UNITY MINING LIMITED

GOG RANGE FIRETOWER MINERAGRAPHY

SEPTEMBER 2012

McArthur Ore Deposit Assessments Pty Ltd

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UNITY MINING LIMITED

Gog Range Firetower Mineragraphy
September 2012

Method

David Evans (Unity) submitted two drill core samples [FTD038 421.2m, 449.8m] for mineragraphic assessment.

The sawn half core samples were marked for polished thin section preparation and then optically scanned. The offcuts from the thin section were assayed by ALS.

The assessment was undertaken in two styles: quantitative and qualitative.

To quantify the mineralogical makeup and to measure liberation and mineral association parameters, the polished thin sections of both samples were scanned on a 5mm x 1mm grid with a 106µm mask to simulate a 106µm grind. The 106µm-diameter circular area centred on each grid point was logged by estimating the area% of each mineral present. The minerals logged were: *pyrite* (Py), *chalcopyrite* (Cp), *magnetite* (Mt), *hematite* (He), *quartz* (Qz), *carbonate* (CO), *clay* (Cy) and *muscovite* (Mu). The data collected were collated and the usual liberation and mineral association parameters calculated.

In a qualitative sense, each polished thin section was examined in detail and ~20 photomicrographs were taken at various scales to representatively document the textures present. The images were collated in PowerPoint and annotated.

Although the author considers it to be invalid to make genetic conclusions from just two samples without knowledge of the field relationships, comments on genetic sequencing are offered for geologic interest.

Quantitative Results

Detailed tabulations are provided later in the report, but an essential summary is provided below:

Composition

Firetower – Offcut Assays by ALS

Sample	%Cu	%Pb	%Zn	ppmAg	%Bi	%As	%Fe	ppmAu	%Mo	%Sn	%WO3	%S
FTD038 421.2m	**4.41**	0.01	0.02	21	0.008	0.01	26.2	0.35	0.009	<0.01	0.01	7.21
FTD038 449.8m	**4.96**	0.01	0.03	8	0.011	0.02	31.6	0.22	0.02	<0.01	0.02	5.72

Firetower – Optical Microscopy Mineral Composition (wt%)

Sample	Py	Cp	Mt	He	Qz	CO	Cy	Mu
FTD038 421.2m	13.5	25.7	3.0	22.6	7.7	23.9	2.0	1.6
FTD038 449.8m	4.9	18.7	3.8	4.2	12.1	52.1	0	4.1

Py=pyrite, Cp=chalcopyrite, Mt=magnetite, He=hematite, Qz=quartz, CO=carbonate, Cy=clay, Mu=muscovite

Firetower – Assays calculated from Optical Microscopy

Sample	%Cu	%Fe	%S
FTD038 421.2m	**8.89**	36.0	16.2
FTD038 449.8m	**6.49**	22.1	9.2

Other minerals observed in trace amounts were *pyrrhotite*, *sphalerite* and *electrum*.

The *carbonate* logged in both samples is difficult to identify positively, but the observed high reflectivity suggests a high Fe content, i.e. *ankerite* or *siderite*.

Liberation

Firetower FTD038 421.2m – Liberation at simulated 106µm grind

	Py	Cp	Mt	He	Qz	CO	Mu
Liberated	0	4	0	0	51	27	0
Binary	3	19	5	35	20	22	16
Ternary	64	55	25	45	10	38	63
Quaternary	32	22	70	20	19	13	21

Firetower FTD038 449.8m – Liberation at simulated 106µm grind

	Py	Cp	Mt	He	Qz	CO	Mu
Liberated	0	20	0	0	59	32	23
Binary	69	58	12	25	18	27	60
Ternary	31	16	79	70	22	37	14
Quaternary	0	6	8	5	2	4	3

The sulphides and Fe oxides are quite fine-grained, requiring a grind of <50µm for effective liberation of the *chalcopyrite*.

Mineral Association

The figures below show what percentage of the *chalcopyrite* occurs with other minerals in the 106µm circular masks. The association with *carbonate* is high, suggesting the two minerals have a genetic relationship.

Firetower – Chalcopyrite %association

Sample	Py	Mt	He	Qz	CO	Mu
FTD038 421.2m	58	20	38	27	64	29
FTD038 449.8m	3	12	12	15	71	13

Qualitative Descriptive Mineragraphy

The reader is referred to the comprehensive set of annotated photomicrographs below which illustrates the various textures observed.

The variety of the textures observed suggests these Firetower rocks have undergone a complex history which is difficult to unravel from just two samples.

FTD038 421.2m

The acid volcanic host is cut by a vein of *carbonate-hematite-magnetite-pyrite-chalcopyrite*. The outer parts of the vein are composed of an intergrowth of Fe-rich *carbonate* and *hematite* blades, while the core of the vein is *pyrite-chalcopyrite*. Relics of *magnetite* suggest the *hematite* has replaced original *magnetite*. *Carbonate* is seen to infiltrate and partially replace the *hematite-magnetite* with later *pyrite-chalcopyrite* filling interstices and cutting across the *hematite* and weakly penetrating the volcanic wallrock. *Chalcopyrite* also partially replaces *pyrite*. One 80µm grain of *electrum* was observed hosted by *chalcopyrite* close to coarse *pyrite*.

The interpreted paragenetic sequence is:

EARLY *magnetite→hematite→carbonate→pyrite→chalcopyrite* LATE

FTD038 449.8m

Similar to the first sample, but the *carbonate-pyrite-chalcopyrite* is less structurally controlled, chaotically pervading a fragmental acid volcanic host. The volcanic groundmass surrounding the quartz phenocrysts is almost totally replaced by pervasive *carbonate-magnetite-hematite-quartz-muscovite* with later *pyrite-chalcopyrite*. Two distinct phases of *chalcopyrite* deposition are evident. Late calcite veinlets cut across all earlier textures.

The interpreted paragenetic sequence is:

EARLY *magnetite→hematite→carbonate→pyrite→chalcopyrite→calcite* LATE

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Principal Mineralogist
12.10.12

Unity Mining Ltd - GOG Range Drillcore Mineralogy

Total SCAN - 106µm Mask

Sample Firetower FTD038 421.2m

GJMcA 4.10.12

Average composition - all grains

	Py	Cp	Mt	He	Qz	CO	Cy	Mu	Other
Vol%	10.4	23.7	2.3	16.5	11.4	30.3	3.1	2.2	0.0
Wt%	13.5	25.7	3.0	22.6	7.7	23.9	2.0	1.6	0.0
APG	30	40	8	33	44	38	61	8	1

ASSAYS

	SG	Fe	Cu	S
Calc'd	3.87	36.0	8.89	16.2
Actual		**26.2**	**4.41**	**7.2**

COMPOSITE PROPORTIONS

	Py	Cp	Mt	He	Qz	CO	Mu
Mono	0	4	0	0	51	27	0
Binary	3	19	5	35	20	22	16
Ternary	64	55	25	45	10	38	63
Quat.y+	32	22	70	20	19	13	21

BINARY ASSOCIATION MATRIX

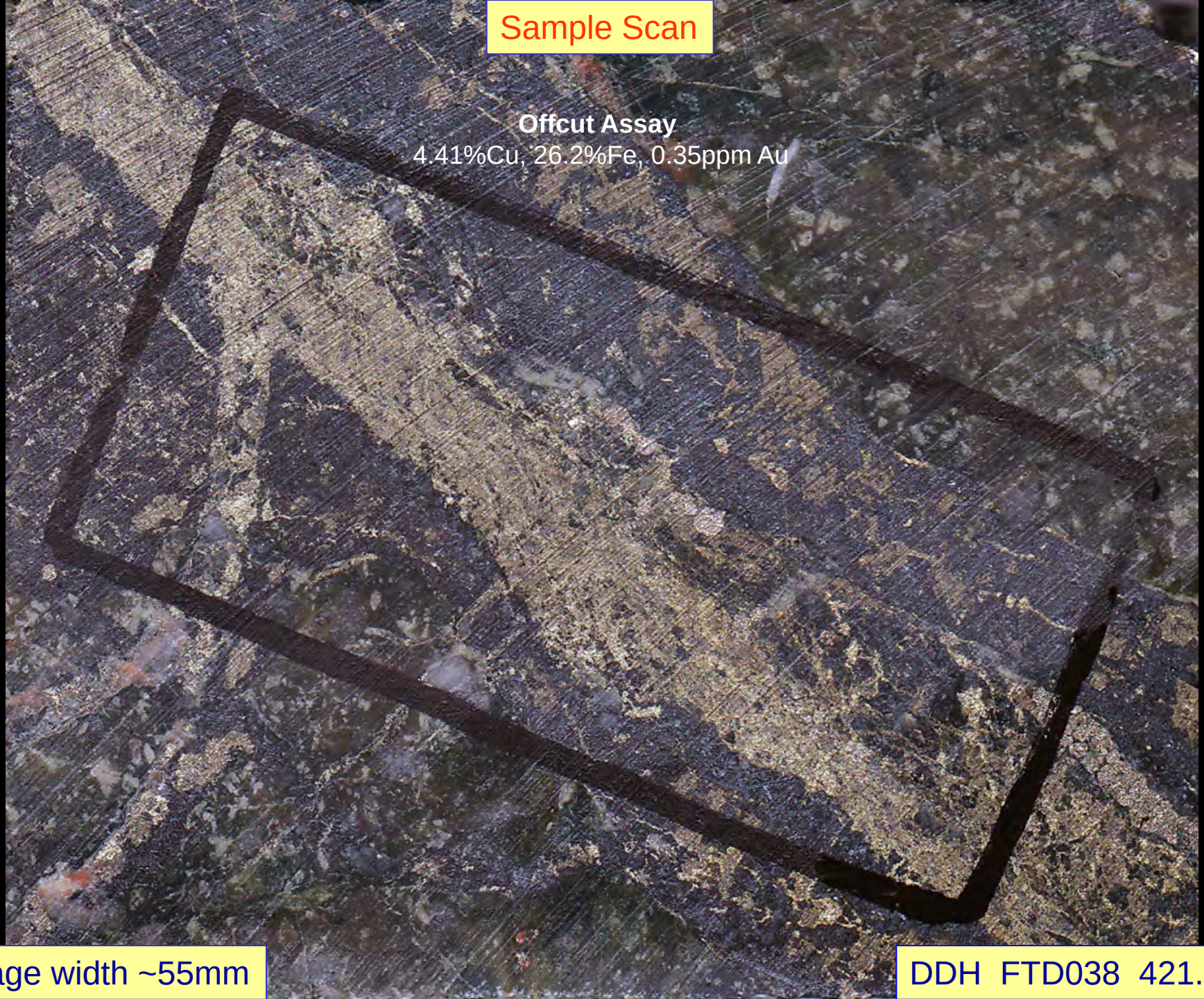
	Py	Cp	Mt	He	Qz	CO	Mu
Py		3	0	0	0	0	0
Cp	7		0	0	9	6	4
Mt	0	0		0	0	4	0
He	0	0	0		0	35	14
Qz	0	12	9	0		7	0
CO	0	6	3	13	5		8
Mu	0	2	0	14	2	14	

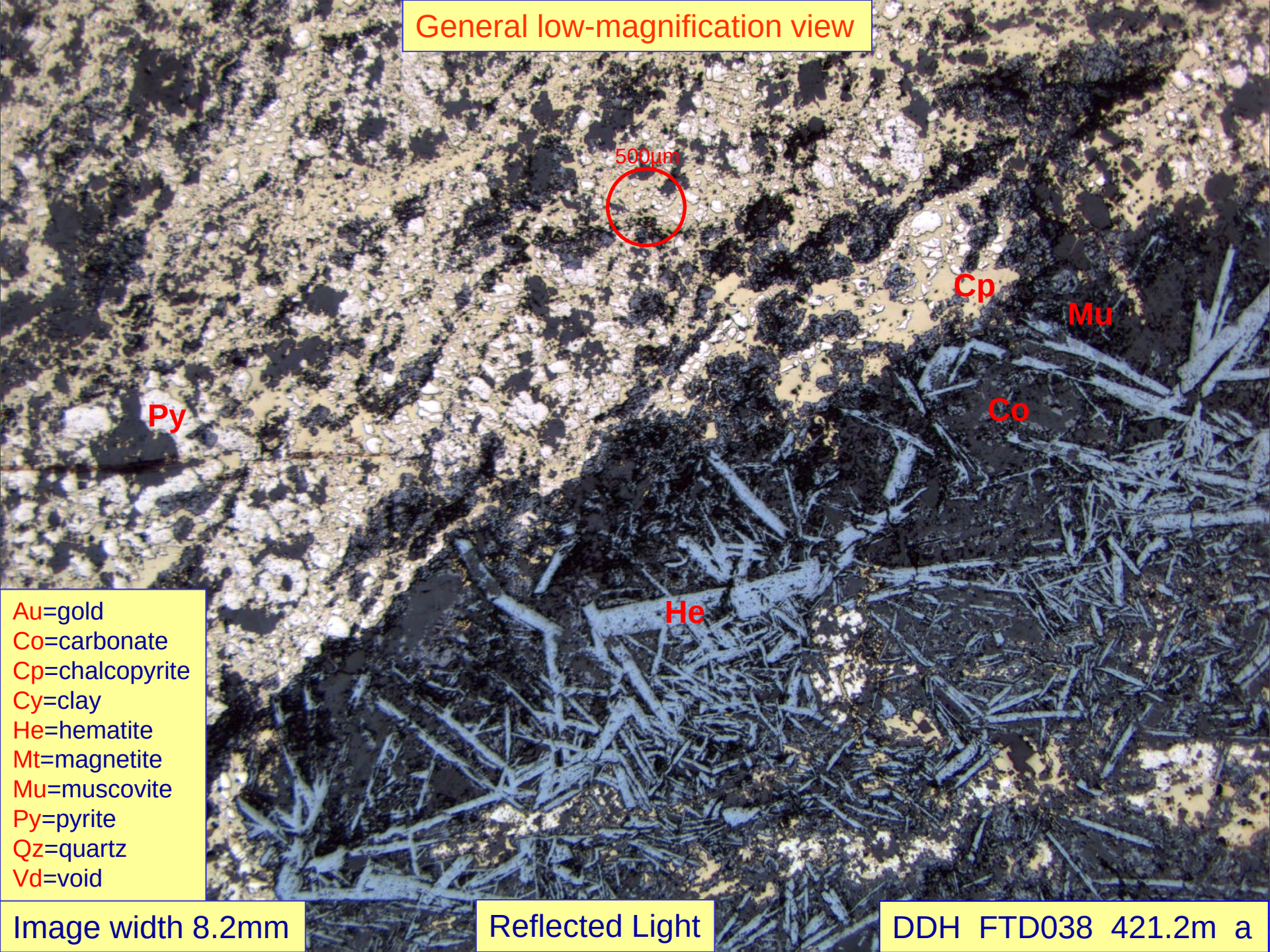
TOTAL ASSOCIATION MATRIX

		Py	Cp	Mt	He	Qz	CO	Mu
	Py		100	25	32	8	74	16
	Cp	58		20	38	27	64	29
of	**Mt**	37	55		93	48	79	41
all	**He**	7	33	47		16	89	42
	Qz	5	29	29	18		55	3
	CO	25	47	21	50	10		30
	Mu	32	62	35	73	16	79	

APG Average area% per grain when present

Py Pyrite
Cp Chalcopyrite
Mt Magnetite
He Hematite
Qz Quartz
CO Carbonate
Cy Clay
Mu Muscovite
Ga Gangue


Sample Scan
Offcut Assay
4.41%Cu, 26.2%Fe, 0.35ppm Au
Image width ~55mm
DDH FTD038 421.2m


General low-magnification view
500µm
Cp
Mu
Co
Py
He
Au=gold
Co=carbonate
Cp=chalcopyrite
Cy=clay
He=hematite
Mt=magnetite
Mu=muscovite
Py=pyrite
Qz=quartz
Vd=void
Image width 8.2mm
Reflected Light
DDH FTD038 421.2m a

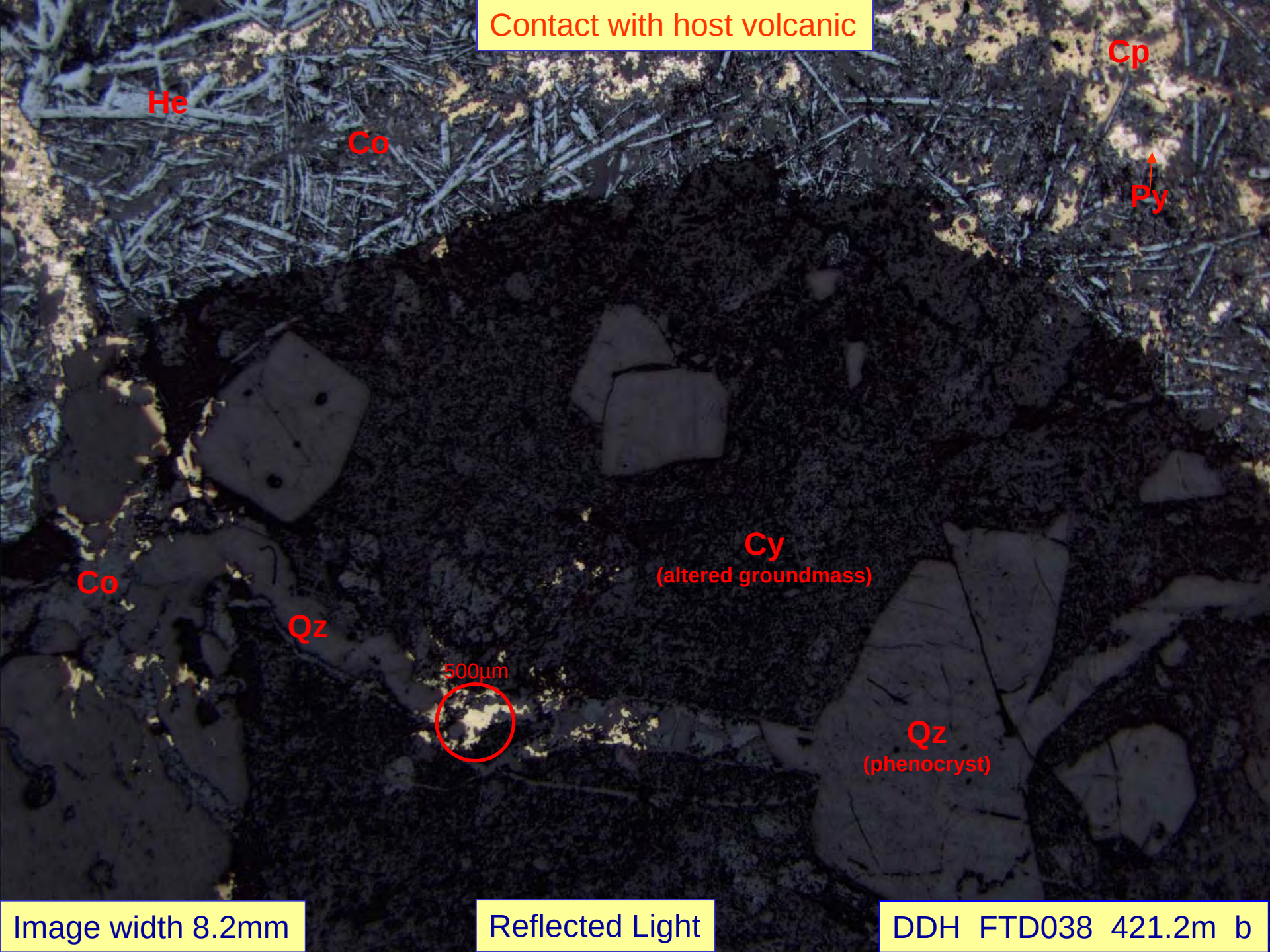
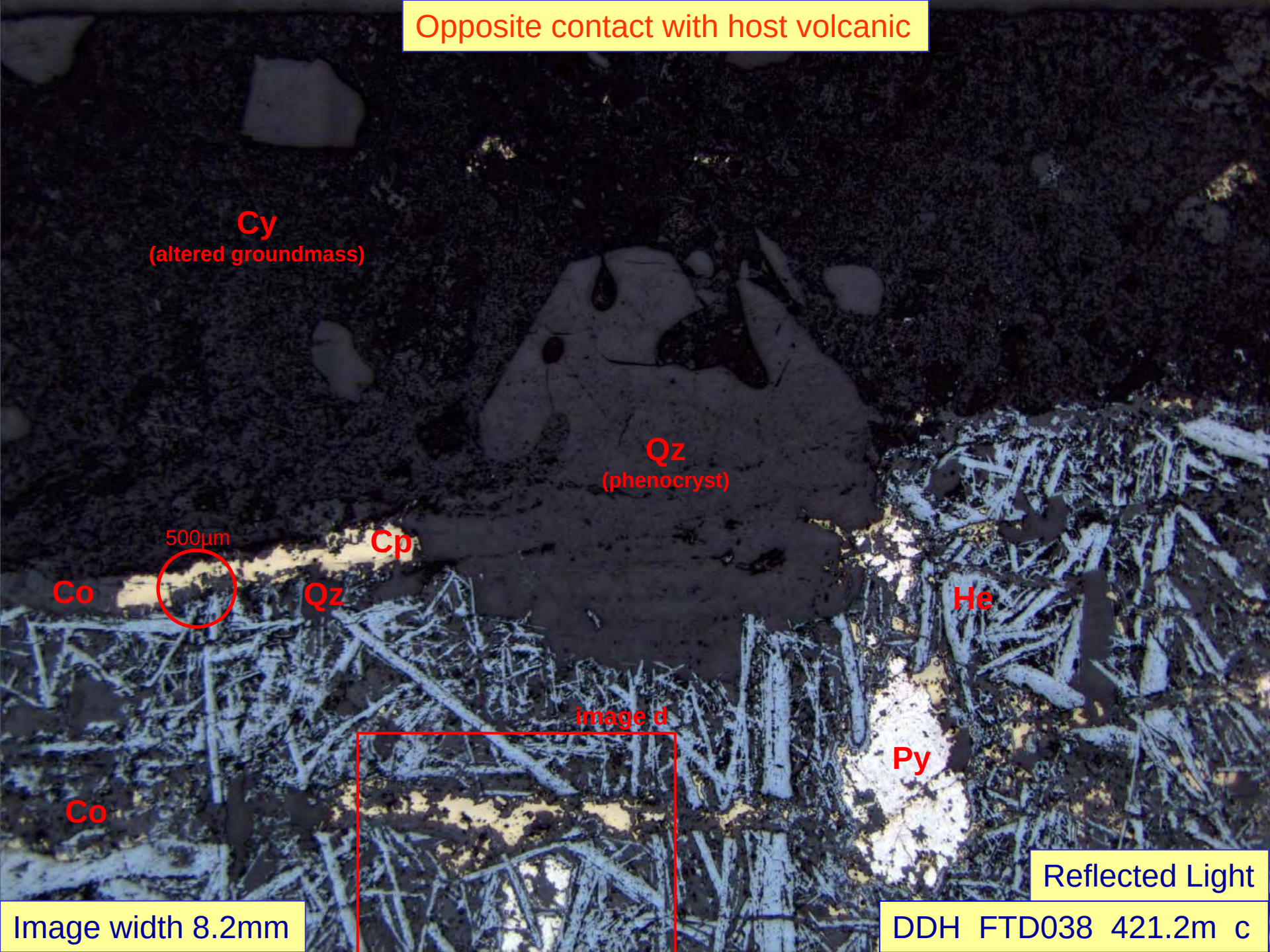
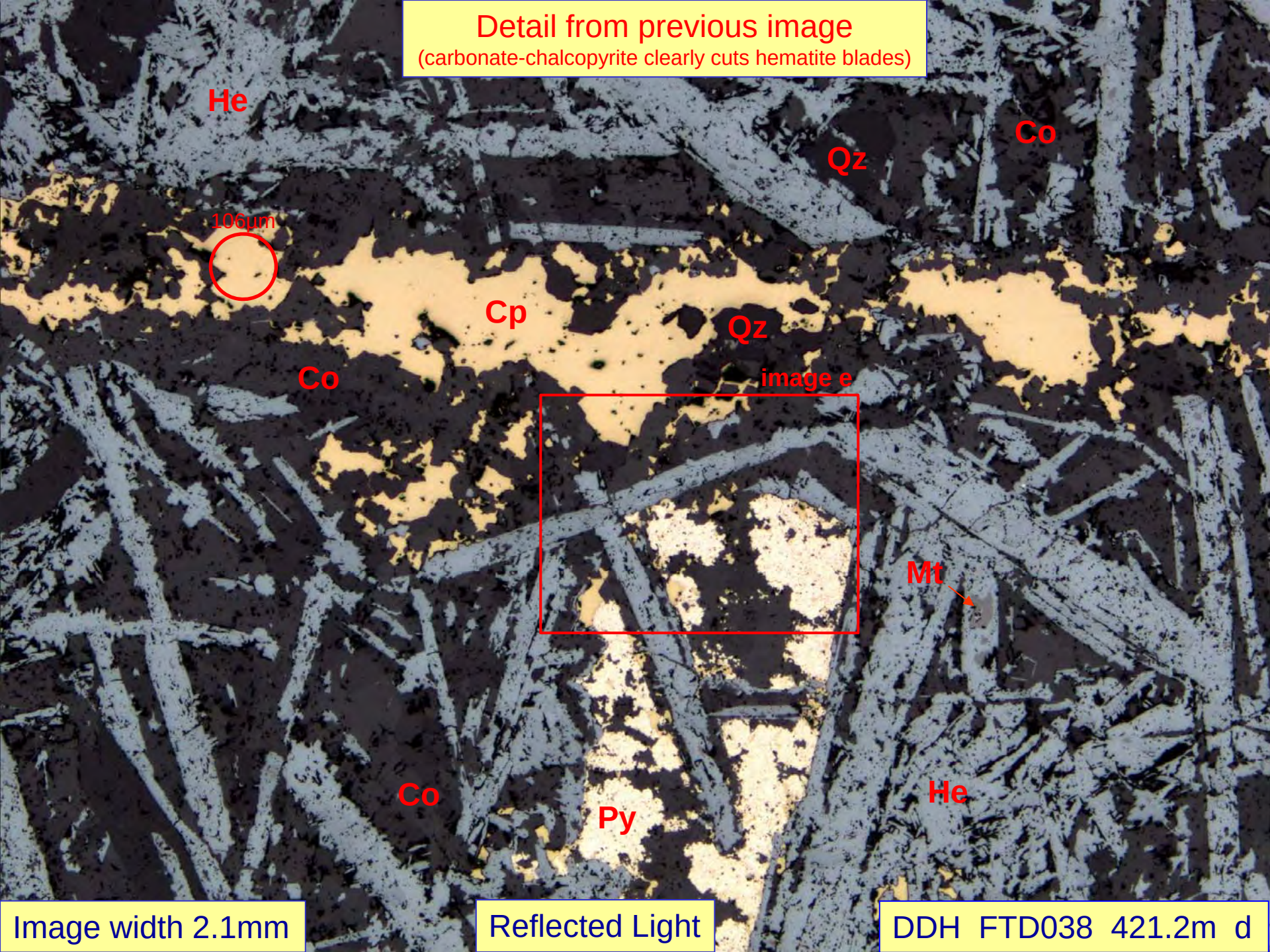


