



## Profile

Haifeng Liu, doctor and professor, is the director of Shanghai Coal Gasification Engineering and Technology Research Center, director of Sinopec-East China University of Science and Technology Gasification Technology Research Center, the executive director of Shanghai Energy Research Association and the outstanding talent of the Ministry of Education in the new century. He is the doctoral supervisor majoring in thermal engineering, chemical technology and fluid machinery and engineering. He has presided over and participated in the completion of a number of "973" projects, "863" projects, key projects, National Natural Science Foundation projects and so on. He has published more than 100 papers in AICHE J, Chem Eng Sci, Ind Eng Chem Res, Fuel, Phys Fluids, Int J Multiphase Flow, Chaos and other important academic journals at home and abroad. He is a co-author of the textbook Engineering fluid Mechanics. He has won one second prize for national scientific and technological progress, one special prize, one first prize, two second prize and one third prize for scientific and technological progress at the provincial and ministerial level. And, he has been authorized more than 40 invention patents (2 American patents).

## Research Field

Gasification technology of coal and wastes, multi-phase flow and nonlinear time series analysis

## Research results and selected published papers

### Research projects:

1. The National Natural Science Foundation of China (U1402272), basic study on the high efficiency gasification of lignite coal in the entrained-flow gasifier based on the macoro non-equilibrium of gas-slag temperature, 2015/01-2018/12, 2.21million yuan (leader).
2. The Foundation of Shanghai Science and Technology Committee (14DZ1200103), 1500 tons/day grade high ash melting point, high ash coal pressurized gasifier process software package, 2014/07-2016/06, 1.05 million yuan (leader).
3. The National High Technology Research and Development Program of China (2013AA051103), the development of pulverized coal gasification with air and gas preparation new technology, 2013/01-2016/3, 4.70 million yuan (leader).
4. The National natural science foundation of China (21176079), research on the key scientific problems of combined gasification of water hyacinth and coal to realize energy-oriented use, 2012/01-2015/12, 0.60 million yuan (leader).
5. The Foundation of Shanghai Science and Technology Committee (11DZ2281900), the development of Shanghai engineering research center for coal gasification, 2011/12-2013/09, 1 million yuan, (leader).
6. The National Development Programming of Key Fundamental Researches of China (2010CB227005), research on the mechanism of slag formation, rheology and heat transfer process during gasification, 2010/01-2014/12, 4.647 million yuan (leader).
7. New Century Excellent Talents in University (NCET-08-0775), 2009/01-2011/12, 0.50 million yuan (leader).
8. The National Key Technologies R&D Program in China (2007BAA08B0101), research and demonstration of the application of a single daily consumption of 2000 tons of coal gasification technology, 2008/10-2011/12, 4.30 million yuan (leader).
9. The National natural science foundation of China (50776033), New technology of coal-water slurry gasification with sewage sludge and its application in basic research, 2008/01-2010/12, 0.35 million yuan (leader).
10. National Key Program of Basic Research in China (2004CB217703), research on the multiphase turbulent flow reaction in the multi-impinging stream entrained-flow gasifier, 2004/01-2009/12, 4.238million yuan (leader).

### Results and Rewards:

1. Haifeng Liu(Ranking:1/30), The key device development and application for single-nozzle cold-wall type lining pressurized pulverized coal gasification, Shanghai Municipal People's Government, Invention, Shanghai grand prize, 2015.
2. Haifeng Liu(Ranking:4/12), High efficient and large-scale coal-water slurry gasification, People's Government of Shandong Province, Scientific and technological progress, Provincial first prize, 2016.
3. Haifeng Liu(Ranking:4/15), Opposed multi-burners coal-water slurry gasification with 2000 t/d coal consumption, China petroleum and chemical industry federation, Scientific and technological progress, Provincial first prize, 2013.
4. Haifeng Liu(Ranking:5/10), The key technology and industrial application for producing synthesis gas through oxidation of non-catalytic part of gaseous hydrocarbon, Shanghai Municipal People's Government, Scientific and technological progress, Provincial first prize, 2010.
5. Haifeng Liu(Ranking:10/10), Coal-water slurry gasification with opposed multi-burners, State Council of the People's Republic of China, Scientific and technological progress, National second prize, 2007.

