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催化学报

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主编 李灿 张涛

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中国催化领域获奖人论文专刊

Special Issue for Excellent Research Work in Recognition of Scientists Who Are in Catalysis Field in China

CATALYSIS



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中国化学会催化学会会刊

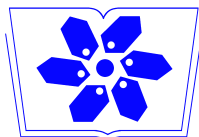
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中国催化领域获奖人论文专刊

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Special Issue for Excellent Research Work in Recognition of Scientists Who Are in Catalysis Field in China

**Chinese Journal of Catalysis
Graphical Contents**

Editorial

Chin. J. Catal., 2015, 36: 1405 doi: 10.1016/S1872-2067(15)60957-3

Preface to Special Issue for Excellent Research Work in Recognition of Scientists Who Are in Catalysis Field in China

Can Li, Tao Zhang
Dalian Institute of Chemical Physics, Chinese Academy of Sciences



Perspective

Chin. J. Catal., 2015, 36: 1406–1408 doi: 10.1016/S1872-2067(15)60907-X

Recent advances in new bio-catalytic systems for the production of transportation fuels and organic chemicals

Enze Min *
Research Institute of Petroleum Processing, SINOPEC



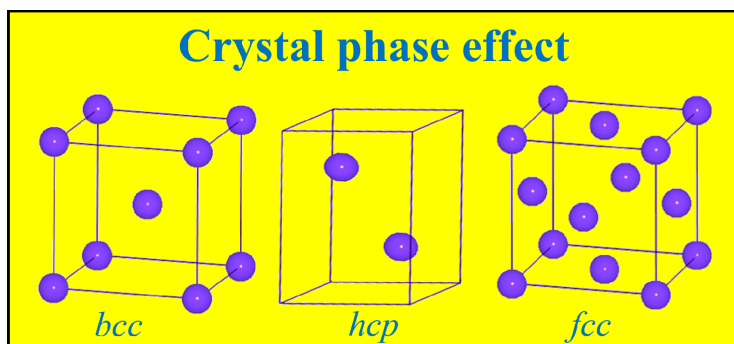
Recent progress in the characterization and application of bacteria as biocatalysts are reviewed and algae research in PetroAlgae Inc. and Algae Research Laboratory of Research Institute of Petroleum Processing Institute are discussed.

Chin. J. Catal., 2015, 36: 1409–1418 doi: 10.1016/S1872-2067(15)60932-9

Tuning the catalytic behavior of metal nanoparticles: The issue of the crystal phase

Shuang Liu, Yong Li*, Wenjie Shen*

Dalian Institute of Chemical Physics, Chinese Academy of Sciences



The impact of the crystal phase of metal nanoparticles on catalytic performance was reviewed. This is a new direction for nanocatalysts.

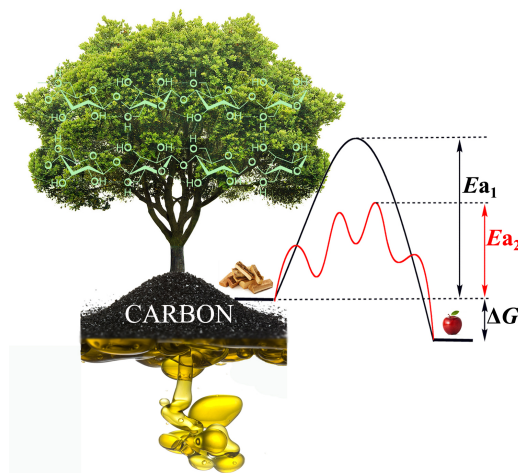
Minireview

Chin. J. Catal., 2015, 36: 1419–1427 doi: 10.1016/S1872-2067(15)60942-1

Porous carbon in catalytic transformation of cellulose

Xiaochen Zhao, Jinming Xu, Aiqin Wang, Tao Zhang*

Dalian Institute of Chemical Physics, Chinese Academy of Sciences



Porous carbon in catalytic cellulose transformation is reviewed in terms of the properties of carbon, carbon as solid acid in cellulose hydrolysis, and carbon as catalyst support in cellulose hydrolytic hydrogenation reaction.

Reviews

Chin. J. Catal., 2015, 36: 1428–1439 doi: 10.1016/S1872-2067(15)60885-3

Advances in visible-light-mediated oxidative coupling reactions

Guoting Zhang, Changliang Bian, Aiwen Lei*

Wuhan University

Photoredox catalyzed oxidative cross-coupling reactions



Nu = Nucleophiles, TM = Transition-metal,
O = Oxidants, PS = Photosensitizer

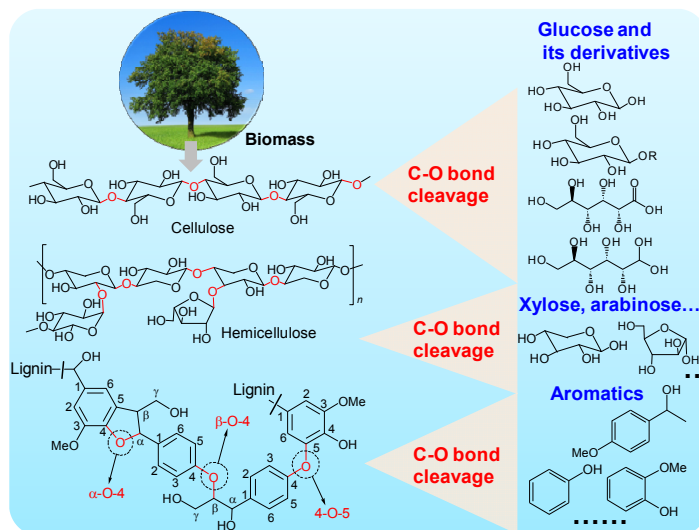
Recent advances in visible light photoredox-catalyzed cross-coupling reactions, including the visible light-photocatalyzed oxidation/coupling reaction of amines, oxidative decarboxylative coupling reactions and cross-coupling hydrogen evolution reactions have been reviewed together with several other reactions.