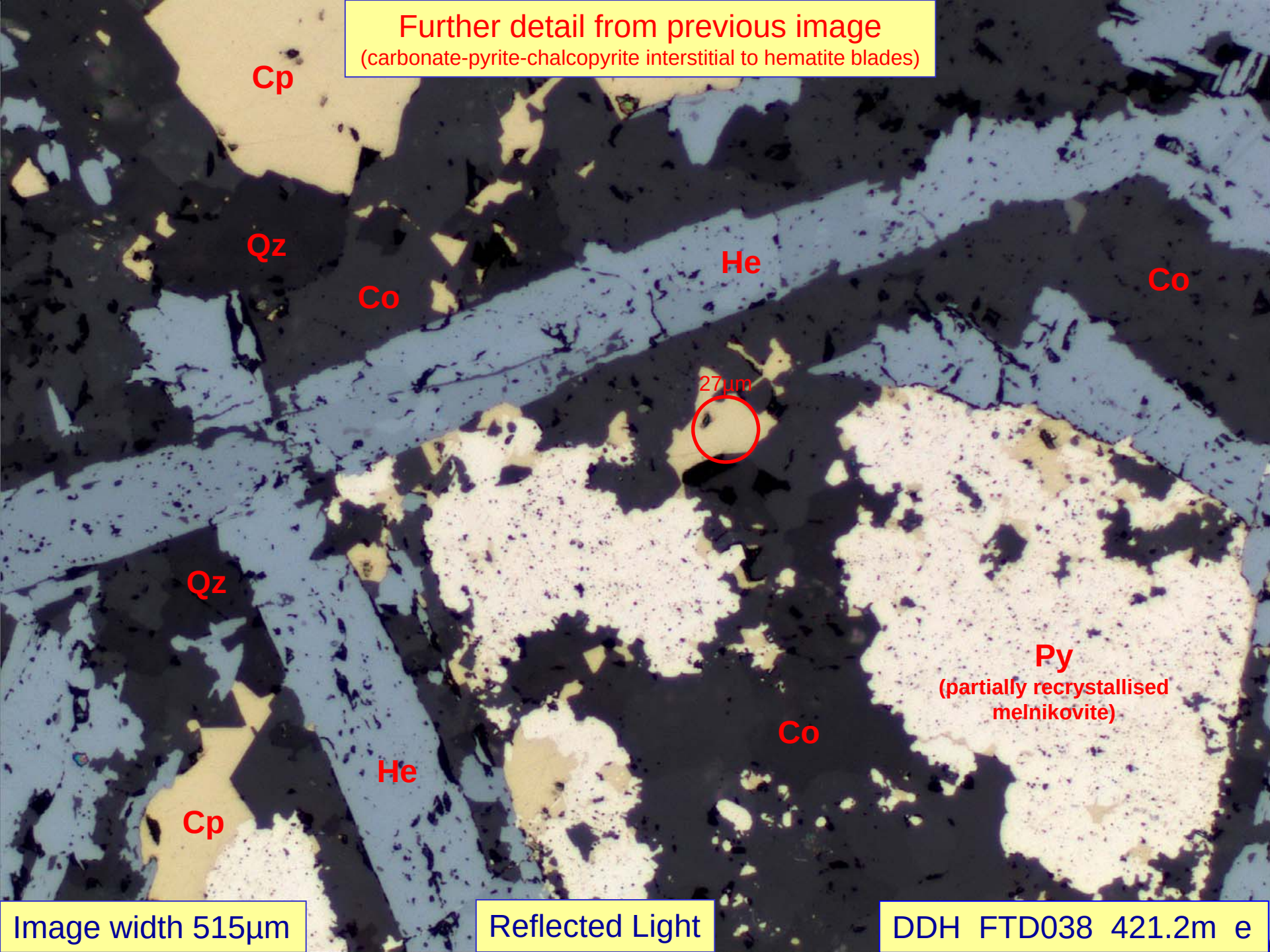
Image width 8.2mm

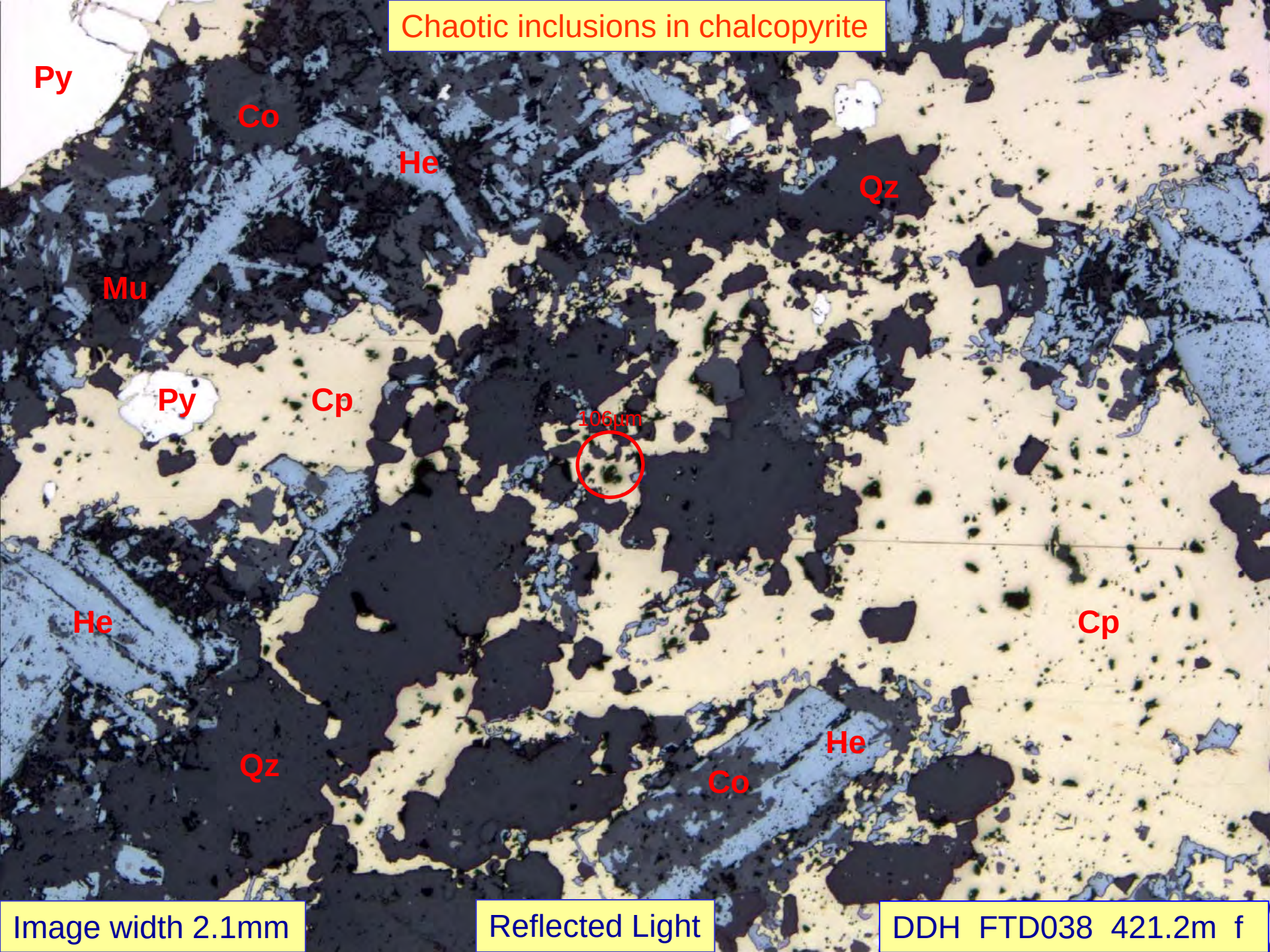
Reflected Light

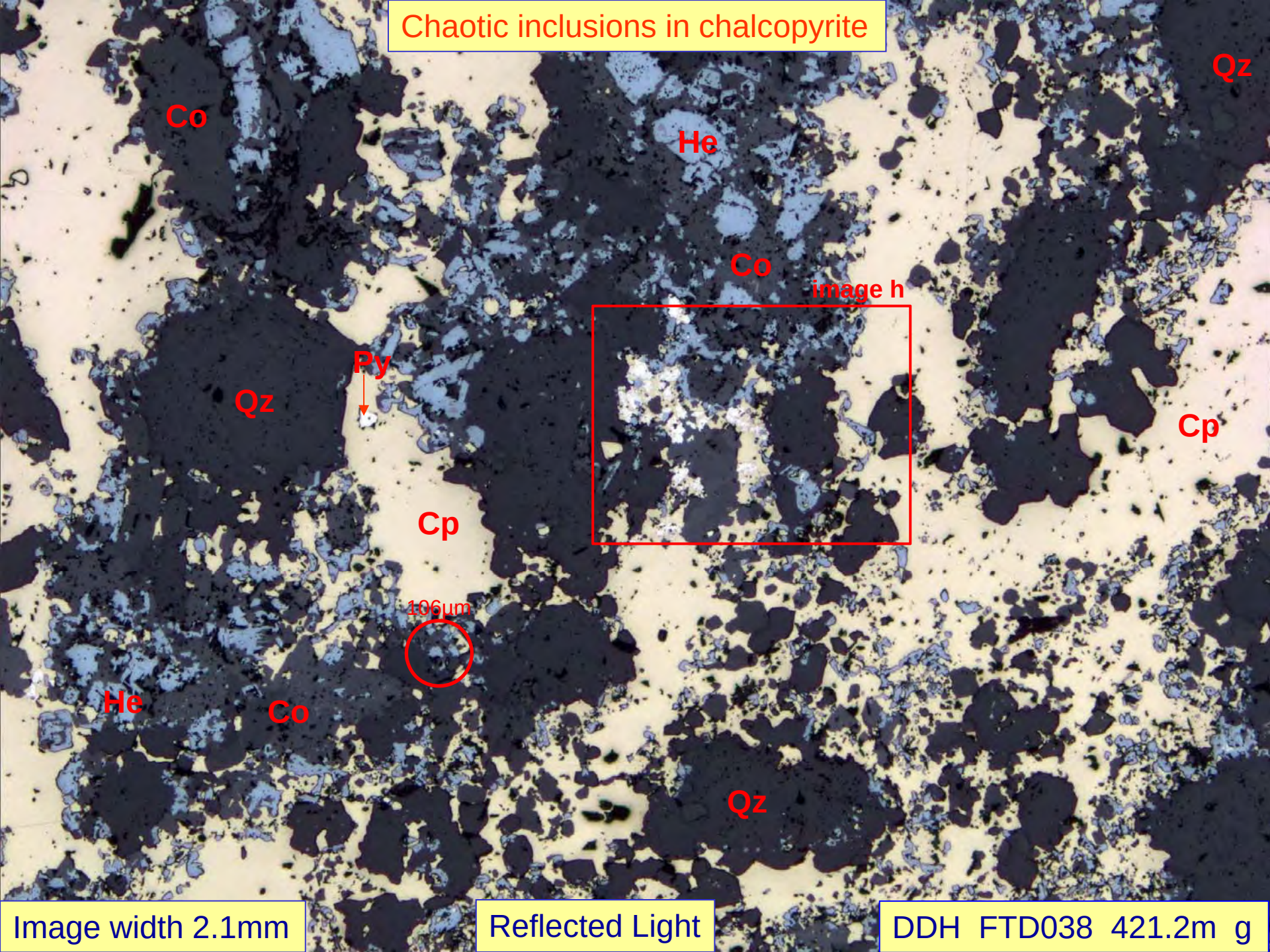
DDH FTD038 421.2m b

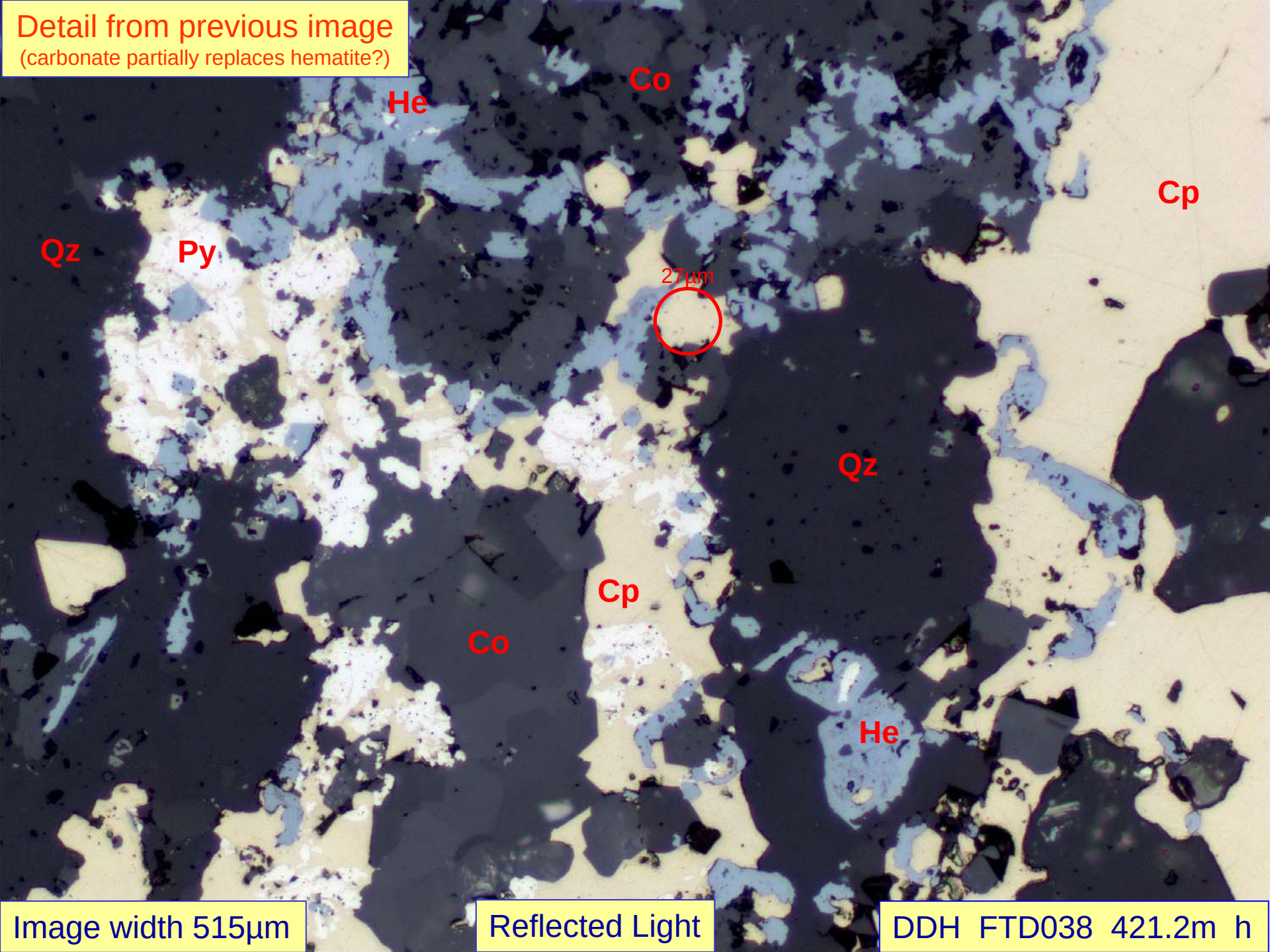

Opposite contact with host volcanic
Cy
(altered groundmass)
Qz
(phenocryst)
500µm
Cp
Co
Qz
He
image d
Py
Co
Reflected Light
Image width 8.2mm
DDH FTD038 421.2m c

