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# 催化学报

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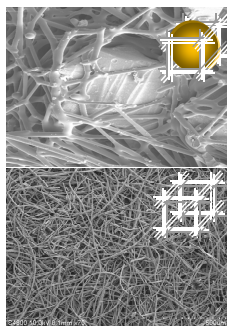
*Chin. J. Catal.*, 2010, 31: 717–724 doi: 10.3724/SP.J.1088.2010.00146

#### Advances in Research on Novel Microfibrous Structured Catalytic/Adsorbent Packings

LING Min, ZHAO Guofeng, CAO Fahai, LU Yong\*

*East China Normal University; East China University of Science and Technology*

##### Microfibrous structure



##### Beneficial properties

- Unique form factors
- High contacting efficiency
- Enhanced mass/heat transfer
- Low pressure drop compared to randomly packed beds
- Uniform residence time
- Avoiding separation issues (e.g., suspension reactors)
- Facilitation of scale-up
- Ease of functionalization

##### Research practices

- Miniature H<sub>2</sub> generation and cleanup
- High efficiency air filtration
- Electrochemical energy storage
- Selective oxidation of alcohols
- F-T synthesis
- ...

##### Process Intensification

New-type microfibrous structured packings demonstrate a beneficial manner different from traditional contacting schemes such as packed beds. The latest progress in their use toward process intensification has been reviewed.

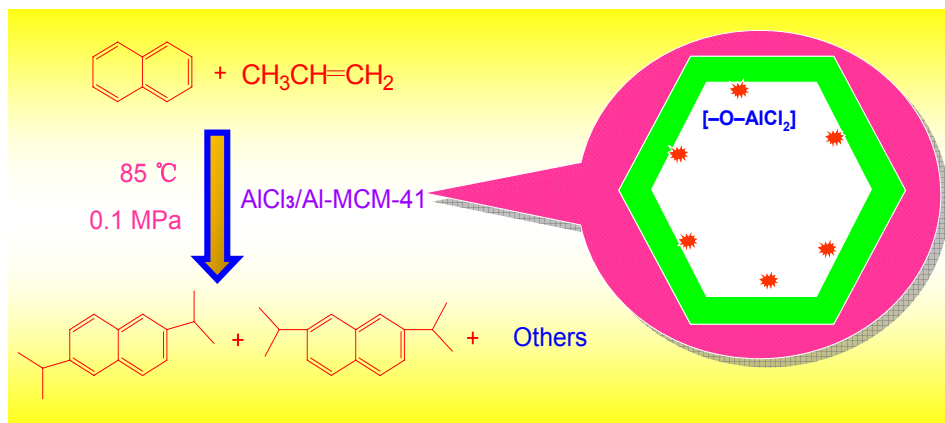
### Communication

*Chin. J. Catal.*, 2010, 31: 725–728 doi: 10.1016/S1872-2067(09)60080-2

#### Alkylation of Naphthalene with Propylene Catalyzed by Aluminum Chloride Immobilized on Al-MCM-41

TANG Hua, JI Min\*, WANG Xinkui, HE Min, CAI Tianxi

*Dalian University of Technology*



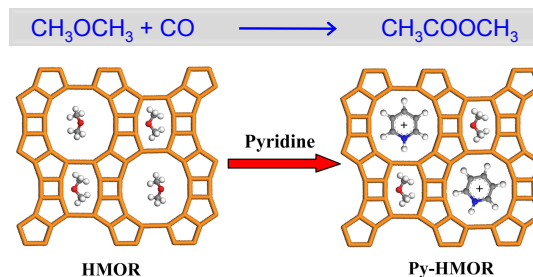
Alkylation of naphthalene with propylene can be carried out over AlCl<sub>3</sub>/Al-MCM-41 catalysts in a slurry bubble column reactor at 85 °C. The pore diameter influences the conversion of naphthalene and selectivity for 2,6-diisopropylnaphthalene.

