

Alに富む含水ブリッジマナイトの圧縮特性

Compressibility of Al-bearing hydrous bridgmanite

*柿澤 翔¹、井上 徹¹、西 真之^{1,2}、有本 岳史¹、丹下 慶範³、肥後 祐司³

*Sho Kakizawa¹, Toru Inoue¹, Masayuki Nishi^{1,2}, Takeshi Arimoto¹, Tange Yoshinori³, Yuji Higo³

1.愛媛大学地球深部ダイナミクス研究センター、2.東京工業大学地球生命研究所、3.高輝度光科学研究センター

1.Geodynamics Research Center, Ehime University, 2.Earth-life Science Institute, Tokyo Institute of Technology, 3.JASRI

Water is the most important volatile component on the Earth, because it has significant influences on the chemical and physical properties of mantle minerals (e.g., melting temperature, electrical conductivity, and so on). The nominally anhydrous minerals (NAMs) can contain small amount of water. In particular, wadsleyite and ringwoodite which are the major constituent minerals in the mantle transition zone can contain ~2-3 wt% water (e.g., Inoue et al., 1995; Kohlstedt et al., 1996). Recently, hydrous ringwoodite contained ~1.5 wt% water was discovered by Pearson et al. (2014) as inclusion in ultra deep diamond. This observation implies that the mantle transition zone contains some water at least locally. On the other hand, water solubility of bridgmanite which is the most abundant mineral in the lower mantle, is a matter of debate (e.g., Bolfan-Casanova et al., 2000, 2003; Murakami et al., 2002; Litasov et al., 2003). In this situation, Al-bearing hydrous bridgmanite contained ~0.8 wt % water with 4.7 wt% Al₂O₃ was synthesized by Inoue et al., (in prep). The dominant substitution mechanism was suggested to be Si⁴⁺ → Al³⁺ + H⁺. However, the physical properties of Al-bearing hydrous bridgmanite under high pressure are unknown. In this report, the compressibility of Al-bearing bridgmanite is tried to determine.

In situ P-V-T experiments of Al-bearing hydrous bridgmanite were conducted up to 50 GPa and 900 or 1500 K, using multi-anvil high pressure apparatus (SPEED-Mk.II) with sintered diamond 2nd stage anvil at SPring-8 BL04B1. Al-bearing hydrous bridgmanite was softer than MgSiO₃ bridgmanite below 27 GPa. Then with increasing pressure up to 40 GPa from 27 GPa, The drastic softening was observed. Above 40 GPa, it become the steady state as below 27 GPa. This phenomenon looked like the symmetrization of hydrogen bond in the case of iceVII - iceX transformation (Sugimura et al., 2008). In this presentation, we will report the compressibility of Al-bearing hydrous bridgmanite in detail.

キーワード：下部マントル、ブリッジマナイト、水、圧縮特性

Keywords: lower mantle, bridgmanite, water, compressibility