STELLAR RESOURCES LTD

HEEMSKIRK TIN PROJECT

SEVERN MINERAGRAPHY

FEBRUARY 2012

McArthur Ore Deposit Assessments Pty Ltd

Gary J McArthur PhD FAusIMM MMICA MSEG

Suite 6, 1st Floor, Brownell Place, 11 Wilson St (P.O. Box 1303) Burnie TAS 7320 AUSTRALIA
Tel (03) 6431 1701 Fax (03) 6431 1278 Mobile 0419 367240 email gary@modapl.com.au

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Heemskirk Tin Project

Severn Drillcore Mineragraphy
February 2012

Method

Ray Hazeldene (Stellar Resources, Tasmania) requested a mineragraphic assessment of Sn mineralisation from the Severn Deposit which forms part of Stellar's Heemskirk Tin Project in Western Tasmania. 14 samples (see table below) were selected from the available drillcore by Ray Hazeldene as a representative suite of the mineralisation from 7 drillhole intercepts. Polished thin sections were prepared by Simon Stephens (Hobart, TAS) from each half-core sample with the offcuts submitted to ALS (Burnie, TAS) for assaying and to McKnight Mineralogy (Ballarat, VIC) for Quantitative X-Ray Diffraction Analysis (QXRD).

Sample	DDH	Downhole Depth m.
5508	ZS107W	536.1
5509	ZS107W	531.5
5510	G87	347.3
5511	G84	433.3
5512	G81	445.9
5513	G74	370.2
5514	G72	294.3
5515	G72	292.4
5516	G72	287.9
5517	G72	286.7
5518	G72	284.0
5519	G65	261.7
5521	ZS107	547.6
5522	ZS107	563.9

The assessment was undertaken in two stages: quantitative logging and qualitative photographic mineragraphy. To quantify the liberation characteristics, a simple method was adopted. For each polished section, 300 "grains" (centred on a 4.2mm x 1mm grid) were logged across the slide using a 53µm circular mask to simulate a ~53µm grind. For each "grain" the area% of each mineral present was visually estimated. The minerals logged were *pyrite* (Py), *pyrrhotite* (Po), *cassiterite* (Cs), *stannite* (St), *arsenopyrite* (As), *chalcopyrite* (Cp), *sphalerite+galena* (SpGn), and gangue (*quartz, siderite, silicates, topaz, fluorite, etc*; Ga).

During all scans, the textural style of each grain was recorded to allow production of grain maps. These maps allow ready comparison of the liberation of the *cassiterite* between the 14 samples.

The standard mineral liberation and association parameters were calculated and presented in summary spreadsheet form. Cumulative yield (grade-recovery) curves were calculated for Sn at the simulated 53µm “grind” for each sample.

About 15 representative photomicrographs were taken of each sample at various scales, to document the mineragraphic textures. These were annotated in PowerPoint format. These photographs necessarily concentrate on the sulphide mineralisation. For each of the sulphide minerals, several textural types have been recognised and these have been semi-quantified.

Overall Composition

Polished Section Offcut Assays

The sample offcuts when assayed by ALS gave the following results. Because the samples were deliberately hand-picked to focus on sulphides, the grades are much higher than the published resource grades which would include sulphide-poor internal dilution.

Severn Offcut ALS Laboratory Assays (wt%)

Method		**XRF**	**XRF**	**XRF**	**AAS**	**AAS**	**AAS**	**AAS**	**AAS**
Analyte	**Weight**	**Fe**	**Sn**	**WO3**	**Cu**	**Pb**	**Zn**	**Bi**	**As**
Sample	kg	%	%	%	%	%	%	%	%
	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.01
5508	0.17	27.3	3.40	0.02	0.09	0.01	0.01	0.02	0.16
5509	0.25	22.9	1.55	<0.01	0.06	0.01	0.01	0.01	0.02
5510	0.12	28.9	5.78	0.01	0.01	0.01	<0.01	0.01	0.01
5511	0.14	18.0	1.60	0.01	0.09	0.01	<0.01	0.01	1.22
5512	0.08	21.5	7.04	0.02	0.06	0.01	0.01	0.00	0.01
5513	0.11	25.0	5.87	0.01	0.06	0.01	0.01	0.04	0.10
5514	0.09	25.2	0.56	<0.01	0.03	0.01	0.01	0.01	<0.01
5515	0.07	33.2	4.52	0.01	0.66	0.05	0.02	0.01	0.01
5516	0.14	40.7	11.65	0.02	0.13	0.01	0.01	0.09	0.33
5517	0.10	34.0	0.17	0.01	0.10	0.01	licat0	0.04	0.02
5518	0.10	36.9	0.07	0.02	0.16	0.01	0.01	0.02	0.06
5519	0.07	38.3	7.39	0.03	0.13	0.01	0.01	0.03	<0.01
5521	0.29	22.7	0.04	<0.01	0.04	0.01	0.01	0.01	0.03
5522	0.18	27.4	0.76	<0.01	0.09	0.01	0.02	0.01	<0.01
MEAN		**28.7**	**3.60**	**0.02**	**0.12**	**0.01**	**0.01**	**0.02**	**0.18**
cf Mineralogy Estimate		**31.2**	**2.52**	**-**	**0.11**	**-**	**-**	**-**	**0.31**

In some samples the offcut lab assays are quite different to the estimated assays due to physical differences in the mineralisation between that on the polished section and that in the surrounding offcuts. This is particularly apparent in sample #5516 where the lab assay is 11.65%Sn, but the polished section is only 3.73%Sn.

Quantitative X-Ray Diffraction Analysis (QXRD)

The sample offcuts (note: not exactly the same sample as the polished thin section) gave the following QXRD results.

Severn QXRD – Gangue Minerals (wt%) *decreasing order →*

Sample	Qz	Sd	Cl	Tm	Ka	Mu	Tz	Fl	Bt
5508	4.4	11.7	1.0		5.7	5.0	0.1	11.8	11.0
5509	21.5	16.4	9.8		5.4	4.6			3.4
5510	16.4	60.8	2.4	0.7		5.2		0.1	0.8
5511	17.9	4.5		3.6	0.9	0.1	25.0		
5512	12.3	0.9		44.8	0.7				
5513	14.6	0.4		10.1	0.6			9.7	0.8
5514	15.1	14.3	9.5	9.1	4.0	3.5			0.7
5515	4.2		19.2	1.1	8.9				1.2
5516	1.3	4.5	3.1		2.1	0.9		0.6	
5517	17.0	7.4	16.3	0.2	2.7				0.6
5518	9.2	0.3	8.3		4.8				0.3
5519	12.3	12.3		1.4	0.1	0.7	0.6	0.3	
5521	18.0	21.0	18.2	1.8	3.3	7.2		3.1	2.2
5522	15.3	17.4	23.0	1.7	4.9			0.1	1.3
MEAN	**12.8**	**12.3**	**7.9**	**5.3**	**3.2**	**1.9**	**1.9**	**1.8**	**1.6**

Sample	Ap	Tc	Ru	Mi	Tt	Ca	Ab	Mt	Ak
5508	1.4	0.2	0.1	1.1		0.7			
5509	2.6	0.4	0.2		0.4	0.6		0.2	
5510	2.5	1.1	0.4	0.2		0.1		0.3	
5511	1.1	1.5	2.3	3.5					
5512		2.1	0.7	2.4		0.1			
5513		0.3		1.1	0.1		2.5		
5514	1.2	1.9	0.9	0.5	0.4	0.2			
5515	0.7	0.7	1.2		1.5	0.6			
5516	0.6	0.4	0.4		1.0	0.5	0.2		0.1
5517	1.9	3.5	0.3		1.5	0.5	0.2		
5518		1.1	0.4		1.6	0.4			
5519	2.8			0.2	0.9	0.1			
5521	1.3	2.1	1.9	0.5	0.1	0.2	0.7	0.2	
5522	3.4	1.4	0.8		1.2	0.4		0.4	0.1
MEAN	**1.4**	**1.2**	**0.7**	**0.7**	**0.6**	**0.3**	**0.3**	**0.1**	**<0.1**

Qz=quartz, Sd=siderite, Cl=chlorite, Tm=tourmaline, Ka=kaolinite, Tz=topaz, Fl=fluorite, Bt=biotite, Ap=apatite, Tc=talc, Ru=rutile, Mi=microcline, Tt=titanite, Ca=calcite, Ab=albite, Mt=magnetite, Ak=ankerite. Blank means not detected.

Severn QXRD – Ore Minerals (wt%) *decreasing order →*

Sample	Po	Py	Cs	As	Cp
5508	0.1	41.7	3.7	0.3	
5509	0.1	32.1	2.2		
5510		2.9	5.2		
5511	7.5	29.1	1.7	0.7	0.5
5512	22.6	6.4	7.0		
5513	0.3	51.2	7.7		0.2
5514	20.0	16.2	1.0	1.5	
5515	51.2	2.1	5.9		1.5
5516	69.3	0.1	14.3	0.5	
5517	46.6		0.8	0.5	
5518	72.2	0.2	0.9	0.1	
5519	38.3	21.2	8.8		
5521		16.0	1.1	0.8	0.1
5522	4.2	23.0	1.1		0.1
MEAN	**23.7**	**17.3**	**4.4**	**0.3**	**0.2**

Po=pyrrhotite, Py=pyrite, Cs=cassiterite, As=arsenopyrite, Cp=chalcopyrite. Blank means not detected.

Other minerals detected during the optical microscopy, but not detected by QXRD are:

- Marcasite
- Native bismuth
- Bismuthinite
- Carbonaceous matter
- Sphalerite
- Stannite
- Tetrahedrite
- Galena

By applying theoretical compositions to the mean QXRD gangue composition, it is possible to estimate the distribution residence of SiO_2, Fe and F:

SiO_2: 58% in quartz, 10% in chlorite, 8% in tourmaline, 7% in kaolinite, 4% in muscovite, 4% in talc, 3% in topaz, 2% in microcline

Fe: 65% in siderite, 26% in chlorite, 7% in tourmaline, 1% in biotite

F: 70% in fluorite, 17% in topaz, 6% in tourmaline, 4% in apatite

The estimated average gangue composition is 3.10 SG, 41% SiO2, 17%Fe, 2.5%F.

Quantitative Optical Microscopy

The results of the 53µm "grain" quantitative optical microscopy total scans are summarised and compared to the QXRD results below. Note: the detailed summaries provided later in the report show volume%, not weight%.

Severn Optical Microscopy 53µm "Grains" Wt%

Sample	Py	Po	Cs	St	As	Cp	SpGn	Ga
5508	35.1		7.3		Tr	Tr		57.4
5509	48.8	0.5	2.0		Tr	0.2		48.5
5510	4.5	Tr	4.5					91.0
5511	33.0	1.0	2.0		7.9	0.2	1.8	54.1
5512	2.9	21.8	9.4	Tr		Tr		65.7
5513	67.4		2.3	Tr		0.2	Tr	30.0
5514	4.5	14.3				Tr		81.1
5515	1.0	40.4	3.6	Tr		1.4	Tr	53.6
5516	0.4	59.9	4.7		0.2	0.6		34.3
5517	0.9	24.2	0.4			Tr		74.5
5518	Tr	69.1	Tr			0.8		29.9
5519	21.4	38.6	6.7			0.4		32.9
5521	55.2	Tr	Tr		1.4	0.1		43.1
5522	36.2	8.2	1.1			0.3		54.1
MEAN	**22.2**	**19.9**	**3.1**	**Tr**	**0.7**	**0.3**	**0.1**	**53.6**
cf QXRD	**23.7**	**17.3**	**4.4**	**-**	**0.3**	**0.2**	**-**	**54.0**

Py=pyrite, Po=pyrrhotite, Cs=cassiterite, St=stannite, As=arsenopyrite, Cp=chalcopyrite, SpGn=sphalerite+galena, Ga=gangue
Tr means <0.05%, blank means not detected during the scan.

There is considerable compositional variation between the samples:

- 7 are *pyrite*-dominant, 6 are *pyrrhotite*-dominant, only one sample (#5519) has significant content of both *pyrite and pyrrhotite*
- As is typical for all West Coast deposits, *arsenopyrite* is nuggetty
- There is no correlation between *cassiterite* and *pyrite, pyrrhotite* or *chalcopyrite* content
- *Pyrrhotite* and *chalcopyrite* are correlated (r=0.72)
- *Stannite* content is very low

Liberation and association parameters

Liberation parameters for the 53µm "grain" scans are summarised below. More detail is provided later in the report.

Severn Optical Microscopy 53µm "Grains" Cassiterite Distribution%

Sample	%Free	%Binary	%Ternary+	Estimated liberation grind size µm	%Associated with					
					Py	Po	St	Cp	As	Ga
5508	8	68	6	23	4	0	0	2	0	92
5509	0	42	58	17	67	0	0	0	0	91
5510	16	72	12	21	12	0	0	0	0	84
5511	31	31	38	24	35	3	0	7	8	64
5512	14	66	20	29	0	20	0	0	0	86
5513	23	58	19	34	19	0	0	0	0	77
5514	0	0	0	-	0	0	0	0	0	0
5515	36	37	27	33	0	63	0	0	0	28
5516	37	54	9	39	0	54	0	0	0	17
5517	0	100	0	24	0	58	0	0	0	42
5518	0	0	100	7	0	100	0	30	0	70
5519	8	57	35	32	19	57	0	5	0	66
5521	0	62	37	11	37	0	0	0	0	100
5522	0	91	9	18	7	0	0	2	0	100
MEAN	**17**	**59**	**18**	**28**	**11**	**25**	**0**	**2**	**0**	**70**

Cassiterite shows a higher association with *pyrrhotite* than with *pyrite*.

Severn Optical Microscopy 53µm "Grains" Chalcopyrite Distribution%

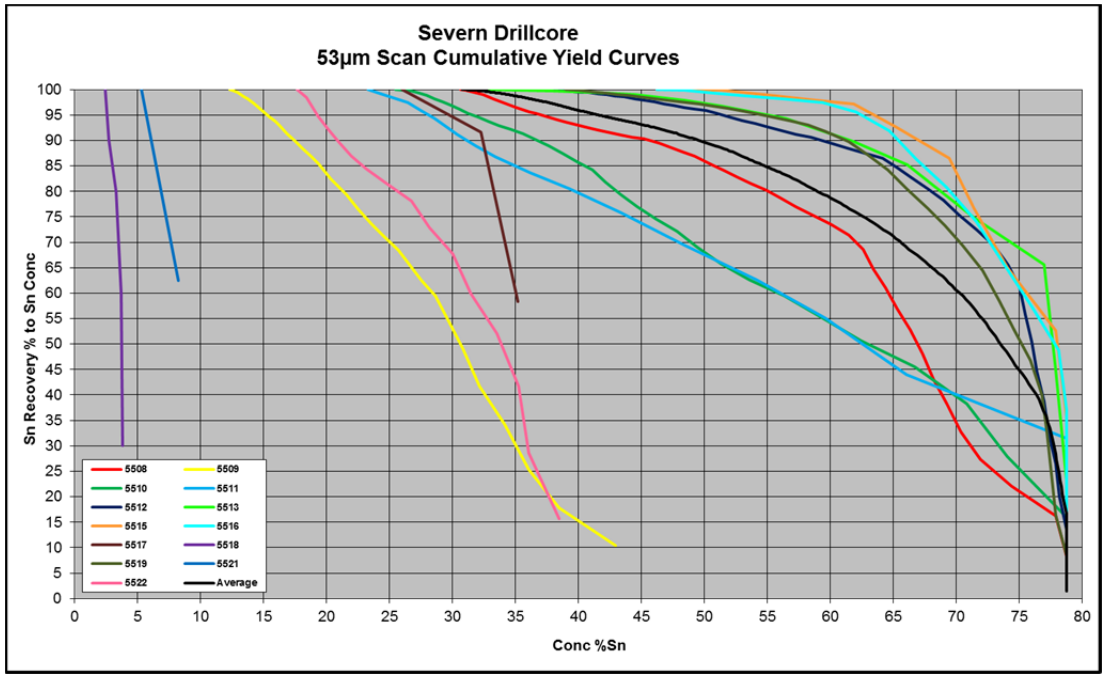
Sample	%Free	%Binary	%Ternary+	%Associated with					
				Py	Po	Cs	St	As	Ga
5508	0	50	50	20	0	30	0	0	100
5509	0	8	92	92	0	0	0	0	100
5510	0	0	0	0	0	0	0	0	0
5511	0	73	27	12	0	6	0	0	100
5512	0	0	100	0	100	0	0	0	100
5513	0	85	15	21	0	0	0	0	91
5514	0	100	0	0	0	0	0	0	100
5515	0	65	36	0	34	0	2	0	100
5516	0	97	3	0	69	0	0	0	33
5517	0	100	0	0	0	0	0	0	100
5518	0	15	84	10	100	42	0	0	43
5519	0	14	80	44	89	11	0	0	49
5521	0	51	49	49	0	0	0	0	100
5522	0	87	13	5	0	8	0	0	100
MEAN	**0**	**55**	**41**	**14**	**48**	**10**	**1**	**0**	**74**

About half of the *chalcopyrite* is associated with *pyrrhotite*.

Cumulative Yield Curves

Cumulative yield (grade-recovery) curves have been calculated at the simulated 53µm "grind", using data collected during the mask scans. Considerable variation is apparent.

The recoveries shown are the maximum theoretically possible at a 53µm "grind". In a real plant situation, actual Sn recoveries would be significantly less. The main purpose of the plots is to compare the samples. The black line is the average curve for all samples, weighted by sample %Sn grade.



Samples 5518 and 5521 at the far left contain only trace *cassiterite* (0.05%Sn) whereas samples 5512, 5513, 5515, 5516 and 5519 at the far upper-right have an average head grade of 4.2%Sn. As would be expected, *cassiterite* liberation generally increases with Sn grade.

MICROTEXTURAL ANALYSIS

Sulphide Microtextures

Recognition and classification of the sulphide microtextures has been achieved by interpretation of the extensive photomicrographic documentation. The important microtextures for the important ore minerals are summarised below, but the reader is directed to the complete catalogue of photomicrographs provided later in the report to fully appreciate the microtextural variation of all minerals.

Each microtexture classified below (presented in decreasing order of occurrence), includes a brief comment on the metallurgical processing implications, colour-coded: **favourable**, **minor issues**, **detrimental**.

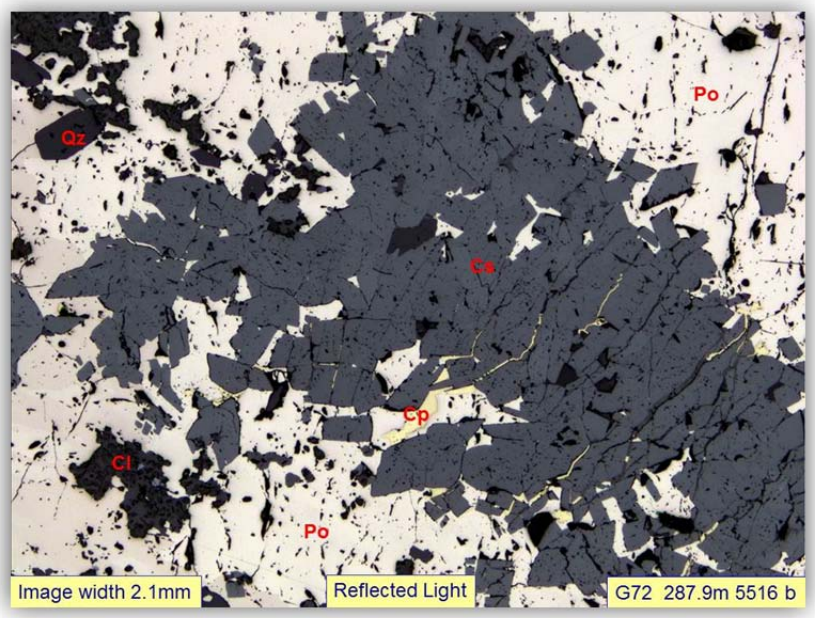
Mineral codes used in the image annotations are:

As=arsenopyrite, Cl=chlorite, CM=carbonaceous matter, Cp=chalcopyrite, Cs=cassiterite, Fl=fluorite, Ma=marcasite, Mt=magnetite, Mu=muscovite, Po=pyrrhotite, Py=pyrite, Qz=quartz, Ru=rutile, Sd=siderite, St=stannite, Tm=tourmaline, Tz=topaz, Vd=void

Cassiterite SnO_2 (78.8%Sn)

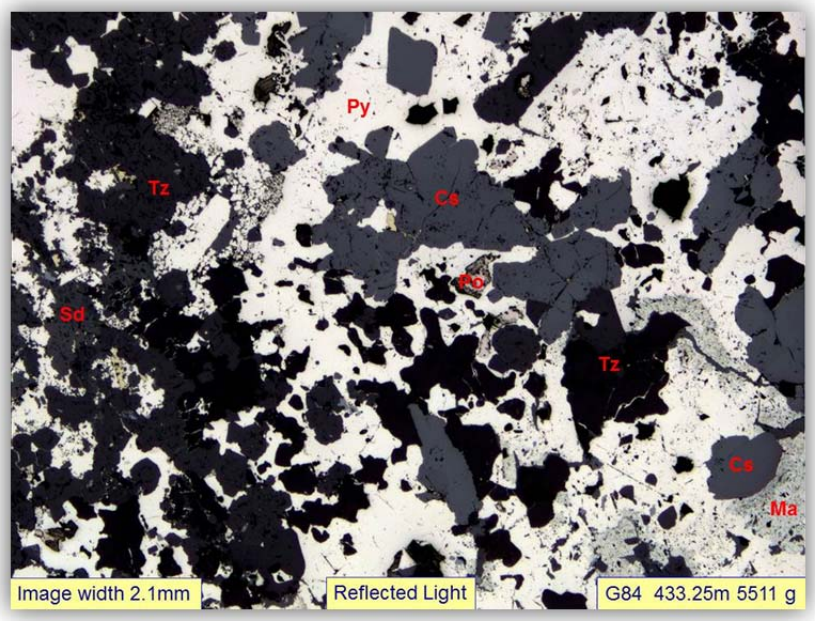
***CsA*: Crystal aggregates in massive pyrrhotite**

