

# Stardust Al-Foil C2068W1

## FIB – TEM work

FIB Dual Beam FEI Strata DB 235

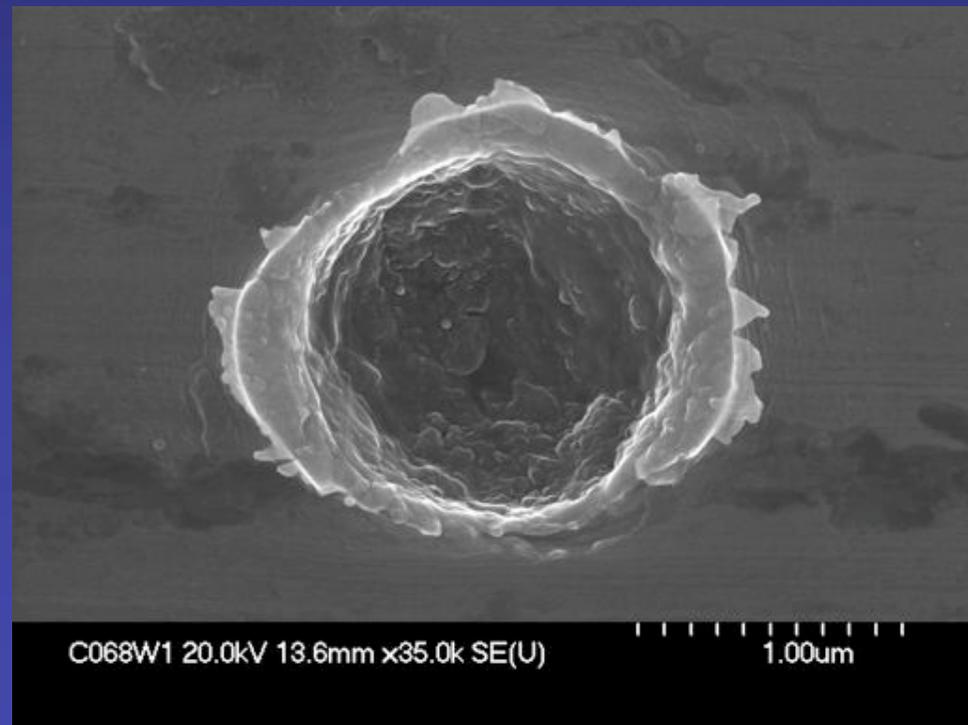
TEM FEI Tecnai G2 20 and Philip CM30

Hugues Leroux, LSPES-Lille, France

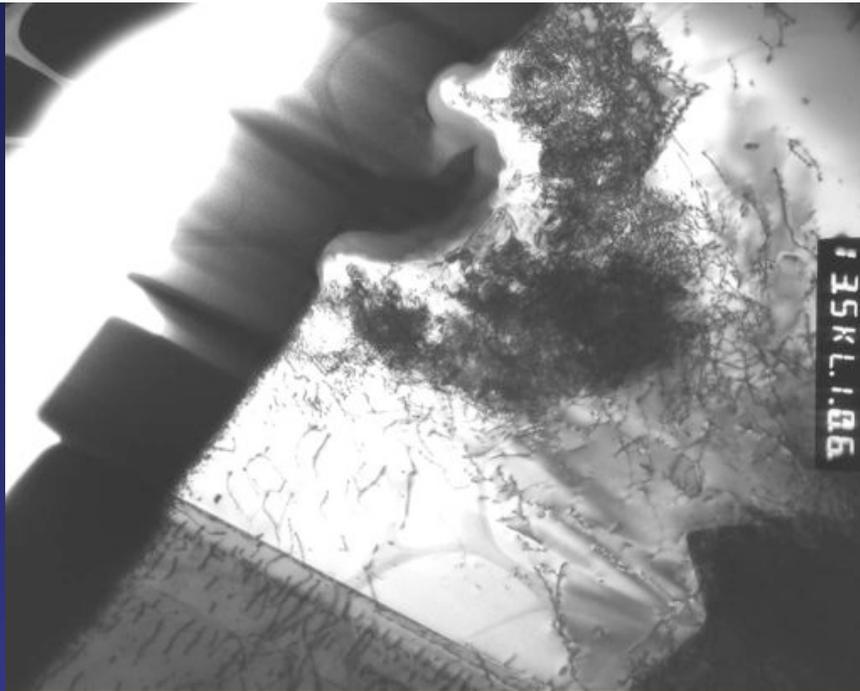
David Troadec, IEMN-Lille, France

Janet Borg, IAS-Orsay, France

Selected crater (#11)

