

PECULIAR REE PATTERN IN A GRANULAR-OLIVINE INCLUSION FROM THE MURCHISON (CM2) CHONDRITE. M. Inoue¹ and N.

Nakamura². ¹Kanazawa Univ., Ishikawa 923-1224, Japan, mutsuo@lrl.ku-unet.ocn.ne.jp, ²Kobe Univ., Kobe 657-0059, Japan, and now at NASA Johnson Space Center, Houston, TX 77058-3696, USA

Introduction: The CM chondrites as well as CV and CO contain amounts of inclusions (e.g., chondrules and CAIs). The inclusions from CM chondrites have preserved the abundant information about the formation and evolution processes of aqueously altered meteorites [1]. The abundances of rare earth elements (REE) in various meteoritic materials are expected to be a unique tool to constrain their geochemical environments. During systematic investigation of REE abundances in CM chondrules, we have encountered a chondrule-like inclusion from the Murchison chondrites, *MC-9*, carrying a peculiar REE abundance pattern. In this study, we report analytical results of REE (La, Ce, Nd, Sm, Eu, Gd, Dy, Er, Yb, Lu), alkalis (K and Rb), alkaline earths (Ba, Sr, Ca, Mg) and Fe by isotope dilution mass spectrometry (IDMS) for the inclusion along with petrographic examinations.

Experimental setup: The inclusion, *MC-9* (mass = ~2.8 mg) was separated from Murchison whole rock fragment by hand-picking through freeze-thaw processing. This specimen was broken into approximately two parts; One part (38wt.%) of a whole inclusion was used for preparation of a polished thin section for petrographic examinations and the rest (62wt.%) was used for analysis of IDMS.

Results and Discussion: *MC-9* exhibits homogeneous granular-olivine (Fa; 0.385) texture carrying abundant glass and phosphate inclusions and has no sign of aqueous alteration. It is notable that *MC-9* indicates smoothly light-REE enriched REE pattern together with a large negative Eu anomaly (CI-normalized La/Lu ratio = 3.0; Eu/Eu* = 0.33). This smooth REE fractionation can not be explained as due to gas/solid REE fractionation in the nebula observed in CV and CO chondrules and inclusions [2] and REE features reflecting tetrad effect in aqueously altered CM chondrules [3], but are well understood as results of liquid/solid interaction. We suggest that the observed REE pattern of *MC-9* provides a new information about formation and evolution processes of this inclusion in the early solar system and/or the CM parent bodies.

References: [1] Brearley A. J. 2006. *Meteorites and the Early Solar System II*, edited by Lauretta D. S. and McSween H. Y. Jr., pp587-624. [2] Misawa K. and Nakamura N. 1988. *Geochim. Cosmochim. Acta* 52:1699-1710. [3] Inoue M. et al. 2008. *Geochim. Cosmochim. Acta*. (submitted).