Reference List

NWA6342 - 72 grams
Enriched ultramafic Shergottite

Figure 1: *Photo of sawn surface of NWA6342. Sample is 4 cm across (photo from Irving et al.2011).*

Introduction

NWA6342 is a single, unweathered stone that was found in Algeria in 2010. Only patches of fusion crust remain. It is a poikilitic basalt that has been highly shocked.

It has a CRE age of 3.8 – 5. 1 m.y.

Petrography

The interior of NWA6342 is dark green with pale green patches (figure 1). The sample is heterogeneous with both poikilitic and non-poikilitic regions (figure 2). There are also patches and veins of vesicular shock melt glass (Irving et al. 2011). In the poikilitic areas of NWA6342, large oikocrysts of pigeonite enclose rounded chadocrysts of olivine and accessory minerals (merrillite, feldspar, chromite, ilmenite and sulfide). Interstitial to the large poikilitic pyroxene are areas with vesicular glass with plagioclase composition intergrown with acicular crystals of pigeonite, ilmenite, merrillite and opaques.

Evidence for high-intensity shock include, plagioclase glass, vesicular melt pockets, thin veins cutting mafic minerals and complex recrystallization of mafic minerals (Irving et al. 2011).

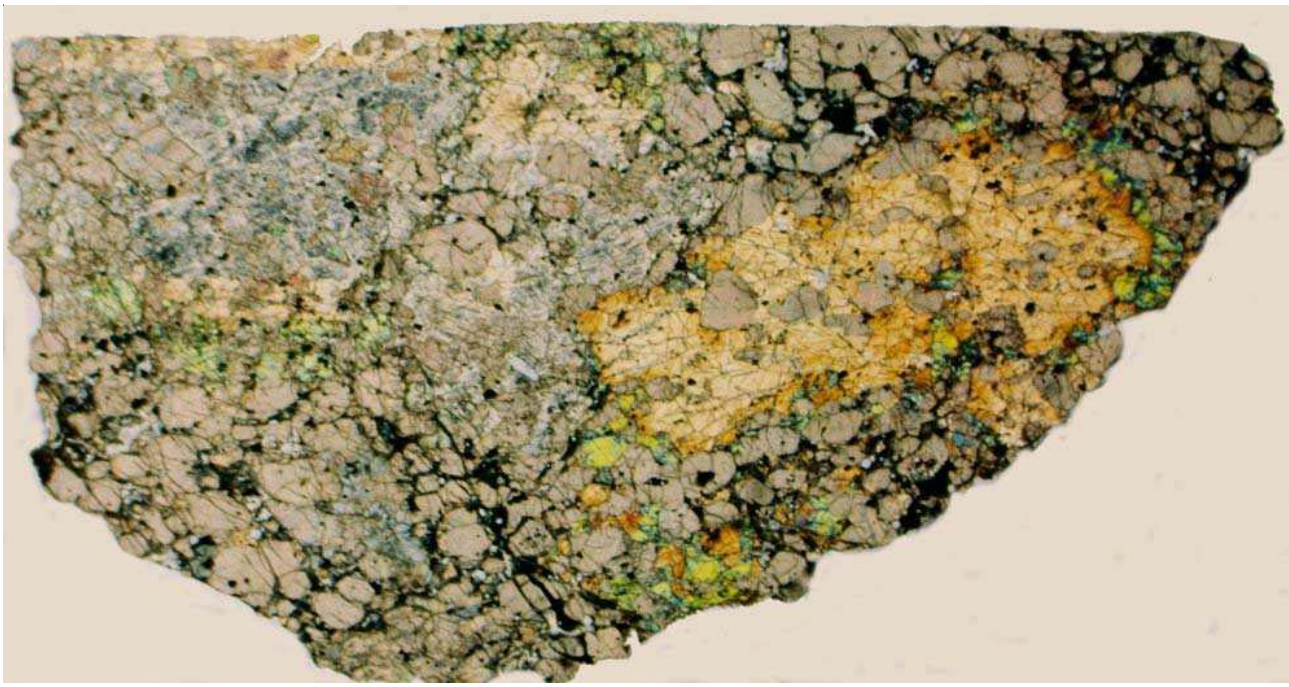

Figure 2: *Photo of thin section of NWA6342 (Irving et al. 2011).*

Mineralogy

Olivine: Chadocrysts of early formed olivine are Fo_{66}.