Occurrence: 15-20% of all cassiterite
Typical grainsize: 500µm
Normal mineral associates: pyrrhotite, chalcopyrite, siderite
Metallurgical Implication: Easily liberated



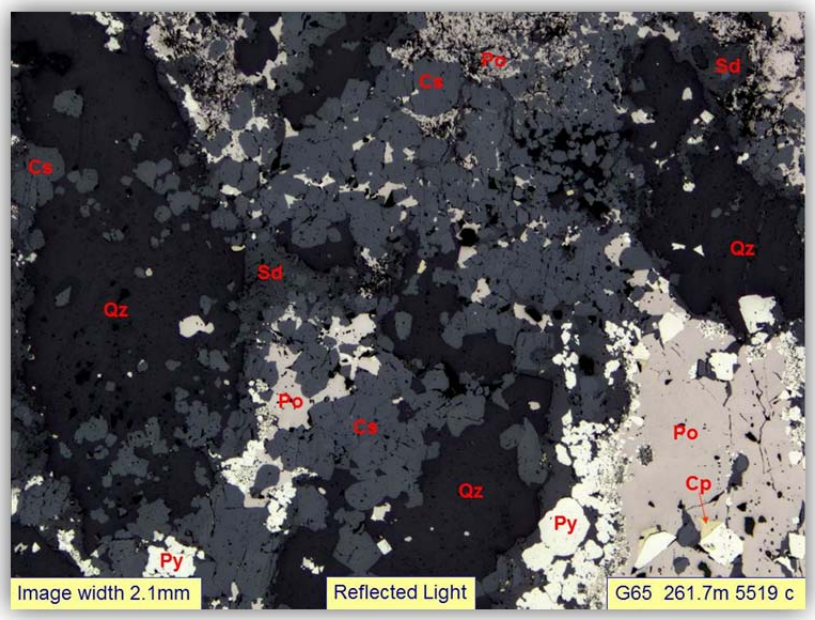
***CsB*: Crystals enclosed in crystalline pyrite**

Occurrence: 15-20% of all cassiterite
Typical grainsize: 200µm
Normal mineral associates: pyrite
Metallurgical Implication: Easily liberated



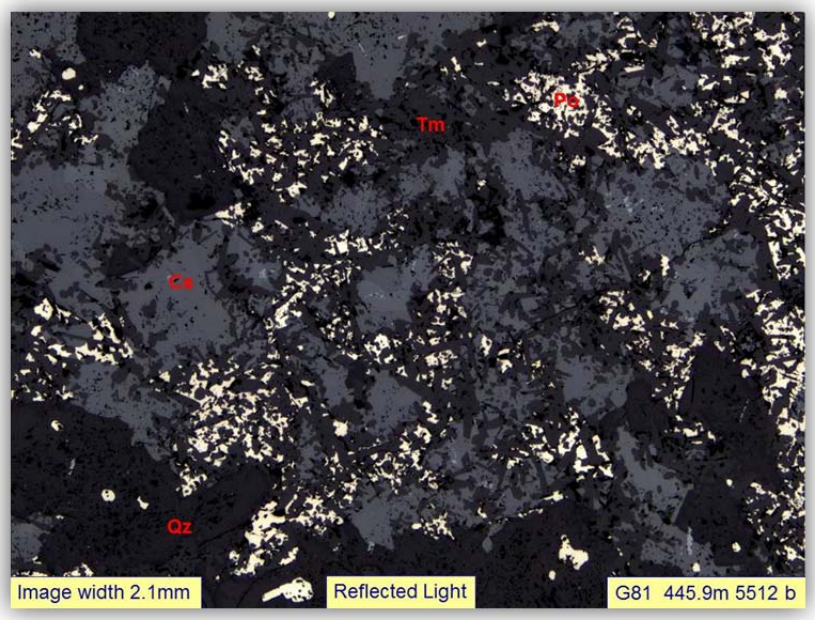
***CsC*: Coarse crystals interstitial to, or included within euhedral quartz**

Occurrence: 10% of all cassiterite
Typical grainsize: 200µm
Normal mineral associates: quartz, pyrrhotite, rutile
Metallurgical Implication: Easily liberated



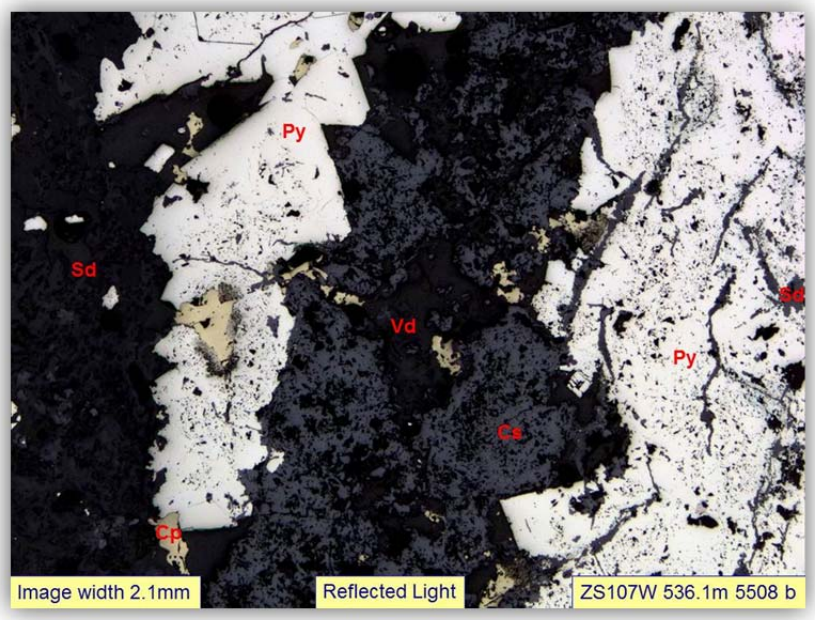
***CsD*: Semi-massive aggregates with interstitial and included tourmaline-(rutile)**

Occurrence: 10% of all cassiterite
Typical grainsize: 200µm
Normal mineral associates: tourmaline, pyrrhotite, rutile
Metallurgical Implication: Binaries with tourmaline likely



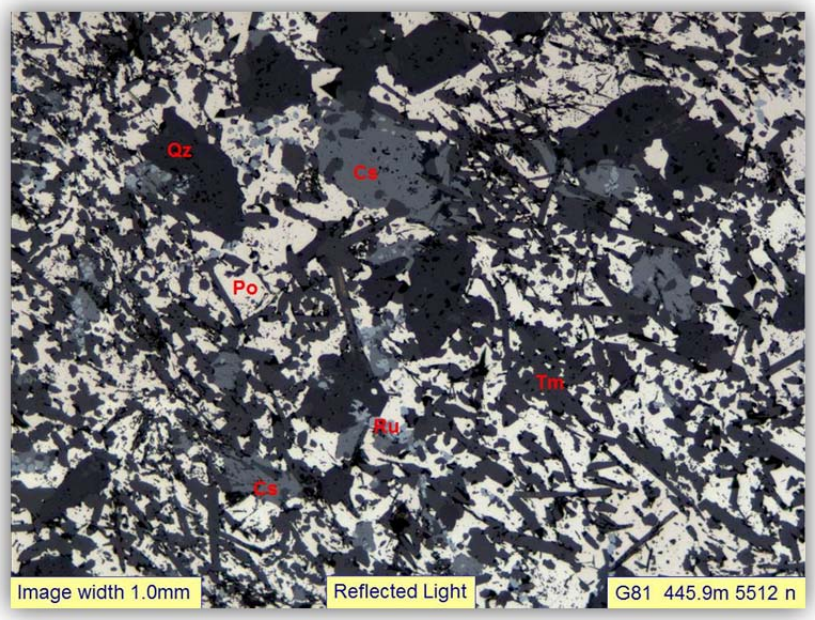
***CsE*: Vughy radiating crystal clusters between pyrite**

Occurrence: 10% of all cassiterite
Typical grainsize: 200µm
Normal mineral associates: pyrite
Metallurgical Implication: Easily liberated



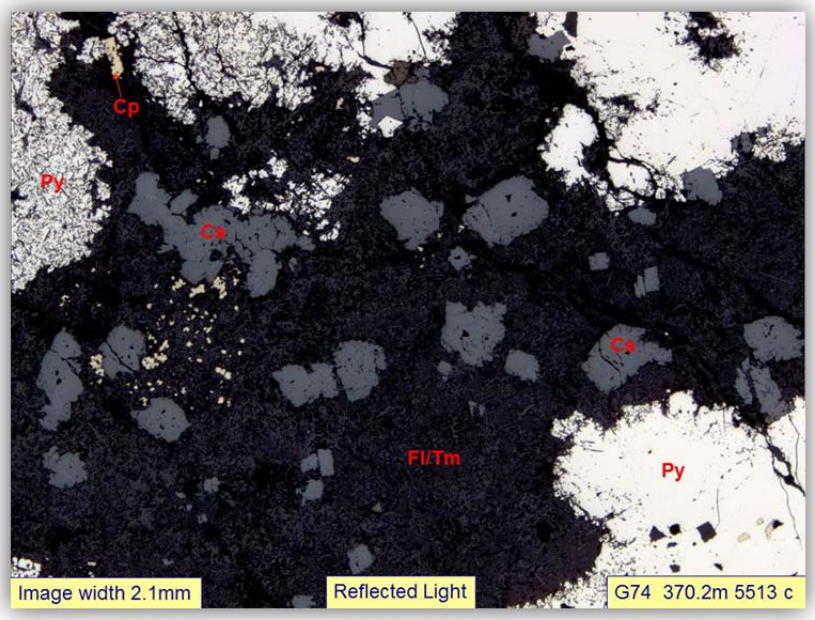
***CsF**: Scattered grains in pyrrhotite-tourmaline intergrowths*

Occurrence: 5-10% of all cassiterite
Typical grainsize: 100µm
Normal mineral associates: pyrrhotite, tourmaline, rutile
Metallurgical Implication: Composites with tourmaline, pyrrhotite and rutile likely



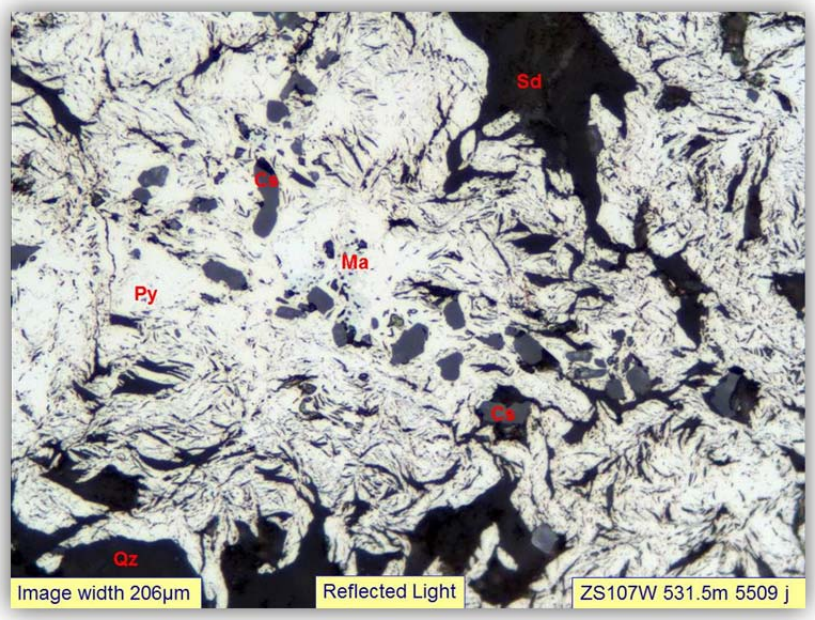
***CsG**: Irregular grains or euhedra hosted by fluorite-tourmaline interstitial to pyrite/pyrrhotite*

Occurrence: 5-10% of all cassiterite
Typical grainsize: 150µm
Normal mineral associates: fluorite, tourmaline
Metallurgical Implication: Easily liberated



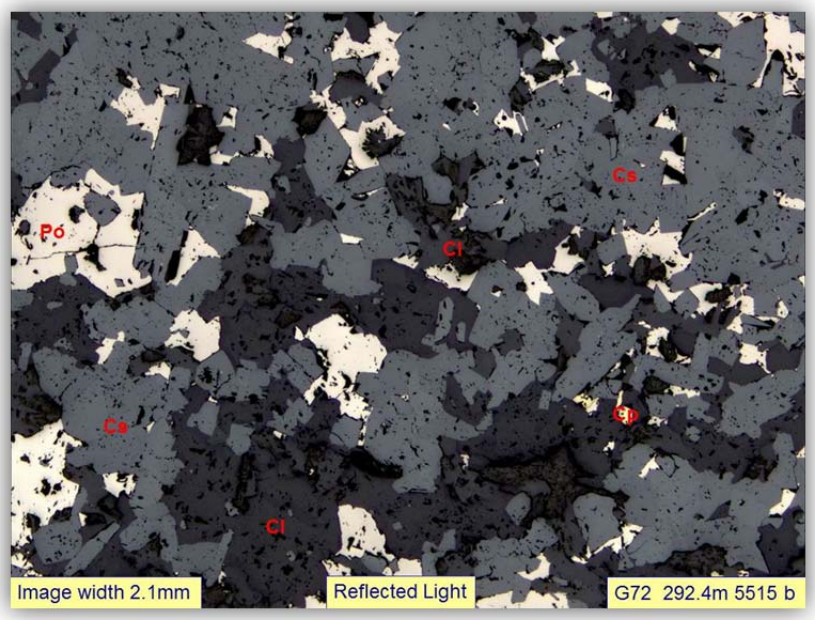
***CsH**: Crystals enclosed in colloform or feathery melnikovite pyrite*

Occurrence: 5% of all cassiterite
Typical grainsize: 25µm
Normal mineral associates: pyrite, siderite
Metallurgical Implication: Binaries with pyrite likely



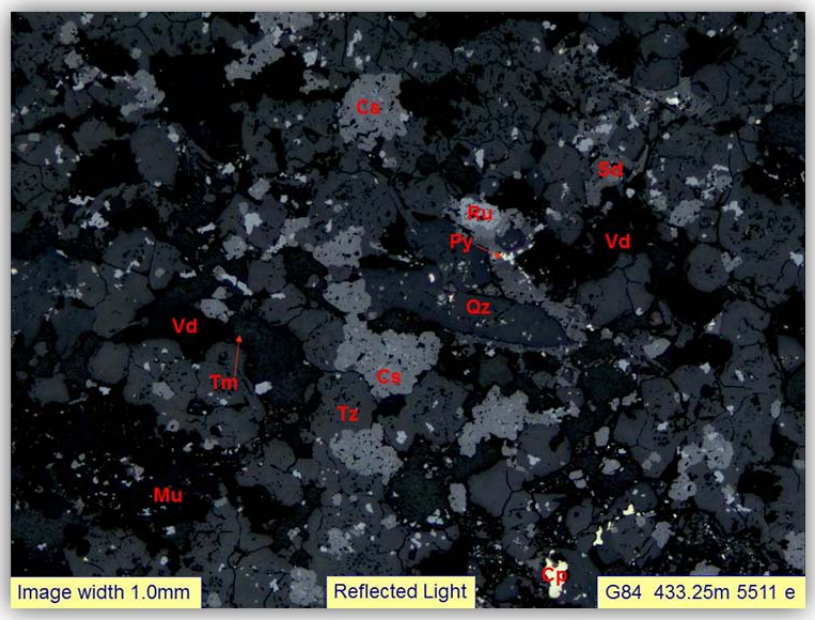
***CsI**: Coarse crystal aggregates with interstitial chlorite-pyrrhotite*

Occurrence: 5% of all cassiterite
Typical grainsize: 250µm
Normal mineral associates: chlorite, pyrrhotite
Metallurgical Implication: Easily liberated



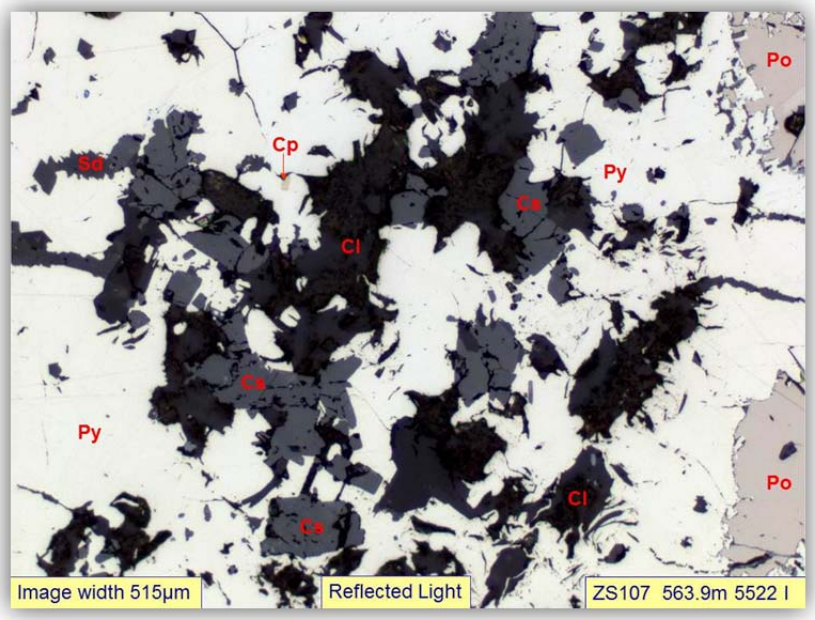
***CsJ*: Scattered ragged grains interstitial to topaz aggregates**

Occurrence: 1-5% of all cassiterite
Typical grainsize: 30µm
Normal mineral associates: topaz, siderite, tourmaline, rutile
Metallurgical Implication: Composites with topaz and rutile likely



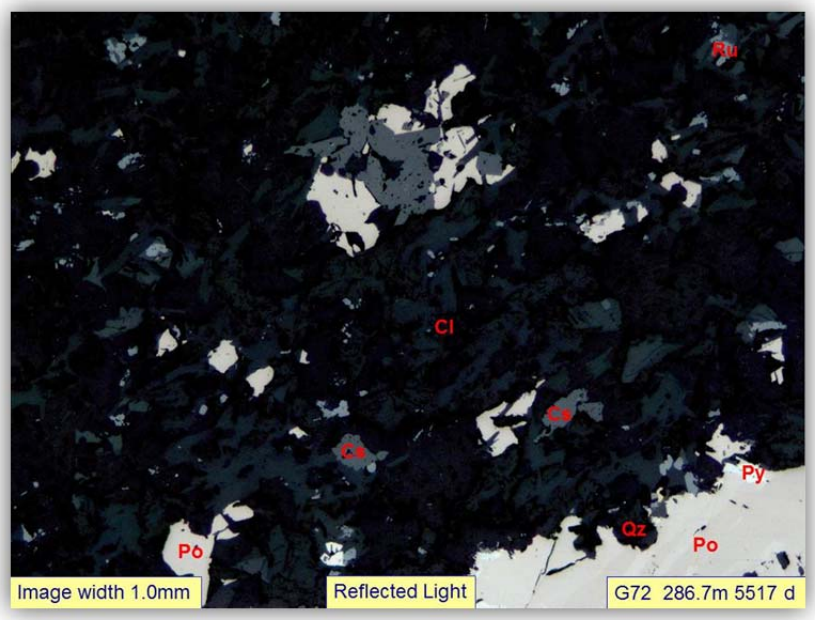
***CsK*: Crystal aggregates with chlorite interstitial to pyrite**

Occurrence: 1-5% of all cassiterite
Typical grainsize: 50µm
Normal mineral associates: chlorite, pyrite
Metallurgical Implication: Some binaries with chlorite



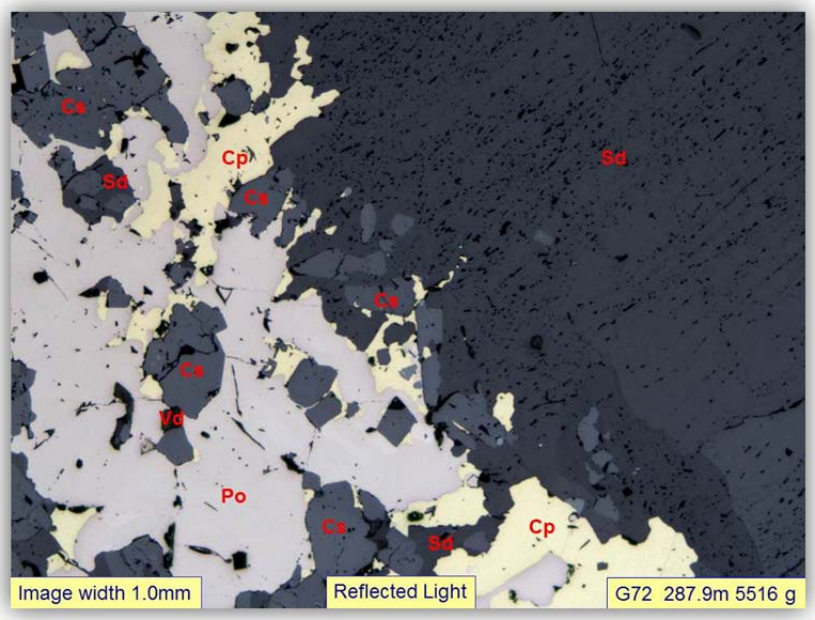
***CsL*: Disseminated crystal aggregates in chlorite**

