

Stardust foil C2086N,1

A simple bowl shaped crater of 59 microns top lip diameter, abundant Mg-rich silicate residue on crater floor.

Secondary electron and backscattered electron images. Stereometric depth and shape models and profile.

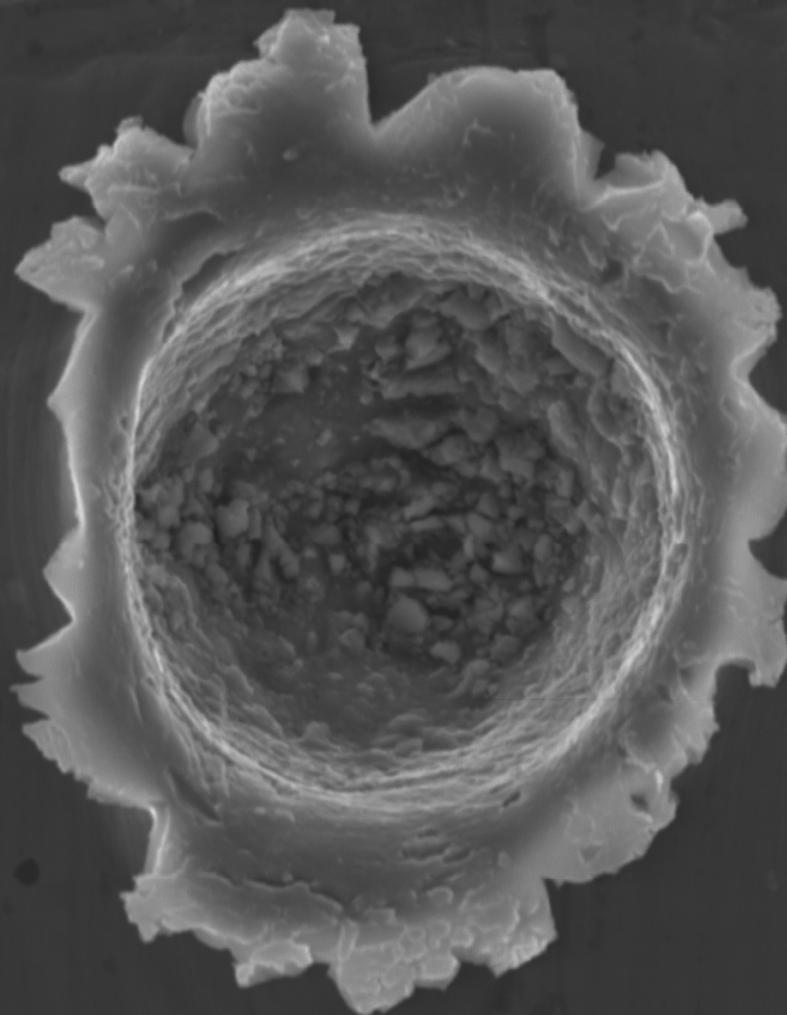
EDS X-ray maps and quantitative spectra

Anton Kearsley, NHM May 2006

Sample sent on to Peter Hoppe (Mainz)

