I1029,1,6,0 01apr08
9 o'clock swarm pico in Si3N4 sandwich

STXM 11.0.2 18th April 2008

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sample prep by Dave Frank

whole keystone sample
Absorption image near Al K-edge

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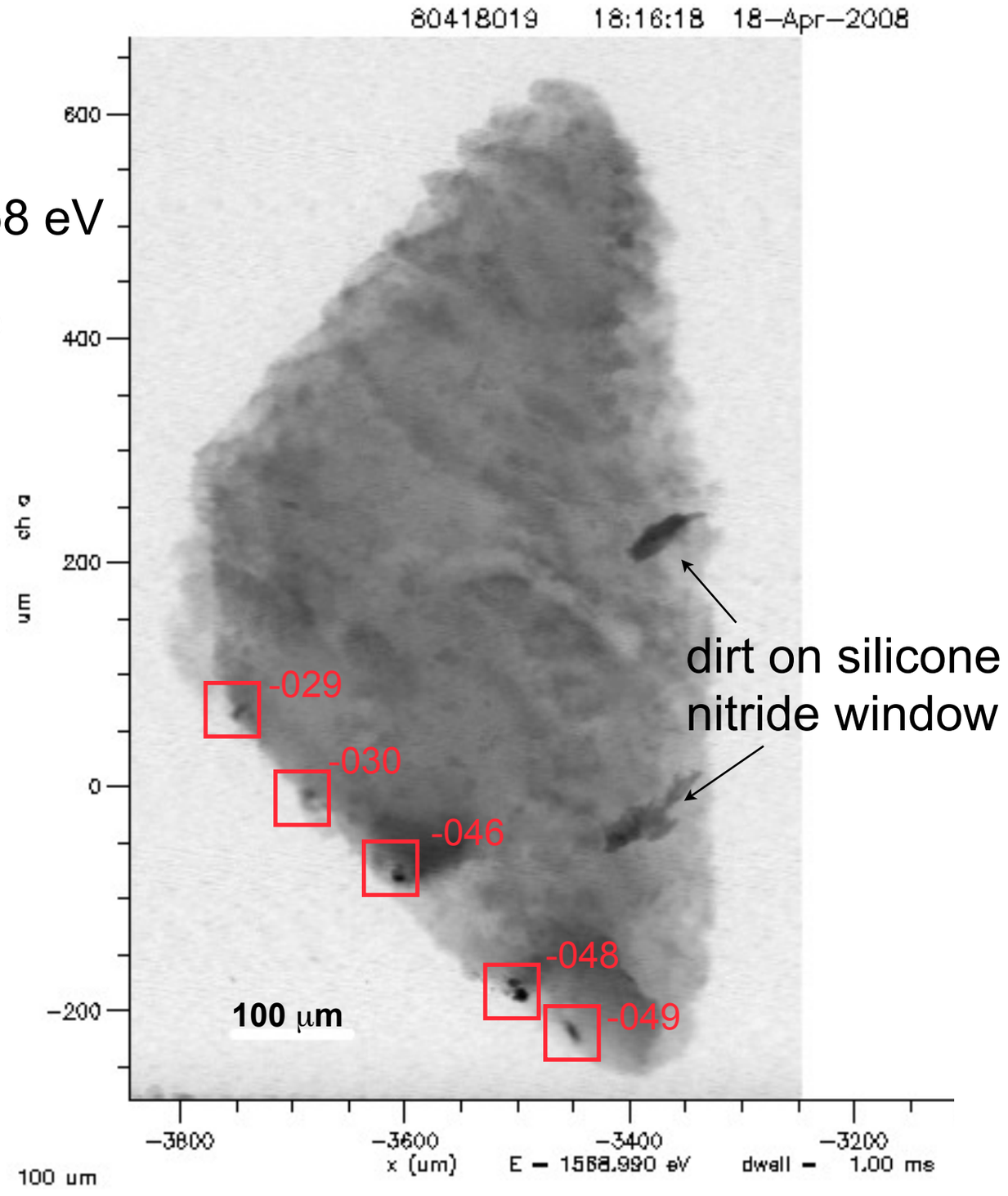
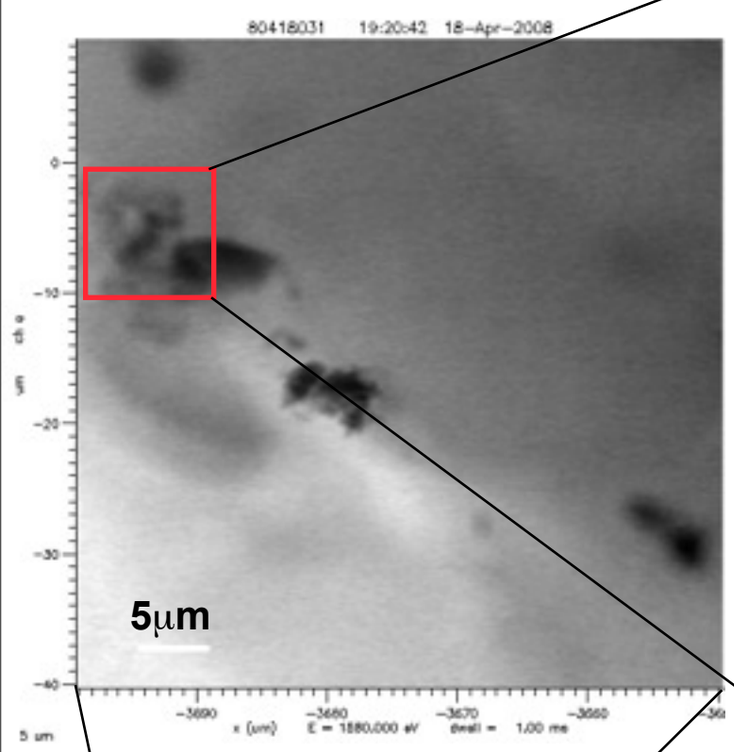
350μm thick keystone is optically thin at 1558 eV

