

Simultaneous measurement of liquid Fe-C density and sound velocity at high pressure

SHIMOYAMA, Yuta^{1*} ; TERASAKI, Hidenori¹ ; TAKUBO, Yusaku¹ ; URAKAWA, Satoru² ; KUWABARA, Souma¹ ; KATAYAMA, Yoshinori³

¹Graduate School of Science, Osaka University, ²Department of Earth Sciences, Okayama University, ³Japan Atomic Energy Agency

The cores of terrestrial planets, such as Mercury, Mars and Moon are considered to contain some light elements. The effect of light elements on density and bulk modulus of liquid iron is necessary for estimating of these core compositions. Sound velocity of liquid iron alloys is also important for identifying light elements in the core by comparison with observed seismic data.

In this study, we have measured density and sound velocity of liquid Fe-C at SPring-8 beamline BL22XU. Density was measured using X-ray absorption method (Katayama et al., 1993) and sound velocity was measured using pulse-echo overlapping method (Higo et al., 2009). Experimental conditions were 1.2-2.9 GPa and 1650-1850 K. Obtained density values of this study were consistent with our previous results (Shimoyama et al., 2013). In sound velocity measurement, we could observe clear sample wave signal. Measured compressional wave velocity of liquid Fe-C was found to increase with pressure.

Keywords: Density, Sound velocity, liquid Fe-C