ADDITIONAL Sr ISOTOPIC HETEROGENEITY IN ZAGAMI OLIVINE-RICH LITHOLOGY.

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Introduction: Prior isotopic analyses of Zagami have established differing initial $^{87}Sr/^{86}Sr$ (I_{Sr}) ratios of among Zagami lithologies, fine-grained (FG), coarse-grained (CG), and dark mottled lithologies (DML) [1–3]. The Zagami sample (KPM-NLH000057) newly allocated from the Kanagawa Prefectural Museum of Natural History contained DML and the Ol-rich lithology [4] which included more ferroan olivines (Ol-rich: $Fa_{97–99}$ vs late-stage melt pockets: $Fa_{90–97}$ [1]). We have combined mineralogy-petrology [4] and Rb–Sr isotopic studies on the Kanagawa Zagami sample, which will provide additional clues to the genesis of enriched shergottites and to the evolution of Martian crust and mantle.

Results and Discussion: A fragment of the Kanagawa Zagami sample (,54–1), weighing 241 mg, was processed and eight samples were separated for isotopic studies. Saw-dust samples (,05–1 and ,55) were also analyzed. Whole-rock (WR1) and saw-dust (,55) samples show enrichments of Rb, Sr, Sm, and Nd, which is comparable to those reported for the highly evolved basalt, Los Angeles (LA) [5] but the abundances are 1.5–3 times higher than those of Zagami FG, CG, and DML [2,3]. Ten new analyses of Kanagawa Zagami yield a Rb–Sr age of 169 ± 2 Ma (2σ) for $\lambda(^{87}Rb) = 0.01402\ Ga^{-1}$ with an $I_{Sr} = 0.721412 \pm 0.000008$ (2σ). Two fractions, "Opq (ρ>4.0)" and "Px residue (2.85<ρ<3.7)", deviate 9.1 and 3.6 epsilon-units, respectively, from a best-fit line, suggesting further isotopic heterogeneities. Excluding these data we obtain almost identical results: T = 169 ± 6 Ma (2σ), $I_{Sr} = 0.721413 \pm 0.000020$ (2σ). On a (T, I_{Sr})-diagram, DML and CG plot at identical positions [2,3], but FG [2,3] and the Ol-rich lithology plot above and below, respectively, CG and DML and are clearly resolved. Moreover, the Ol-rich lithology plots just above the evolved shergottites, LA and Dho 378 Plag [5,6]. Thus, the Ol-rich lithology in Kanagawa Zagami is considered to be different from Zagami FG, CG, and DML not only in texture and chemistry [4], but also in Sr isotopic signatures of parent magma. It seems unlikely to produce the isotopic heterogeneities (i.e. lower I_{Sr}) in the Ol-rich lithology as a latest-stage product of fractional crystallization [1,7]. An implication is that new magma whose Sr isotopic signature was similar to those of the highly evolved shergottites was infiltrated into a nearly solidified body and cooled rapidly at a final-stage of the Zagami formation. This scenario is consistent with the mineralogical and petrological observations [4] as well as the existence of Sr isotopic heterogeneities within the Ol-rich lithology.

References: [1] McCoy T. J. et al. 1999. *Geochim. Cosmochim. Acta* 63: 1249–1262. [2] Nyquist L. E. et al. 2006. *Meteoritics & Planetary Science* 41: A135. [3] Nyquist L. E. et al. 2010. *Meteoritics & Planetary Science* 45: A154. [4] Niihara T. et al. 2012. *Meteoritics & Planetary Science* 47: *This volume*. [5] Nyquist L. E. et al. 2000. *Meteoritics & Planetary Science* 41: A121. [6] Nyquist L. E. et al. 2006. *Antarctic Meteorites* XXX: 89–90. [7] Treiman A. H. and Sutton S. R. (1992). *Geochim. Cosmochim. Acta* 56: 4056–4074.