*Chin. J. Catal.*, 2010, 31: 729–738 doi: 10.1016/S1872-2067(09)60081-4

### Stability Enhancement of H-Mordenite in Dimethyl Ether Carbonylation to Methyl Acetate by Pre-adsorption of Pyridine

LIU Junlong, XUE Huifu, HUANG Xiumin, WU Pei-Hao, HUANG Shing-Jong, LIU Shang-Bin\*, SHEN Wenjie\*  
Dalian Institute of Chemical Physics, Chinese Academy of Sciences  
Institute of Atomic and Molecular Sciences, "Academia Sinica", Taiwan  
Taiwan University

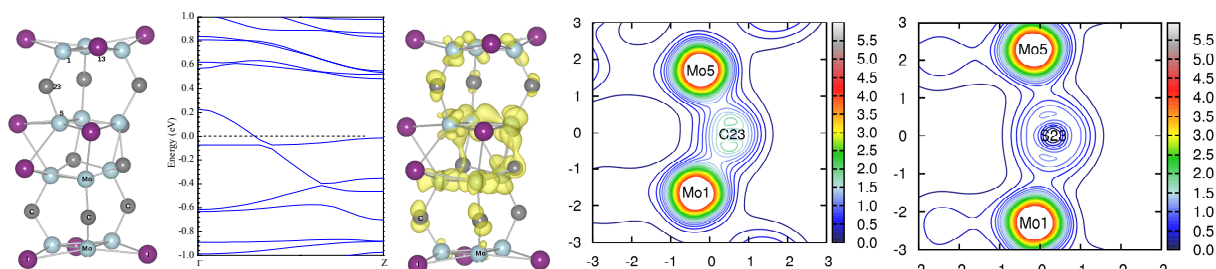
Selective adsorption of pyridine on the acidic sites in the 12-MR pores caused dimethyl ether carbonylation to methyl acetate to occur preferentially on the acidic sites in the 8-MR pores of HMOR, which significantly improved the stability of the catalyst.



*Chin. J. Catal.*, 2010, 31: 739–746 doi: 10.1016/S1872-2067(09)60082-6

### A Theoretical Investigation of the Structural Properties of Chemically Modified Mo-S-I Nanowires

WEN Shuhao, HOU Zhufeng\*, LIU Jianyong\*, HE Guozhong  
Dalian Institute of Chemical Physics, Chinese Academy of Sciences; Fudan University

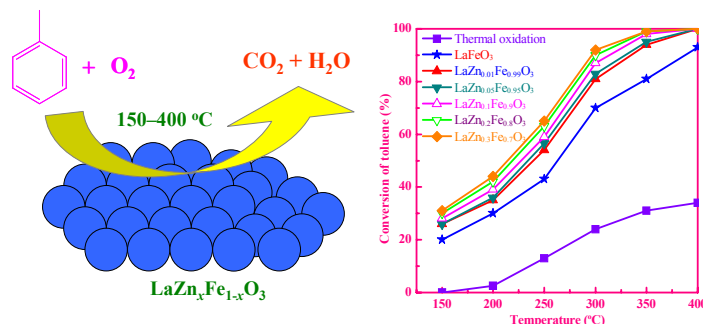


The first principle density functional theory calculation results show that the chemical modification of MoSI nanowire will obtain good structural and electronic properties, which provide the basis for chemical modification of the MoSI nanowire materials applying in catalysis.

*Chin. J. Catal.*, 2010, 31: 747–750 doi: 10.1016/S1872-2067(09)60083-8

### Synthesis, Characterization, and Performance of $\text{LaZn}_x\text{Fe}_{1-x}\text{O}_3$ Perovskite Nanocatalysts for the Combustion of Toluene

Seyed Ali HOSSEINI\*, Mohammad Taghi SADEGHI, Abdolali ALEMI, Aligholi NIAEI, Dariush SALARI, Leila KAFI-AHMADI  
University of Tabriz, Iran

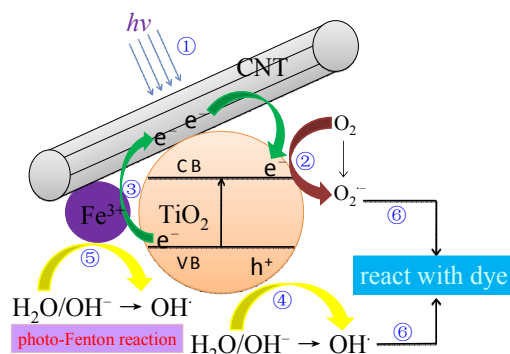


We report the synthesis and characterization of nanocrystalline  $\text{LaZn}_x\text{Fe}_{1-x}\text{O}_3$  ( $x = 0.01, 0.05, 0.1, 0.2$ , and  $0.3$ ) perovskites prepared by sol-gel combustion. Their activity for the catalytic combustion of toluene was investigated.