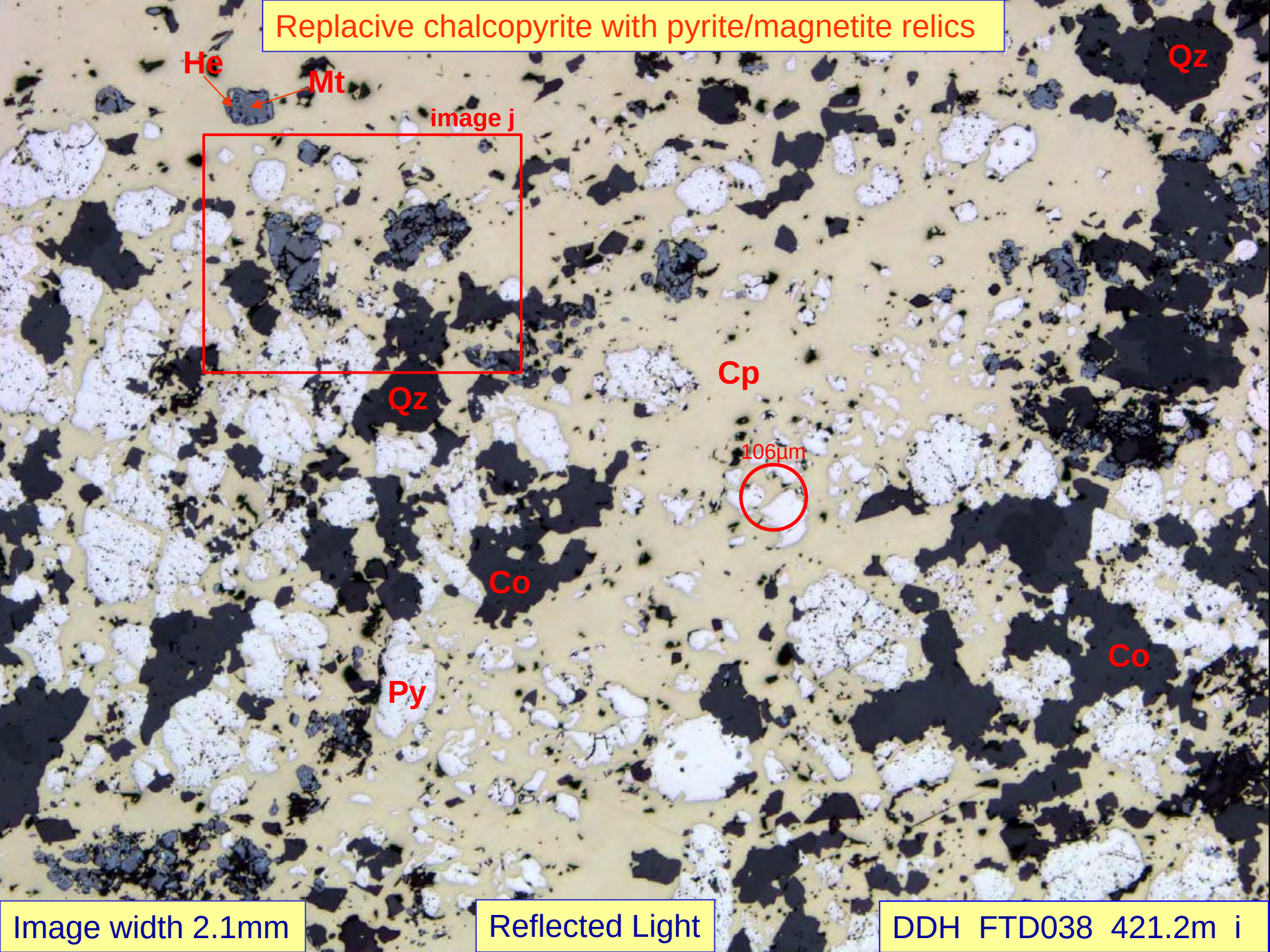

Detail from previous image
(carbonate-chalcopyrite clearly cuts hematite blades)
He
Co
Qz
106µm
Cp
Qz
Co
image e
Mt
Co
Py
He
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m d

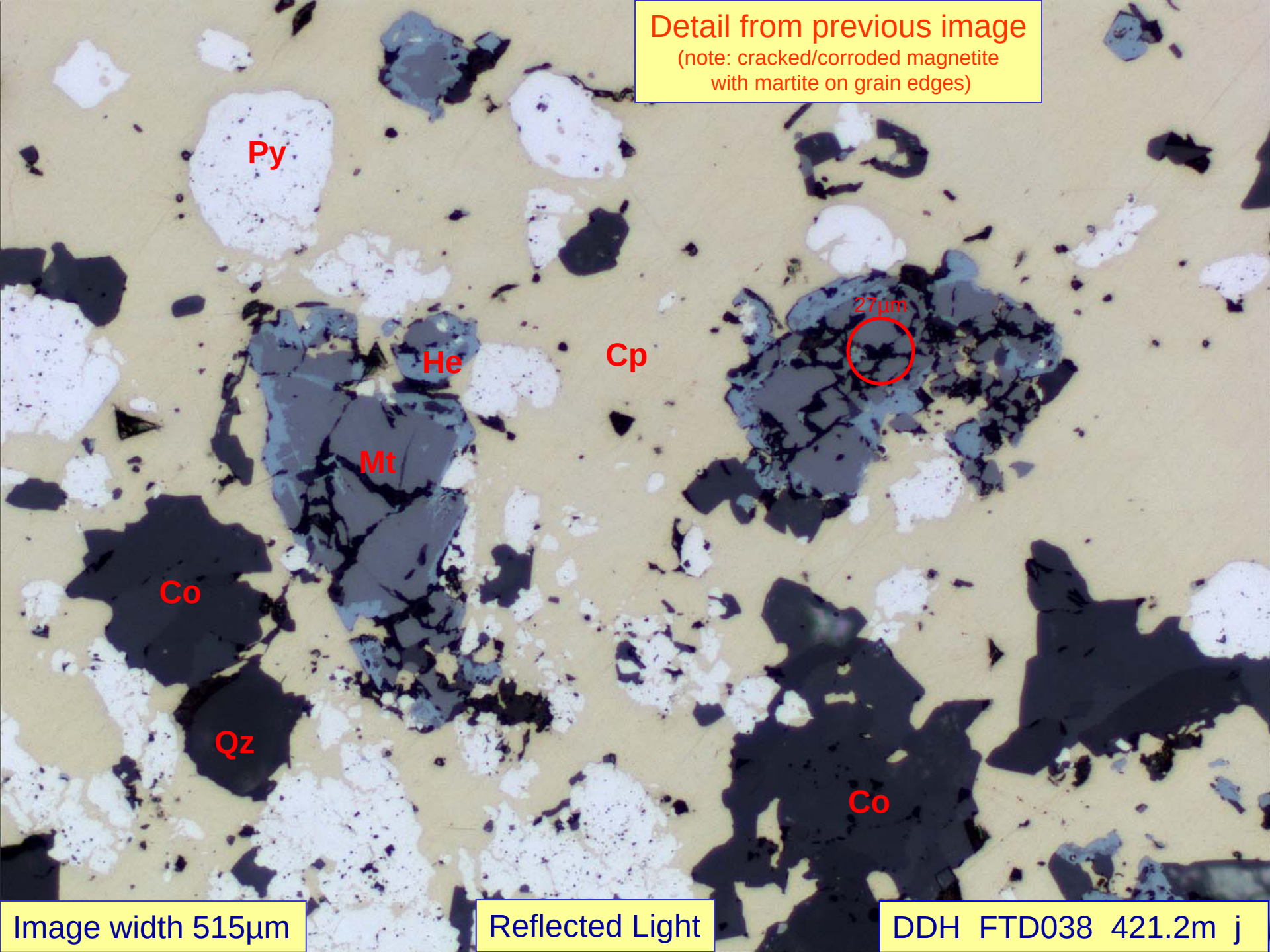

Further detail from previous image
(carbonate-pyrite-chalcopyrite interstitial to hematite blades)
Cp
Qz
Co
He
Co
27µm
Qz
Py
(partially recrystallised
melnikovite)
Co
He
Cp
Image width 515µm
Reflected Light
DDH FTD038 421.2m e

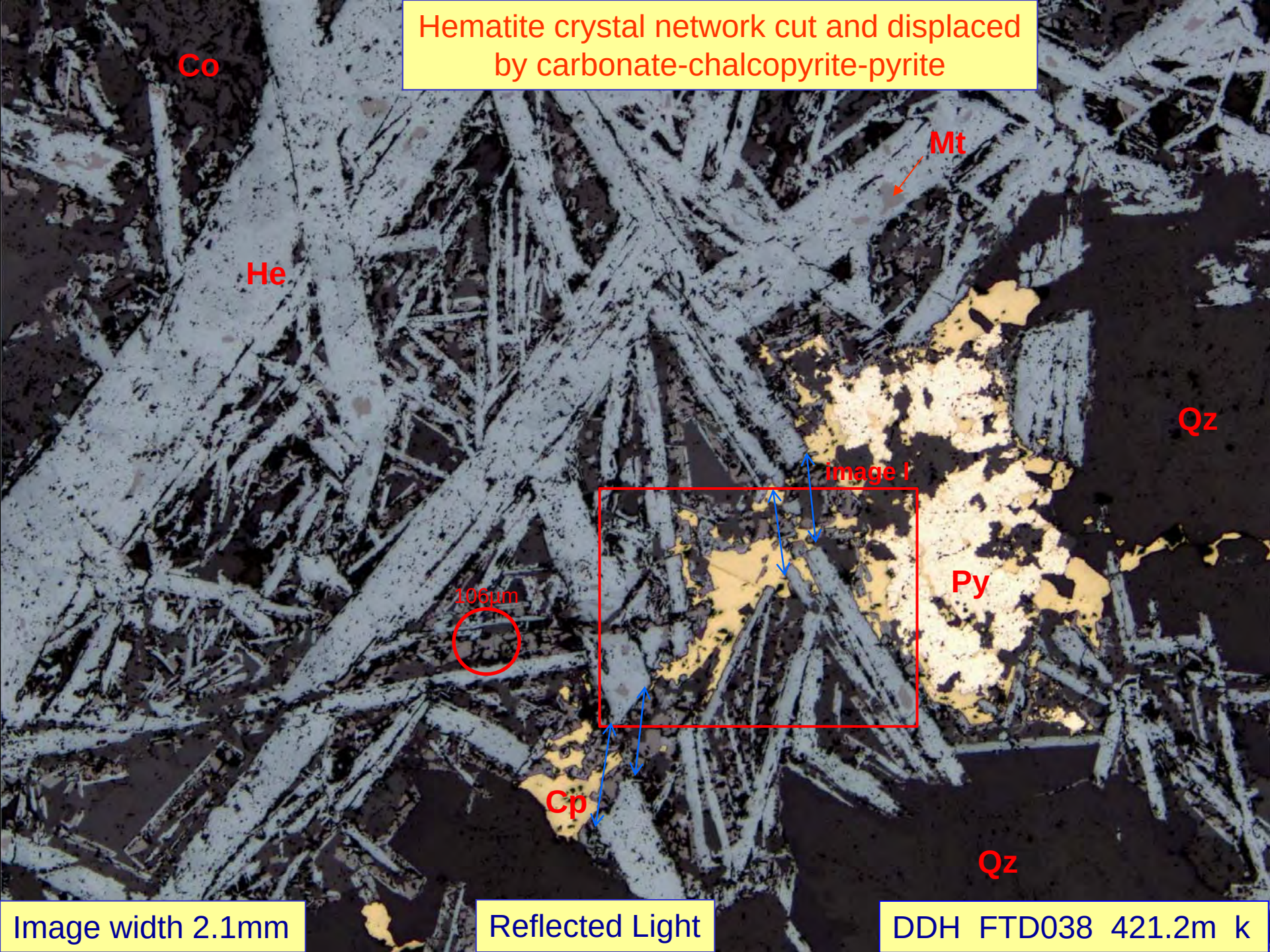

Chaotic inclusions in chalcopyrite
Py
Co
He
Qz
Mu
Py
Cp
106µm
He
Cp
Qz
Co
He
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m f

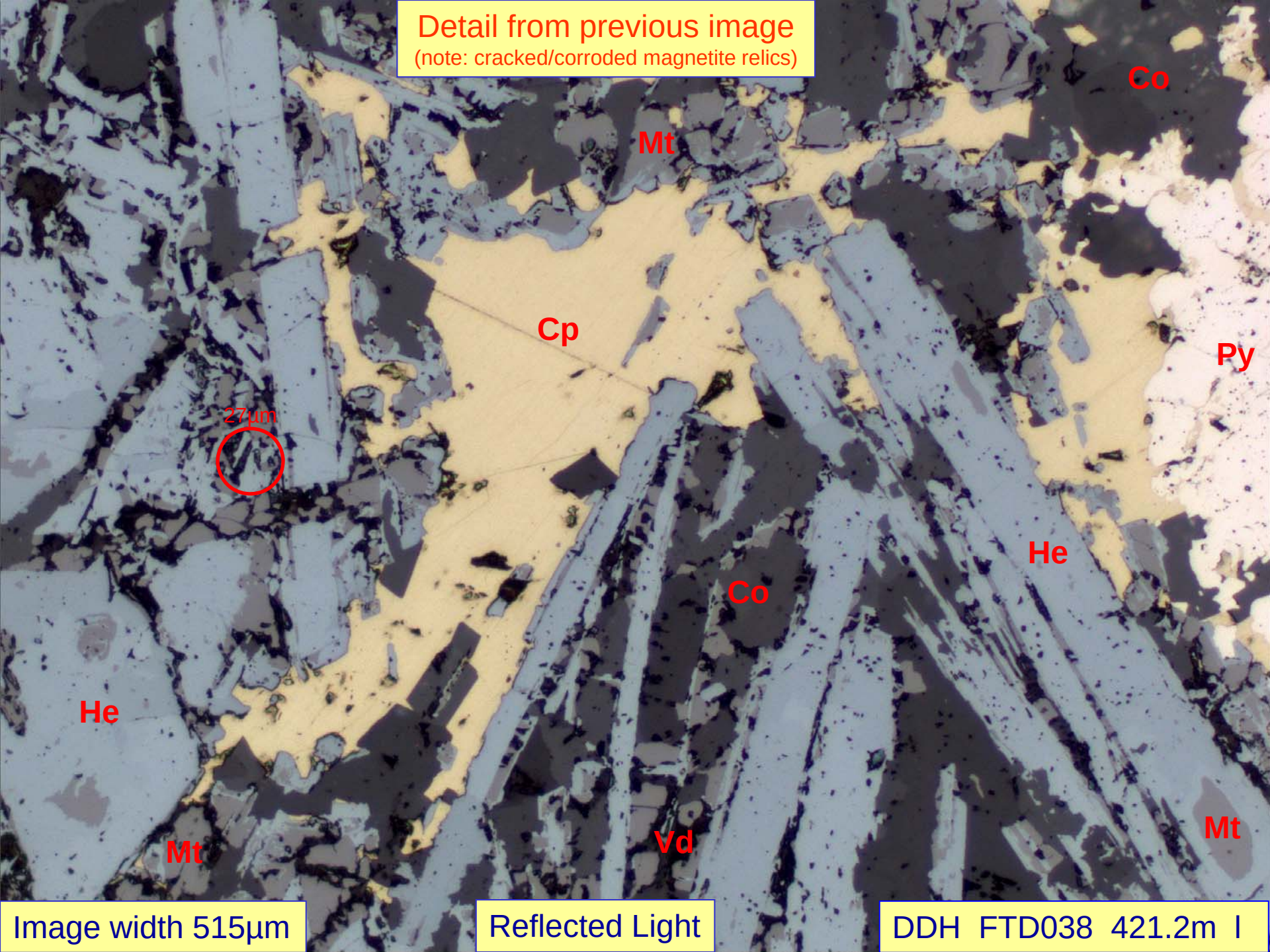

Chaotic inclusions in chalcopyrite
Co
He
Qz
Co
image h
Py
Qz
Cp
Cp
106um
He
Co
Qz
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m g

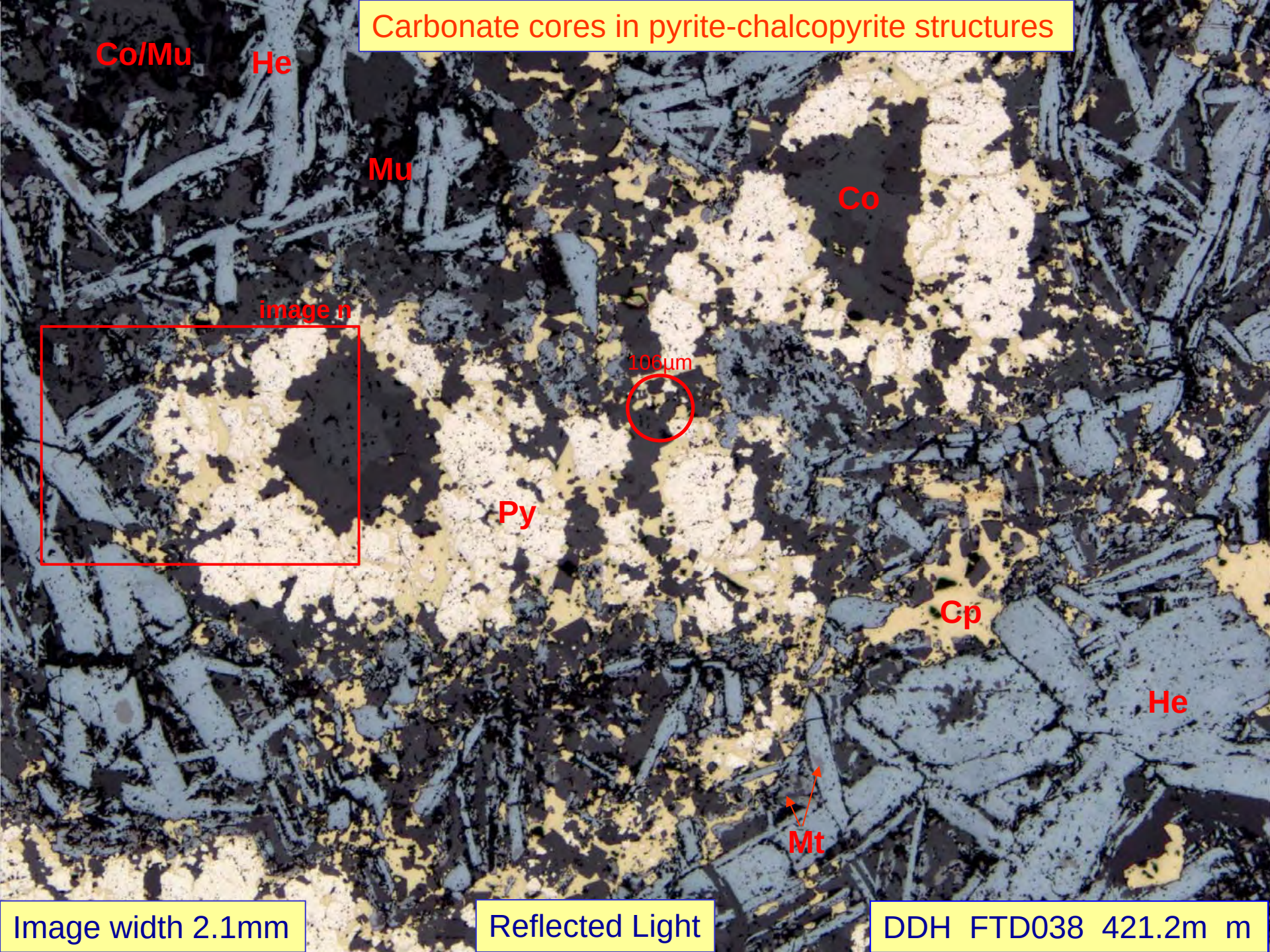

Detail from previous image
(carbonate partially replaces hematite?)
Co
He
Cp
Qz
Py
27µm
Qz
Cp
Co
He
Image width 515µm
Reflected Light
DDH FTD038 421.2m h

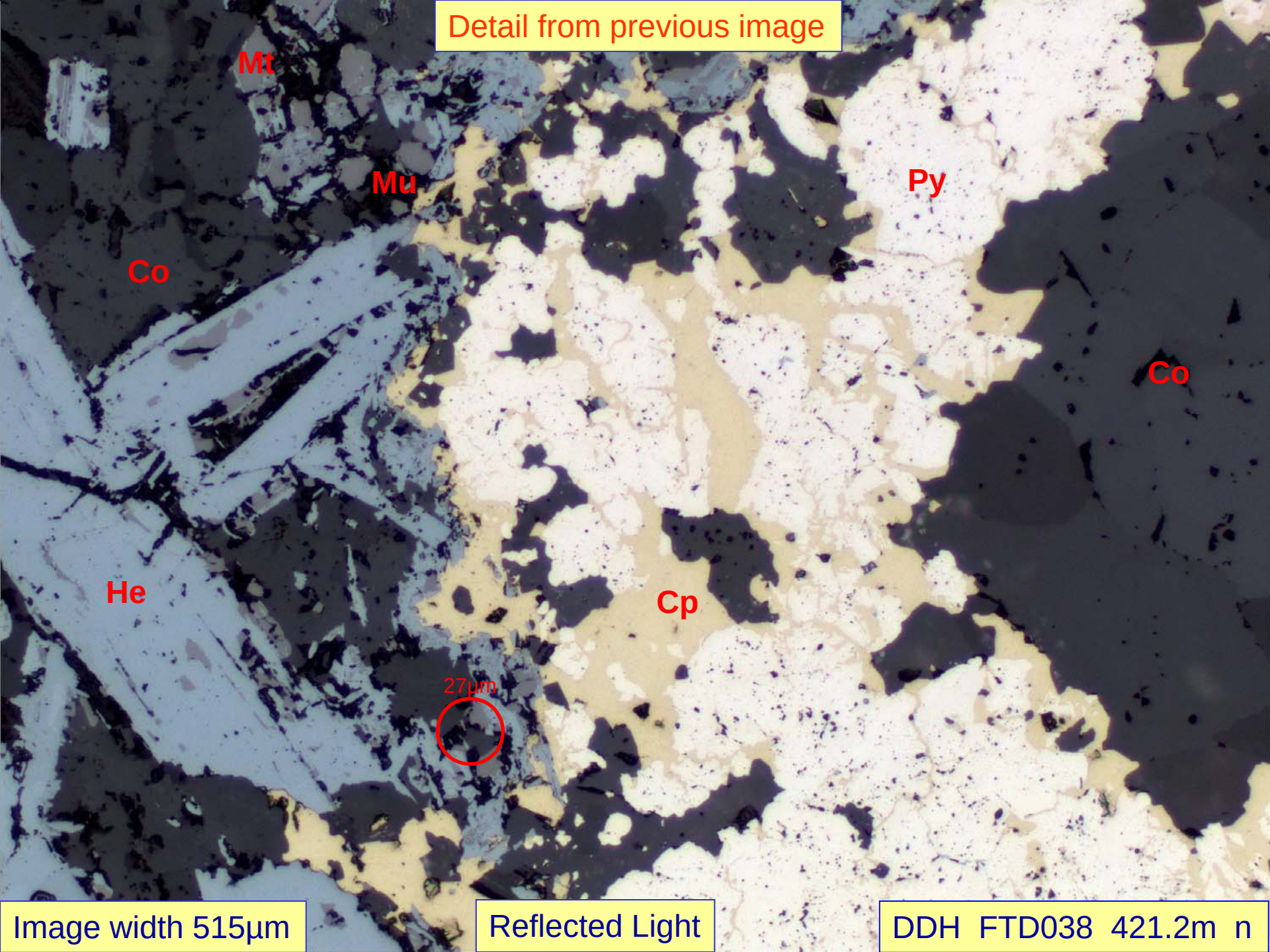

Replacive chalcopyrite with pyrite/magnetite relics
He
Mt
image j
Qz
Qz
Cp
106µm
Co
Co
Py
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m i

