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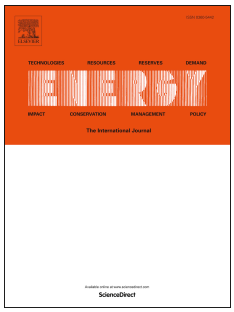

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Understanding fly-ash formation during fluidized-bed gasification of high-silicon-aluminum coal based on its characteristics

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ABSTRACT: Investigations on fly-ash formation in fluidized-bed gasification are important in mitigating ash-related problems and exploiting its further usage. In this study, the characteristics of ash fusion, size distribution, and the elemental composition of fly ash from the fluidized-bed gasification of high-silicon–aluminum coals were examined, and its formation process during gasification was explored. The ash fusion temperatures of the fly ashes were lower than those of the corresponding raw coal. Although the mean particle size of fly ashes from Jincheng anthracite is smaller than that from Lu'an bitumite, they both have a two-peak distribution. The carbon content and elemental distribution in the two fly ashes vary obviously because of the differences in maceral distribution and mineral composition of original coal. For high-silicon-aluminum coal, fly-ash formation occurred through the char gasification of a shrinking nucleus, the agglomeration of some fine particles into large particles by sintering and collision, and the entry of char particles into a cyclone separator that is entrained by syngas.

Keywords: High-silicon-aluminum coal; Fluidized-bed gasification; Fly ashes; Characteristics; Formation.

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