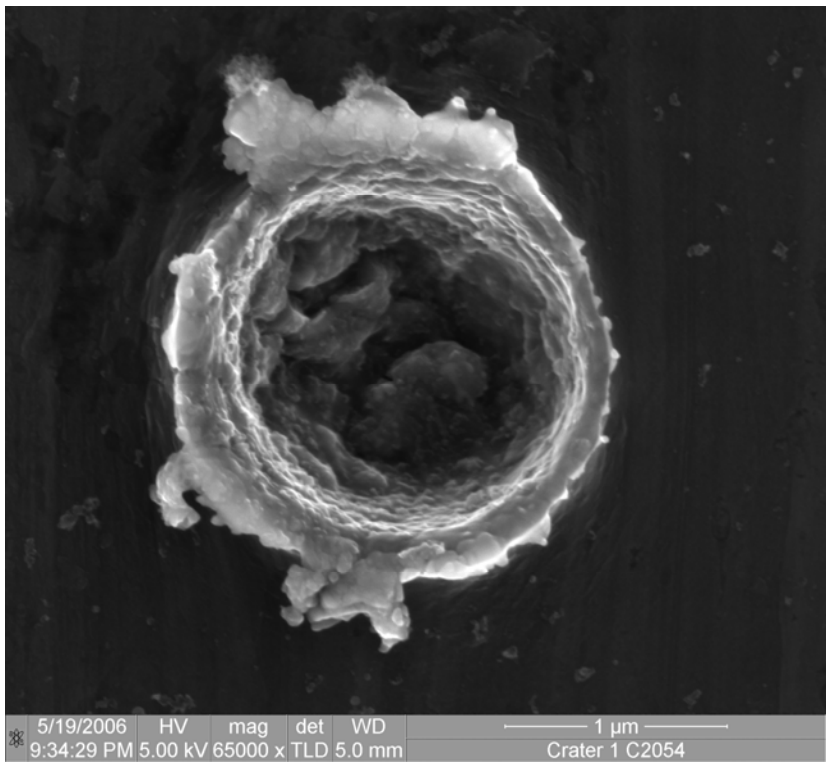
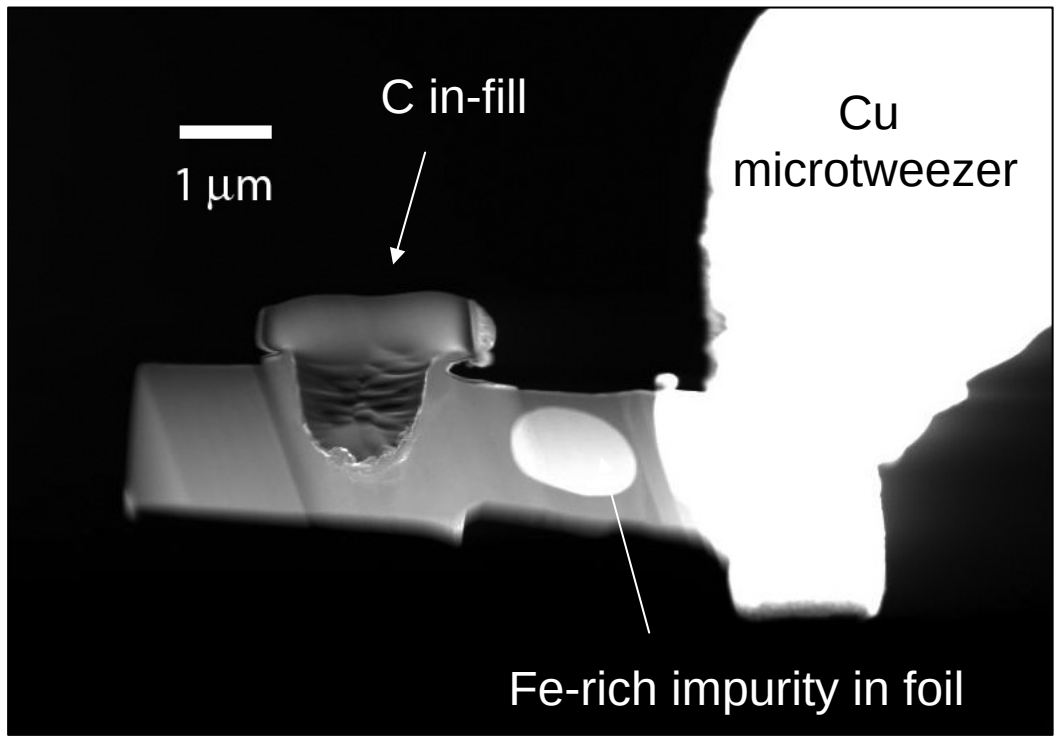
C2043 N,1 Crater 1