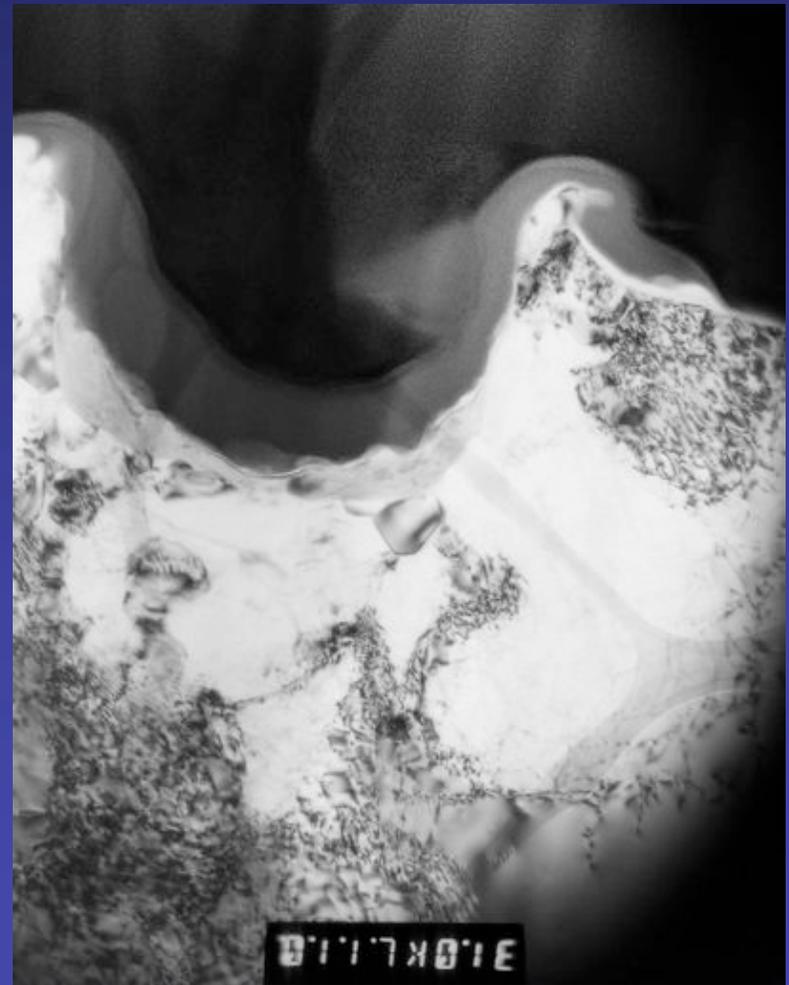


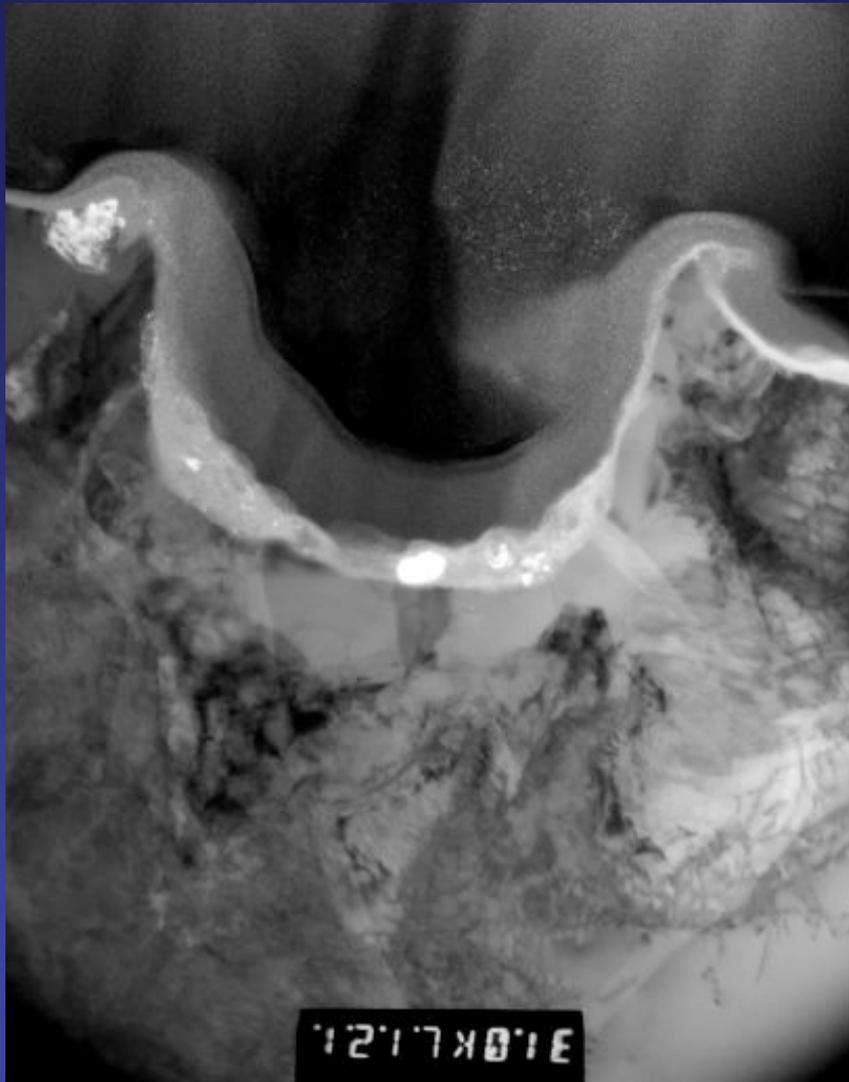
report sent 19 June 2006



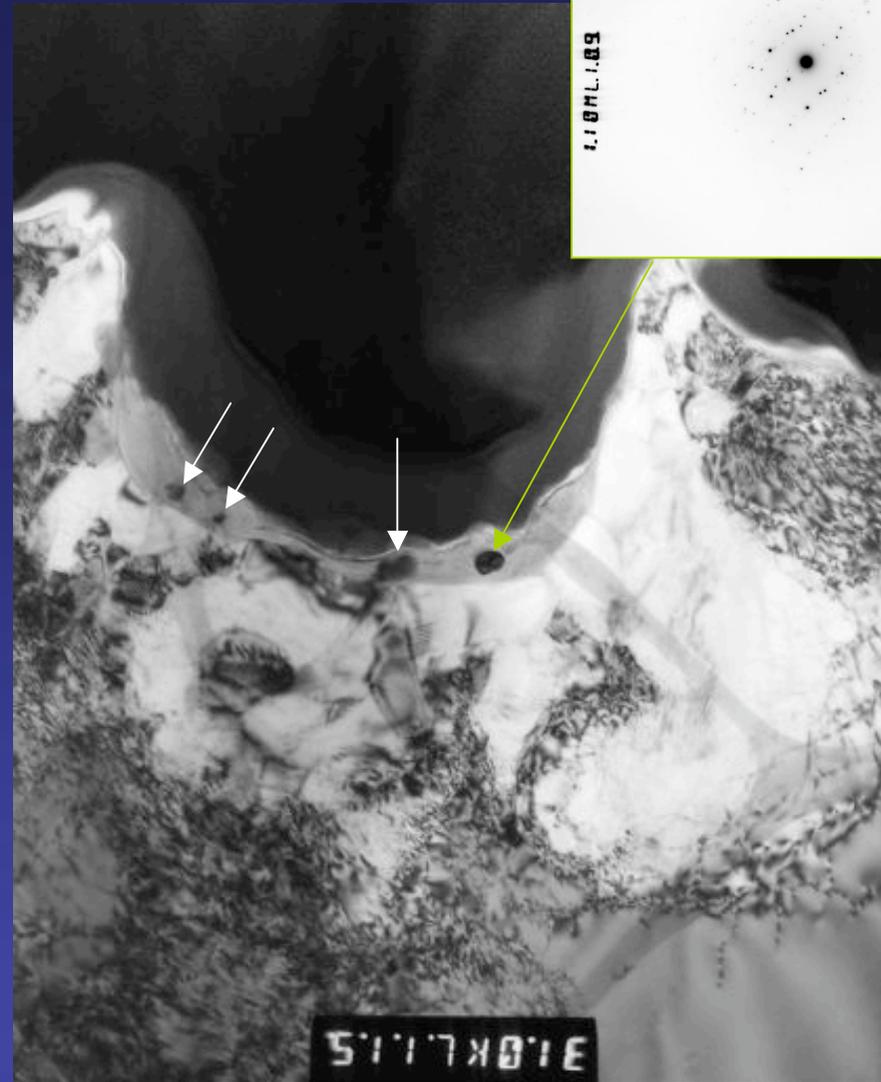
Crater diameter =  $1.3 \mu\text{m}$

Note that plastic deformation occurred in the Al-foil. The dislocation density is found strongly increased (dark lines and dark area in Al). Al in contact with the residue is recrystallized.

