EAE SEM on Stu samples 9 July 2019

Stuart samples from China – mainly chalcopyrite related – unusual balls of cpy!

Chalcopyrite balls have a bluish tinge, growing out of a botryoidal gold sulphide layer, on a matrix which is mainly silicate based with fragments of sulphides.

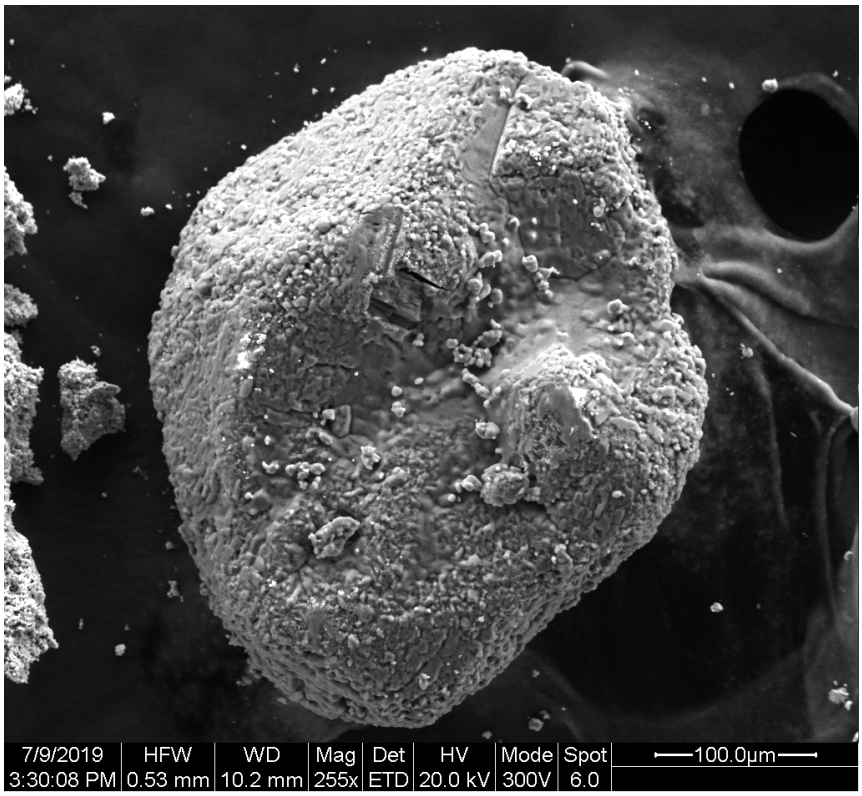
Fragments from ball edge

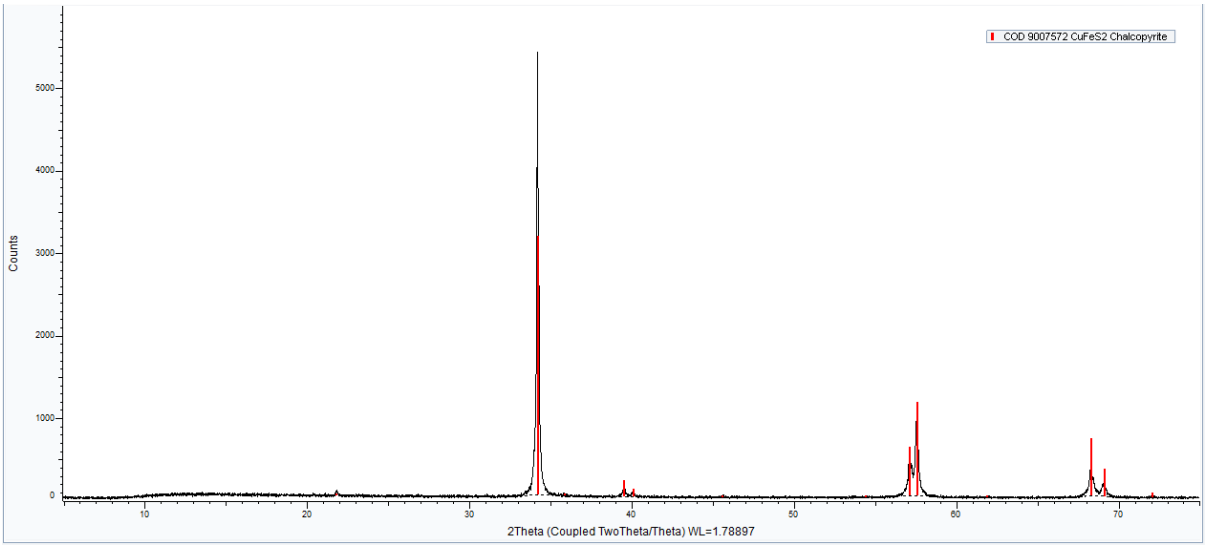
Fragments from the edge of the full ball of chalcopyrite to later be made into a puck.

