Fundamental Study for Biomass Char Utilization at Sintering Process in View of Combustion Property.

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ABSTRACT

The steel industry occupies for about 14% of CO_2 emissions in Japan, and it is necessary to reduce CO_2., Sintering and blast furnace processes occupies the majority for CO_2 emission from steel industry. As blast furnace exhaust gas is used in the downstream process, the target of our study is to reduce CO_2 from the sintering process. Most of CO_2 emitted from the sintering process comes from coke breeze combustion.

It is effective to replace coke breeze with low oxidation iron or biomass as bonding agent. Regarding the former, fundamental study for using mill scale and magnetite ore from the viewpoint of promoting oxidation of metallic iron and ferrous (Fe^{2+}) oxide is performing both in universities and iron and steel making companies.

On the other hand, regarding the latter, there are only a few previous studies in Japan. Kawaguchi et al. examined using biomass char sinter pot test, and resulted in that shortened sintering time due to the high combustion rate of biomass char and maintained product yield by sieving and using large particle char. However, there is no mention of other sintering operating factors or their effects on sinter product quality. Therefore, in this study, in order to explore the effective use of biomass char, we will examine the NOx emission and sinter quality with its combustion characteristics and heat profile in sintering packed bed.

In this study, PKS(Palm Kernel Shell) char was used as biomass char, and its combustion characteristics were investigated by particle size. As a result, it was confirmed that the finer the PKS char showed the faster the burning rate and the lower the NOx conversion rate.

It is suggested that higher combustion rate caused lower oxygen partial pressure in the combustion film near the char particle. Then lower oxygen partial pressure suppressed oxidation reaction of Nitrogen component in the char.