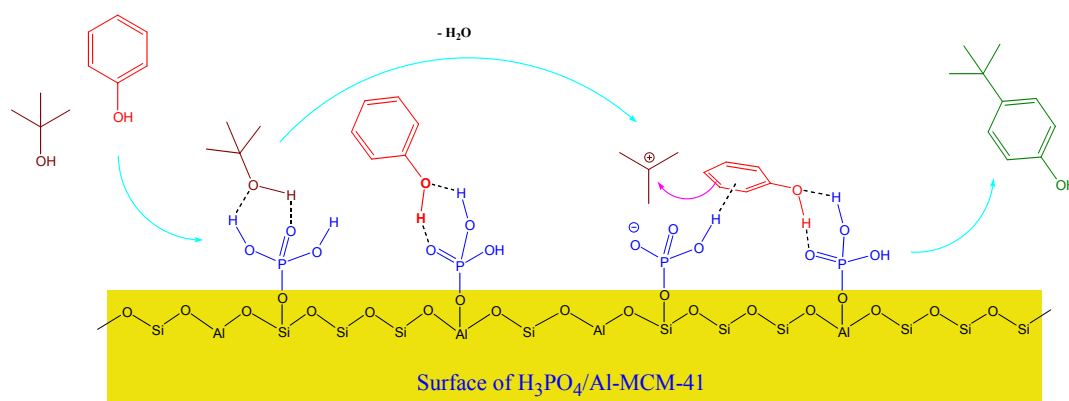
### Degradation of Rhodamine B by Fe-Carbon Nanotubes/TiO<sub>2</sub> Composites under UV Light in Aerated Solution

ZHANG Kan, MENG Zeda, OH Wonchun<sup>\*</sup>  
*Hanseu University, Korea*

The responsibilities for the obvious increase of photocatalytic activity indicated that the photoactivity not only benefits from CNT introduced, but also relates to the cooperative effect of the Fe particles via photo-Fenton reaction.

Vapor-Phase Alkylation of Phenol with *Tert*-butyl Alcohol Catalyzed by H<sub>3</sub>PO<sub>4</sub>/MCM-41

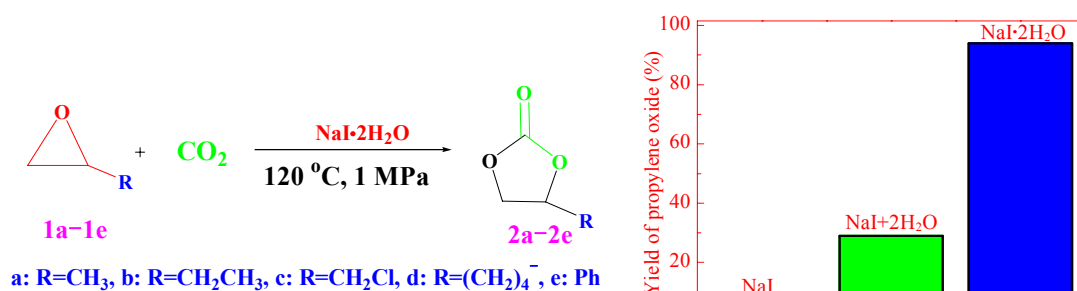
Mehran GHIACI\*, Behzad AGHABARARI  
*Isfahan University of Technology, Iran*



The catalytic performance of Al-MCM-41 containing 5, 10, 15, 20, 30, and 35 wt% H<sub>3</sub>PO<sub>4</sub> was studied for the vapor phase alkylation of phenol with *tert*-butyl alcohol from 383–493 K.

