

5 - 4 ASH DEPOSITION BEHAVIOR AND ITS MECHANISMS IN HIGH-TEMPERATURE COAL GASIFICATION

Key words : Coal, Coal ash, Ash deposition, Gasification, CCSEM

I. Naruse Toyohashi University of Technology

Abstract

Precise and quantitative behaviors on ash deposition phenomena in high-temperature coal gasification was studied, using a horizontal pulverized coal gasifier with a pre-combustor to produce a vitiated air with high temperature and/or high oxygen concentration. The deposition experiment was carried out by inserting a water-cooled tube into the gasifier. Three types of coal with a different melting temperature and ash content were burned. The deposition phenomena were quantitatively and visually discussed by analyzing ash particles in the raw coal, the reacting particles and the deposition layer by means of CCSEM.

As a result, quantity of the ash deposition on the tube surface increases with a decrease of the melting temperature of coal ash. Index of easiness of the ash deposition depended on the coal type. The index related to content of included mineral in a raw coal. As shown in the bottom figure, deposition of fine particulates of about 3 μm became a trigger of initial deposition at the stagnation point of tube even if the different types of coal were burned. The chemical compositions of ash particles in the reacting particles differed from those in the initial deposition layer. This suggests that the chemical compositions also contribute to the ash deposition phenomena.

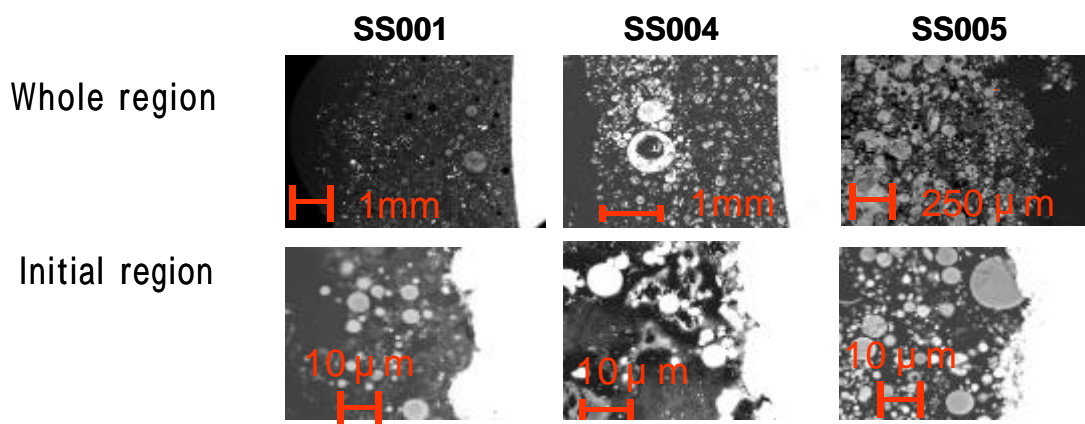


Figure Cross-sectional SEM photos of ash deposition layer