Occurrence: 1-5% of all cassiterite
Typical grainsize: 50µm
Normal mineral associates: chlorite, pyrrhotite, rutile
Metallurgical Implication: Composites with chlorite and pyrrhotite likely



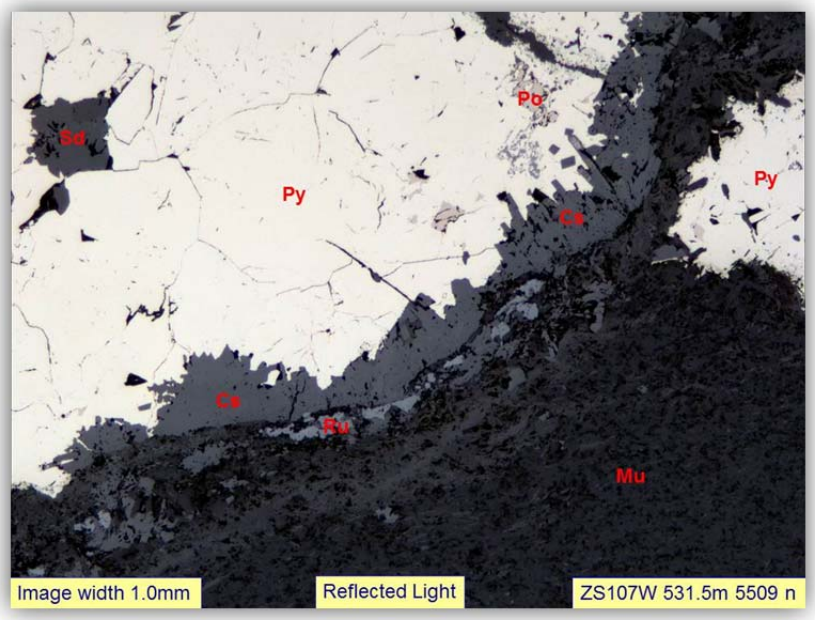
***CsM*: Scattered grains in siderite veinlets**

Occurrence: 1-5% of all cassiterite
Typical grainsize: 30µm
Normal mineral associates: siderite
Metallurgical Implication: Inconsequential



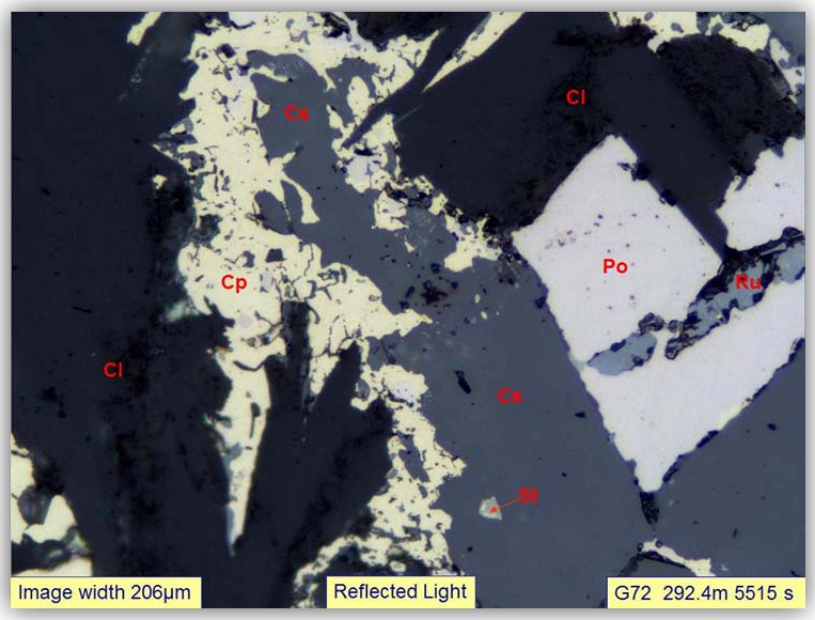
***CsN*: Radiating crystal growths overgrown by pyrite**

Occurrence: <1% of all cassiterite
Typical grainsize: 75µm
Normal mineral associates: pyrite
Metallurgical Implication: Inconsequential



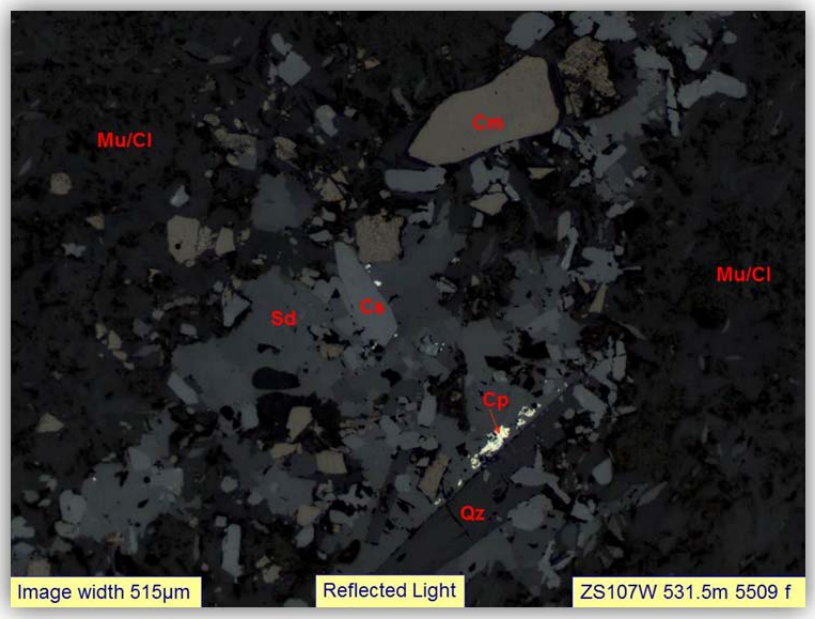
***CsO*: Crystals corroded by chalcopyrite**

Occurrence: <1% of all cassiterite
Typical grainsize: 75µm
Normal mineral associates: chalcopyrite, stannite
Metallurgical Implication: Binaries with chalcopyrite likely, minor stannite



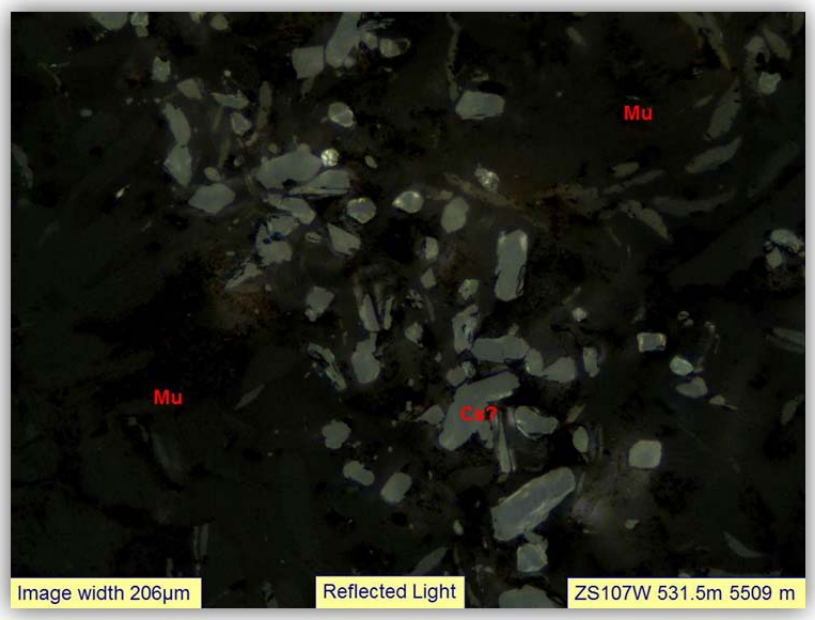
***CsP*: Crystals in complex breccias**

Occurrence: <1% of all cassiterite
Typical grainsize: 20µm
Normal mineral associates: siderite, carbonaceous matter
Metallurgical Implication: Inconsequential



***CsQ*: Fine-grained crystals in muscovite**

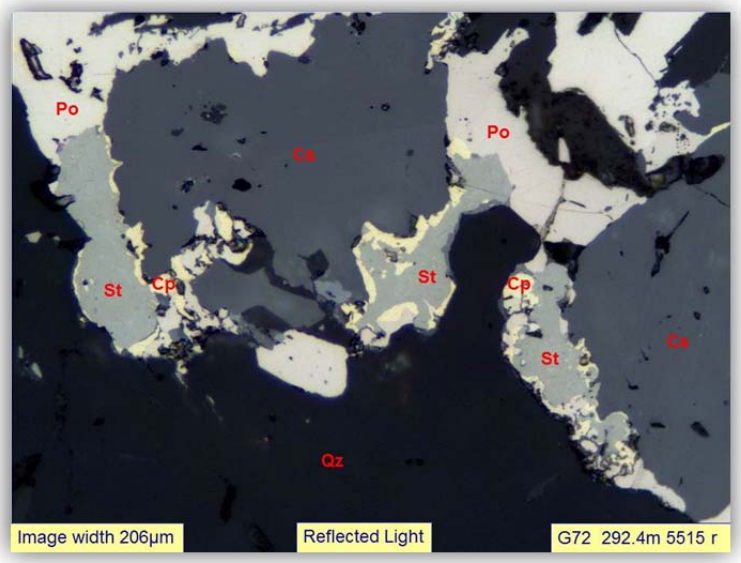
Occurrence: <1% of all cassiterite
Typical grainsize: 20µm
Normal mineral associates: muscovite
Metallurgical Implication: Inconsequential



Stannite Cu_2FeSnS_4 (27.6% Sn)

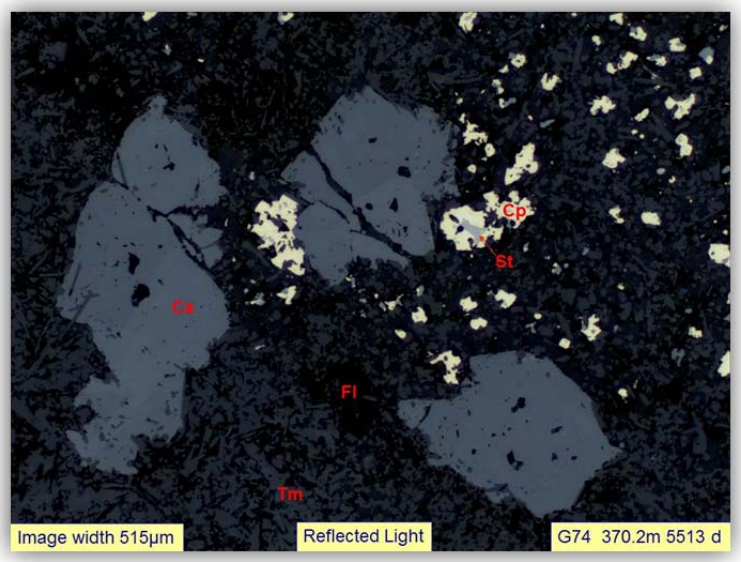
***StA**: Irregular grains at chalcopyrite-cassiterite interfaces*

Occurrence: 25-30% of all stannite
Typical grainsize: 30µm
Normal mineral associates: chalcopyrite, cassiterite
Metallurgical Implication: Rare binaries with cassiterite



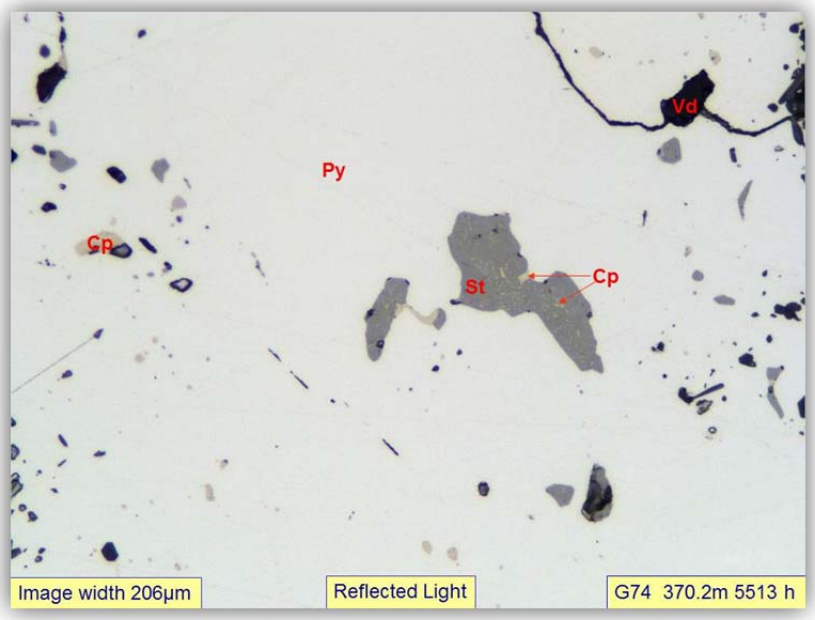
***StB**: Irregular inclusions hosted by disseminated chalcopyrite*

Occurrence: 20% of all stannite
Typical grainsize: 10µm
Normal mineral associates: chalcopyrite
Metallurgical Implication: Inconsequential



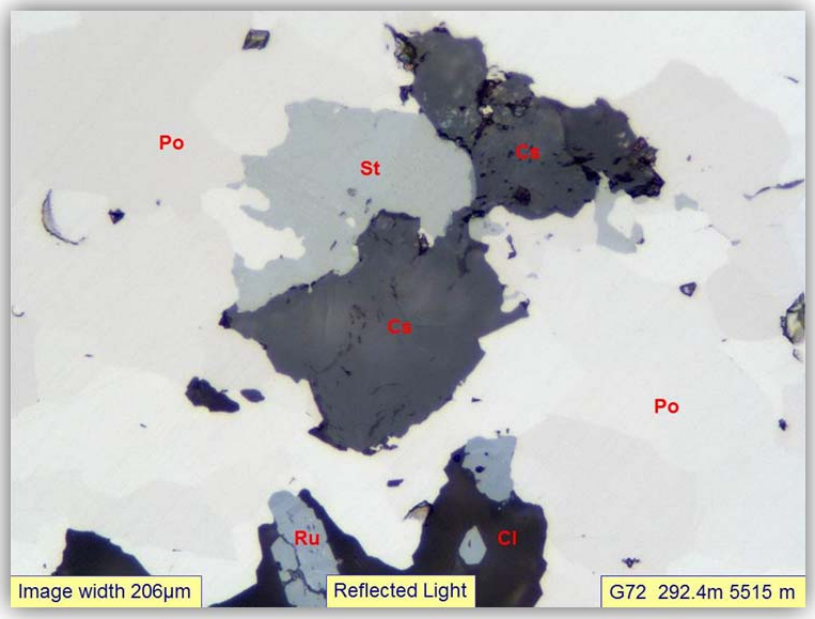
***StC**: Blebs in crystalline pyrite, sometimes with chalcopyrite disease*

Occurrence: 20% of all stannite
Typical grainsize: 15µm
Normal mineral associates: pyrite, chalcopyrite
Metallurgical Implication: Inconsequential



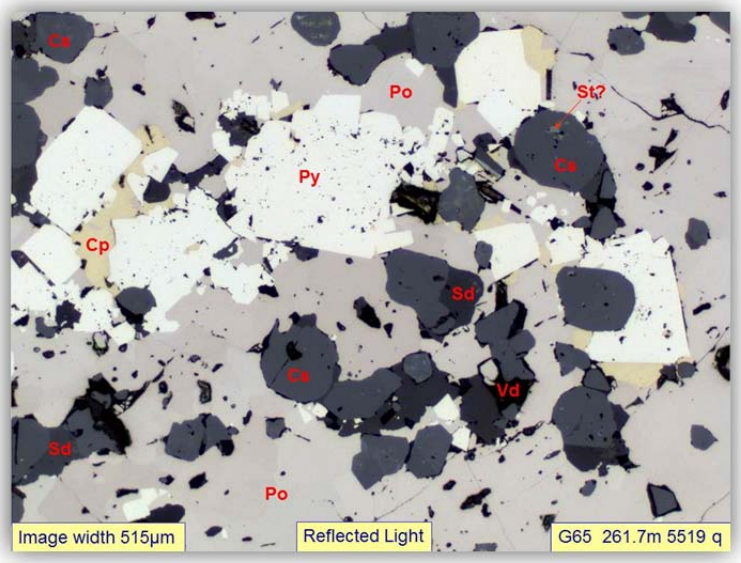
***StD**: Irregular grains in massive pyrrhotite near cassiterite*

Occurrence: 20% of all stannite
Typical grainsize: 100µm
Normal mineral associates: pyrite, cassiterite
Metallurgical Implication: Inconsequential



***StE*: Irregular grains in cassiterite**

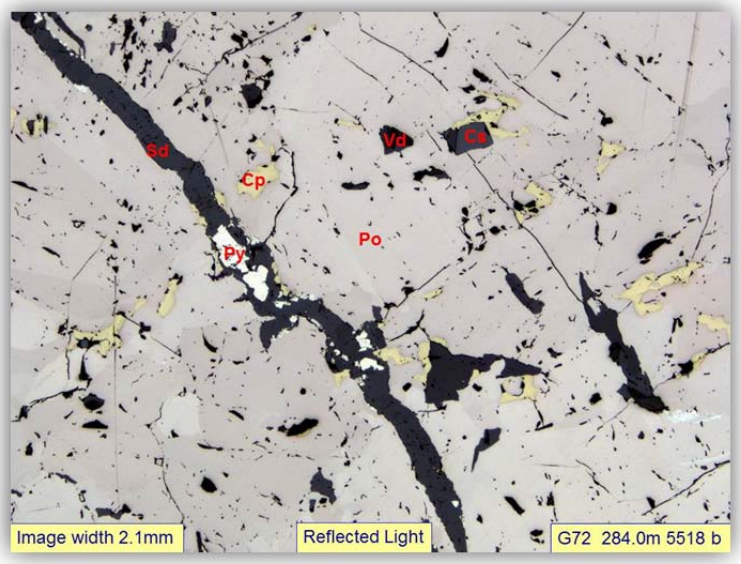
Occurrence: 10% of all stannite
Typical grainsize: 5µm
Normal mineral associates: cassiterite
Metallurgical Implication: Binaries with cassiterite



Chalcopyrite Cu_2FeS_2

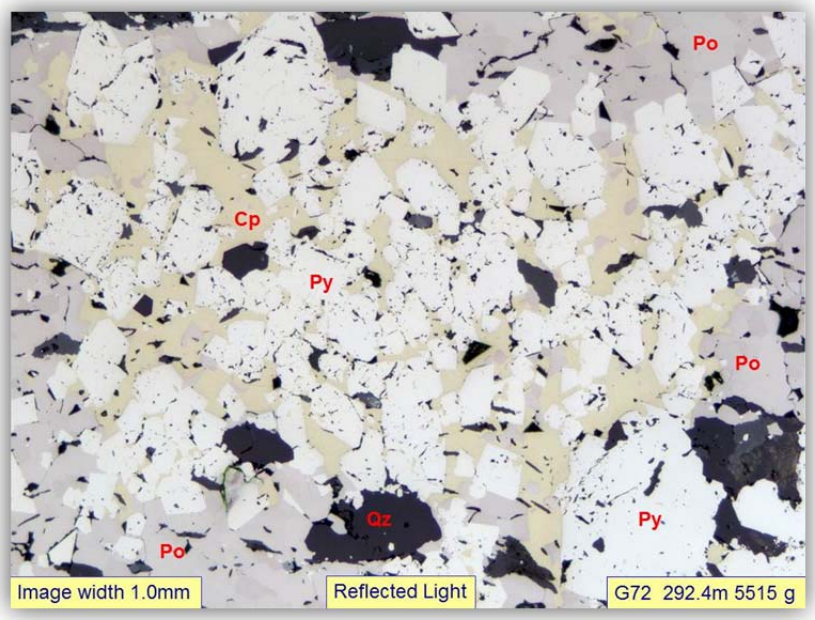
***CpA*: Interstitial to pyrrhotite**

Occurrence: 20% of all chalcopyrite
Typical grainsize: 50µm
Normal mineral associates: pyrrhotite
Metallurgical Implication: Binaries with pyrrhotite likely



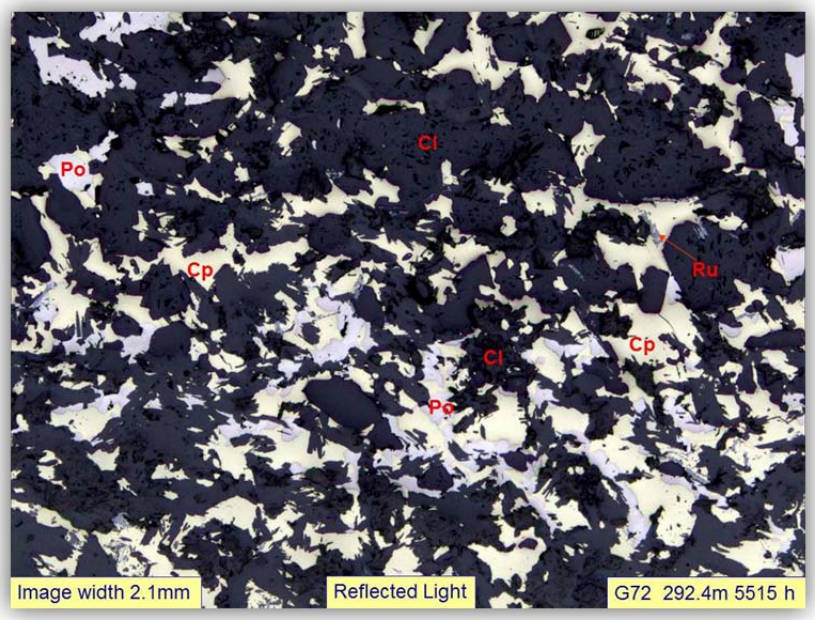
***CpB*: Interstitial to pyrite**

Occurrence: 15-20% of all chalcopyrite
Typical grainsize: 200µm
Normal mineral associates: pyrite
Metallurgical Implication: Minor binaries with pyrite