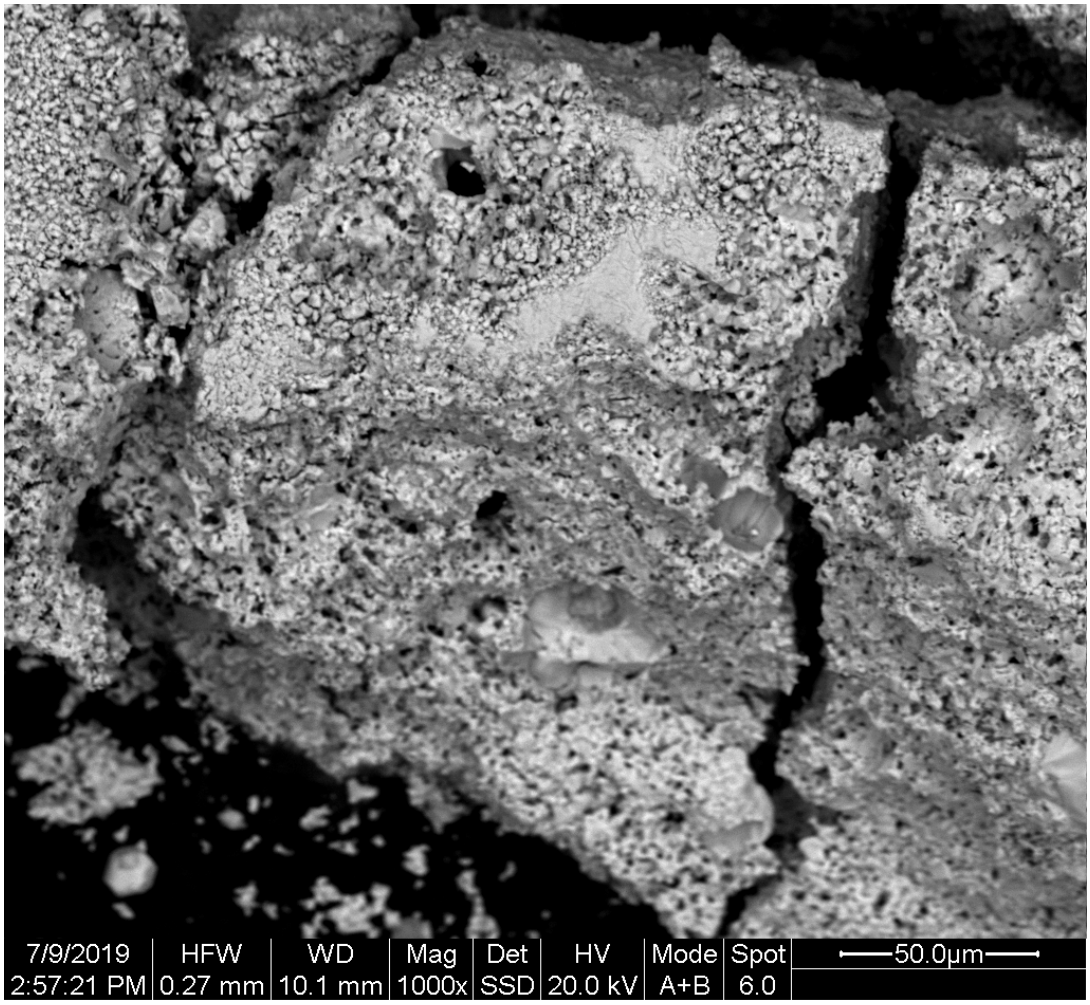
Lots of small grains of chalcopyrite meshed together

Some cavities perhaps where a micron-sized ball of material (micro-scale of the larger ball perhaps?) popped out. EDAX in these hollows apparently less S rich but probably just X-rays being blocked by the cavity lip. Some crystal shapes discernible below 10 microns.

A couple of circular lumps of Na_2SO_4 also present in amongst the other material – any impact on the overall structure? Unexpected mineral in association, and are probably grains which blew on from another part of the lab!






7/9/2019
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HFW
0.27 mm
WD
10.1 mm
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20.0 kV
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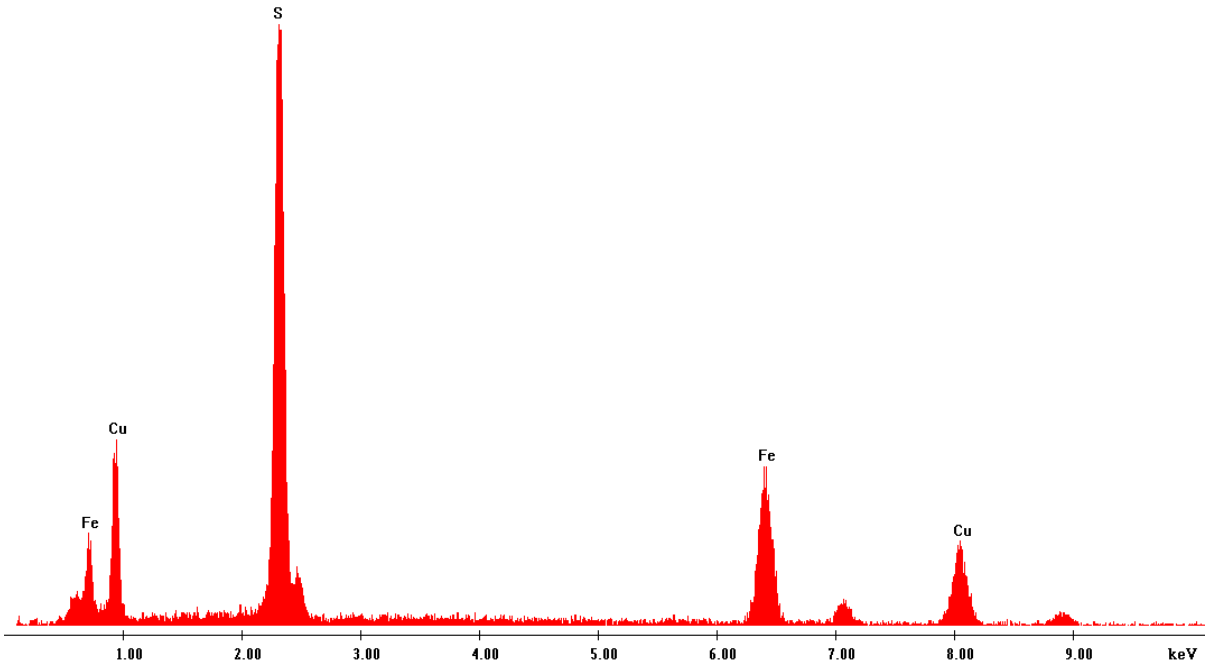
6.0
50.0µm