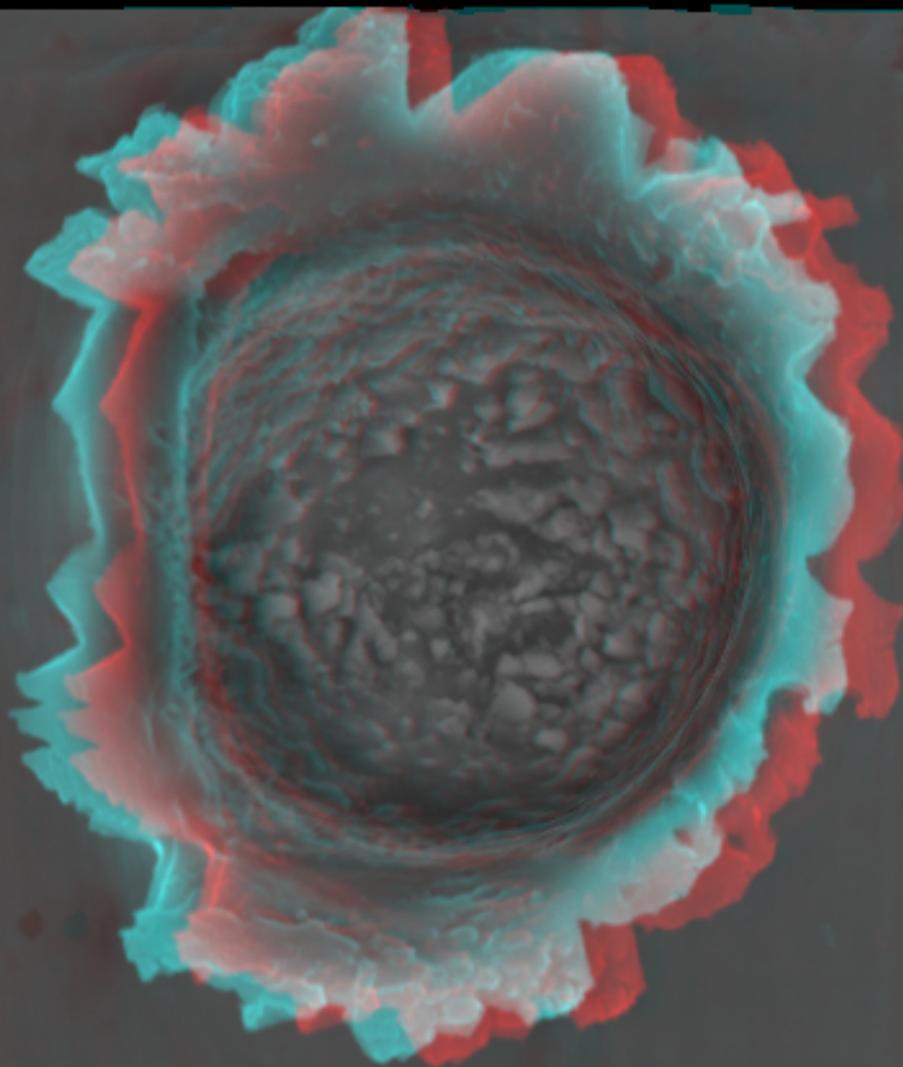
Stardust foil C2086N,1

SEI

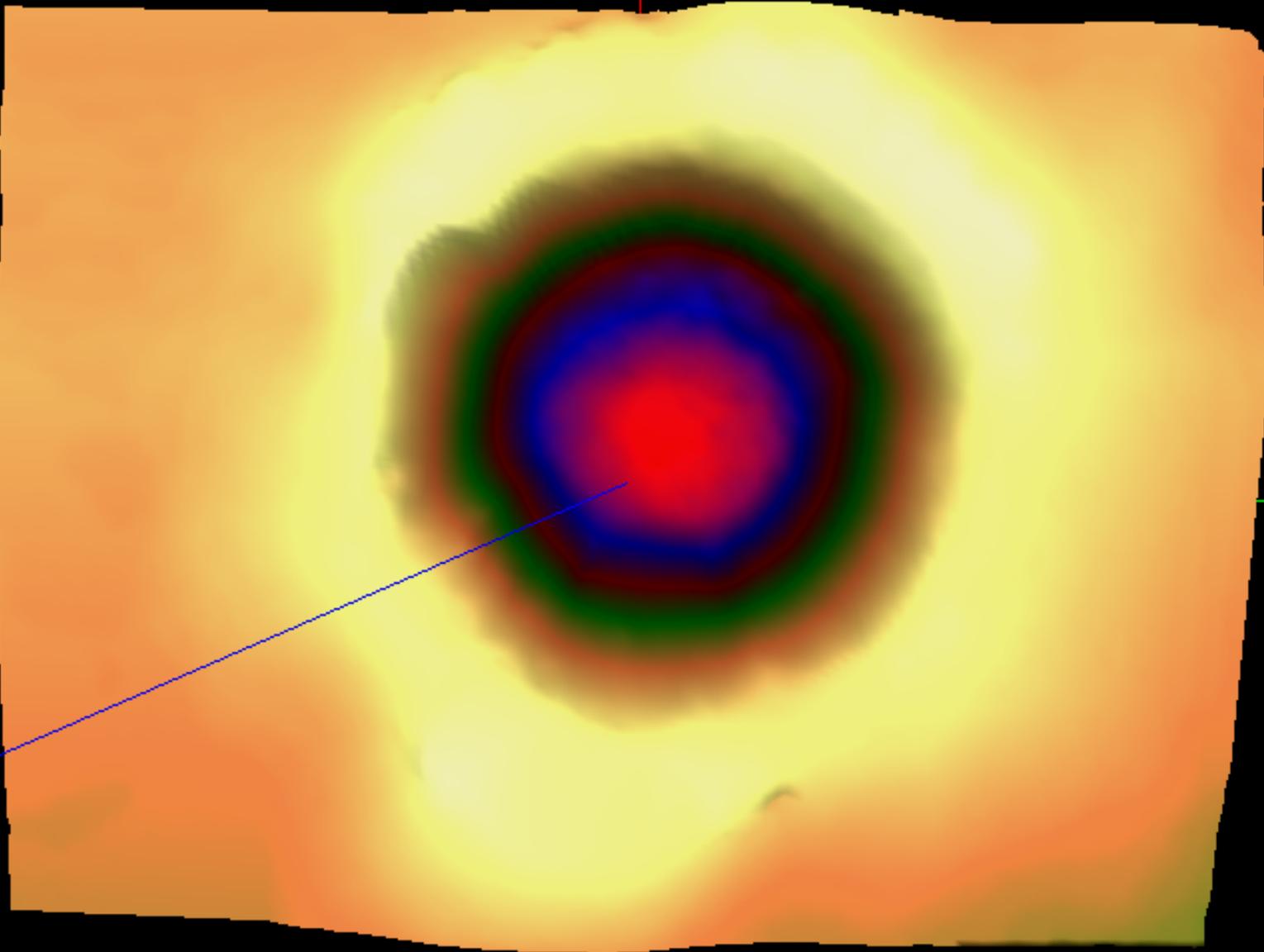


60 μm

Stardust foil
C2086N,1



Stereo anaglyph of secondary electron images