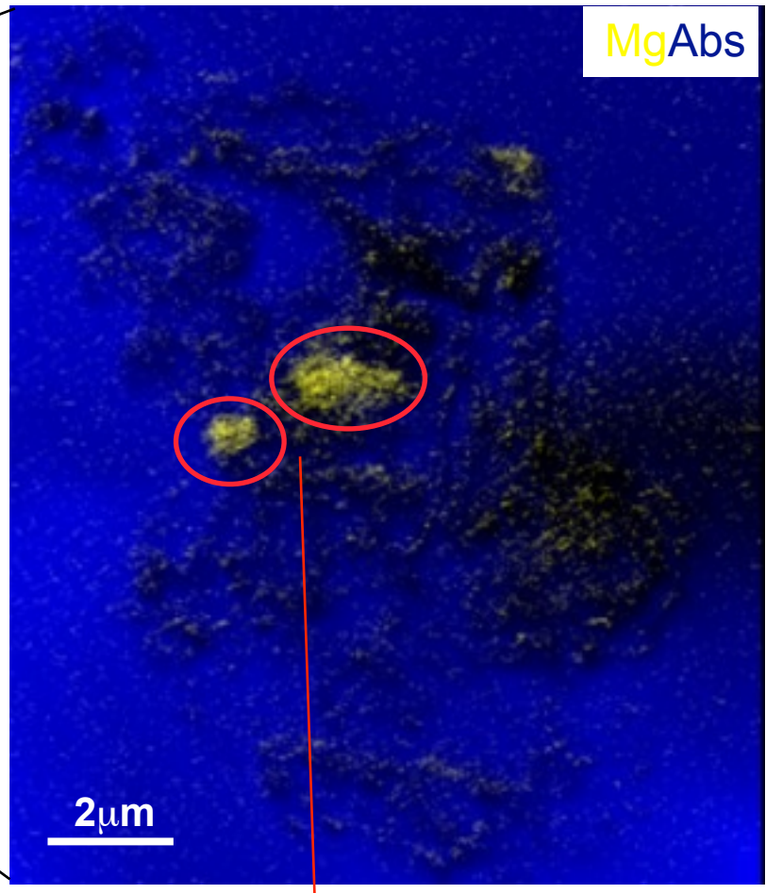
5 “swarm” particles in 350μm thick keystone