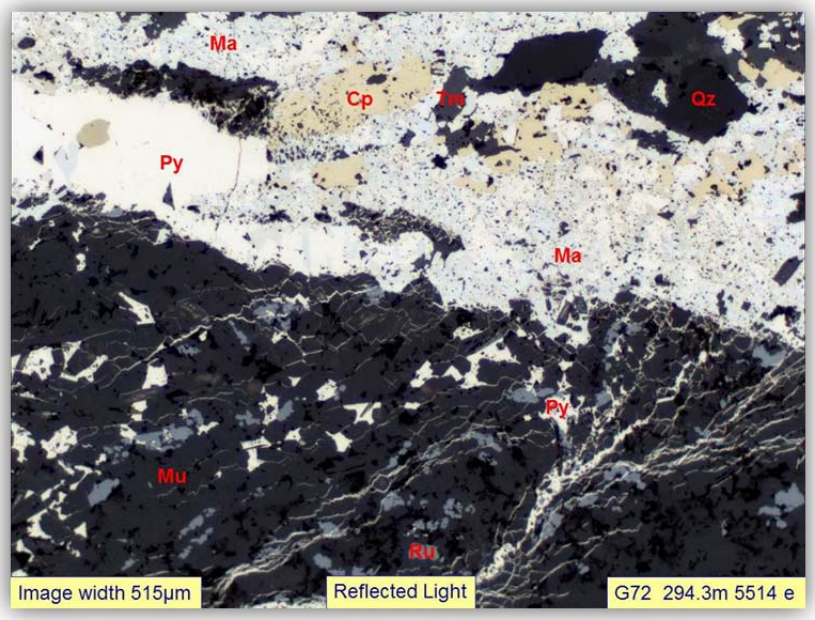
***CpC*: Hosted by chlorite in chlorite-pyrrhotite intergrowths**

Occurrence: 15% of all chalcopyrite
Typical grainsize: 25µm
Normal mineral associates: chlorite, pyrrhotite, cassiterite
Metallurgical Implication: Composites with chlorite and pyrrhotite likely



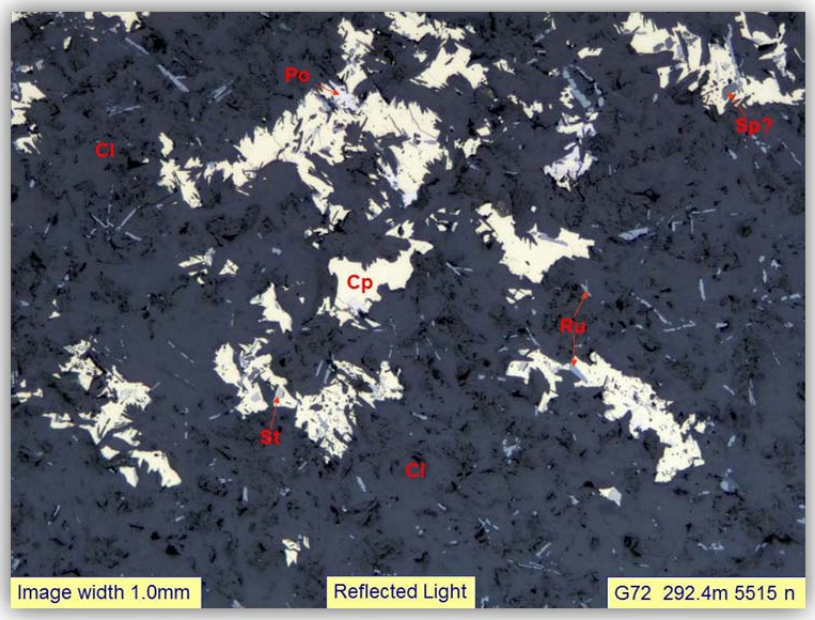
***CpD*: Remobilised in microshears**

Occurrence: 10-15% of all chalcopyrite
Typical grainsize: 50µm
Normal mineral associates: chlorite, pyrrhotite, quartz, marcasite, pyrite
Metallurgical Implication: Binaries with pyrite and marcasite likely



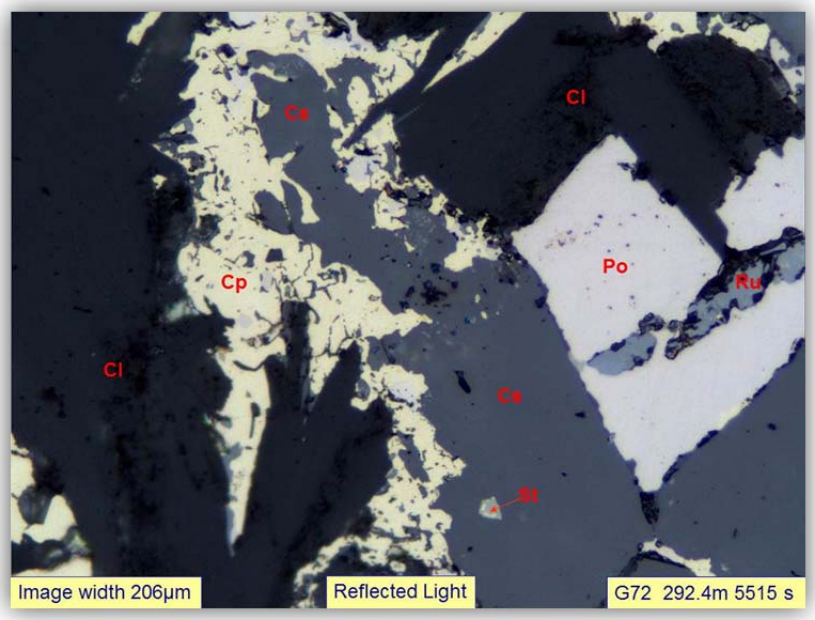
***CpE*: Highly irregular grains in massive chlorite**

Occurrence: 5-10% of all chalcopyrite
Typical grainsize: 50µm
Normal mineral associates: chlorite, rutile, pyrrhotite
Metallurgical Implication: Composites with chlorite and rutile likely



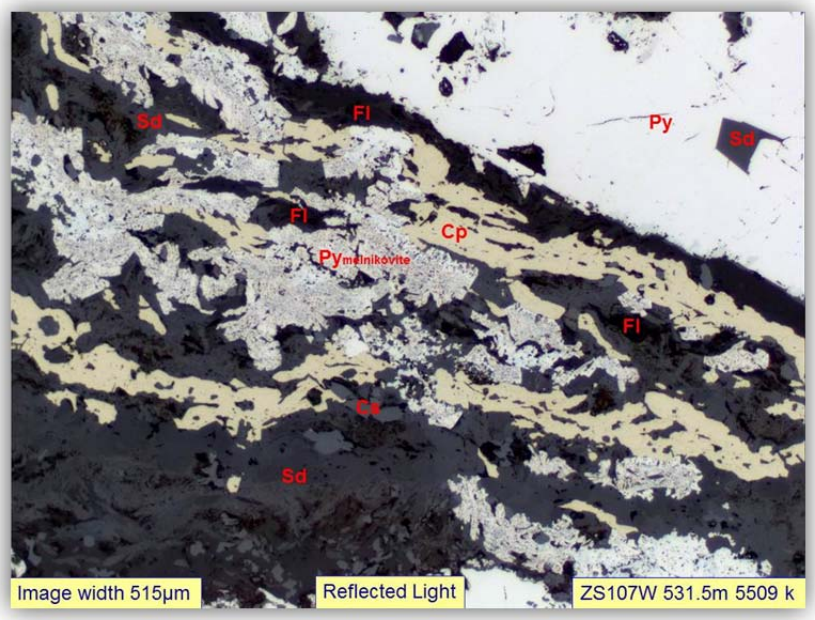
***CpF*: Replacing cassiterite, with stannite**

Occurrence: 5% of all chalcopyrite
Typical grainsize: 5µm
Normal mineral associates: cassiterite, stannite
Metallurgical Implication: Inconsequential



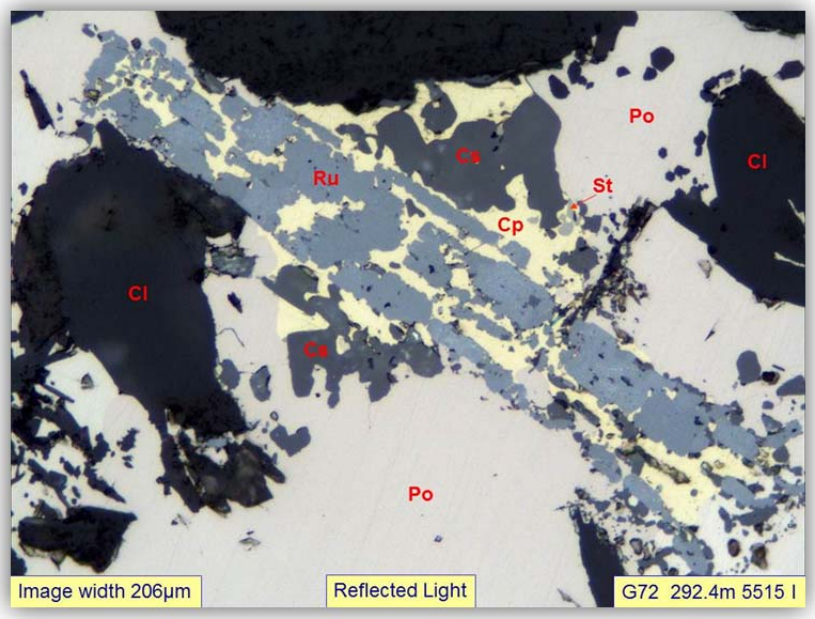
***CpG*: Late cross-cutting veinlets with siderite and/or fluorite**

Occurrence: 5% of all chalcopyrite
Typical grainsize: 50µm
Normal mineral associates: siderite, fluorite, pyrite
Metallurgical Implication: Inconsequential



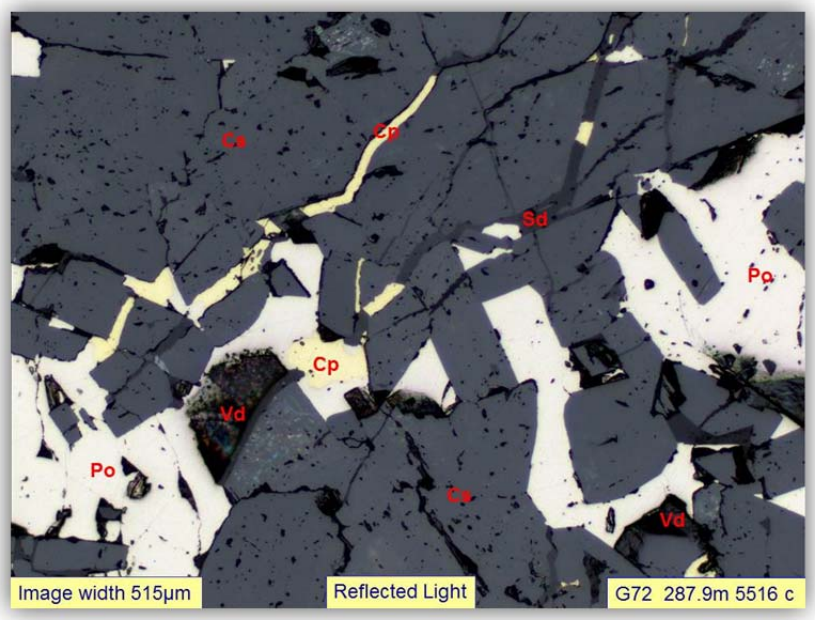
***CpH*: Replacing rutile**

Occurrence: 1-5% of all chalcopyrite
Typical grainsize: 10µm
Normal mineral associates: rutile
Metallurgical Implication: Inconsequential



***CpI*: Filling narrow cracks with siderite in cassiterite**

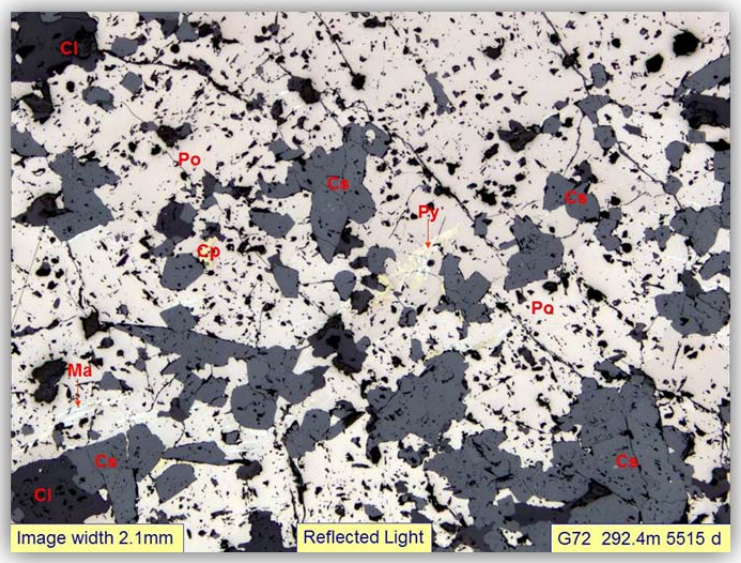
Occurrence: 1-5% of all chalcopyrite
Typical grainsize: 5µm
Normal mineral associates: cassiterite, siderite
Metallurgical Implication: Inconsequential



Pyrrhotite $Fe_{1-x}S$

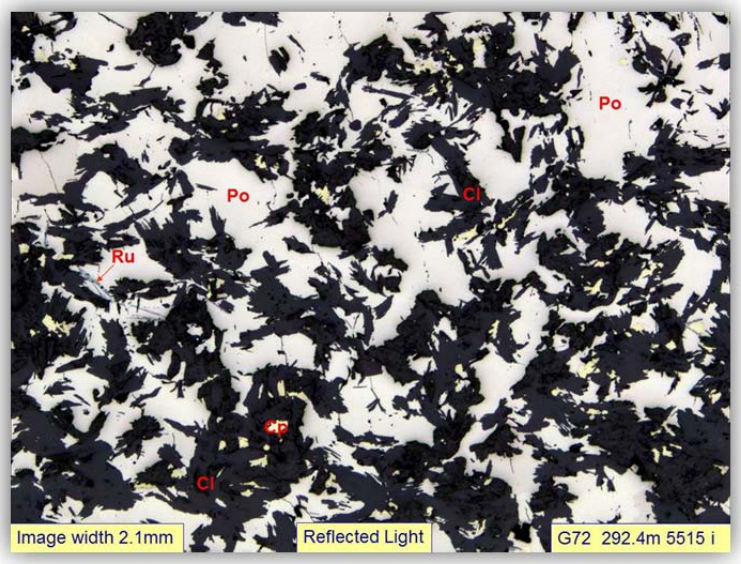
***PoA*: Massive**

Occurrence: 35-40% of all pyrrhotite
Typical grainsize: >1mm
Normal mineral associates: cassiterite, chalcopyrite
Metallurgical Implication: May oxidise readily



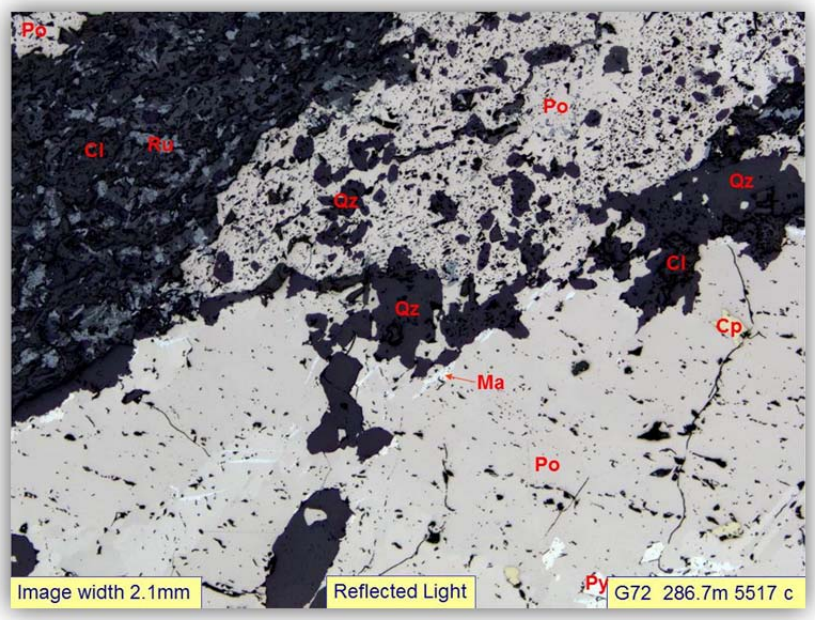
***PoB*: Intergrown with chlorite/quartz and minor chalcopyrite**

Occurrence: 15-20% of all pyrrhotite
Typical grainsize: 200µm
Normal mineral associates: chlorite, chalcopyrite
Metallurgical Implication: May oxidise readily



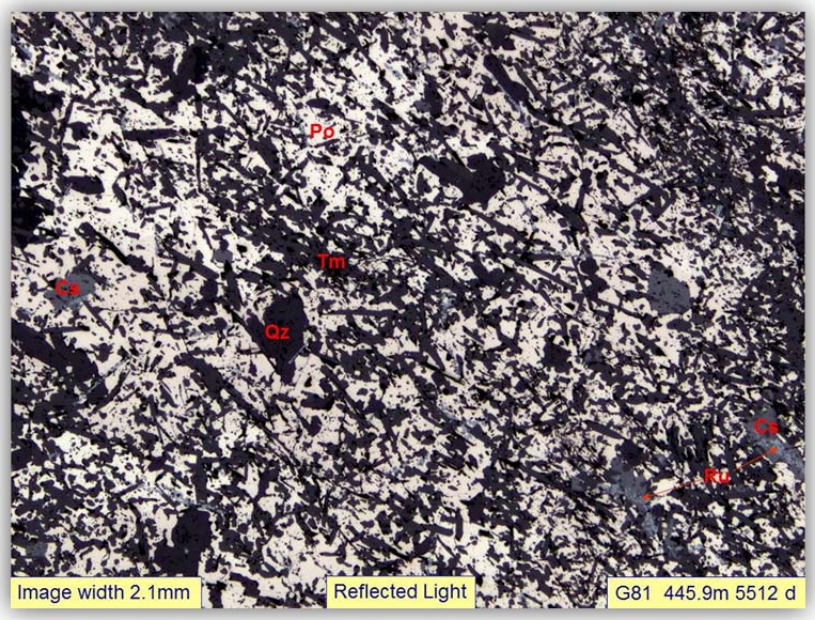
***PoC*: Massive, but dirty with inclusions**

Occurrence: 10% of all pyrrhotite
Typical grainsize: 50µm
Normal mineral associates: quartz, siderite, rutile
Metallurgical Implication: May oxidise readily



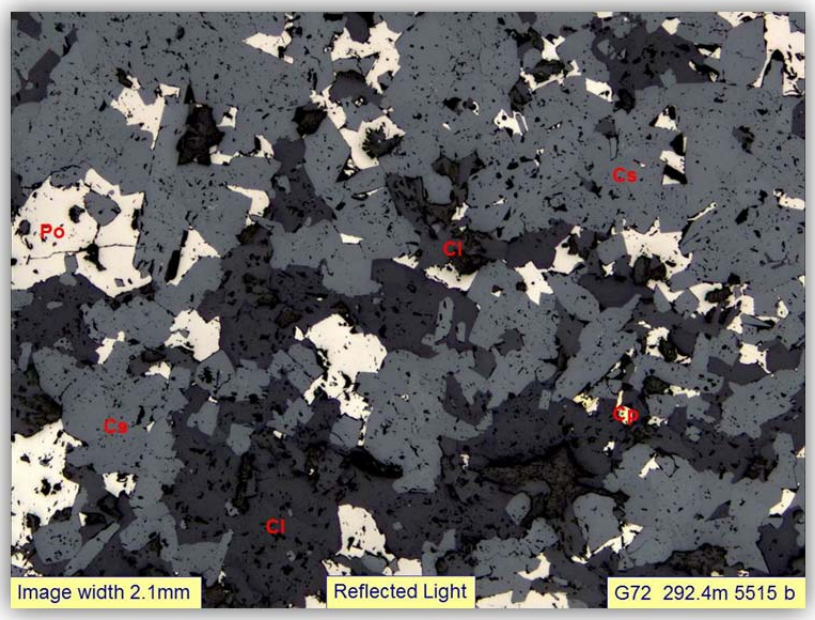
***PoD*: Intergrown with tourmaline crystal aggregates**

Occurrence: 5-10% of all pyrrhotite
Typical grainsize: 20µm
Normal mineral associates: tourmaline, cassiterite, rutile, chalcopyrite
Metallurgical Implication: Inconsequential