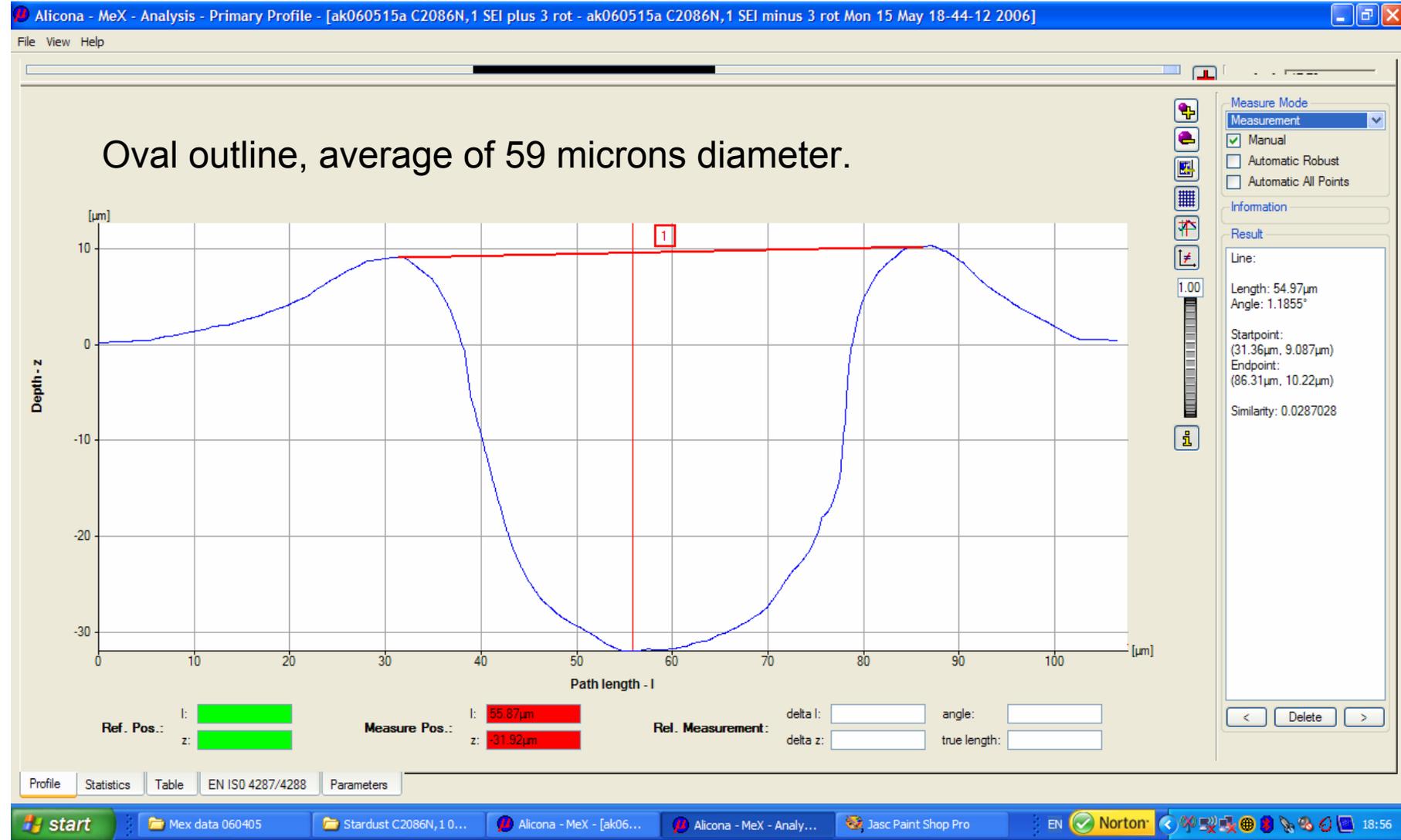
μm

5
0
-5
-10
-15
-20
-25
-30

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Depth model

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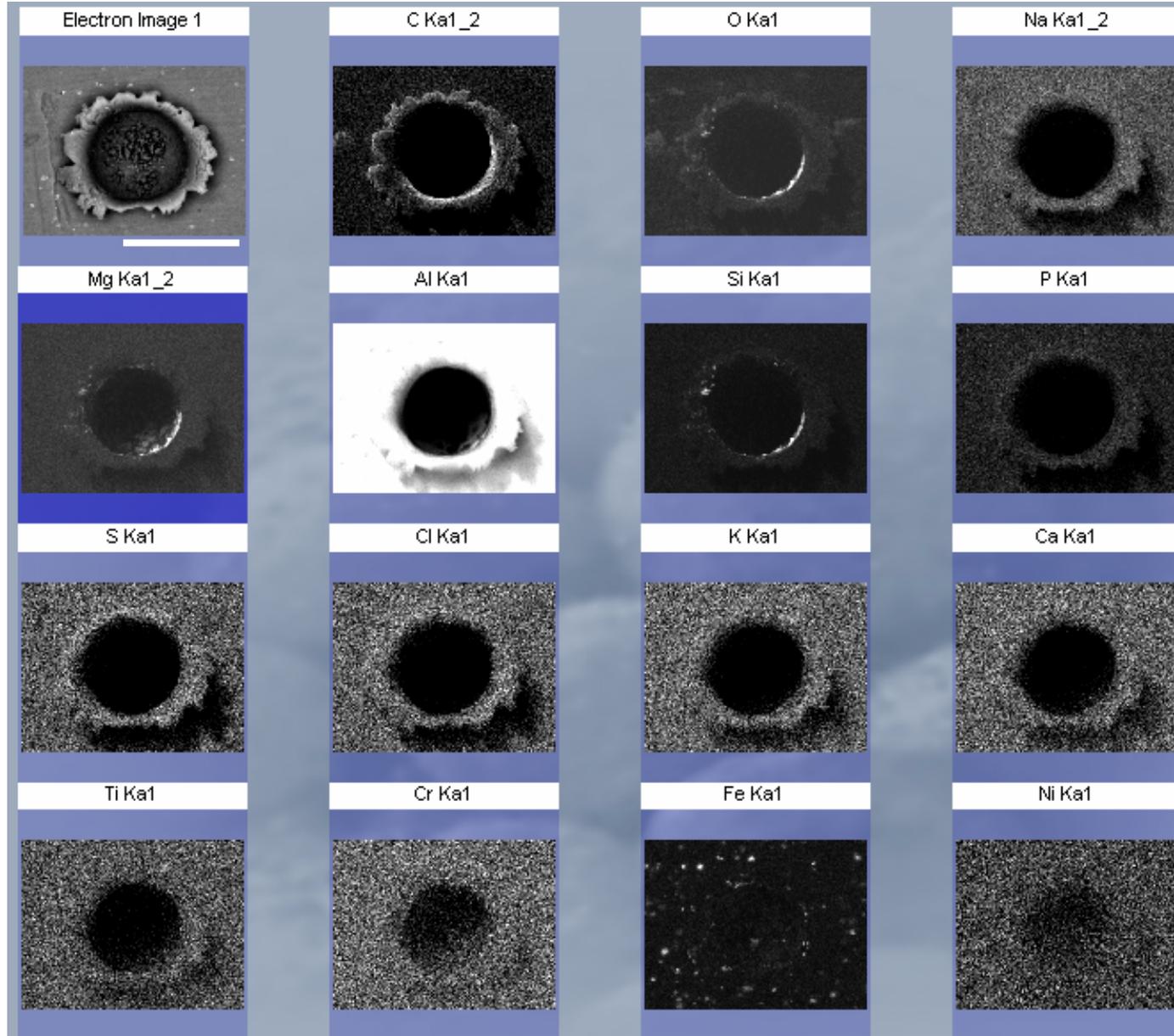


