

Zhaohui Chen, PhD

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Education

- ♦ **Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China (2013-2016)**

Ph.D. Degree, AET group, State Key Laboratory of Multiphase Complex Systems

Thesis: "Production of Methane-rich Syngas and Tar from Low-rank Coals by Coupling Pyrolysis and Gasification in an Integrated Fluidized Bed"

- ♦ **Taiyuan university of technology, Taiyuan, China (2008-2011)**

M.E Degree, Key Laboratory of Coal Science and Technology

Thesis: "Study on the Mechanism of COS Formation and Removal in the Iron Oxide Desulfurization Bed"

- ♦ **North University of China, Taiyuan, China (2004-2008)**

B.Sc. Degree, Department of Chemical Engineering

Research Interests

- Thermal and catalytic conversion of carbon resources
- Catalytic conversion of methanol and light hydrocarbon
- Fluidized bed and multi-stage/integrated fluidized bed applications
- Design and molding of industrial catalyst
- Process design and reactor scale-up
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Work Experience

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| ♦ Process Engineering Advanced Research Lab (PEARL),
Polytechnique Montreal, Montreal, QC, Canada | Postdoc | 2019- |
| ♦ Institute of Process Engineering,
Chinese Academy of Sciences, Beijing, China | Researcher | 2018 |
| ♦ Department of Chemical Engineering,
Tsinghua University, Beijing, China | Postdoc | 2016-2018 |
| ♦ Energy Research Institute, ENN group,
Langfang Hebei, China | Engineer | 2011-2013 |

Expertise

- Regulation of pyrolysis reaction of coal/oil shale by design of reactor structure
- Methanol/Light hydrocarbons aromatization
- Pressurized catalytic gasification of coal for SNG production
- Multi-stage (fluidized) bed and high-pressure fluidized bed
- Molding of Fluid catalyst
- High temperature desulfurization

Research Background

- Basic research on the conversion of medium - and low-rank coal into cogeneration low-carbon

fuel and chemicals (National Basic Research Program of China)

- Research on the key technology of the new process of coal to SNG (National High Technology Research and Development Program of China)
- Key technologies and process integration for efficient grading of low rank coal based on mild pyrolysis (JST-MOST National special project for international scientific and technological cooperation)
- Directional control mechanism and method of pyrolysis of low metamorphic coal to produce high quality oil and gas (National Key Research and Development Program of China)
- Key basis for preparation of high H/C ratio syngas and SNG based on lignite oxidation pyrolysis (Yuanan Union National Natural Science Foundation of China)
- Key technologies and demonstration for production of aromatic and polymethoxydimethyl ether from coal-based methanol (National Key Research and Development Program of China)

Journal Publications

- **Chen ZH***, Hou YL, Yang YF, et al. A multi-stage fluidized bed strategy for the enhanced conversion of methanol into aromatics. *Chem. Eng. Sci.*, Under Review
- **Chen ZH***, Hou YL, Song WL, et al. High-yield production of aromatics from methanol with a temperature shift, three-stage fluidized bed reactor technology, *Chem. Eng. J.*, In Press
- Wang DL, **Chen ZH***, Zhou ZM, et al. Catalytic upgrading of volatiles from coal pyrolysis over sulfated carbon-based catalysts from waste red oil. *Fuel Process Technol.*, In press
- Wang DL, Yu J, **Chen ZH***, et al. Role of alkali sodium on the catalytic performance of red mud during coal pyrolysis. *Fuel Processing Technol.*, 2019, 186: 81-87.
- **Chen ZH**, Li YJ, Lai DG, et al. Coupling coal pyrolysis with char gasification in a multi-stage fluidized bed to co-produce high-quality tar and syngas. *Appl. Energy*, 2018, 215: 348-355.
- **Chen ZH**, Gao SQ, Xu GW. Simultaneous production of CH₄-rich syngas and high-quality tar from lignite by the coupling of noncatalytic/catalytic pyrolysis and gasification in a pressurized integrated fluidized bed. *Appl. Energy*, 2017, 208: 1527-1537.
- **Chen ZH**, Dun QM Shi Y, et al. High quality syngas production from catalytic coal gasification using disposable Ca (OH)₂ catalyst. *Chem. Eng. J.*, 2017, 316: 842-849.
- **Chen ZH**, Shi Y, Lai DG, et al. Coal rapid pyrolysis in a transport bed under steam-containing syngas atmosphere relevant to the integrated fluidized bed gasification. *Fuel*, 2016, 176: 200-208.
- **Chen ZH**, Lai DG, Bai LQ, et al. Methane-rich syngas production in an integrated fluidized bed by coupling pyrolysis and gasification of low-rank coal[J]. *Fuel Process Technol.* 2015, 140: 88-95.
- **Chen ZH**, Gao SQ, Xu GW. Analysis and control methods of coal pyrolysis process. *CIESC J.*, 2017, 68(10): 3693-3707. In Chinese
- **Chen ZH**, Dun QM, Shi Y, et al. Effects of pyrolysis temperature and atmosphere on rapid coal pyrolysis in transport bed reactor. *CIESC J.*, 2016, 68(4), 1566-1573. In Chinese
- **Chen ZH**, Liu L, Jin YD, et al. Pressurized catalytic gasification of high ash fusion temperature coal: catalytic activity of K₂CO₃ and K recovery. *CIESC J.*, 2017, 68(5): 2155-2161. In Chinese
- **Chen ZH**, Liu L, Wu H, et al. Effect of Ca(OH)₂ catalyst on catalytic coal gasification and methanation. *J. Fuel Chem. Technol.*, 2016, 44(10): 1160-1167. In Chinese