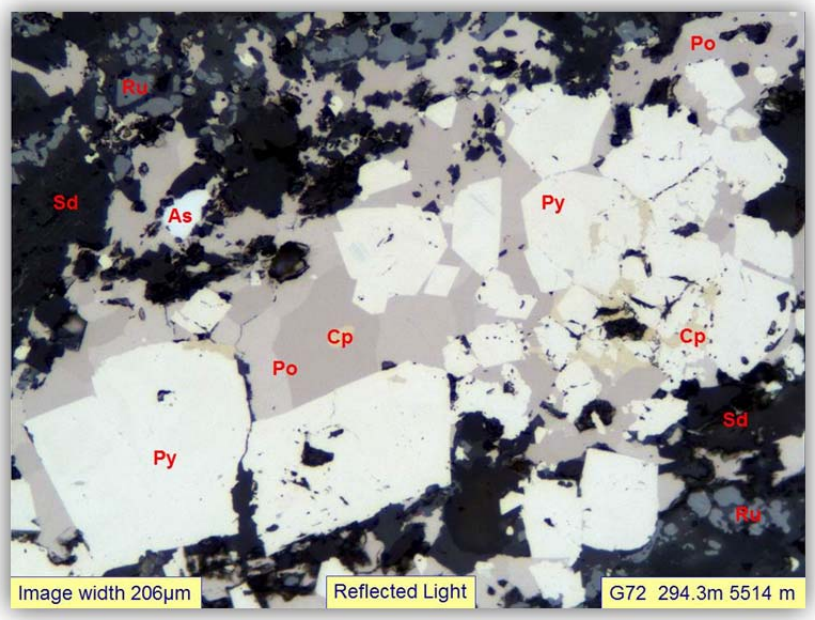
***PoE**: With chlorite or siderite interstitial to cassiterite aggregates*

Occurrence: 5-10% of all pyrrhotite
Typical grainsize: 100µm
Normal mineral associates: chlorite, cassiterite, chalcopyrite
Metallurgical Implication: Inconsequential



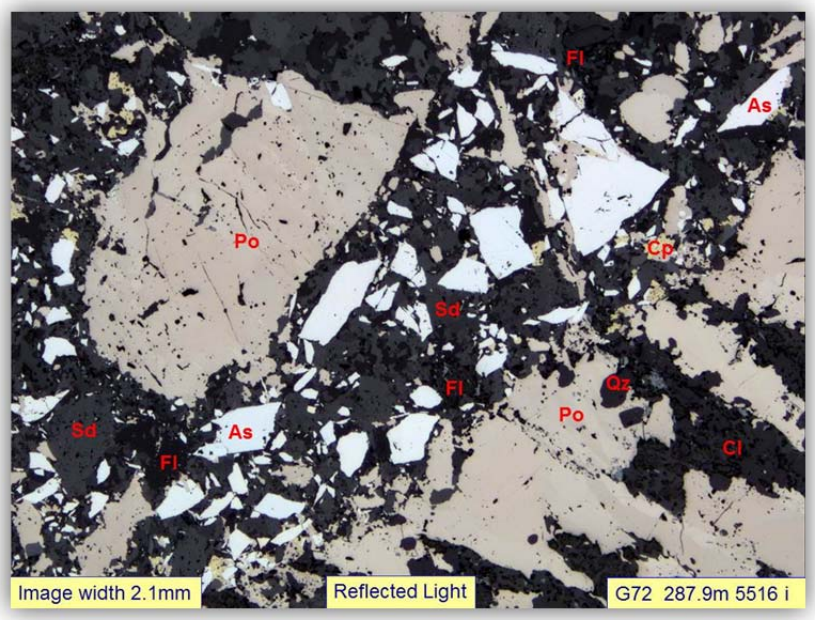
***PoF**: Interstitial to euhedral pyrite*

Occurrence: 5% of all pyrrhotite
Typical grainsize: 50µm
Normal mineral associates: pyrite, chalcopyrite
Metallurgical Implication: Inconsequential



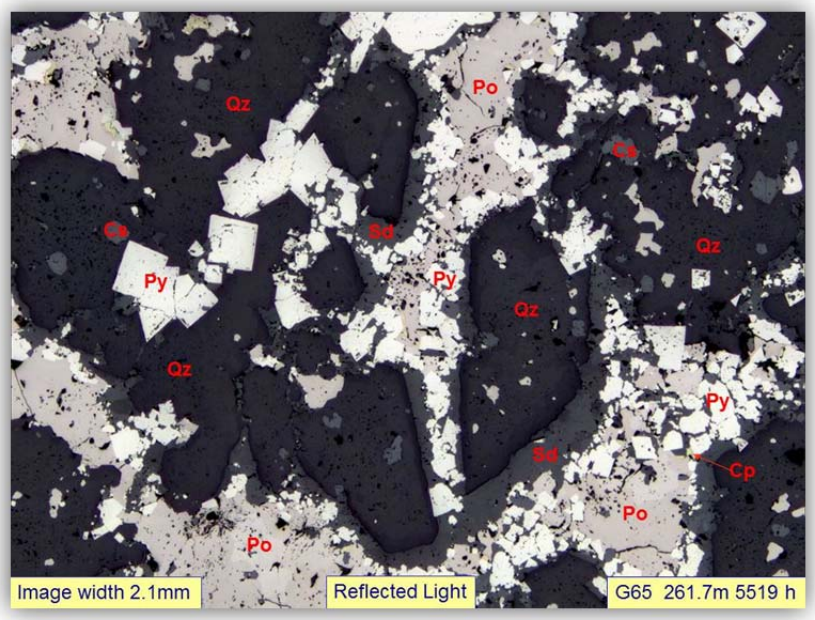
***PoG**: Slightly corroded dislocated angular fragments in microbreccias*

Occurrence: 1-5% of all pyrrhotite
Typical grainsize: >1mm
Normal mineral associates: siderite
Metallurgical Implication: Inconsequential



***PoH**: Arcuate interstices between euhedral quartz rimmed by pyrite and siderite*

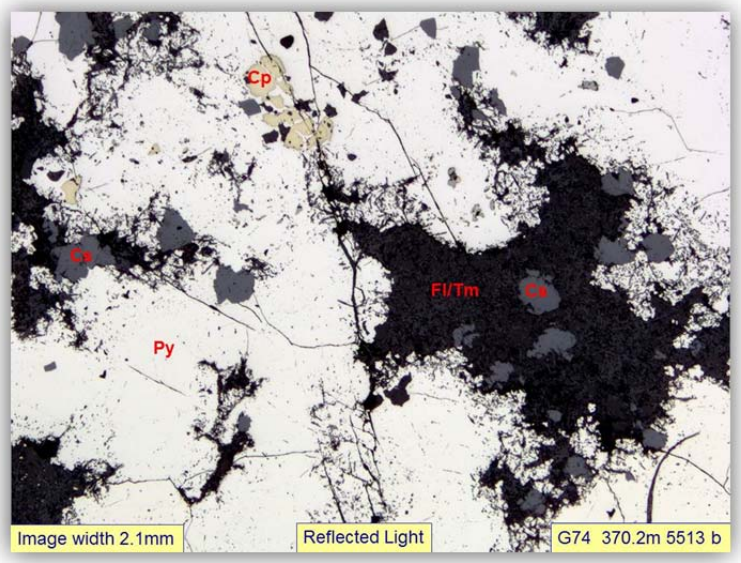
Occurrence: 1-5% of all pyrrhotite
Typical grainsize: 150µm
Normal mineral associates: pyrite, siderite, quartz, chalcopyrite
Metallurgical Implication: Inconsequential



Pyrite FeS_2

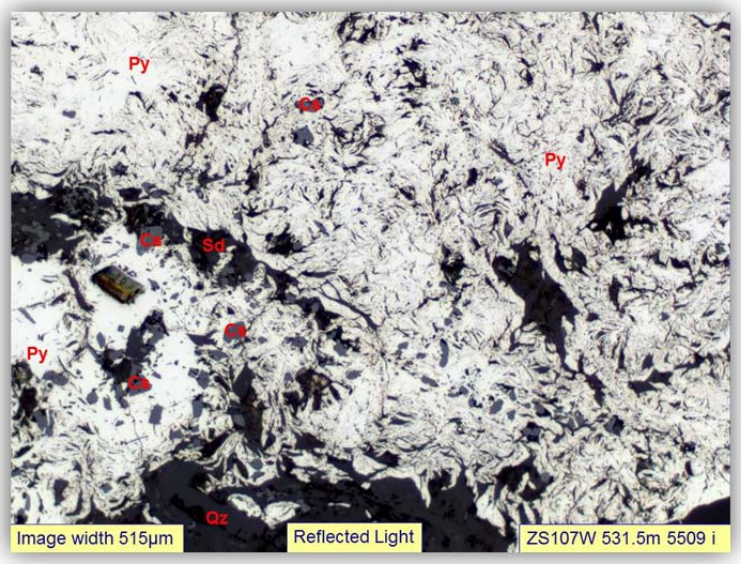
***PyA*: Massive crystalline, with minor melnikovite/marcasite relicts**

Occurrence: 25-30% of all pyrite
Typical grainsize: 300µm
Normal mineral associates: chalcopyrite
Metallurgical Implication: Inconsequential



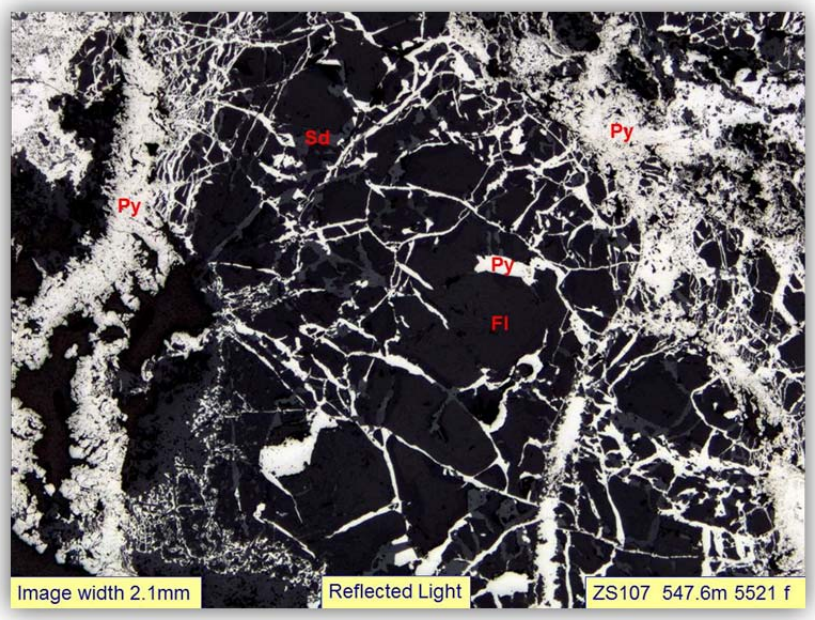
***PyB*: Feathery melnikovite aggregates**

Occurrence: 15% of all pyrite
Typical grainsize: >1mm
Normal mineral associates: siderite, chlorite, muscovite
Metallurgical Implication: Will oxidise and slake rapidly



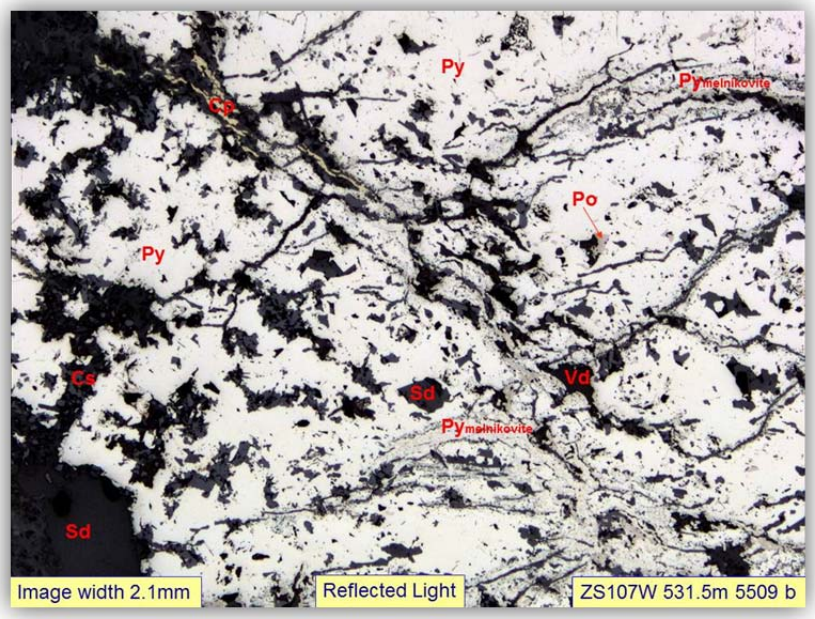
***PyC*: Very finely braided veinlet networks**

Occurrence: 10% of all pyrite
Typical grainsize: 2µm
Normal mineral associates: siderite, fluorite, muscovite, marcasite
Metallurgical Implication: Will oxidise readily



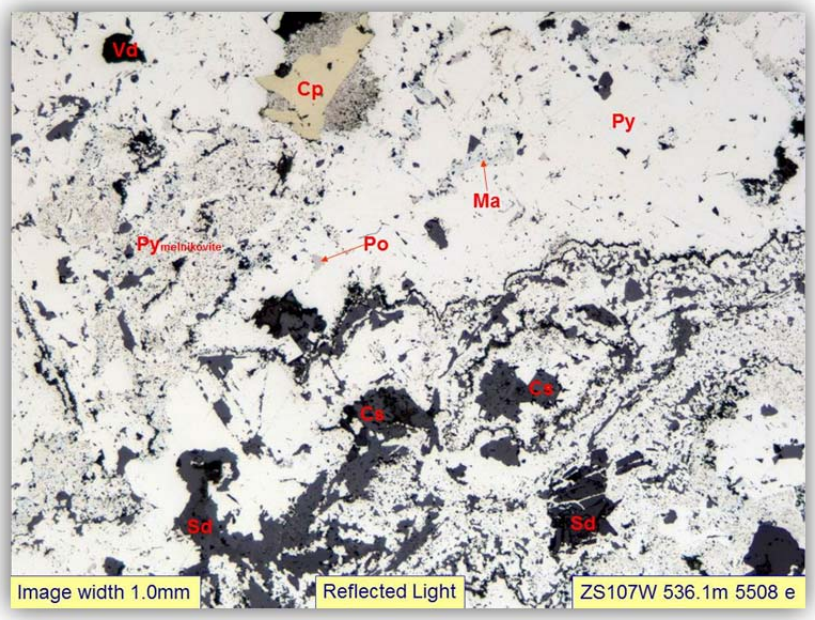
***PyD*: Massive crystalline, with symmetric crustiform melnikovite within**

Occurrence: 5-10% of all pyrite
Typical grainsize: 150µm
Normal mineral associates: siderite, chalcopyrite
Metallurgical Implication: Will oxidise readily



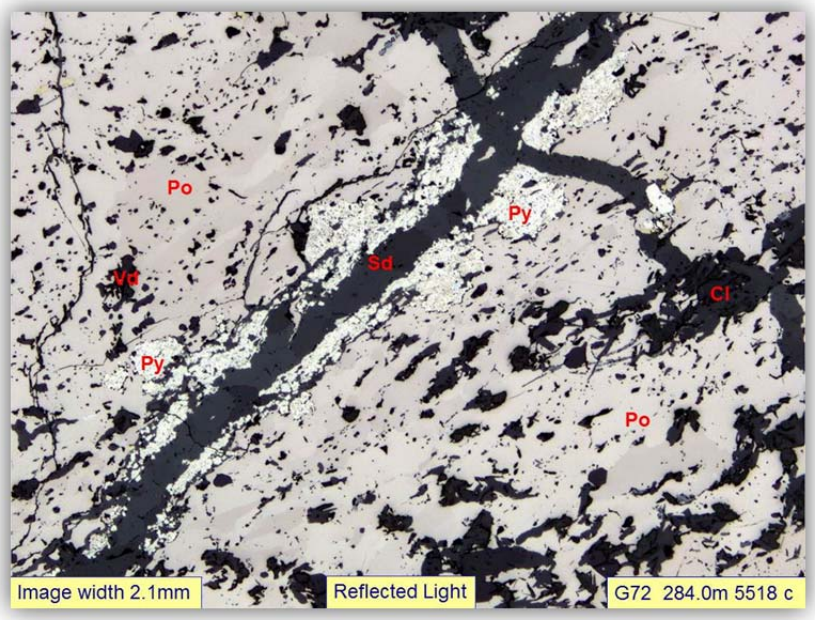
***PyE*: Colloform melnikovite, sometimes symmetric crustiform**

Occurrence: 5% of all pyrite
Typical grainsize: 50µm
Normal mineral associates: siderite
Metallurgical Implication: Will oxidise readily



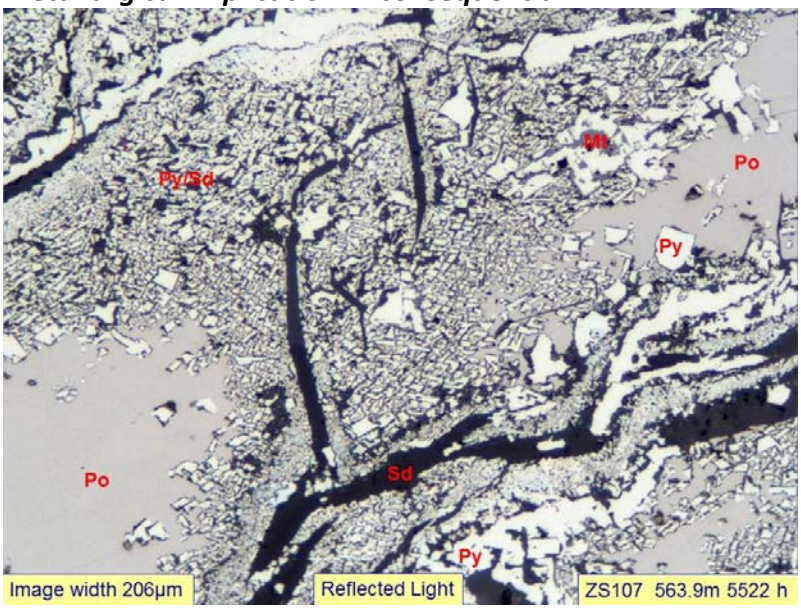
***PyF*: Partially recrystallised melnikovite replacing pyrrhotite adjacent to siderite veinlets**

Occurrence: 5% of all pyrite
Typical grainsize: 50µm
Normal mineral associates: pyrrhotite, siderite
Metallurgical Implication: Inconsequential



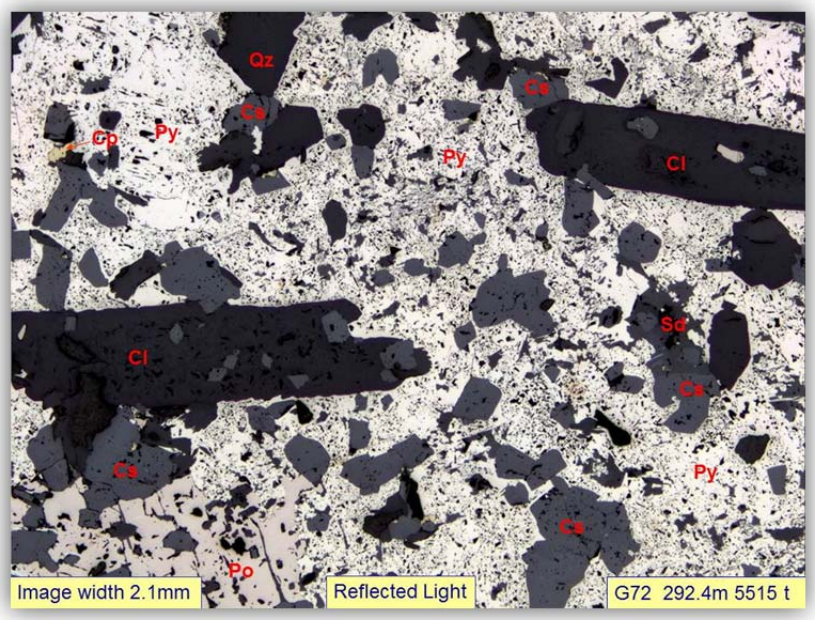
***PyG*: Ex-pyrrhotite porous with irregular magnetite inclusions**

Occurrence: 5% of all pyrite
Typical grainsize: 30µm
Normal mineral associates: magnetite, marcasite, pyrrhotite, siderite
Metallurgical Implication: Inconsequential



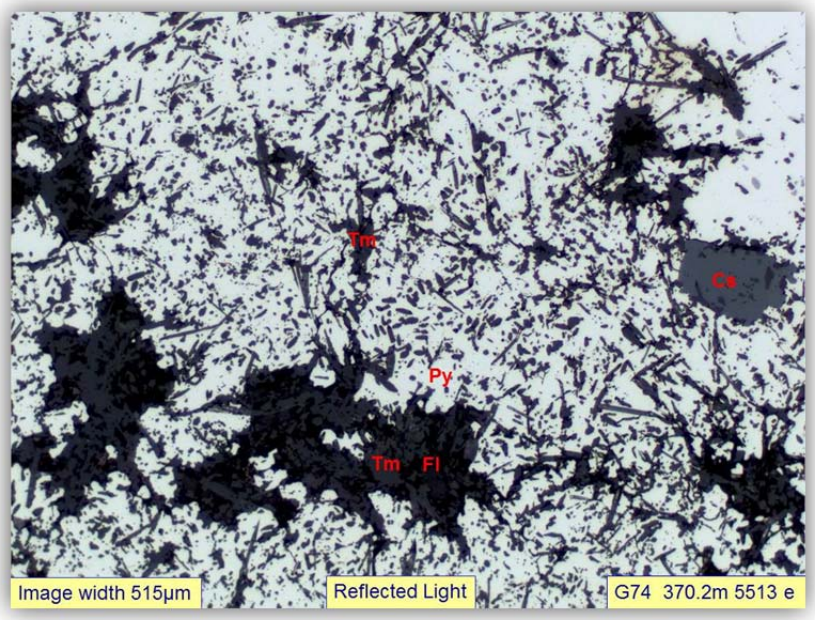
***PyH*: Massive porous ex-melnikovite with abundant inclusions**

Occurrence: 5% of all pyrite
Typical grainsize: 100µm
Normal mineral associates: quartz, siderite, cassiterite, chlorite
Metallurgical Implication: Inconsequential



