

Observation of morphological behavior with heating of volcanic ash by in situ particle image analysis

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1. Introduction

An *in-situ* observation to particle morphology under any perturbations is well used to understand physical chemistry behavior of mineral particles. With using by a heating response as a one of perturbation is interesting to investigate to melting and crystallinity of minerals. One of drawback to particle morphology investigation by a manually microscope is a qualitative approach rather than quantitative approach.

Our group has reported particle characterization and classification of a volcanic ash fine particle using by images for the purpose of determining particle size distribution which is based on described in ISO13322. The particles are appropriately dispersed and fixed on an optical microscope implemented an automated real time particle image analysis function on software. This report will be discussed for observation of morphological behavior with heating of volcanic ash by in situ particle image analysis.

2. Material and Method

In this study, the volcanic ash was sampling from Ito flow in Kagoshima. As a statistical particle image analysis, an automated particle image analyzer, Morphologi G3-SE (Malvern Instruments) was used for evaluation of particle size and shape. The observation mode was reflectance mode magnification was 75x in total magnification. The sample was dispersed with SDU (Sample Dispersion Unit) which attached Morphologi G3-SE. Number of measured particles was several hundred and a parameter filter function on software was used based on shape and pixel number of particle image. As a heat stage, Linkam stage TS1500 (Japan Hightech Co., Ltd.) was use for sample heating up to 1500 °C. A sample particle was dispersed on a platinum sample cell by SDU.

3. Result and Discussion

As a result of feasibility study, Fig.1 shows the observed images at 30 °C, 500 °C, 1000 °C, and 1500 °C. No change was observed between 30 °C and 1000 °C. However, the significant change of particle morphology by melting was observed between 1000 °C and 1500 °C. Refer to result of feasibility test, the temperature range from 1000 °C to 1500 °C is appropriate for this investigation.

4. Conclusion

In summarize of this study, it was possible to observe particle morphology change by heating. This report will be more discussed about the application and the capability for more quantitative investigation by particle image analysis.

Keywords: volcanic ash, microscopy, particle image analysis, particle diameter, particle distribution

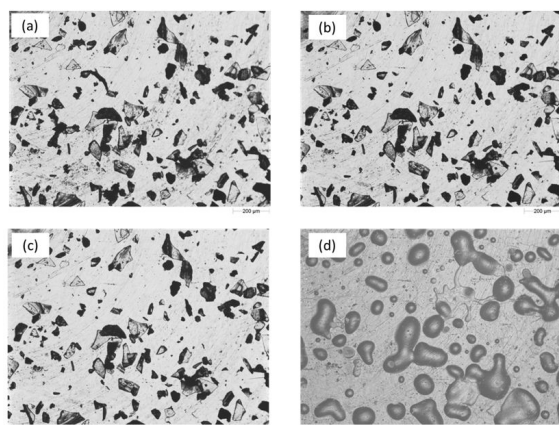


Fig.1 Particle morphology change under heating. (a)30°C (b)500°C (c)1000°C (d)1500°C