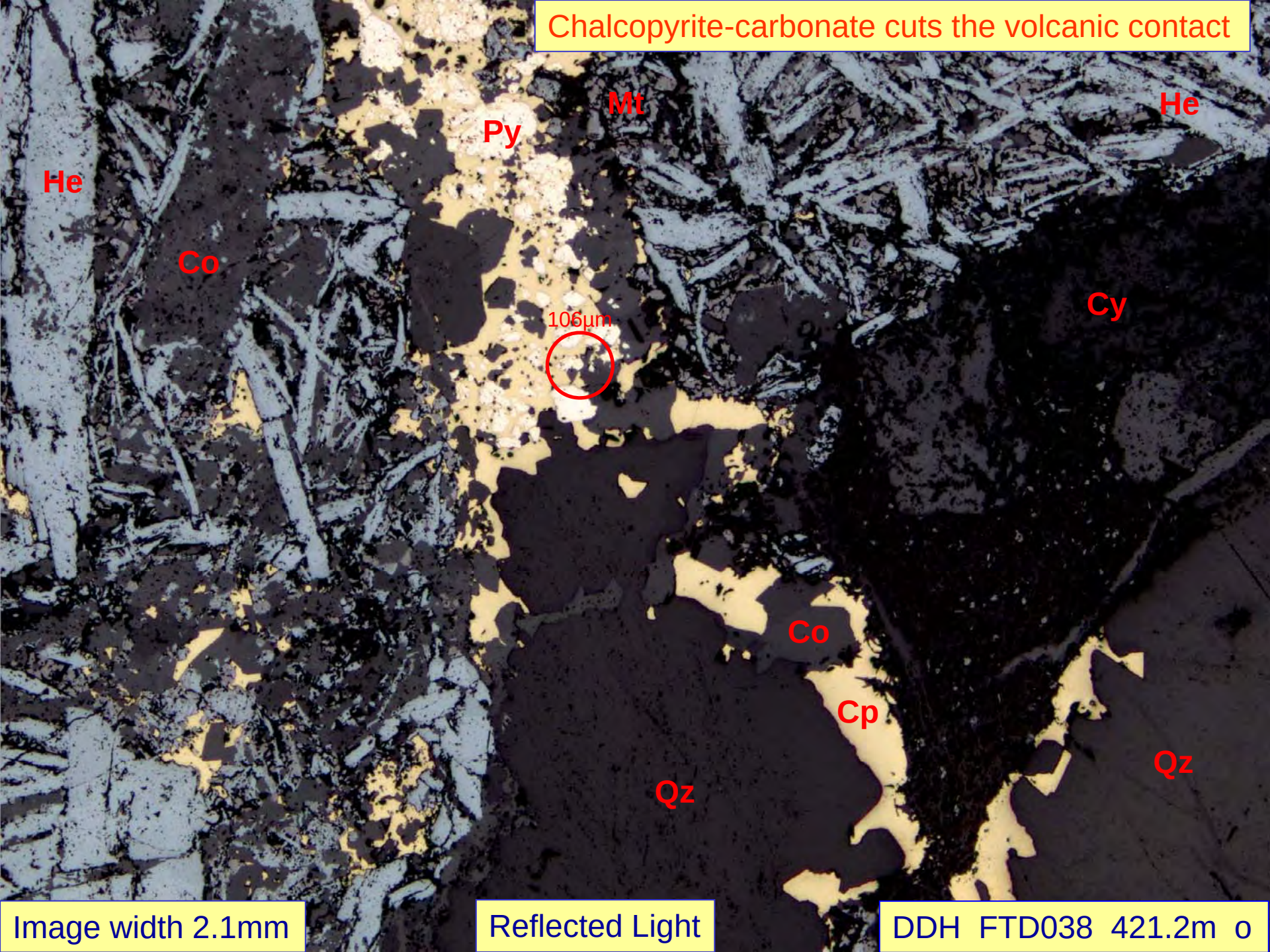

Detail from previous image
(note: cracked/corroded magnetite
with martite on grain edges)
Py
He
Cp
27µm
Mt
Co
Qz
Co
Image width 515µm
Reflected Light
DDH FTD038 421.2m j

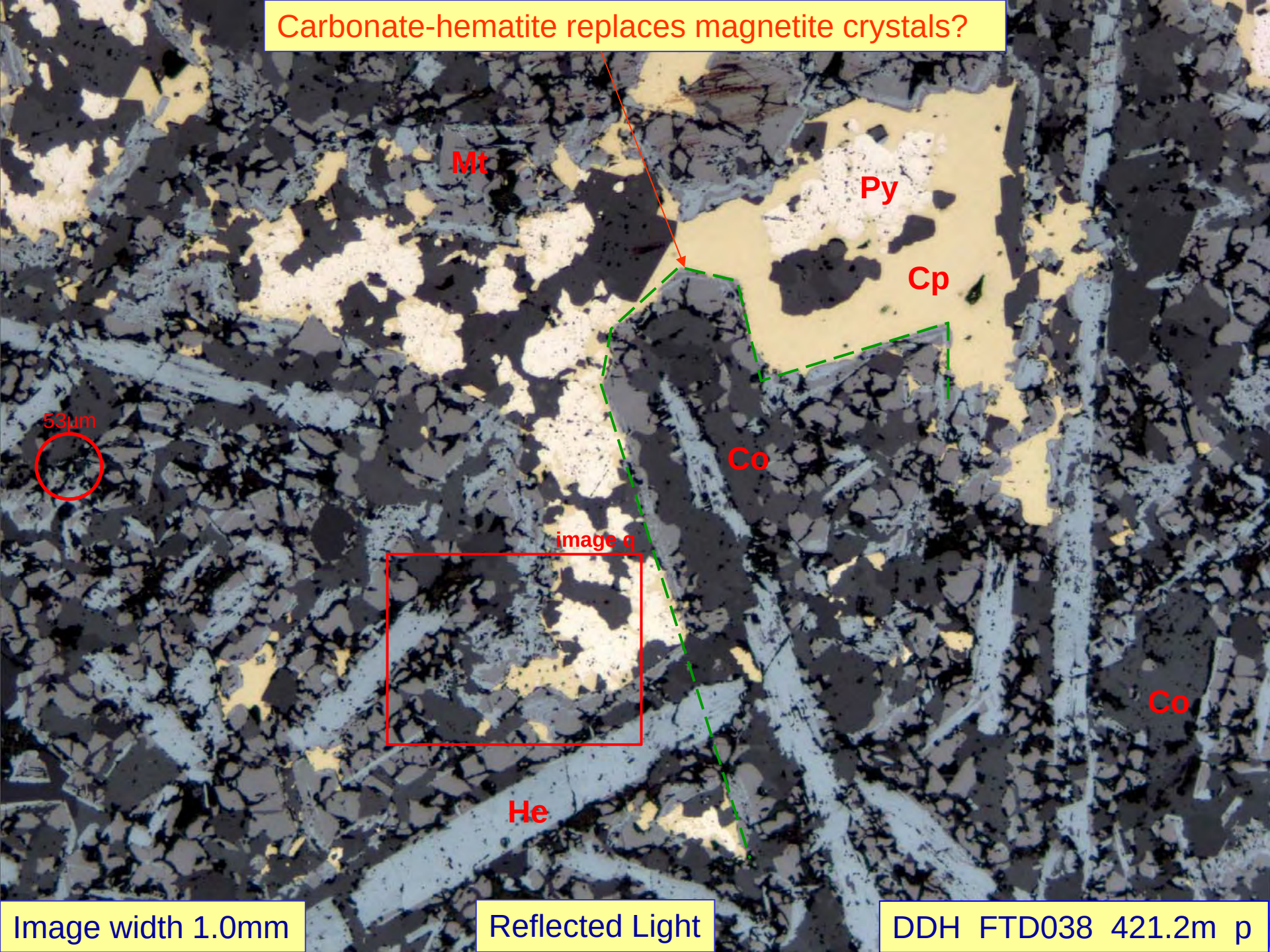

Hematite crystal network cut and displaced by carbonate-chalcopyrite-pyrite
Co
Mt
He
Qz
image I
Py
106µm
Cp
Qz
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m k

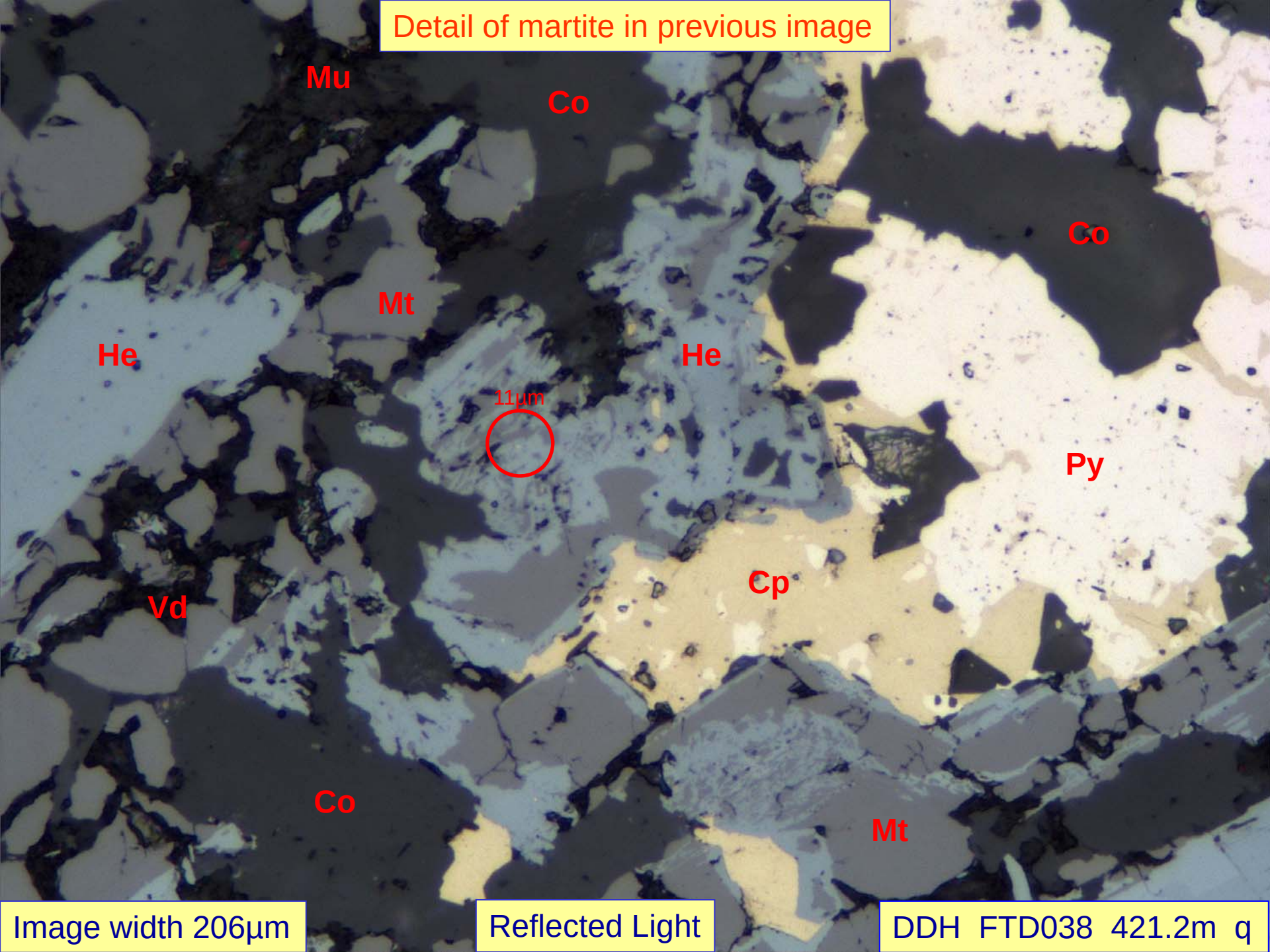

Detail from previous image
(note: cracked/corroded magnetite relics)
Co
Mt
Cp
Py
27µm
He
Co
He
Mt
Vd
Mt
Image width 515µm
Reflected Light
DDH FTD038 421.2m I

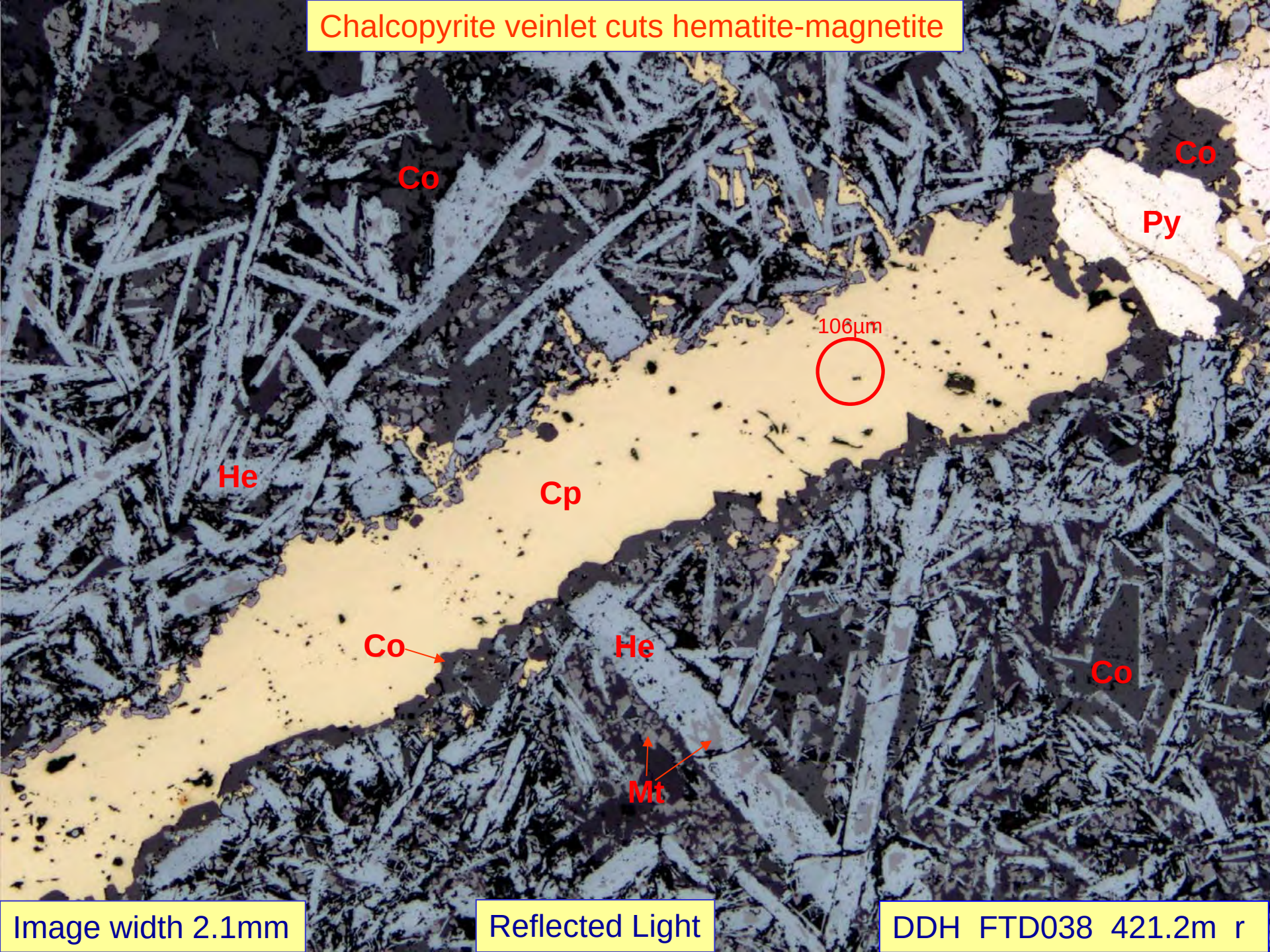

Carbonate cores in pyrite-chalcopyrite structures
Co/Mu
He
Mu
Co
image n
106µm
Py
Cp
He
Mt
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m m

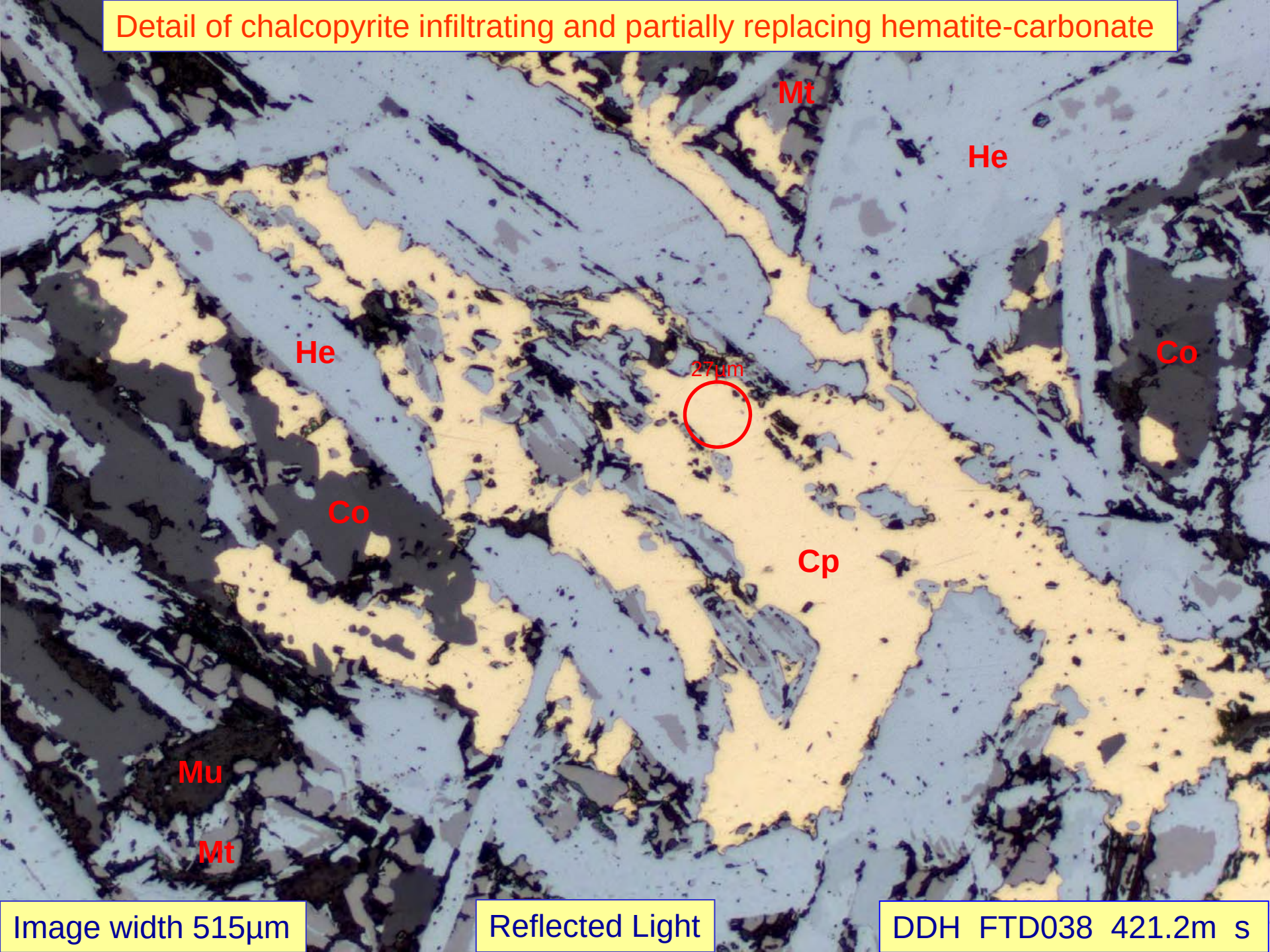

Detail from previous image
Mt
Mu
Py
Co
Co
He
Cp
27µm
Image width 515µm
Reflected Light
DDH FTD038 421.2m n

