

GROVE MOUNTAINS (GRV) 020090: A HIGHLY FRACTIONATED LHERZOLITIC SHERGOTTITE.

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Introduction: Lherzolitic shergottites are a small group of martian meteorites, with only six of this group were reported. The first five, i.e. ALHA77005, Y-793605, LEW 88516, GRV 99027 and NWA 1950 share similar petrology and geochemistry, probably ejected from a same igneous unit on the Mars [e.g., 1-5]. GRV 020090 was classified as the sixth rock [6]. It may be unique, with a low abundance of olivine and high FeO-contents of Mg, Fe-silicates. In this work, we continue the study of GRV 020090, in order to clarify its petrogenesis.

Petrography: GRV 020090 consists of poikilitic and interstitial parts as other lherzolitic shergottites, but pyroxene oikocrysts contain much less olivine. Common presence of baddeleyite (up to $4\mu\text{m} \times 10\mu\text{m}$) in association with ilmenite is characteristic of GRV 020090. Another unique feature is coexistence of three distinct phases of feldspars that have been converted to maskelynite. Orthoclase and silica-excess feldspar usually occur at rims of the major plagioclase.

Mineral chemistry: The Fa-content of olivine shows a bimodal distribution, with a peak at Fa₃₃ for the grains in poikilitic part and another one at Fa₄₁ for those in the interstitial region. The interstitial pigeonite is also enriched in FeO-content (Fs₂₆₋₃₄). Chromite in the interstitial part usually coexists with ilmenite, and is TiO₂-rich (13.5-19.1 wt%) in comparison with the euhedral grains in the pyroxene oikocrysts (0.71-2.82 wt% TiO₂). Compositional ranges of feldspars are An₂₄₋₅₇Ab₄₁₋₆₈Or₁₋₉ for the major plagioclase, An₁₋₇Ab₃₆₋₅₁Or₄₃₋₆₃ for orthoclase, and An₃₇₋₆₂Ab₃₃₋₅₅Or₄₋₉ (based on only Na, K, Ca atomic ratios) with [Si₄O₈] up to 38mol% for silica-excess feldspar (here [] is vacancy). Excess of silica up to 52 mol% [Si₄O₈] was also found in orthoclase.

Discussion: (Na⁺, K⁺)+Al³⁺ can be substituted with []+Si⁴⁺ or Ca²⁺+2Al³⁺ with []+2Si⁴⁺, and presence of [Si₄O₈] was reported in plagioclase in lunar rocks [7]. The excess of silica of feldspars in GRV 020090 correlates negatively with the albite-content of K-poor plagioclase or KAlSi₃O₈-content of orthoclase, suggesting of presence of [Si₄O₈]. The high contents of [Si₄O₈] of feldspars, FeO-contents of Mg, Fe-silicates, TiO₂-contents of the interstitial chromite, and the common occurrences of orthoclase and baddeleyite suggest that GRV 020090 crystallized from a melt probably produced by low-degree partial melting, and it may sample an unique igneous unit on the Mars.

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