



# Chinese Journal of Catalysis

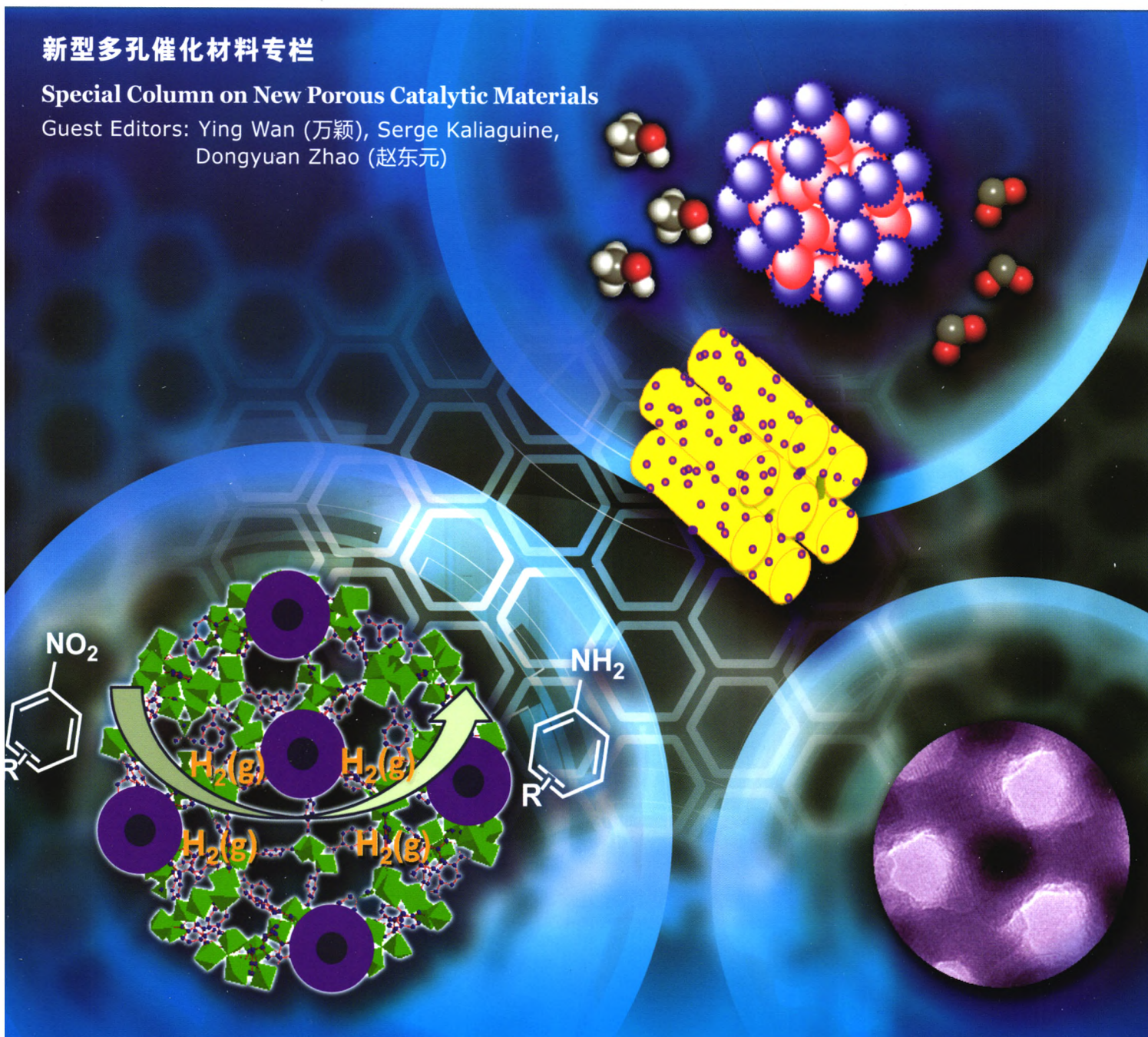
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Volume 37 | Number 1 | January 2016

新型多孔催化材料专栏

Special Column on New Porous Catalytic Materials

Guest Editors: Ying Wan (万颖), Serge Kaliaguine,  
Dongyuan Zhao (赵东元)

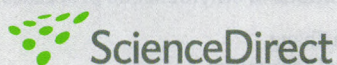


万方数据



Editors-in-Chief Can Li (李灿) Tao Zhang (张涛)  
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## Chinese Journal of Catalysis

### Graphical Contents

#### Special Column on New Porous Catalytic Materials

*Chin. J. Catal.*, 2016, 37: 1–2 doi: 10.1016/S1872-2067(15)61027-0

##### Preface to Special Column on New Porous Catalytic Materials

Ying Wan, Serge Kaliaguine, Dongyuan Zhao (Guest Editors)

*Shanghai Normal University, China; Université Laval, Canada; Fudan University, China*

