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能源与环境新型催化剂专栏

Special Column on Novel Catalysts for Energy and Environmental Issues

Guest Editor: Atsushi Fukuoka

Heterogeneous
catalysis

CO_2 ,
 H_2O , N_2

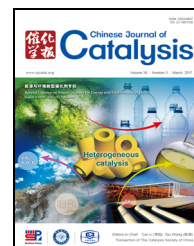
HC , NO_x ,
 CO , $\text{PM}_{2.5}$

CH_4



Editors-in-Chief Can Li (李灿) Tao Zhang (张涛)
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Chin. J. Catal., 2017, 38: 419 doi: 10.1016/S1872-2067(17)62803-1

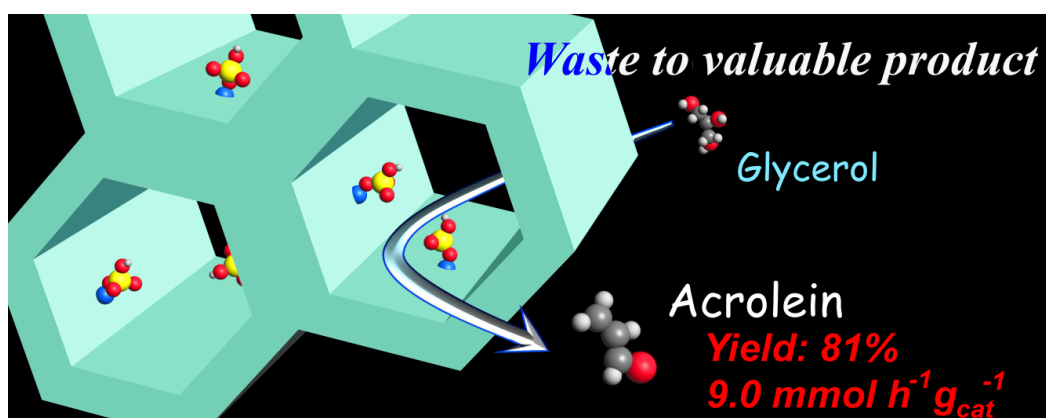
Preface to Special Column on Novel Catalysts for Energy and Environmental Issues

Atsushi Fukuoka (Guest Editor)
Hokkaido University, Japan

*Chin. J. Catal.*, 2017, 38: 420–425 doi: 10.1016/S1872-2067(16)62564-0 [Article]

Conversion of glycerol to acrolein by mesoporous sulfated zirconia-silica catalyst

Hirokazu Kobayashi, Shogo Ito, Kenji Hara, Atsushi Fukuoka*
Hokkaido University, Japan; Tokyo University of Technology, Japan

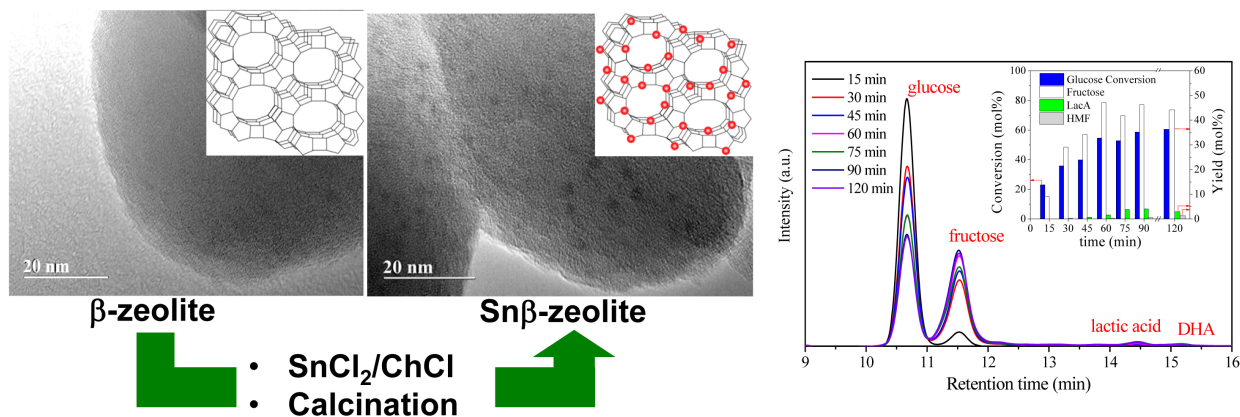


Mesoporous sulfated zirconia-silica catalyst bearing only Brønsted acid sites selectively converts glycerol to acrolein in gas phase at 523 K. Mild acid strength, absence of Lewis acid sites and large pore benefit the reaction.

Chin. J. Catal., 2017, 38: 426–433 doi: 10.1016/S1872-2067(17)62754-2 [Article]

Preparation of Sn- β -zeolite via immobilization of Sn/choline chloride complex for glucose-fructose isomerization reaction

Asep Bayu, Surachai Karnjanakom, Katsuki Kusakabe, Abuliti Abudula, Guoqing Guan *
Hirosaki University; North Japan Research Institute for Sustainable Energy (NJRISE)



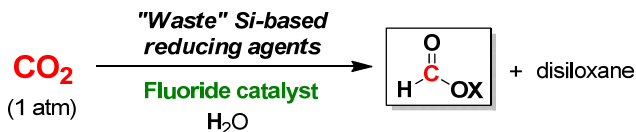
Sn- β -zeolite prepared by immobilization of SnCl₂/ChCl followed by calcination showed good activity and high selectivity for glucose-fructose isomerization.