Chin. J. Catal., 2015, 36: 1440–1460 doi: 10.1016/S1872-2067(15)60923-8

Selective activation of the C–O bonds in lignocellulosic biomass for the efficient production of chemicals

Weiping Deng, Hongxi Zhang, Laiqi Xue, Qinghong Zhang,
Ye Wang*
Xiamen University; Changji University

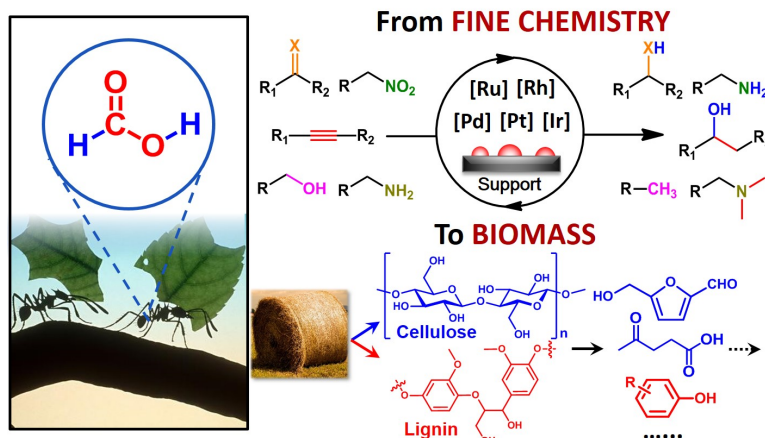
Recent advances in the development of new catalysts and novel strategies for the selective cleavage of the C–O bonds in cellulose, hemicellulose and lignin have been reviewed. Key factors and mechanisms for the formations of glucose, glucose derivatives, xylose, arabinose and aromatics have been discussed.



Chin. J. Catal., 2015, 36: 1461–1475 doi: 10.1016/S1872-2067(15)60861-0

Formic acid: A versatile renewable reagent for green and sustainable chemical synthesis

Xiang Liu, Shushuang Li, Yongmei Liu, Yong Cao*
Fudan University

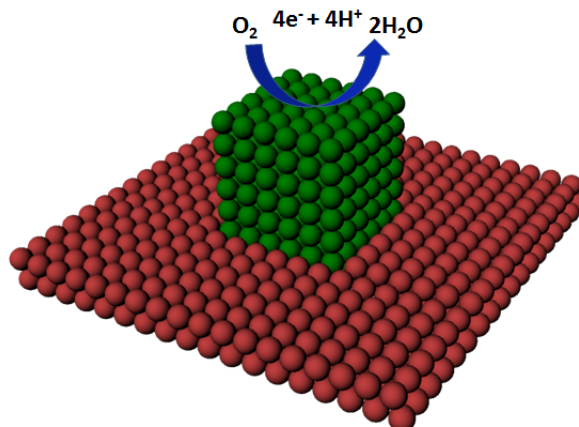


Despite its structural simplicity, formic acid is a versatile bio-renewable feedstock for opening up new chemical space to lead to the discovery of new sustainable reactions of unprecedented selectivity.

Chin. J. Catal., 2015, 36: 1476–1493 doi: 10.1016/S1872-2067(15)60911-1

Recent advances in surface and interface engineering for electrocatalysis

Chengming Wang*, Song Bai, Yujie Xiong*
University of Science and Technology of China



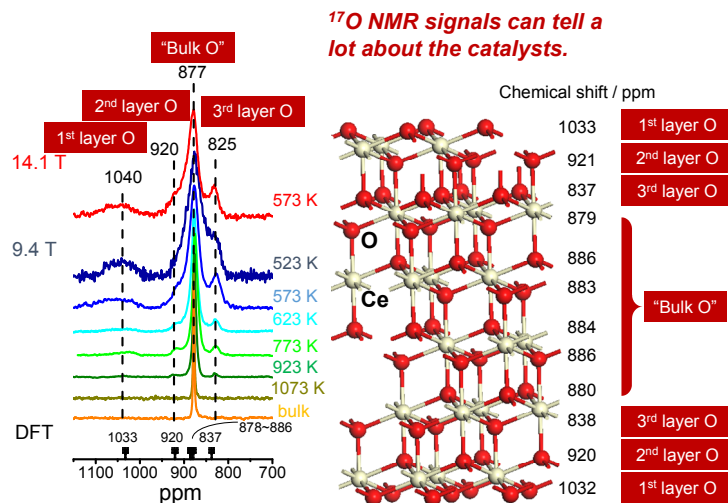
This review discusses how to rationally design and fabricate noble metal-based nanostructures as electrocatalysts towards low cost and high performance, from the viewpoint of surface and interface engineering.

Chin. J. Catal., 2015, 36: 1494–1504 doi: 10.1016/S1872-2067(15)60931-7

^{17}O solid-state NMR studies of oxygen-containing catalysts

Li Shen, Luming Peng*
Nanjing University

This review focuses on the use of ^{17}O solid-state NMR spectroscopy to study the structures of oxygen-containing catalysts and the interactions between the catalysts and adsorbed molecules.

