

## The stability and water solubility of possible Al-bearing high pressure hydrous and nominally anhydrous minerals in the mantle

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Recent discovery of hydrous ringwoodite in natural diamond inclusion [1], whose water content was ~1.4-1.5 wt%, shows that the mantle transition zone is really hydrous condition, at least in some regions. In addition, a new dense hydrous magnesium silicate, phase H [2] [3] was found by first-principle calculation and experimental studies, and Al-rich phase D was also found [4]. Thus the study on the water in the mantle becomes a hot topic again after the finding of hydrous wadsleyite and hydrous ringwoodite (e.g. [5] [6]).

Our group has been conducting the study for the stability and water solubility of hydrous and nominally anhydrous minerals, and the recent target is to clarify the effect of Al. In this process, we found the new Al-bearing hydrous phase in the upper mantle condition, and that Al-bearing bridgmanite (Mg-silicate perovskite) can contain significant amount of water. So we are doing those projects to clarify the maximum water solubility in P-T conditions, the structure by single crystal X-ray and powder neutron diffractions, the equation of state and the elastic wave velocity. In this presentation, we will introduce the recent progress of the water in the mantle based on our projects.

[1] Pearson *et al.* (2014) *Nature* **507**, 221-224. [2] Tsuchiya (2013) *Geophys. Res. Lett.* **40**, 4570-4573. [3] Nishi *et al.* (2014) *Nature Geoscience* **7**, 224-227. [4] Pamato *et al.* (2015) *Nature Geoscience* **8**, 75-79. [5] Inoue *et al.* (1995) *Geophys. Res. Lett.* **22**, 117-120. [6] Kohlstedt *et al.* (1996) *Contrib. Mineral. Petrol.* **123**, 345-357.