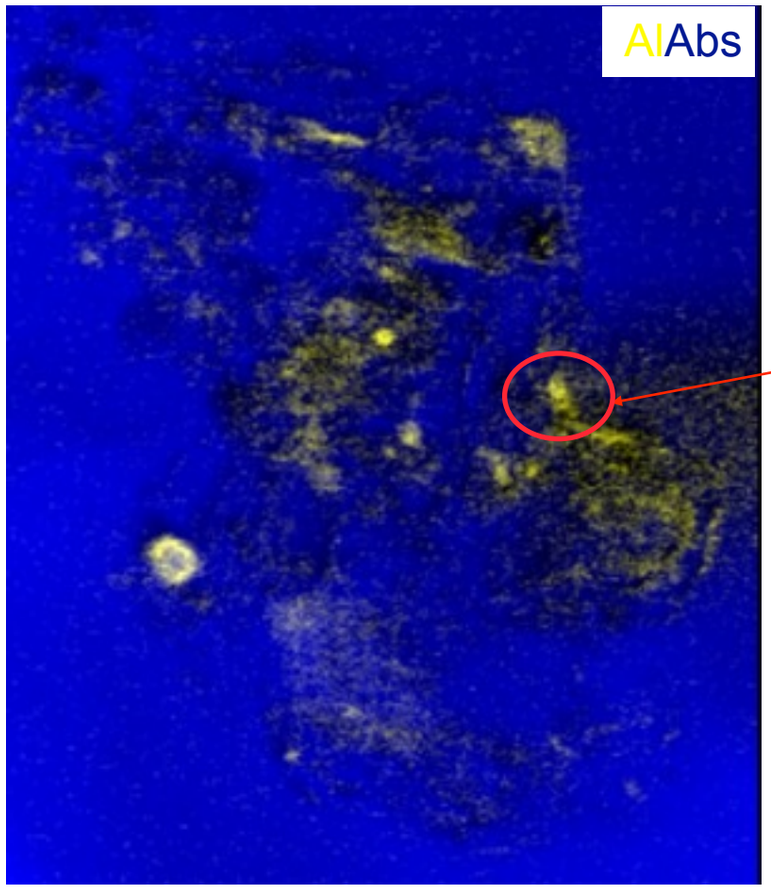
pico-keystone was damaged in extraction and contains no fragments