Chin. J. Catal., 2017, 38: 434–439 doi: 10.1016/S1872-2067(17)62800-6 [Article]

Reductive transformation of CO₂: Fluoride-catalyzed reactions with waste silicon-based reducing agents

Ken Motokura, Masaki Naijo, Sho Yamaguchi, Akimitsu Miyaji,
 Toshihide Baba *
Tokyo Institute of Technology, Japan

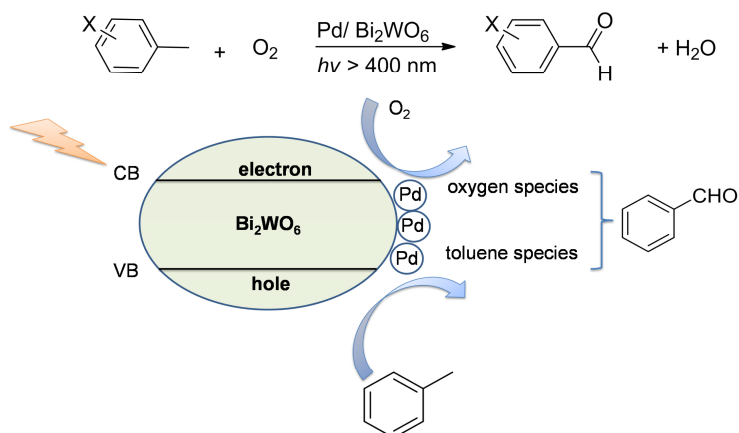
Fluoride-catalyzed transformation of CO₂ to formic acid was examined using “waste” Si-based materials, disilane and metallic Si powder, as reducing agents.



Chin. J. Catal., 2017, 38: 440–446 doi: 10.1016/S1872-2067(17)62757-8 [Article]

Photocatalytic aerobic oxidation of toluene and its derivatives to aldehydes on Pd/Bi₂WO₆

Bo Yuan, Bao Zhang, Zhiliang Wang, Shengmei Lu, Jun Li, Yan Liu *, Can Li *
Dalian Institute of Chemical Physics, Chinese Academy of Sciences; University of Chinese Academy of Sciences



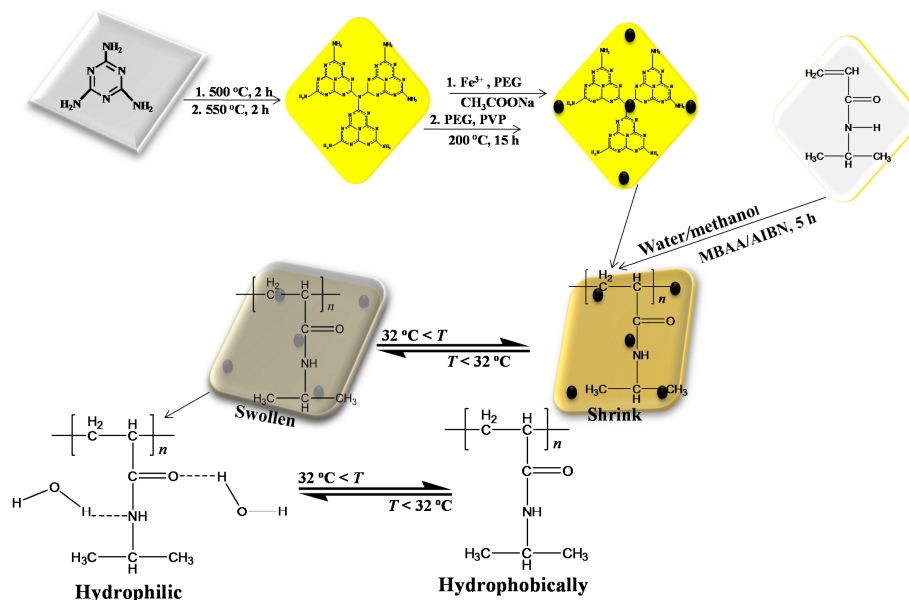
Flower-like Bi₂WO₆ loaded with Pd nanoparticles as cocatalyst is a highly efficient photocatalyst in the catalytic oxidation of toluene and its derivatives using O₂ as the oxidant.

Articles

Chin. J. Catal., 2017, 38: 447–457 doi: 10.1016/S1872-2067(16)62591-3

Preparation and characterization of ternary magnetic g-C₃N₄ composite photocatalysts for removal of tetracycline under visible light

Xu Tang, Liang Ni*, Juan Han*, Yun Wang
Jiangsu University

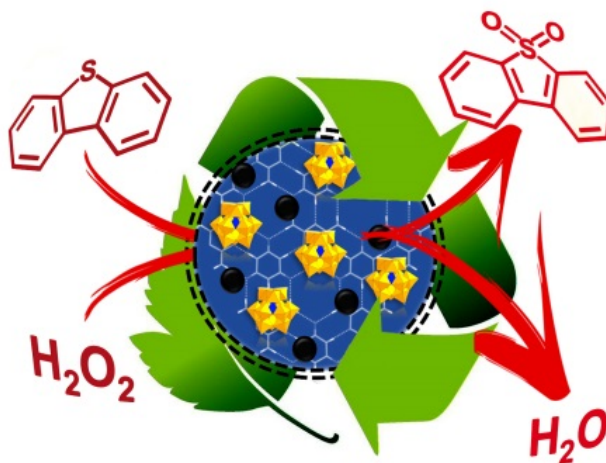


A stable and magnetic PNIPAM/Fe₃O₄/g-C₃N₄ photocatalyst was fabricated by a hydrothermal method and thermal photoinitiating technology. Its activity could be modulated by temperature, showing promise for use in intelligent catalysis.

