72335

Micropoikilitic Impact Melt Breccia
St. 2,146.9 g

INTRODUCTION

72335 is a fine-grained, clast-bearing impact melt with a poikilitic texture. It was collected to sample the contact of the matrix of Boulder 2, Station 2, with an apparent clast, represented by 72315 (see section on Boulder 2, Station 2). However, like 73215, it is identical in all analyzed respects with all other samples from Boulder 2. Nonetheless, the literature about 72335 is distinct in that a granulite clast dominated the early allocations, rather than the matrix, leading to a temporary inference that it was distinct. Although no definitive geochronological data exist, a general assumption is that 72335 crystallized at the same time as other melts of similar petrography and chemistry at the Apollo 17 site, i.e. 3.86 Ga ago. The sample, 8 x 1.5 x 1.5 cm, is angular and greenish gray (5GY 6/1) (Fig. 1). It is tough, homogeneous, and lacks penetrative fractures. Clasts larger than 1 mm compose less than 10% of the rock. The exposed surface (N,T, part of E) of 72335 has a thin patina and many zap pits. Irregular cavities with drusy crystals form about 30% of the surface; they range up to 1 mm, although most are about 0.2 mm across.

72335 is so similar to other samples from Boulder 2 that it will not be described here in detail, but specific studies are referenced. It was studied mainly under a consortium led by the Caltech group (Dymek et al., 1976a), but not in as much detail as 72395. The description of 72395 can be assumed as a description of 72335. Following chipping of a few pieces for allocation, the W end of the sample was sawn off (,16; 33.6 g; Fig. 2) and stored at Brooks.

PETROGRAPHY

All five samples from Boulder 2 are very similar in petrography. Dymek et al. (1976a)

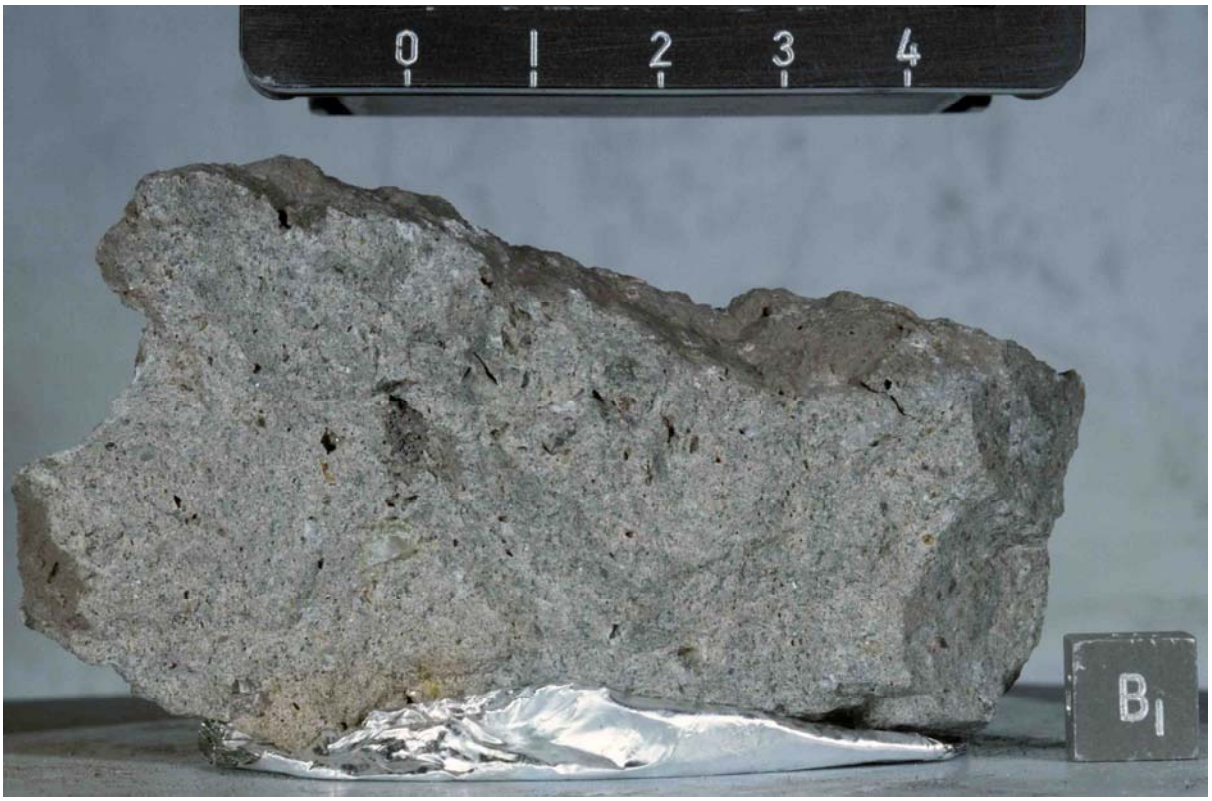

Figure 1: Broken B face of sample 72335, showing irregular vugs and homogeneous character. The exposed surface (at the top) has a darker-colored patina. Scale in centimeters. S-73-23543.

