64815 META-POIKILITIC IMPACT MELT 20.9 g

INTRODUCTION: 64815 is a poikilitic impact melt that has been subjected to low-grade thermal metamorphism. It was erroneously identified by LSPET (1973) and the Apollo 16 Lunar Sample Information Catalog (1972) as a "crushed ultramafic rock." Macroscopically 64815 is light olive gray in color, coherent and angular (Fig. 1). A few zap pits are present on one surface. This rock is a rake sample collected from the rim of a subdued crater on Stone Mountain.

FIGURE 1. Smallest scale division in mm. S-72-55336.

PETROLOGY: Simonds et al. (1933) include 64815 in a general discussion of poikilitic impact melts. Texturally 64815 is distinct from most other Apollo 16 poikilitic rocks in being coarser-grained, more clast-rich and apparently somewhat metamorphosed (Fig. 2).

Simonds et al. (1973) give a mode of 55% plagioclase plus mesostasis, 34% orthopyroxene, 9% olivine and 2% opaques. Oikocrysts are irregular in shape, up to 0.5 mm, and contain abundant chadacrysts of rounded plagioclase and olivine. Low-Ca pyroxene (Wo_4En_{72}) is the dominant oikocryst-forming mineral although many plagioclase and olivine grains also contain abundant rounded inclusions. Olivine usually occurs as discrete, rounded grains (Fo_{68-70}, mostly 0.1 - 0.3 mm) both outside of, and included within, orthopyroxene oikocrysts. Angular, lightly shocked clasts of plagioclase (up to 0.5 mm) are very abundant. The grain boundaries of these clasts tend to be smooth, often forming triple junctions with other plagioclase and olivine grains (Fig. 2). Accessory minerals include metal, troilite, ilmenite, at least one other opaque oxide, and phosphate. Some of the phosphate grains also contain minute, rounded inclusions of plagioclase. Very small (<10 μm), irregularly shaped interstices are often filled by a homogeneous, poorly-reflecting phase which may be either K-feldspar or glass. No relict olivine or lithic clasts were observed (Simonds et al., 1973).

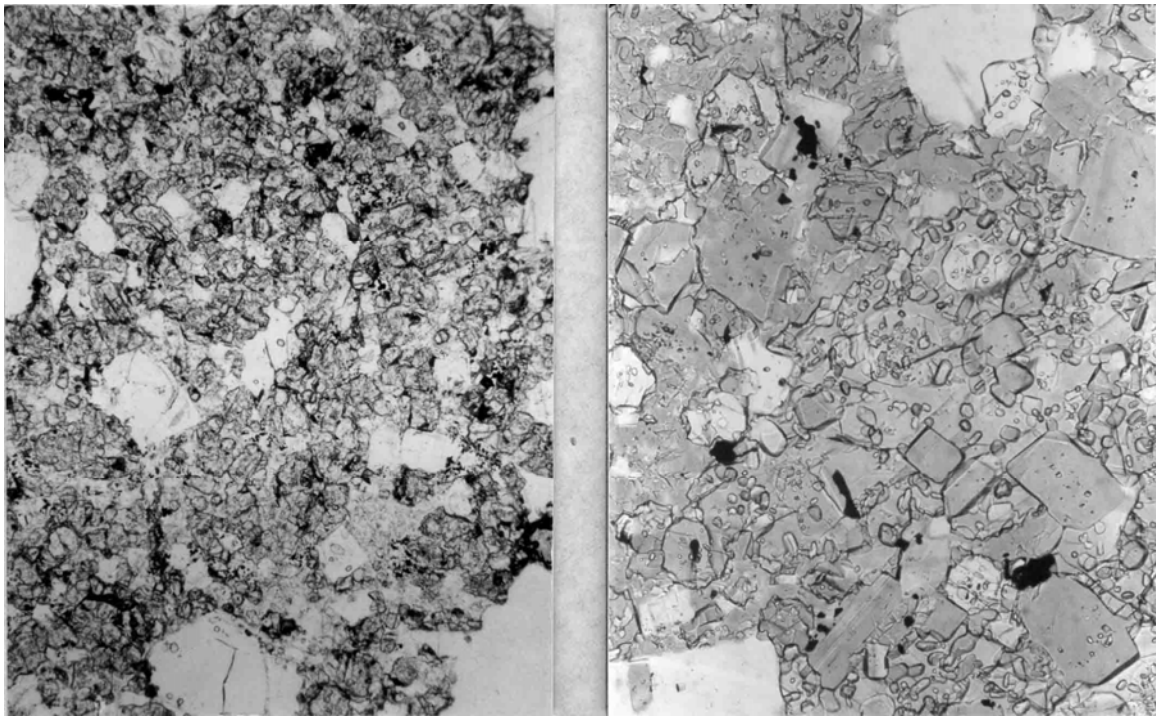

FIGURE 2. 64815,5 a) general view, ppl. Width 2 mm.
b) close-up, ppl. Width 0.5 mm.

CHEMISTRY: Major and trace element analyses of 64815 are provided by Hubbard et al. (1973), Wanke et al. (1976, 1977) and Wasson et al. (1977). The data are summarized in Table 1 and Figures 3 and 4. Chemically 64815 closely resembles other KREEP-rich Apollo 16 poikilitic rocks such as 60315 and 62235 although it has slightly lower incompatible element abundances. Its major element composition plots very near the olivine-plagioclase-spinel peritectic of the OL-AN-SI system (Fig. 3). 64815 is highly enriched in siderophile elements (Table 1), indicating a significant meteoritic component.