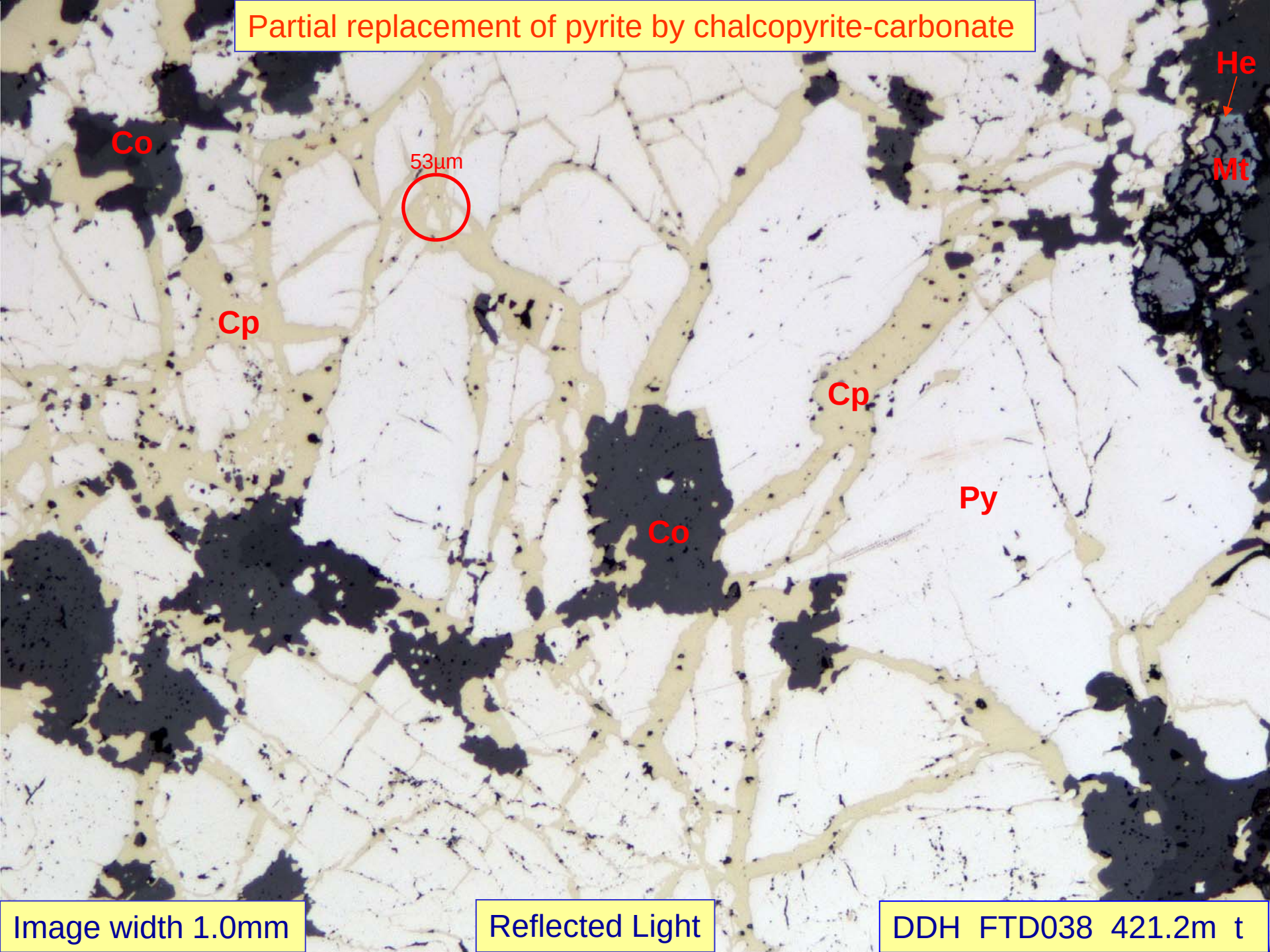

Chalcopyrite-carbonate cuts the volcanic contact
Mt
He
Py
He
Co
Cy
106µm
Co
Cp
Qz
Qz
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m o

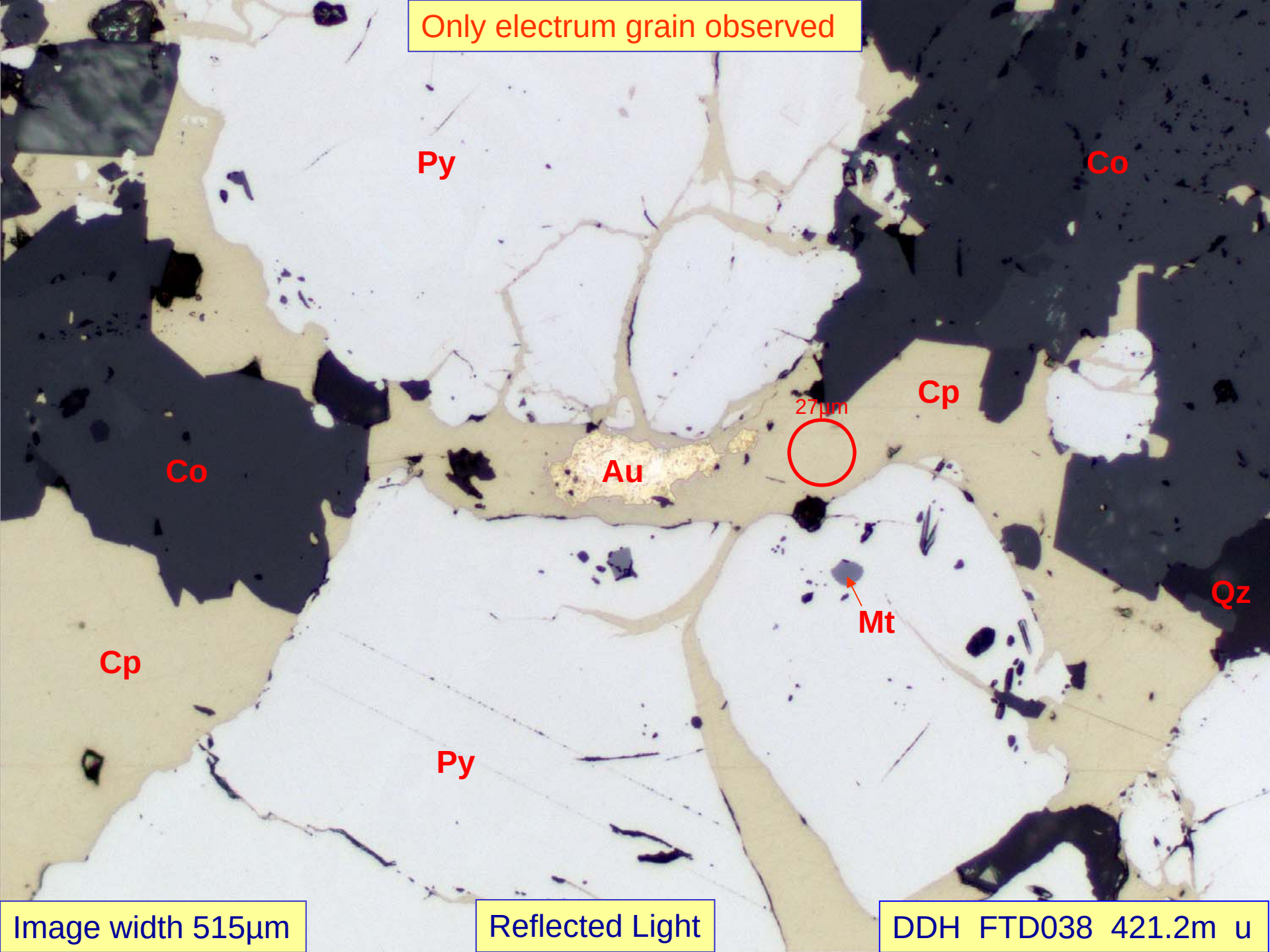

Carbonate-hematite replaces magnetite crystals?
Mt
Py
Cp
Co
53µm
image q
Co
He
Image width 1.0mm
Reflected Light
DDH FTD038 421.2m p


Detail of martite in previous image
Mu
Co
Co
Mt
He
He
11µm
Py
Cp
Vd
Co
Mt
Image width 206µm
Reflected Light
DDH FTD038 421.2m q


Chalcopyrite veinlet cuts hematite-magnetite
Co
Co
Py
106µm
He
Cp
Co
He
Co
Mt
Image width 2.1mm
Reflected Light
DDH FTD038 421.2m r


Detail of chalcopyrite infiltrating and partially replacing hematite-carbonate
Mt
He
He
Co
27µm
Co
Cp
Mu
Mt
Image width 515µm
Reflected Light
DDH FTD038 421.2m s


Partial replacement of pyrite by chalcopyrite-carbonate
Co
53µm
He
Mt
Cp
Cp
Py
Co
Image width 1.0mm
Reflected Light
DDH FTD038 421.2m t


Only electrum grain observed
Py
Co
Cp
27µm
Co
Au
Mt
Qz
Cp
Py
Image width 515µm
Reflected Light
DDH FTD038 421.2m u

Unity Mining Ltd - GOG Range Drillcore Mineralogy

Total SCAN - 106μm Mask

Sample Firetower FTD038 449.8m

GJMcA 4.10.12

Average composition - all grains

	Py	Cp	Mt	He	Qz	CO	Cy	Mu	Other
Vol%	3.2	14.8	2.4	2.6	15.3	56.7	0.0	4.9	0.0
Wt%	4.9	18.7	3.8	4.2	12.1	52.1	0.0	4.1	0.0
APG	54	46	6	9	43	65	0	17	1

ASSAYS

	SG	Fe	Cu	S
Calc'd	3.32	22.1	6.49	9.2
Actual		**31.6**	**4.96**	**5.7**

COMPOSITE PROPORTIONS

	Py	Cp	Mt	He	Qz	CO	Mu
Mono	0	20	0	0	59	32	23
Binary	69	58	12	25	18	27	60
Ternary	31	16	79	70	22	37	14
Quat.y+	0	6	8	5	2	4	3

BINARY ASSOCIATION MATRIX

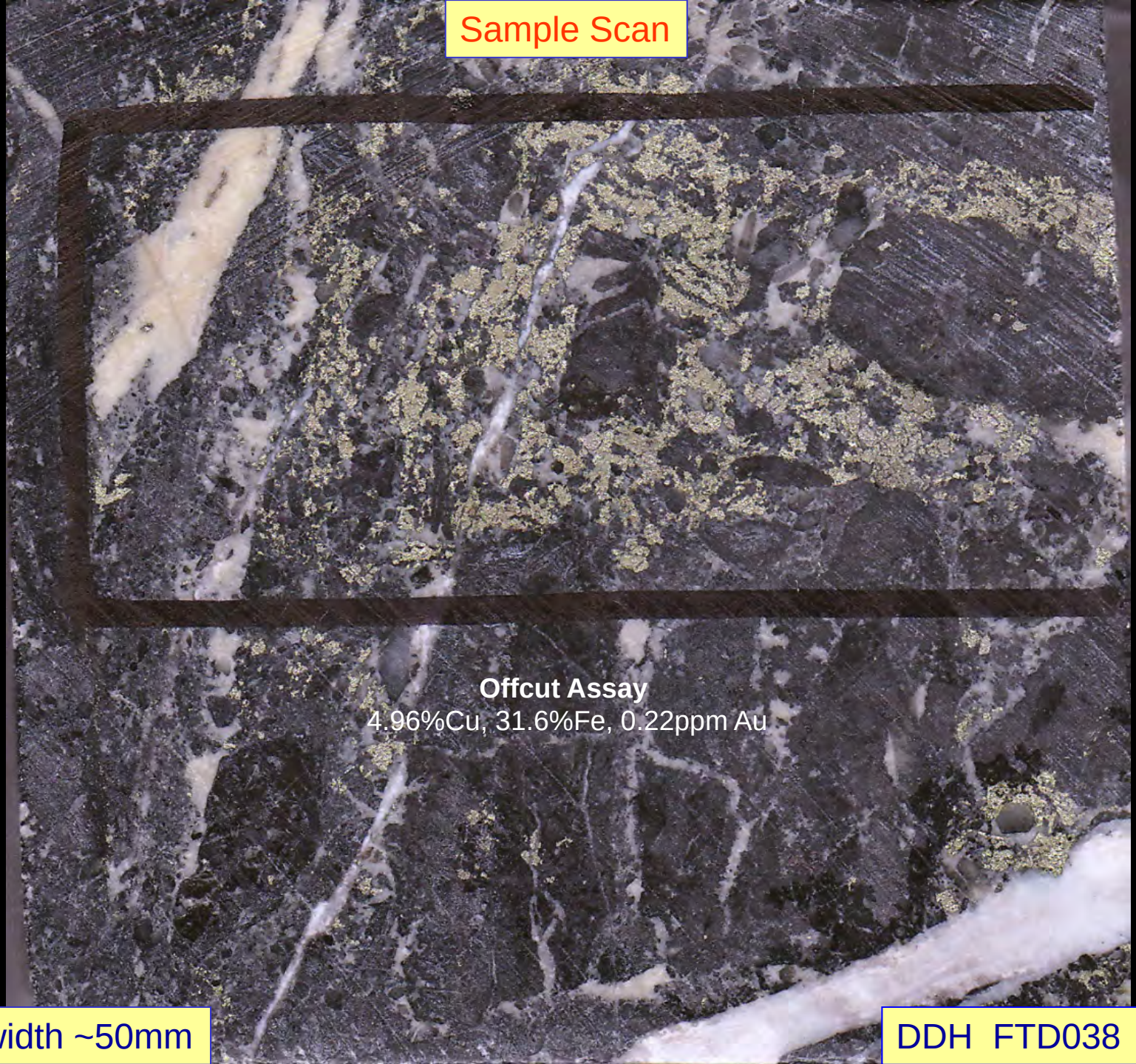
	Py	Cp	Mt	He	Qz	CO	Mu
Py		30	0	0	0	39	0
Cp	0		0	0	7	58	9
Mt	0	0		0	1	12	9
He	0	0	0		1	24	1
Qz	0	5	7	6		12	16
CO	1	11	10	6	6		9
Mu	0	9	25	25	37	36	

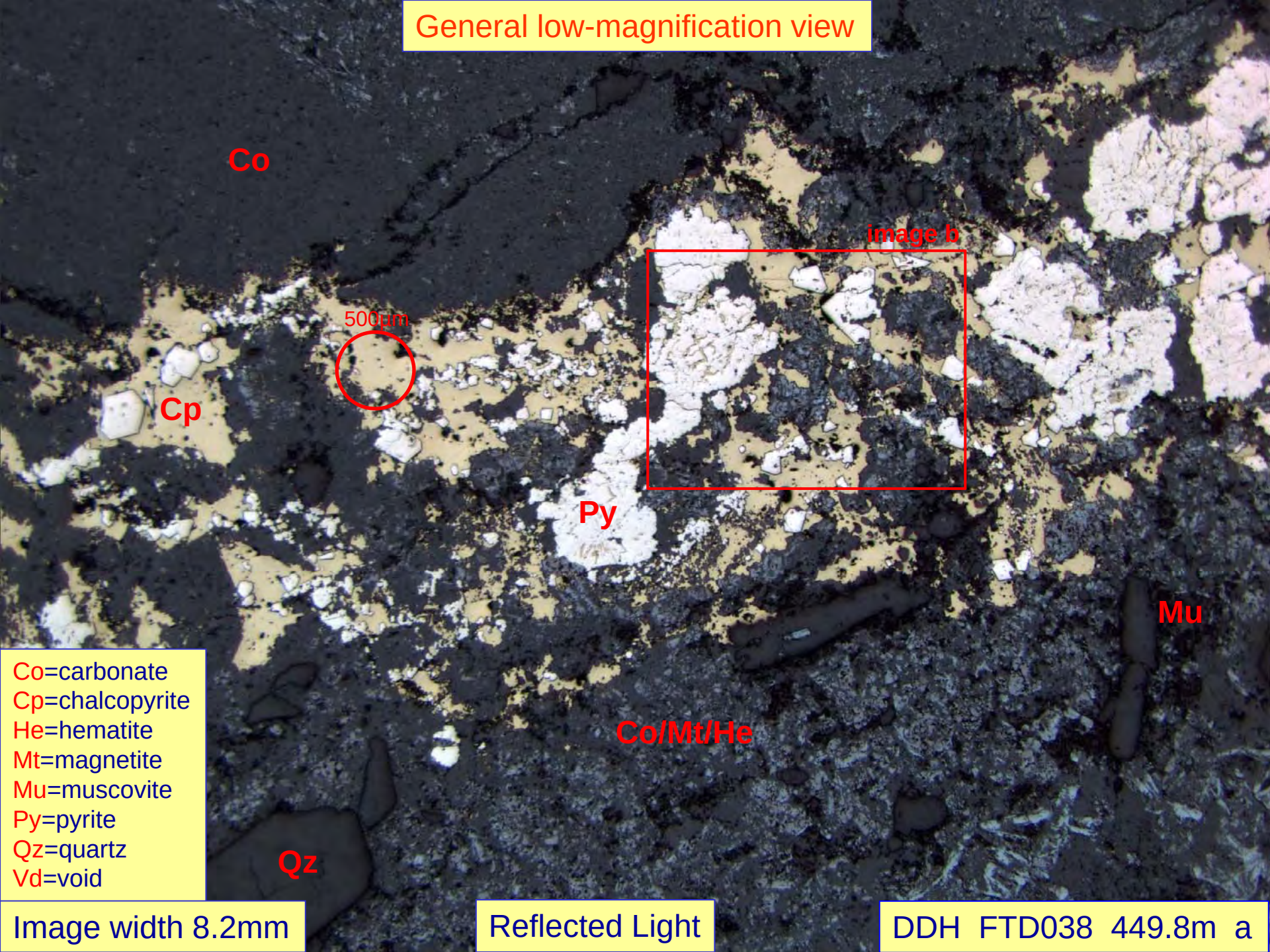
TOTAL ASSOCIATION MATRIX

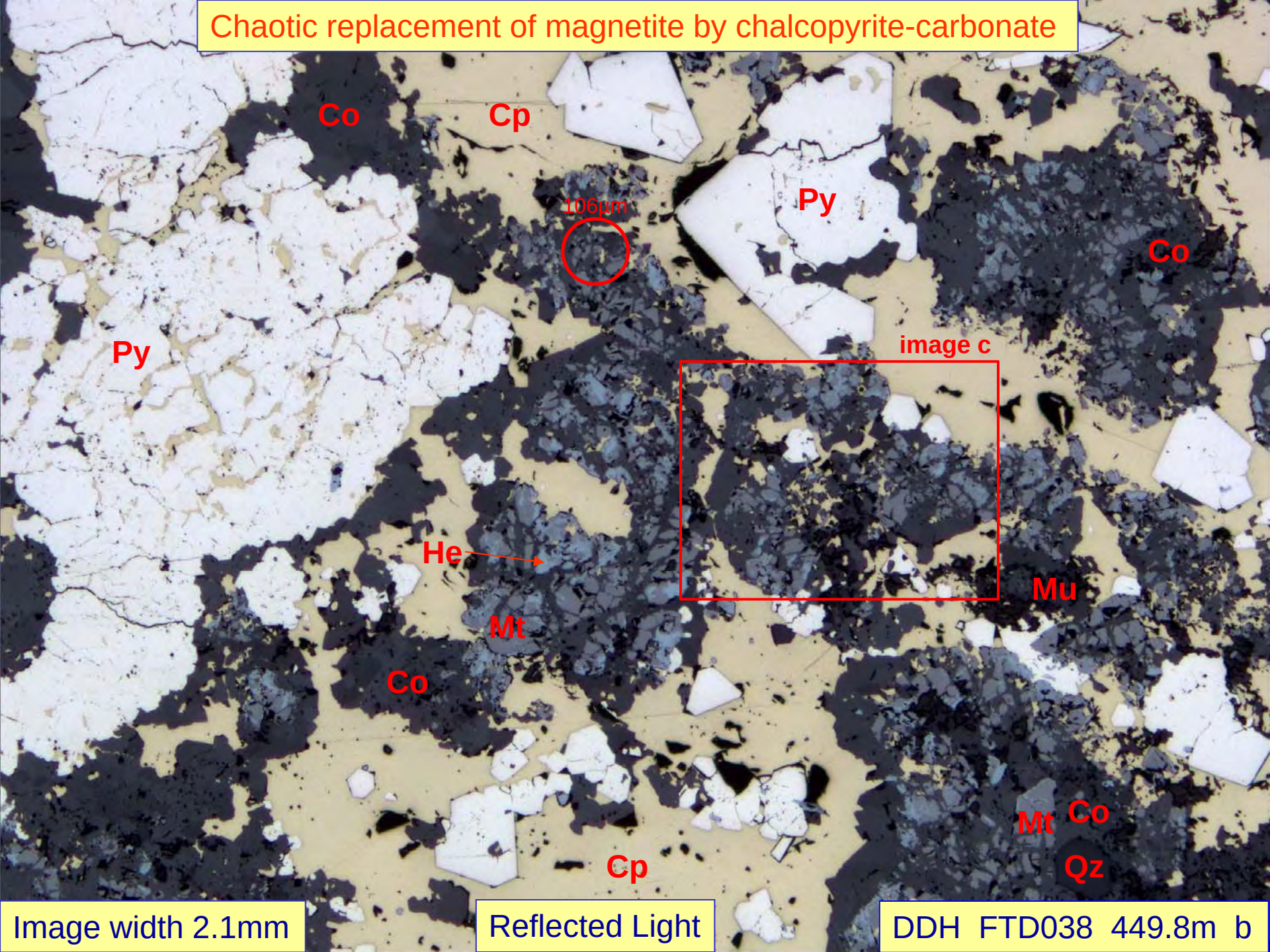
		Py	Cp	Mt	He	Qz	CO	Mu
	Py		61	0	0	0	70	0
	Cp	3		12	12	15	71	13
of	**Mt**	0	14		72	25	99	38
all	**He**	0	2	73		30	98	45
	Qz	0	11	30	24		58	41
	CO	4	22	46	34	25		25
	Mu	0	15	41	37	59	75	