## Hydrated Alkali Metal Halides as Efficient Catalysts for the Synthesis of Cyclic Carbonates from CO<sub>2</sub> and Epoxides

ZHOU Xi, ZHANG Yi, YANG Xiangui, YAO Jie, WANG Gongying\*  
Chengdu Institute of Organic Chemistry, Chinese Academy of Sciences

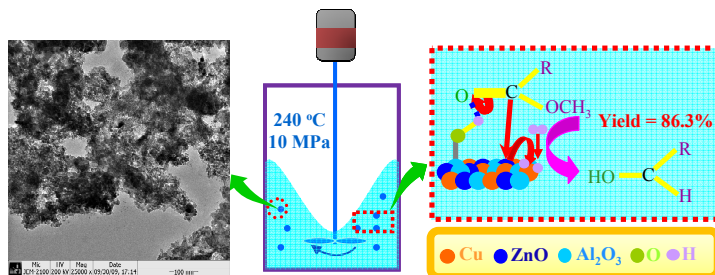


Hydrated alkali metal halides show much higher activity than anhydrous alkali metal halides for the reaction between CO<sub>2</sub> and epoxides in the absence of a co-catalyst and a solvent under mild reaction conditions.



### Cu-Zn/Al<sub>2</sub>O<sub>3</sub> Catalyst for the Hydrogenation of Esters to Alcohols

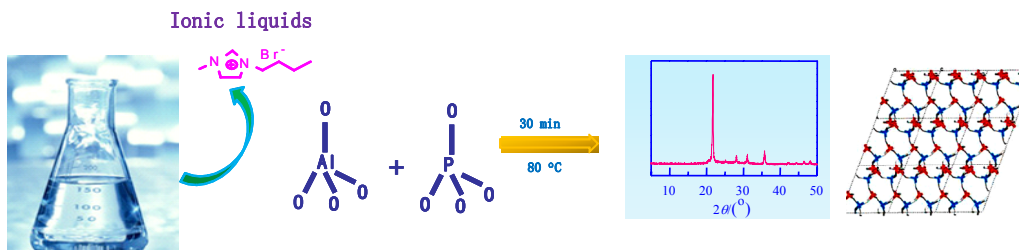
YUAN Peng, LIU Zhongyi, ZHANG Wanqing, SUN Haijie, LIU Shouchang\*  
Zhengzhou University



The yield of high alcohols reached above 86.3% over the Cu-Zn/Al<sub>2</sub>O<sub>3</sub> catalyst under relatively mild conditions of 240 °C and 10 MPa hydrogen pressure.

### Low-Temperature Synthesis and Characterization of AlPO-Cristobalite in Ionic Liquid

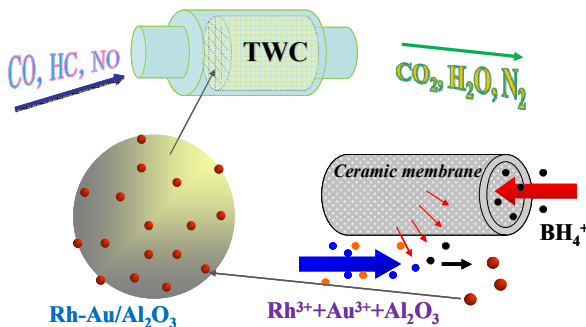
XU Renshun, ZHANG Weiping\*, HAN Xiuwen, BAO Xinhe\*  
Dalian Institute of Chemical Physics, Chinese Academy of Sciences



A novel method for the synthesis of AlPO-cristobalite is reported. AlPO-cristobalite can be synthesized at 80 °C for 30 min in the [bmim]Br ionic liquid. The resultant sample is  $\alpha$ -AlPO-cristobalite, and most of the Al and P species are connected by Al–O–P tetrahedrons.

### Preparation and Characterization of Rh-Au/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> Three-Way Nanocatalysts

LIU Licheng, ZI Xuehong, DAI Hongxing, ZHAO Zhen, WANG Xinpeng, HE Hong\*  
Beijing University of Technology; China University of Petroleum; Dalian University of Technology



A new method, ultrasound-assisted membrane reduction (UAMR), was used to prepare Rh-Au/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts. The catalysts exhibited small particles less than 3 nm and high activity in three-way model reactions.