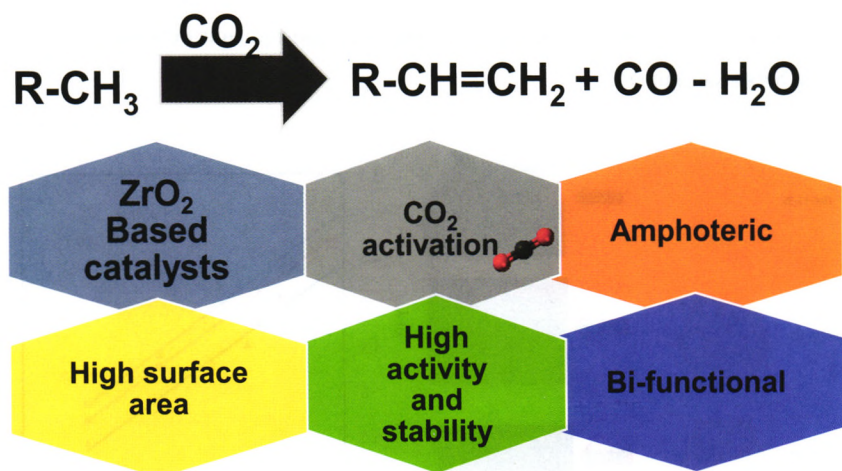


*Chin. J. Catal.*, 2016, 37: 3–15 doi: 10.1016/S1872-2067(15)60901-9 [Review]

##### Ethylbenzene to styrene over ZrO<sub>2</sub> based mixed metal oxide catalysts with CO<sub>2</sub> as a soft oxidant

Nanzhe Jiang, Abhishek Burri, Sang-Eon Park\*

*Yanbian University, China; Inha University, Korea*

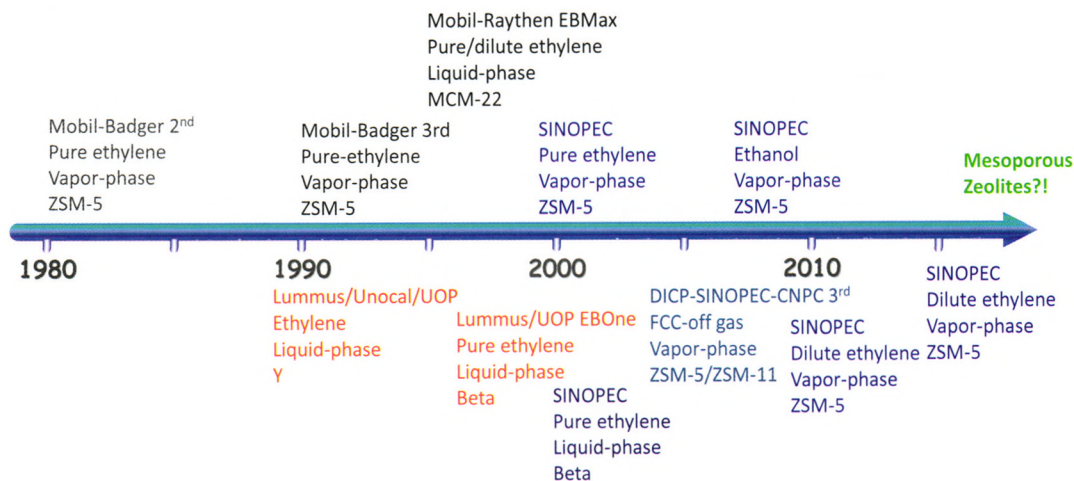


Acid-base bi-functionality activation of alkyl aromatics and CO<sub>2</sub> is simultaneously performed on the same zirconia-based mixed metal oxide catalyst to yield high activity and selectivity.

*Chin. J. Catal.*, 2016, 37: 16–26 doi: 10.1016/S1872-2067(15)60965-2 [Review]

### Advances in development and industrial applications of ethylbenzene processes

Weimin Yang\*, Zhendong Wang, Hongmin Sun, Bin Zhang  
Sinopec Shanghai Research Institute of Petrochemical Technology



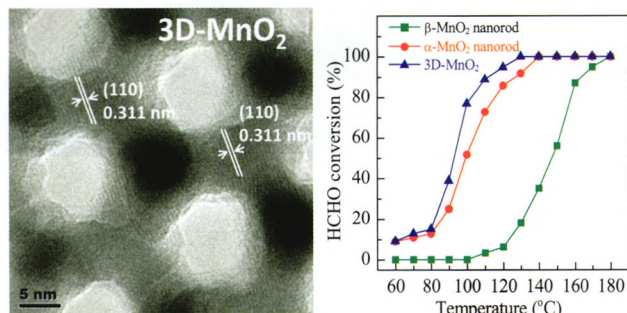
Advances in catalysts and processes for benzene ethylation with pure/dilute ethylene or ethanol to produce ethylbenzene are summarized. Some promising techniques and applications are discussed.