Figure 2: Sawn face of Wend piece 72335,16 showing high proportion of vugs. Small divisions on scale are 1 mm. S-76-24377.

gave descriptions of the petrography subsequent to a briefer description by Albee et al. (1974b) and Dymek et al. (1976b). They did not give individual descriptions of the petrography, and that practice is for the most part followed here; thus, for a description and mineral diagrams of 72335 matrix see sample 72395.

Dymek et al. (1976a, c) described the sample, following a briefer description by Albee et al. (1974b). They noted that the earliest allocations had been of a 1-cm clast of a fine-grained, granulitic anorthositic norite (feldspathic granulite), and that the actual matrix was similar to the other Boulder 2 samples (Fig. 3). The description by Simonds et al. (1974) is of the granulitic clast: feldspars 25 to 500 microns and mafic grains 10 to 30 (rarely 100) microns. The paragenesis of Engelhardt (1979) (ilmenite crystallizing later than pyroxene) is for the actual matrix.

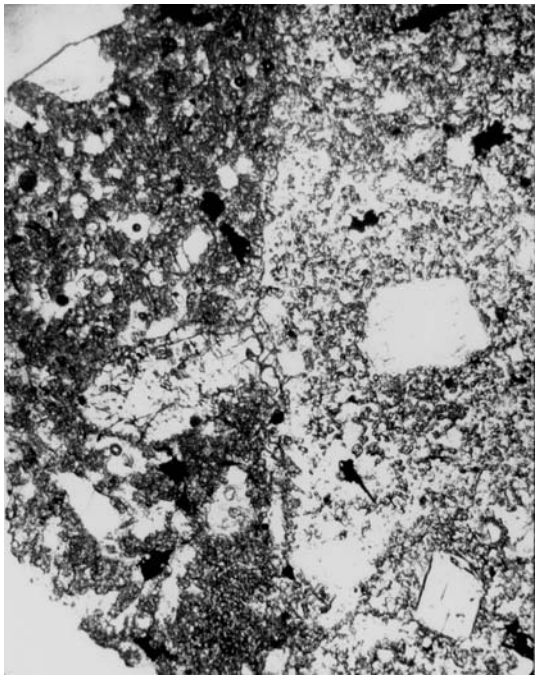

Figure 3: Photomicrograph of 72335,5 showing poikilitic impact melt matrix (left) and feldspathic granulite clast (left). Plane transmitted light. Field of view about 1 mm wide.

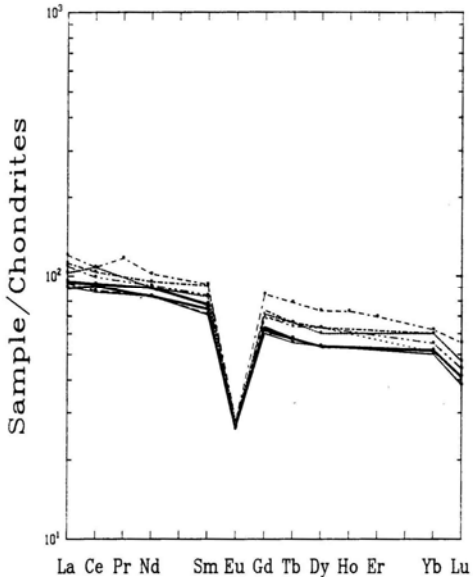

Figure 4: Rare earth element abundances of matrix samples in 72335 (bold lines) with other Boulder 2 data comparison.

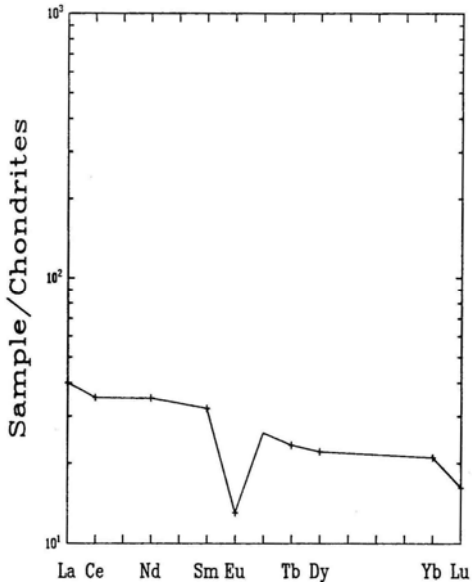

Figure 5: Rare earth element abundances of feldspathic granulite clast in 72335.