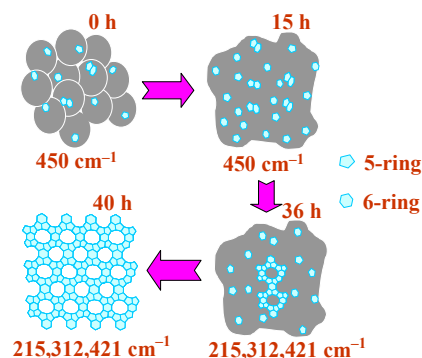
### Static Synthesis and Crystallization Mechanism of ZSM-35 Zeolite

JU Xiaohua, FAN Fengtao, TIAN Fuping\*, FENG Zhaochi\*

Dalian University of Technology;

Dalian Institute of Chemical Physics, Chinese Academy of Sciences

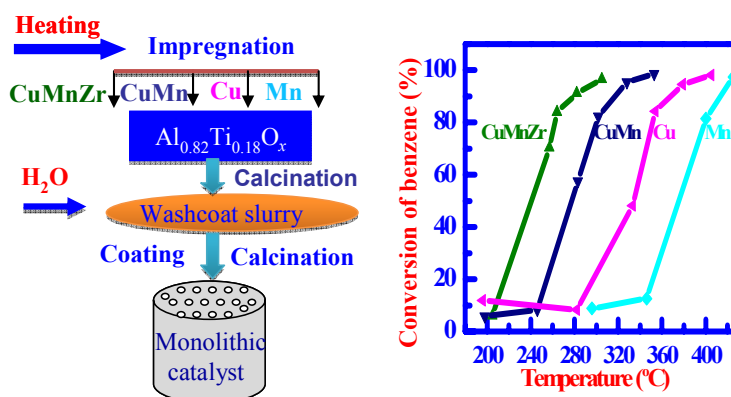
The building units in the precursors were identified as five-membered and six-membered silicate ring species. The aggregation of these ring species yielded ZSM-35 zeolite through the hydrothermal treatment.



### Effect of ZrO<sub>2</sub> Addition on the Properties of CuMn<sub>2</sub>/Al-Ti Monolithic Catalysts for Benzene Catalytic Combustion

ZHANG Zhiqiang, HE Zhanfeng, WANG Juanyun, WANG Huanyi, LI Jihua, JIANG Yi\*, CHEN Junhe, ZHANG Xiaoxia

Chengdu Institute of Organic Chemistry, Chinese Academy of Sciences

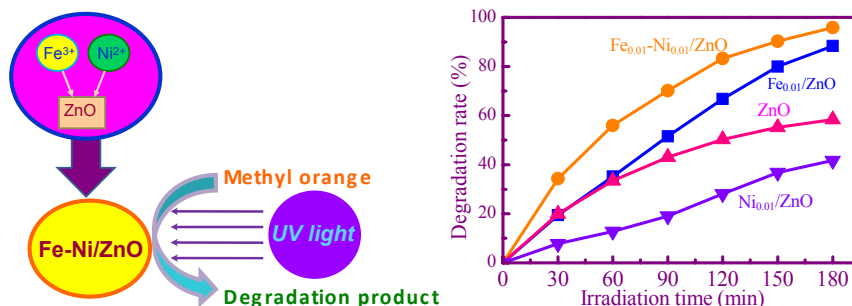


After the addition of ZrO<sub>2</sub>, the specific surface area, components dispersion, redox ability, and catalytic activity for benzene combustion of CuMn<sub>2</sub>Zr<sub>1.25</sub>-O<sub>x</sub>/Al<sub>0.82</sub>Ti<sub>0.18</sub>O<sub>x</sub> monolithic catalyst increased.