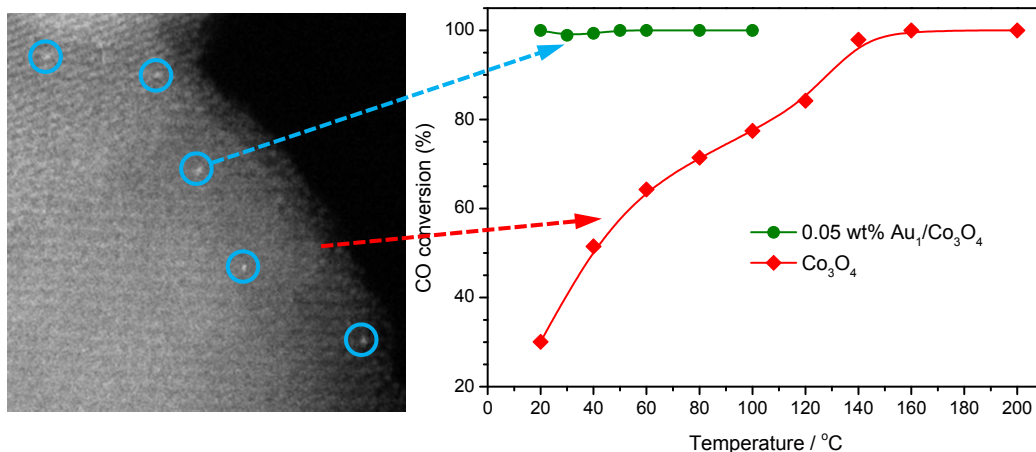


Communications

Chin. J. Catal., 2015, 36: 1505–1511 doi: 10.1016/S1872-2067(15)60889-0

Highly active $\text{Au}_1/\text{Co}_3\text{O}_4$ single-atom catalyst for CO oxidation at room temperature

Botao Qiao, Jian Lin, Aiqin Wang, Yang Chen, Tao Zhang*, Jingyue Liu*
Arizona State University, USA; Dalian Institute of Chemical Physics, Chinese Academy Sciences, China



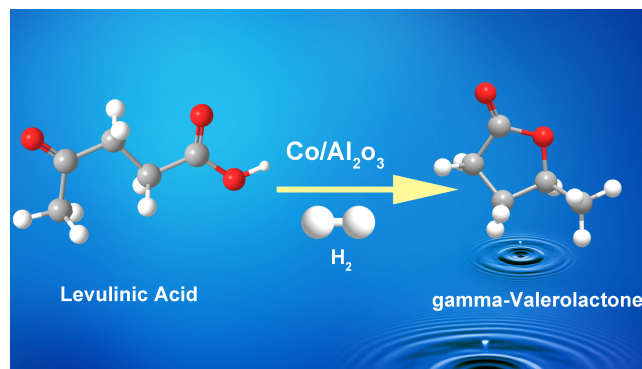
Total CO conversion at ambient temperatures was realized with extremely low loading of Au, demonstrating the high atomic efficiency and suggesting the potential application of gold single-atom catalysts.

Chin. J. Catal., 2015, 36: 1512–1518 doi: 10.1016/S1872-2067(15)60934-2

Magnetic $\text{Co}/\text{Al}_2\text{O}_3$ catalyst derived from hydrotalcite for hydrogenation of levulinic acid to γ -valerolactone

Xiangdong Long, Peng Sun, Zelong Li, Rui Lang, Chungu Xia,
Fuwei Li*
Lanzhou Institute of Chemical Physics, Chinese Academy of Science

A non-precious metal $\text{Co}/\text{Al}_2\text{O}_3$ catalyst prepared by reduction of a hydrotalcite precursor hydrogenated levulinic acid to γ -valerolactone with high efficiency and stability.



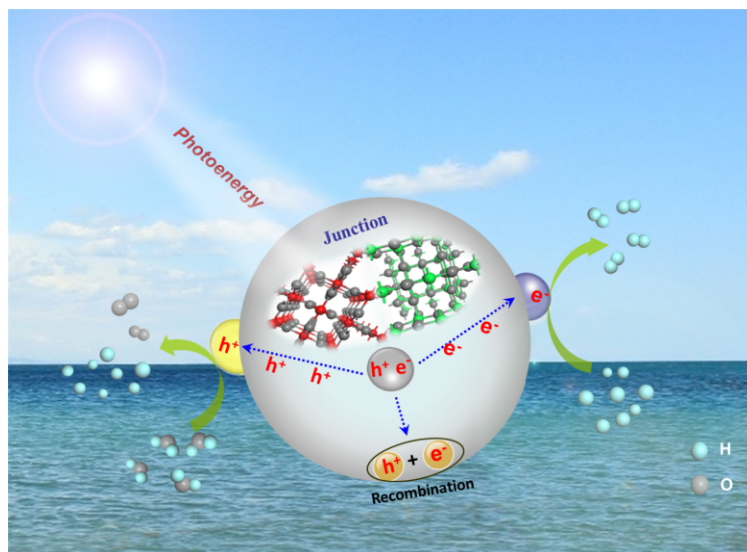
Feature article

Chin. J. Catal., 2015, 36: 1519–1527 doi: 10.1016/S1872-2067(15)60874-9

Charge separation promoted by phase junctions in photocatalysts

Yi Ma, Xiuli Wang, Can Li*
 Dalian Institute of Chemical Physics,
 Chinese Academy of Sciences;
 Dalian National Laboratory for Clean Energy

Charge separation is an important step in photocatalysis. Construction of phase junctions on semiconductors is a promising strategy to enhance the efficiency of charge separation, inspiring the design of future photocatalysts.