### Selected Publications in International Journals:

1. Hui Zhao, Zhaowei Wu, Weifeng Li, Jianliang Xu, Haifeng Liu\*. Interaction of two drops in the bag breakup regime by a continuous air jet. *Fuel*, 2019, 236:843-850.
2. Chunyu Wang, Hui Zhao, Zhenghua Dai, Weifeng Li, Haifeng Liu\*. Influence of alkaline additive on viscosity of coal water slurry. *Fuel*, 2019, 235: 639-646.
3. Ming Liu, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Hui Zhao, and Haifeng Liu. Experimental Studies on Two Dimensional Particle Swarm Gasification of Different Coal Chars and Petroleum Coke at High Temperature. *Fuel*, 2019, 241: 973-84.
4. Ming Liu, Zhihao Zhou, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, and Haifeng Liu. Comparison of HTSM and TGA Experiments of Gasification Characteristics of Different Coal Chars and Petcoke. *Energy & Fuels*, 2019, 33: 3057-3067.
5. Ming Liu, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, and Haifeng Liu. Characteristics of Single Petcoke Particle during the Gasification Process at High Temperatures. *Chinese Journal of Chemical Engineering*, 2019, <https://doi.org/10.1016/j.cjche.2019.02.025>.
6. Ming Liu, Zhongjie Shen, Jianliang Xu, Qinfeng Liang, Haifeng Liu\*. New Slag-Char Interaction Mode in the Later Stage of High Ash Content Coal Char Gasification. *Energy Fuels* 2018, 32, 11, 11335-11343.
7. Binbin Zhang, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Haifeng Liu\*. Numerical study of dynamic response analysis of slag behaviors in an entrained flow gasifier. *Fuel*, 2018, 234: 1071-1080.
8. Ningsheng Wang, Haifeng Lu, Jianliang Xu, Xiaolei Guo, Haifeng Liu\*. Velocity profiles of granular flows down an inclined channel. *Int. J. Multiphas. Flow*, 2018, <https://doi.org/10.1016/j.ijmultiphaseflow>.
9. Zhongjie Shen, Liqi Liang, Qinfeng Liang, Jianliang Xu, Kuangfei Lin, Haifeng Liu\*. In situ experimental and modeling study on coal char combustion for coarse particle with effect of gasification in air (O<sub>2</sub>/N<sub>2</sub>) and O<sub>2</sub>/CO<sub>2</sub> atmospheres. *Fuel*, 2018, 233: 177-187.
10. Ming Liu, Zhongjie Shen, Jianliang Xu, Qinfeng Liang, Haifeng Liu\*. Experimental Studies on CO<sub>2</sub> Gasification of Petcoke Particle Swarm at High Temperatures. *AIChE J*, 2018, 64 (11):4009-4018.
11. Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Haifeng Liu\*, Kuangfei Lin. Study on the Fragmentation Behaviors of Deposited Particles on the Molten Slag Surface and Their Effects on Gasification for Different Coal Ranks and Petroleum Coke. *Energy Fuels*, 2018, 32 (9): 9243-9254.
12. Binbin Zhang, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Haifeng Liu\*. Modeling the slag flow and heat transfer on the bottom cone of a membrane wall entrained-flow gasifier. *Fuel*, 2018, 226: 1-9.
13. Hui Zhao, ZhaoWei Wu, WeiFeng Li, JianLiang Xu, HaiFeng Liu\*. Transition Weber number between surfactant-laden drop bag breakup and shear breakup of secondary atomization. *Fuel*, 2018, 221: 138-143.
14. Jie Zhou, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Haifeng Liu\*. A new prediction method for the viscosity of the molten coal slag. Part 2: The viscosity model of crystalline slag. *Fuel*, 2018, 220: 233-239.
15. Jie Zhou, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Haifeng Liu\*. A new prediction method for the viscosity of the molten coal slag. Part 1: The effect of particle morphology on the suspension viscosity. *Fuel*. 2018, 220: 296-302.
16. Ningsheng Wang, Jianliang Xu, Xiaolei Guo, Haifeng Lu, Hui Zhao, Weifeng Li, Haifeng Liu\*. Velocity profiles of avalanches during hopper discharge. *Fuel*. 2018, 218: 350-356.
17. Jianliang Xu, Qinfeng Liang, Zhenghua Dai, Haifeng Liu\*. The influence of swirling flows on pulverized coal gasifiers using the comprehensive gasification model. *2018 Fuel Process Technol.* 2018, 172: 142-154.
18. Hui Zhao, ZhaoWei Wu, WeiFeng Li, JianLiang Xu, HaiFeng Liu\*. Nonmonotonic Effects of Aerodynamic Force on Droplet Size of Prefilming Air-Blast Atomization, *Ind Eng Chem Res*, 2018, 57(5): 1726-1732.
19. Ming Liu, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Haifeng Liu\*. Morphological Evolution of a Single Char Particle with a Low Ash Fusion Temperature during the Whole Gasification Process. *Energy Fuels*. 2018, 32 (2): 1550-1557.
20. Binbin Zhang, Zhongjie Shen, Qinfeng Liang, Jianliang Xu, Haifeng Liu\*. Modeling study of residence time of molten slag on the wall in an entrained flow gasifier. *Fuel*. 2018, 212: 437-447.