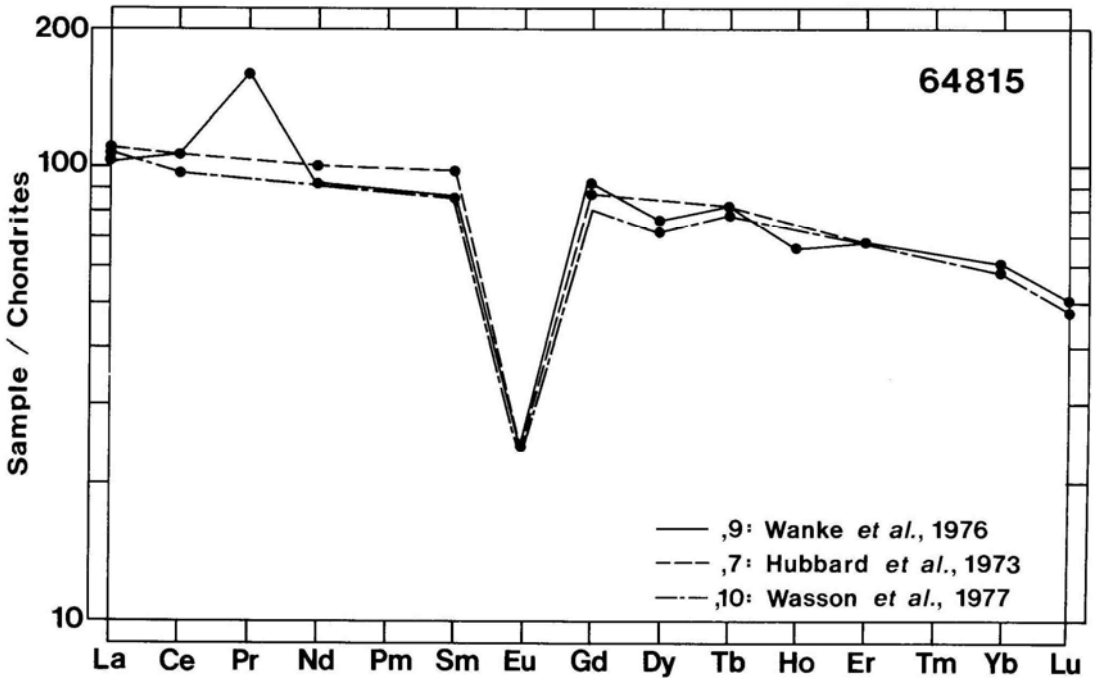

FIGURE 3. Rare earths.

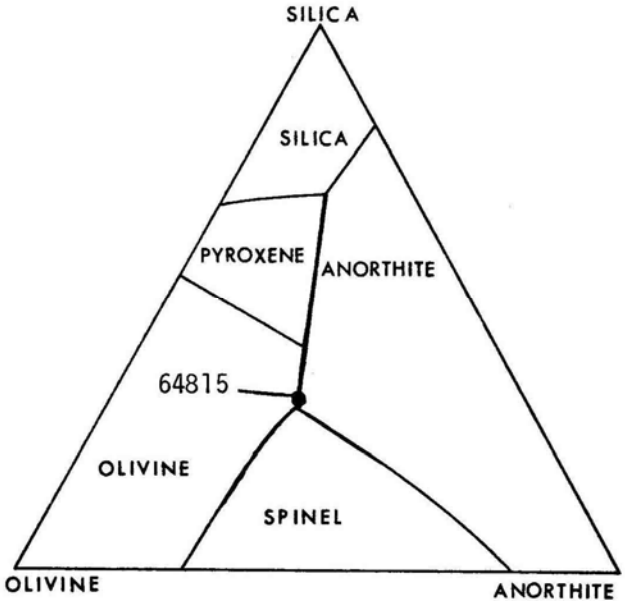

FIGURE 4. From Simonds et al. (1973).

RADIOGENIC ISOTOPES AND GEOCHRONOLOGY: Nyquist et al. (1973) report whole rock Rb-Sr data (Table 2). The high $^{87}Sr/^{86}Sr$ ratio is typical of KREEP-rich lunar rocks.

PHYSICAL PROPERTIES: Pearce and Simonds (1974) report magnetic parameters determined on a potted butt. Fe^0/Fe^{2+} is 0.0245 and total Fe^0 is 1.8 wt%.

PROCESSING AND SUBDIVISIONS: 64815 has never been sawn. Allocations have been filled by taking small chips from the rock. The largest single piece remaining (,0) weighs 18.9 g.

TABLE 1. Summary chemistry of 64815.

SiO_2	45.6
TiO_2	1.64
Al_2O_3	17.6
Cr_2O_3	0.24
FeO	9.4
MnO	0.12
MgO	11.9
CaO	12.0
Na_2O	0.50
K_2O	0.27
P_2O_5	0.30
Sr	138
La	34.8
Lu	1.7
Rb	6.7
Sc	22
Ni	460-830
Co	~45
Ir ppb	9-16
Au ppb	8-14
C	
N	
S	1140
Zn	<5.8
Cu	14

Oxides in wt%; others in ppm except as noted.

TABLE 2. Summary of Rb-Sr data for 64815.

Sample	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$ measured	$^{87}Sr/^{86}Sr$ at 4.6 b.y.*	T_{BABI}(b.y.)	T_{LUNI} (b.y.)
64815,2	0.142	0.70808± 8	0.70008	4.43±.07	4.47± 0.07

*Corrected for interlaboratory bias by Nyquist (1977)