

60636
KREEP Breccia
35.7 grams



Figure 1: Photo of 60636. Scale in cm.mm. S73-20496

Introduction

This rake sample was collected near the LM. It has one of the highest contents of trace elements in the Apollo 16 collection. It has been dated at 3.94 b.y.

Petrography

60636 is a clast-rich impact melt. It has many vugs. Warner et al. (1976) appear to have described one of the plagioclase-rich clasts. A more complete description, based on additional thin sections, is required.

Compositional variation of Apollo 16 impact-melt rocks is discussed by Korotev (1994).

Chemistry

Laul and Schmitt (1973) reported the composition of 60636 (table 1, figure 3).

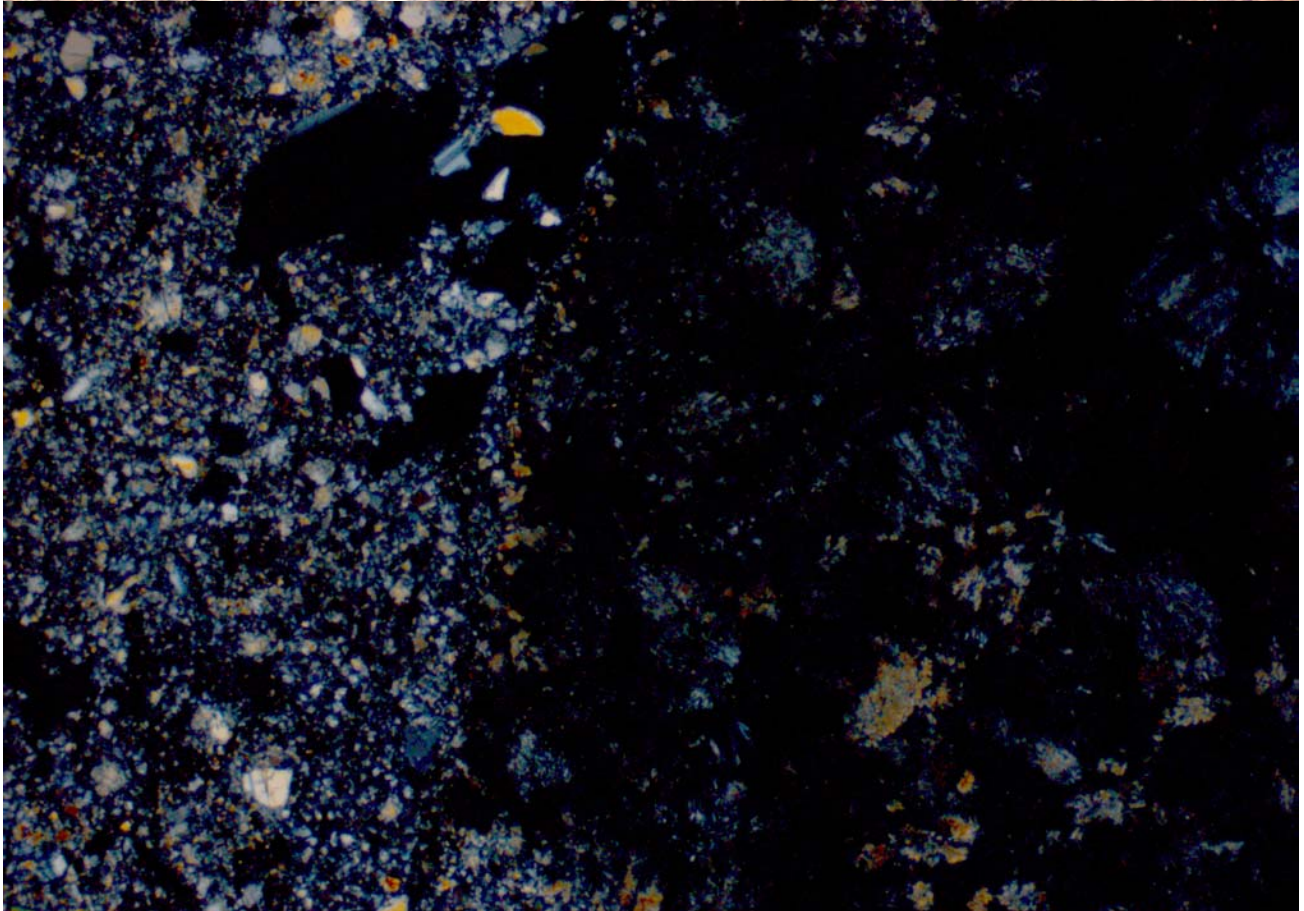
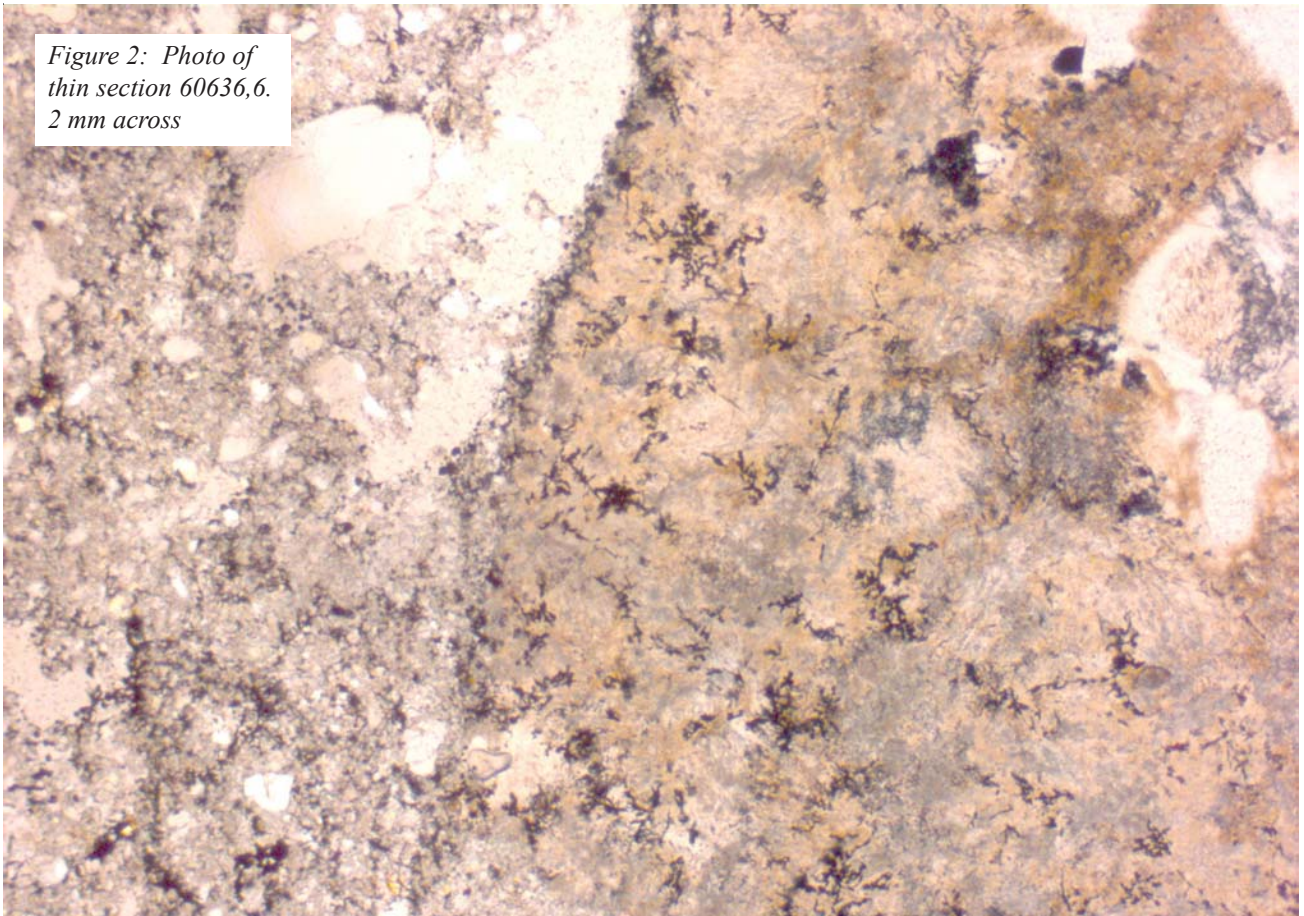
Radiogenic age dating