S
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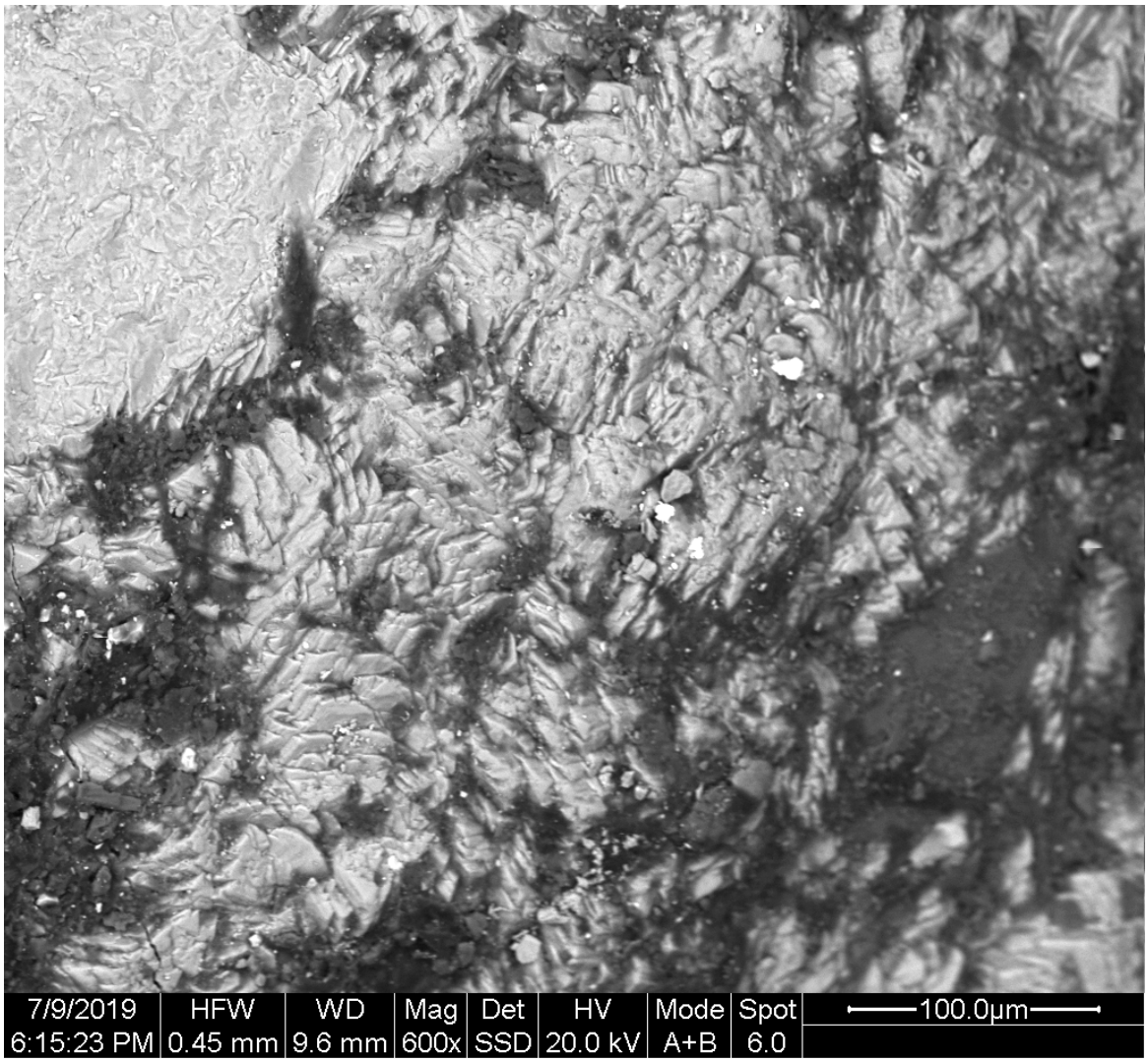
keV

Centre of cpy ball – including bluish centre

Platy texture in amongst darker contrast (as opposed to true colour) phase in backscatter with a few bright speckles. Some rather platy chalcopyrite. Darker phase in contrast is K-Ca-Al-Si.