*Chin. J. Catal.*, 2016, 37: 27–31 doi: 10.1016/S1872-2067(15)61026-9 [Communication]

### Synthesis of three-dimensional ordered mesoporous MnO<sub>2</sub> and its catalytic performance for formaldehyde oxidation

Bingyang Bai, Qi Qiao\*, Junhua Li\*, Jiming Hao  
Chinese Research Academy of Environmental Sciences;  
Tsinghua University

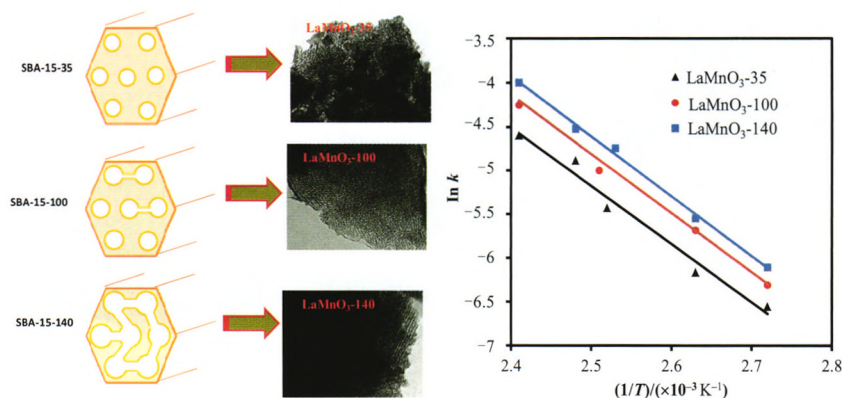
Three-dimensional ordered mesoporous MnO<sub>2</sub> was synthesized using KIT-6 molecule sieves as a hard template. The material showed high catalytic activity in formaldehyde oxidation and has good development potential.



*Chin. J. Catal.*, 2016, 37: 32–42 doi: 10.1016/S1872-2067(15)60909-3 [Article]

### Pore structure effects on the kinetics of methanol oxidation over nanocast mesoporous perovskites

Mahesh M. Nair, Freddy Kleitz, Serge Kaliaguine\*  
Université Laval, Canada



Changing SBA-15 template aging temperature which affects the pore structure of the mesoporous perovskite does not change activation energy. Only preexponential factor is changed proportionally to specific surface area.

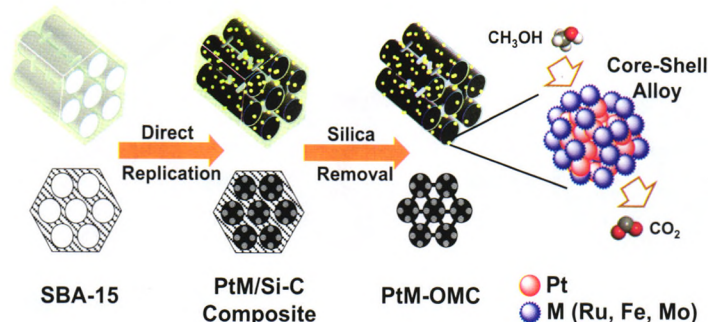


*Chin. J. Catal.*, 2016, 37: 43–53 doi: 10.1016/S1872-2067(15)60878-6 [Article]

### Ordered mesoporous carbon supported bifunctional PtM (M = Ru, Fe, Mo) electrocatalysts for a fuel cell anode

Chin-Te Hung, Zih-Hao Liou, Pitchaimani Veerakumar, Pei-Hao Wu, Tuan-Chi Liu\*, Shang-Bin Liu\*

*Institute of Atomic and Molecular Sciences, Academia Sinica, Taiwan, China; National Taiwan University of Science and Technology, Taiwan, China; National Taiwan Normal University, Taiwan, China*



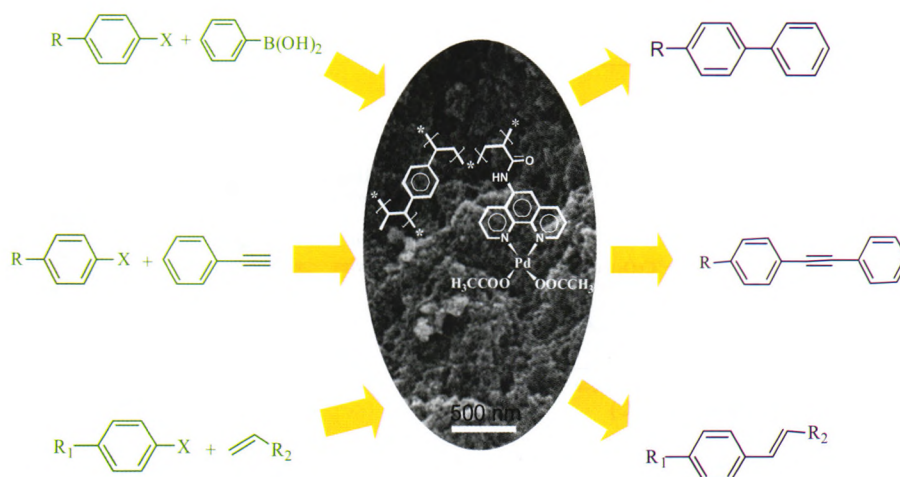
The deposition onto an ordered mesoporous carbon (OMC) support of well dispersed PtM (M = Ru, Fe, Mo) alloy nanoparticles (NPs) was directly replicated. These PtM-OMC catalysts use a cost-effective second metal such as Fe and possess uniform (2–3 nm) and highly dispersed alloy NPs catalysts that exhibit superior electrocatalytic performance and excellent tolerance to CO poisoning during the methanol oxidation reaction.