### Preparation of (Fe, Ni)-Codoped ZnO and Its Photocatalytic Activity for Degradation of Methyl Orange

FU Tianhua, GAO Qianqian, LIU Fei, DAI Huajun, KOU Xingming\*

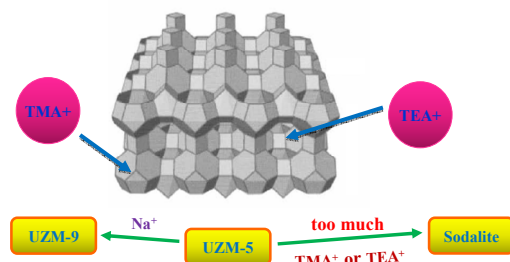
Sichuan University



The (Fe, Ni)-codoped ZnO photocatalyst was prepared, and its photocatalytic activity for degradation of methyl orange was discussed. (Fe, Ni) co-doping greatly improves the photocatalytic activity of ZnO.

### Synthesis of UZM-5 Zeolite by a Hydrothermal Method Using Tetraethylammonium Hydroxide-Tetramethylammonium Chloride as Organic Templates

LIU Yan, LI Yingxia\*, LI Jianwei, CHEN Biaohua  
*Beijing University of Chemical Technology*

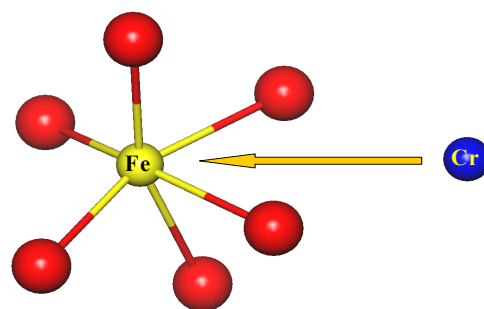


The synthesis of UZM-5 zeolite by the hydrothermal method in the tetraethylammonium hydroxide (TEAOH)-tetramethyl-ammonium chloride (TMACl) system was studied and mainly focused on the effects of TEAOH, TMACl, and sodium ions on the crystallization process of UZM-5 zeolite.

### Effects of Cr Promoter on Structure and Fischer-Tropsch Synthesis Performance over Fe-Based Catalysts

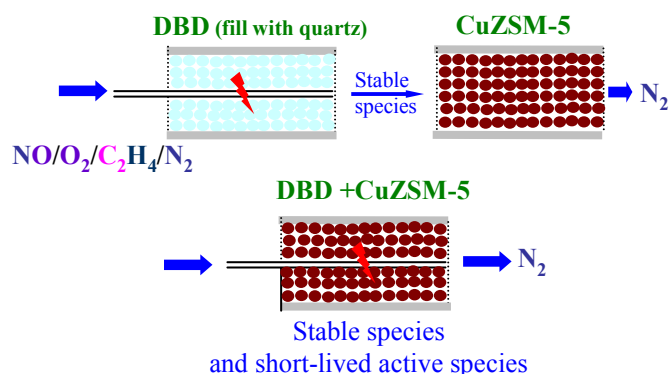
WANG Hulin, YANG Yong\*, WANG Hong, QING Ming, XIANG Hongwei, LI Yongwang  
*Institute of Coal Chemistry, Chinese Academy of Sciences*

Cr atoms were incorporated into the lattice of  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> and located at the substitutional sites of Fe atoms. With the increase of Cr content in the catalysts, the Fe-rich phase  $\alpha$ -(Fe<sub>1-x</sub>Cr<sub>x</sub>)<sub>2</sub>O<sub>3</sub> and Cr-rich phase  $\alpha$ -(Cr<sub>1-y</sub>Fe<sub>y</sub>)<sub>2</sub>O<sub>3</sub> appeared.



### Effect of Combination Way of Dielectric Barrier Discharge and CuZSM-5 on NO<sub>x</sub> Removal

CHEN Gang, SUN Qi\*, SHI Lei, NIU Jinhai, SONG Zhimin  
*Liaoning Normal University; Dalian University of Technology*