Chin. J. Catal., 2017, 38: 458–468 doi: 10.1016/S1872-2067(16)62548-2

Synthesis and characterization of PMoV/Fe₃O₄/g-C₃N₄ from melamine: An industrial green nanocatalyst for deep oxidative desulfurization

Ezzat Rafiee*, Maryam Khodayari
Razi University, Iran

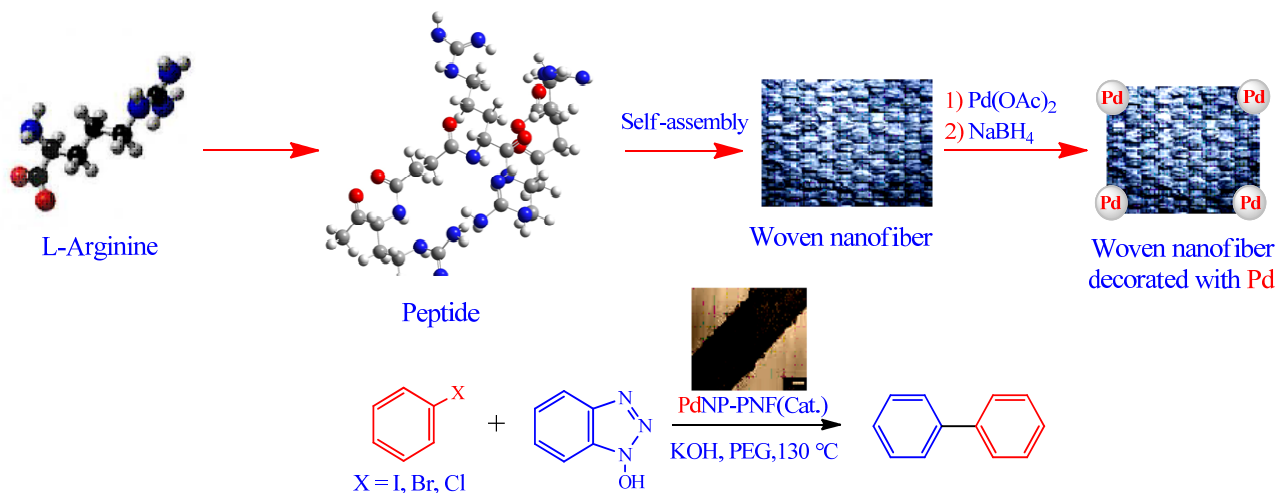


H₅PMo₁₀V₂O₄₀ was supported on a Fe₃O₄/g-C₃N₄ magnetic support to produce a PMoV/Fe₃O₄/g-C₃N₄ nanocomposite. This catalyst was characterized and used for selective oxidative desulfurization of sulfides. Oxidation of dibenzothiophene-containing model oils and real oil was also studied under optimized reaction conditions. Moreover, the effects of various nitrogen-containing compounds and aromatic hydrocarbons on dibenzothiophene removal were investigated.

Chin. J. Catal., 2017, 38: 469–474 doi: 10.1016/S1872-2067(17)62586-X

Synthesis of biaryls using palladium nanoparticles immobilized on peptide nanofibers as catalyst and hydroxybenzotriazole as novel phenylating reagent