Tera et al. (1974) determined the age of 60636 by U-Th-Pb to be about 3.94 b.y.

Processing

There is only one thin section and it may not be representative.

Figure 2: Photo of thin section 60636,6. 2 mm across



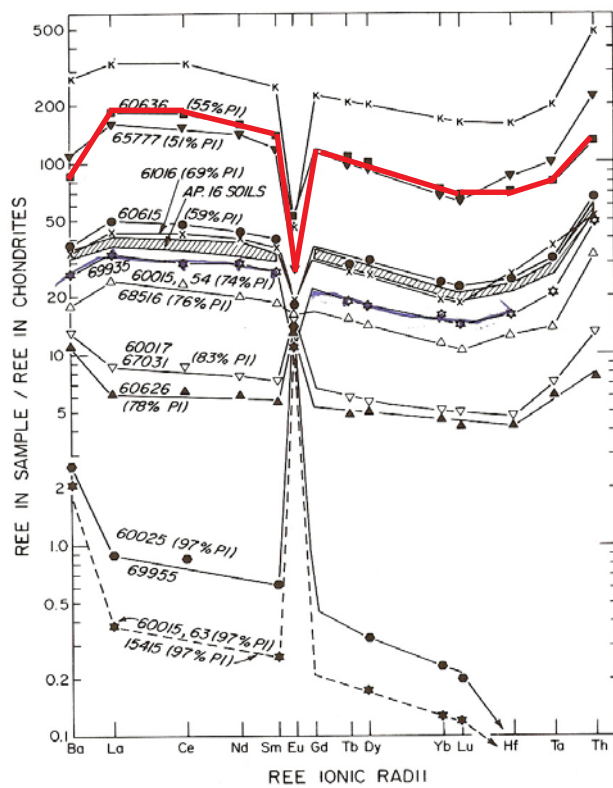


Figure 3: All you need to know, in one diagram, from Laul and Schmidt 1973, with apologies.