PXRD suggests that the bluish (true colour) phase is a small amount of galena. The bright spots are probably galena, may have been missed under S in EDAX.



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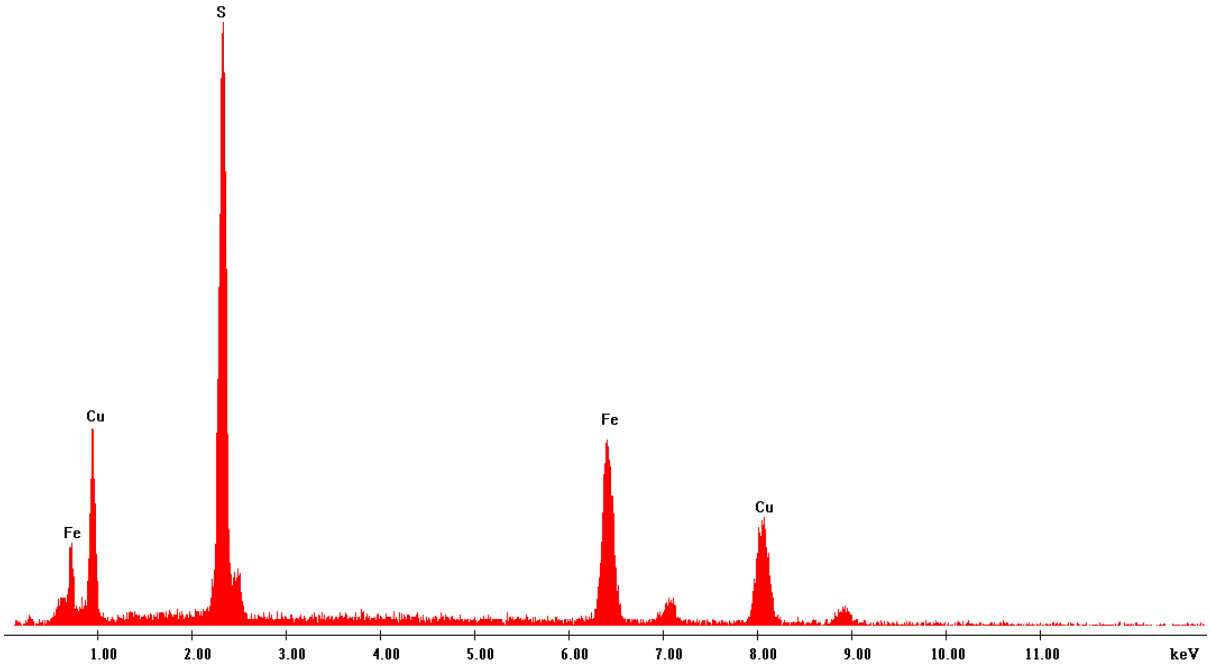
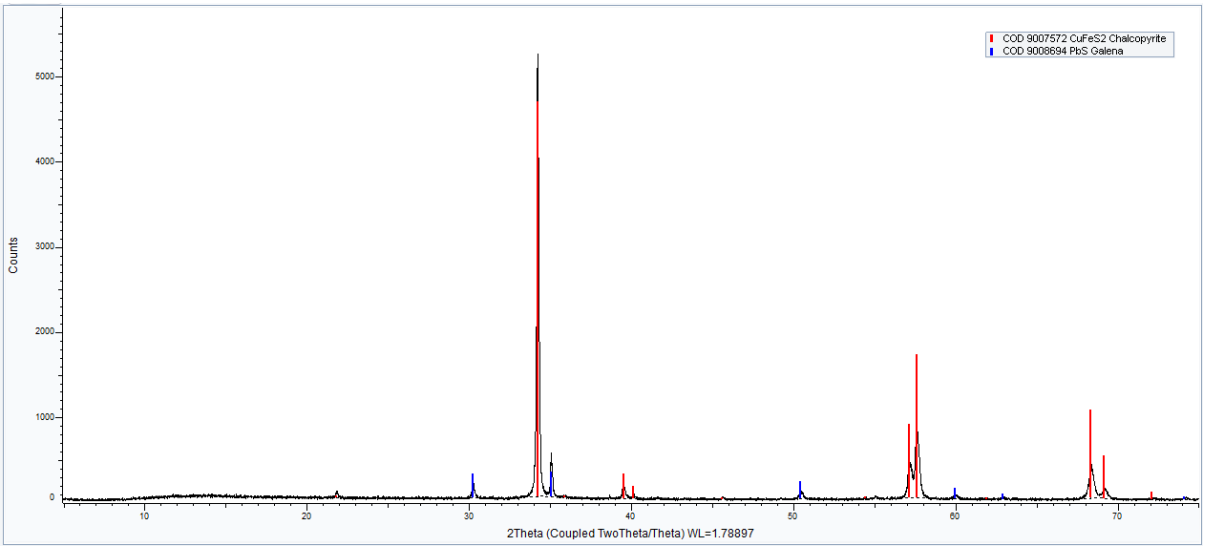
Label A: SJM4_cpy

