Sayh al Uhaymir (SaU) 449

Anorthositic impact melt breccia

16.5 g

Figure 1: slice through SaU 449 – photo courtesy of R. Korotev.

Introduction

Sayh al Uhaymir (SaU) 449 was found on a limestone plateau in the Dhofar desert of Sultanate of Oman. It is a single brownish to dark green stone weighing 16.5 g, with no fusion crust (Connolly et al., 2008).

Petrography, mineralogy, and composition

This sample is a clast-rich impact melt breccia containing numerous mineral fragments and lithic clasts embedded in a fine-grained impact-melt matrix. The lithic clast population is dominated by impact-melt breccias of anorthositic, gabbroic, and noritic compositions, and the size of the clasts is 0.01-10 mm. The main minerals are pyroxene (clinopyroxene - $En_{6.5\text{-}71.1}Wo_{5.1\text{-}44.1}$; Fe/Mn = 61; orthopyroxene - $En_{53.2\text{-}79.5}Wo_{3.3\text{-}4.7}$; Fe/Mn = 59), feldspar ($An_{93.4\text{-}97.4}Ab_{2.5\text{-}9.2}$), and minor olivine ($Fo_{50.5\text{-}76.7}$; Fe/Mn = 96), silica, chromite, ilmenite (MgO = 3.6 wt%), Ca-phosphate, troilite and FeNi metal. The glassy matrix has an average composition of SiO_2 = 46.2, TiO_2 = 0.33, Al_2O_3 = 25.6, FeO = 5.80, MgO = 4.85, CaO = 15.33, Na_2O = 0.38 [all in wt.%] (Connolly et al., 2008).

This sample has similarities to SaU 300 but based on compositional and textural studies carried out so far, it is not paired (Korotev et al., 2009a,b). Instead SaU 449 has similar composition and textures to Dhofar 925 (Fig. 2) and may be paired or launch

paired. The two samples were found over 200 km apart, so launch pairing may be more likely.

SaU 449 is a member of a small group of anorthositic breccias with intermediate Fe content exhibiting a high percentage of a mafic component not recognized (or rare) in the Apollo collections (Fig. 3; Korotev et al., 2009b).

High concentrations of siderophile elements, and ratios such as Ni/Ir, are similar to ratios observed in IAB irons, compared to that of most lunar meteorite breccias which have ratios more similar to CM chondrites (Korotev et al., 2009b).

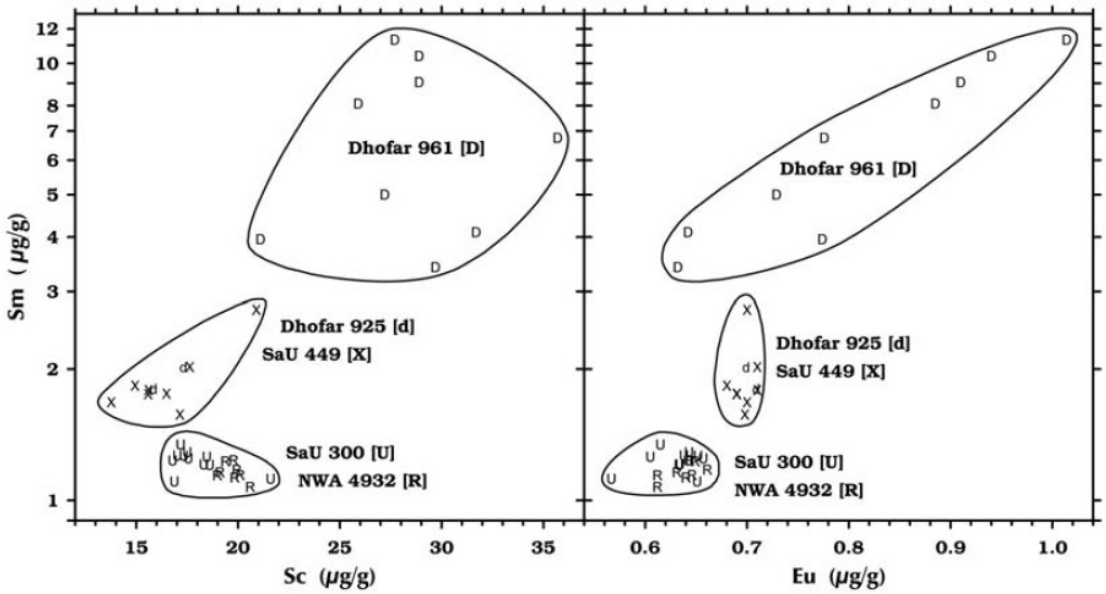

Figure 2: Bulk composition of SaU 449 (symbol X) illustrating the distinct compositional character of this sample from SaU 300, and the similarity to Dhofar 925 (d) (from Korotev et al., 2009b).

