

**PETROGRAPHY AND MICROELEMENTS COMPOSITION OF THE LARGE LABRADORITIC
INCLUSION IN THE DAR AL GANI 1064 POLYMICT UREILITE.**

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Introduction: Ureilites are the second largest group of achondritic meteorites after the HED. Polymict ureilites are lithified regolith breccias of the ureilite parent body (-es) [1]. Feldspar-bearing rock fragments systematically observed in the polymict ureilites [2] are interpreted as products of igneous fractionation of a primitive chondrite source of the ureilites. Here we report the preliminary results of microscopic, microprobe and LA-ICP-MS investigations of a large feldspar rock fragment from the Dar al Gani 1064 polymict ureilite.

Results: DAG 1064 is a typical polymict ureilite comprised by ureilite rock and mineral fragments, feldspar-bearing fragments, melt rocks and carbonaceous chondrite clasts. The large (10x5x4 mm) light-grey fragment was recognized on the both surfaces of the broken meteorite fragment. The smallest of the broken parts and tiny fragment chips were mounted in epoxy and polished. The fragment comprises the polycrystalline feldspatic rock. The rock consists of 200- μm quasi-isometric feldspatic grains demonstrating blocky- or radial extinction in plane-polarized light. The grains contain sub-parallel multiphase lamellae <3 μm width and up to 50 μm length. A distance between the lamellae is \sim 3 μm .

The lamellae are graphic intergrowths (symplectites) of light- and dark-grey phases which are well recognized in reflected light but have very low BSE contrast relatively to the host feldspar. The minor areas of intersertal texture are unevenly distributed among the isometric feldspar grains and composed of chaotically intersecting feldspar lathes (5-10 μm width and 30-50 μm length). Polygonal interstitions (up to 5x10 μm) of the lathes are filled by the material similar to that of the lamellae. Rare tiny (<5 μm) isometric inclusions of Fe-sulfide with metal blebs occur in the feldspar fragment. Quite rare tiny Fe-Ni sulfide inclusions occur in the lamellae.

The feldspar is $\text{An}_{54.4\pm 2.7}\text{Ab}_{45.4\pm 2.7}$ (N=21) and corresponds to labradorite. The lamellae and interstitions are enriched in Mg, Fe and depleted in Al, Ca, Na in comparison with those of the host feldspar. The areas of interstitions enriched in light-grey phase contain up to (wt%) 69.2 SiO₂, 9 MgO, 3.35 FeO, 0.33 MnO, 0.64 Cr₂O₃ (MG#=84, Fe/Mn=10 at.). The largest dark areas of interstitions have composition $\text{An}_{28}\text{Ab}_{71.3}$ - $\text{An}_{36.2}\text{Ab}_{63.6}$; the compositions of largest light areas are nonstoichiometric and may represent a glass or unresolvable mixture of mineral phases.

The feldspar inclusion of DAG 1064 is poor in the lithophile elements in comparison to the CI chondrites composition with exception of Sr, Ba, Ta and Eu, however only Pb is lower than 0.1xCI. The REE concentrations generally are <0.7xCI except for Gd that is 1xCI; Eu is 18.6xCI, Eu/Eu*= \sim 23.4, Gd_n/Lu_n=1.87.

Discussion The DAG 1064 feldspar fragment is differing from all ureilitic feldspar-rich fragments by monomineral composition, medium-grained texture and large size. The feldspar fragment of DAG 1064 seems to be a pristine igneous rock. The feldspar composition is similar to that of labradoritic population of feldspar-bearing fragments [2]. The bulk Fe/Mg and Fe/Mn ratios of lamellae and interstitions composition are on the fractional crystallization trend of the labradoritic fragments [2] indicating that the fragments belongs to the population of the labradoritic fragments.

Low REE concentrations, positive Eu peak, depletion of the HREE and occurrence of opaque inclusions indicate the cumulus nature of the rock formed in a high reducing environment. However, the texture of the rock does not correspond to a cumulate. It can correspond to re-melted medium-grained monomineral feldspatic rock, but such rock could not be formed in the partial melt basin on the asteroidal parent body. Most possibly, the fragment is a partially re-melted large feldspar crystal, which may be a fragment of a very coarse-grained feldspar-pyroxene cumulate rock. The isometric feldspatic grains of the DAG 1064 feldspar fragment probably are relic blocks of precursor crystal; lamellae could be a result of precipitations formed during the high-temperature heating of the feldspar. The areas composed of feldspar lathes probably are domains of quickly crystallized melt localized between the large feldspar crystals. The texture of the Mg,Fe,Si-rich lamellae in the DAG 1064 feldspar is similar to that of linear precipitations observed in the more Ca-rich feldspar of ungrouped achondrite NWA 7325, however, lamellae in feldspar of Northwest Africa 7325 are Mg,Al-enriched and Si-depleted [3]. The feldspar fragment of the DAG 1064 most probably was re-melted due to a shock event, and shock-generated features of the plagioclase may be erased by thermal metamorphism.

References: [1] Downes H. et al. (2008) *GCA* 72:4825–4844. [2] Cohen B. A. et al. (2004), *GCA* 68: 4249–4266. [3] Goodrich C. et al. (2017) *GCA* 203:381–403.