Pyroxene: Two pyroxenes are reported pigeonite with $Wo_{5.5-9.0}En_{83-74}$ and augite ~$Wo_{32}En_{74-84}$.

Chemistry

The analysis of sawdust from NWA6342 is very low in Al2O3; this rock is ultramafic (table 1). The REE pattern is parallel to the "enriched" shergottites (figure 3).

Radiogenic age dating

Not yet

Cosmogenic isotopes and exposure ages

The isotopic ratios of rare gas in NWA6342 has been reported by Huber et al.(2012). They calculate an exposure to cosmic ray of 3.8 m.y. by ^{21}Ne measurement and 5.2 m.y. by a more rigorous method.

Other Studies

Oxygen isotopic composition is given in Irving et al. (Delta ^{17}O = 0.3 ‰).

Processing

NWA6342 has a sawn surface (figure 1).

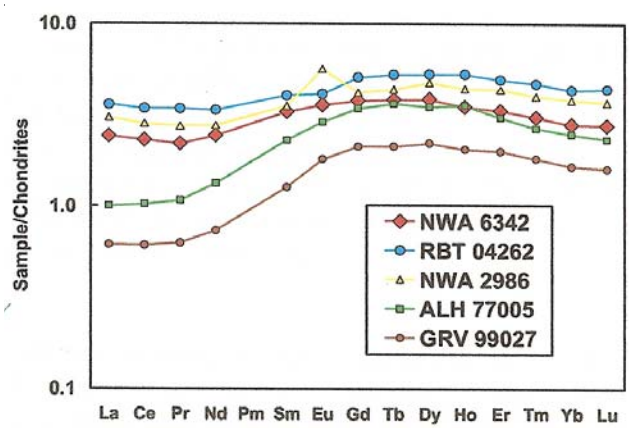

Figure 3: *Normalized rare-earth-element diagram of NWA6342 (Irving et al. 2011).*

References for NWA6342.

Table 1. Chemical composition of NWA4342.

reference	Irving11	
weight		
SiO2 %	42.44	(a)
TiO2	0.45	(a)
Al2O3	3.33	(a)
FeO	21.11	(a)
MnO	0.5	(a)
MgO	25.48	(a)
CaO	4.06	(a)
Na2O	0.85	(a)
K2O	0.12	(a)
P2O5	0.67	(a)
S %		
sum		
Sc ppm		
V	97	(b)
Cr	6636	(a)
Co	71.8	(b)
Ni	4030	(a)
Cu		
Zn		
Ga		
Ge ppb		
As		
Se		
Rb	0.96	(b)
Sr	16.8	(b)
Y		
Zr		
Nb		
Mo		
Ru		
Rh		
Pd ppb		
Ag ppb		
Cd ppb		
In ppb		
Sn ppb		
Sb ppb		
Te ppb		
Cs ppm		
Ba	15.8	(b)
La	0.77	(b)
Ce	1.89	(b)
Pr	0.266	(b)
Nd	1.5	(b)
Sm	0.66	(b)
Eu	0.27	(b)
Gd	1.02	(b)
Tb	0.19	(b)
Dy	1.28	(b)
Ho	0.27	(b)
Er	0.72	(b)
Tm	0.1	(b)
Yb	0.62	(b)
Lu	0.09	(b)
Hf	0.69	(b)
Ta		
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		

technique: (a) XRF (b) ICP-MS