*Chin. J. Catal.*, 2016, 37: 54–60 doi: 10.1016/S1872-2067(15)60952-4 [Article]

### A Pd-metalated porous organic polymer as a highly efficient heterogeneous catalyst for C-C couplings

Zhifeng Dai, Fang Chen, Qi Sun, Yanyan Ji, Liang Wang, Xiangju Meng\*, Feng-Shou Xiao

*Zhejiang University*



A Pd-metalated porous polymer bearing phenanthroline moieties (Pd/POP-Phen) exhibits high activities, excellent selectivities and superior recyclabilities in Suzuki, Sonogashira and Heck couplings.

*Chin. J. Catal.*, 2016, 37: 61–72 doi: 10.1016/S1872-2067(15)60917-2 [Article]

### Size-control growth of thermally stable Au nanoparticles encapsulated within ordered mesoporous carbon framework

Shuai Wang, Jie Wang, Xiaojuan Zhu, Jianqiang Wang,

Osamu Terasaki, Ying Wan\*

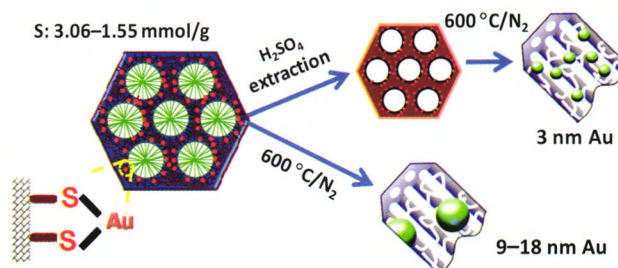
*Shanghai Normal University, China;*

*Shanghai Institute of Applied Physics,*

*Chinese Academy of Sciences, China;*

*Stockholm University, Sweden*

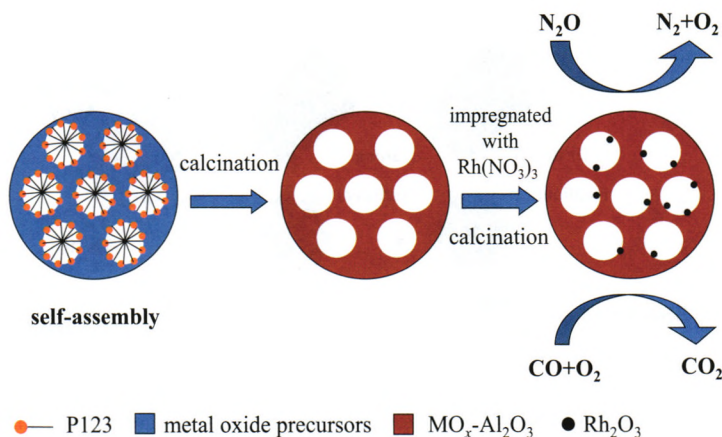
Thermally stable gold nanoparticles with sizes of 3–18 nm and free of protecting agent have been loaded onto ordered mesoporous carbon via a coordination-assisted self-assembly approach.



*Chin. J. Catal.*, 2016, 37: 73–82 doi: 10.1016/S1872-2067(15)60951-2 [Article]

### Rh<sub>2</sub>O<sub>3</sub>/mesoporous MO<sub>x</sub>-Al<sub>2</sub>O<sub>3</sub> (M = Mn, Fe, Co, Ni, Cu, Ba) catalysts: Synthesis, characterization, and catalytic applications

Huan Liu, Yi Lin, Zhen Ma\*  
Fudan University

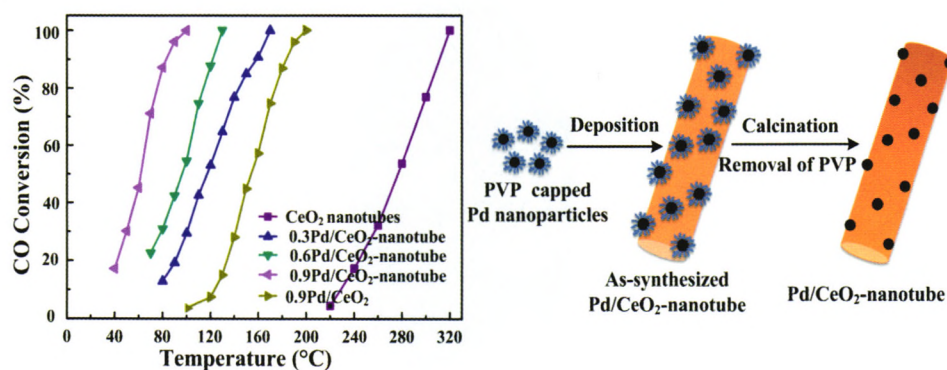


Mesoporous MO<sub>x</sub>-Al<sub>2</sub>O<sub>3</sub> (M = Mn, Fe, Co, Ni, Cu, Ba) materials were prepared by a one-pot evaporation-induced self-assembly method. Rh<sub>2</sub>O<sub>3</sub> nanoparticles were loaded onto these mesoporous supports via wet impregnation.

