Xinggui Zhou

Department: School of Chemical Engineering

Professional field: Chemical engineering and technology

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Profile

Education

1996: PhD, Chemical Engineering, East China University of Science and Technology, China.

1987: BE, Chemical Engineering, East China University of Science and Technology,

Academic Experience

2001.01-Present, Professor, ECUST.

2002.5~2002.8, Visiting Professor, LAGEP, Lyon.

1998.01-2000.12, Associate Professor, ECUST.

1996.06-1997.12, Lecturer, ECUST.

1995.9-1996.1, Visiting Student, Department of Chemical Engineering, University of Virginia.

Non-academic Experience

1999.04-2009.1, Deputy Director, State Key Laboratory of Chemical Engineering (Shanghai).

2008.01-present, Coordinator, “Plan 111 of Chemical Reaction Engineering Science and Technology”.

2010.01-present, Director, State Key Laboratory of Chemical Engineering (Shanghai).

Research Field

1.Catalysis and reaction engineering

Chemical Kinetics:Density functional theory studies the Surface Reaction Mechanism of heterogeneous catalysts, and the relationship between surface structure and catalyst performance, and builds microscopic chemical kinetics by integrating elementary reaction networks Determine the main reaction path, the most abundant species on the surface, the rate control steps, and the apparent activation energy and reaction order that can be verified experimentally; establish a catalyst chemical kinetics that takes into account the structural parameters of the catalyst.

Optimization of Pore structure of catalyst: The Pore structure modeling method and the reaction diffusion model based on the pore structure model were studied. The influence of Pore structure parameters on the apparent reaction performance of the catalyst was studied, and the influence of different diffusion mechanism and capillary effect on the adsorption and reaction behavior was studied. The method of optimizing pore structure of catalyst was studied.

Structure Control of catalyst: The mechanism of structure formation and evolution during the preparation of catalytic materials (including nano-carbon materials, molecular sieves, etc.) , and the regulation methods of multi-scale structure (including morphology, crystal phase and surface structure) of catalytic materials were studied. The research focuses on the control mechanism of the formation of meso-scale structures of metal-zeolite catalysts, and the Non-equilibrium thermodynamics methods for the prediction and regulation of structural evolution.

2.Intensification and optimization of reaction process

Reaction Intensification: The reaction process was strengthened by catalyst functional composite (such as metal-molecular sieve bifunctional catalyst) , the process was simplified and the yield of the target product was increased The reaction heat balance and one-way conversion can be achieved by coupling the reaction process (such as dehydrogenation and hydroxylation) , and the mass transfer resistance can be reduced by designing the catalyst structure (such as nano-zeolite, or multi-channel Zeolite) To improve the stability of the catalyst.

Transfer enhancement: The kinetics of deposition and dissolution in microchannels are studied by the method of uniform distribution and mixing based on configuration theory The integrated technology of chemical process based on micro-fluid technology for dangerous reaction process or synthesis of dangerous chemicals is studied, and the methods of uniform fluid distribution and mixing enhancement in large-scale reactor are studied.

Reaction Process Optimization: the Study of non-stationary characteristics of the reaction process (such as catalyst deactivation process, batch reaction process) modeling and optimization methods.

3. Regulation of crystal structure and morphology

Drug Crystallization: The effects of solvents and impurities on the crystal growth kinetics and crystal morphology, the aggregation morphology of solute molecules in solution and their effects on nucleation and growth kinetics were studied The transformation law and regulation of crystal polymorphs are studied.

Controlled Synthesis of molecular sieve: The Nucleation and growth kinetics of molecular sieves, the influence of structure-directing agents on the size and mesoporous structure of molecular sieves, and the entrapment of metal precursors during the growth of molecular sieves were studied

Research results and selected published papers

1.Ye, Guanghua; Zhou, Xinggui; Zhou, Jinghong; Yuan, Weikang; Coppens, Marc-Olivier , Influence of catalyst pore network structure on the hysteresis of multiphase reactions, AICHE JOURNAL, 2017, 63(1), 78-86

2.Ye, Guanghua; Sun, Yuanyuan; Zhou, Xinggui; Zhu, Kake; Zhou, Jinghong; Coppens, Marc-Olivier, Method for generating pore networks in porous particles of arbitrary shape, and its application to catalytic hydrogenation of benzene, CHEMICAL ENGINEERING JOURNAL, 2017, 329, 56-65

3.Zhou, Xinggui; Wang, Yifan; Wu, Wei, Design and optimization of an ammonia fuel processing unit for a stand-alone PEM fuel cell power generation system, INTERNATIONAL JOURNAL OF ENERGY RESEARCH, 2017, 41(6), 877-888

4.Cao, Yueqiang; Sui, Zhijun; Zhu, Yian; Zhou, Xinggui; Chen, De, Selective Hydrogenation of Acetylene over Pd-In/Al2O3 Catalyst: Promotional Effect of Indium and Composition-Dependent Performance, ACS CATALYSIS, 2017, 7(11), 7835-7846

5.Ye, Guanghua; Zhou, Xinggui; Yuan, Weikang; Ye, Guanghua; Coppens, Marc-Olivier, Probing pore blocking effects on multiphase reactions within porous catalyst particles using a discrete model, AICHE JOURNAL, FEB, 2016, 62(2)451~460

6.Xu, Pengkai; Duan, Xuezhi; Qian, Gang; Zhou, Xing-Gui, Dependence of wall stress ratio on wall friction coefficient during the discharging of a 3D rectangular hopper, POWDER TECHNOLOGY, NOV, 2015, 284326~335

7.Feng, Xiang; Duan, Xuezhi; Yang, Jia; Qian, Gang; Zhou, Xinggui; Chen, De; Yuan, Weikang, Au/uncalcined TS-1 catalysts for direct propene epoxidation with H-2 and O-2: Effects of Si/Ti molar ratio and Au loading, CHEMICAL ENGINEERING JOURNAL, 15-Oct, 2015, 278234~239

8.Zhu, Kake; Zhou, Xinggui, Manipulating the architecture of zeolite catalysts for enhanced mass transfer, CURRENT OPINION IN CHEMICAL ENGINEERING, AUG, 2015, 942~48

9.Feng, Xiang; Duan, Xuezhi; Cheng, Hongye; Qian, Gang; Chen, De; Yuan, Weikang; Zhou, Xinggui, Au/TS-1 catalyst prepared by deposition-precipitation method for propene epoxidation with H-2/O-2: Insights into the effects of slurry aging time and Si/Ti molar ratio, JOURNAL OF CATALYSIS, MAY, 2015, 325128~135

10.Thanh Hai Pham; Qi, Yanying; Yang, Jia; Duan, Xuezhi; Qian, Gang; Zhou, Xinggui; Chen, De; Yuan, Weikang, Insights into Flagg Iron-Carbide-Catalyzed Fischer-Tropsch Synthesis: Suppression of CH4 Formation and Enhancement of C-C Coupling on chi-Fe5C2 (510), ACS CATALYSIS, APR, 2015, 5(4)2203~2208