OXYGEN-ISOTOPIC COMPOSITION OF MAGNETITE IN THE DOM 03238 CO3.1 CHONDRITE.

B.-G. Choi[1], S. Itoh[2], H. Yurimoto[2], A. E. Rubin[3], J. T. Wasson[3] and J. N. Grossman[4]. [1]Dept. Earth Sci. Edu. SNU. Seoul 151-748, KOREA (bchoi@snu.ac.kr). [2]Dept. Natural History Sci. Hokkaido Univ. Sapporo 060-0810, JAPAN. [3]IGPP, UCLA, Los Angeles, CA 90095, USA. [4]USGS, Reston, VA 20192, USA.

Magnetite is a key mineral for understanding the O-isotopic compositions of fluids in chondritic parent bodies [1]. Oxygen isotopes of magnetite in various unequilibrated chondrites that have been studied by ion microprobe show higher $\Delta^{17}O$ values than other phases in the host rocks [2-7]. Magnetite in CO chondrites has not been previously studied mainly because of its rare occurrence (typically <0.1 vol.%). Dominion Range (DOM) 03238 is a unique CO chondrite having high (7.6 vol. %) magnetite content [8]. It was classified as subtype 3.1 based on Cr contents in ferroan olivine [8]. We studied the occurrence of magnetite \in DOM 03238 and measured their oxygen-isotopic compositions along with those of adjacent silicate minerals using the Cameca 1270 ion microprobe at Hokkaido University.

Most metal grains in both chondrules and the matrix of DOM 03238 have been replaced by magnetite. Surviving metal grains are generally Ni rich. There are many magnetite grains or magnetite-bearing assemblages that extend from chondrules into matrix; this indicates *in situ* formation of magnetite. Based on their occurrence, magnetite grains can be divided into two groups: (1) subhedral magnetite occurs either in chondrules or as isolated grains in the matrix and (2) irregular magnetite occurs mainly in circular or ellipsoidal opaque assemblages.

The range of O-isotopic compositions in magnetite in DOM 03238 is very similar to those of Allende and Ningqiang [2,5,7]. The weighted average of $\Delta^{17}O$ values is -2.3±0.4‰ (n=7), whereas that from adjacent forsterite is -5.2±1.3 (n=4). The two magnetite groups differ in $\delta^{18}O$ values: +4.0±0.8‰ and 0.2±0.8 for the first and second groups, respectively. The $\Delta^{17}O$ values are not distinguishable within analytical uncertainty: -2.0±0.6‰ and -2.5±0.6.

Petrological observations and O-isotopic data show that magnetite in DOM 03238 formed by alteration of pre-existing metallic phases in the parent body, a petrogenetic history similar to that of other magnetite-bearing type-3 chondrites [2-7]. Relatively high magnetite abundances require unusually large amounts of oxygen-bearing fluids (possibly H_2O); however, there is little additional evidence for aqueous alteration in this meteorite [8]. The similarity of the $\Delta^{17}O$ values (-2 to -3‰ in averages [2,5,7]) of magnetite in Allende (CV3), Ningqiang (C3-an) and DOM 03238 (CO3) indicates that fluids with such O-isotopic compositions were common in carbonaceous-chondrite parent bodies.

[1] Yurimoto, H. et al. 2008, Reviews in Mineralogy and Geochmistry series, 68, 141-168. [2] Choi, B.-G. et al., 1997, Earth Planet. Sci. Lett., 146, 337-349. [3] Choi, B.-G. et al., 1998, Nature, 392, 577-579. [4] Choi, B.-G. et al., 2000, Meteoritics Plant. Sci. 35, 1239-1248. [5] Choi, B.-G. et al., 2003, Geochim. Cosmochim. Acta. 67, 4655-4660. [6] Greenwood, J. P. et al., 2002; Geochim. Cosmochim. Acta. 64, 3897-3911 [7] Hsu, W., 2005, Earth Planet. Sci. Lett., 243, 107-114 [8] Grossman J. N. & Rubin A. E., 2006. Abstract #1383. 37th Lunar & Planetary Science Conference.