- Crater identified by Janet Borg
- Section extracted with FIB by Rhonda Stroud
  - In-fill with C, lift-out with Cu microtweezer

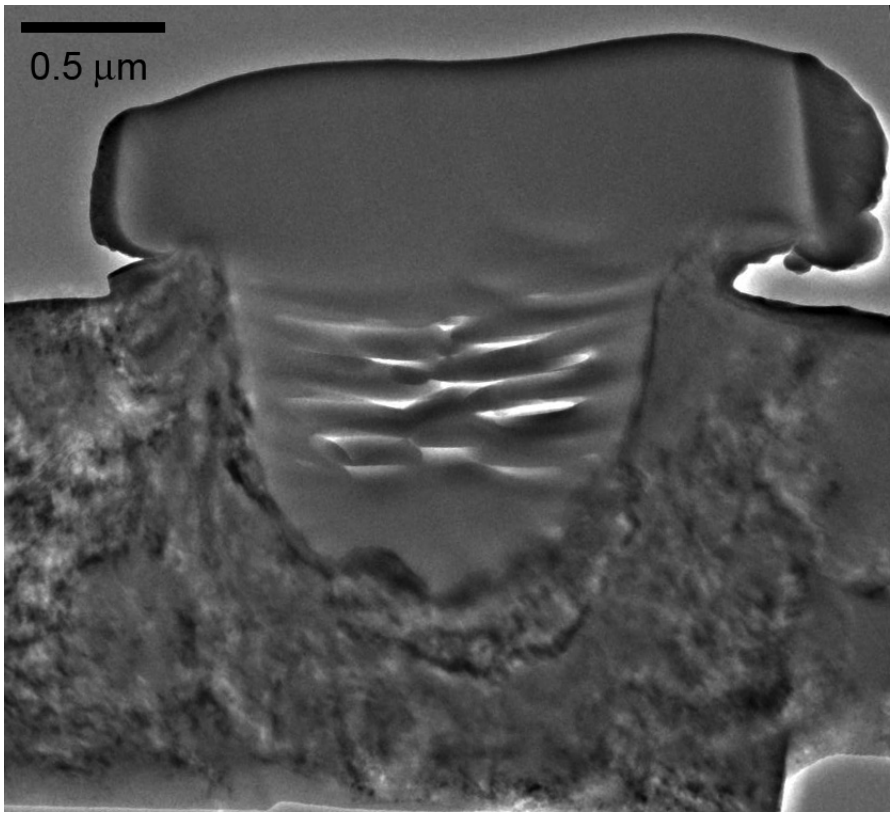
Secondary Electron Image of Crater



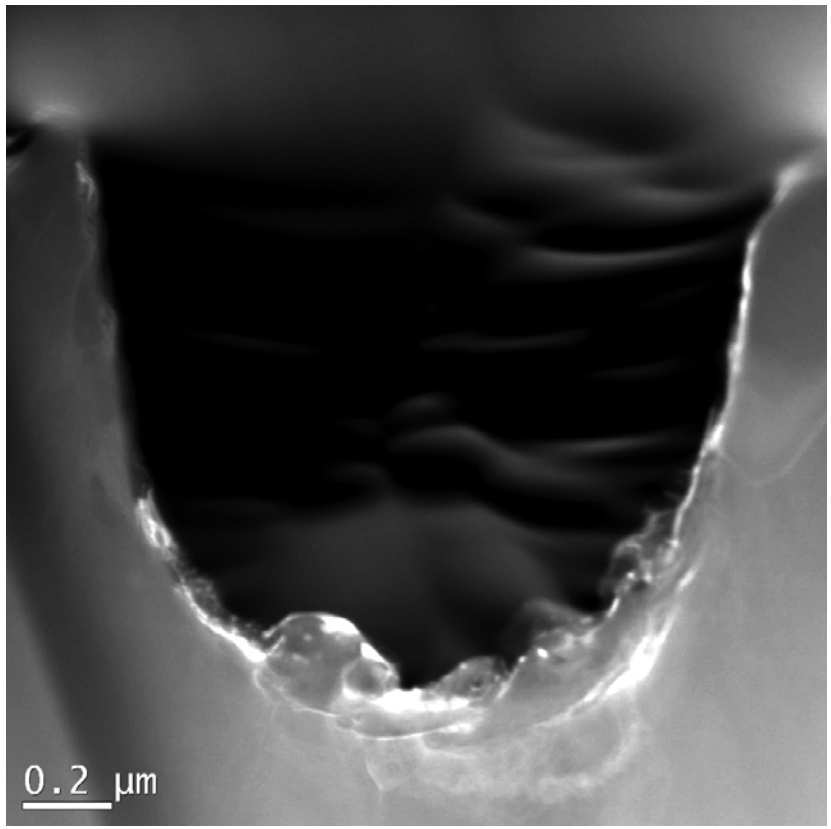
Z-contrast STEM of extracted foil section