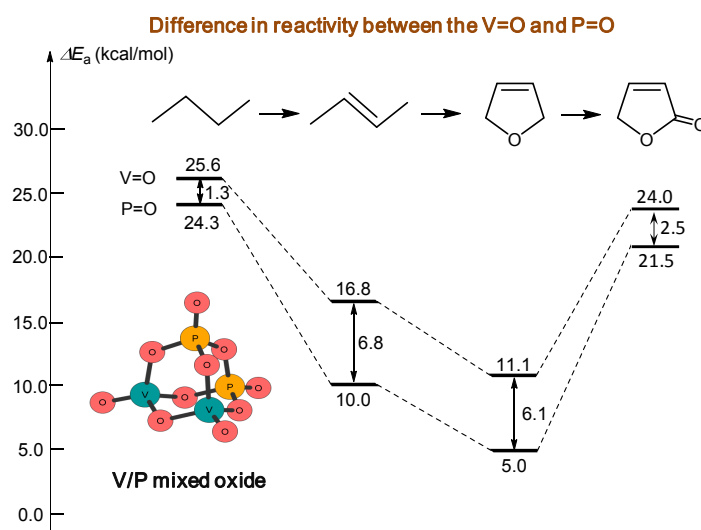
Articles

Chin. J. Catal., 2015, 36: 1528–1534 doi: 10.1016/S1872-2067(15)60905-6

DFT studies on the activation of C–H bonds on V/P mixed oxides

Gang Fu*, Ruming Yuan, Pei Wang, Huilin Wan*
 Xiamen University

DFT calculations on the activation of C–H bonds on V/P mixed oxides with a set of oxo clusters, $V_{4-x}P_xO_{10}$ ($x = 0-4$), showed that the PO–H was stronger than the VO–H as the proton was preferentially bonded to the P=O bond. For alkane activation, the P=O bond was not as active as expected because the activation requires a large reorganization energy. The P=O bond played a role in the activation of intermediates with a more acidic C–H bond, such as 2-butene and 2,5-dihydrofuran.

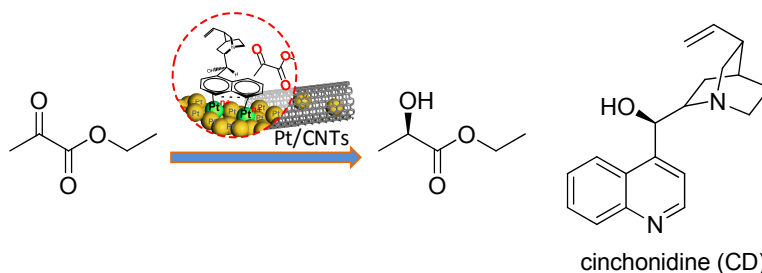


Chin. J. Catal., 2015, 36: 1535–1542 doi: 10.1016/S1872-2067(15)60831-2

Highly oxidized Pt species stabilized inside carbon nanotubes for asymmetric hydrogenation

Zaihong Guan, Shengmei Lu, Can Li*
 Dalian Institute of Chemical Physics,
 Chinese Academy of Sciences

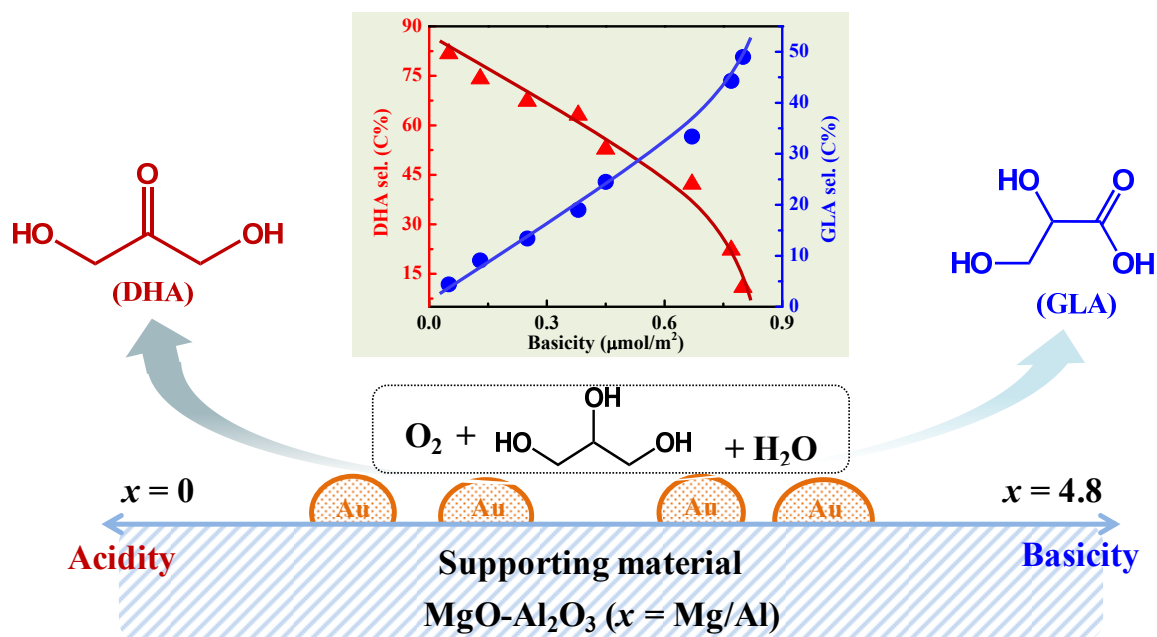
Pt⁴⁺ species stabilized inside carbon nanotubes facilitated the coordination of the chiral modifier and entrapment of the reactant to give high enantioselectivity in the asymmetric hydrogenation of α -ketoester.