Arash Ghorbani-Choghamarani *, Zahra Taherinia
Ilam University, Iran

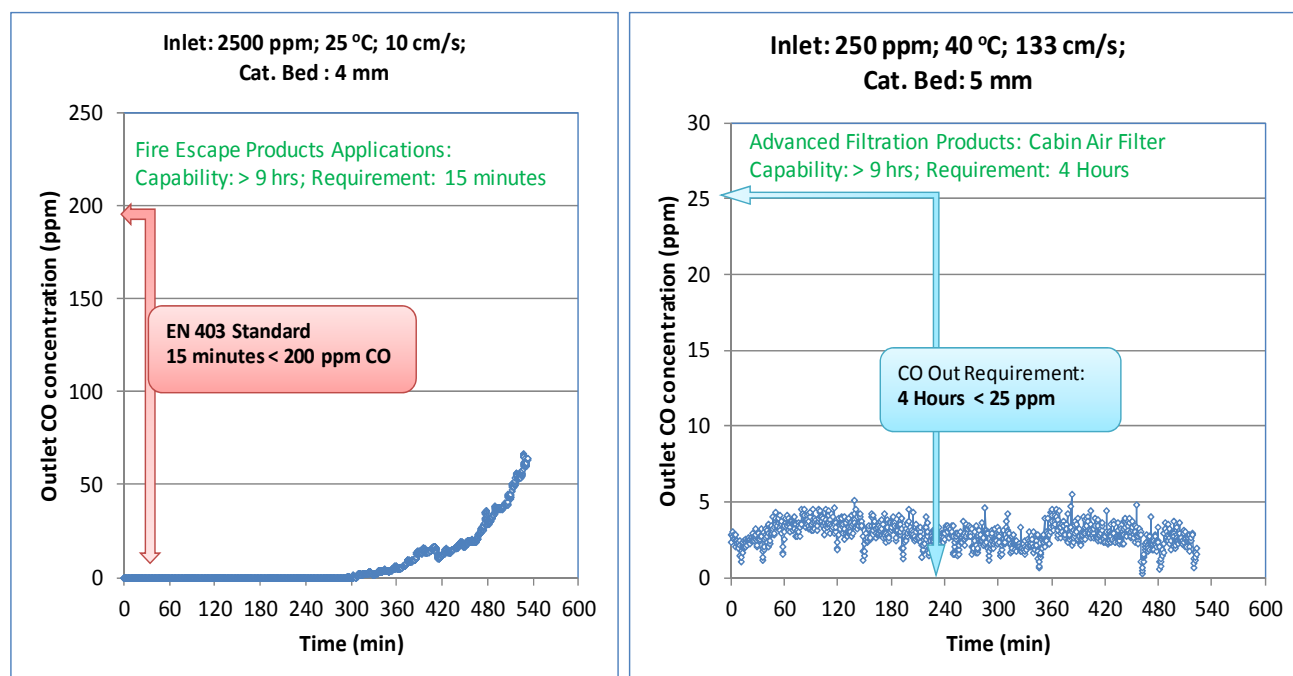


Pd nanoparticles supported on peptide nanofibers (PdNP-PNF) represent unique catalytic activity for the phenylation of aryl halides by hydroxybenzotriazole as new phenylating agent under green reaction conditions.

Chin. J. Catal., 2017, 38: 475–488 doi: 10.1016/S1872-2067(17)62749-9

Pt-CeO₂/SiO₂ catalyst for CO oxidation in humid air at ambient temperature

Shirish S. Punde *, Bruce J. Tatarchuk
Auburn University, USA

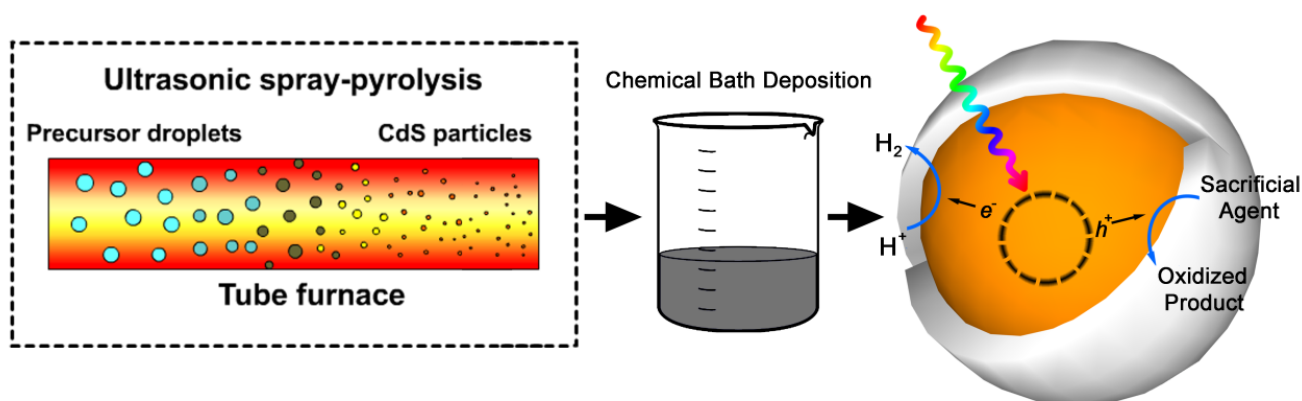


Highly active Pt-Ceria/silica catalyst for low temperature CO oxidation in humid air has been developed. Effect of catalyst preparation variables was studied and the activity maintenance of the catalyst for different applications was investigated.

Chin. J. Catal., 2017, 38: 489–497 doi: 10.1016/S1872-2067(17)62769-4

Surface treatment effect on the photocatalytic hydrogen generation of CdS/ZnS core-shell microstructures

Jinzhan Su*, Tao Zhang, Lu Wang, Jinwen Shi, Yubin Chen
Xi'an Jiaotong University