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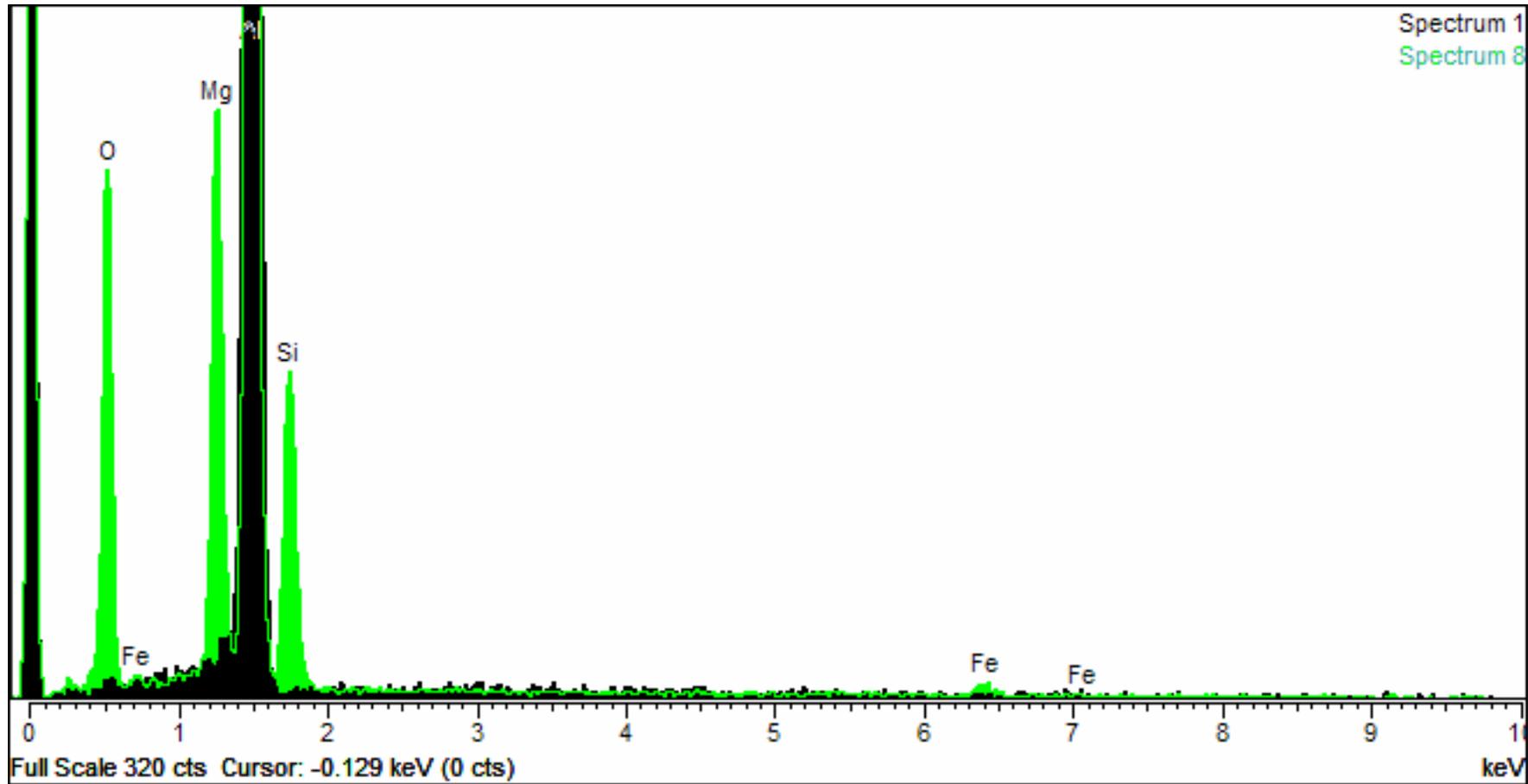
X-ray maps
with beam-
normal
incidence.

Residue
can be
located at
the crater
rim, but not
on the walls
or floor

60 μm
scalebar



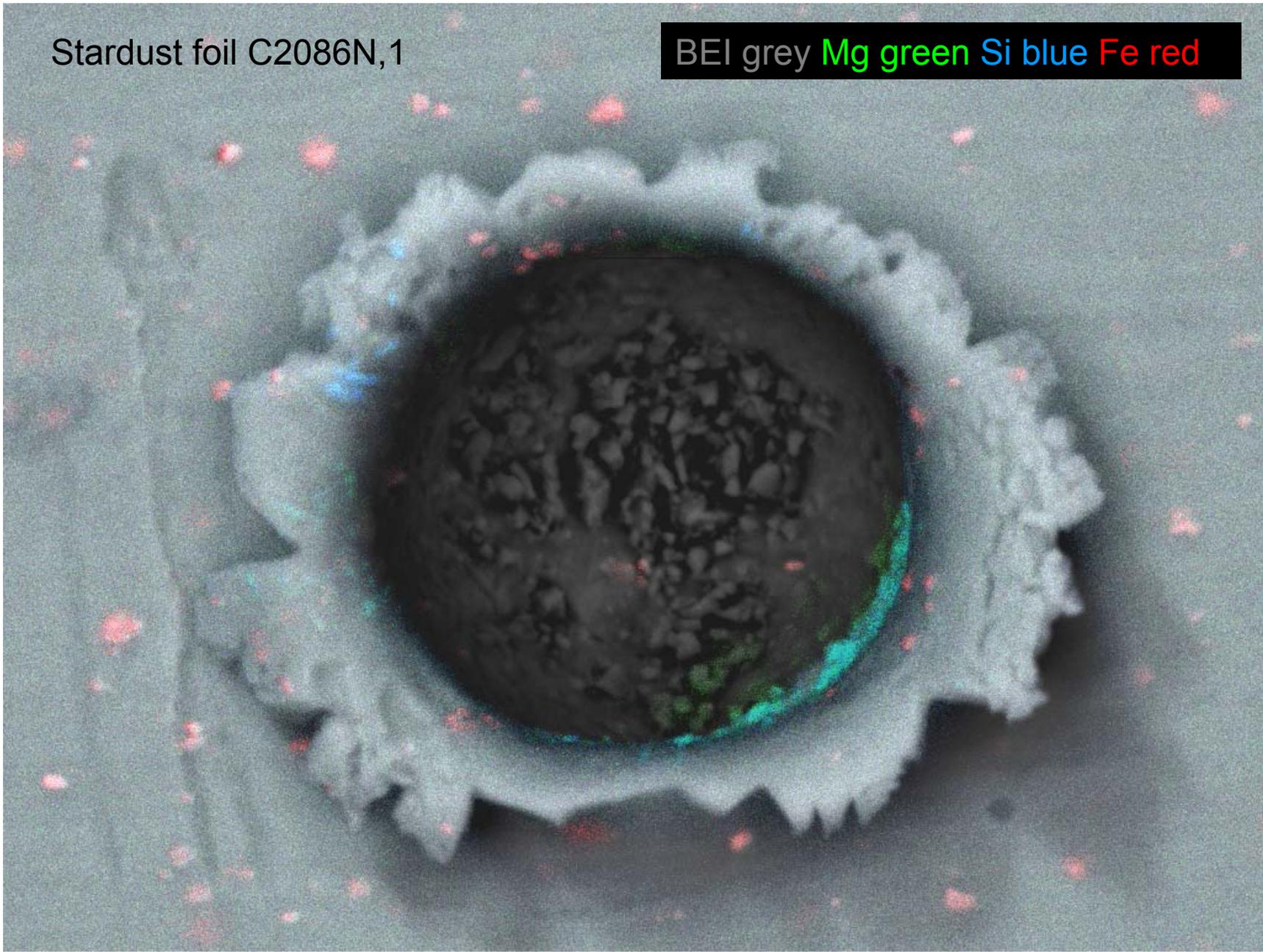
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Typical EDS X-ray spectrum of residue on crater lip (green) superimposed on spectrum of nearby aluminium alloy surface. Mg-rich olivine.