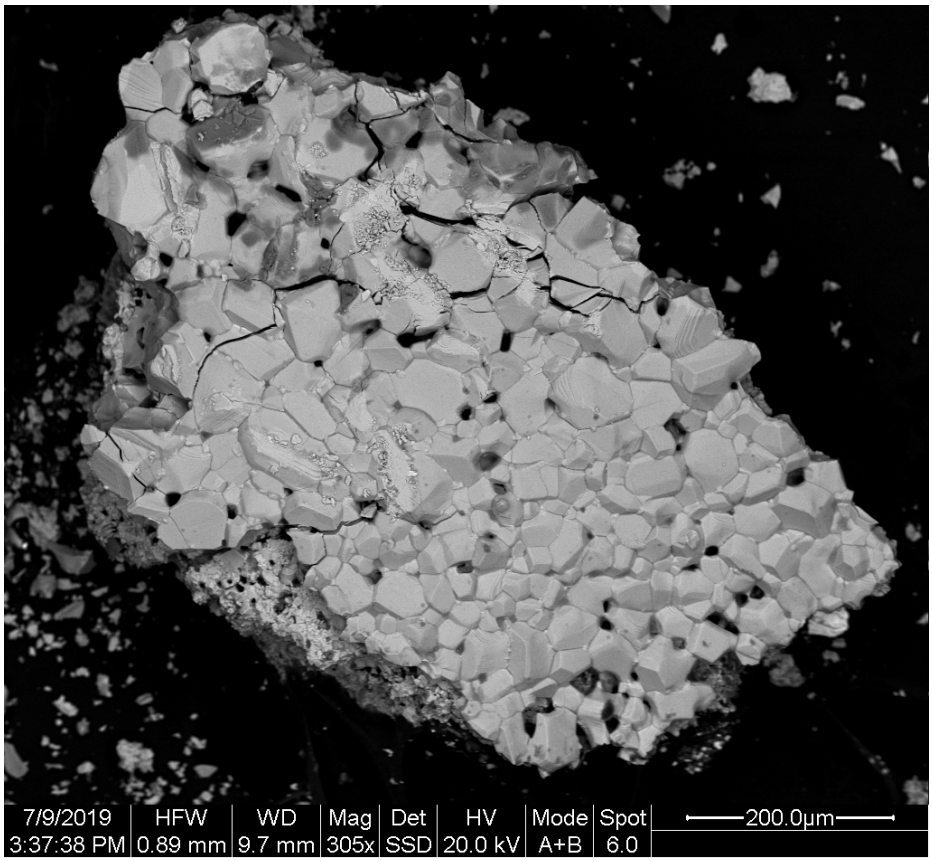


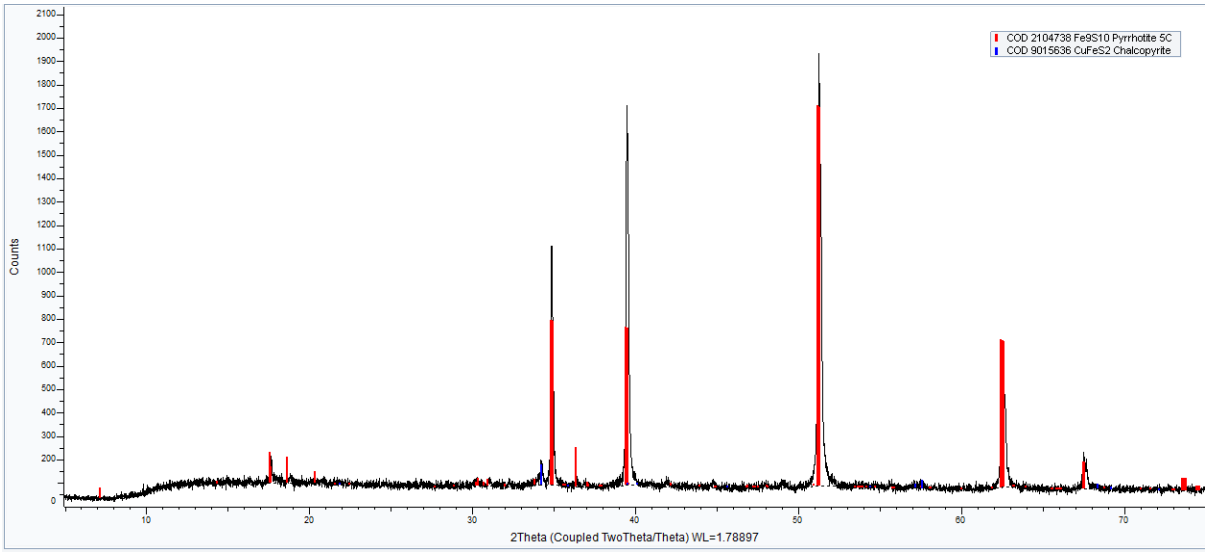


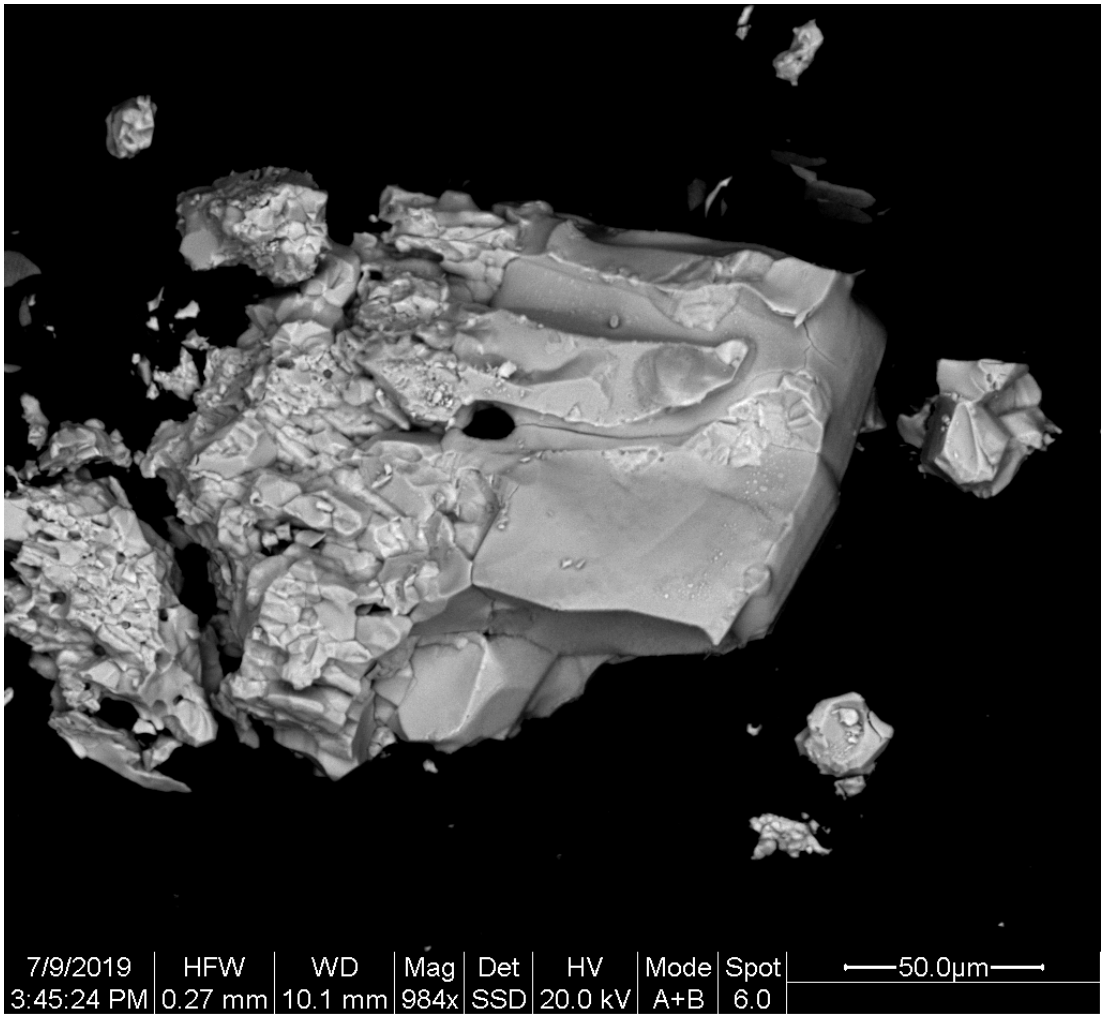
Gold botryoidal sulphide layer

Botryoidal sulphide – largest lump contains smaller crystals with dimensions up to 50 microns glued together, albeit rather loosely – seemed to crack under the electron beam. Much smaller mineral grains on