

DIRECT MEASUREMENT OF THE ADHESIVE FORCE BETWEEN FLYASH PARTICLES FROM INCINERATION PLANT AT HIGH TEMPERATURES

T. Masuda^{1,2}, A. Ingram¹, Z. Zhang¹, J.P.K. Seville¹

¹*School of Chemical Engineering, The University of Birmingham, Birmingham, UK*

²*Yokohama Research and Development Centre, Mitsubishi Heavy Industries, LTD., Yokohama, Japan*

Ceramic filters, which are known to be highly efficient gas filtration devices, are often used for dust reduction in thermal power plants operating at high temperatures. Therefore it is expected that ceramic filters may also be applied to incineration plants, for the purpose of reduction of dioxin, high efficiency power generation and effective utilization of fly ash particles. However fly ash particles in incinerators are different from those in power generation plants. Particular concern is particle adhesion at high temperatures, which affects the pressure drop and ease of cleaning of the filters. This may determine whether it is feasible to apply ceramic filters to dust reduction in incinerators. In this work, the adhesive force between fly ash particles from an incinerator was measured directly using a novel micromanipulation technique. Fly ash particles were heated on a hot stage under a microscope and the adhesive force between particles at temperatures from ambient to 580 C was measured. The sizes of the coagulating particles ranged from 100 to several hundreds of microns. Results indicate that the adhesion force of the fly ash particles increases with temperature. Microscopic observations showed that the increase of adhesion was mainly caused by formation of a liquid bridge between particles at higher temperatures. The details of this technique and the experimental findings were presented.