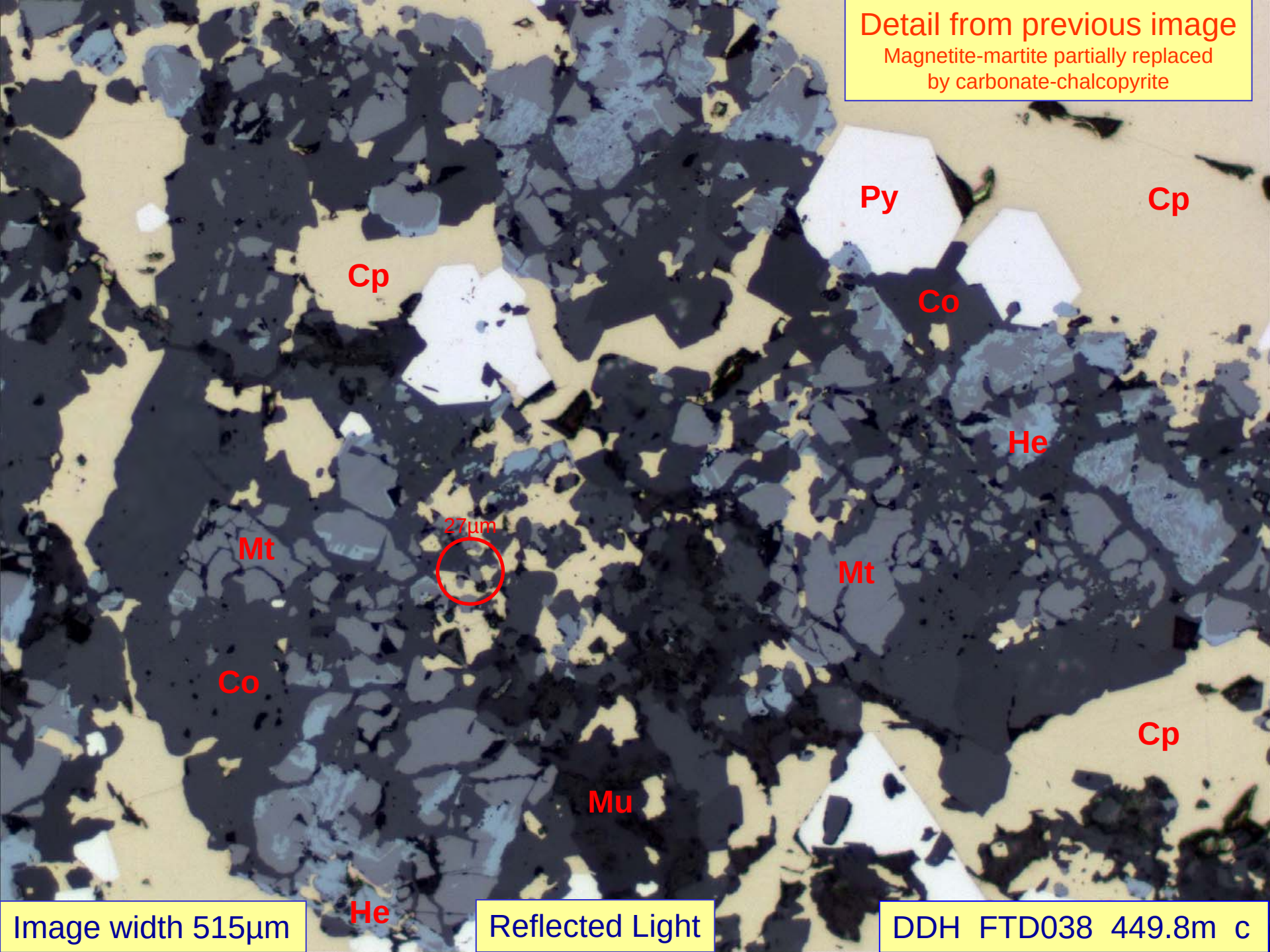
APG Average area% per grain when present

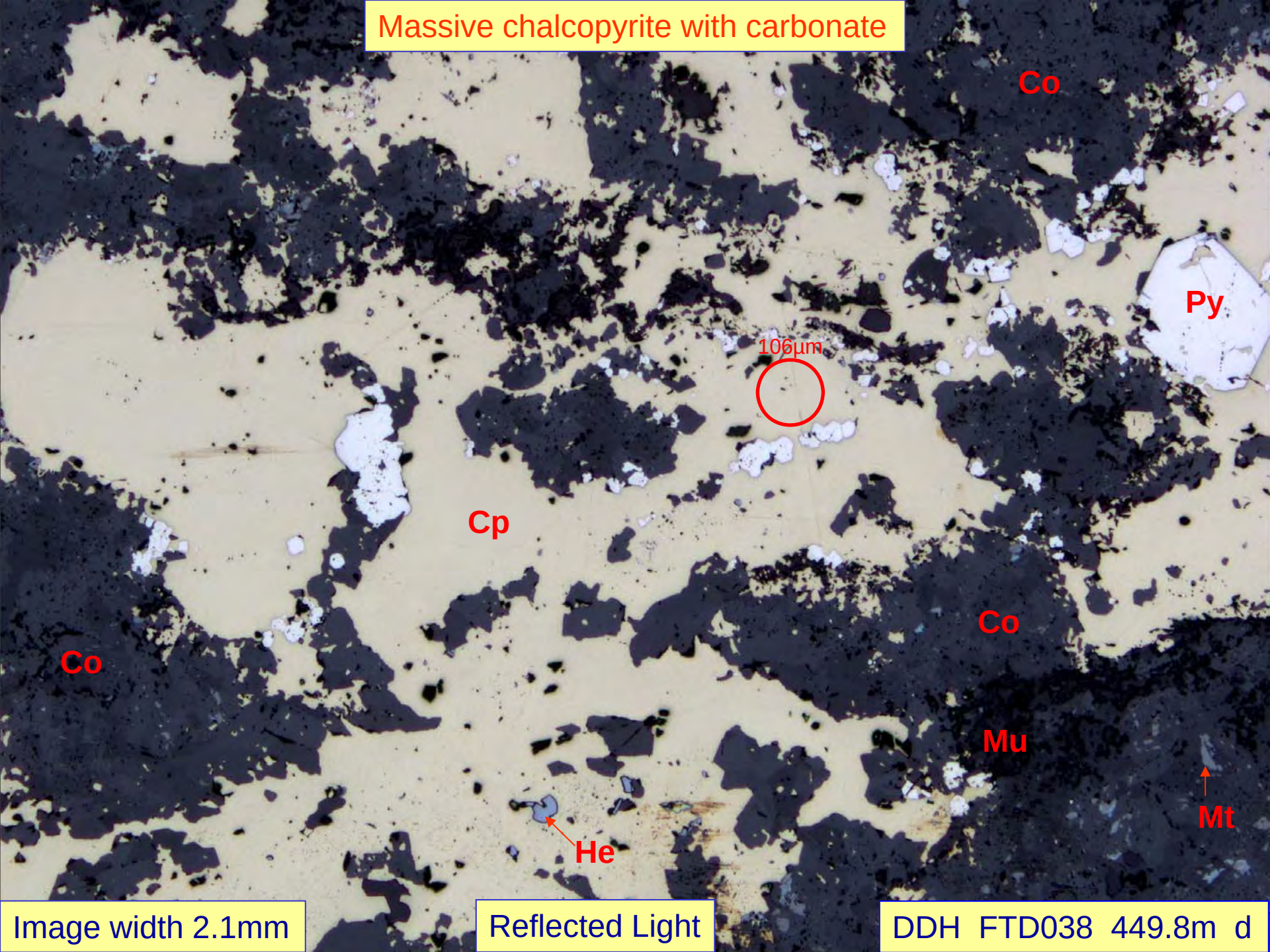
Py Pyrite
Cp Chalcopyrite
Mt Magnetite
He Hematite
Qz Quartz
CO Carbonate
Cy Clay
Mu Muscovite
Ga Gangue

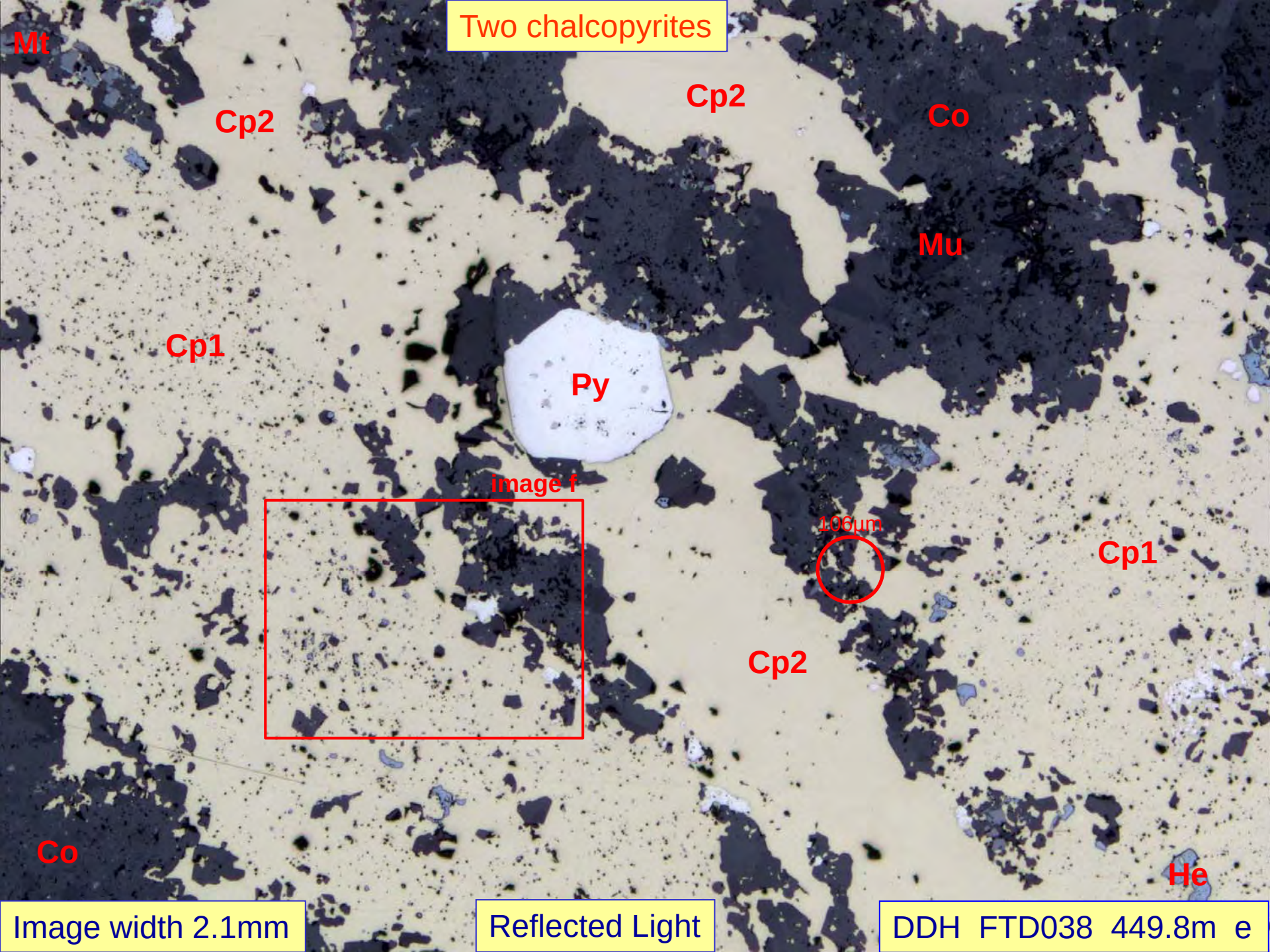

Sample Scan
Offcut Assay
4.96%Cu, 31.6%Fe, 0.22ppm Au
Image width ~50mm
DDH FTD038 449.8m

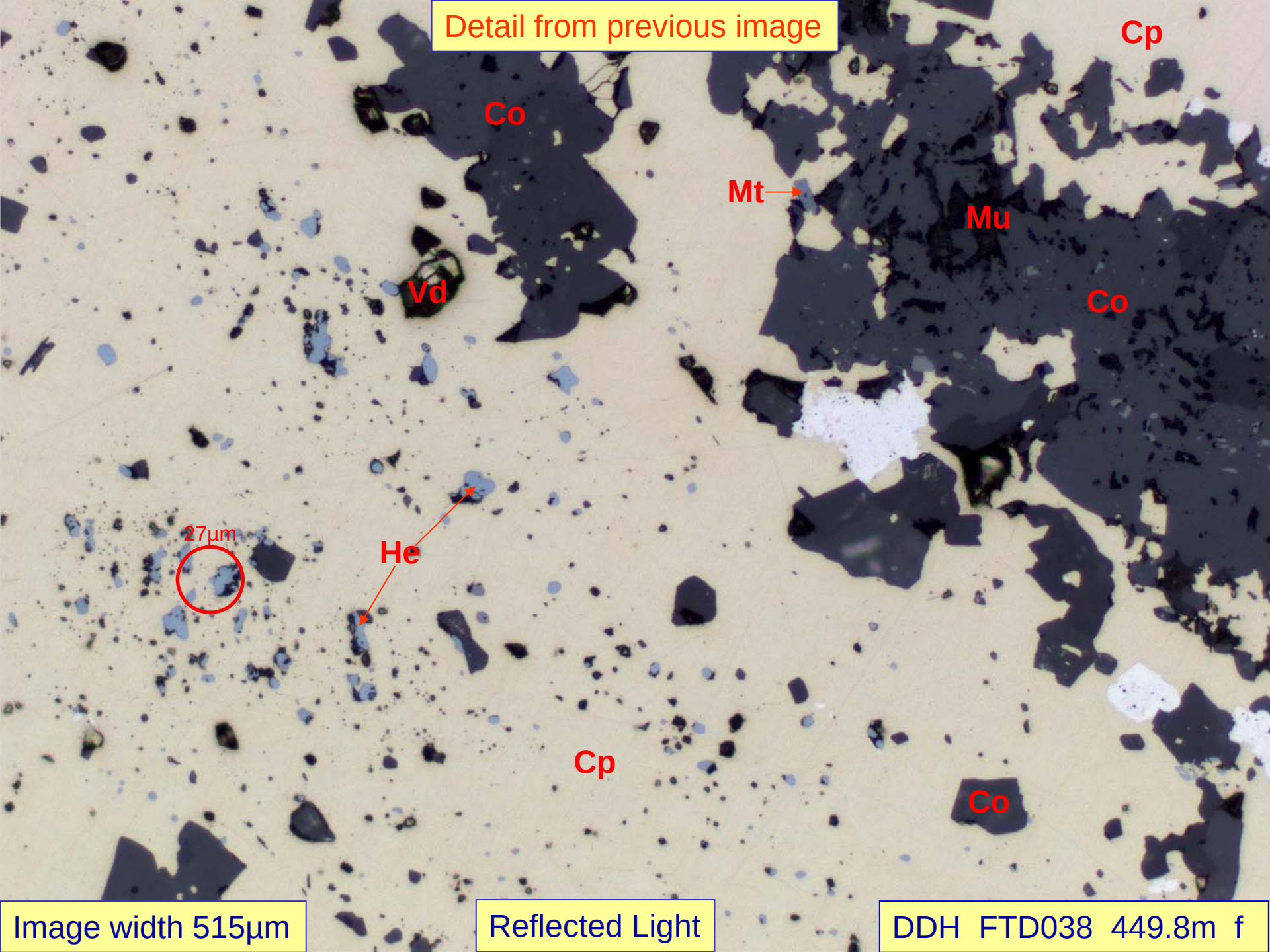

General low-magnification view
Co
image b
500µm
Cp
Py
Mu
Co/Mt/He
Qz
Co=carbonate
Cp=chalcopyrite
He=hematite
Mt=magnetite
Mu=muscovite
Py=pyrite
Qz=quartz
Vd=void
Image width 8.2mm
Reflected Light
DDH FTD038 449.8m a

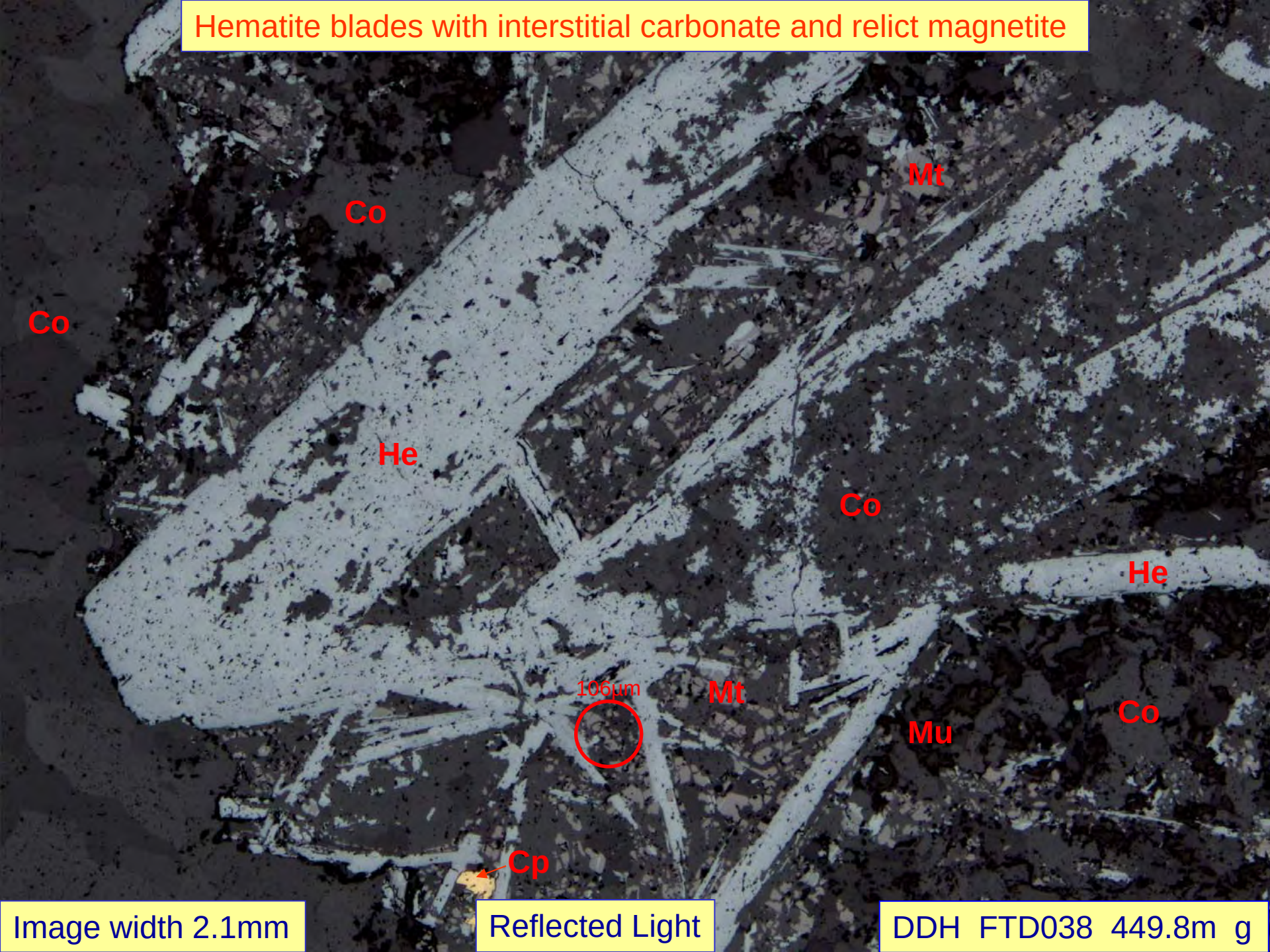

Chaotic replacement of magnetite by chalcopyrite-carbonate
Co
Cp
106µm
Py
Co
Py
image c
He
Mu
Mt
Co
Mt
Co
Qz
Cp
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m b