surface may have previously bound larger grains together.

Some chalcopyrite, but mainly pyrrhotite – I was expecting Fe and S alone to be pyrite but EDAX and PXRD say otherwise.



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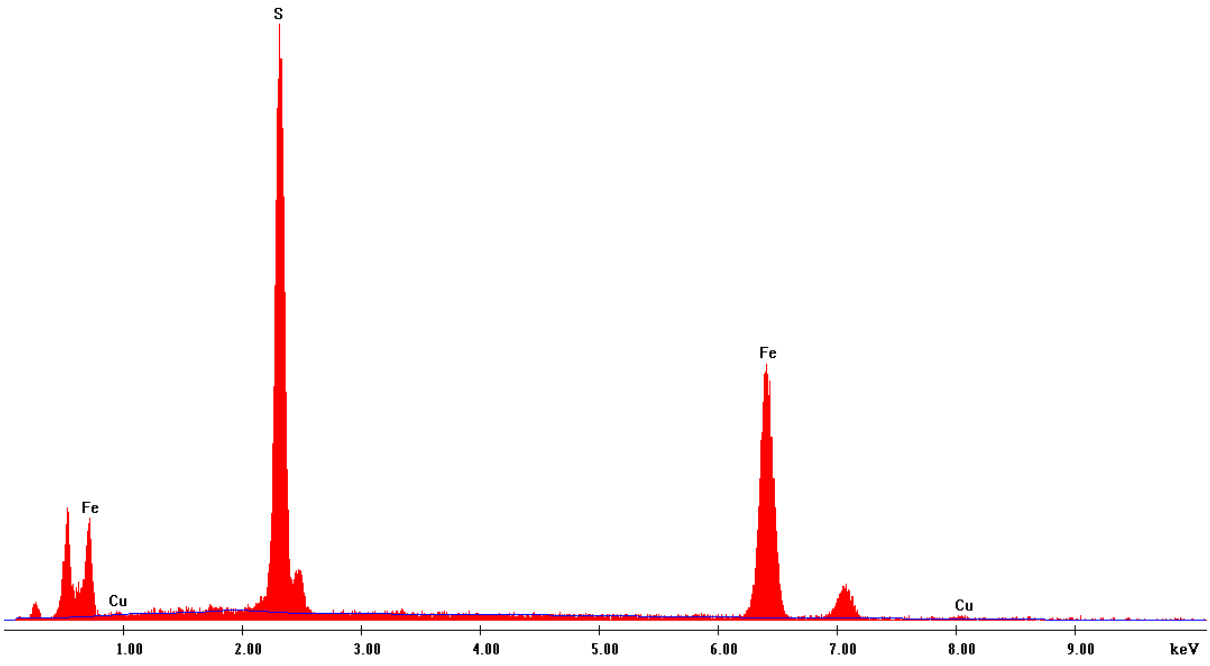
3:45:24 PM
HFW
0.27 mm
WD
10.1 mm
Mag
984x
Det
SSD
HV
20.0 kV
Mode
A+B
Spot
6.0
50.0µm