CHEMISTRY

Chemical analyses of the matrix and the granulitic clast are tabulated separately (Tables 1 and 2 respectively). The rare earth elements are also plotted separately (Figs. 4 and 5). The chemistry of the matrix is identical with that of other Boulder 2 samples, with rare earths at the lower end of the range (Fig. 4). In the earliest publications (e.g. Laul and Schmitt, 1974a,b), the granulite clast was assumed to represent bulk rock. Later publications (e.g. Laul and Schmitt, 1975) recognize that the first allocations were atypical, but instead of recognizing the presence of a granulitic clast, suggested that the 72335 matrix was heterogeneous. The distinct siderophile ratio the feldspathic sample (Group 3, cf. Group 2 of the other matrices) was recognized. It is possible that the sample of feldspathic granulite analyzed included matrix contamination, as it was not specifically sampled as a clast.

RADIOGENIC ISOTOPES AND CHRONOLOGY

Tera et at. (1974a) reported Rb and Sr isotopic data for a split that is probably at least mainly a feldspathic granulite clast, without specific discussion. $^{87}Rb/^{S6}Sr$ (0.03695) and $^{87}Sr/^{86}Sr$ (0.70136+1-5) are distinct from those of the matrix of the other Boulder 2 samples and correspond with $_{TBABI}$ of 4.40 Ga.

EXPOSURE

MacDougall et al. (1974) and Hutcheon et al. (1974b) studied a small undocumented chip, supposedly from the surface, for tracks. However, there was no track density gradient discernable on the edge examined. Interior feldspars showed solar flare track gradients extended over several grains; a maximum density of more than 5 x 10^8 cm^{-2} fell to about 3 x 10^7 cm^{-2}, then rose again. Large variations in track densities occurred adjacent to olivines and feldspars. The results may suggest some irradiation of grains prior to compaction, unusual exposure geometries, or annealing differences.

PROCESSING

A few small chips were first taken for allocations. One of these earlier chips (,2) appears to have been a clast (or dominantly a clast) of feldspathic granulite. Further chipping was made for allocations of the matrix. In 1975, a saw cut was made to remove the W end (,16; 33.6 g, Fig. 2) for remote storage at Brooks.

Table 1: Chemical analyses of bulk rock/matrix of 72335.

Split	,6	,7
wt %		
SiO_2		
TiO_2	1.6	1.6
Al_2O_3	18.2	18.3
Cr_2O_3	0.190	0.200
FeO	8.6	8.8
MnO	0.112	0.114
MgO	11	12
CaO	10.7	11.0
Na_2O	0.61	0.60
K_2O	0.27	0.34
P_2O_5		
ppm		
Sc	16	18
V	50	50
Co	23	26
Ni	200	230
Rb		
Sr		
Y		
Zr	450	450
Nb		
Hf	10	10
Ba	300	300
Th	4.6	4.8
U	1.3	1.3
Cs		
Ta	1.5	1.5
Pb		
La	31.6	30.0
Ce	82	80
Pr		
Nd	54	50
Sm	14.1	13.5
Eu	1.84	1.82
Gd		
Tb	2.7	3.1
Dy	17	20
Ho		
Er		
Tm		
Yb	10.4	10.2
Lu	1.4	1.4
Li		
Be		
B		
C		
N		
S		
F		
Cl		
Br		
Cu		
Zn		
ppb		
Au	4	4
Ir		
	(1)	(1)

References and methods:
(1) Laul and Schmitt (1974); INAA

Table 2: Chemical analyses of a feldspathic granulite clast in 72335.

Split	,2	,2	,2
wt %			
SiO_2			
TiO_2	0.60		
Al_2O_3	27.3		
Cr_2O_3	0.100		
FeO	4.8		
MnO	0.060		
MgO	8		
CaO	15.4		
Na_2O	0.45		
K_2O	0.12		0.1037
P_2O_5			
ppm			
Sc	8.0		
V	30		
Co	25	28	
Ni	330	360	
Rb		2.0	1.882
Sr		145	147.8
Y			
Zr	150		
Nb			
Hf	4.2		
Ba	120	(a)120	
Th	2.4		
U	0.80	0.71	
Cs		0.095	
Ta	0.59		
Pb			
La	13.2		
Ce	31		
Pr			
Nd	21		
Sm	5.8		
Eu	0.90		
Gd			
Tb	1.1		
Dy	7.0		
Ho			
Er			
Tm			
Yb	4.2		
Lu	0.55		
Li			
Be			
B			
C			
N			
S			
F			
Cl			
Br			
Cu			
Zn		1.7	
ppb			
Au	4	5.3	
Ir	12	15	
I			
At			
Ga			
Ge			
As			
Se		67	
Mo			
Tc			
Ru			
Rh			
Pd			
Ag		0.70	
Cd		(b)80	
In		0.8	
Sn			
Sb		1.5	
Te			
W			
Re		1.4	
Os			
Pt			
Hg			
Tl		0.58	
Bi			
	(1)	(1)	(2)

Notes:
(a) tabulated as Bd in original reference
(b) authors say probably high as a results of contamination.

References and methods:
(1) Laul and Schmitt (1974a,b,c), Laul et al. (1974): INAA, RNAA
(2) Tera et al. (1974a); ID/MS