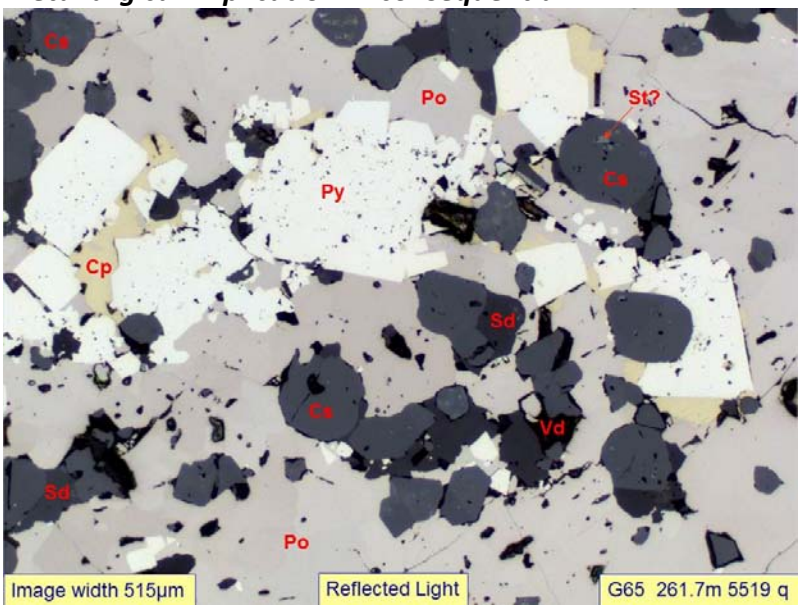
***PyI*: Intergrown with tourmaline crystal aggregates**

Occurrence: 5% of all pyrite
Typical grainsize: 25µm
Normal mineral associates: tourmaline, fluorite
Metallurgical Implication: Inconsequential



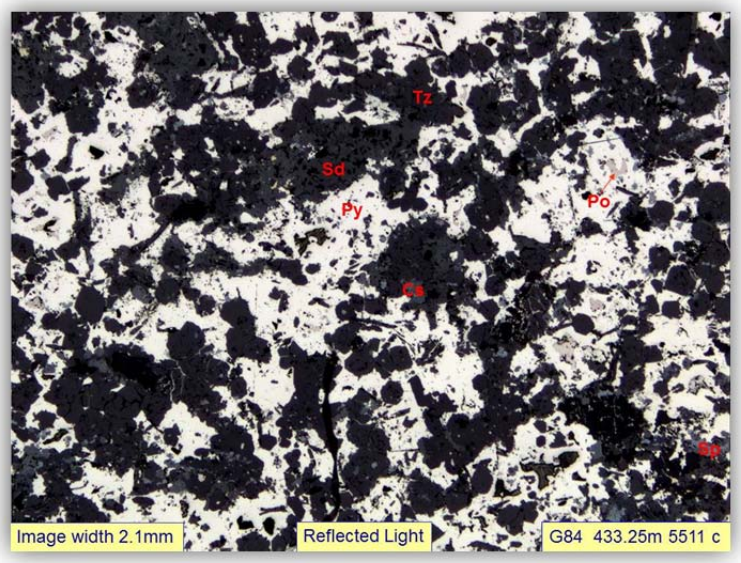
***PyJ*: Partially recrystallised melnikovite and crystalline euhedra rimming pyrrhotite**

Occurrence: 1-5% of all pyrite
Typical grainsize: 75µm
Normal mineral associates: pyrrhotite, siderite
Metallurgical Implication: Inconsequential



***PyK*: Intergrown with topaz/siderite**

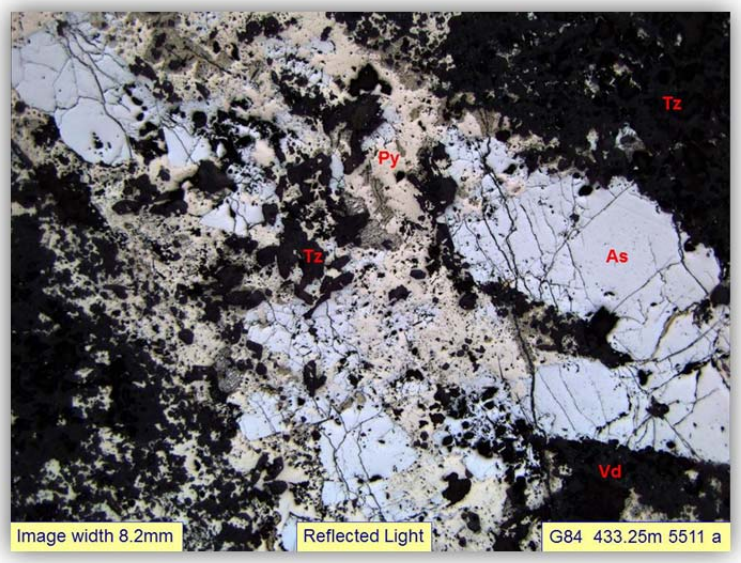
Occurrence: 1-5% of all pyrite
Typical grainsize: 75µm
Normal mineral associates: topaz, siderite
Metallurgical Implication: Inconsequential



Arsenopyrite FeAsS

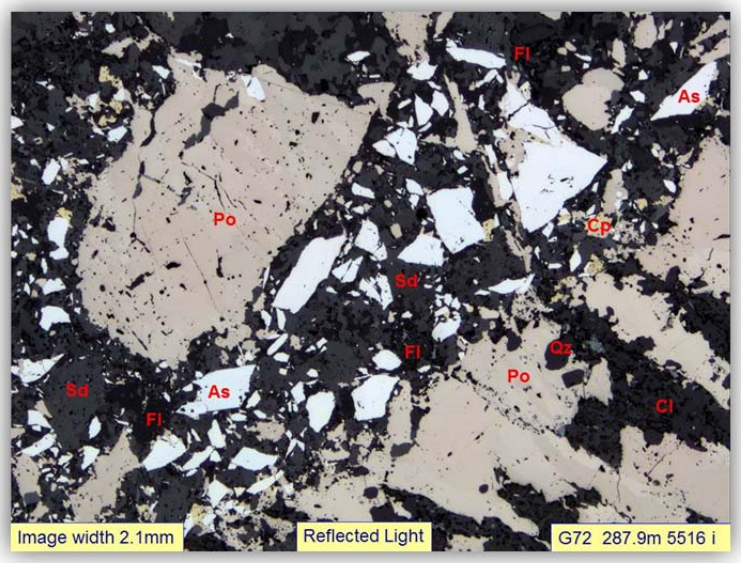
***AsA*: Coarse rhombs enclosed in crystalline pyrite**

Occurrence: 75% of all arsenopyrite
Typical grainsize: >1mm
Normal mineral associates: pyrite
Metallurgical Implication: Inconsequential



***AsB**: Dislocated angular fragments in microbreccias*

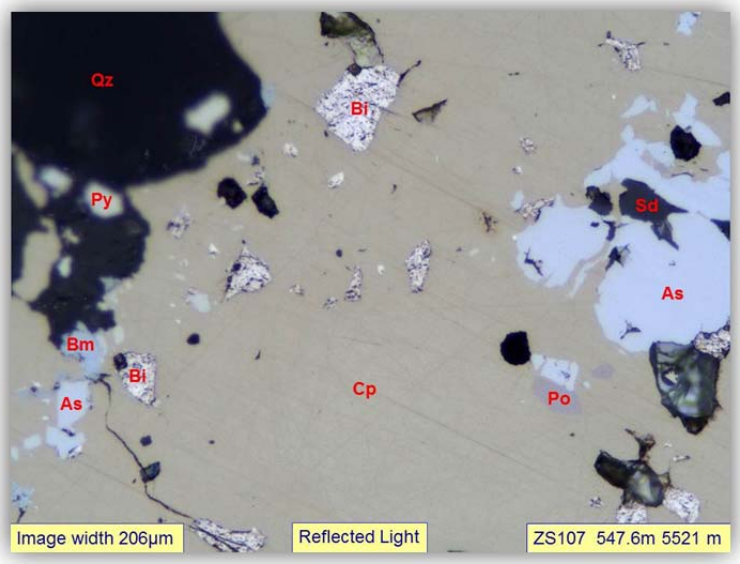
Occurrence: 20% of all arsenopyrite
Typical grainsize: 100µm
Normal mineral associates: siderite, fluorite, pyrrhotite
Metallurgical Implication: Inconsequential



Native Bismuth Bi (100% Bi)

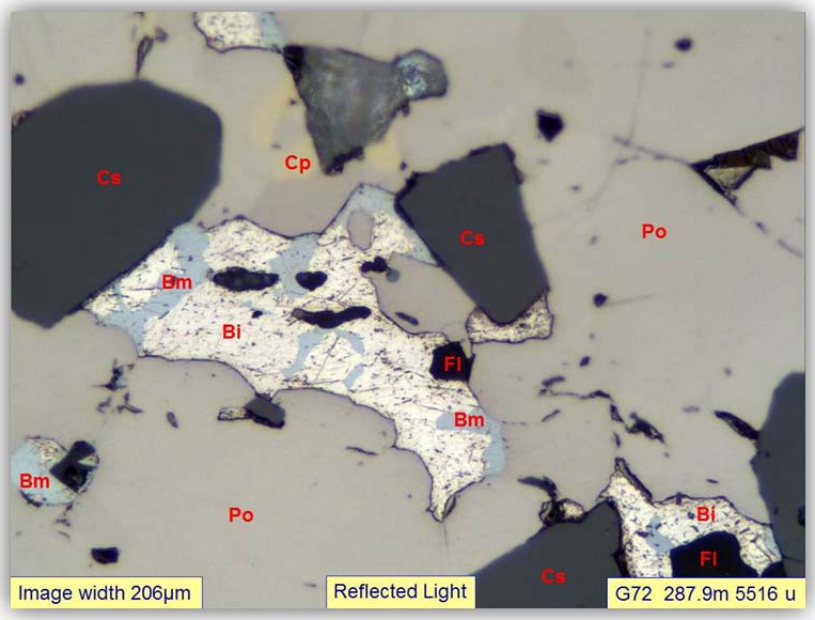
***BiA**: Irregular inclusions in chalcopyrite, sometimes with bismuthinite*

Occurrence: 25-30% of all native bismuth
Typical grainsize: 100µm
Normal mineral associates: chalcopyrite, bismuthinite
Metallurgical Implication: Penalty in Cu concentrates



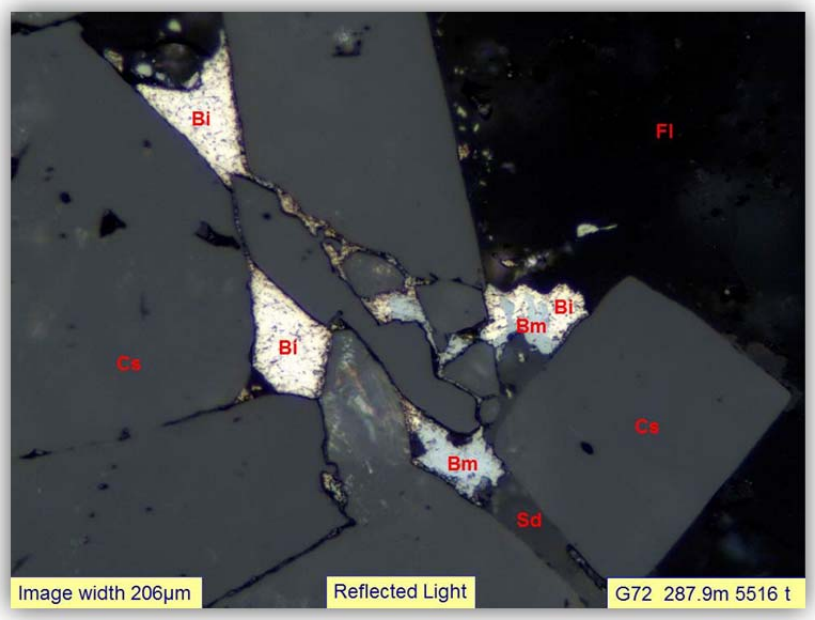
***BiB*: Irregular inclusions with bismuthinite in pyrrhotite**

Occurrence: 20-25% of all native bismuth
Typical grainsize: 100µm
Normal mineral associates: pyrrhotite, bismuthinite chalcopyrite
Metallurgical Implication: Inconsequential



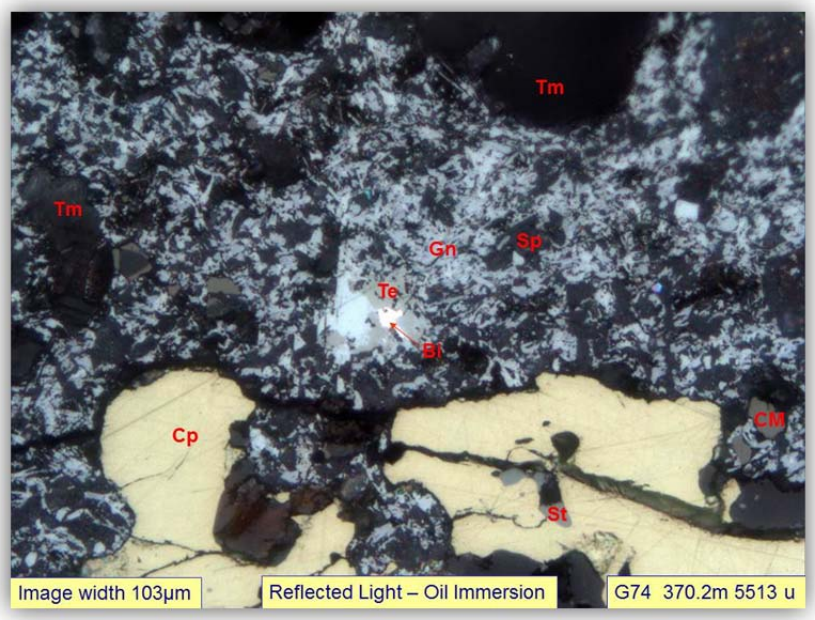
***BiC*: Filling cracks in cassiterite with bismuthinite**

Occurrence: 15-20% of all native bismuth
Typical grainsize: 40µm
Normal mineral associates: cassiterite, bismuthinite, fluorite
Metallurgical Implication: Possible penalty in Sn concentrates?



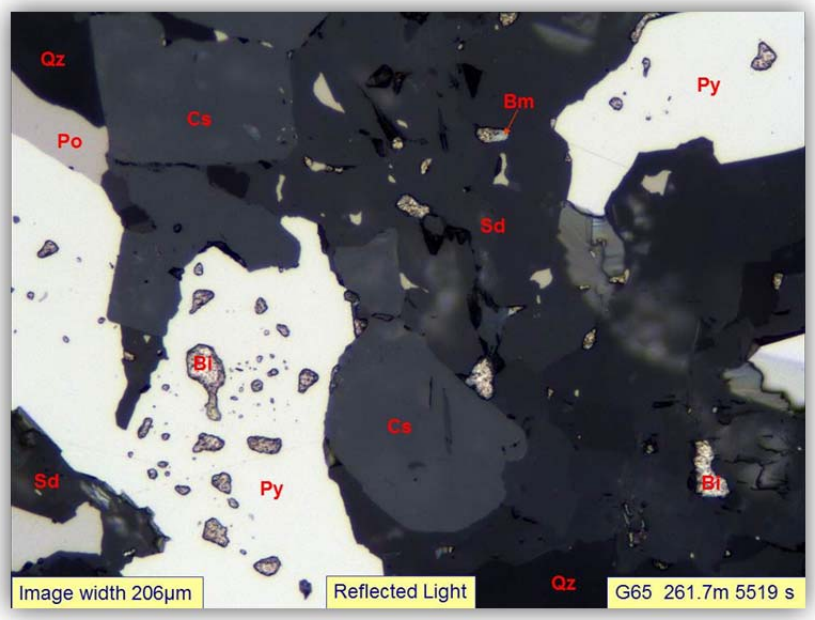
***BiD**: Irregular inclusions in very rare tetrahedrite*

Occurrence: 10-15% of all native bismuth
Typical grainsize: 5µm
Normal mineral associates: tetrahedrite, galena
Metallurgical Implication: Inconsequential



***BiE**: Irregular blebs in crystalline pyrite, sometimes with bismuthinite*

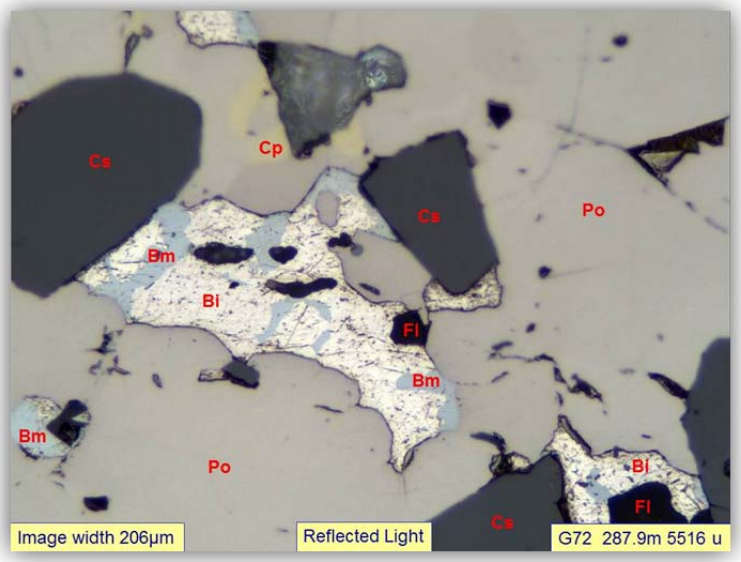
Occurrence: 10% of all native bismuth
Typical grainsize: 25µm
Normal mineral associates: pyrite, chalcopyrite, bismuthinite
Metallurgical Implication: Inconsequential



Bismuthinite Bi_2S_3 (81.3%Bi)

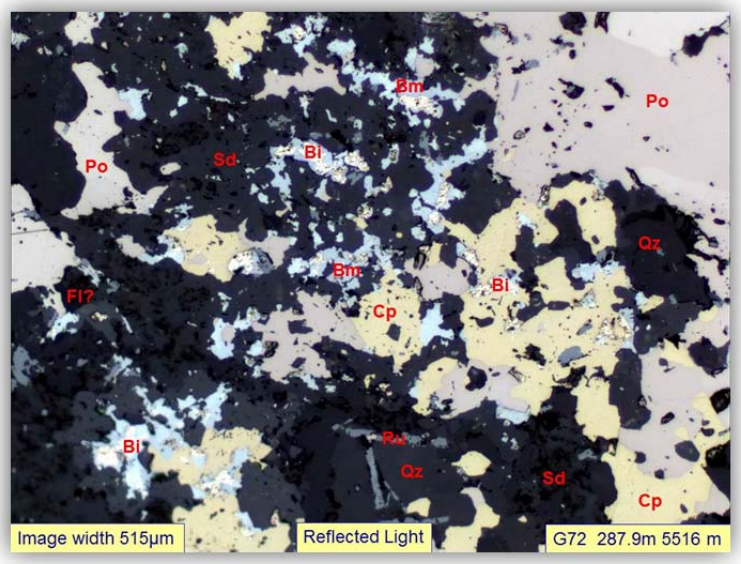
***BmA*: Irregular inclusions with native bismuth in pyrrhotite**

Occurrence: 25-30% of all bismuthinite
Typical grainsize: 15µm
Normal mineral associates: pyrrhotite, native bismuth
Metallurgical Implication: Inconsequential



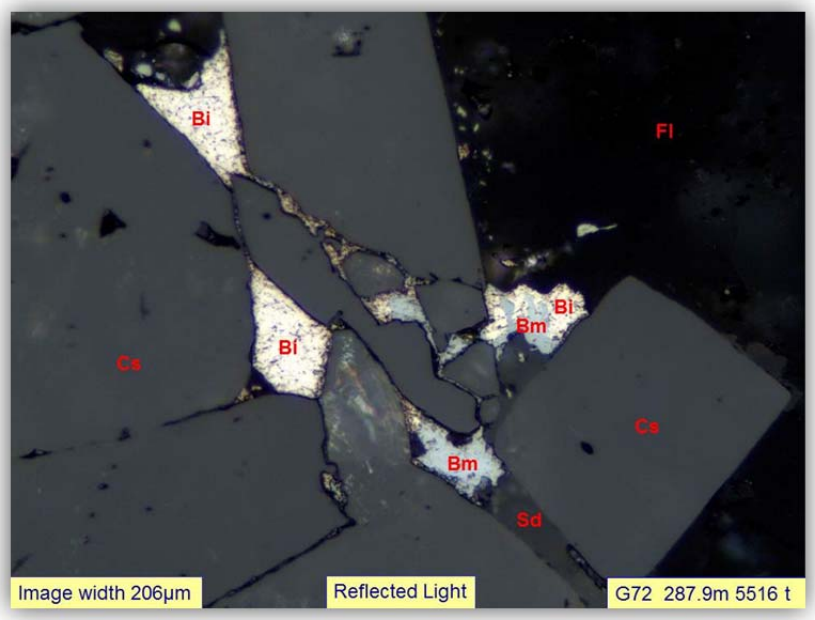
***BmB*: Irregular inclusions in chalcopyrite, sometimes with native bismuth**

Occurrence: 25-30% of all bismuthinite
Typical grainsize: 20µm
Normal mineral associates: chalcopyrite, native bismuth
Metallurgical Implication: Penalty in Cu concentrates



***BmC*: Filling cracks in cassiterite with native bismuth**

Occurrence: 20% of all bismuthinite
Typical grainsize: 25µm
Normal mineral associates: cassiterite, native bismuth
Metallurgical Implication: Possible penalty in Sn concentrates?

