

Equation of state for liquid FeS at high pressure and temperature

Keisuke Nishida[1]; # Akio Suzuki[1]; Eiji Ohtani[2]; Tatsuya Sakamaki[3]; Satoru Urakawa[4]; yoshinori katayama[5]

[1] Inst.Mineral. Petrol.& Econ. Geol., Faculty of Sci.,Tohoku Univ; [2] Depart. Earth and Planetary Materials Science, Tohoku Univ; [3] Inst.Mineral. Petrol.& Econ. Geol., Faculty of Sci.,Tohoku Univ.; [4] Dept Earth Sci, Okayama Univ.; [5] JAEA QuBS

Density of liquid Fe-alloy is a basic physical property in order to understand the composition and dynamics of the cores of planetary bodies. There are only a few studies of density measurements performed at high pressure. Density measurements of liquid Fe-S using sink/float method have been reported by Balog et al. (2003) and Nishida et al. (2006). Density measurements of liquid Fe-S (S = 10, 20, and 27 wt%) using X-ray absorption method were carried out in the pressure and temperature ranges of 1.5 - 6.2 GPa and 1500 - 1780 K, respectively (Sanloup et al. 2000). Chen et al. (2005) measured the density of liquid FeS at 4.2 GPa and 1573 K using X-ray absorption method from the radiography image. A two-dimensional variation in transmitted X-ray intensity of the sample was obtained on an exposure.

In this study, the density of liquid FeS was measured up to 5 GPa and temperature range of 1000 - 1900 K using X-ray absorption method at BL22XU beamline, SPring-8, Japan. The obtained density of the liquid FeS at 3.7 GPa and 1800 K is 4.68 g/cm³. Isothermal bulk modulus (K_T) of the liquid FeS was obtained using this results. The obtained K_T was 20(2) GPa, corresponding to K' values of 8.