

## Accepted Manuscript

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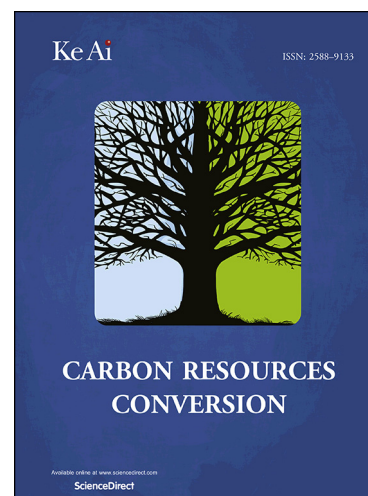
PII: S2588-9133(17)30019-4  
DOI: <https://doi.org/10.1016/j.crcon.2018.04.004>  
Reference: CRCON 5

To appear in: *Carbon Resources Conversion*

Received Date: 16 December 2017  
Revised Date: 18 April 2018  
Accepted Date: 21 April 2018

Please cite this article as: J. Hou, Y. Ma, S. Li, W. Shang, A comparative study on characteristics of sulfur and nitrogen transformation and gaseous emission for combustion of bituminous coal and char, *Carbon Resources Conversion* (2018), doi: <https://doi.org/10.1016/j.crcon.2018.04.004>

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# A comparative study on characteristics of sulfur and nitrogen transformation and gaseous emission for combustion of bituminous coal and char

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**ABSTRACT:** The characteristics of sulfur and nitrogen transformation and the emissions comparison of sulfurous and nitrogenous gas were investigated using SEM, XPS, TG-FTIR and TG-gas analyzer during the combustion process of Shenmu bituminous coal (SM coal) and its char. SEM indicated that porosity and specific surface area of char were enlarged after coal pyrolysis and a large amount of space could be provided for the oxidation reaction of various sulfur species with oxide during the combustion process. The sulfur and nitrogen species of the two samples analyzed by XPS showed that, pyritic sulfur, organic sulfide sulfur, sulphone and sulfoxide sulfur in coal were partly transformed to thiophenic sulfur and sulfate sulfur in the pyrolysis of coal, and the total sulfur content in char was reduced. Besides, the sulfur and nitrogen species changes of SM coal, char and the ashes determined by XPS showed that sulfur fixation effect was enhanced in the presence of calcium oxide during combustion. The component analysis of the gas during combustion via TG-FTIR indicated that SO<sub>2</sub> and NO<sub>2</sub> began to escape at 300 °C and reached

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