Sn isotopes fractionation during cooling of the lunar magma ocean

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The internal structure of the Moon is assumed to result from the cooling and the crystallization of the lunar magma ocean (LMO). It is largely accepted that anorthitic plagioclase starts to crystalize between 68% and 78% of solidification of the LMO [1, 2] and forms a flotation crust at the surface of the denser residual LMO. After ~95% of solidification, a thin Potassium (K), rare earth elements (REE) and Phosphorus (P) rich layer (KREEP) crystallizes at the base of the anorthitic crust [3]. In a recent study [4], it was shown that ferroan anorthosites (FAN) exhibit an extensive range of δ^{66}Zn. This was interpreted as the result of redistribution and mixing of Zn during cataclasis of FAN.

In this study we report Sn isotopic composition of FAN and KREEP samples. Because Sn and Zn have similar 50% condensation temperature (704K and 726K respectively in solar nebula conditions [5]), one can expect that both elements should be similarly affected by condensation and evaporation processes. This study aims at assessing the causes of Sn and Zn isotopic fractionation of moderately volatile elements in FAN and KREEP samples as a consequence of the crystallization of the LMO or of surface redistribution through impacts or eruptions.

[1] Lin *et al.* (2017) *Nature Geoscience,* **10,** 14. [2] Sun *et al.* (2017), *GCA*, **206**, 273-295. [3] Elkins-Tanton et al. (2011), *EPSL*, **304**, 326-336. [4] Kato et al. (2015), *Nature Communication*, **6**, 7617. [5] Lodders et al. (2003), *The Astrophysical Journal*, **591**, 1220.