Hydrous bridgmanite: possible water reservior in the lower mantle

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Recently hydrous ringwoodite was found in a natural diamond inclusion [1], which includes ~1.5 wt% H_2O. In addition, the experimental studies show that wadsleyite and ringwoodite, which are the most abundant minerals in the mantle transition zone, can contain water up to 2.2–2.7 wt% [e.g. 2, 3]. These results show that the mantle transition zone is a strong water reservoir in the Earth's interior, and at least locally, hydrous. On the other hand, the water storage capacity in the lower mantle is a matter of debate.

In the last Goldschmidt conference, we presented that Al-bearing bridgmanite (Mg-silicate perovskite) can contain significant amount of water [4,5]. The possible H substitution mechanism can be proposed by means of chemical compositional relationship between Mg, Si, Al and H. In addition, we clarified the possible H position in the bridgmanite by means of the powder neutron diffraction analysis in J-PARC, together with the single crystal X-ray structural analysis in PF. This shows that the significant amount of H (water) can be stored in the Earth's lower mantle.

We have also conducted the equation of state and the ultrasonic wave velocity measurements of hydrous bridgmanite in BL04B1, SPring-8 to determine the elastic wave velocities and the elastic properties under high pressure and temperature condition. In this talk, we will introduce about the recent progress of our "hydrous bridgmanite" project.

[1] Pearson *et al*. (2014) Nature **507**, 221-224. [2] Inoue *et al*. (1995) Geophys Res Lett **22**, 117-120. [3] Kohlstedt *et al*. (1996) Contrib Mineral Petrol **207**, 345-357. [4] Inoue *et al*. (2015) Goldschmidt2015. [5] Kakizawa *et al*. (2015) Goldschmidt2015.