Chin. J. Catal., 2015, 36: 1543–1551 doi: 10.1016/S1872-2067(15)60936-6

Acid-base property of the supporting material controls the selectivity of Au catalyst for glycerol oxidation in base-free water

Zifei Yuan, Zhankun Gao, Bo-Qing Xu*
Tsinghua University

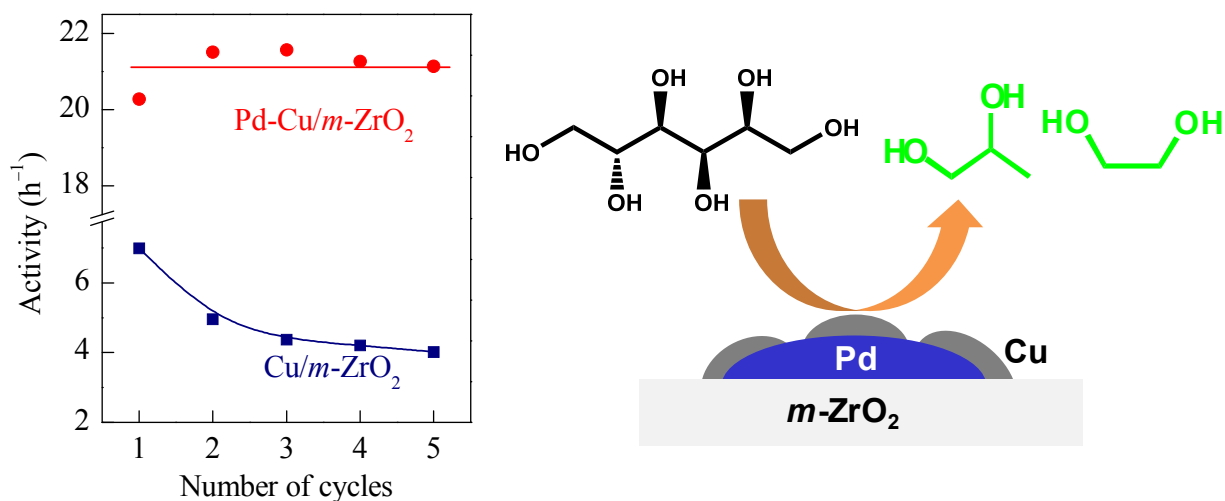


Increasing the basicity or lowering the acidity of the supporting MgO-Al₂O₃ material for nano Au catalyst results in continuously improved selectivity for GLA but lowered selectivity for DHA, disclosing for the first time a counter relationship in the production of DHA and GLA from Au-catalyzed aerobic GL oxidation in base-free water.

Chin. J. Catal., 2015, 36: 1552–1559 doi: 10.1016/S1872-2067(15)60892-0

Selective hydrogenolysis of sorbitol to ethylene glycol and propylene glycol on ZrO₂-supported bimetallic Pd-Cu catalysts

Yuqing Jia, Haichao Liu*
Peking University

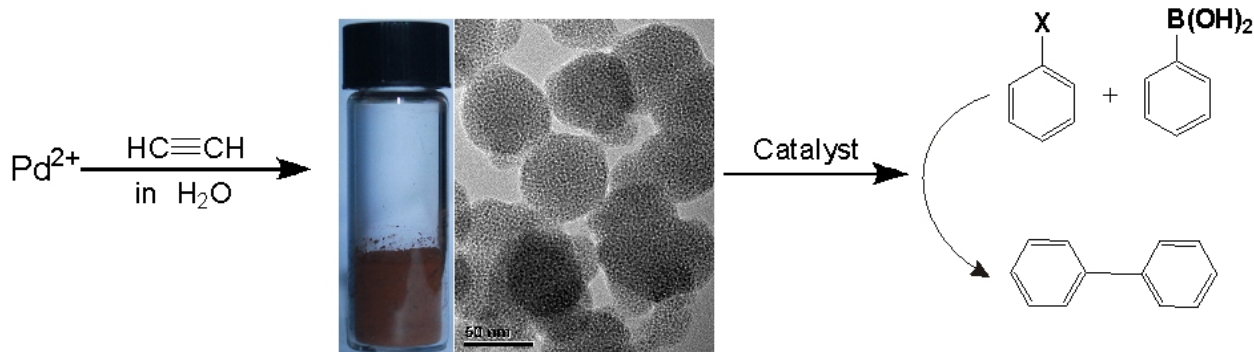


The presence of Pd largely improves the activity and stability of Cu/ZrO₂ catalyst in selective sorbitol hydrogenolysis to ethylene glycol and propylene glycol as a result of strong interaction between Pd and Cu.

Chin. J. Catal., 2015, 36: 1560–1572 doi: 10.1016/S1872-2067(15)60930-5

A nanoparticulate polyacetylene-supported Pd(II) catalyst combining the advantages of homogeneous and heterogeneous catalysts

Huan Li*, Guangxu Chen, Paul N. Duchesne, Peng Zhang, Yan Dai, Huayan Yang, Binghui Wu, Shengjie Liu, Chaofa Xu, Nanfeng Zheng*
Xiamen University, China; Shanxi University, China; Dalhousie University, Canada



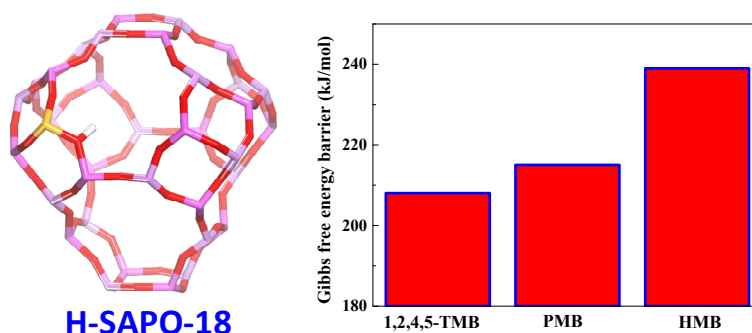
Reacting acetylene with an aqueous PdCl₄²⁻ solution allows the facile and readily scalable synthesis of a nanoparticulate polyacetylene-supported Pd(II) catalyst that exhibits excellent activity in aqueous Suzuki-Miyaura coupling reactions.

