#### 1283 (论文)

碳酸乙烯酯选择加氢合成甲醇与乙二醇高效稳定 Cu/SiO<sub>2</sub> 催化剂研究

刘佳驹, 贺鹏, 王利国, 刘辉, 曹妍, 李会泉

#### 1294 (论文)

碱金属助剂对 CoCu/TiO<sub>2</sub> 催化剂上二氧化碳加氢合成链烃的影响

石志彪, 杨海艳, 高鹏, 陈新庆, 刘洪江, 钟良枢, 王慧, 魏伟, 孙予罕

#### 1303 (论文)

稀土三元催化体系 ZnO/SiO<sub>2</sub> 负载化及季铵盐催化 CO<sub>2</sub> 与环氧丙烷合成高分子量聚碳酸酯

程瑞华, 周宇杰, 侯侨丽, 刘柏平

#### 1311 (论文)

采用金属有机骨架材料 M(HBTC)(4,4'-bipy)-3DMF (M = Ni, Co, Zn) 催化 CO<sub>2</sub> 与环氧丙烷的环加成反应

Seol-Hee Kim, Robin Babu, Dong-Woo Kim, Wonjoo Lee, Dae-Won Park

#### 1320 (论文)

新型胍桥联共价三嗪聚合物在二氧化碳捕集和催化转化方面的应用

刘安华, 张金菊, 吕小兵

### 综述

#### 1329

Fe/Co 催化剂在合成气转化领域的新进展: 结构调控和性能强化

李印文, 张欣, 卫敏

#### 1347

改性钒钛基 SCR 催化剂的研究进展

陈传敏, 曹悦, 刘松涛, 陈建猛, 贾文波

### 论文

#### 1366

Au 促进 Pt/WO<sub>3</sub> 催化甘油氢解制 1,3-丙二醇

杨超军, 张帆, 雷念, 杨曼, 刘菲, 苗治理, 孙永南, 赵晓晨, 王爱琴

#### 1373

拓扑相变制备具有拓宽可见光响应范围的 Ti<sup>3+</sup> 自掺杂 3D 空盒状 TiO<sub>2</sub>

张成江, 田丽君, 陈连清, 黎小芳, 吕康乐, 邓克俭

#### 1384

Pd-基金属-酸-碱多功能催化剂的制备及其丙酮一步法合成 MIBK 性能研究

马瑞, 李云鹏, 武冠东, 贺宇飞, 冯俊婷, 赵莹莹, 李殿卿

#### 1395

甲烷氧化偶联: Mn<sub>2</sub>O<sub>3</sub>-Na<sub>2</sub>WO<sub>4</sub>/SiO<sub>2</sub> 催化剂的金属氧化物 MO<sub>x</sub> (M = Ti, Mg, Ga, Zr) 改性及掺杂效应研究

王鹏伟, 张鑫, 赵国锋, 刘晔, 路勇

#### 1403

三维百合花状的 CoNi<sub>2</sub>S<sub>4</sub> 作为先进的双功能电催化剂用于氢析出和氧析出反应

黎景卫, 庄秋娜, 许培蔓, 张大维, 韦丽成, 袁定胜

#### 1411

微波辅助离子热合成具有高光催化活性的 BiOBr 片层微米立方体

缪应纯, 廉志超, 霍宇凝, 李和兴

#### 1418

高硅 ZSM-5 原粉的外表面改性及其在甲醇制丙烯反应中的应用

赵学斌, 洪杨, 王林英, 樊栋, 闫娜娜, 刘晓娜, 田鹏, 郭新闻, 刘中民

#### 1427

碳模板诱导生长 Fe-N<sub>x</sub> 活性位点

张世明, 张鹤友, 张维民, 原鲜霞, 陈胜利, 马紫峰

### 相关信息

1435 《催化学报》2017 年 SCI 影响因子为 3.525

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)

在线投稿网址

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