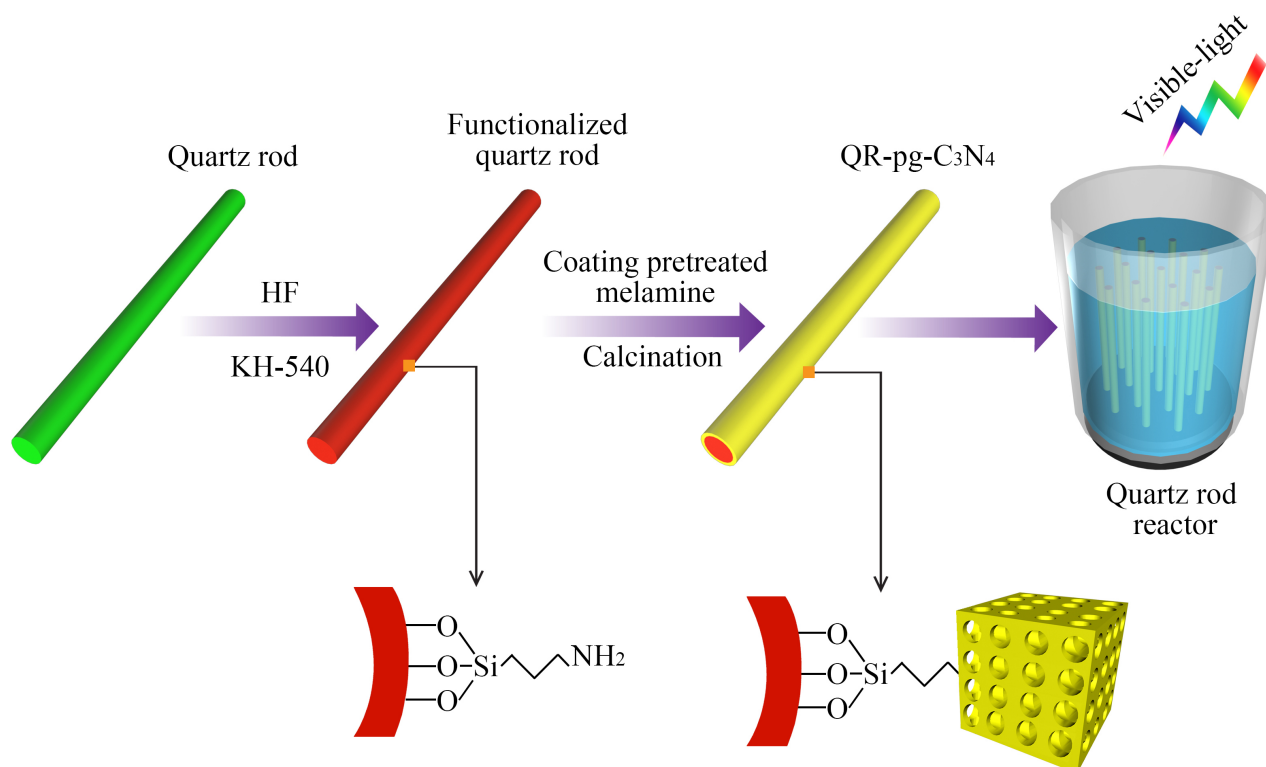


CdS/ZnS core-shell heteromicrostructures with optimized amount of ZnS loaded as shell were synthesized by a simple two-step method. Surface treatments further improve their photocatalytic activities and stabilities. This method demonstrates a promising low-cost synthesis of core/shell microstructures.

Chin. J. Catal., 2017, 38: 498–508 doi: 10.1016/S1872-2067(17)62763-3

Fabrication of porous g-C₃N₄ and supported porous g-C₃N₄ by a simple precursor pretreatment strategy and their efficient visible-light photocatalytic activity

Zhenxing Zeng, Kexin Li*, Kai Wei, Yuhua Dai*, Liushui Yan, Huiqin Guo, Xubiao Luo
NanChang Hangkong University



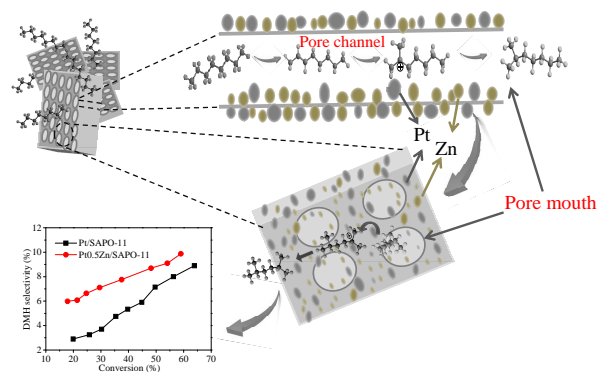
Porous g-C₃N₄ and supported porous g-C₃N₄ were fabricated for the first time by a simple precursor pretreatment strategy and applied in organic-pollutant degradation, hydrogen evolution, and simultaneous hydrogen evolution with organic-pollutant degradation under visible-light irradiation.

Chin. J. Catal., 2017, 38: 509–517 doi: 10.1016/S1872-2067(17)62755-4

Zinc-modified Pt/SAPO-11 for improving the isomerization selectivity to dibranched alkanes

Zhichao Yang, Yunqi Liu*, Jinchong Zhao, Jianxia Gou, Kaian Sun, Chenguang Liu
China University of Petroleum (East China)

Zinc-modified Pt/SAPO-11 catalysts were prepared, characterized, and assessed in the hydroisomerization of *n*-octane. The dimethylhexane selectivities of the modified catalysts were higher than that of unmodified Pt/SAPO-11.