Chin. J. Catal., 2015, 36: 1573–1579 doi: 10.1016/S1872-2067(15)60891-9

Aromatic-based hydrocarbon pool mechanism for methanol-to-olefins conversion in H-SAPO-18: A van der Waals density functional study

Chuan-Ming Wang*, Yang-Dong Wang, Hong-Xing Liu, Guang Yang, Yu-Jue Du, Zai-Ku Xie*
SINOPEC Shanghai Research Institute of Petrochemical Technology

Hexamethylbenzene was theoretically proven to be the primary component of methylbenzenes in H-SAPO-18. The overall Gibbs free energy barriers of the aromatic-based cycle were greater than 200 kJ/mol at 673 K in H-SAPO-18.

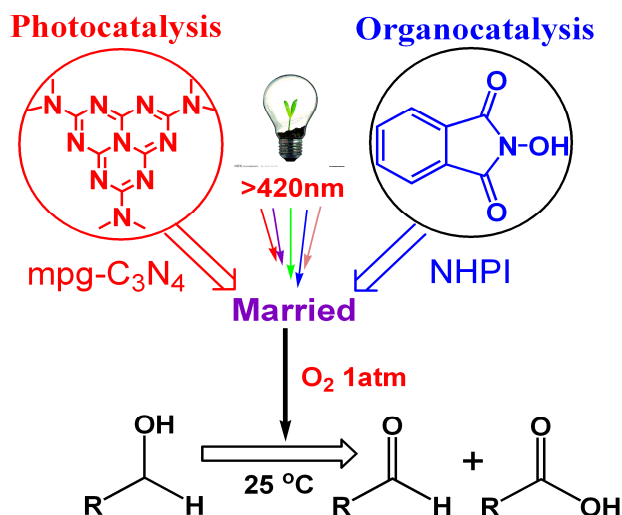


Chin. J. Catal., 2015, 36: 1580–1586 doi: 10.1016/S1872-2067(15)60871-3

Selective aerobic oxidation of alcohols by a mesoporous graphitic carbon nitride/*N*-hydroxyphthalimide system under visible-light illumination at room temperature

Pengfei Zhang, Jiang Deng, Jianyong Mao, Haoran Li, Yong Wang*
Zhejiang University

Mesoporous graphitic carbon nitride and *N*-hydroxyphthalimide were used to catalyze oxidation of aromatic alcohols by oxygen under visible-light irradiation. Visible light was harnessed as an efficient energy source to induce radical oxidation at room temperature.

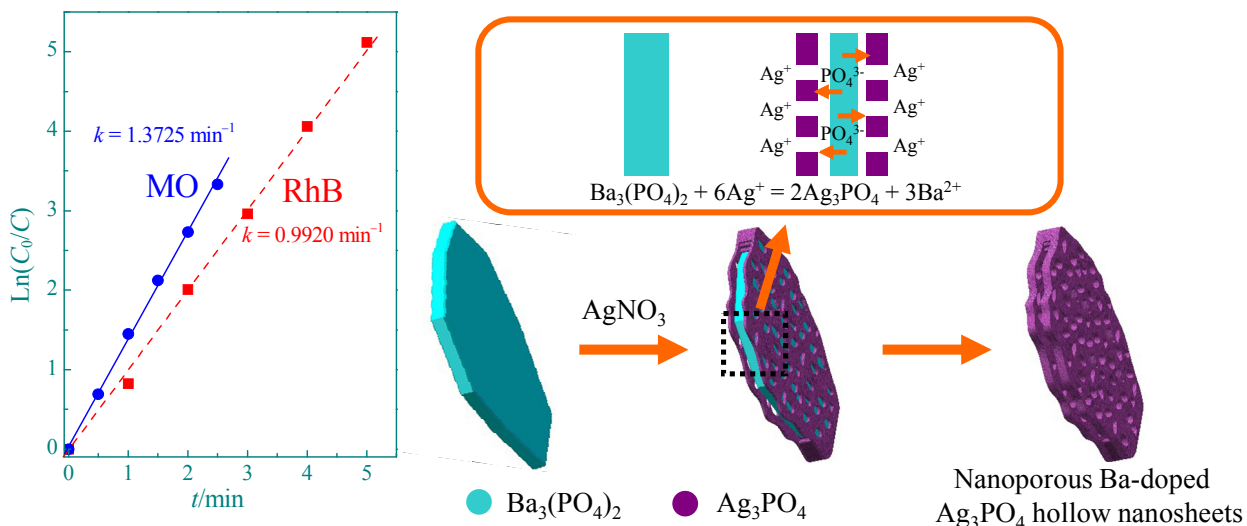


Chin. J. Catal., 2015, 36: 1587–1595 doi: 10.1016/S1872-2067(15)60938-X

Tunable photocatalytic selectivity and stability of Ba-doped Ag_3PO_4 hollow nanosheets