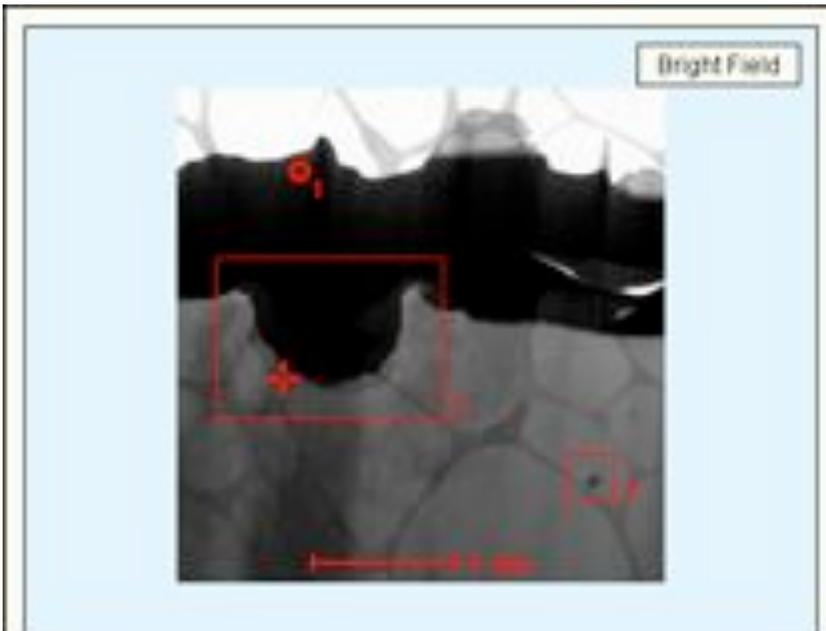




Diffuse dark field  
The residue is bright. Note the presence of crystallites

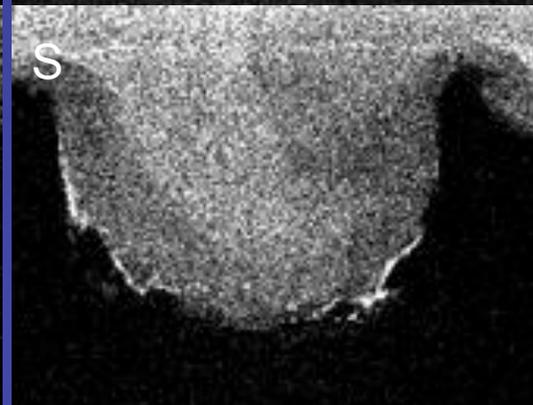
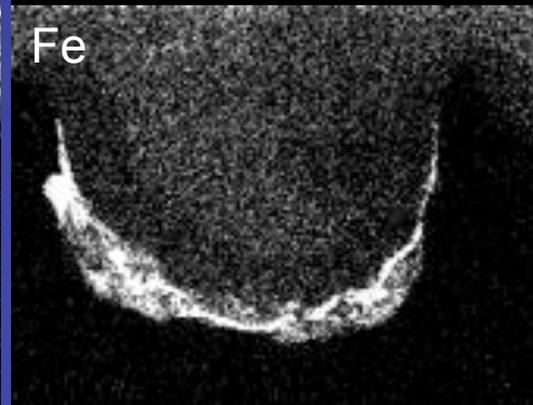
