OXYGEN-ISOTOPE COMPOSITION OF RELICT GRAINS IN CARBONACEOUS-CHONDRITE CHONDRULES. T. Kunihiro, A. E. Rubin, K. D. McKeegan and J. T. Wasson, University of California Los Angeles, CA 90095-1567 USA

Introduction: Type-II porphyritic chondrules in CO3.0 chondrites contain low-FeO relict grains [1]; overgrowth thickness are thin, ~5 µm. Similarly thin overgrowths occur on coarse high-FeO olivine phenocrysts, suggesting that these are also relict grains. Recycled chondrule materials thus constitute the dominant component of type-II chondrules, suggesting that these chondrules formed relatively late during the chondrule-forming period. Flash evaporation and recondensation causes the composition of the solid precursors to move towards the composition of the gas. Microscale *in situ* analyses of O-isotope compositions can help assess the degree of heterogeneity among chondrule precursors, as preserved as relict grains, and help us understand the nebular processes that caused these isotopic differences.

Experimental: The CO3.0 Yamato 81020 chondrite [2] is well suited for this study because it experienced minimal aqueous/thermal alteration. Relict and host olivine grains in six type-II chondrules from Yamato 81020 were analyzed for their O-isotopic compositions. The microanalyses were performed by secondary-ion-mass spectrometry with the Cameca IMS-1270 instrument at UCLA in a peak-jumping mode.

Results: Five of the chondrules contain low-FeO relict grains with Fa<10 and host phenocrysts with Fa15-35; one chondrule has a Fa25 relict and Fa60 phenocrysts. The results of the O-isotope analyses are summarized in Figure 1.

Discussions: Because Fe is reduced at high and oxidized at low nebular temperatures in a solar gas, one might expect relict-grain-bearing chondrules to record changes in the $\Delta^{17}O$ of the nebular gas. Five low-FeO relict grains have low $\Delta^{17}O$ (=$\delta^{17}O$-0.52• $\delta^{18}O$) composition relative to the host phenocrysts. The difference between relict grains and phenocrysts varies from 0 to 3‰ in $\Delta^{17}O$. The results are similar to those of Jones *et al*. [3] and the unpublished study of Wasson *et al*. [4]. Because relicts predate host phenocrysts, the observed heterogeneity is consistent with the picture that there was an upward drift in $\Delta^{17}O$ with time in the CO-chondrule forming region. However, one high-FeO (Fa20-30) relict grain has a higher $\Delta^{17}O$ value compared to the host phenocrysts. This either implies that the drift in $\Delta^{17}O$ was not monotonic or, more likely, that sampling heterogeneities were present on the scale of chondrule precursors.

References: [1] Wasson and Rubin (2003) *GCA* **67**, *in press*. [2] Kojima *et al*. (1995) *Proc. NIPR Symp. Antarct. Meteorit.* 8, 79-96. [3] Jones *et al.* (2000) *MAPS* 35, 849. [4] Wasson *et al.* (2000) *MAPS* **35**, A166 (abs).

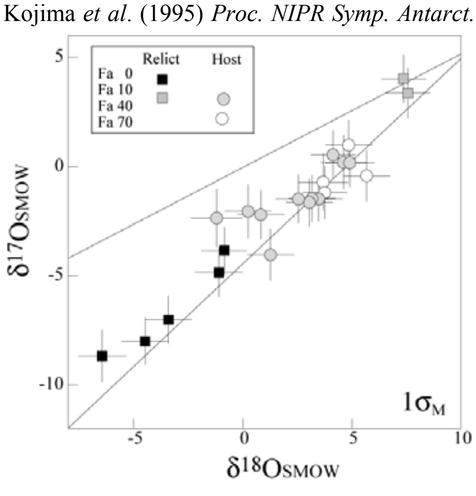

Fig. 1: O- isotope distribution of relict grains and host phenocrysts from Y81020 type-II porphyritic chondrules.