Hongchao Yu, Haixiao Kang, Zhengbo Jiao, Gongxuan Lü*, Yingpu Bi*

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



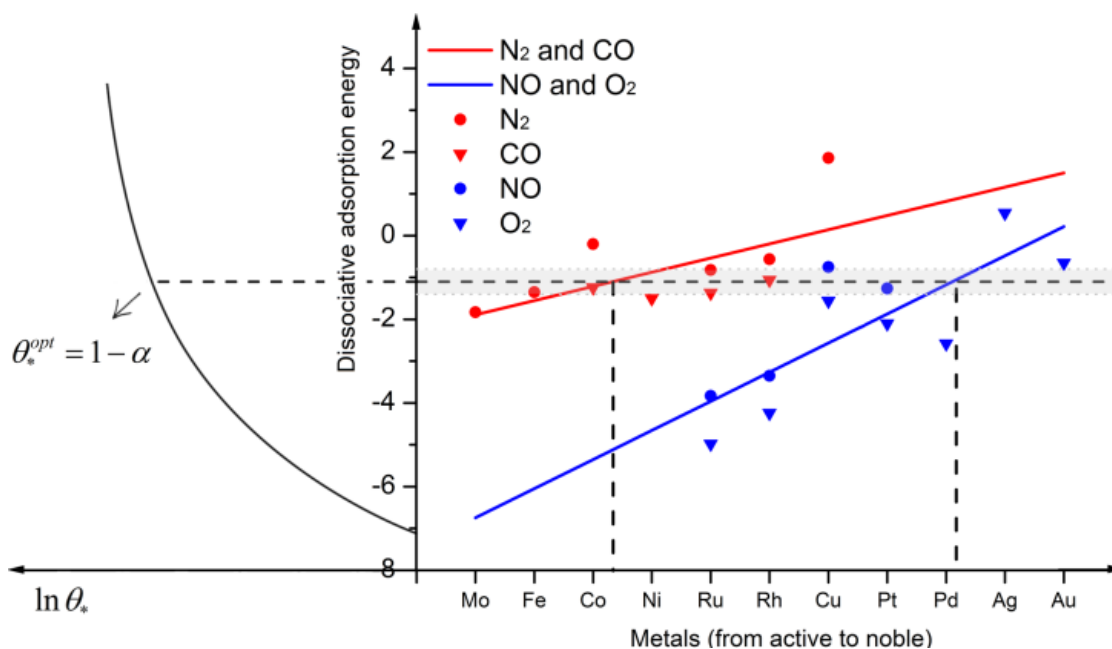
Ba-doped Ag_3PO_4 hollow nanosheets, which exhibit much higher photocatalytic performance and photoconversion efficiency than Ag_3PO_4 cubes and spherical particles under visible light irradiation, have been synthesized for the first time by a novel and simple cation exchange process using $\text{Ba}_3(\text{PO}_4)_2$. The products exhibit preferential decomposition of methyl orange (MO) in comparison to rhodamine B (RhB) and high photocatalytic stability under visible light irradiation.

Chin. J. Catal., 2015, 36: 1596–1605 doi: 10.1016/S1872-2067(15)60875-0

Catalyst screening: Refinement of the origin of the volcano curve and its implication in heterogeneous catalysis

Yu Mao, Jianfu Chen, Haifeng Wang*, P. Hu

East China University of Science and Technology, China; The Queen's University of Belfast, United Kingdom

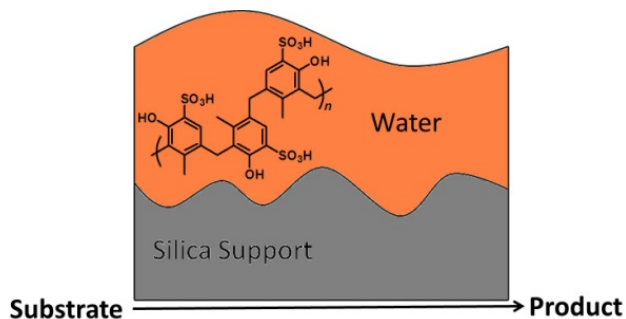


A self-consistent mathematic elucidation of the origin of volcano curve was conducted by a two-step kinetic model analytically, and some interesting guidelines for catalyst design are discussed during our derivation.

Chin. J. Catal., 2015, 36: 1606–1613 doi: 10.1016/S1872-2067(15)60910-X

Silica-supported poliresulenas a solidacid catalyst for organic reactions

Kexing Zeng, Zhipeng Huang, Jie Yang, Yanlong Gu*
Huazhong University of Science and Technology;
Lanzhou Institute of Chemical Physics,
Chinese Academy of Science



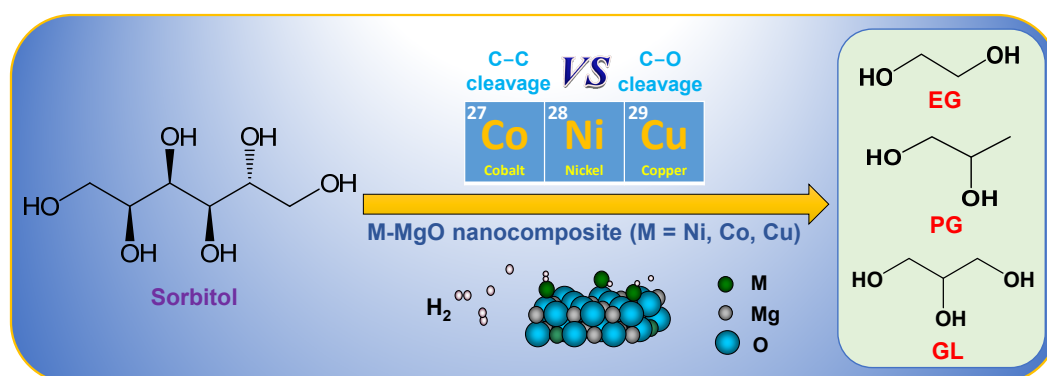
Salient features: low cost; easy to prepare; high efficiency; good recyclability and diverse applications in catalysis.