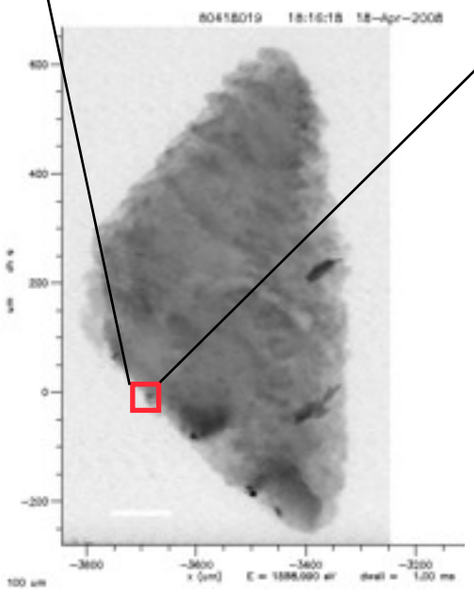


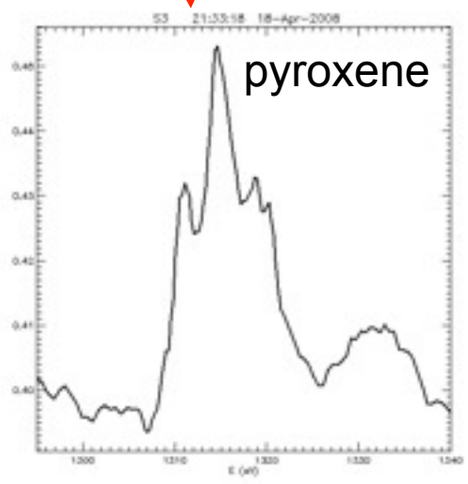
cluster region
Al & Mg maps and XANES



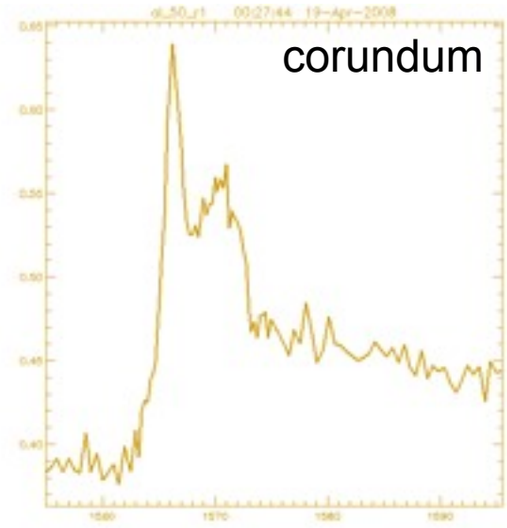








Mg K-edge XANES



Al K-edge XANES

glassy morphology

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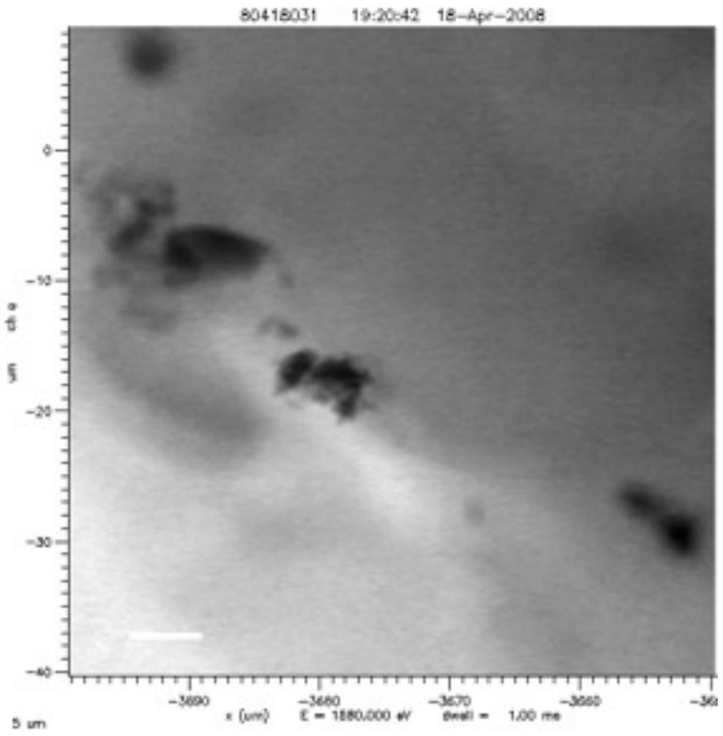
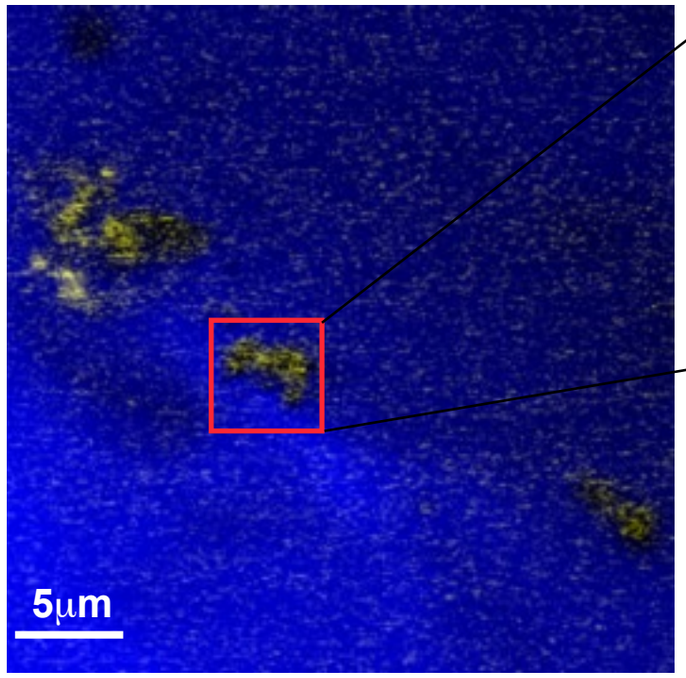
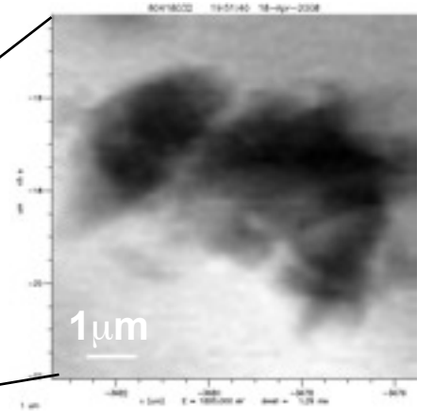
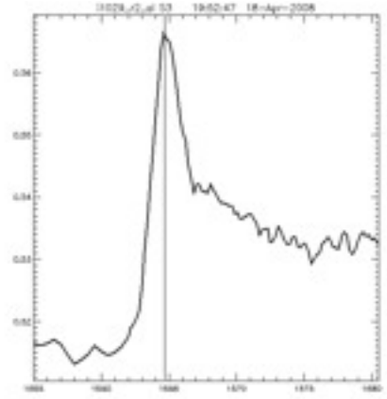