*Chin. J. Catal.*, 2016, 37: 83–90 doi: 10.1016/S1872-2067(15)60913-5 [Article]

### Synthesis of Pd nanoparticles supported on CeO<sub>2</sub> nanotubes for CO oxidation at low temperatures

Jingmi Wu, Liang Zeng, Dangguo Cheng\*, Fengqiu Chen, Xiaoli Zhan, Jinlong Gong\*  
Zhejiang University; Tianjin University

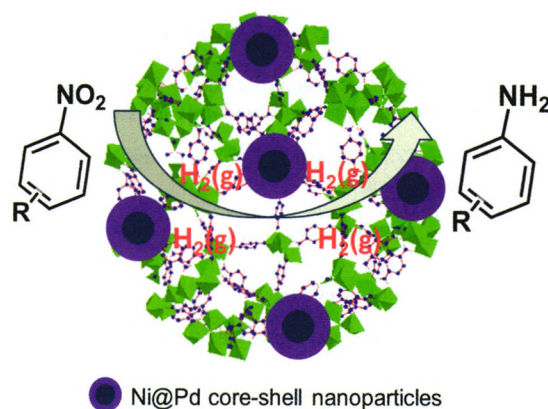


The preparation of CeO<sub>2</sub> nanotube-supported Pd nanoparticles and their catalytic performance toward CO oxidation were described. Abundant Ce<sup>3+</sup> and Pd–O–Ce interactions on the nanotube facilitated the reaction.

*Chin. J. Catal.*, 2016, 37: 91–97 doi: 10.1016/S1872-2067(15)60940-8 [Article]

### Ni@Pd core-shell nanoparticles supported on a metal-organic framework as highly efficient catalysts for nitroarenes reduction

Siping Jian, Yingwei Li\*  
South China University of Technology



Bimetal core-shell Ni@Pd nanoparticles supported on MIL-101 were prepared and exhibit high catalytic activity and selectivity during the reduction of nitroarenes.



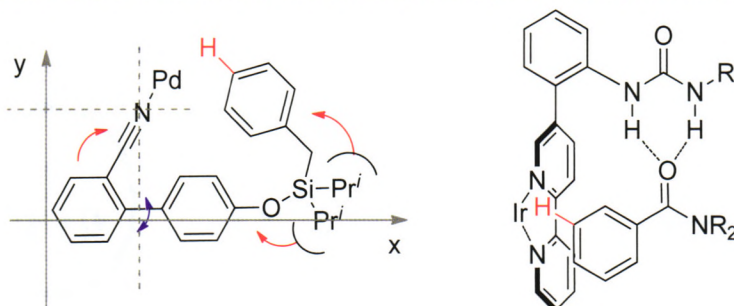
## Highlight

*Chin. J. Catal.*, 2016, 37: 98–101 doi: 10.1016/S1872-2067(15)61008-7

### Recent advances of remote selective C–H activation: Ligand and template design

Guoqiang Yang, Nicholas Butt, Wanbin Zhang\*  
Shanghai Jiao Tong University

#### remote site selective C–H activation: template and ligand design



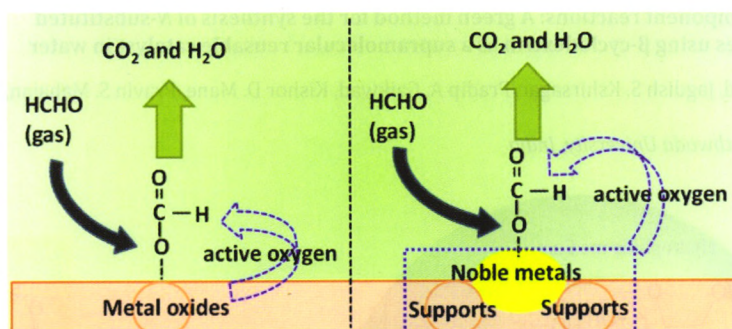
The *para*-selective C–H activation of toluene-type substrates has been achieved using a strained biphenyl-type template, and a highly selective *meta*-C–H borylation of aromatic amides has been reported by taking advantage of secondary ligand interactions.

## Review

*Chin. J. Catal.*, 2016, 37: 102–122 doi: 10.1016/S1872-2067(15)61007-5

### Progress in research on catalysts for catalytic oxidation of formaldehyde

Bingyang Bai\*, Qi Qiao, Junhua Li\*, Jiming Hao  
Chinese Research Academy of Environmental Sciences; Tsinghua University



This paper reviews progress in research on precious-metal and transition-metal oxide catalyst systems for HCHO oxidation. The oxidation properties, factors influencing the catalytic activity, and reaction mechanisms are discussed, and future development directions and research hotspots are considered.

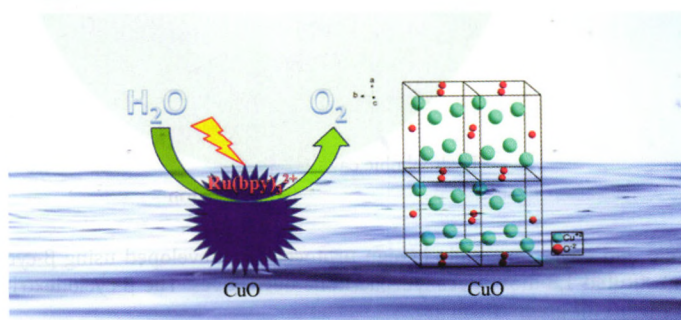
## Articles

*Chin. J. Catal.*, 2016, 37: 123–134 doi: 10.1016/S1872-2067(15)61012-9

### Flower-like 3D CuO microsphere acting as photocatalytic water oxidation catalyst

Xiaoqiang Du, Jingwei Huang, Yingying Feng, Yong Ding\*  
Lanzhou University;  
Lanzhou Institute of Chemical Physics,  
Chinese Academy of Sciences

A flower-like 3D CuO microspheres based on earth abundant elements has been successfully synthesized. It is the first time that a copper oxide shows efficient photocatalytic water oxidation performance with good stability.



