

NWA 4480
Intermediate Basaltic Shergottite
13 grams



Figure 1: Photo of NWA 4480 by G. Hupe. Cube is 1 cm.

Introduction

NWA 4480 is a fresh ellipsoidal stone with nearly complete dark brown fusion crust (figure 1). It was purchased by G. Hupe in Tagounite, Morocco in 2006, but is thought to be from Algeria.

Petrography

The texture of NWA 4480 is different from the other shergottites (figure 4). Irving et al. (2007) describe the matrix of NWA 4480 as a fine-grained basalt with grain size about 0.15 mm, which includes “glomerocrysts” with larger grain size (0.5-0.8 mm). The matrix consists of plagioclase laths, olivine, complexly-zoned pyroxene (augite cores, pigeonite rims), Ti-chromite, ilmenite, merrillite and silica (figure 2). Glomerocrysts are made of coarse plagioclase and olivine, with interstitial pyroxene and ilmenite. There is an abundance of olivine and it is relatively Fe-rich (Fe_{68-79}).

Chemistry

Irving et al. (2007) reported a preliminary chemical analysis for NWA4480 (table). The light REE are depleted (figure 3), so it is classified as “intermediate” even before Nd or Sr isotopes are determined !

Radiogenic age dating

Not yet



Figure 2: Photo of small slab of NWA4480 (from G. Hupe).

Cosmogenic isotopes and exposure ages

Not yet

Other Studies

Oxygen isotopes were reported by Rumble and Irving (2009).

Table 1. Chemical composition of NWA 4480.

reference weight	Irving 2007		Irving 2010	
	MB 92		fusion crust	
SiO ₂ %			45.22	(b)
TiO ₂			1.44	(b)
Al ₂ O ₃			12.53	(b)
FeO	20.33	(a)	19.82	(b)
MnO			0.45	(b)
MgO			6.24	(b)
CaO			9.44	(b)
Na ₂ O	1.48	(a)	1.98	(b)
K ₂ O			0.13	(b)
P ₂ O ₅			1.62	(b)
S %				
sum				
Sc ppm	39.7	(a)		
V				
Cr	1027	(a)		
Co				
Ni	<60	(a)		
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb				
Sr				
Y				
Zr				
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm				
Ba				
La	1.85	(a)		
Ce				
Pr				
Nd				
Sm	2.69	(a)		
Eu	0.86	(a)		
Gd				
Tb	1.05	(a)		
Dy				
Ho				
Er				
Tm				
Yb	4.16	(a)		
Lu				
Hf	3.16	(a)		
Ta				
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm	0.24	(a)		
U ppm				

technique: (a) INAA, (b) fused bead emp.

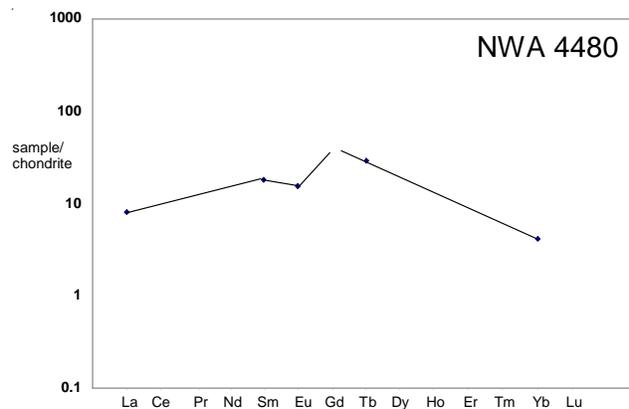


Figure 3: REE pattern for NWA 4480.

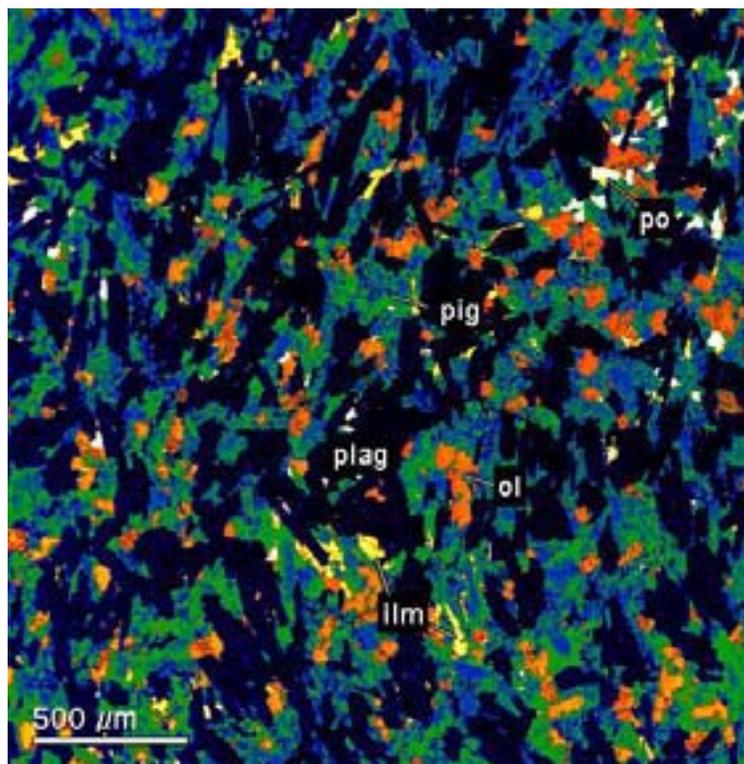


Figure 4: False-color, back-scatter electron image illustrating fine-grained texture of NWA 4480 (Irving et al. 2007).

References for NWA4480

- Connolly H.C. and 7 authors (2007b) The Meteoritical Bulletin, No. 92, 2007 September. *Meteorit. & Planet. Sci.* **42**, 1647-1694.
- Irving A.J., Kuehner S.M., Korotev R.L. and Hupe G.M. (2007a) Baby basaltic Shergottite NWA 4480: An Eu-anomalous Martian magma related to “Lherzolithic” Shergottites (abs#5127). *Meteorit. & Planet. Sci.* **42**, A73.
- Rumble D. and Irving A.J. (2009) Dispersion of oxygen isotopic compositions among 42 Martian meteorites determined by laser fluorination: Evidence for assimilation of (ancient) altered crust (abs#2293). *Lunar Planet. Sci.* **XL**, Lunar Planetary Institute @ The Woodlands.