

Research Group of Circulating Fluidized Bed Technology  
Institute of Engineering Thermophysics, Chinese Academy of Sciences



山东邹城 40 吨 / 时煤粉预热燃烧锅炉  
40 t/h Preheating Pulverized Coal Combustion Boiler in Shandong Province

Orienting at the major demand of national energy security and sustainable development, taking circulating fluidized bed (CFB for short) as key common technology platform, the research group pioneered a new route of directional conversion nitrogen in coal combustion and CFB gasification of coal, breakthrough a series of key technologies, including ultralow NO<sub>x</sub> combustion of coal, mild gasification reaction and coupling decomposition of macromolecular organics, flow and combustion uniformity in scale furnace, etc., which provide systematic solutions to clean and efficient utilization of coal in many industries of national economy such as coal-fired industrial boiler with ultralow NO<sub>x</sub> combustion, large-scale CFB gasifier and coal-fired boilers with ultra-high steam parameter, and were demonstrated and industrialized in the fields of coal-fired industrial boiler, industrial gas and synthetic ammonia made of coal, and coal-fired power generation, creating remarkable economic and social benefits, leading the development of coal combustion and gasification technology, making outstanding contribution innovatively and systematically in promoting scientific and technological progress, industrial technology innovation, economic construction and environmental protection, etc.

Outstanding contributors of this research group

Lyu Qinggang

He proposed a new route of directional conversion of nitrogen in coal combustion – ultralow NO<sub>x</sub> combustion and coal gasification process in CFB with high flux, and invented a new type furnace of CFB boiler with ultra-high steam parameters.

Zhu Zhiping

He revealed the path of CFB gasification reaction at mild gasification condition, researched and developed the core components and key technologies of CFB coal gasification system, and opened up the R&D direction of pressurized coal gasification orienting at syngas and SNG.

Zhu Jianguo

He revealed the mechanism of preheating enhanced combustion and directional conversion of nitrogen in coal combustion, broke through the key technology of fluidized preheating combustion, and developed the integrated scheme of pulverized coal preheating combustion boiler which has been applied.



研究集体  
Group Photo



甘肃金化千吨级加压循环流化床气化炉  
Pressurized CFB Gasifier with the Capacity of Kiloton/day Grade in Gansu Province

循环流化床技术研究集体

推荐单位：中国科学院工程热物理研究所

研究集体主要科技贡献：

该研究集体面向国家能源安全与可持续发展的重大需求，以循环流化床为共性关键技术平台，开创循环流化床煤氮定向转化和温和气化新路径，突破煤炭超低 NO<sub>x</sub> 燃烧、温和气化反应与大分子有机物耦合裂解、超大尺度炉膛流动和燃烧均匀性等重大系列关键技术，形成超低 NO<sub>x</sub> 排放燃煤工业锅炉、大型循环流化床煤气炉、大型超高参数循环流化床燃煤锅炉等面向国民经济多个行业的煤炭清洁高效利用系统解决方案，在有重大需求的燃煤工业锅炉、煤制工业燃气与煤制合成氨、燃煤发电领域实现了技术示范与产业化应用，创造了显著的经济效益和社会效益，引领了煤燃烧与煤气化技术发展新方向，在推动我国科技进步、行业技术革新、经济建设和环境保护等方面做出了创新性和系统性的突出贡献。

研究集体突出贡献者



吕清刚 Lyu Qinggang

吕清刚 中国科学院工程热物理研究所

提出循环流化床煤氮定向转化-超低NO<sub>x</sub>燃烧新路径和高倍率循环流化床煤气化工艺，发明超高参数循环流化床锅炉新炉型。



朱治平 Zhu Zhiping

朱治平 中国科学院工程热物理研究所

探明温和气化条件下循环流化床气化反应路径，研发循环流化床煤气化系统核心部件和关键技术，开拓面向合成气和SNG的加压煤气化技术研发方向。



朱建国 Zhu Jianguo

朱建国 中国科学院工程热物理研究所

揭示预热强化燃烧与煤氮定向转化机理，突破流态化预热燃烧关键技术，开发煤粉预热燃烧锅炉集成方案并实现应用。

研究集体主要完成者

王海刚 李诗媛 宋国良 刘志成 任强强 于旷世 王小芳  
欧阳子区 孟广军 王东宇 高鸣 张海霞 王 坤 董鹏飞  
刘敬樟 满承波 黄黎然



MW 级煤粉预热燃烧试验平台  
MW Test Platform of Preheating Pulverized Coal Combustion

Major contributors

- Wang Haigang
- Li Shiyuan
- Song Guoliang
- Liu Zhicheng
- Ren Qiangqiang
- Yu Kuangshi
- Wang Xiaofang
- Ouyang Ziqu
- Meng Guangjun
- Wang Dongyu
- Gao Ming
- Zhang Haixia
- Wang Kun
- Dong Pengfei
- Liu Jingzhang
- Man Chengbo
- Huang Canran



山东兖州 75 吨 / 时高温后燃循环流化床锅炉  
75 t/h CFB Boiler with High Temperature and Post-Combustion in Shandong Province



新疆宜化 3×40000 m<sup>3</sup>/h 循环流化床气化炉  
3 units of 40000 m<sup>3</sup>/h CFB Gasifier in Xinjiang Province



山东枣庄 350 MW 超临界多边形炉膛循环流化床锅炉  
350 MW Super-Critical CFB Boiler with Polygonal Furnace in Shandong Province