S
Fe
Fe
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Cu
1.00
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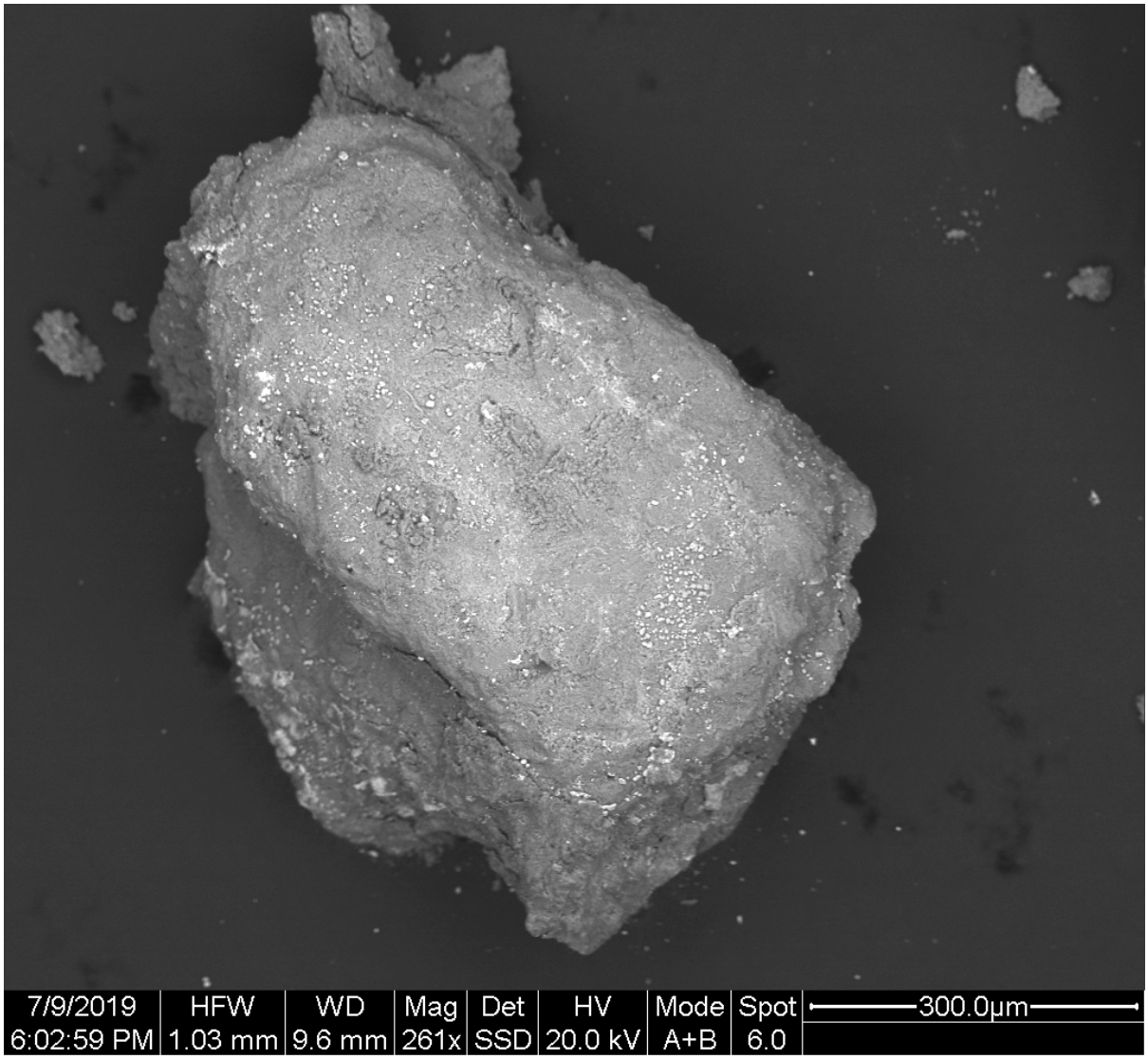
keV

Matrix

Matrix from chalcopyrite balls – mainly K-Mg-aluminosilicate, along with some FeS (probably also pyrrhotite) grains.