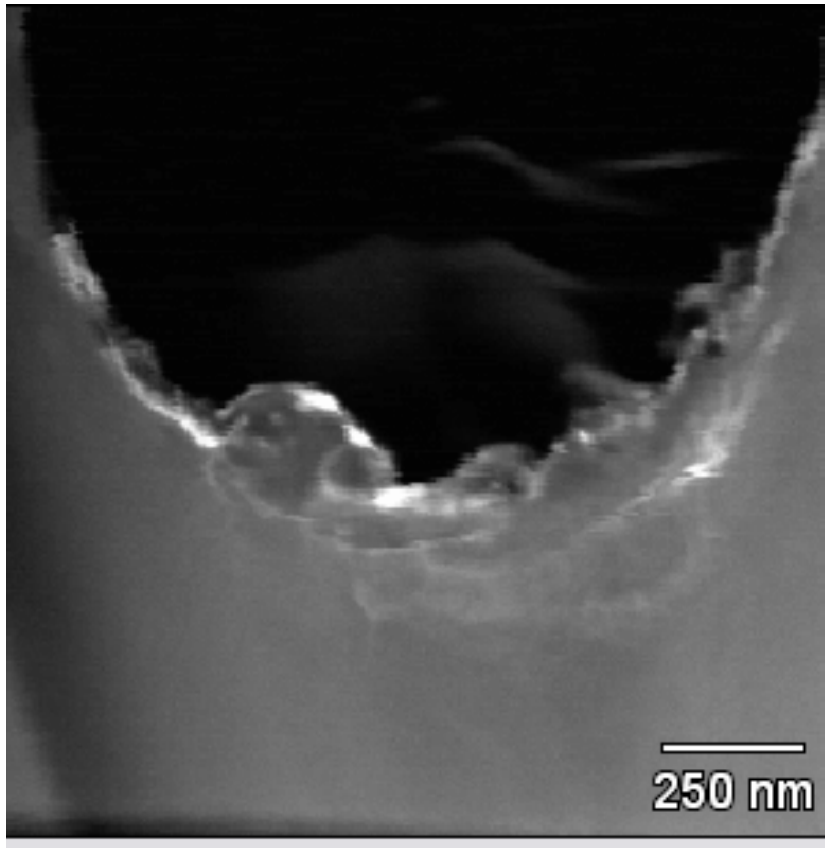
Bright-Field TEM



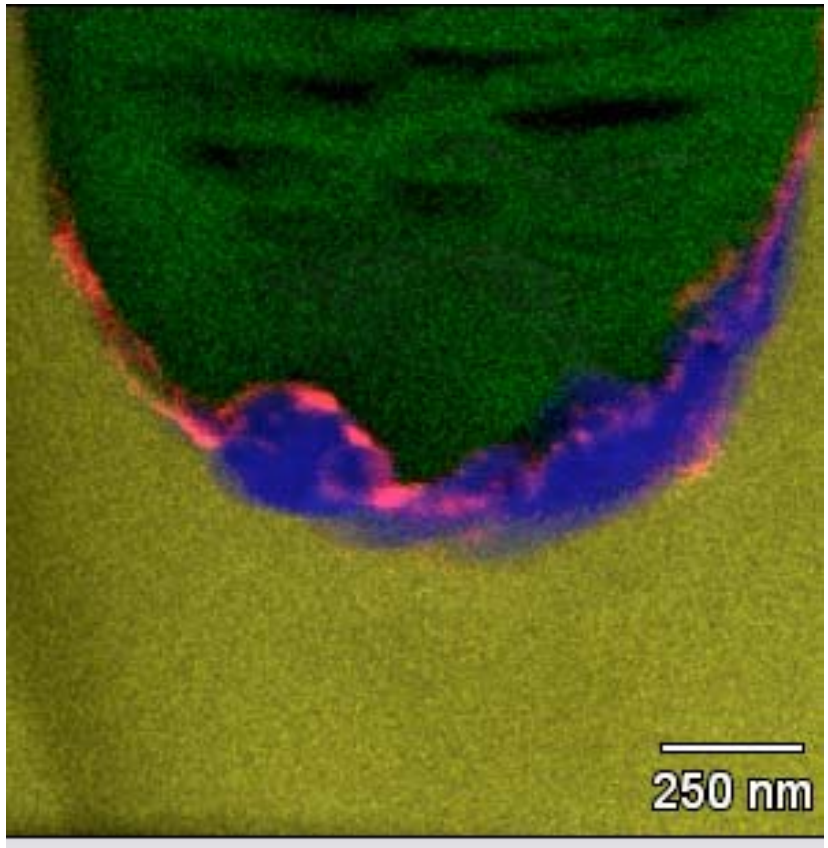
Z-contrast STEM



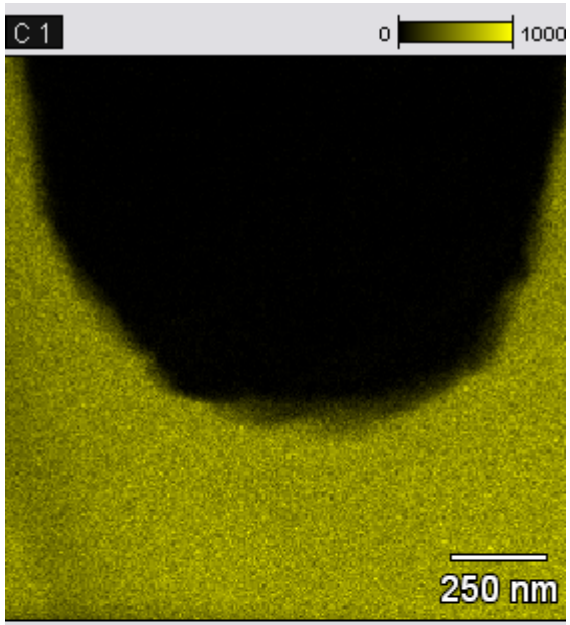
Crater 1 Foil C2043, N,1
EDS Spectral Imaging Analysis