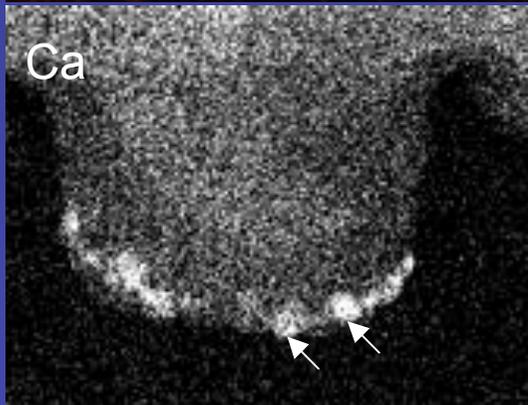
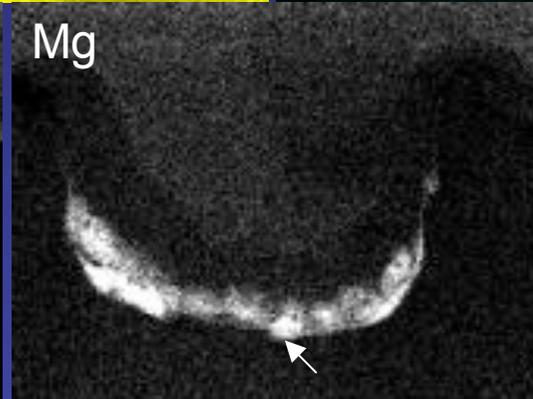
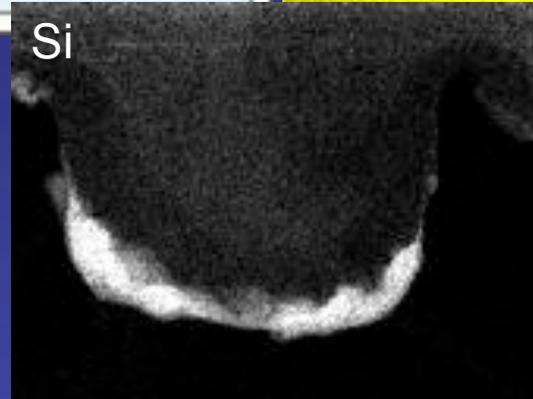
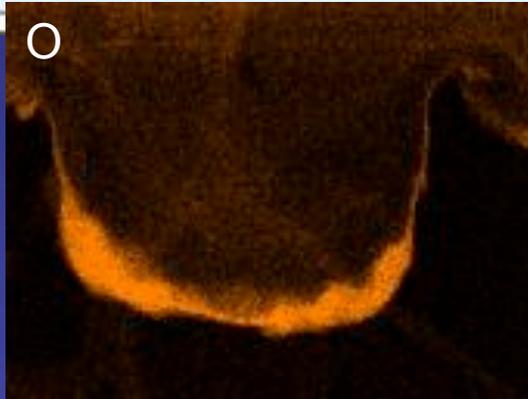
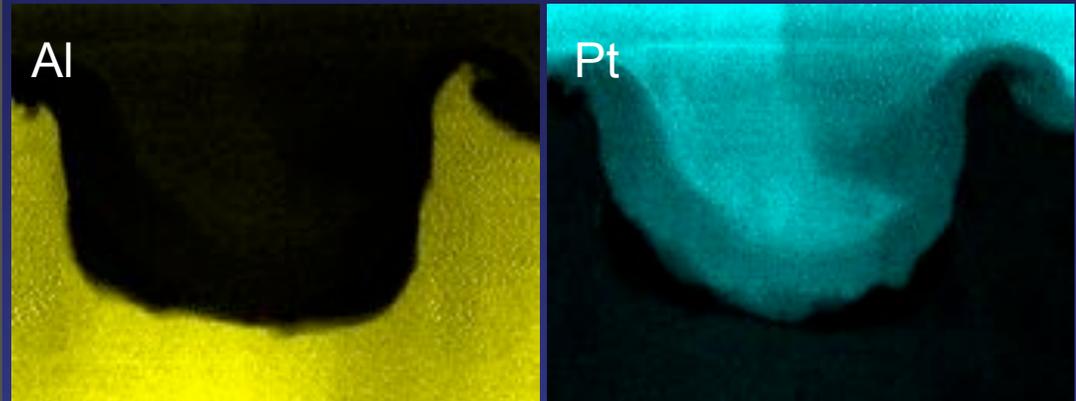