Absorption Image

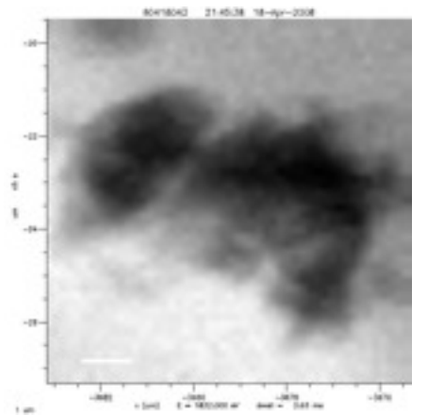


Al map (Y), Abs (B)

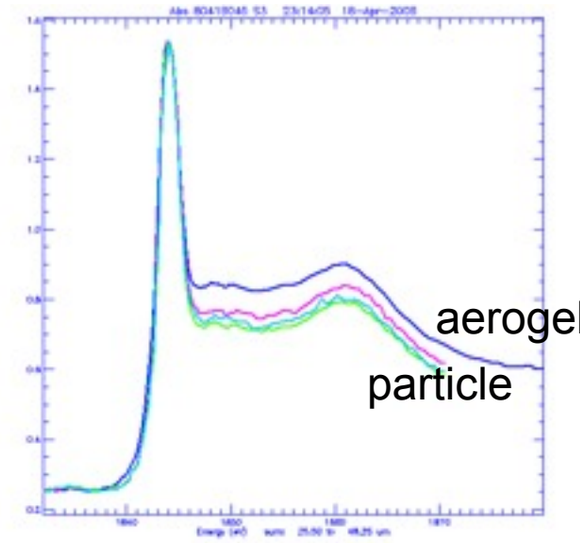




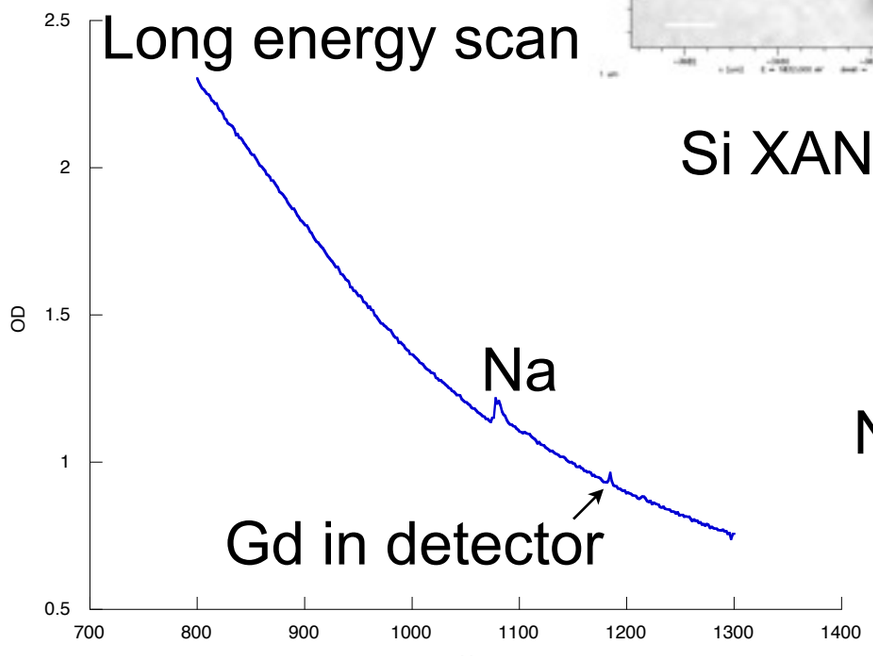
Al XANES



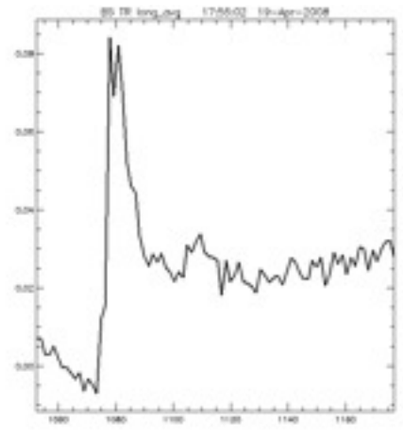
Si XANES



- Al is not metallic: oxide, glass?
- Al is minor component (low signal)
- Si is silica: glass or melted aerogel
- Na glass, % level in all fragments
- no Ce (solar panel component)
- no Fe
- Mg, % level in all fragments



