Development for the density measurement method of the liquid using the X-ray radiography technique under high-pressures

Akifumi Nozawa[1]; Ken-ichi Funakoshi[1]

[1] JASRI

The falling-sphere method was applied to measure the density of liquid under high-pressures and high-temperatures. Using the falling-sphere method, the density of liquid can be estimated from the falling velocities of various spheres using Stokes equation. Although the falling-sphere measurements attempted by both of the quench (Fujii and Kushiro, 1977) and the X-ray radiographic method (Kanzaki et al. 1987), the accurate density did not obtained, because there were some problem for the experimental techniques. In this study, we carried out the density measurements by falling-sphere method using X-ray radiographic technique.

Experiments were carried out using the multi-anvil press installed at the BL04B1 of the SPring-8. We have measured the density of liquid sulfur up to 5.7GPa, 660C. We used the several kinds of metal spheres(Ni, Mo, Ta, W, Au, Pt) and each sphere was set on the top of the sulfur sample. When the sulfur was melted, these spheres fell down into the liquid, and its radiographic images were observed by CCD camera. If the falling velocities of different densities of sphere were obtained, the density of liquid is determined from Stokes equation. We have determined the density of liquid sulfur to 3.03+-0.07g/cm3 in 3.8GPa, 472C. Here, we will discuss experimental problems and techniques about the falling sphere method under high temperatures and high pressures.