Bright field  
Note the presence of crystallites, arrowed. One of them is indexed as CPX. For the other, it was difficult to record good diffraction data



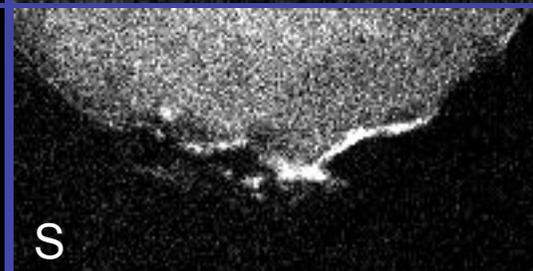
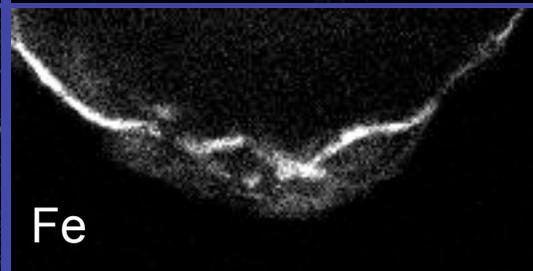
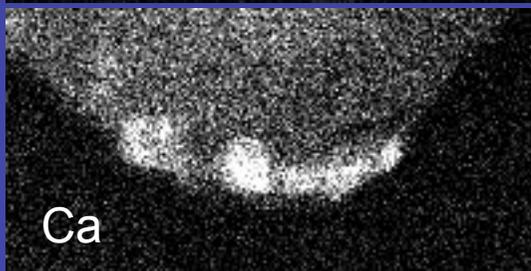
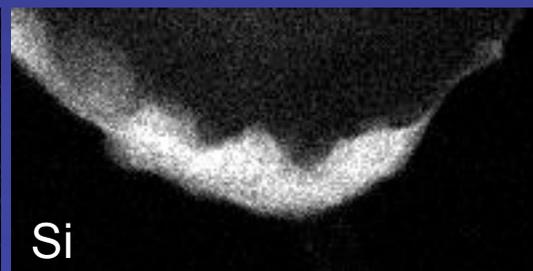
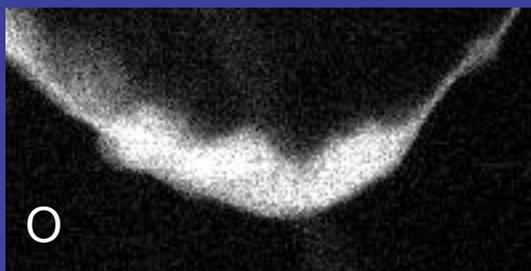
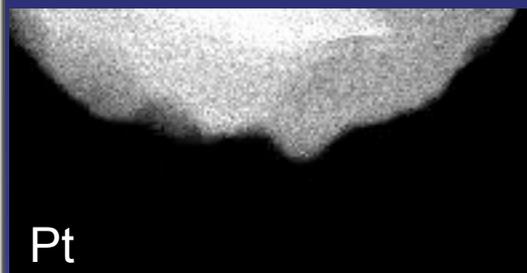
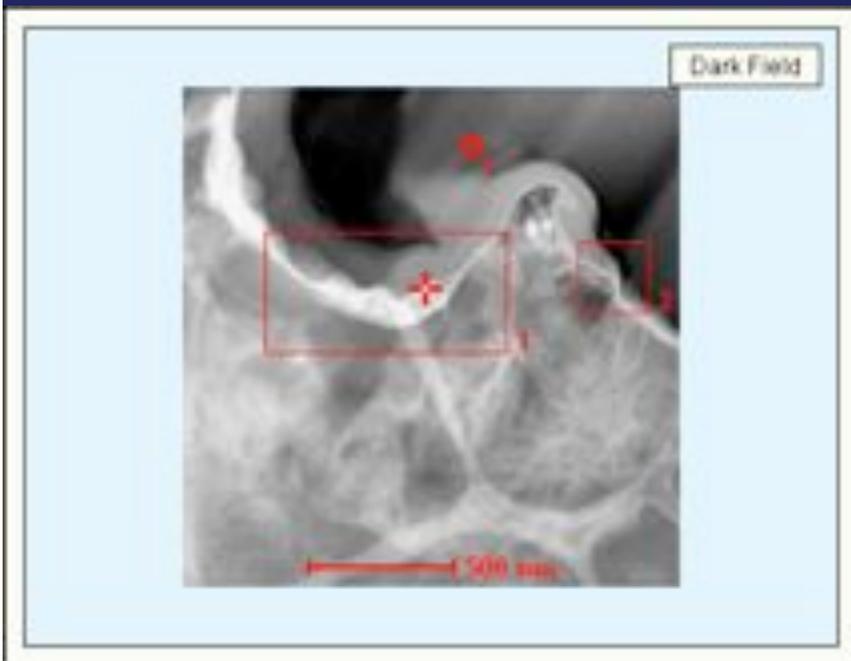
## EDS elemental map (# 1)