- **Chen ZH**, Shangguan J, Zhang L, et al. Formation of carbonyl sulfide in removal of hydrogen sulfide using metal oxide sorbents. *Modern Chem. Ind.*, 2011, 32(1): 244-249. In Chinese
- Lai DG, **Chen ZH**, Shi Y, et al. Pyrolysis of oil shale by solid heat carrier in an innovative moving bed with internals. *Fuel*, 2015, 159: 943-951.
- Lai DG, **Chen ZH**, Lin LX, et al. Secondary cracking and upgrading of shale oil from pyrolyzing oil shale over shale ash. *Energy Fuel*, 2015, 29(4): 2219-2226.
- Dun QM, **Chen ZH**, Huang FL, et al. Influences of temperature and residence time on secondary reactions of volatiles from coal pyrolysis. *Chin. J. Process Eng.*, 2018, 18(1): 140-147. In Chinese
- Shi Y, Lai DG, **Chen ZH**, et al. Co-pyrolysis characteristics of Shenmu bituminous coal and Huadian oil shale. *Chin. J. Process Eng.*, 2016, 16(4): 634-638. In Chinese
- Shi Z, Cheng S, **Chen ZH**, et al. Distribution of products and migration of main elements during pyrolysis of shenmu bituminous coal. *Chin. J. Process Eng.*, 2016,16(5): 802-811. In Chinese
- Lai DG, Zhan JH, **Chen ZH**, et al. Oil shale pyrolysis by solid heat carrier in internal-structured moving bed. *CIESC J.*, 2017, 68(10): 3647-3657. In Chinese
- Shen K, Wang N, Chen X, **Chen ZH**, et al. Seed-induced and additive-free synthesis of oriented nanorod-assembled meso/macroporous zeolites: toward efficient and cost-effective catalysts for the MTA reaction. *Catal. Sci. Technol.*, 2017, 7(21): 5143-5153.
- Wang N, Hou YL, Sun WJ, Cai DL, **Chen ZH**, et al. Modulation of b-axis thickness within MFI zeolite: Correlation with variation of product diffusion and coke distribution in the methanol-to-hydrocarbons conversion. *Appl. Catal. B: Environ.*, 2019 243: 721-733.
- Cai DL, Hou YL, Zhang CX, Wang N, **Chen ZH**, et al. Analyzing transfer properties of zeolites using small-world networks. *Nanoscale*, 2018, 10: 16431-16433.

Conference Publications

- **Chen ZH**. Targeted regulation for pyrolysis of coal/oil shale based on innovation of reactor structure. The 5th Young Scholar' Symposium on Coal Chemical Industry, May 4-6, 2018, Taiyuan, China.
- **Chen ZH**, Qian WZ. Decoupling technology by multi-stage fluidized bed for methanol aromatization. The 3rd Symposium on Energy Conversion Chemistry and Technology. Apr. 20-23, 2018, Xiamen, China.
- **Chen ZH**, Hou YL, Qian WZ. Characteristics of methanol to aromatics (MTA) in a multi-staged fluidized bed. Scientific Program of the 8th Asian-Pacific Chemical Reaction Engineering Symposium, November 12-15, 2017, Shanghai, China.
- **Chen ZH**, Gao SQ. Multi-stage fluidized bed pyrolysis and gasification of lignite. The 9th National Fluidization Conference and Particle Technology Conference, Aug. 25-27, 2017, Yinchuan, China.
- **Chen ZH**, Gao SQ. Coal pyrolysis in a transport bed under relevant conditions of the integrated fluidized bed process. The 3rd Joint Meeting of Strategic Japanese–Chinese Joint Research, Oct. 6–27, 2015, Kanagawa, Japan.
- **Chen ZH**, Shi Y, Gao SQ. The coal pyrolysis in a transport bed integrated to a fluidized bed bottom for char gasification. 13th China–Japan Symposium on Coal and C1 Chemistry, Aug. 31–Sept. 04, 2015, Dunhuang, China.

- **Chen ZH**, Lai DG, Tian Y, et al. Coal gasification coupling pyrolysis in an integrated fluidized bed to produce methane-rich syngas. The 10th Korea–China Clean Energy Workshop, Aug. 31–Sept. 03, 2014, Seoul, Korea.
- **Chen ZH**, Shangguan J, Zhang L, et al. Some factors in COS formation by the reaction of H₂S with CO. The 15th National Catalysis Conference, Nov. 28-Dec. 2, 2010, Guangzhou, China.

Patents and Software Copyrights

- A preparation method of raw material for catalytic coal gasification. CN201210219747.7
- A method of extraction aluminum oxide from coal ash. CN201310273115.3
- A combined method of catalyst recovery and aluminum compound separation from coal ash. CN201310273146.9
- A method of catalyst loading and its recovery for coal gasification. CN201410251387.8
- Continuous reaction-regeneration system and method of a three-stage fluidized bed based on methanol to aromatics CN201810826662.2
- A method of a two-stage fluidized bed reactor for syngas to aromatics. CN 201711384742.9
- A two-stage pyrolysis device and method for solid fuel. CN201810449777.4
- A two-stage circulating fluidized bed reaction-regeneration system and method for the preparation of aromatics from syngas. CN201810332927.3
- Preparation method and use of a red mud-base semi-coke catalyst, CN201811317124.7
- A preparation method of raw material and its application in catalytic gasification. CN201210132896.X
- Raw material preparation and its application in catalytic coal gasification. CN201310226491.7
- A kind of raw material for catalytic coal gasification and its processing and application method. CN201310226495.5

Reviewer Responsibilities

Academic Journals: Appl. Energy, Chem. Eng. J., Fuel, Fuel Process Technol., etc