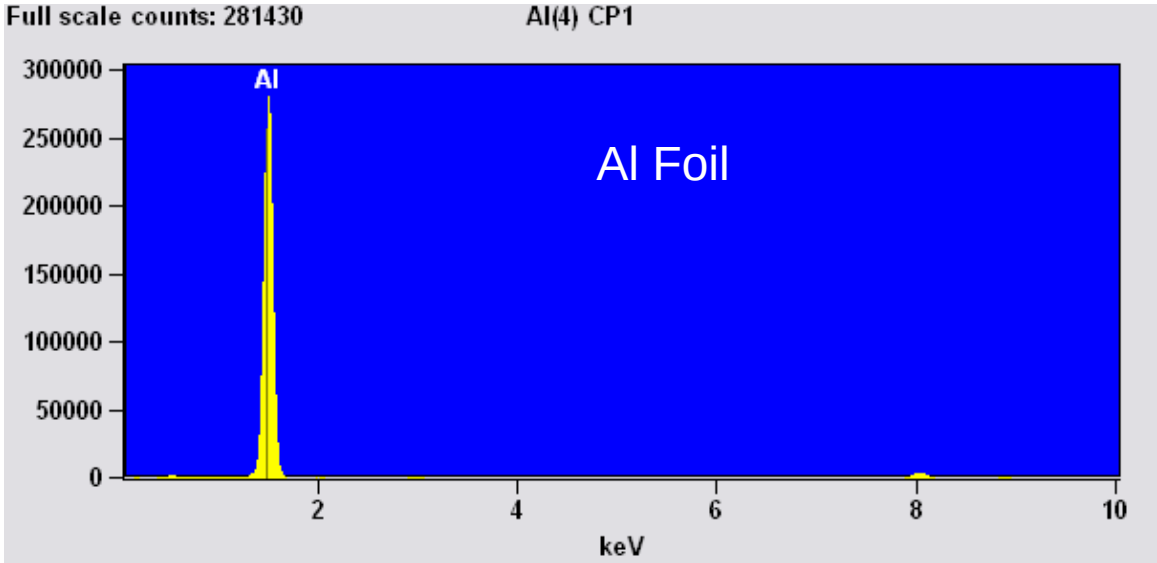


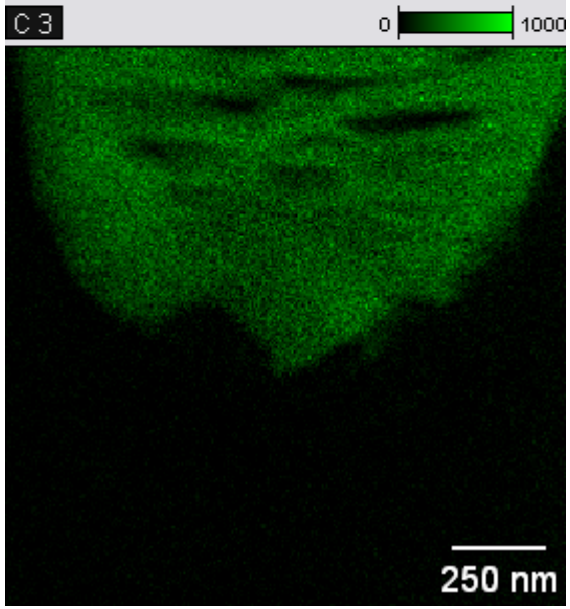
Z-contrast STEM image
A full EDS spectrum was obtained at each pixel, and then the phases present were identified using the Compass principle component analysis software.