Note the non-homogeneous distribution of Mg, Ca, S and Fe. Fe,S is mainly present at the top edge of the residue. Some crystallites are arrowed.



## EDS elemental map (#2)

Other elemental map on the right side.



## Quantitative analyses

- 15 analyses recorded
- The residue seems depleted in oxygen (I mean that I do not have the good oxide stoichiometry using a reasonable sample thickness).
- The composition of the residue is heterogeneous
- The crystallite shown before (arrowed, with the diffraction pattern) contains significant amount of Ca and Cr. The ratio (Mg+Fe+Ca+Cr)/Si is close to 1, i.e., it might be a Px, as indicated by the diffraction pattern (spe 324 and 327).
- An analysis on an other crystallite could be compatible with an olivine (spe 337), although oxygene deviates.

Spe	O	Si	Mg	Ca	Cr	Mn	Fe	S	Ni	Na
320	59.3	24.5	7.0	1.1	0.3	0.2	5.5	1.8	0.2	nd
321	53.4	19.20	14.5	1.7	0.4	0.2	8.7	1.3	0.5	nd
322	54.9	19.5	18.2	1.0	0.3	0.2	5.6	0.1	0	nd
323	59.2	20.8	12.9	1.7	0.4	0.3	4.5	0	0.1	nd
324	51.6	23.8	7.4	4.6	2.7	0.1	5.4	2.9	0.1	1.0
325	52.4	22.5	16.1	2.4	0.6	0.3	5.0	0.2	0	0.4
326	54.7	24.7	12.9	1.2	0.2	0.2	5.7	0.3	0.1	nd
327	51.3	21.9	9.9	4.4	2.4	0.2	6.7	2.3	0.1	0.6
328	40.1	11.9	8.8	1.8	0.8	0.3	23.6	11.1	0.7	nd
329	55.9	23.4	14.3	1.6	0.5	0.4	3.6	0.1	0	nd
330	61.2	25.2	6.3	0.8	0.3	0.2	3.3	2.0	0.2	nd
333	62.7	15.7	15.8	0.6	0	0.1	3.0	0.3	0	1.5
335	57.5	18.8	10.3	2.5	0.6	0.1	4.6	4.4	0.1	0.8
336	63.8	21.8	9.4	2.7	0.4	0	1.7	0.2	0	nd
337	60.6	14.5	19.9	0.4	0	0.1	3.1	0.2	0	1.1

## Quantitative analyses

- Al is not quantified,
- systematic quantification with a sample thickness of 120 nm.
- Analyses 324, 327, 337 have been done on crystallites
- analyses 322, 323, 325, 333, 335, 336 are also done on crystallites, but not sure that the beam was really on the crystallites,
- The analyses could be refined later

# Quantitative analyses - localisation