*Chin. J. Catal.*, 2016, 37: 135–145 doi: 10.1016/S1872-2067(15)61010-5

### Oxidation of 4-chloro-3-methylphenol using zeolite Y-encapsulated iron(III)-, nickel(II)-, and copper(II)-*N,N'*-disalicylidene-1,2-phenylenediamine complexes

Solomon Legese Hailu, Balachandran Unni Nair \*, Mesfin Redi-Abshiro, Isabel Diaz, Rathinam Aravindhnan, Merid Tessema  
CSIR-Central Leather Research Institute, India; Addis Ababa University, Ethiopia; Instituto de Catálisis y Petroleoquímica, Spain

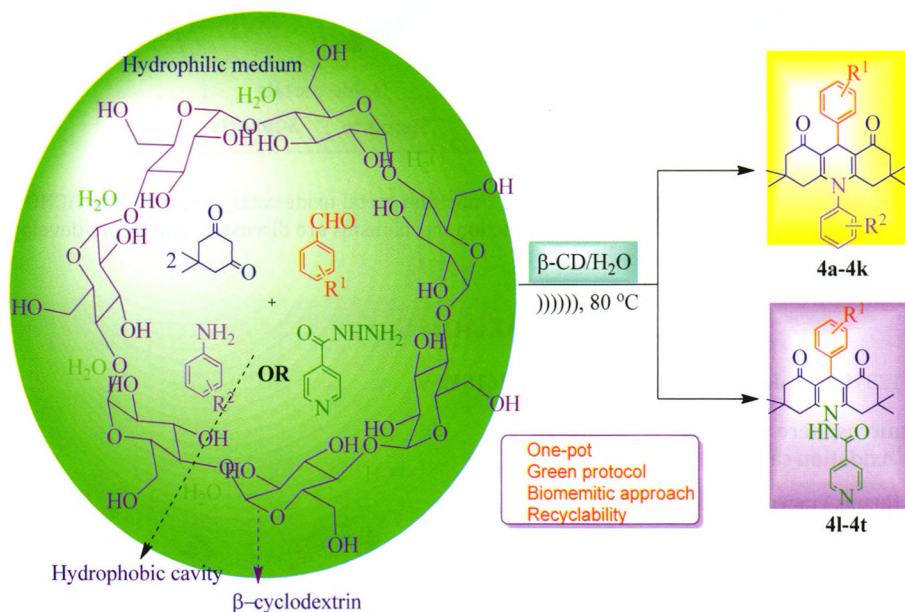


Iron(III), nickel(II) and copper(II)-*N,N'*-disalicylidene-1,2-phenylenediamine complex is successfully encapsulated through ship-in-a-bottle method into zeolite Y supercage. Zeolite encapsulated metal complexes show good catalytic efficiency towards degradation of 4-chloro-3-methyl phenol.

*Chin. J. Catal.*, 2016, 37: 146–152 doi: 10.1016/S1872-2067(15)61005-1

### Ultrasound assisted multicomponent reactions: A green method for the synthesis of *N*-substituted 1,8-dioxo-decahydroacridines using $\beta$ -cyclodextrin as a supramolecular reusable catalyst in water

Asha V. Chate, Umesh B. Rathod, Jagdish S. Kshirsagar, Pradip A. Gaikwad, Kishor D. Mane, Pravin S. Mahajan, Mukesh D. Nikam, Charansingh H. Gill \*  
Dr. Babasaheb Ambedkar Marathwada University, India



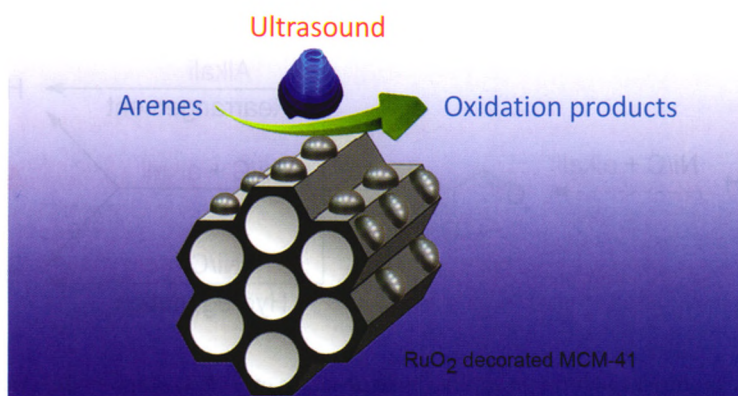
A mild and environmentally benign protocol was developed using  $\beta$ -cyclodextrins as a catalyst to significantly improve the yield of *N*-substituted 1,8-dioxo-decahydroacridine derivatives. The  $\beta$ -cyclodextrin employed in the multi-component reaction satisfies the requirements for green chemistry.