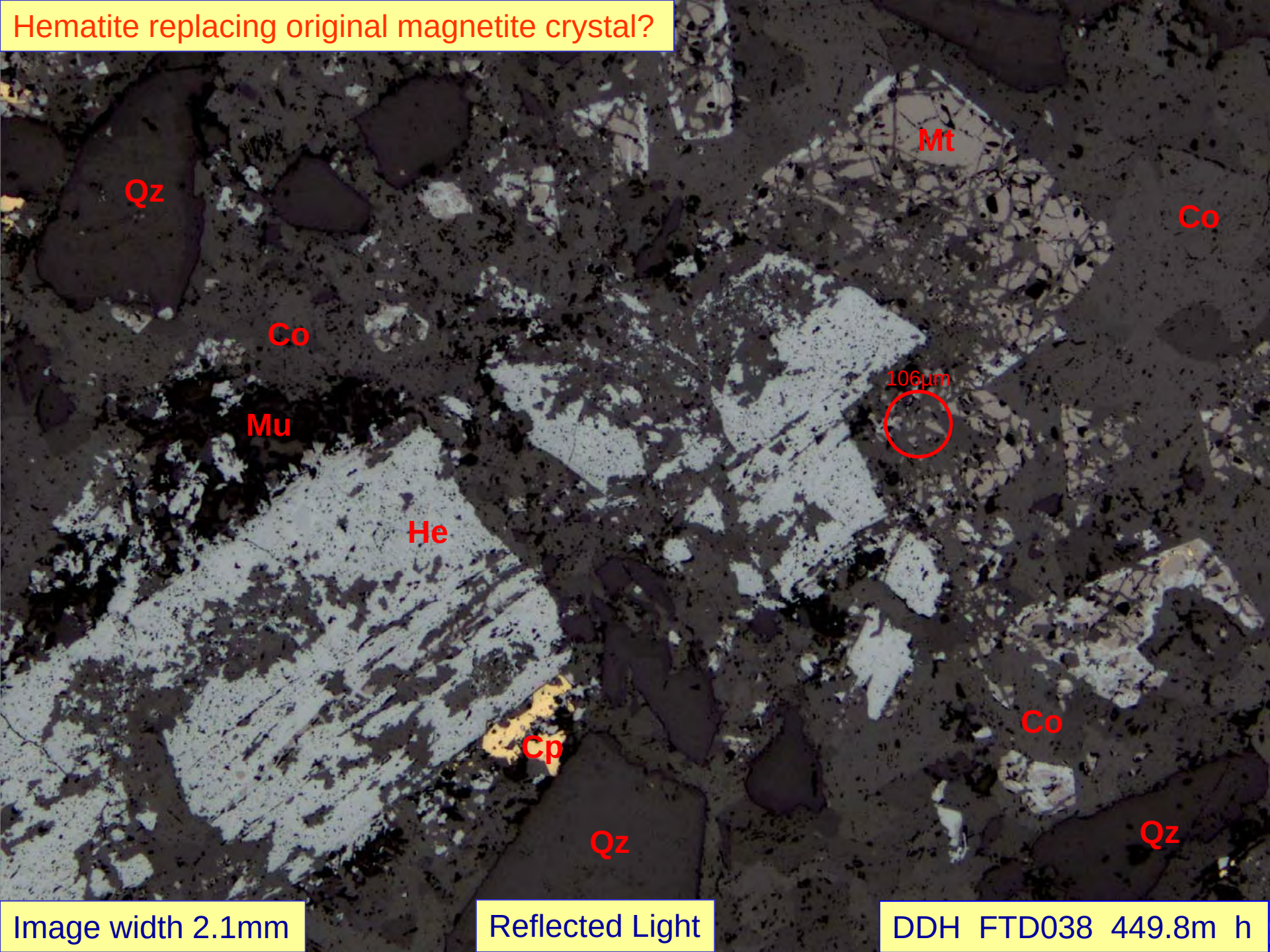

Detail from previous image
Magnetite-martite partially replaced
by carbonate-chalcopyrite
Py
Cp
Cp
Co
He
27µm
Mt
Mt
Co
Cp
Mu
He
Image width 515µm
Reflected Light
DDH FTD038 449.8m c

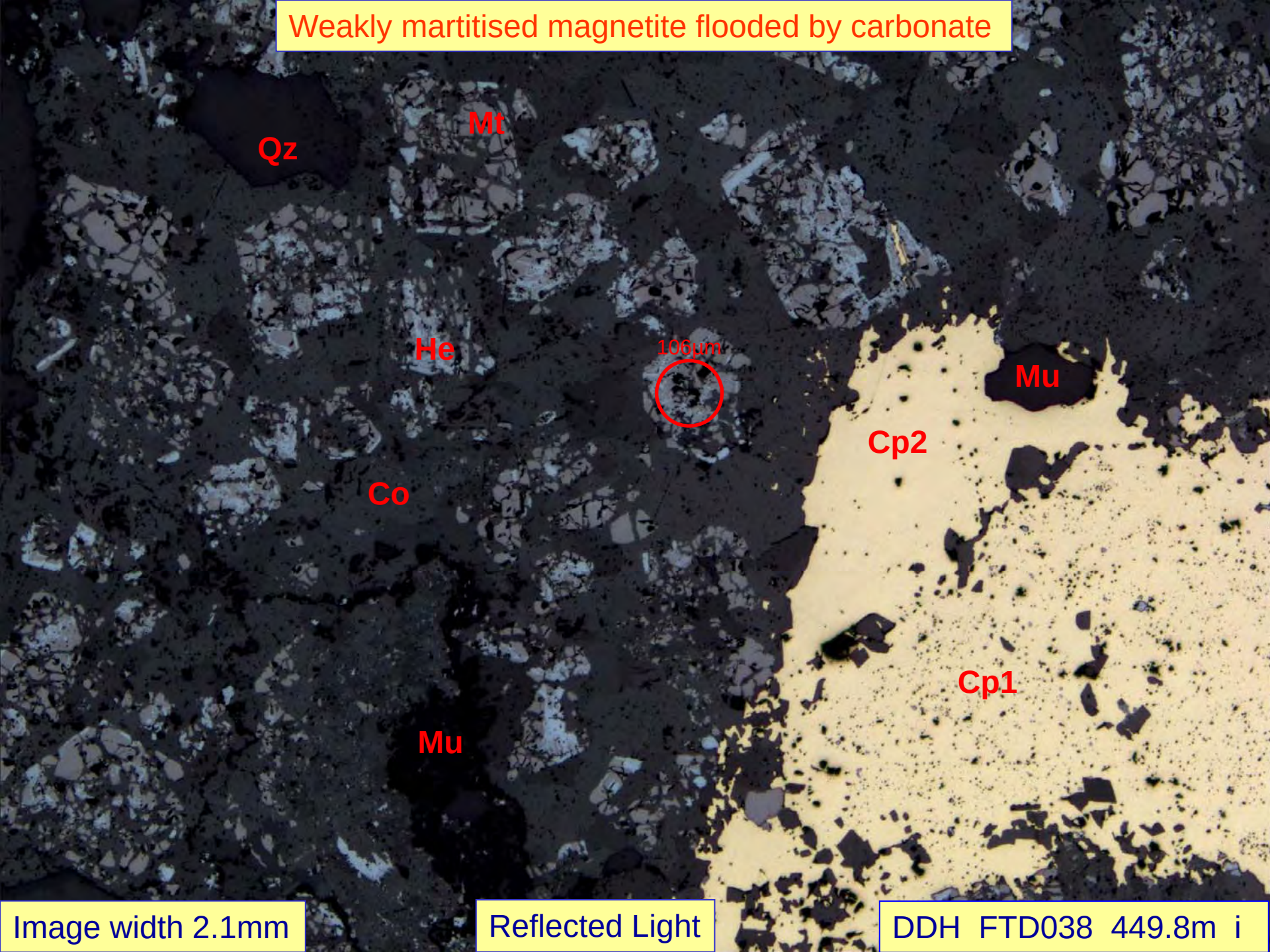

Massive chalcopyrite with carbonate
Co
Py
106µm
Cp
Co
Co
Mu
Mt
He
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m d

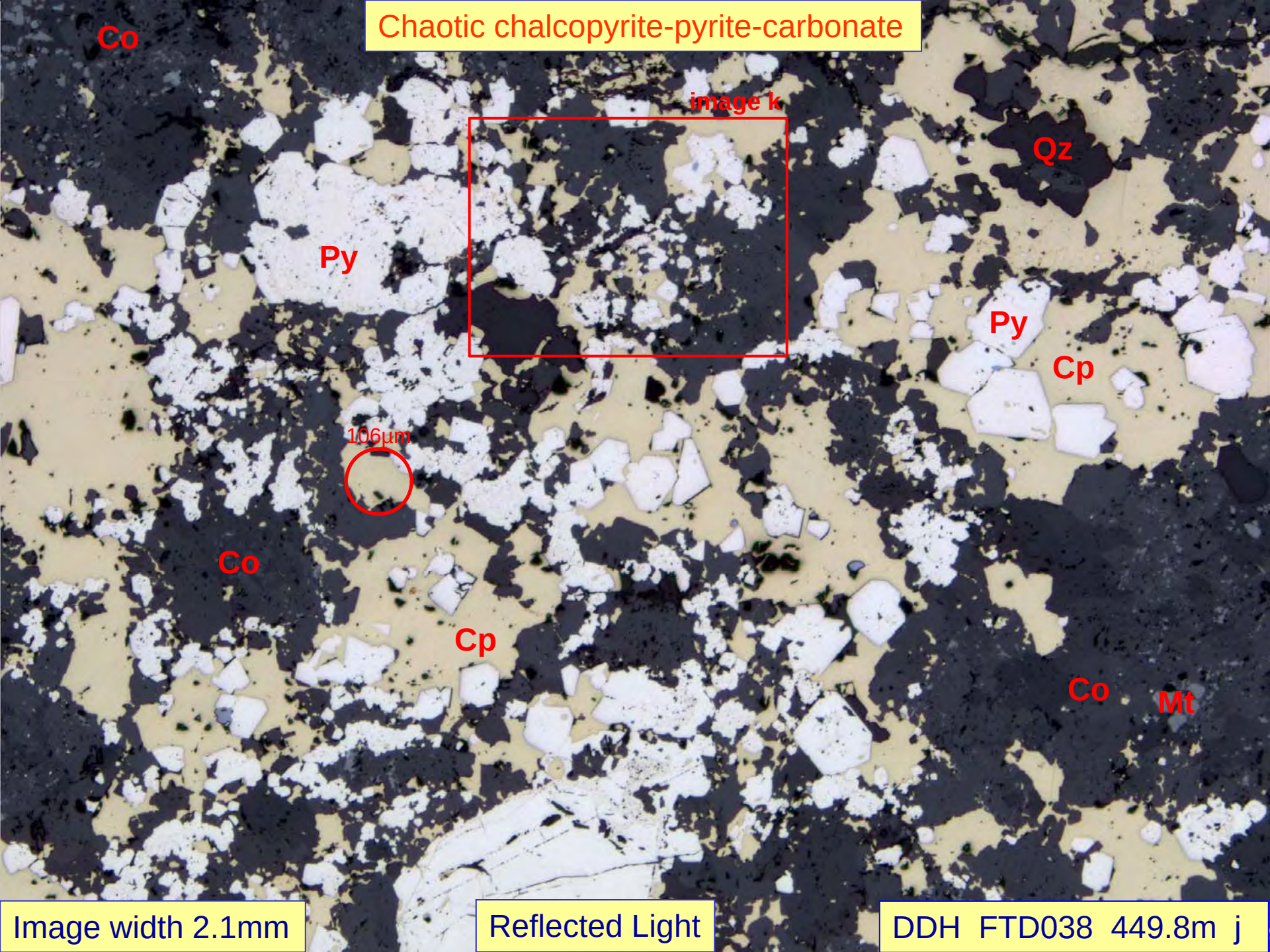

Two chalcopyrites
Mt
Cp2
Cp2
Co
Mu
Cp1
Py
image f
106µm
Cp1
Cp2
Co
He
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m e

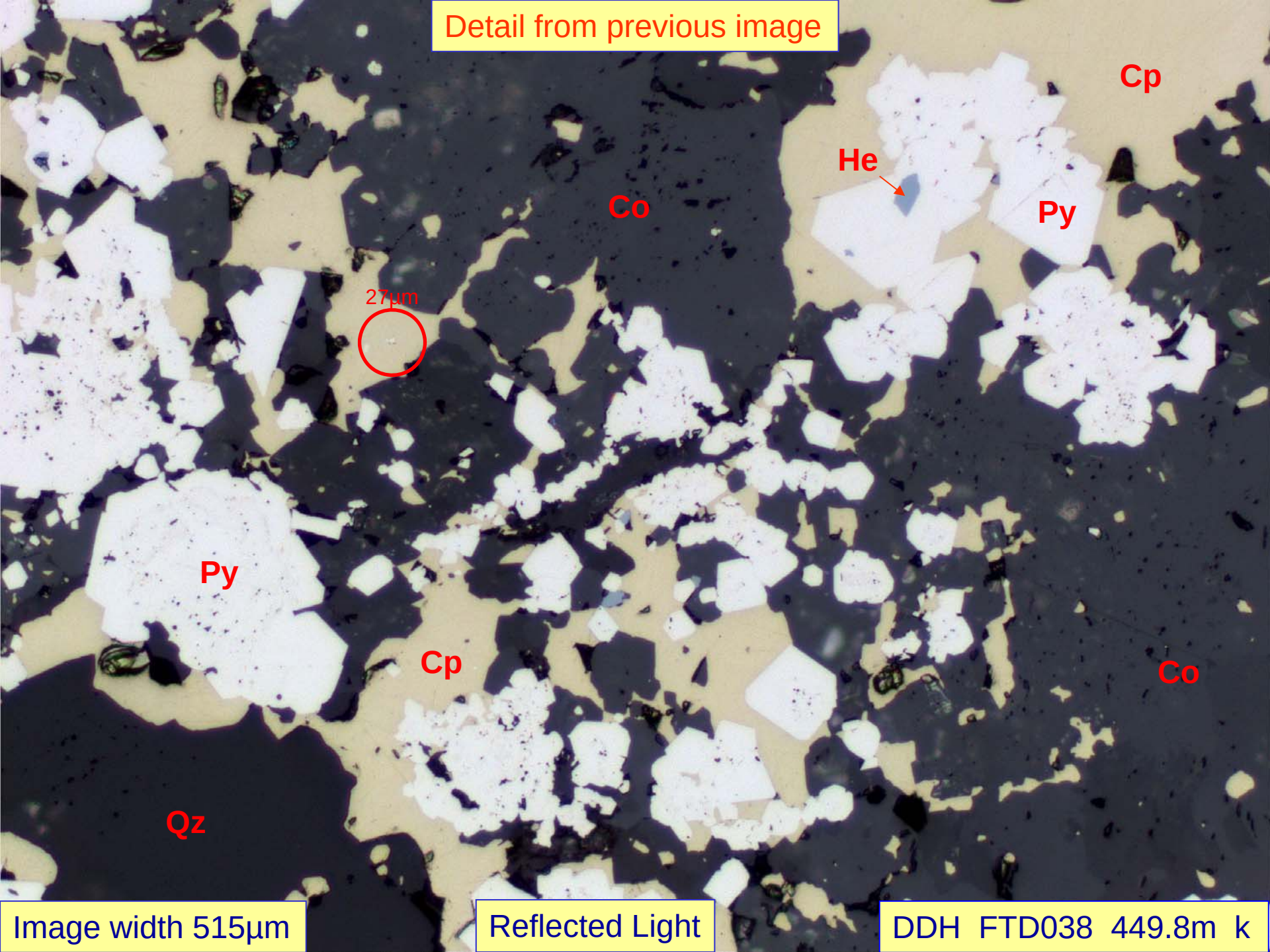

Detail from previous image
Cp
Co
Mt
Mu
Vd
Co
27µm
He
Cp
Co
Image width 515µm
Reflected Light
DDH FTD038 449.8m f

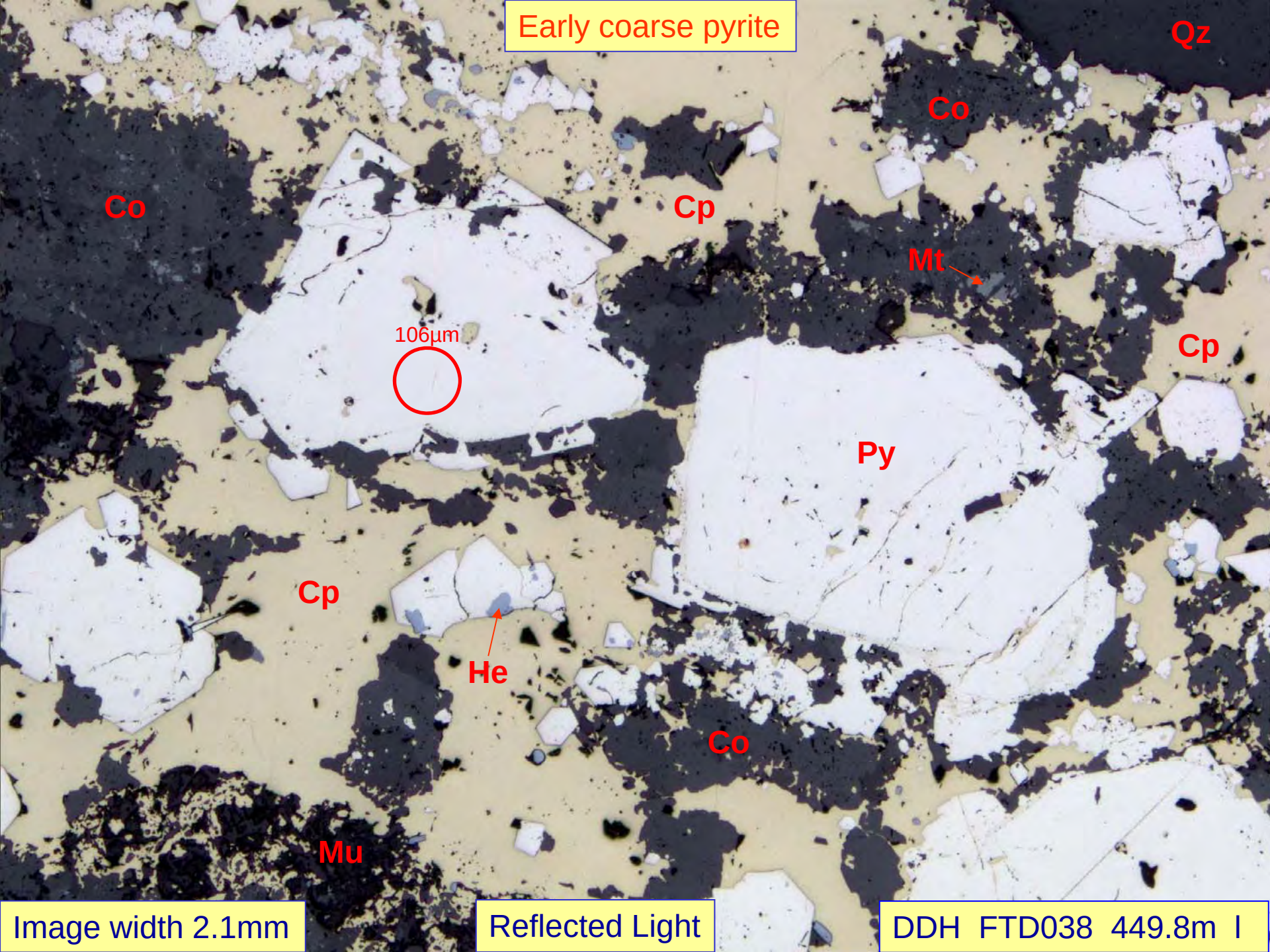

Hematite blades with interstitial carbonate and relict magnetite
Mt
Co
Co
He
Co
He
106µm
Mt
Co
Mu
Cp
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m g

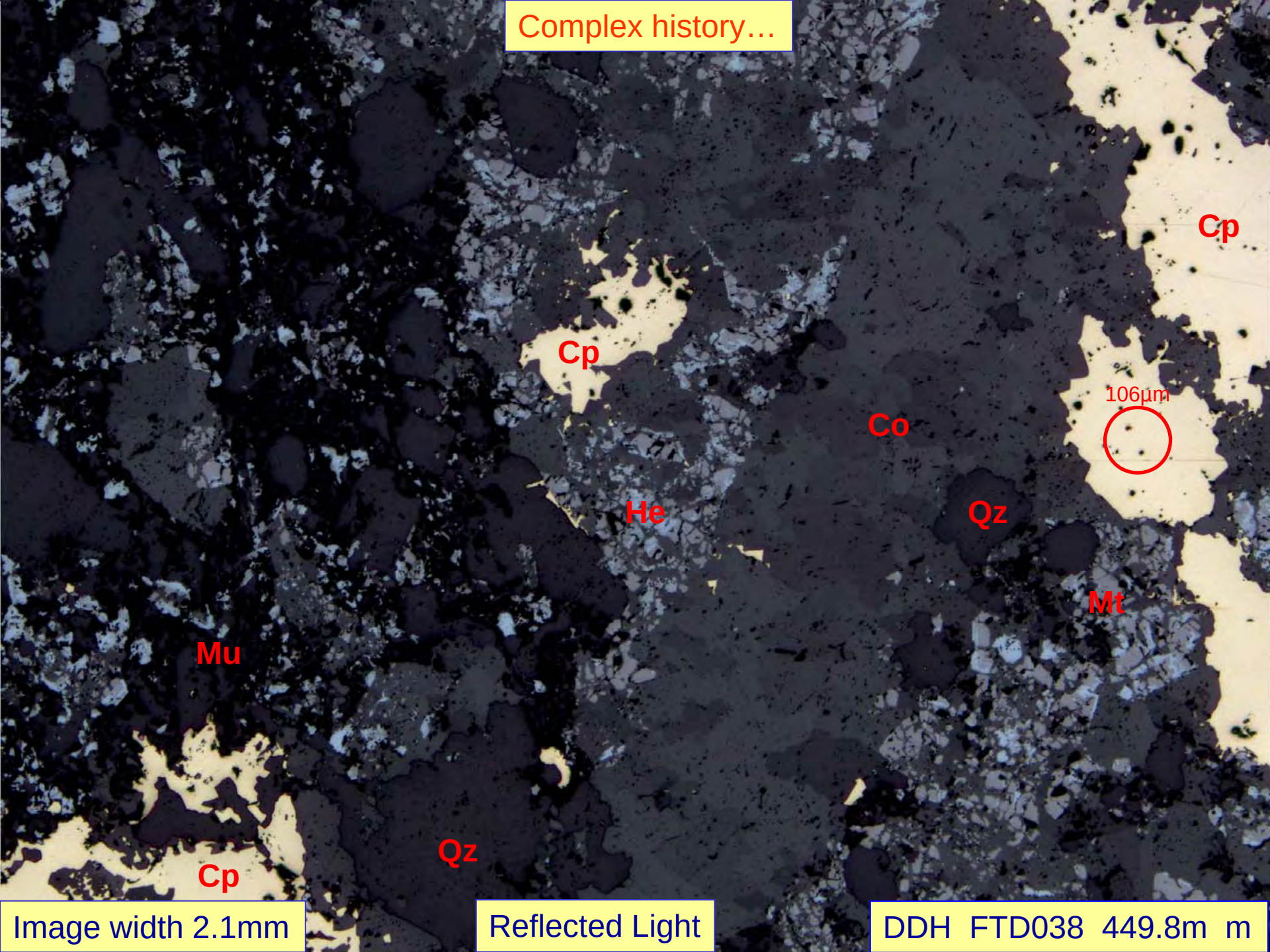

Hematite replacing original magnetite crystal?
Qz
Mt
Co
Co
106µm
Mu
He
Co
Cp
Qz
Qz
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m h

