

BABY BASALTIC SHERGOTTITE NWA 4480: AN EU-ANOMALOUS MARTIAN MAGMA RELATED TO "LHERZOLITIC" SHERGOTTITES

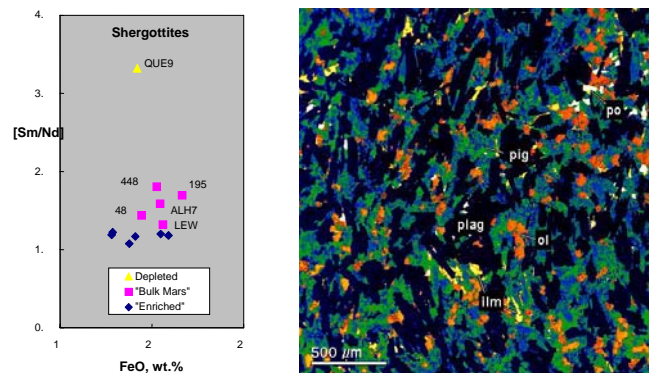
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A 13 gram, almost fully fusion-crusted, ellipsoidal stone found in Algeria is an unusual type of basaltic shergottite.

Petrography: The dominant matrix (mean grainsize 0.15 mm) consists of plagioclase laths (maskelynite, An_{58.4-61.0} Or_{1.6}), showing some preferred flow(?) alignment of long axes (Fig.1), olivine (Fa_{67.9-79.2}, FeO/MnO = 49-52) and complexly-zoned clinopyroxene with accessory Ti-chromite, ilmenite, Mg-Fe-bearing merrillite and rare Si-rich glass or silica polymorph. Clinopyroxene is patchily zoned from augite cores (Fs_{24.9-31.2} Wo_{35.3-31.1}, FeO/MnO = 30-32) to pigeonite rims (Fs_{55.4-56.4} Wo_{17.5-15.4}, FeO/MnO = 36). Glomerocryst regions are composed of coarser (0.5-0.8 mm) plagioclase (maskelynite, An_{66.3-68.5} Or_{0.3}, more calcic than in the matrix) and olivine with interstitial pigeonite and ilmenite.

Bulk Composition: INAA of two ~37 mg whole fragments of matrix material + fusion crust gave (in wt.%) Na 1.40, Fe 15.8, and (in ppm) Sc 39.7, Cr 1027, Ni <60, La 1.85, Sm 2.69, Eu 0.86, Tb 1.05, Yb 4.16, Hf 3.16, Th 0.24.

Magmatic Affinities: NWA 4480 is moderately LREE-depleted with elevated HREE abundances and a negative Eu anomaly. The chondrite-normalized Sm/Nd ratio is similar to values (1.4-1.7) for "lherzolitic" shergottites and basaltic shergottites NWA 480/1460 [1], and intermediate between those for "enriched" and depleted basaltic shergottites (Fig. 2). The abundance of Fe-rich olivine in NWA 4480 and its absence in NWA 480/1460 imply that different types of mafic liquids were derived from the "Bulk Mars" mantle source. Removal of plagioclase-rich glomerocrysts from the NWA 4480 parental magma may explain the matrix Eu anomaly.



References: [1] Barrat J.-A. et al. 2002. *MAPS* 37: 487-499; Irving A. and Kuehner S. 2003. *LPS XXXIV*, #1503; Nyquist L. et al. 2006. *LPS XXXVII*, #1723.