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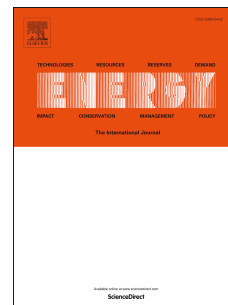
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1     **Understanding fly-ash formation during fluidized-bed gasification of**  
2             **high-silicon-aluminum coal based on its characteristics**

3                     Fenghai Li,<sup>a,b,c</sup> Quanrun Liu,<sup>b\*</sup> Meng Li,<sup>a,b</sup> Yitian Fang<sup>c</sup>

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

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

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