*Chin. J. Catal.*, 2016, 37: 153–158 doi: 10.1016/S1872-2067(15)61001-4

### Ruthenium nanoparticles supported on mesoporous MCM-41 as an efficient and reusable catalyst for selective oxidation of arenes under ultrasound irradiation

Alireza Khorshidi \*  
University of Guilan, Iran



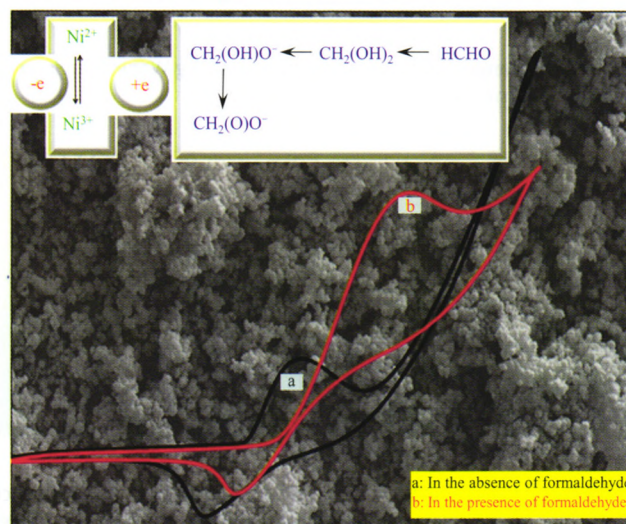
MCM-41 crystallites loaded with Ru nanoparticles were used as heterogeneous catalysts in selective oxidation of arenes under sonic waves. The catalyst active site was found to be RuO<sub>2</sub> species formed during the course of reaction.

*Chin. J. Catal.*, 2016, 37: 159–168 doi: 10.1016/S1872-2067(15)60990-1

### Preparation of a novel supported electrode comprising a nickel (II) hydroxide-modified carbon paste electrode (Ni(OH)<sub>2</sub>-X/CPE) for the electrocatalytic oxidation of formaldehyde

Safura Kaviani, Seyed Naser Azizi \*, Shahram Ghasemi  
University of Mazandaran, Iran

A novel Ni(OH)<sub>2</sub>-X/CPE was first prepared and used for the electrocatalytic oxidation of formaldehyde. This electrode exhibited good electrocatalytic activity with regards to formaldehyde oxidation owing to its nanoporous structure and the large surface area of zeolite X.

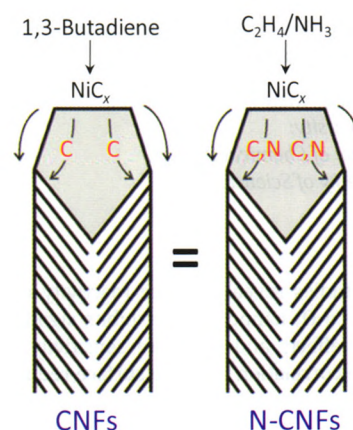


*Chin. J. Catal.*, 2016, 37: 169–176 doi: 10.1016/S1872-2067(15)60982-2

### Comparison of growth mechanisms of undoped and nitrogen-doped carbon nanofibers on nickel-containing catalysts

Vladimir V. Chesnokov, Olga Yu. Podyacheva \*, Alexander N. Shmakov,  
Lidiya S. Kibis, Andrei I. Boronin, Zinifer R. Ismagilov  
Borshkov Institute of Catalysis, Russia;  
Novosibirsk State University, Russia;  
Institute of Coal Chemistry and Materials Science, Russia

A similarity of the growth mechanisms of carbon nanofibers and nitrogen-doped carbon nanofibers on Ni-containing catalysts was demonstrated by the use of XPS and XRD in situ techniques.



