SESSION 1 – *cont.*

Light Elements and Organic Matter from ISM to Small Bodies

DAY 1 – Feb.17, 2016
4:30 pm – 7:10 pm

ORIGIN OF EXTREMELY HEAVIER HYDROGEN ISOTOPIC COMPOSITIONS OF PHOSPHATE MINERALS FROM LL4-6 ORDINARY CHONDRITES. S. Itoh[1], Y. Higashi[1], K. Yanai[2], S. Russell[3], J. Greenwood[4] and H. Yurimoto[2]. [1]Dept. Earth Planet. Sci., Kyoto University, kitashirakawa oiwakecho sakyoku,Kyoto,606-8502,JAPAN.Email:sitoh@kueps.kyoto-u.ac.jp. [2]Natural History Sciences, Hokkaido University. [3]Dept. Earth Sci, Natural History Museum, London. [4]Dept. Earth Envi. Sci, Wesleyan University.

Recently many studies focused on the origin of water in the solar system and Earth with Chondrite, differentiated meteorite, Moon and Mars (e.g., [1][2][3]). One of significant possible precursor of H_20 ice in Earth's orbit could be cometary ice but it is unclear. Deloule and Robert (1995) also reports that the hydrogen isotopic compositions of phyllosilicate from LL3.0 Semarkona OC are D-rich (~4000permil) and suggest the origin of this D-rich isotopic compositions come from the interstellar space or in the outer regions of the solar nebula, like cometary ice [2]. This results suggest that, as the Itokawa S-type asteroids close to Earth's orbit, the heavily hydrogen isotopic compositions of LL OCs resulted from cometary ice close to the earth. However, there is no systematic study of hydrogen isotopic compositions of LL4-6 OCs because it is difficult to estimate the planetsimal hydrogen isotopic compositions of water due to very low water contents and contamination from adsorbed water [3]. In this study, we applied the in-situ measurement technique [1] of water content and hydrogen isotopic compositions of phosphate minerals from LL4-6 OCs by SIMS. All D/H ratios in the phosphate minerals are D-rich (δD ~ +2000 to +25000). Water contents of these phosphate shows the range of 10-100ppm and that of LL6 is the highest water content and D-rich isotopic compositions (δD ~ +10000 to +25000). These results suggest that the origin of D-rich hydrogen isotopic compositions of LL6 phosphate mineral is resulting from extra-planetary with cometary ice. In this talk, the model of D-rich water exchange among apatite and water in the LL parent body using hydrogen diffusion coefficient of apatite. [6]. [1] Greenwood et al. (2008) ***Geophys. Res. Lett.***, 35, L05203. [2] Greenwood et al. (2011) ***Nature Geosci.***, 4, 79-82. [3] Robert, (2011) ***Science***, 293, 1056–1058. [4] Deloule and Robert (1995) *GCA,* **59**, 4695-4706. [5] Robert (2003) *Space science reviews*, 106, 87-101. [6] Itoh et al. (2015) Goldschmidt 2015 abstract: 5138.

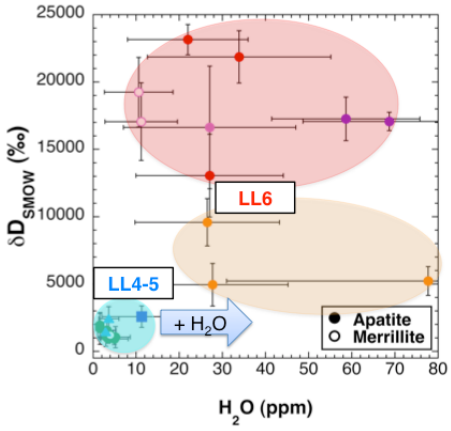

Fig. 1. δD vs H_2O in phosphate from LL OCs.