IMPACT MELT CLASTS IN LUNAR METEORITES DAR AL GANI 262 AND DAR AL GANI 400.
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Introduction: Dar al Gani 262 and Dar al Gani 400 are lunar highland regolith breccias [1,2]. We have conducted a petrologic survey of these meteorites to characterize the crystalline melt breccia fragments for the purposes of future Ar-Ar dating of such melt breccias. Our section of Dag262 is 50 mm by 50 mm and contains 18 crystalline impact melt clasts larger than 100 μm in the smallest dimension (the size necessary for our Ar-Ar study). Our section of DaG400 is 150 mm by 120 mm and contains more than 30 crystalline impact melt fragments larger than 100 μm. Using the petrographic microscope and electron microprobe, we have characterized all 18 melt fragments in Dag262 and 6 of the largest melt fragments in DaG400.

The crystalline melt breccia fragments are distributed homogeneously throughout both samples. Most of the melt fragments in Dag262 are 150-400 μm in the largest dimension, but there is an exceptionally large melt breccia area occupying about one-third of our section. The clasts studied so far in DaG400 are the largest identified in the section, 600-2400 μm in the longest dimensions.

Petrography: Most of the melt clasts studied are microporphyritic crystalline melt breccias. These consist of plagioclase fragments ($An_{95-97.5}$) embedded in a microcrystalline plagioclase ($An_{95-97.5}$) matrix with an interstitial cryptocrystalline pyroxene-rich phase (<2 μm, therefore not analyzable with the electron microprobe). The grain size of the feldspathic and pyroxene-rich components in the matrix and the abundance of relic feldspar grains vary widely among the fragments studied. Olivine (Fo_{65-76}) is a common minor phase in these areas, occurring as minute (1 μm) round grains distributed evenly throughout the area.

A few clast-poor impact melts were identified. These consist of cryptocrystalline plagioclase and pyroxene lathes or needles in roughly equal proportions, indicating rapid quenching. There is a large (400 by 1400 μm) devitrified glassy melt vein running along one edge of our section of DaG262, containing minute (<0.5 μm) BSE-bright specks, presumably pyroxene-rich.

Three areas in DaG262 appear to be igneous rock fragments overprinted with a metamorphic texture. These consist of fine-grained poikiloblastic olivines (Fo_{60-80}) and pyroxenes (En_{65-80}) embedded in granoblastic feldspar ($An_{96-97.5}$). The ratio of Mg number in the pyroxenes to the olivines indicates that the olivine and pyroxene are in equilibrium with each other. The Mg numbers of the olivines and pyroxenes are consistent with high-An anorthositic gabbro [3].

Fixed-grid point analyses on one melt clast each in DaG262 and DaG400, similar in size and texture, showed that the melt clasts had similar average Mg numbers and average Ca contents. A wider survey of ~250 points across both thin sections showed that roughly half of each section is composed of stoichiometric feldspar ranging from An_{89} to An_{99}, with a mean and median of $An_{96.5}$.

Conclusions: Our inspection of these sections of DaG400 and DaG262 agrees well with previous workers [1,2]. These two meteorites are highland regolith breccias with a large number of impact melt clasts. Their feldspathic components are An-rich and there is an absence of KREEPy material. The abundance and diversity of melt breccia fragments implies that many impact events were sampled by these rocks, making them a good target for our study dating multiple impact events. However, the high An content (hence low K) means that using the Ar-Ar system for this purpose will be a challenge.

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References: [1] Bischoff, A. et al. (1998) *Met. Planet. Sci. 33*, 1243-1257. [2] Zipfel, J. et al. (1998) *Met. Planet. Sci. 33*, A171. [3] French, B. et al. (1991) *Lunar Sourcebook*. Cambridge, Cambridge University Press.