PXRD not very high quality, quartz and probably another silicate.



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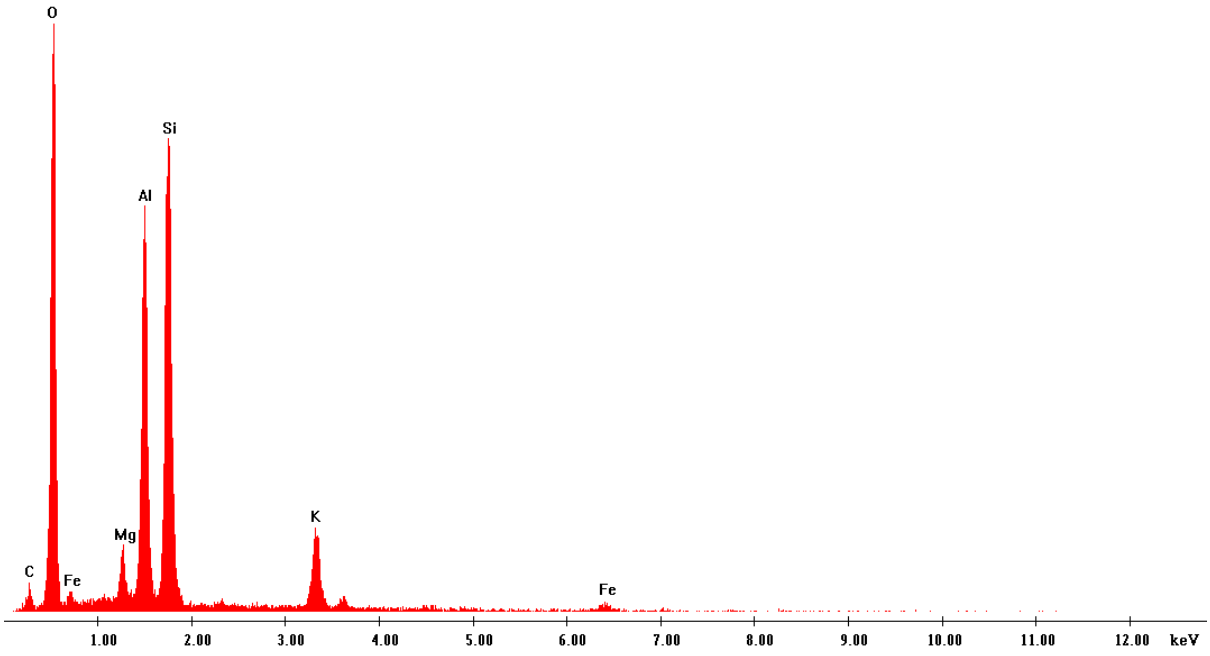

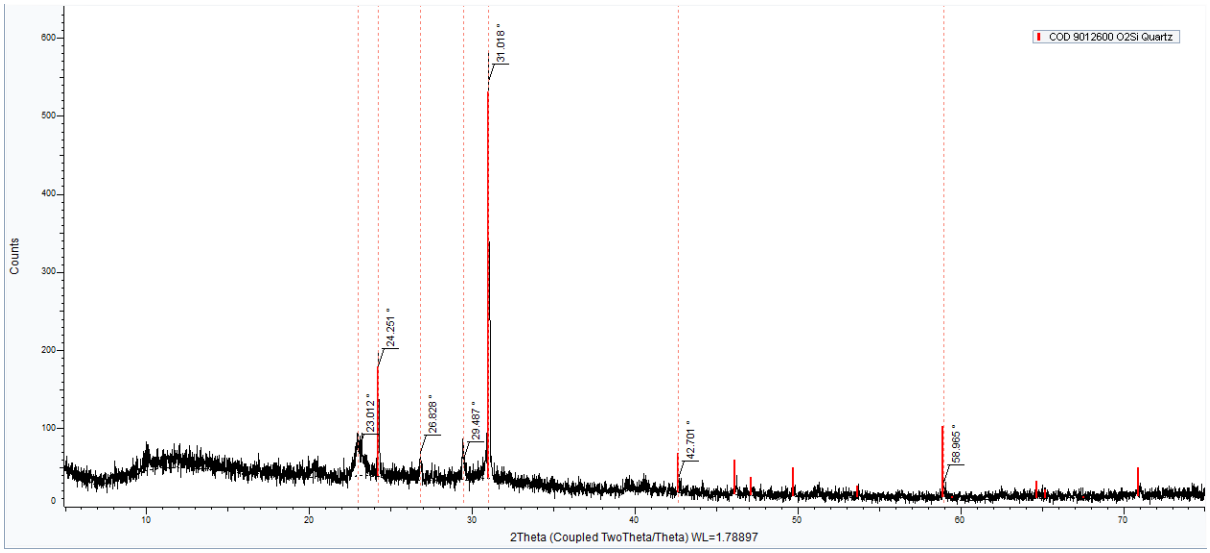

Original sample coding (OPM reference)

SJM1
Fragments from the edge of the full ball of chalcopyrite to later be made into a puck.

SJM2
Botryoidal sulphide

SJM4
blue centre of the lump

SJM5
Matrix from chalcopyrite balls