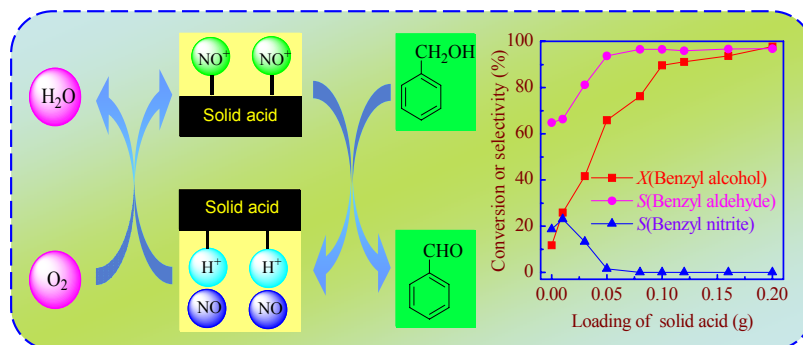


The stable species and some short-lived active species formed from the plasma-induced or plasma-catalytic process may be responsible for the synergistic effect between the dielectric barrier discharge (DBD) plasmas and CuZSM-5 catalyst for NO<sub>x</sub> removal.

### Solid Sulfonic Acid-Promoted Oxidation of Benzyl Alcohol Catalyzed by Isoamyl Nitrite

SHENG Xuebin, MA Hong, LI Decai, HE Jing, XU Jie\*

Dalian Institute of Chemical Physics, Chinese Academy of Sciences; PetroChina Urumuqi Petrochemical Company Fibre Mill

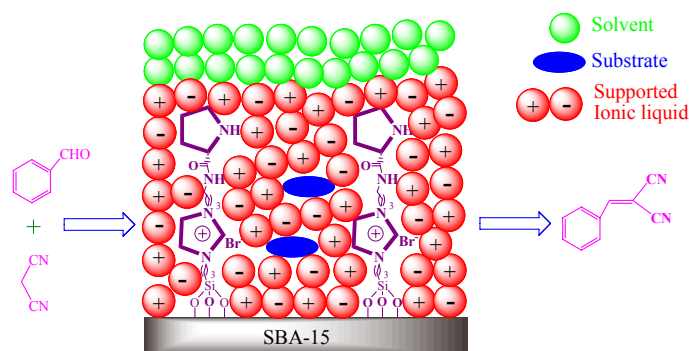


The oxidation of benzyl alcohol catalyzed by isoamyl nitrite was promoted by solid sulfonic acid. A significant promotional effect was observed using a solid acid prepared by treating Amberlyst 15 at 300 °C.

### Knoevenagel Condensation Catalyzed by Immobilized Ionic Liquid-Proline on SBA-15

SHEN Jiachun, GUO Jianping\*, SUN Yanmei, TANG Binyan, CHEN Xiaohua, YIN Dulin\*

Hunan Normal University

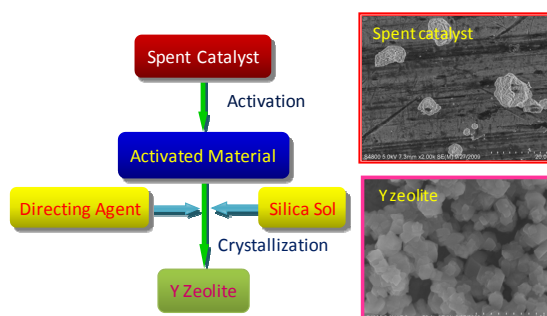


The IL-Pro/SBA-15 catalyst was prepared using SBA-15 as the support to immobilize ionic liquid-proline (IL-Pro), which was synthesized from L-proline. The catalytic performance of the catalyst was measured for Knoevenagel reaction of benzaldehyde with malononitrile.

### Preparation of Ultrafine Y Zeolite from Spent Fluid Catalytic Cracking Catalyst Powders

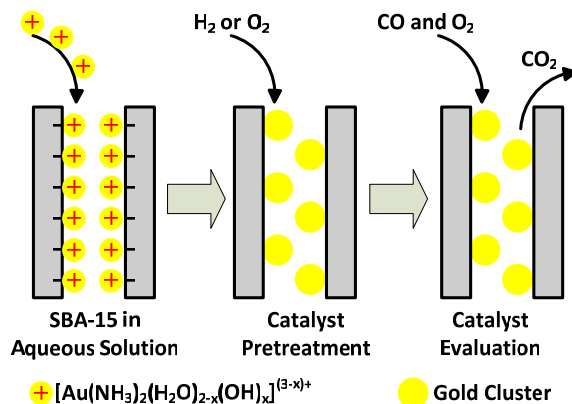
LIU Xinmei\*, LIANG Haining, LI Liang, YANG Tingting, YAN Zifeng  
China University of Petroleum

Using the spent Fluid catalytic cracking catalyst powders, the ultrafine Y zeolite was successfully prepared by a hydrothermal crystallization method. The zeolite possessed higher relative crystallinity and higher surface area.



