REE MICRODISTRIBUTIONS IN NWA 4898: A HIGH-AL MARE BASALT.

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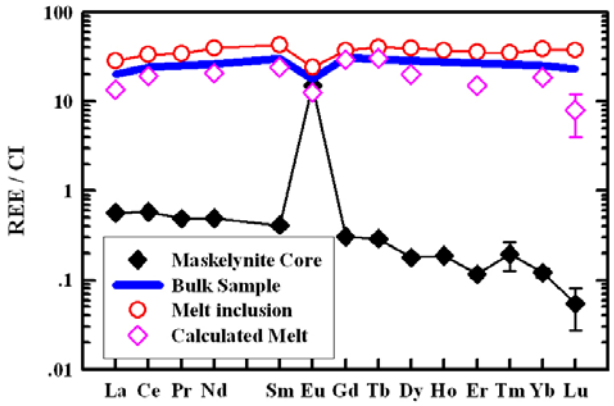
Introduction: Lunar meteorites extend diversity of lunar materials and yield complementary information on the formation and geological evolution of the Moon. Among them, NWA 4898 is a unique high-Al, low-Ti mare basalt [1]. It is much younger (3.6 Ga) than Apollo 14 high-Al basalts (3.95 to 4.33 Ga) and was derived from an extremely LREE-depleted mantle source [2]. Here we report ion microprobe analyses of REEs in NWA 4898 and provide additional constraints on its petrogenesis.

Results: NWA 4898 exhibits an intergranular texture, composed of fine-grained, chemically zoned pyroxenes and anorthite (maskelynite). Olivine occurs as megacrysts and often contains chromite and melt inclusions. Several shock-induced melt veins are visible in the sections. Pronounced normal REE zoning was observed in olivine, pyroxenes, and maskelynite, indicating shock metamorphism did not modify REE microdistributions in NWA 4898. Using the average REEs of maskelynite cores and appropriate partition coefficients for calcic plagioclase [3], we estimate the REE contents of the initial melt that anorthite crystallized from. The calculated melt has slightly lower REEs (20 %) than the bulk sample analyzed by [1]. Melt inclusions in olivine are 40 % higher than the bulk.



Discussion: REE abundances of the calculated initial melt are generally compatible with the bulk composition within analytical uncertainties (relatively large due to low REEs in maskelynite, especially HREEs). This suggests that NWA 4898 evolved in a close system and largely reflects geochemical characteristics of its source region. However, melt inclusions trapped in olivine (Fo_{70}) megacrysts do not represent the initial melt. They are enriched in CaO (13 to 16 wt%) and Al_2O_3 (13 to 15 %) but depleted in MgO (1.3 to 4.5 %), significantly more evolved [Mg/(Mg+Fe) = 0.27] relative to the bulk sample (0.46).

References: [1] Greshake A. et al. 2008. Abstract #1631. 29th Lunar & Planetary Science Conference. [2] Gaffney A. et al. 2008. Abstract #1877. 29th Lunar & Planetary Science Conference. [3] Snyder G. A. et al. 1992. *Geochimica et Cosmochimica Acta* 56:3809-3823.

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