

Density measurement of magmas under high pressure by the sink/float method

*Akio Suzuki¹

1. Department of Earth Science, Graduate School of Science, Tohoku University

Density of magmas (silicate melts) is an important property, which controls its transportation in the Earth's interior. Therefore, various studies have been carried out under high pressure. We have engaged in the density measurement under the static compression. By the measurement of the X-ray absorbance, we can determine the density. However, the synchrotron X-ray beam is essential for high pressure experiments. The density of melt under high pressure can be restricted by observing the sinking and the flotation of the buoyancy markers in the melt. This sink/float experiments can be conducted without the synchrotron beam. Using the sink/float method we have measured various compositions of magmas (silicate melts). The buoyancy marker is selected with considering the following requirements. (1) The marker crystal does not react with the melt. (2) Its equation of state is accurately determined under high pressures and high temperatures to calculate the density of the marker. In the experiments, initially the marker crystal is loaded at the center of the sample container, and it is surrounded by the sample powder. At high pressure the sample was heated to be molten. If the heating duration is sufficient, the marker crystal sinks or floats depending on the density difference between the surrounding melt and the marker. The sample is quenched under high pressure to hold the position of the marker crystal. The recovered sample is cut to confirm the position of the marker. In the presentation, we demonstrate the recent development of the density measurement of magmas (silicate melts) by the sink/float method.

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