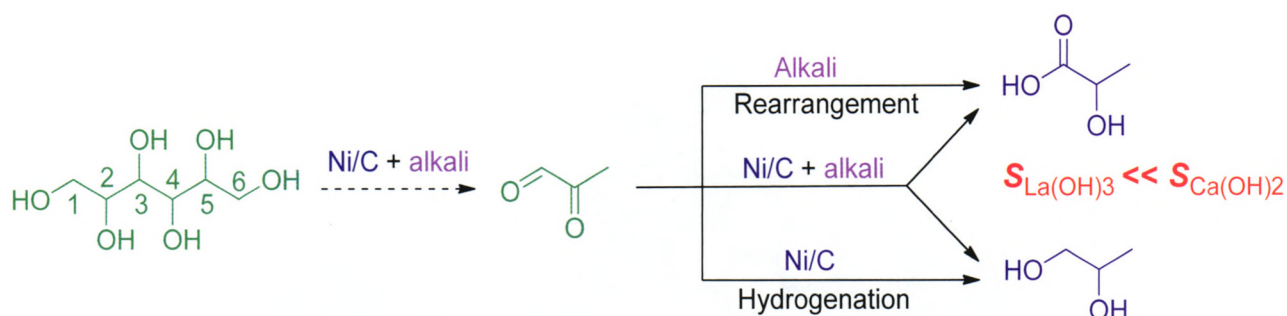


*Chin. J. Catal.*, 2016, 37: 177–183 doi: 10.1016/S1872-2067(15)60976-7

### Effects of alkaline additives on the formation of lactic acid in sorbitol hydrogenolysis over Ni/C catalyst

Junjie Zhang, Fang Lu\*, Weiqiang Yu, Rui Lu, Jie Xu\*

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



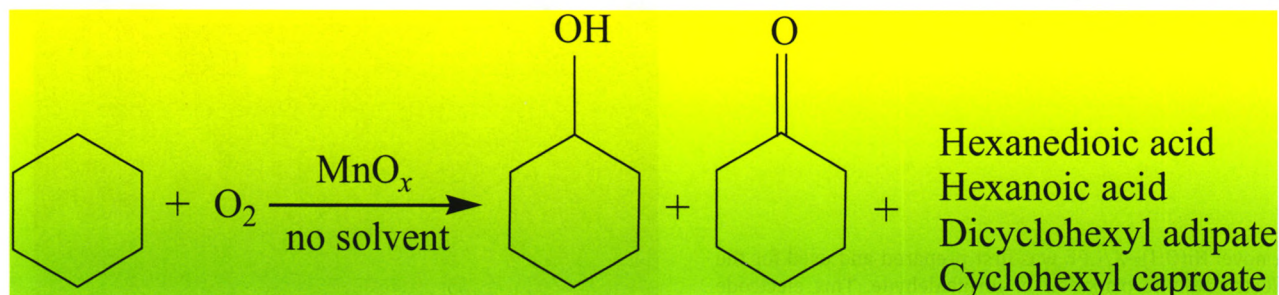
La(OH)<sub>3</sub> has been identified as an efficient additive for sorbitol hydrogenolysis over Ni/C with very little lactic acid formation. The pathways for 1,2-propylene glycol and lactic acid formation were competitive, with the hydrogenation to 1,2-propylene glycol dominating for La(OH)<sub>3</sub>.

*Chin. J. Catal.*, 2016, 37: 184–192 doi: 10.1016/S1872-2067(15)60983-4

### Solvent-free selective oxidation of cyclohexane with molecular oxygen over manganese oxides: Effect of the calcination temperature

Mingzhou Wu, Wangcheng Zhan\*, Yun Guo, Yunsong Wang, Yanglong Guo, Xueqing Gong, Li Wang, Guanzhong Lu\*

East China University of Science and Technology



MnO<sub>x</sub> exhibited high catalytic activity and excellent stability during cyclohexane oxidation with molecular oxygen. The MnO<sub>x</sub> phase state, as determined by the calcination temperature, had a crucial effect on its catalytic activity.

*Chin. J. Catal.*, 2016, 37: 193–198 doi: 10.1016/S1872-2067(15)60969-X

### Theoretical studies of CO oxidation with lattice oxygen on Co<sub>3</sub>O<sub>4</sub> surfaces

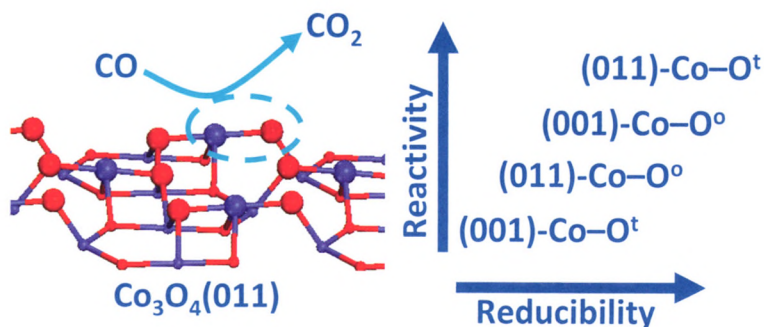
Yang-Gang Wang, Xiao-Feng Yang, Jun Li\*

Tsinghua University;

Dalian Institute of Chemical Physics,

Chinese Academy of Sciences

Theoretical studies reveal that the reactivity of CO oxidation on Co<sub>3</sub>O<sub>4</sub> nanocrystals exhibits significant crystal plane effects and structure sensitivity, and has a positive correlation with the surface reducibility.





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美国麦克仪器成立于1962年，是材料特性实验室分析仪器和服务的领导者。公司致力于生产分析粉末/固体材料物理化学性质的全自动化仪器，能够进行比表面积、孔容、孔径、孔径分布、密度、催化剂性质表征、催化剂活性测试以及粒度粒形分析，可广泛用于基础研究、产品开发及质量控制等各个阶段。

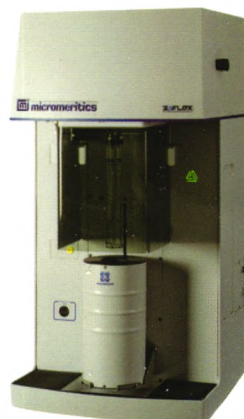
美国麦克仪器公司早在1979年就进入中国市场，是中美建交后最早进入中国市场的分析仪器。在为中国用户服务30多年后，于2011年3月在上海成立了麦克默瑞提克（上海）仪器有限公司，专业为中国市场提供美国麦克仪器公司的产品和服务。2014年8月，公司在上海成立大型分析服务中心，提供全面的分析测试服务。



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