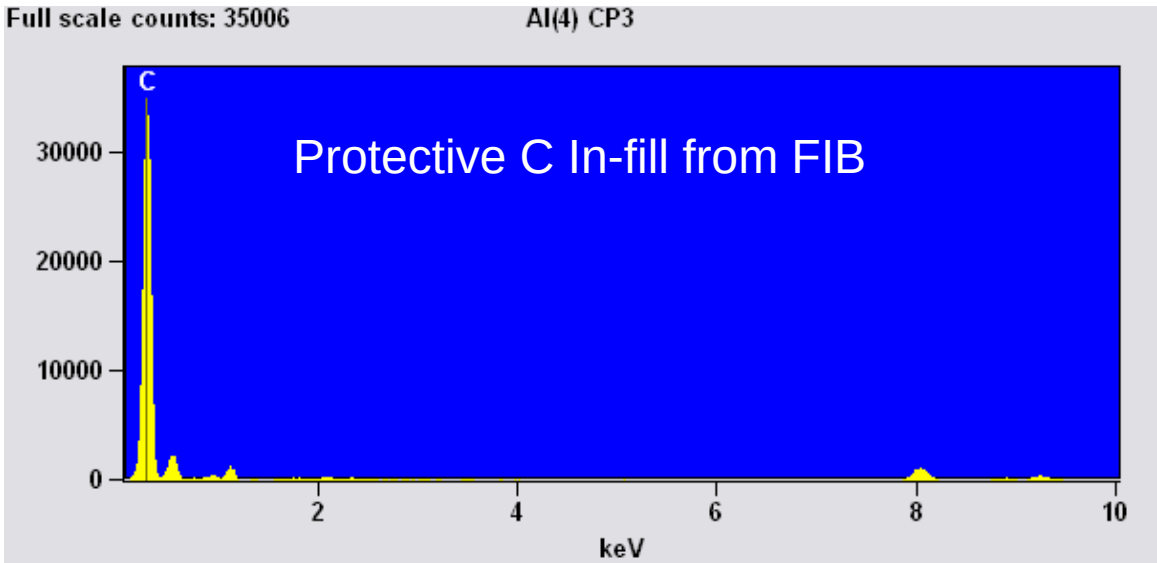


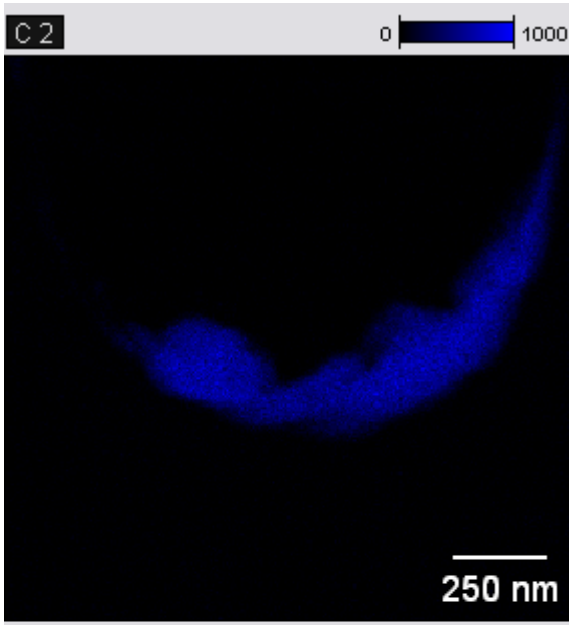
principle component map
4 components:
Foil (yellow), FIB-deposited carbon (green) and
two residue phases (red, blue)