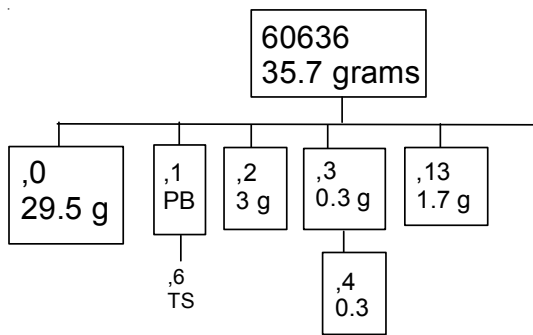


Table 1. Chemical composition of 60636

reference	Laul 73	Warner76
weight		
SiO ₂ %		48 (b)
TiO ₂	1.1 (a)	0.93 (b)
Al ₂ O ₃	20.3 (a)	24.2 (b)
FeO	9.2 (a)	6.2 (b)
MnO	0.112 (a)	0.07 (b)
MgO	10 (a)	6.1 (b)
CaO	11.3 (a)	13.9 (b)
Na ₂ O	0.567 (a)	0.79 (b)
K ₂ O	0.4 (a)	0.73 (b)
P ₂ O ₅		0.4 (b)
S %		
sum		
Sc ppm	15 (a)	
V	35 (a)	
Cr	1163 (a)	
Co	33 (a)	
Ni	420 (a)	
Cu		
Zn		
Ga		
Ge ppb		
As		
Se		
Rb		
Sr		
Y		
Zr	470 (a)	
Nb		
Mo		
Ru		
Rh		
Pd ppb		
Ag ppb		
Cd ppb		
In ppb		
Sn ppb		
Sb ppb		
Te ppb		
Cs ppm		
Ba	320 (a)	
La	63 (a)	
Ce	165 (a)	
Pr		
Nd	100 (a)	
Sm	27 (a)	
Eu	3.71 (a)	
Gd		
Tb	5.5 (a)	
Dy	30 (a)	
Ho		
Er		
Tm		
Yb	16 (a)	
Lu	2.3 (a)	
Hf	13 (a)	
Ta	1.6 (a)	
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm	5.2 (a)	
U ppm	1.6 (a)	

technique: (a) INAA, (b) broad beam e probe



Figure 4: Processing photo of 60636. Scale in mm. S73-20486

References for 60636

Butler P. (1972a) Lunar Sample Information Catalog Apollo 16. Lunar Receiving Laboratory. MSC 03210 Curator's Catalog. pp. 370.

Keil K., Dowty E., Prinz M. and Bunch T.E. (1972) Description, classification and inventory of 151 Apollo 16 rake samples from the LM area and station 5. Curator's Catalog, JSC.

Korotev R.L. (1994) Compositional variation in Apollo 16 impact melt breccias and inferences for the geology and bombardment history of the central highlands of the Moon. *Geochim. Cosmochim. Acta* **58**, 3931-3969.

Laul J.C. and Schmitt R.A. (1973b) Chemical composition of Apollo 15, 16, and 17 samples. *Proc. 4th Lunar Sci. Conf.* 1349-1367.

LSPET (1973b) The Apollo 16 lunar samples: Petrographic and chemical description. *Science* **179**, 23-34.

LSPET (1972c) Preliminary examination of lunar samples. *In* Apollo 16 Preliminary Science Report. NASA SP-315, 7-1—7-58.

Ryder G. and Norman M.D. (1980) Catalog of Apollo 16 rocks (3 vol.). Curator's Office pub. #52, JSC #16904

Sutton R.L. (1981) Documentation of Apollo 16 samples. *In* Geology of the Apollo 16 area, central lunar highlands. (Ulrich et al.) U.S.G.S. Prof. Paper 1048.

Tera F., Papanastassiou D.A. and Wasserburg G.J. (1974) Isotopic evidence for a terminal lunar cataclysm. *Earth Planet. Sci. Lett.* **22**, 1-21.

Warner R.D., Dowty E., Prinz M., Conrad G.H., Nehru C.E. and Keil K. (1976c) Catalog of Apollo 16 rake samples from the LM area and station 5. Spec. Publ. #13, UNM Institute of Meteoritics, Albuquerque. 87 pp.