

### $K_xFe_yO_z$ 对煤化学链催化燃烧性能影响研究

翟春华, 郭万军, 沈来宏, 陈定千, 宋涛, 肖军

东南大学 能源热转换及其过程测控教育部重点实验室, 江苏 南京 210096

### Effect of $K_xFe_yO_z$ on chemical looping catalytic combustion of coal

ZHAI Chun-hua, GUO Wan-jun, SHEN Lai-hong, CHEN Ding-qian, SONG Tao, XIAO Jun

Key Laboratory of Energy Thermal Conversion and Control of Ministry of Education, Southeast University, Nanjing 210096, China

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**摘要** 以廉价的钙铝水泥作为载氧体制备过程的载体, 并以机械混合-挤压成型造粒法制备了基于 $Fe_2O_3$ 为载氧体活性相、钙铝水泥为载体的新型载氧体。在单流化床反应器上研究了钙铝水泥添加比例以及钾添加剂对合成载氧体的化学链燃烧性能的影响。研究表明, 合成载氧体中载体以 $Ca_2Al_2SiO_7$ 形式存在, 钾的添加显著提高了煤气化反应速率以及煤转化速率, 钾在稳定相中以 $K_2Fe_{22}O_{34}$ 存在。 $K_2Fe_{22}O_{34}$ 在煤化学链燃烧过程的催化性能体现在其作为储钾相与 $KFeO_2$ 相的形态转变过程中。

**关键词:** 化学链燃烧 碳捕集 载氧体 催化

**Abstract:** The calcium aluminate cement as a cheap material was used to produce a novel cement-supported  $Fe_2O_3$  oxygen carrier via mechanically mixing and extrusion method. The ratio of cement addition and the effect of K as additive on the CLC performance of coal were experimentally investigated in a single fluidized bed reactor. The results suggest that there is a stable product of  $Ca_2Al_2SiO_7$  formed in the oxygen carriers. The coal gasification rate and conversion rate are significantly accelerated by K in the oxygen carrier samples. A stable phase of  $K_2Fe_{22}O_{34}$  is found in the oxygen carriers. The catalytic effect of K in the coal CLC process depends on the phase transformation of  $K_2Fe_{22}O_{34}$  and  $KFeO_2$ .

**Key words:** chemical looping combustion carbon capture oxygen carrier catalytic

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通讯作者: 沈来宏(1965-), 男, 教授, 主要研究方向为化学链技术, E-mail: lhshen@seu.edu.cn, Tel: 025-83795598; Fax: 025-57714489 E-mail: lhshen@seu.edu.cn


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