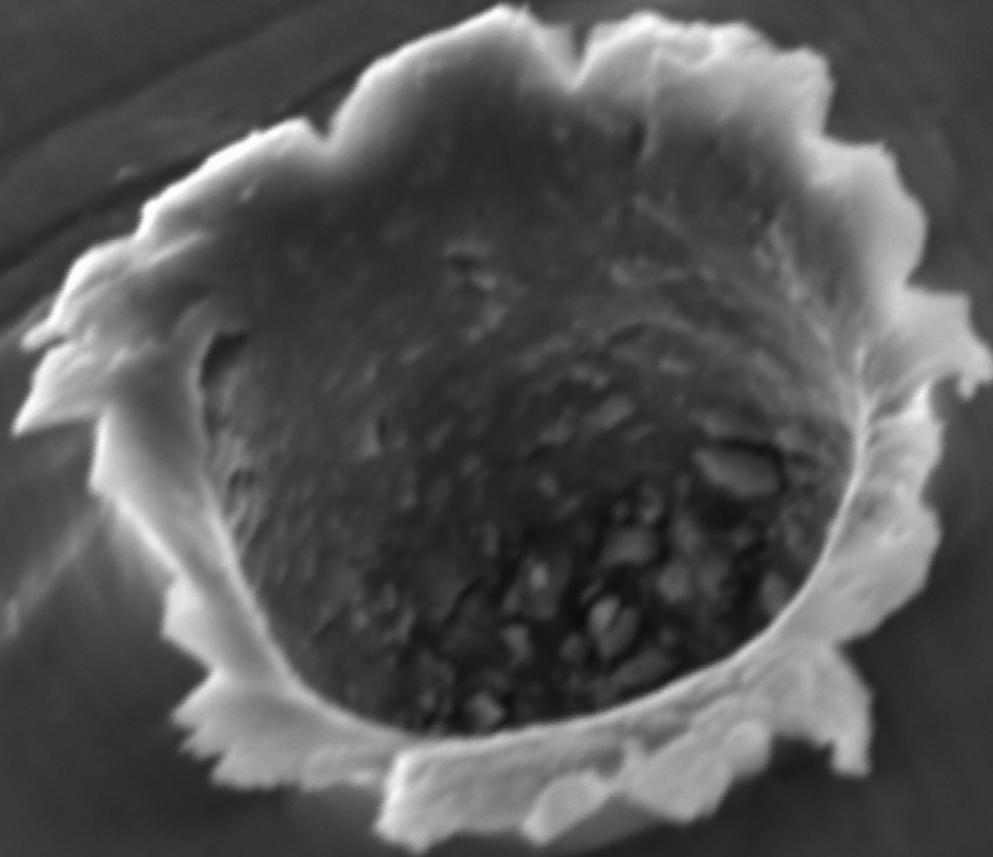
Stardust foil C2086N,1

BEI grey Mg green Si blue Fe red



40µm

Stardust foil C2086N,1

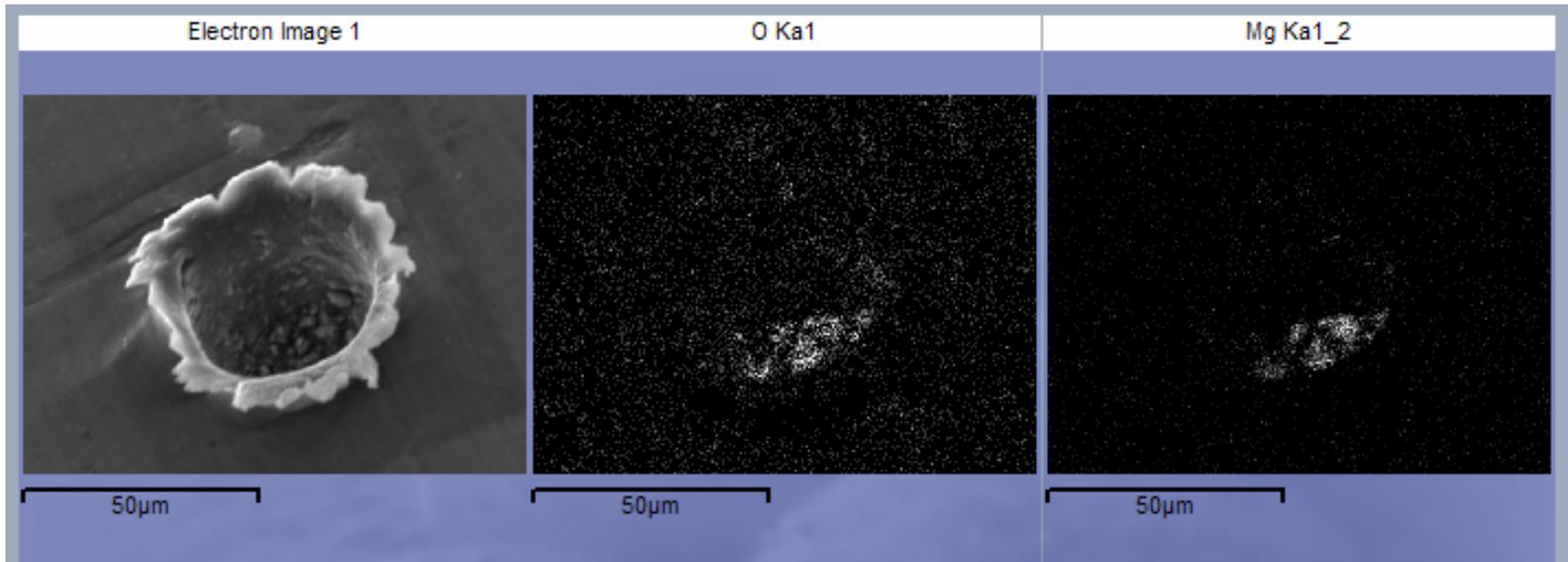


c. 30 degree inclination

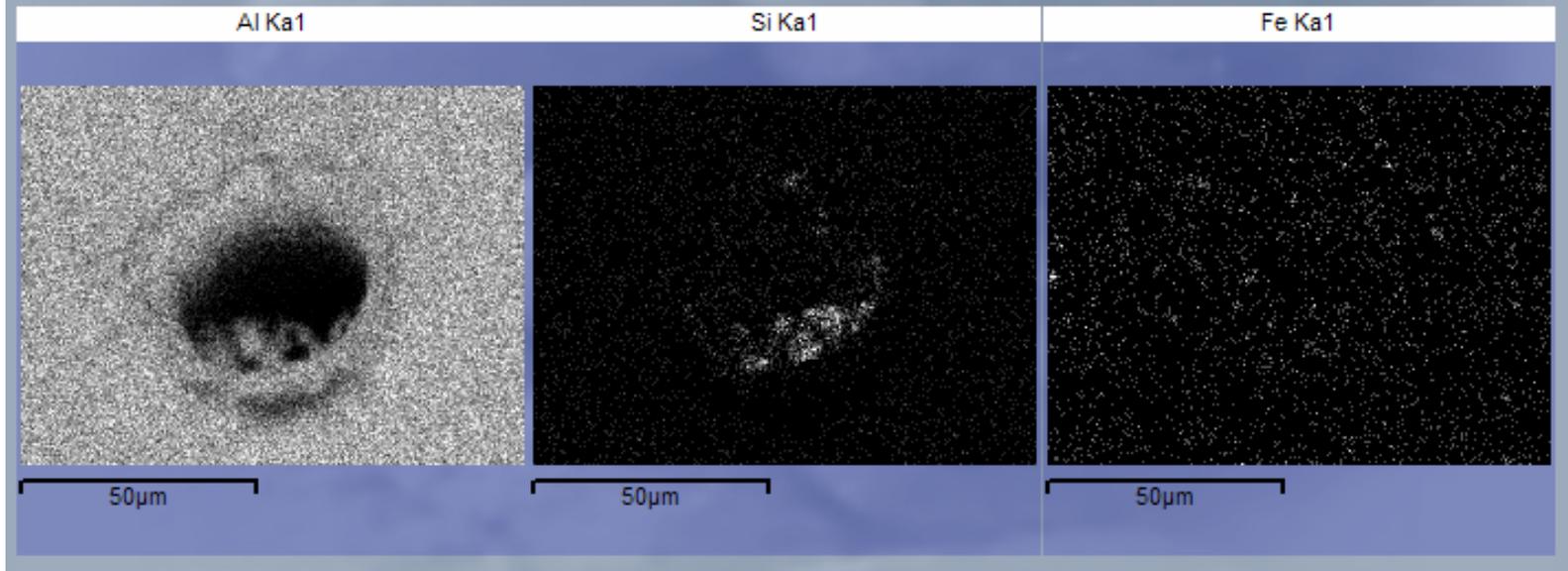