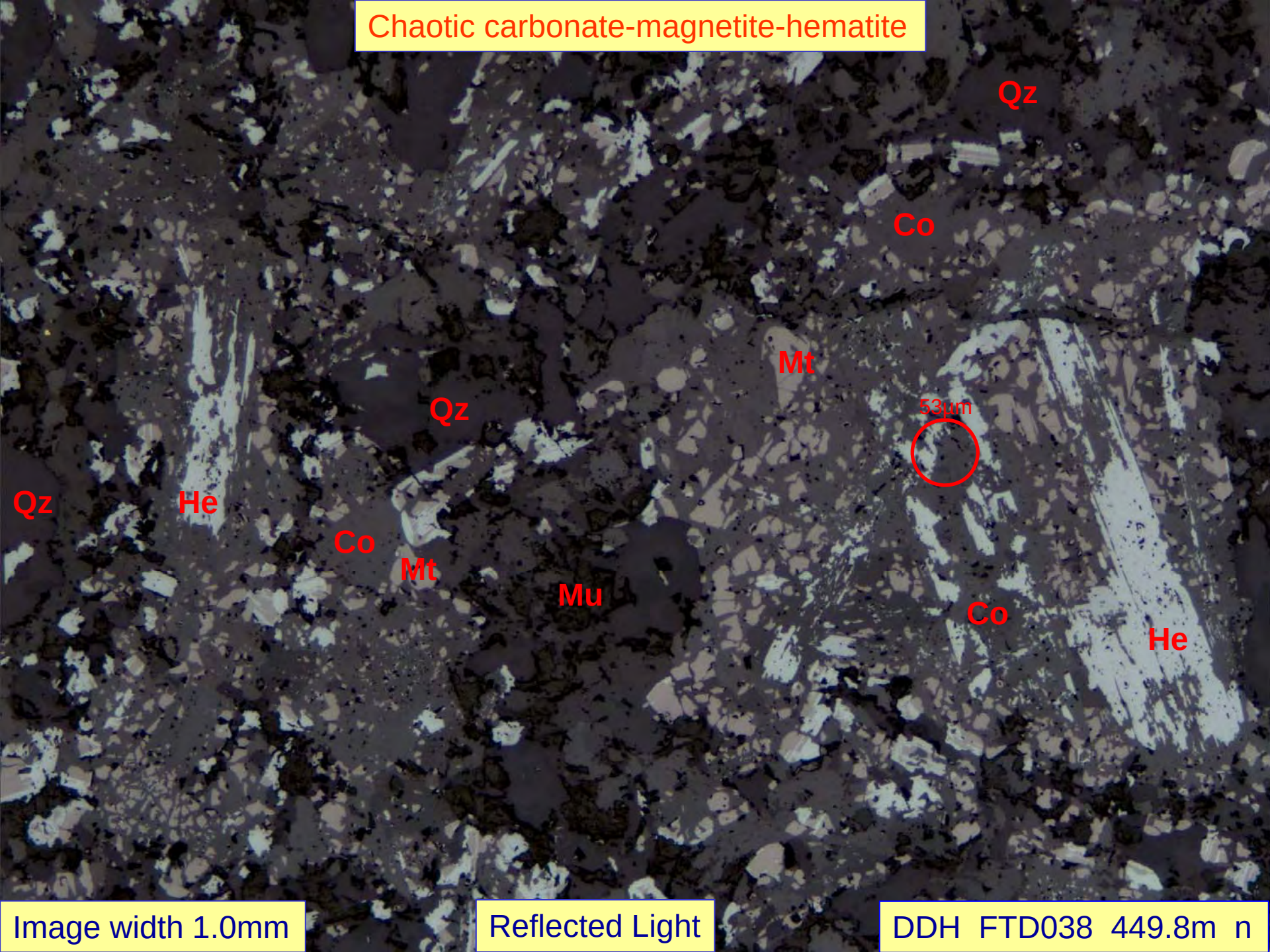

Weakly martitised magnetite flooded by carbonate
Qz
Mt
He
106um
Mu
Cp2
Co
Cp1
Mu
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m i

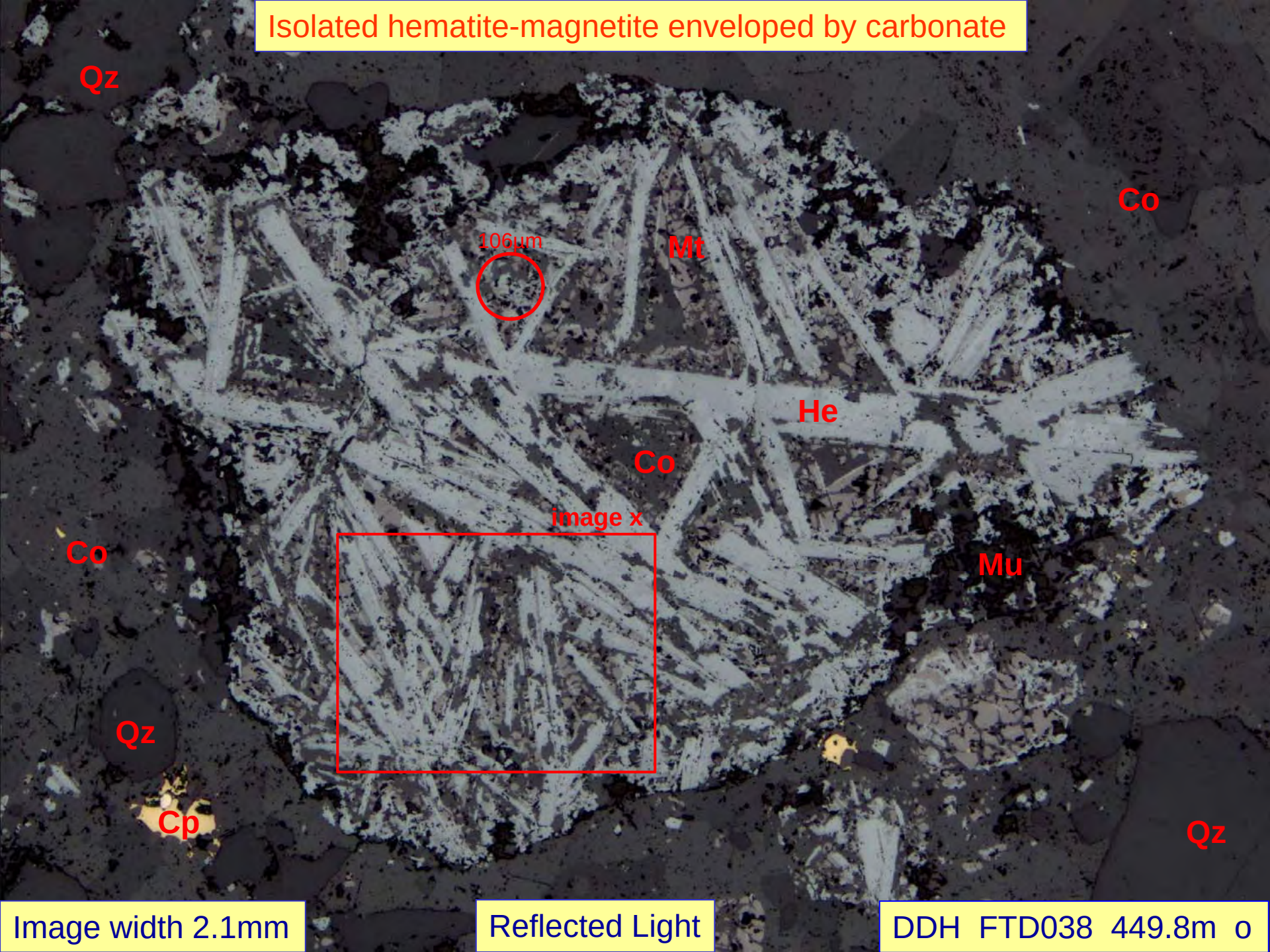

Chaotic chalcopyrite-pyrite-carbonate
Co
image k
Qz
Py
Py
Cp
106µm
Co
Cp
Co
Mt
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m j

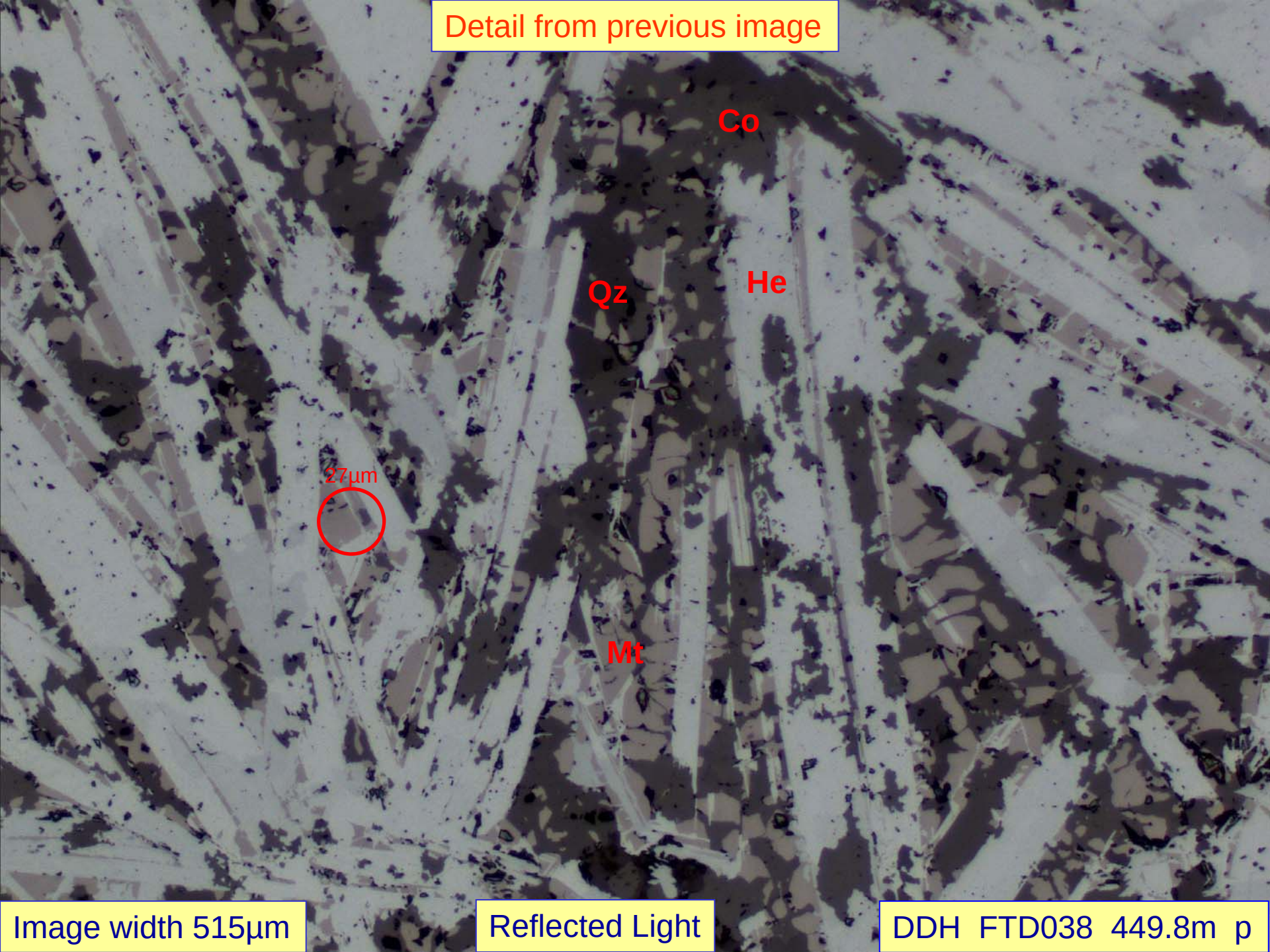

Detail from previous image
Cp
He
Co
Py
27µm
Py
Cp
Co
Qz
Image width 515µm
Reflected Light
DDH FTD038 449.8m k

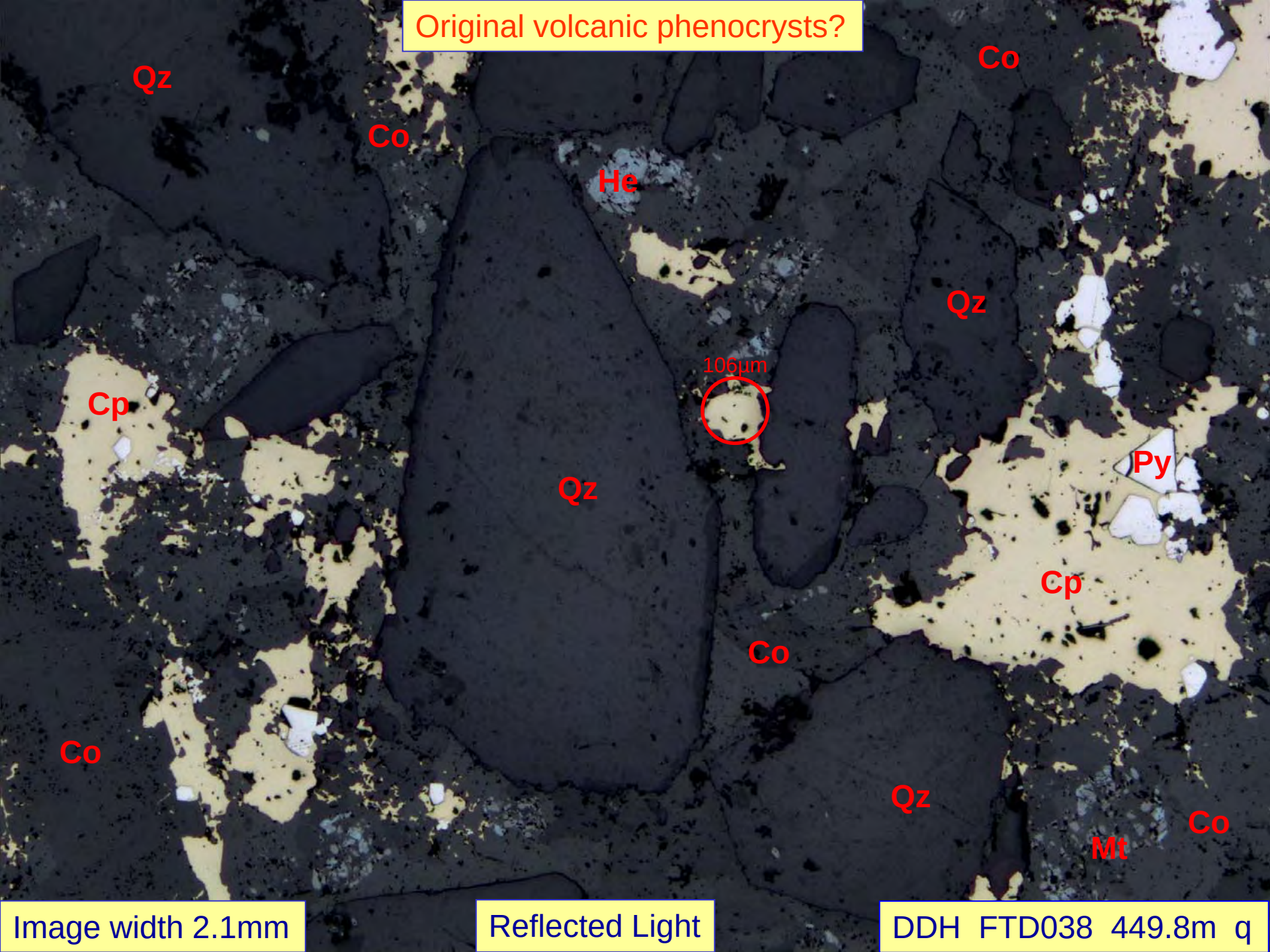

Early coarse pyrite
Qz
Co
Co
Cp
Mt
106µm
Cp
Py
Cp
He
Co
Mu
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m I

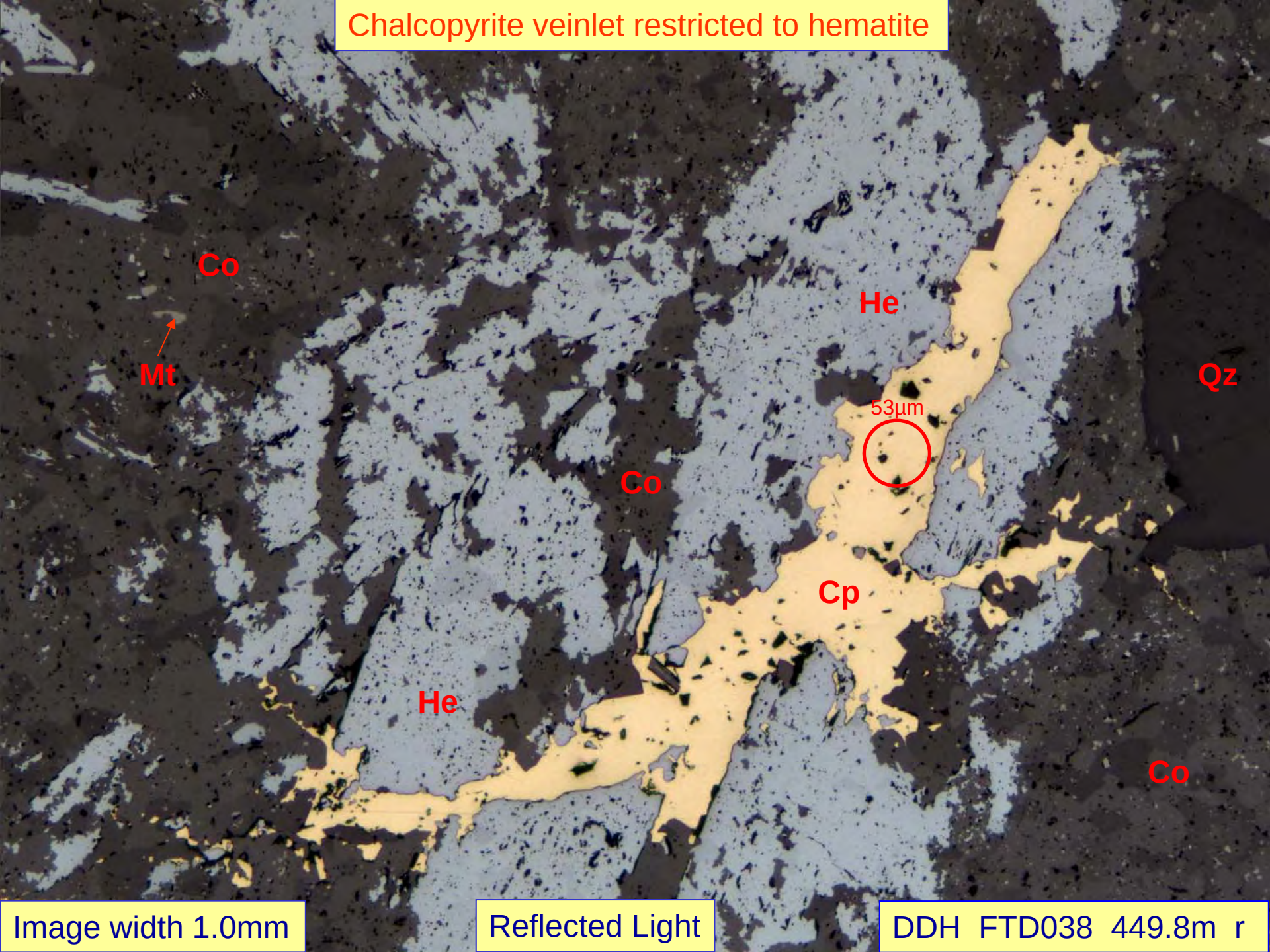

Complex history…
Cp
Cp
106µm
Co
He
Qz
Mt
Mu
Qz
Cp
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m m


Chaotic carbonate-magnetite-hematite
Qz
Co
Mt
Qz
53µm
Qz
He
Co
Mt
Mu
Co
He
Image width 1.0mm
Reflected Light
DDH FTD038 449.8m n


Isolated hematite-magnetite enveloped by carbonate
Qz
Co
106µm
Mt
He
Co
image x
Co
Mu
Qz
Cp
Qz
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m o


Detail from previous image
Co
Qz
He
27µm
Mt
Image width 515µm
Reflected Light
DDH FTD038 449.8m p


Original volcanic phenocrysts?
Qz
Co
Co
He
Qz
106µm
Cp
Py
Qz
Cp
Co
Co
Qz
Co
Mt
Image width 2.1mm
Reflected Light
DDH FTD038 449.8m q


Chalcopyrite veinlet restricted to hematite
Co
Mt
He
Qz
53µm
Co
Cp
He
Co
Image width 1.0mm
Reflected Light
DDH FTD038 449.8m r