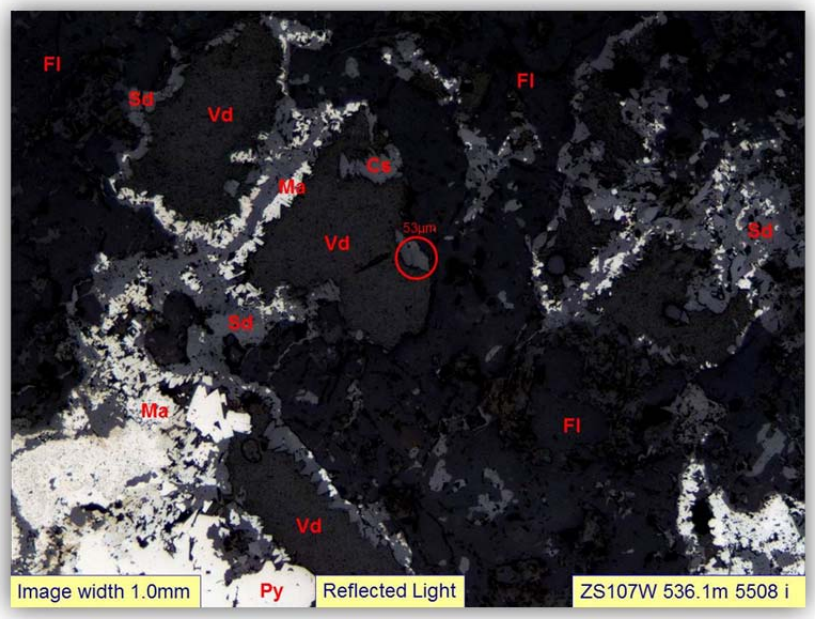


PARAGENETIC SEQUENCING

Comments on paragenetic sequencing

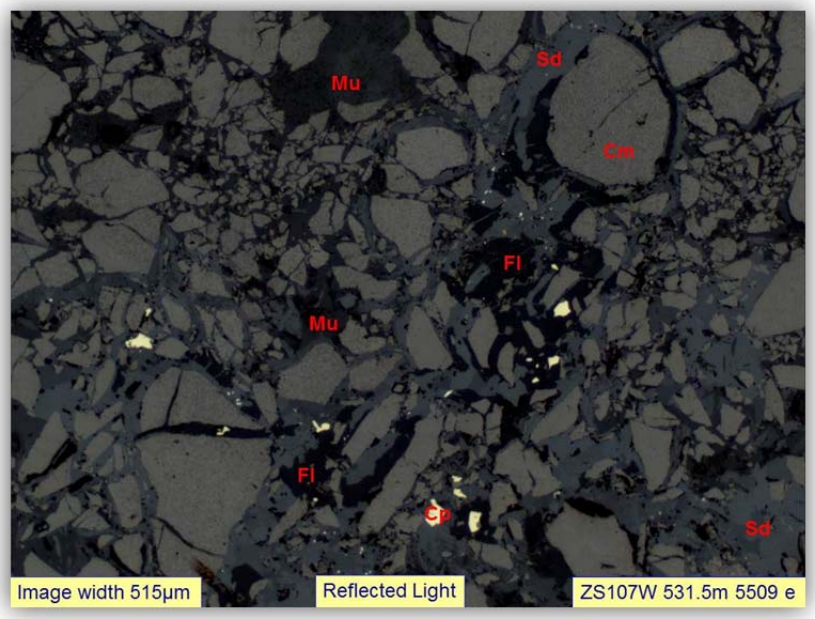
The variety and diversity of mineral textures observed in these 14 Severn samples strongly suggest a complex depositional history with deformational events superimposed over probable multiple mineralising episodes. This sample suite would be one of the most texturally complex set of samples ever examined by the author. From a practical sense this would suggest any potential plant feed from this deposit will show a high variability in mineral composition and mineral liberation/association characteristics. A high density of sampling may be required.

It would be invalid to make any definitive conclusions on the sequencing of these events from the observations made on such a small suite of samples, but it may be advantageous to at least document some of the timing features observed during this assessment.



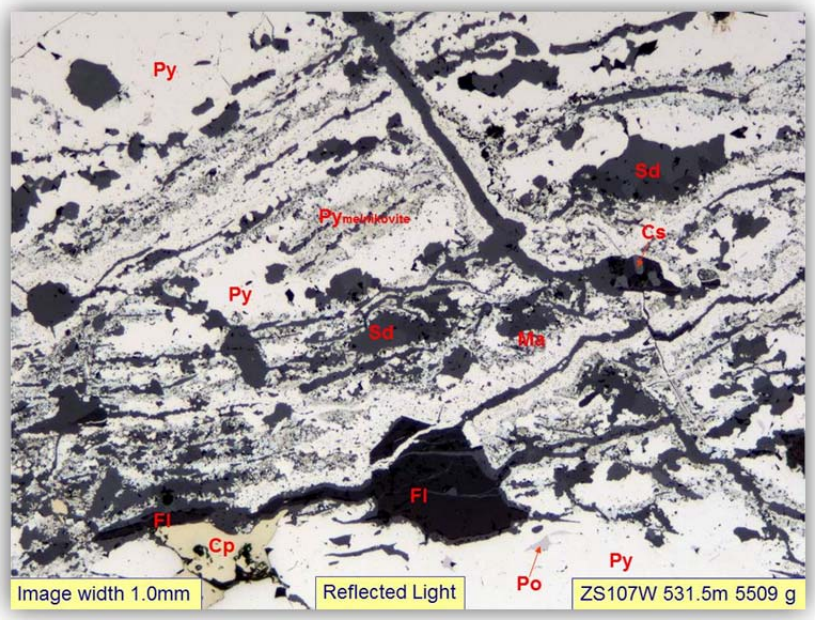
The image above shows apparent early fluorite (Fl) crystals deposited in open space (Vd), sequentially overgrown by siderite (Sd) and marcasite (Ma).

EARLY fluorite – siderite ± marcasite LATE



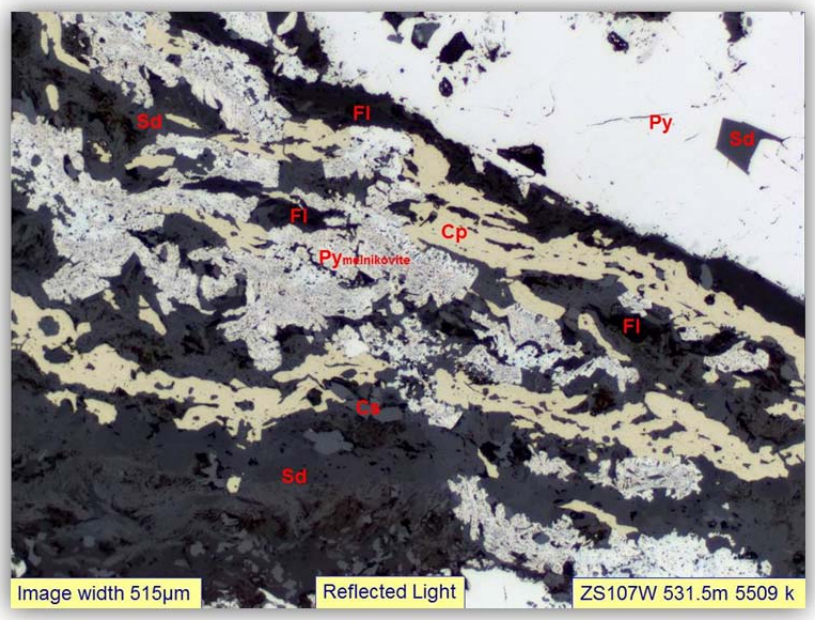
The image above shows brecciated kerogen (Cm) grains healed by later interstitial siderite (Sd) and fluorite (Fl) + chalcopyrite Cp). The kerogen represents recrystallised carbonaceous matter, probably sourced from black shale.

EARLY black shale – kerogen – brecciation – siderite – fluorite/chalcopyrite LATE



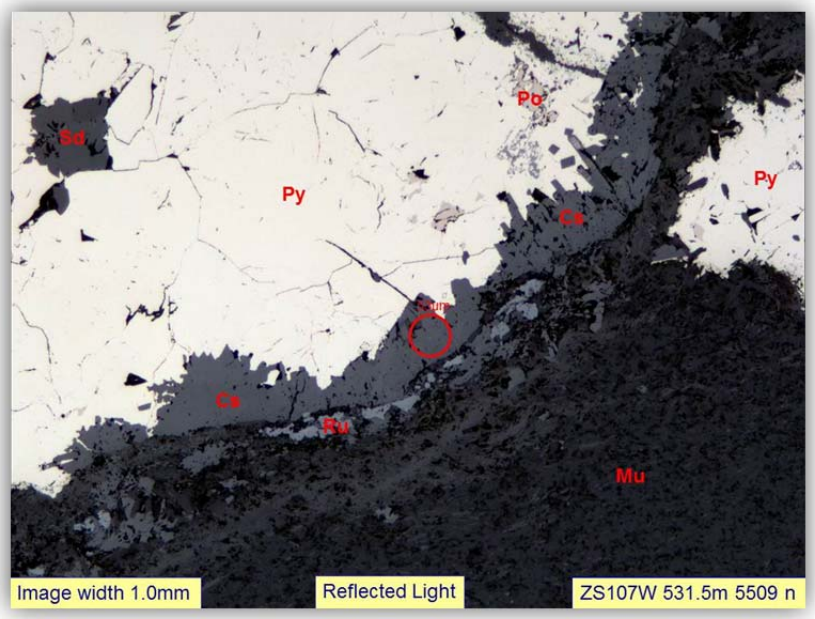
The enigmatic image above can be interpreted as early massive pyrite (Py) that was cracked, allowing later symmetric crustiform deposition of melnikovite pyrite in the empty cracks. Siderite (Sd) and cassiterite (Cs) filled any remaining space. However, note the lower fluorite (Fl) crystal appears to have crustiform pyrite deposited on top of the fluorite crystal faces.

EARLY pyrite – melnikovite – siderite+cassiterite – fluorite LATE



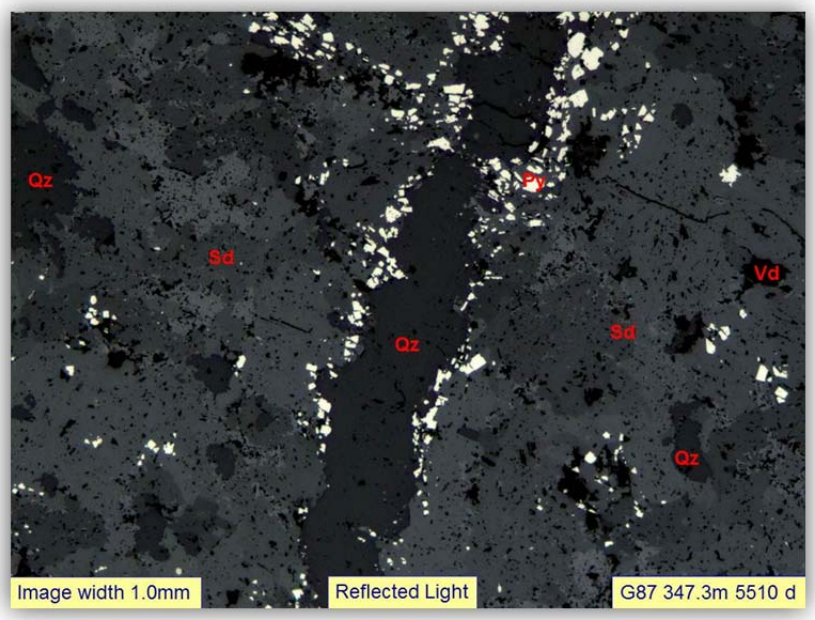
The image above shows a late cross-cutting veinlet containing melnikovite pyrite (Py) and siderite(Sd)+cassiterite(Cs)+chalcopyrite(Cp) with later fluorite (Fl).

EARLY crystalline pyrite – melnikovite – siderite+cassiterite+chalcopyrite – fluorite LATE



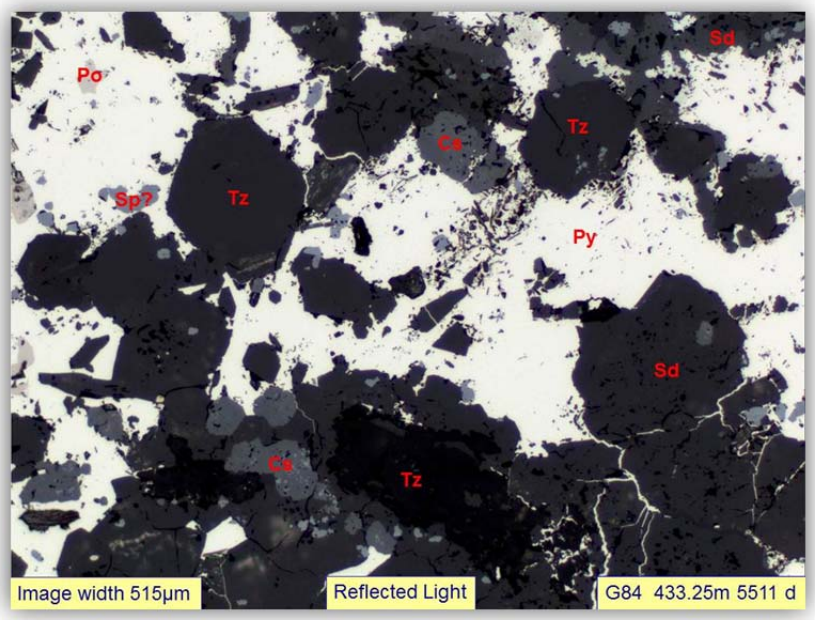
The image above clearly shows radiating crystals of cassiterite (Cs) growing into open space on an altered substrate, later overgrown by pyrite (Py) and finally filled by siderite (Sd).

EARLY altered substrate – cassiterite – pyrite - siderite LATE



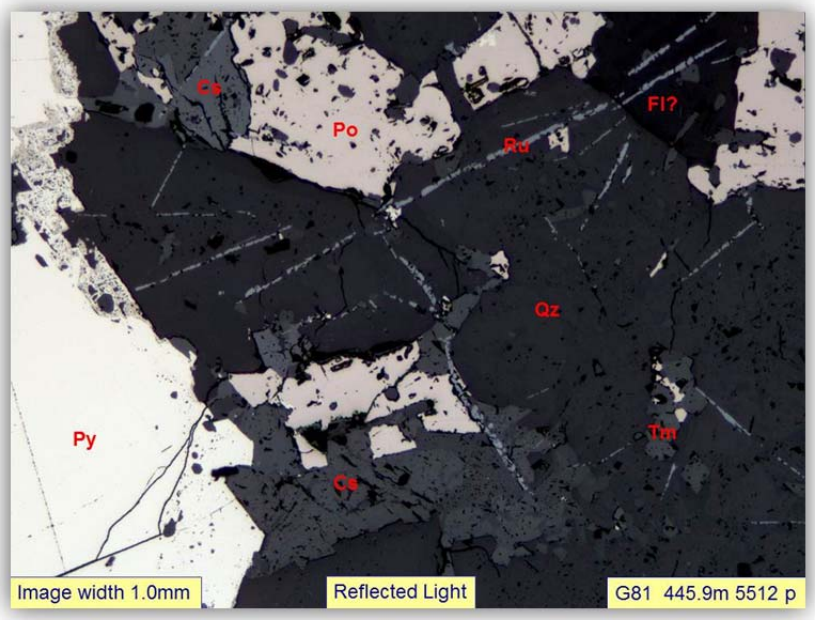
The image above from a barren sample shows massive siderite (Sd) cut by a narrow quartz (Qz) veinlet with fine-grained pyrite (Py) selvedges.

EARLY siderite – pyrite – quartz LATE



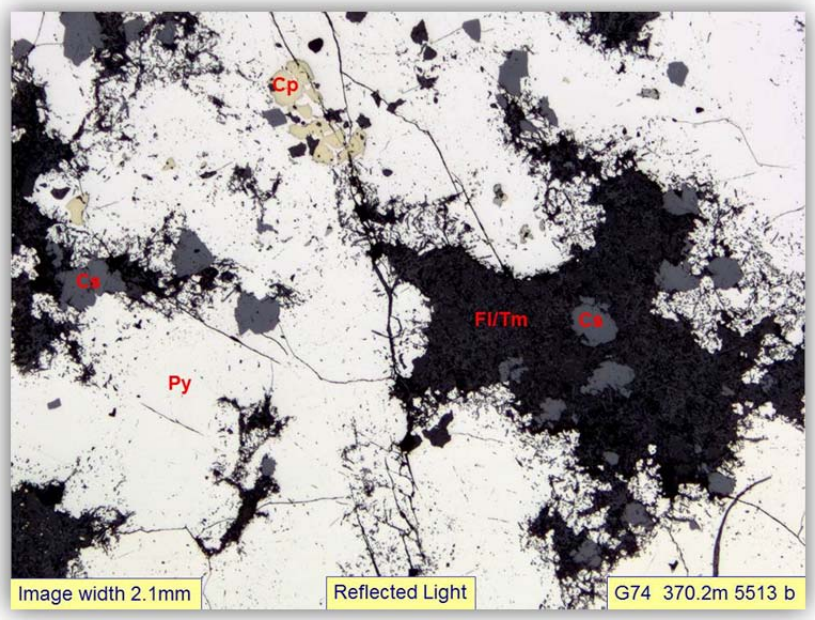
The image above shows early euhedral topaz (Tz) coated by siderite(Sd)+cassiterite(Cs) with later pyrite (Py) infill.

EARLY topaz – siderite+cassiterite – pyrite LATE



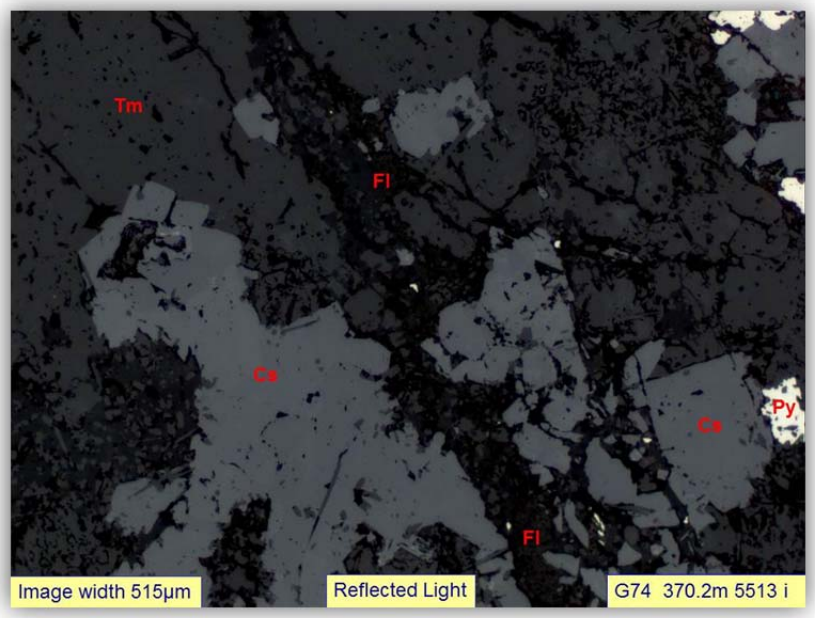
In the confusing image above, quartz (Qz) crystals attached to the pyrite(Py) at left appear to be infilled by pyrrhotite(Po)+cassiterite(Cs) at the lower centre and upper left, and by fluorite(Fl)+tourmaline(Tm) at upper right. The rutile (Ru) crystals are a mystery.

EARLY pyrite – quartz – cassiterite+pyrrhotite – fluorite+tourmaline LATE



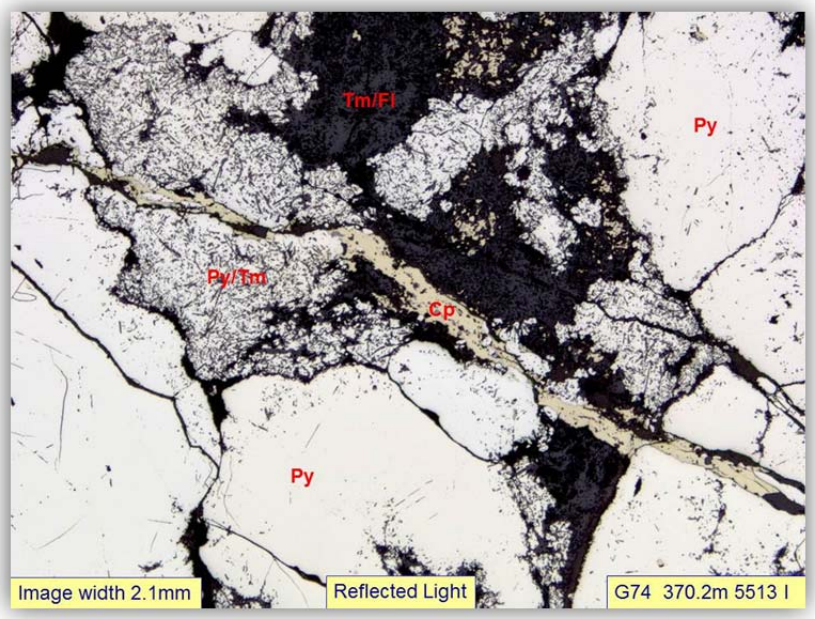
The image above shows early pyrite marginally altered by infilling fluorite (Fl) and tourmaline (Tm) with cassiterite (Cs).