SEI at long working distance

50 μ m

Stardust foil C2086N,1



c. 30 degree inclination X-ray maps of residue on edge of crater floor

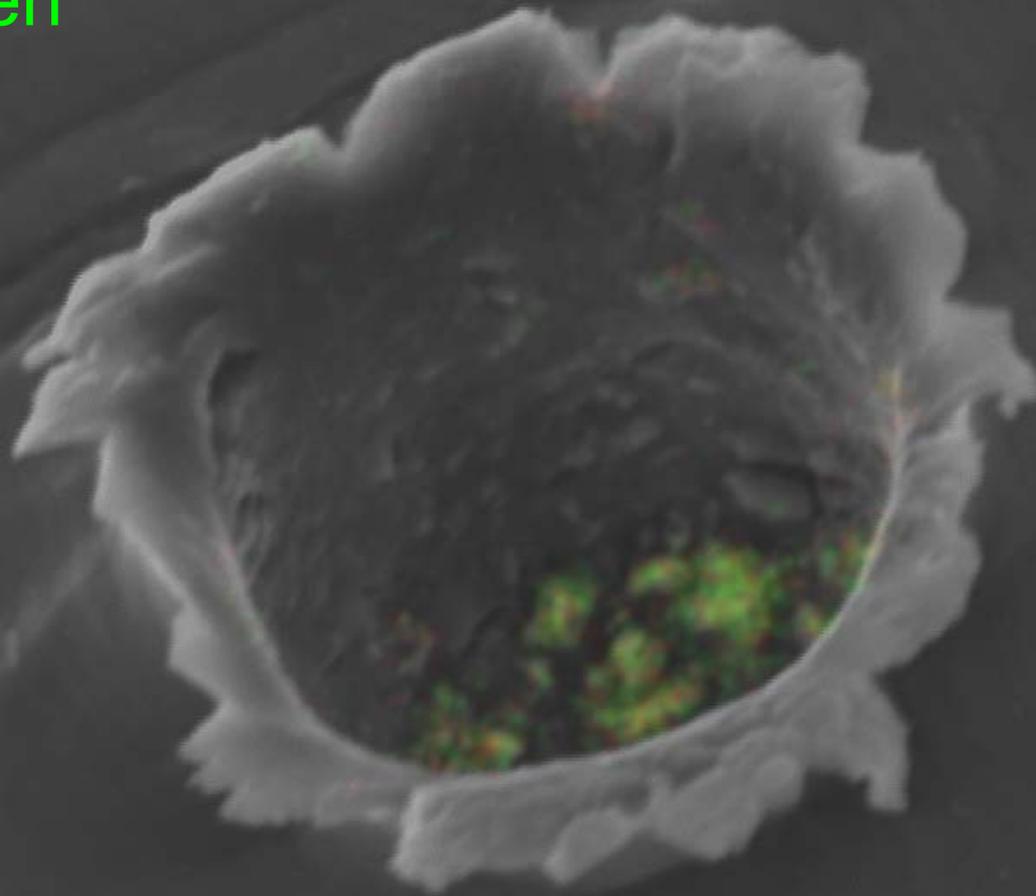


SEI grey

Mg green

Si red

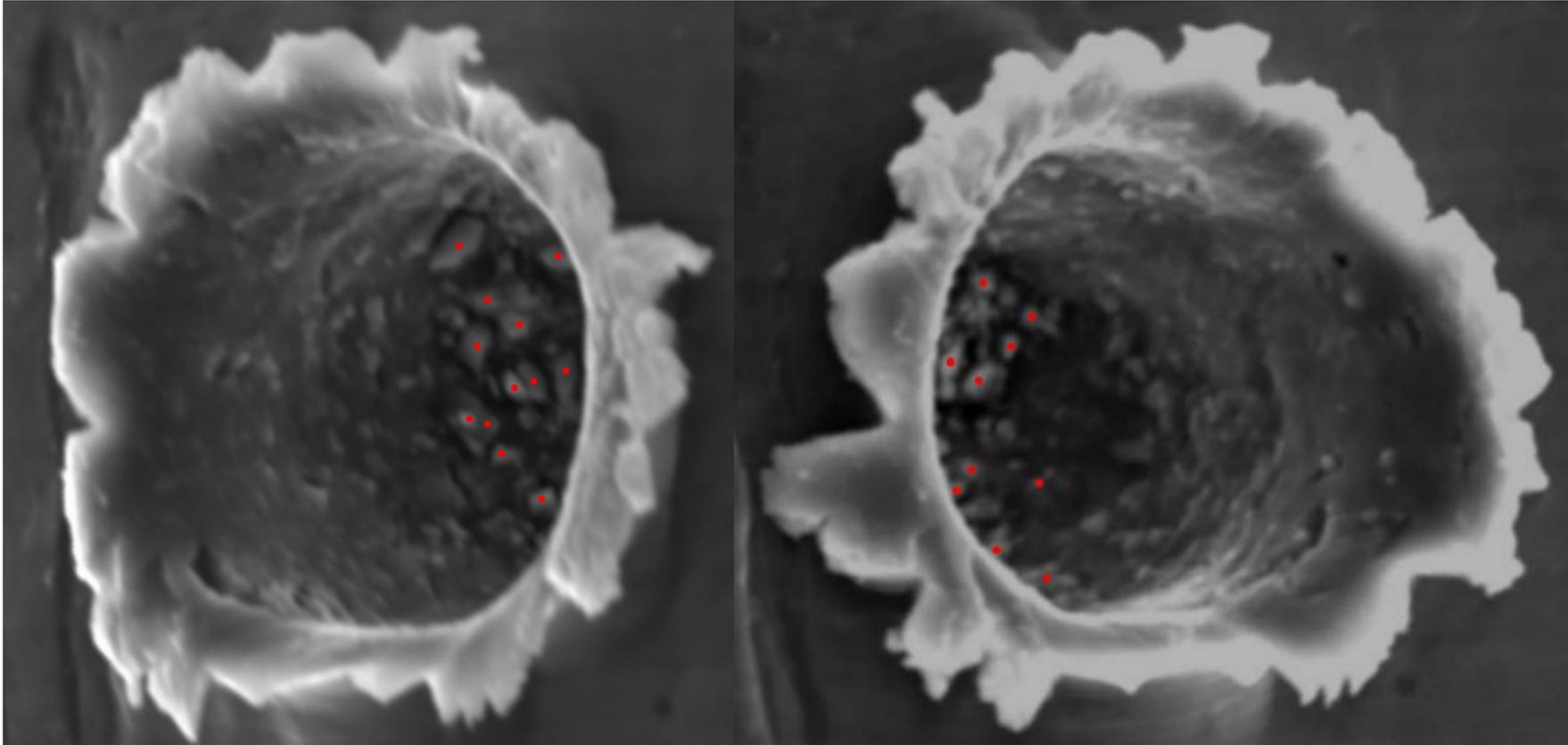