A new type of solid catalyst was prepared by coating a thin layer of poliresulen, a commercially available drug, onto the surface of silica. The obtained silica/poliresulen composite showed remarkable catalytic activity for various organic reactions.

Chin. J. Catal., 2015, 36: 1614–1622 doi: 10.1016/S1872-2067(15)60928-7

Sorbitol hydrogenolysis to glycerol and glycols over M-MgO (M = Ni, Co, Cu) nanocomposite: A comparative study of active metals

Xicheng Wang, Xiaoran Liu, Yue Xu, Gongming Peng, Quan Cao, Xindong Mu*
Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences;
University of Chinese Academy of Sciences; China University of Geosciences



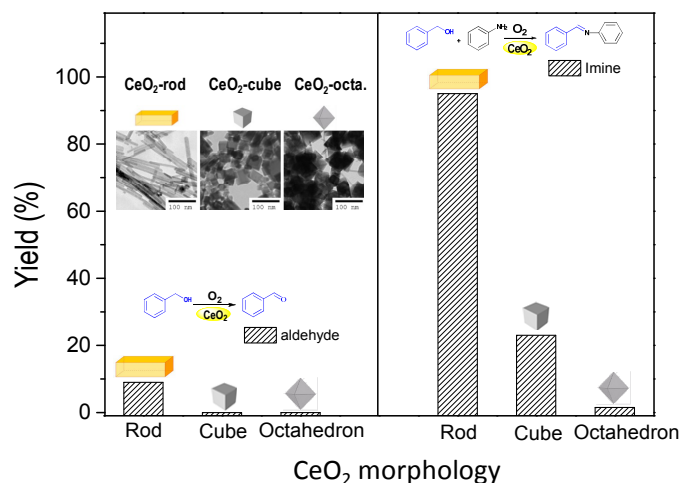
Ni-MgO, Co-MgO, and Cu-MgO bifunctional catalysts prepared by co-precipitation showed diverse activity and selectivity in sorbitol hydrogenolysis to glycerol (GL), 1,2-propylene glycol (PG), and ethylene glycol (EG) under various reaction conditions.

Chin. J. Catal., 2015, 36: 1623–1630 doi: 10.1016/S1872-2067(15)60869-5

An investigation of the effects of CeO₂ crystal planes on the aerobic oxidative synthesis of imines from alcohols and amines

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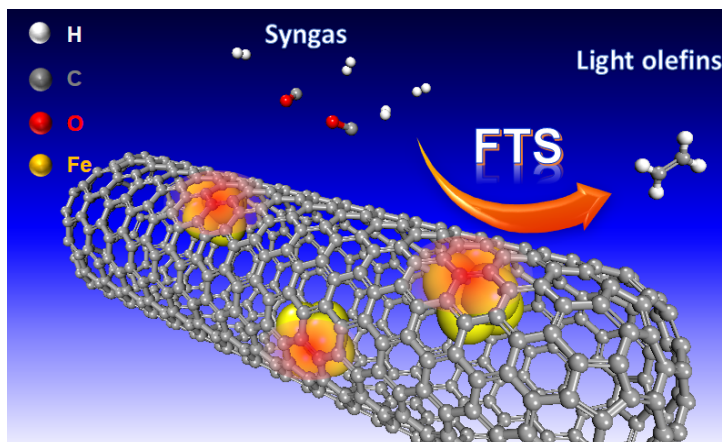
The crystal planes of CeO₂ affect its catalytic performance during the oxidative coupling of alcohols and amines to imines. The (110) plane, having the highest concentration of oxygen vacancies, exhibits the most pronounced redox ability.



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Iron catalyst encapsulated in carbon nanotubes for CO hydrogenation to light olefins

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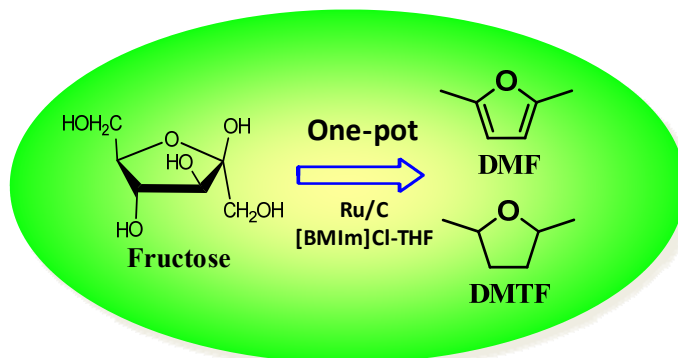


Pod-like carbon nanotubes with encapsulated iron particles were used as an efficient Fischer-Tropsch catalyst for light olefins, giving high selectivity of light olefins and good stability.

Chin. J. Catal., 2015, 36: 1638–1646 doi: 10.1016/S1872-2067(15)60927-5

Tailored one-pot production of furan-based fuels from fructose in an ionic liquid biphasic solvent system

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One-pot production of 2, 5-dimethylfuran and 2, 5-dihmethyltetrahydrofuran from fructose by optimizing the synergic effect of ionic liquid promoted Ru/C catalyst and solvent effect was reported.