Na XANES



the other glassy fragments

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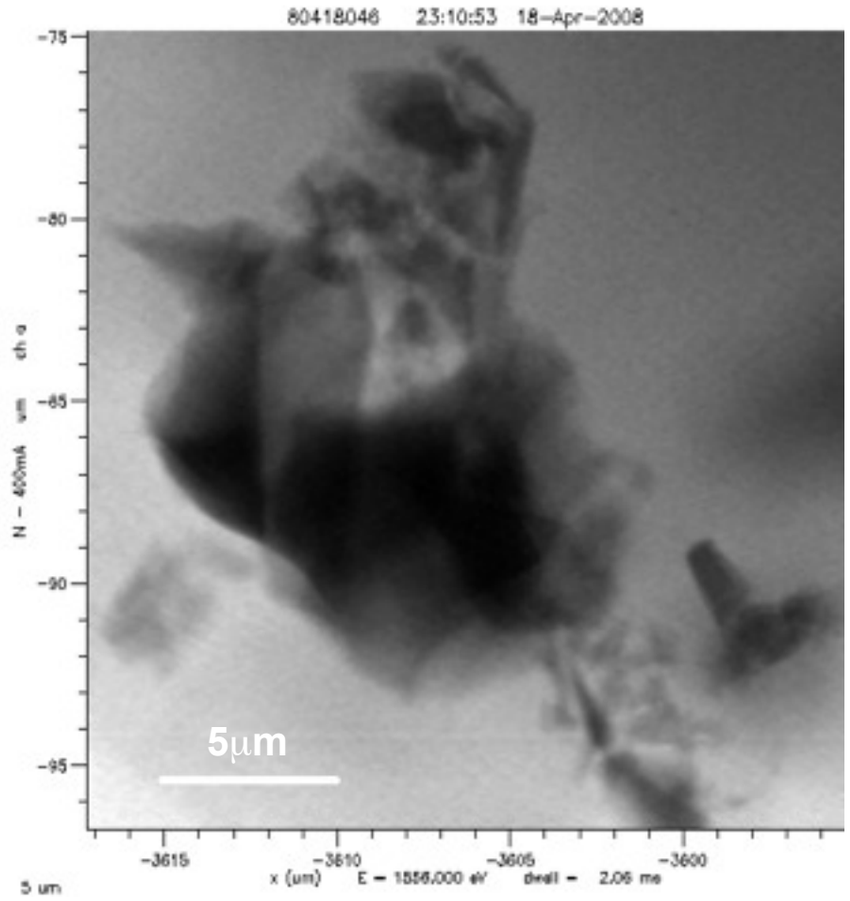