### Preparation of Au/SBA-15 and Its Catalytic Activity for CO Oxidation

SU Jixin\*, ZHANG Shenping, MA Liyuan, QU Wen, ZHANG Mingbo  
Shandong University

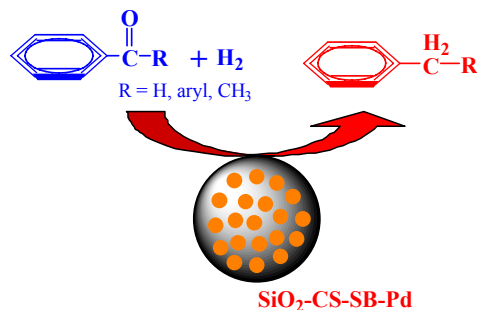


Au/SBA-15 catalyst with high activity and anti-sintering property was prepared by a facile deposition-precipitation method, using ammonia water as precipitant which can react with  $\text{HAuCl}_4$  to form positive charged gold species.

### Hydrogenation of Aromatic Ketones to Aromatic Hydrocarbons over $\text{SiO}_2$ -Supported Chitosan Schiff-Base Palladium Catalyst

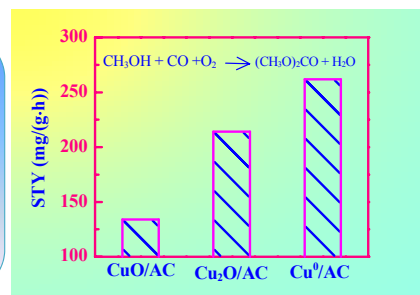
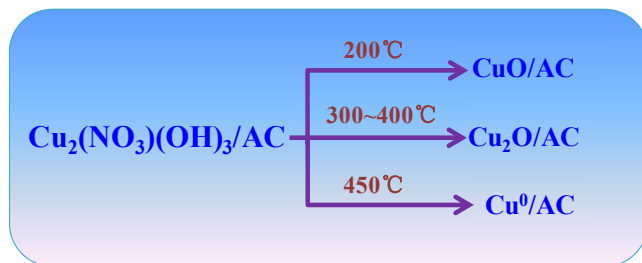
HE Haifeng, GONG Shuwen\*, LIU Lijun, CUI Qingxin, YIN Handong  
Liaocheng University

Aromatic aldehydes or ketones can be effectively converted to their corresponding hydrocarbons by catalytic hydrogenolysis at low temperature and under  $p(\text{H}_2) = 0.1$  MPa using silica-supported chitosan (CS) Schiff-base (SB) palladium  $\text{SiO}_2$ -CS-SB-Pd as the catalyst.



### Preparation of Chlorine-Free Cu/AC Catalyst and Its Catalytic Properties for Vapor Phase Oxidative Carbonylation of Methanol

WANG Ruiyu, LI Zhong\*, ZHENG Huayan, XIE Kechang  
Taiyuan University of Technology



When heating  $\text{Cu}_2(\text{NO}_3)(\text{OH})_3/\text{AC}$  under  $\text{N}_2$  atmosphere, the copper species on the activated carbon surface changed to CuO at  $200^\circ\text{C}$ , to  $\text{Cu}_2\text{O}$  at  $300\sim 400^\circ\text{C}$ , and to  $\text{Cu}^0$  at  $450^\circ\text{C}$ . For the oxidative carbonylation of methanol to dimethyl carbonate, the catalytic activity increased in the order of  $\text{CuO/AC} < \text{Cu}_2\text{O/AC} < \text{Cu}^0/\text{AC}$ .