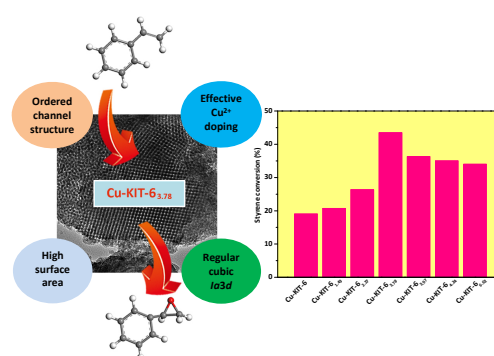


Chin. J. Catal., 2017, 38: 518–528 doi: 10.1016/S1872-2067(17)62767-0

One-pot synthesis of ordered mesoporous Cu-KIT-6 and its improved catalytic behavior for the epoxidation of styrene: Effects of the pH value of the initial gel

Baitao Li*, Xin Luo, Jing Huang, Xiujun Wang, Zhenxing Liang*
South China University of Technology

Using a synthesis solution at a pH of 3.78, approximately 4.6% Cu²⁺ was incorporated into the framework of a KIT-6 support in the form of –Cu–O–Si– groups. Enhanced selectivity for styrene oxide was obtained over this Cu-KIT-6_{3.78} catalyst.



Chin. J. Catal., 2017, 38: 529–536 doi: 10.1016/S1872-2067(17)62750-5

PtSnNa/SUZ-4: An efficient catalyst for propane dehydrogenation

Hualan Zhou, Jingjing Gong, Bolian Xu, Shengcai Deng, Yuanhua Ding, Lei Yu*, Yining Fan*
Nanjing University; Yangzhou University



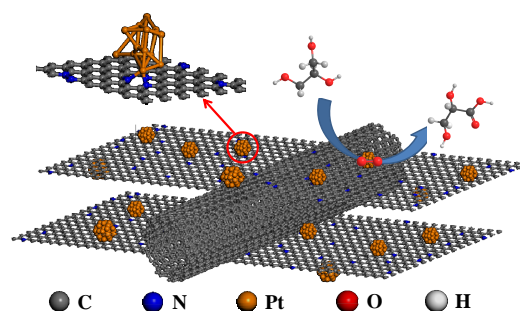
The new catalyst PtSnNa/SUZ-4 was found to be superior to PtSnNa/ZSM-5 during propane dehydrogenation, at least partly because Pt particles on the PtSnNa/SUZ-4 are primarily dispersed over its external surface and so are not deactivated by carbon deposition.

Chin. J. Catal., 2017, 38: 537–544 doi: 10.1016/S1872-2067(17)62761-X

Selective glycerol oxidation using platinum nanoparticles supported on multi-walled carbon nanotubes and nitrogen-doped graphene hybrid

Mengyuan Zhang, Yanyan Sun, Juanjuan Shi, Wensheng Ning, Zhaoyin Hou*
Zhejiang University; Zhejiang University of Technology

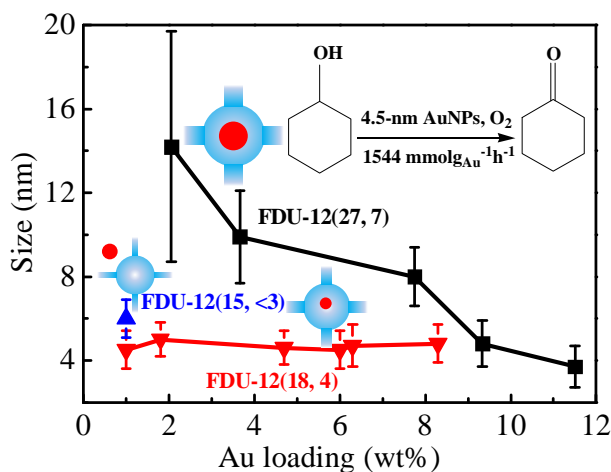
Nitrogen-doped graphene was prepared by direct pyrolysis of melamine using MWCNTs as a scaffold. This composite catalyst support improved Pt dispersion and selective oxidation of glycerol to glyceric acid in a base-free aqueous solution.



Chin. J. Catal., 2017, 38: 545–553 doi: 10.1016/S1872-2067(17)62762-1

Gold nanoparticle stabilization within tailored cubic mesoporous silica: Optimizing alcohol oxidation activity

Wei Hong, Xiaoqing Yan, Renhong Li, Jie Fan*
Zhejiang University; Zhejiang Sci-Tech University

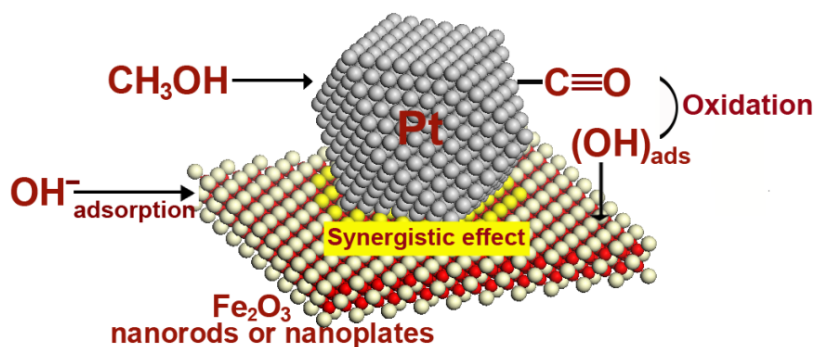


FDU-12 having a sub-5-nm entrance size stabilizes gold nanoparticles over a controlled narrow size distribution across a wide loading concentration during heat-treatment, thus optimizing their catalytic properties in the gas-phase selective oxidation of cyclohexanol.