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50 μm



Stardust foil C2086N,1

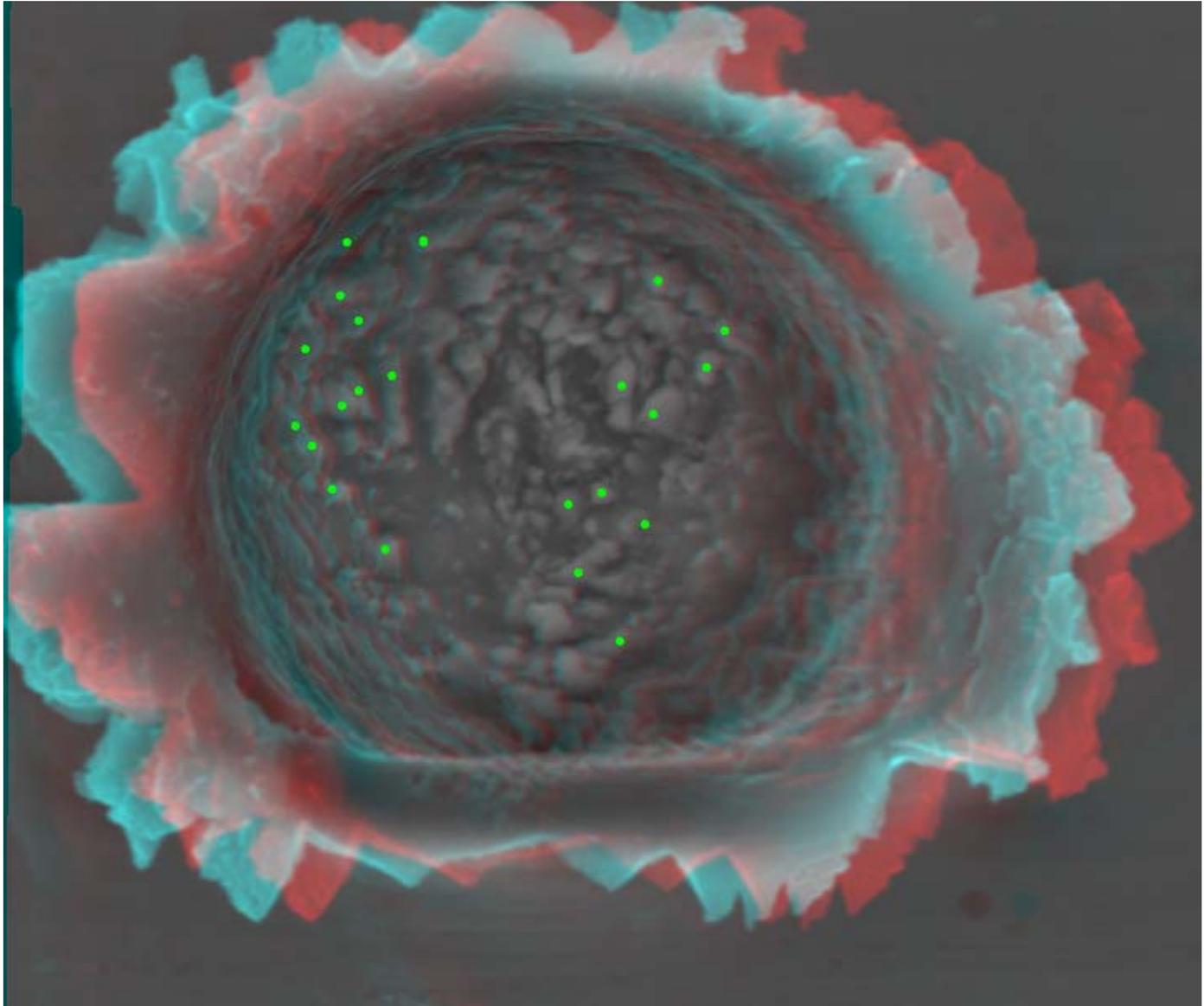


Red points all yielded indistinguishable analyses of high-Mg olivine, with good stoichiometry and Fo:Fa c. 97:3%.