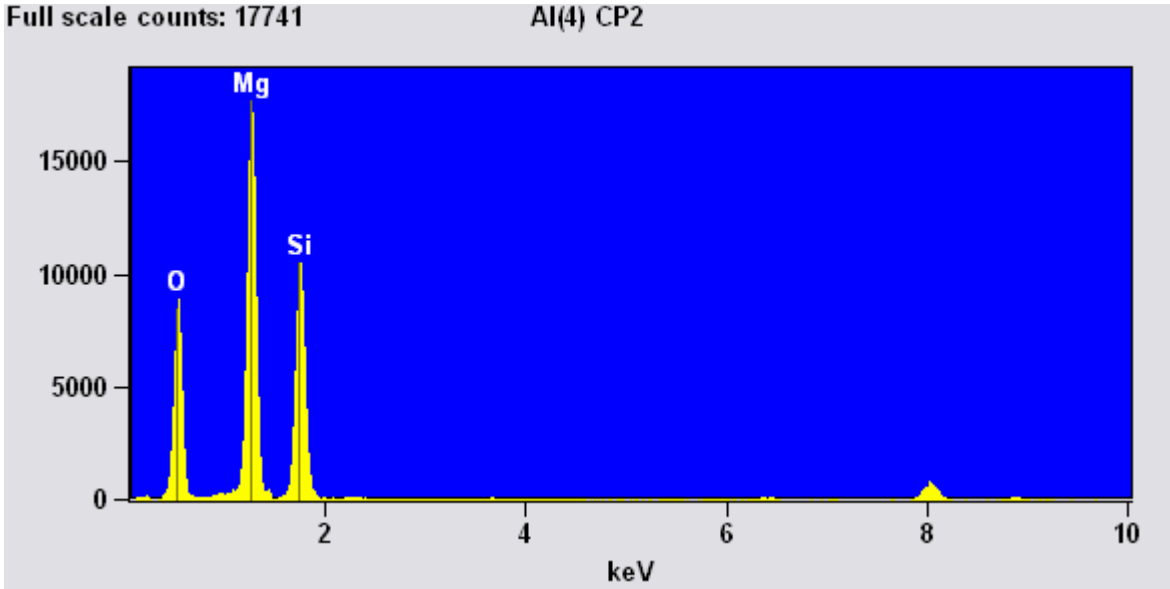

C 1
0
1000
250 nm

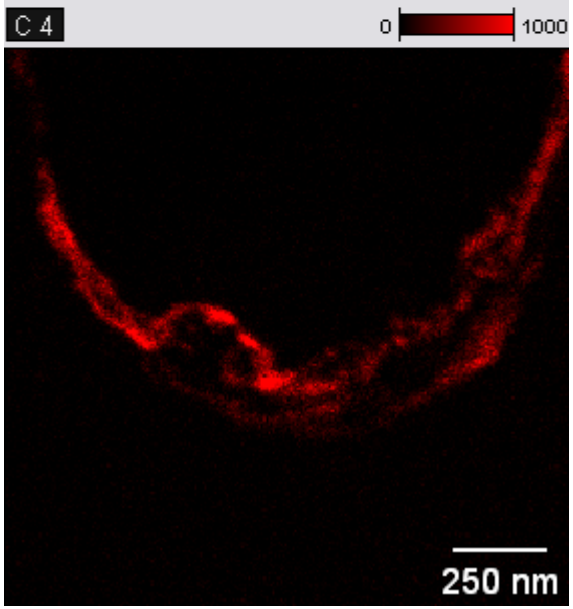

Full scale counts: 281430
Al(4) CP1
Al
Al Foil
300000
250000
200000
150000
100000
50000
0
2
4
6
8
10
keV