Chin. J. Catal., 2017, 38: 554–563 doi: 10.1016/S1872-2067(17)62773-6

Promoting effects of Fe₂O₃ to Pt electrocatalysts toward methanol oxidation reaction in alkaline electrolyte

Guihua Song, Haifang Yang, Yafei Sun, Jingyi Wang, Weidong Qu, Qiang Zhang, Lingjuan Ma, Yuanyuan Feng*
Qufu Normal University

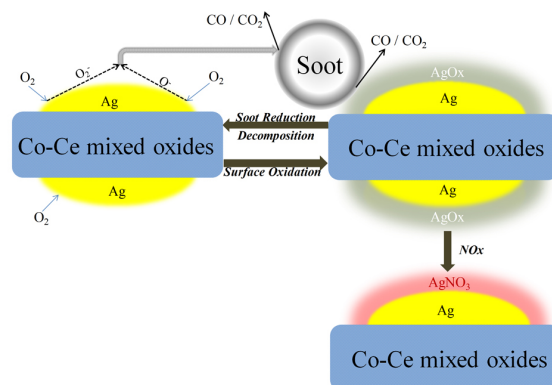


The presence of Fe₂O₃ can promote the kinetic processes of MOR on Pt, and the promoting effect is related to the morphology of Fe₂O₃ promoter. The Fe₂O₃ nanorods show higher promoting effects than Fe₂O₃ nanoplates.

Chin. J. Catal., 2017, 38: 564–573 doi: 10.1016/S1872-2067(17)62758-X

Catalytic performance of Ag/Co-Ce composite oxides during soot combustion in O₂ and NO_x: Insights into the effects of silver

Guchu Zou, Zeyun Fan, Xin Yao, Yi Zhang, Zhixiang Zhang,
Mingxia Chen, Wenfeng Shangguan *
Shanghai Jiao Tong University;
Shanghai Institute of Ceramics, Chinese Academy of Sciences

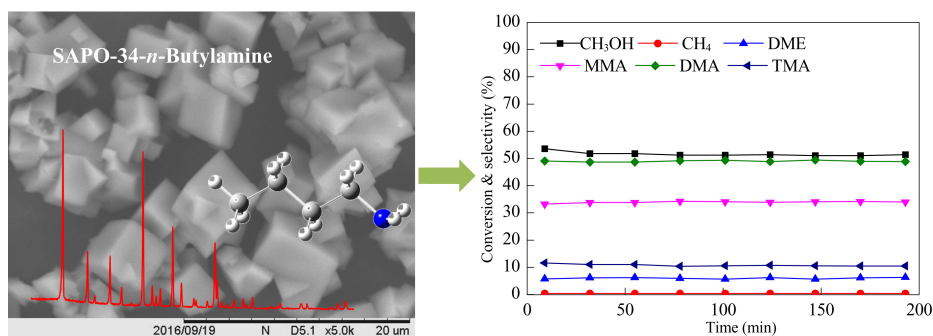


The schematic diagram shows soot oxidation over Ag/Co-Ce catalysts, including self-regeneration under an O₂ atmosphere and the transformation of Ag₂O into AgNO₃ under NO + O₂.

Chin. J. Catal., 2017, 38: 574–582 doi: 10.1016/S1872-2067(17)62775-X

SAPO-34 synthesized with *n*-butylamine as a template and its catalytic application in the methanol amination reaction

Yuyan Qiao, Pengfei Wu, Xiao Xiang, Miao Yang, Quanyi Wang, Peng Tian *, Zhongmin Liu *
Dalian Institute of Chemical Physics, Chinese Academy of Sciences; University of Chinese Academy of Sciences

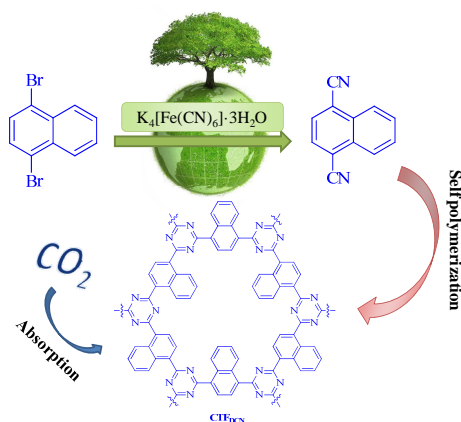


n-Butylamine was used as a template to synthesize SAPO-34 with excellent shape-selective catalytic performance in the methanol amination reaction.

Chin. J. Catal., 2017, 38: 583–588 doi: 10.1016/S1872-2067(17)62771-2

Environmentally benign and economic synthesis of covalent triazine-based frameworks

Ling Zhang, Xue Liu, Rui-Xia Yang, Nian-Yu Huang, Wei-Qiao Deng *
China Three Gorges University; Dalian Institute of Chemical Physics, Chinese Academy of Sciences