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stereo anaglyph

Locations of olivine analyses shown as green dots



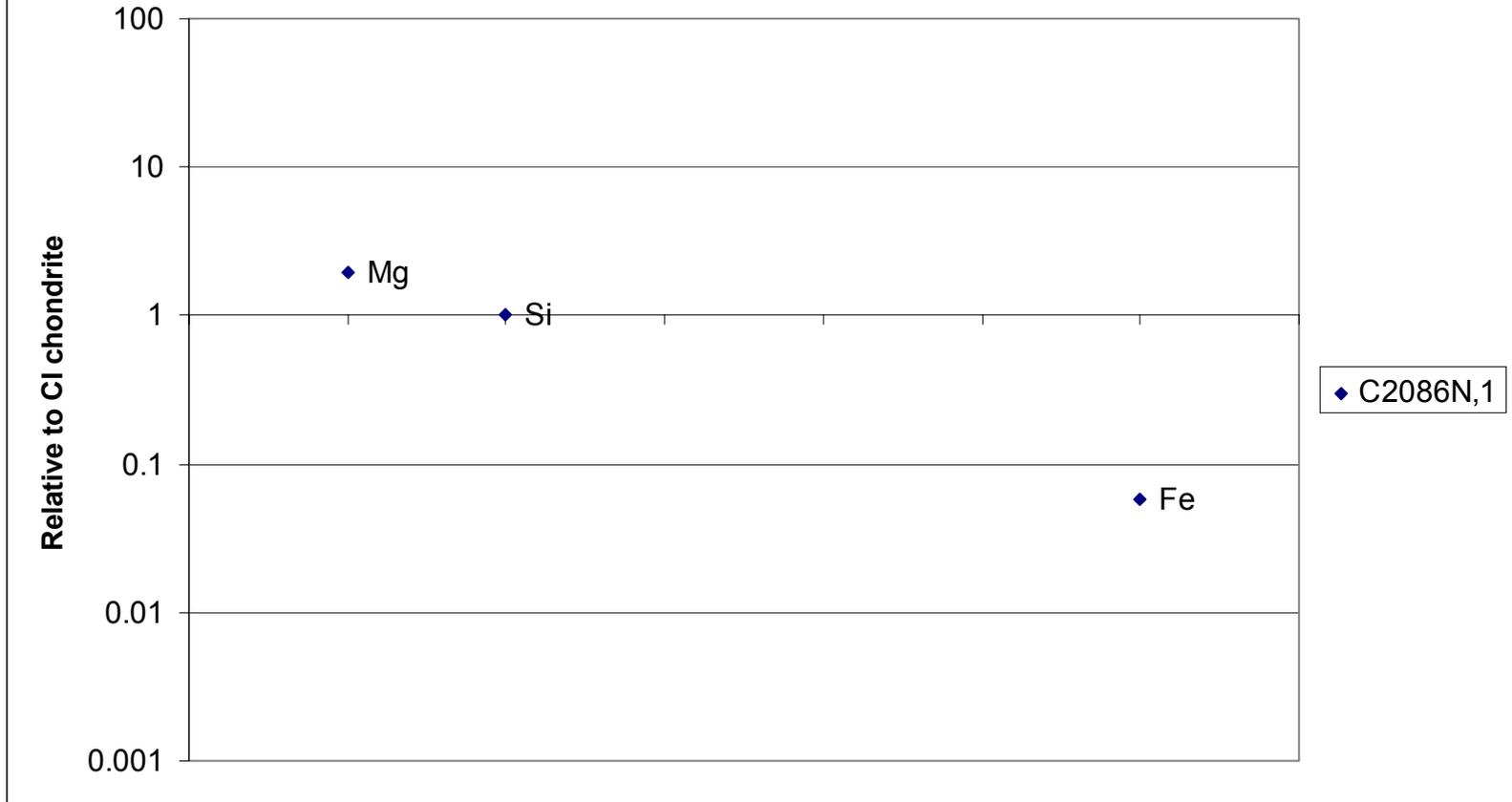
Sample: C2086N,1

Processing option : Oxygen by stoichiometry (Normalised)

All results in atomic%

	Mg	Si	Fe	O	Fo%
Spectrum 1	27.9	14.3	0.7	57.1	97.6
Spectrum 2	28.1	14.2	0.6	57.1	97.8
Spectrum 3	27.7	14.3	0.9	57.1	96.9
Spectrum 4	28.1	14.1	0.7	57.1	97.5
Spectrum 5	27.6	14.3	0.9	57.2	96.8
Spectrum 6	27.8	14.3	0.7	57.2	97.6
Spectrum 7	27.9	14.4	0.6	57.2	98.0
Spectrum 8	28.0	14.2	0.7	57.1	97.5
Spectrum 9	28.4	13.8	0.9	56.9	97.0
Spectrum 10	28.5	13.7	0.9	56.9	96.8
Spectrum 11	27.9	14.3	0.7	57.1	97.5
Spectrum 12	30.9	12.8	0.0	56.4	100.0
Spectrum 13	28.4	13.9	0.8	56.9	97.2
Average	28.2	14.0	0.7	57.0	97.5
Std Deviation	0.8	0.4	0.2	0.2	0.8

C2086N,1



C2086N,1 residue

stoichiometric Olivine of composition $\text{Fo}_{97.5} \text{Fa}_{2.5}$

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summary

A bowl-shaped crater of 59 microns top-lip average diameter, similar depth to lab. impacts of olivine grains under the same velocity conditions.

Impact by a single dense grain of one mineral species?

Density-scaled crater diameter calibration suggests: particle diameter c. 11 μm , and mass c. 2 ng.

There is abundant residue on crater walls and floor

All analyses of residue by EDS are very similar, showing olivine with good stoichiometry of c. 97.5 Fo %.