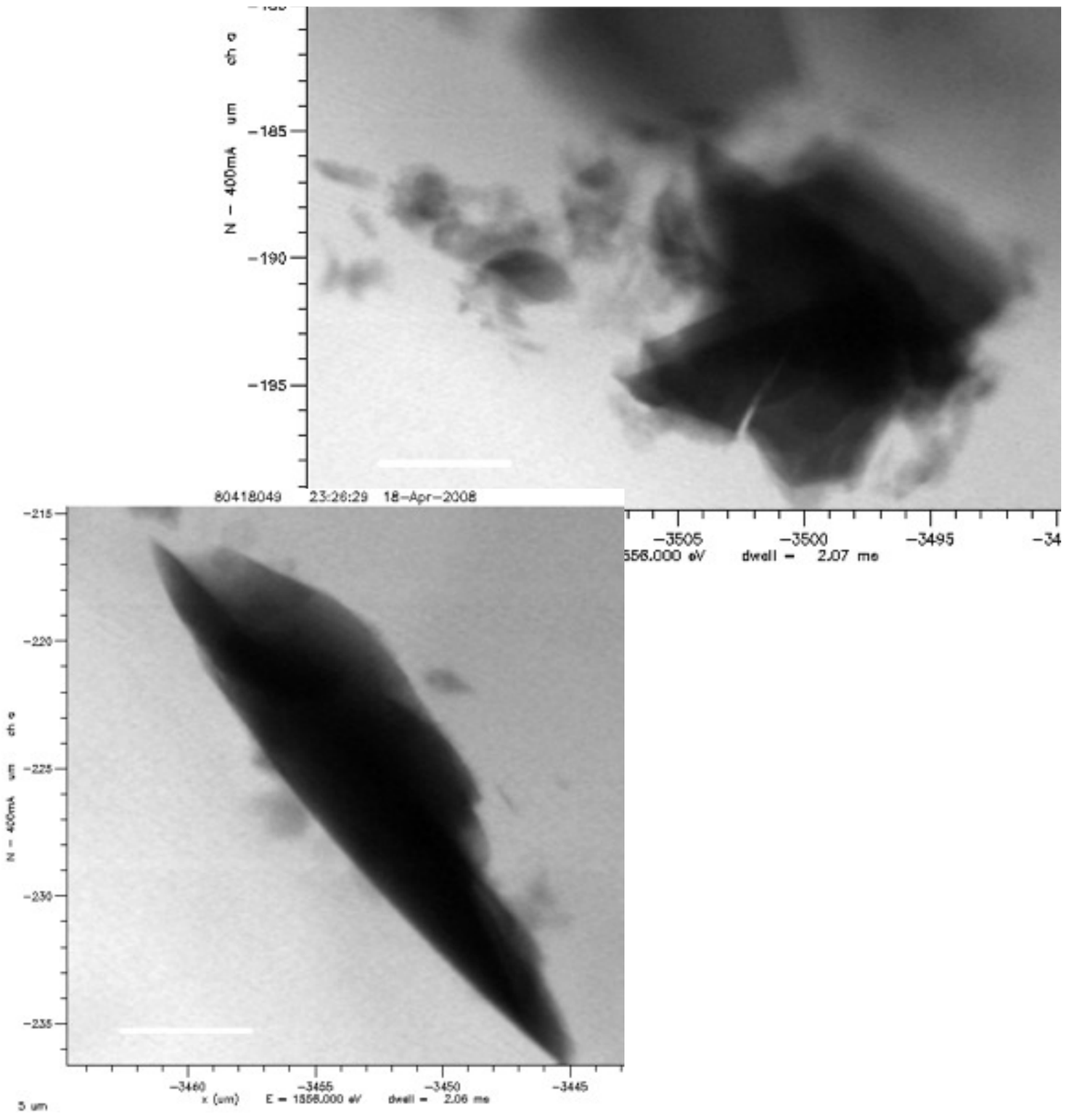

carbon, Ca, Ti in 70µm pico keystone

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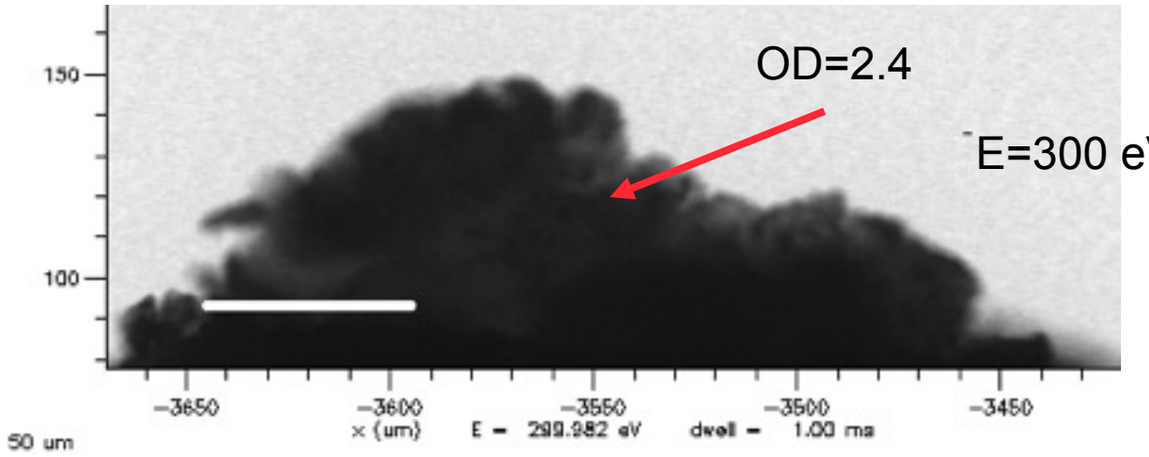
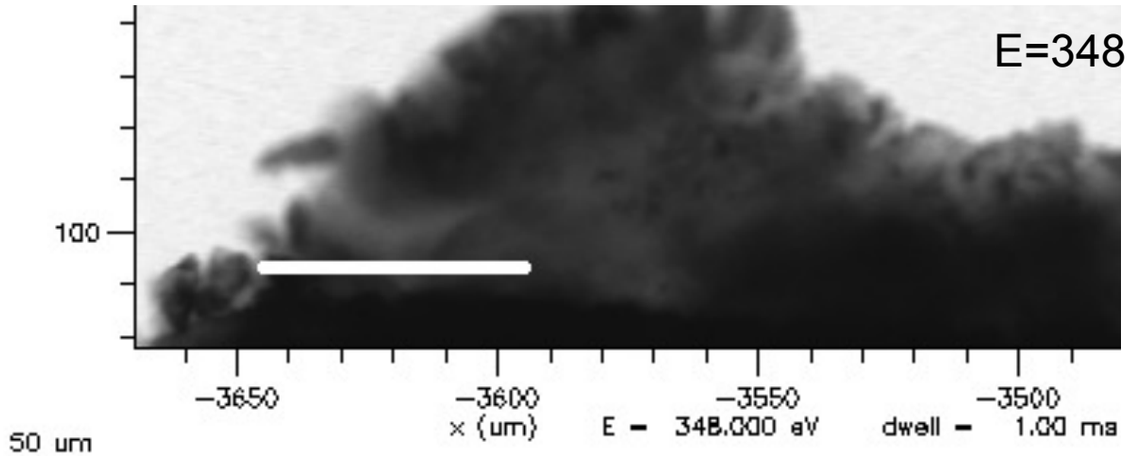
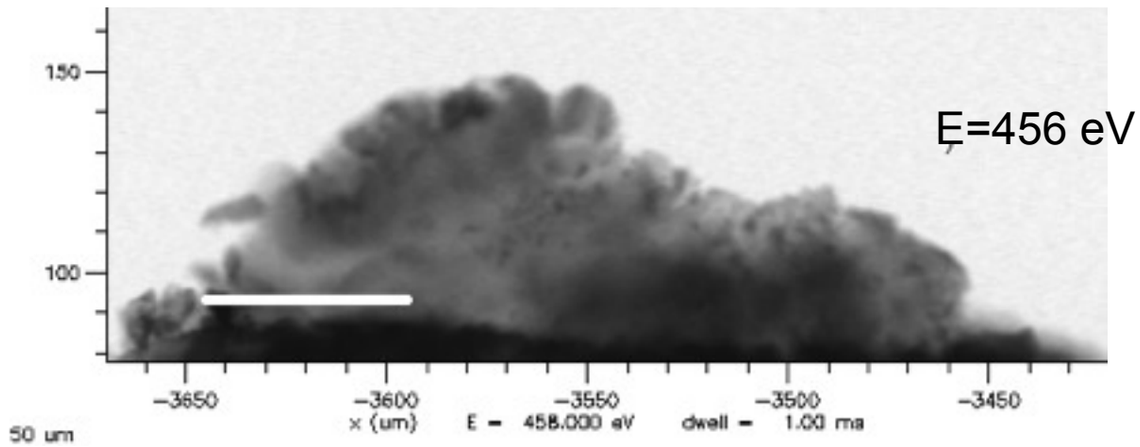


Carbon



Calcium

All possible, though C is limited.
No C, Ca,Ti present in this case



Titanium

Summary

- Double Si_3N_4 window worked well & protected sample from C-deposition.
- 350 um keystone works for Mg, Al, Na, Ce
  —too thick for Si, Fe, Ca, Ti, C (Si worked on ~175 um thick region)
- 70 um pico good for all including Ca, Ti
  —C: possible but limited capability
- Aerogel surface density measurement (Si XANES) 2.8 x10^{-4} g/cm2 (rho = 16 mg/cm^3 if *t* = 175 µm)
- "9:00 swarm" are all but one glassy silica (Si XANES) with oxidised Al (Al XANES). Na and Mg present at % levels.
- One swarm impactor is a cluster of small fragments including
  — 1 spot corundum (Al XANES)
  — 2 spots Mg mineral (cpx?)
  — weak diffuse Al, Mg, Na (glass?)
  — No Fe, Ce or any other metal 800 – 1300 eV detected
  — too thick for best Fe sensitivity, if present must only be a trace