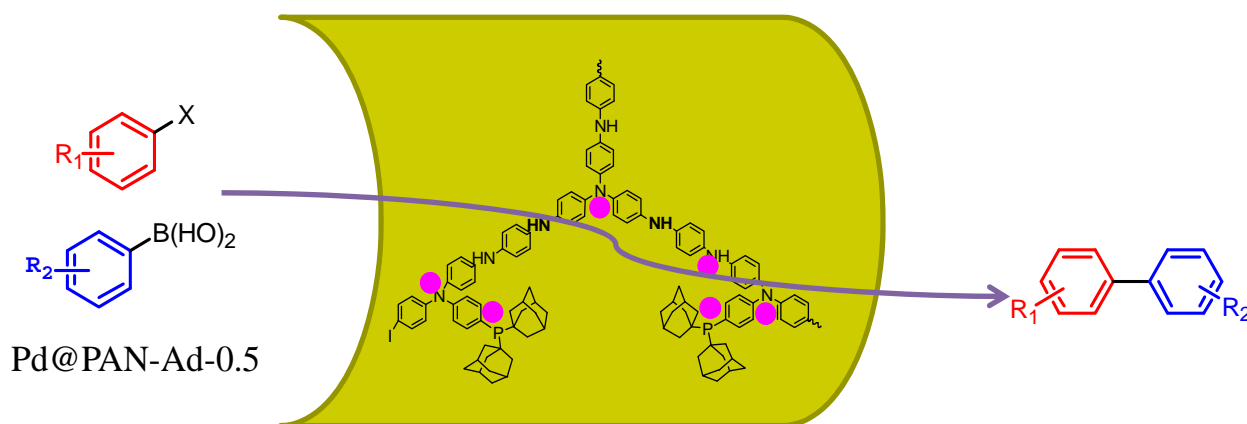


Covalent triazine-based frameworks were prepared from the corresponding dicyano monomers by cyanation of aryl bromides with nontoxic potassium hexacyanoferrate(II) in the presence of palladium acetate.

Chin. J. Catal., 2017, 38: 589–596 doi: 10.1016/S1872-2067(17)62772-4

Palladium nanoparticles in cross-linked polyaniline as highly efficient catalysts for Suzuki-Miyaura reactions

Haipeng Fan, Zhengliang Qi, Dejun Sui, Fei Mao, Rizhi Chen, Jun Huang*
Nanjing Tech University



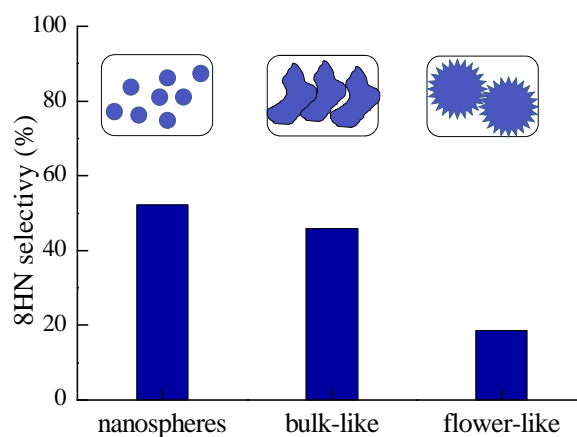
Palladium nanoparticles supported on cross-linked polyaniline with bulky phosphorus-based ligands were developed as highly efficient catalysts for the Suzuki-Miyaura reaction of aryl chlorides and bromides with phenylboronic acids.

Chin. J. Catal., 2017, 38: 597–606 doi: 10.1016/S1872-2067(17)62779-7

Surfactant-assisted hydrothermally synthesized MoS₂ samples with controllable morphologies and structures for anthracene hydrogenation

Min Li, Donge Wang, Jiahe Li, Zhendong Pan, Huaijun Ma, Yuxia Jiang,
Wei Qu, Lin Wang, Zhijian Tian*, Anhui Lu
Dalian University of Technology;
Dalian Institute of Chemical Physics, Chinese Academy of Sciences;
University of Chinese Academy of Sciences

MoS₂ particles with controllable morphologies and structures were synthesized with various surfactants. Mono-dispersed spherical MoS₂ catalysts exhibited higher catalytic activities for anthracene hydrogenation, which can be ascribed to its highly exposed active edges.

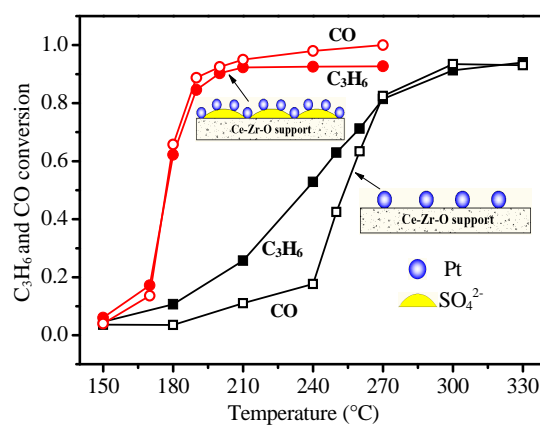


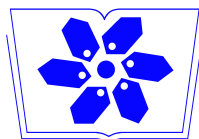
Chin. J. Catal., 2017, 38: 607–616 doi: 10.1016/S1872-2067(17)62781-5

Propene and CO oxidation on Pt/Ce-Zr-SO₄²⁻ diesel oxidation catalysts: Effect of sulfate on activity and stability

Lei Gu, Xiao Chen, Ying Zhou, Qiulian Zhu, Haifeng Huang*,
Hanfeng Lu*
Zhejiang University of Technology

Support sulfation improved catalytic activity and sulfur resistance of Pt/Ce-Zr-SO₄²⁻ catalyst significantly, as their Pt dispersity and total acidity increased, and new active sites (Pt^{δ+}-(SO₄²⁻)^{δ-} couples) were generated.





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