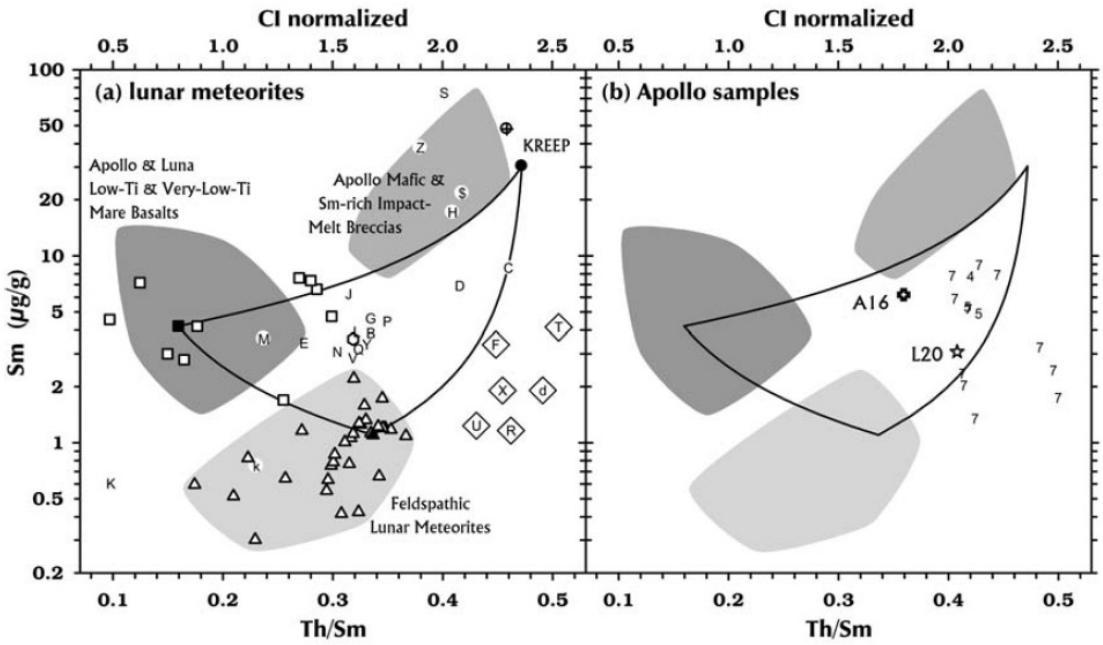

Figure 3: Bulk composition of SaU 449 (symbol X) illustrating the distinct compositional character of this sample and a small group of samples (F, T, X, d and R in diamonds (from Korotev et al., 2009b). They lie outside the three components that can explain most other variation within the lunar meteorites.

Radiogenic age dating

None yet reported.

Cosmogenic isotopes and exposure ages

None yet reported.

Table 1a. Chemical composition of SaU 449

reference	1
weight	237
technique	e
SiO2 %	
TiO2	
Al2O3	
FeO	7.86
MnO	
MgO	
CaO	14
Na2O	0.318
K2O	0.07
P2O5	
S %	
sum	
Sc ppm	16.5
V	
Cr	1370
Co	48.4
Ni	560
Cu	
Zn	
Ga	
Ge	
As	0.65
Se	<1
Rb	<5
Sr	580
Y	
Zr	52
Nb	
Mo	
Ru	
Rh	
Pd ppb	
Ag ppb	
Cd ppb	
In ppb	
Sn ppb	
Sb ppb	
Te ppb	
Cs ppm	0.09
Ba	344
La	4.15

Ce	10.8
Pr	
Nd	6.2
Sm	1.91
Eu	0.702
Gd	
Tb	0.418
Dy	
Ho	
Er	
Tm	
Yb	1.72
Lu	0.247
Hf	1.48
Ta	0.22
W ppb	
Re ppb	
Os ppb	
Ir ppb	18.5
Pt ppb	
Au ppb	9.8
Th ppm	0.87
U ppm	0.39

technique (a) ICP-AES, (b) ICP-MS, (c) wet chemistry (d) FB-EMPA, (e) INAA, (f) RNAA, (g) XRF

Table 1b. Light and/or volatile elements for SaU 449

Li ppm	
Be	
C	
S	
F ppm	
Cl	
Br	0.38
I	
Pb ppm	
Hg ppb	
Tl	
Bi	

1) Korotev et al. (2009b)