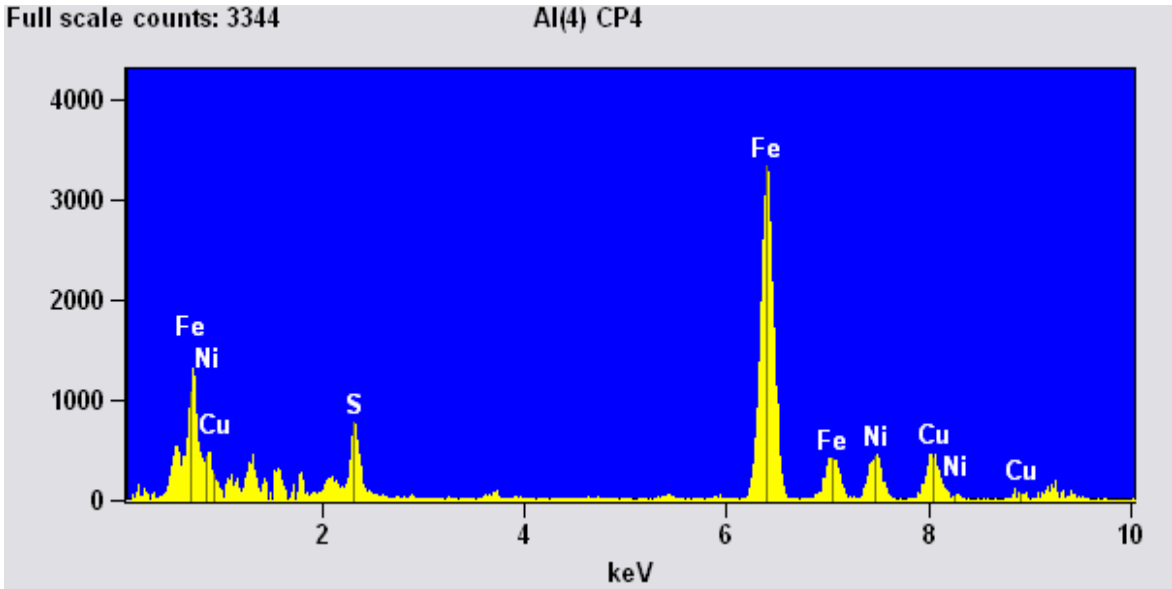

C 3
0
1000
250 nm


Full scale counts: 35006
Al(4) CP3
C
Protective C In-fill from FIB
30000
20000
10000
0
2
4
6
8
10
keV









Note Cu is from support

Standardless- Quantification

Element	Net Counts	Element Wt.%	Wt.% Error	Atom %	Compnd Formula	Compnd Wt.%
O	81499	45.52S	---	57.19		---
Mg	180285	34.39	+/-0.15	28.43	MgO	57.02
Si	126195	20.09	+/-0.10	14.38	SiO2	42.98
		---		---		---
Total		100.00		100.00		100.00

~ Mg_2SiO_4 to within uncertainty of analysis

Element	Net Counts	Element Wt.%	Wt.% Error	Atom %	Compnd Formula	Compnd Wt.%
S	6463	8.63	+/-0.32	14.20	S	8.63
S	924	---	---	---		---
Fe	57629	79.96	+/-0.59	75.55	Fe	79.96
Fe	9434	---	---	---		---
Ni	7732	11.41	+/-0.40	10.26	Ni	11.41
Ni	4455	---	---	---		---
		---		---		---
Total		100.00		100.00		100.00

~ S-poor, Ni-rich Fe-Ni sulfide $Fe_{15}Ni_2S_3$ suggests loss of sulfur on impact

Summary

- Based on the geometry of the residue and EDS analyses we can infer that the impacting grain consisted of a ~400nm grain of forsterite decorated with ~10 nm scale Fe,Ni sulfides
  - Identification of forsterite based on composition data; diffraction analysis pending