EARLY pyrite – cassiterite – fluorite+tourmaline LATE



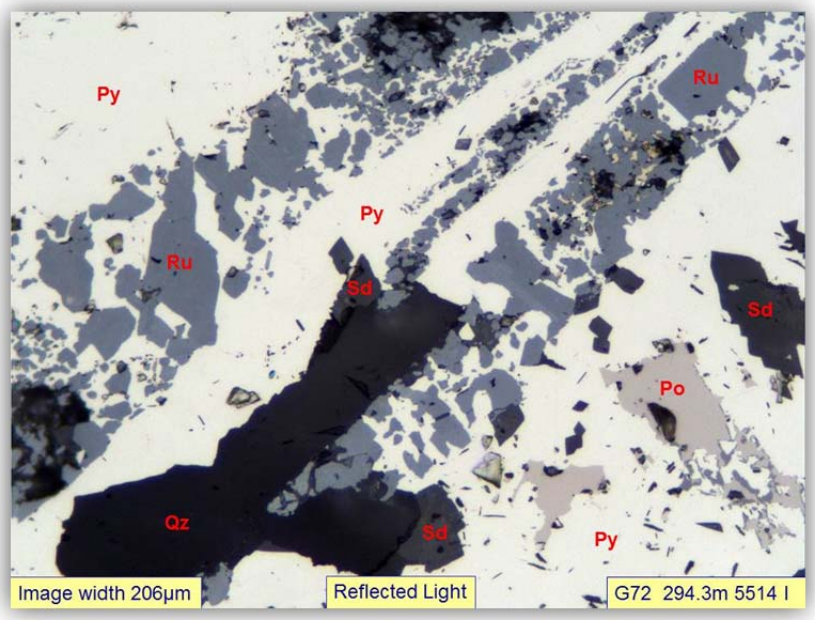
In the image above, cassiterite (Cs) crystals are cut by a micro-fracture filled by fluorite (Fl).

EARLY cassiterite– fluorite LATE



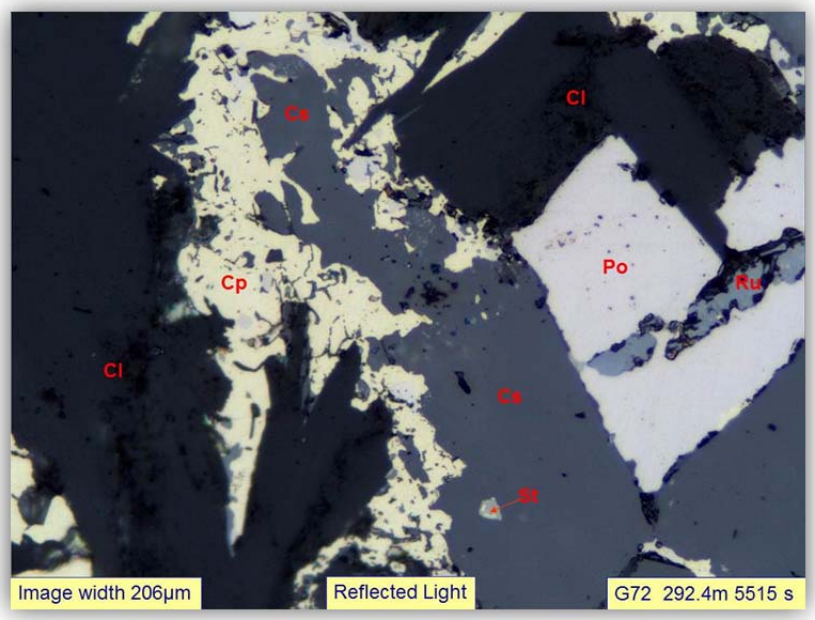
The image above shows tourmaline(Tm)-altered pyrite fractured and healed by infilling chalcopyrite (Cp).

EARLY pyrite – tourmaline+fluorite - chalcopyrite LATE



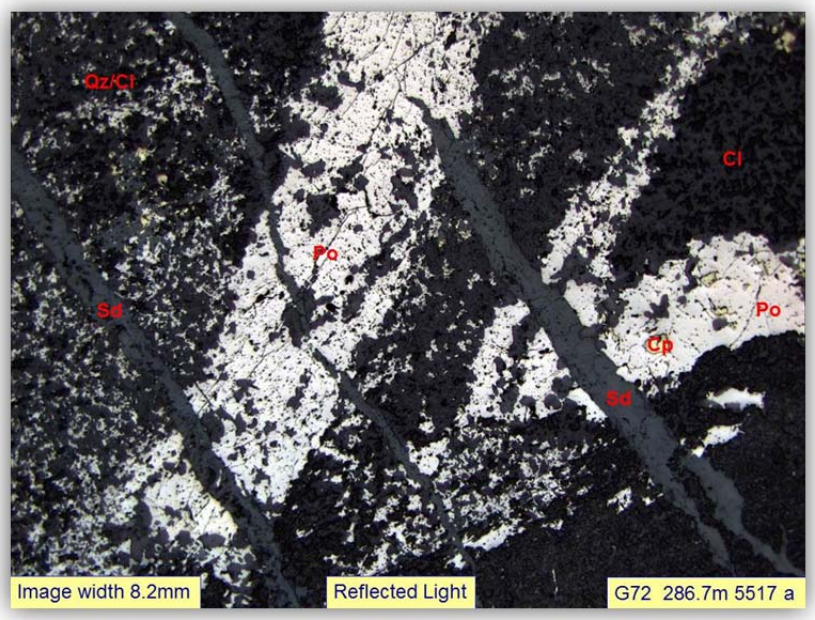
In the image above, rutile (Ru) needles are replaced by pyrite (Py).

EARLY rutile – pyrite LATE



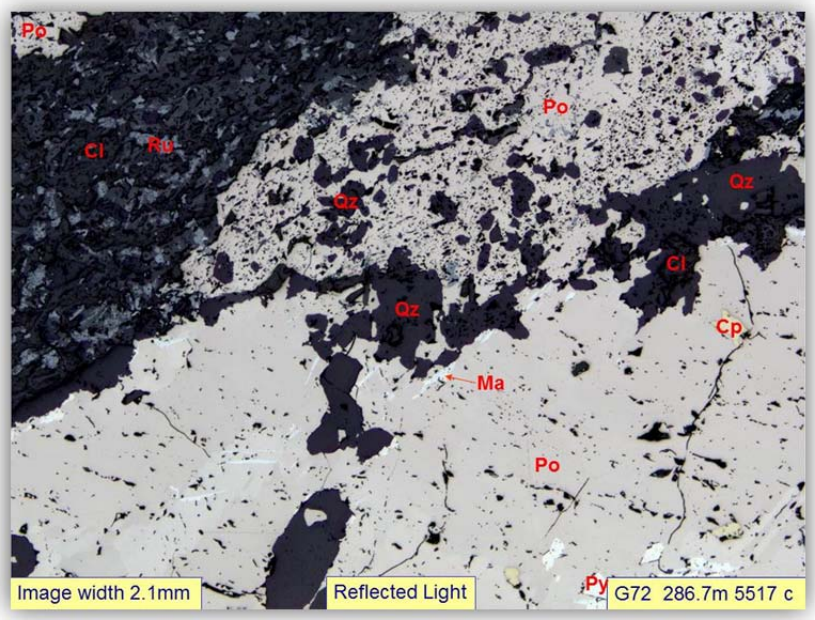
The image above shows cassiterite (Cs) partially replaced by remobilised chalcopyrite (Cp).

EARLY cassiterite – chalcopyrite LATE



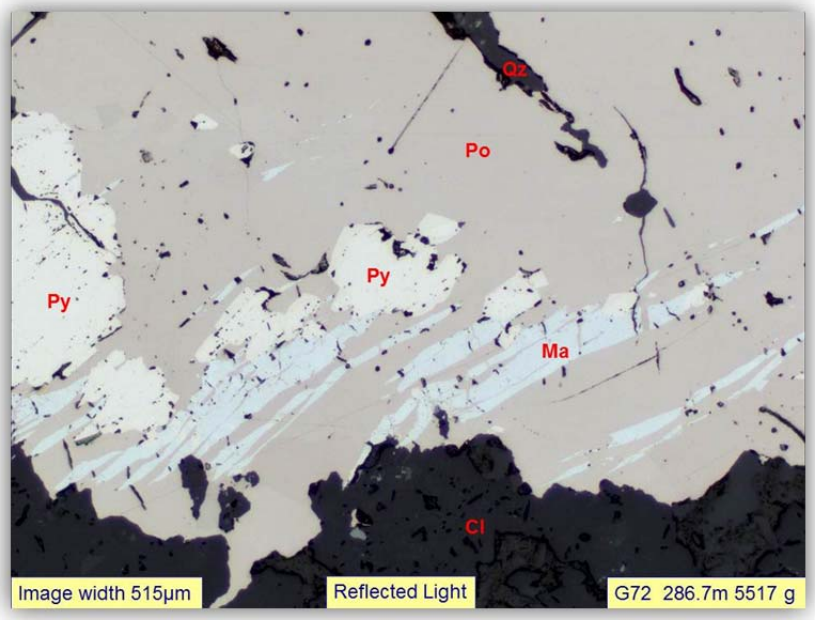
In the image above, pyrrhotite (Po) veins are cut by siderite (Sd) veinlets.

EARLY pyrrhotite – siderite LATE



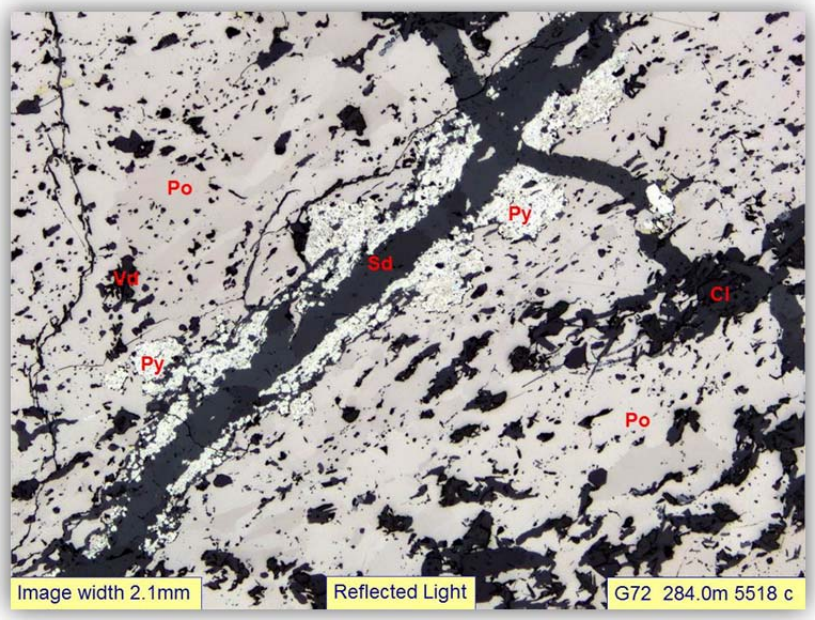
The image above shows earlier “dirty” pyrrhotite (Po) is cut by clean massive pyrrhotite.

EARLY dirty pyrrhotite – clean pyrrhotite LATE



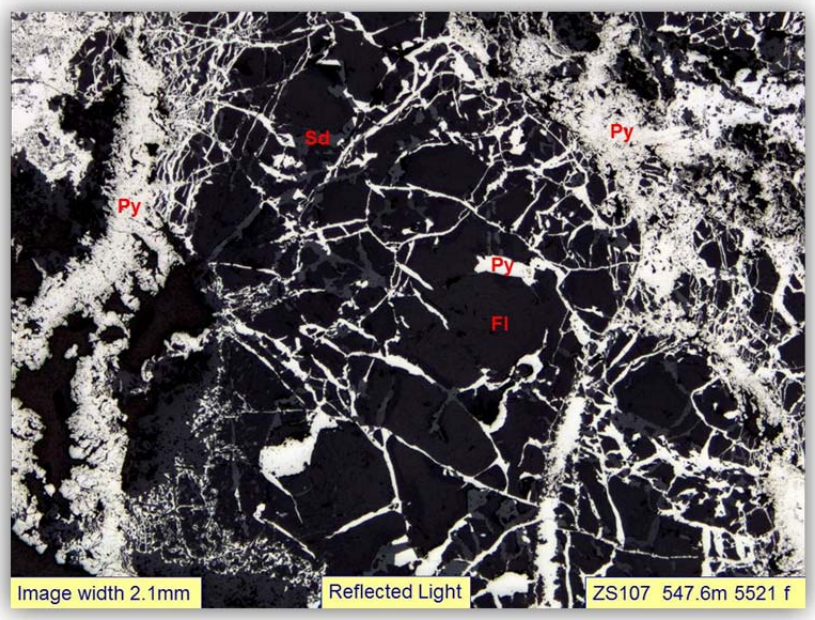
In the image above, pyrrhotite (Po) has exsolved out marcasite (Ma) flames which have later transformed to pyrite (Py).

EARLY pyrrhotite – marcasite - pyrite LATE



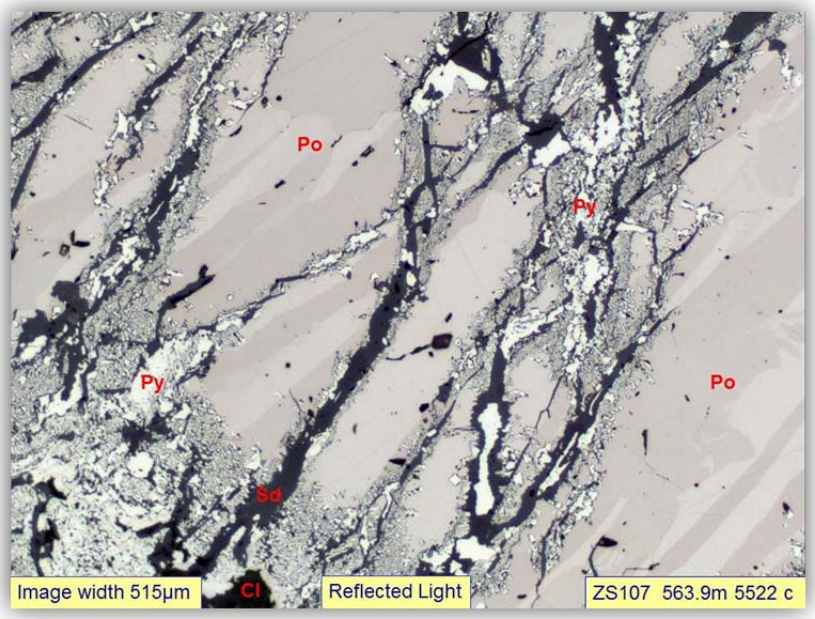
The image above shows pyrrhotite (Po) cut by siderite (Sd) veinlets which have altered the immediate pyrrhotite wallrock to melnikovite pyrite (Py).

EARLY pyrrhotite – melnikovite pyrite LATE



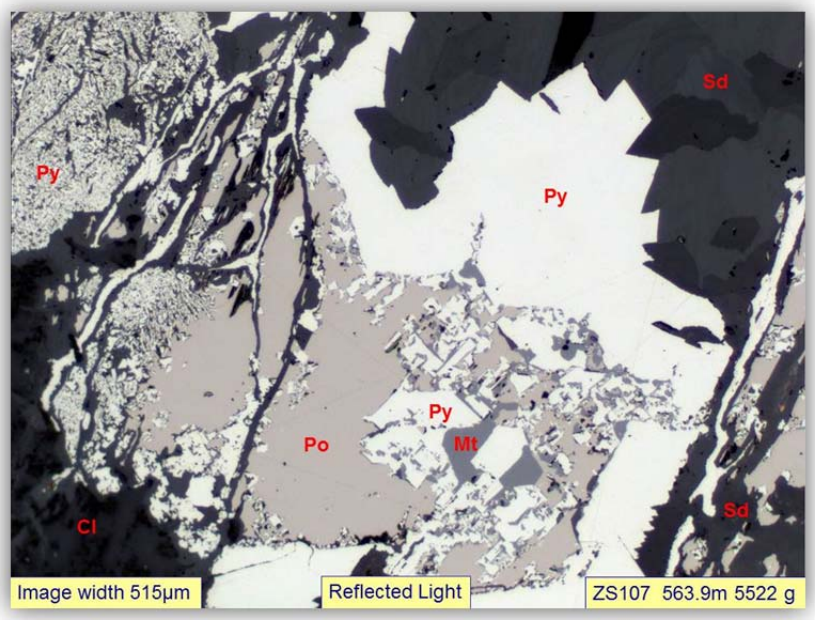
In the image above, fractured fluorite (Fl) has been healed by siderite (Sd) and pyrite (Py).

EARLY fluorite – siderite+pyrite LATE



The image above shows pyrrhotite (Po) cut by braided siderite (Sd) veinlets which have intricately altered the immediate pyrrhotite wallrock to fine-grained pyrite (Py).

EARLY pyrrhotite – siderite - pyrite LATE



The image above shows pyrrhotite (Po) cut by braided siderite (Sd) veinlets which have intricately altered the pyrrhotite to pyrite (Py) and magnetite (Mt).

EARLY pyrrhotite – siderite – pyrite+magnetite LATE

The examples illustrated above amply demonstrate the complexity of the Severn paragenesis. To go further with the interpretation would be outside the original aims of the assessment. Whether further work to elucidate the paragenesis would provide any pointers to assist exploration is a moot point.

Overall Conclusions

- 14 samples from Severn drillcore have been examined in detail by the author to measure mineral composition and liberation characteristics, and in a qualitative sense to categorise the microtextures observed
- The Severn mineralisation is both mineralogically and texturally complex which will translate into mill feed variability
- The cassiterite present is generally of a medium grainsize which should fully liberate at an approximate 30µm grind
- Bismuth and fluorite may present some penalty issues if a Cu concentrate is planned

G.J.McArthur PhD FAusIMM MMICA MSEG
Principal Mineralogist
21.2.12

DETAILED MINERAGRAPHY PHOTOMICROGRAPHS

AND

QUANTITATIVE 53µm MINERALOGY

Core Scan

QXRD: 42% pyrite, 12% fluorite, 12% siderite, 11% biotite, 6% kaolinite, 5% muscovite

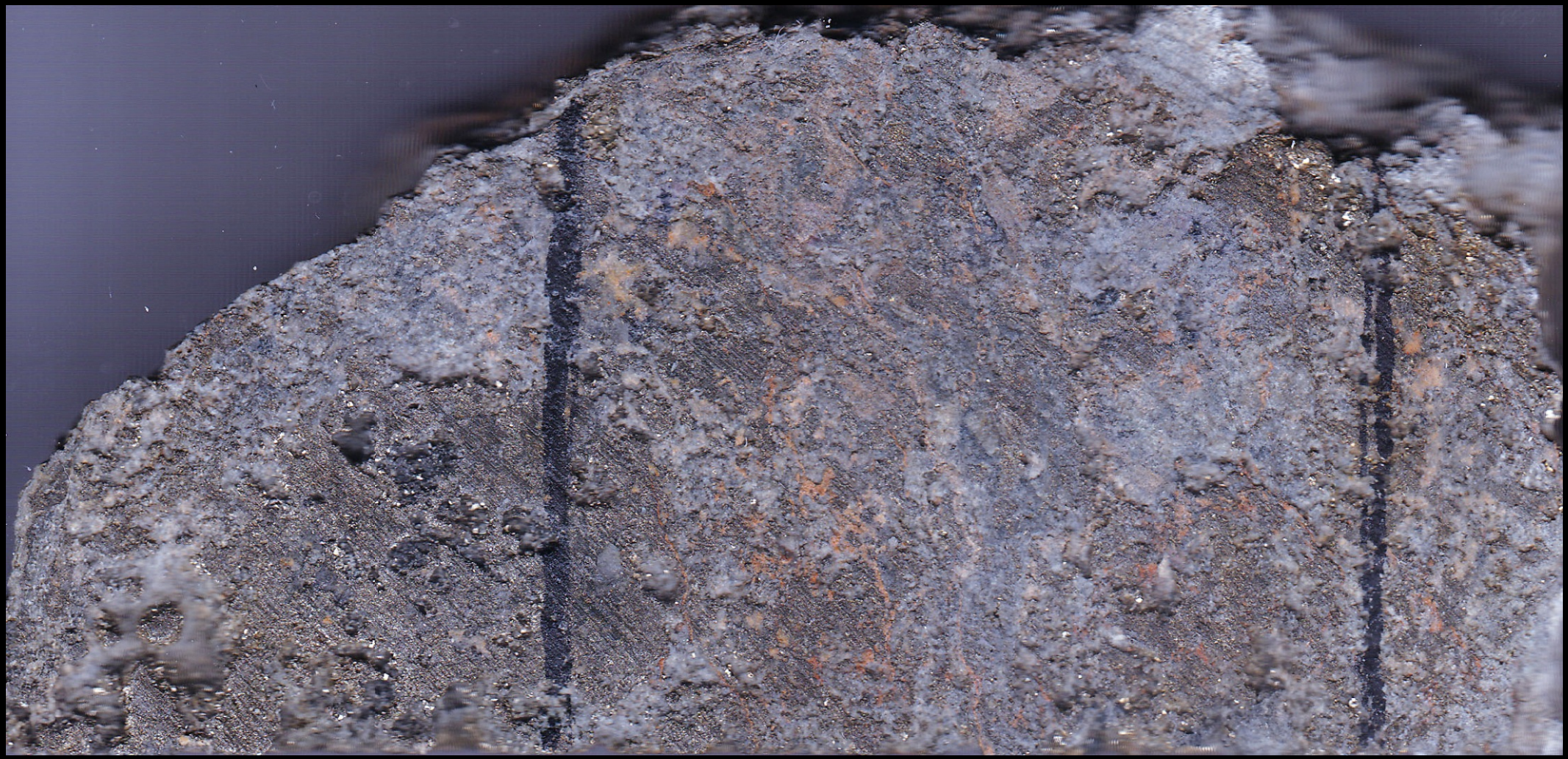
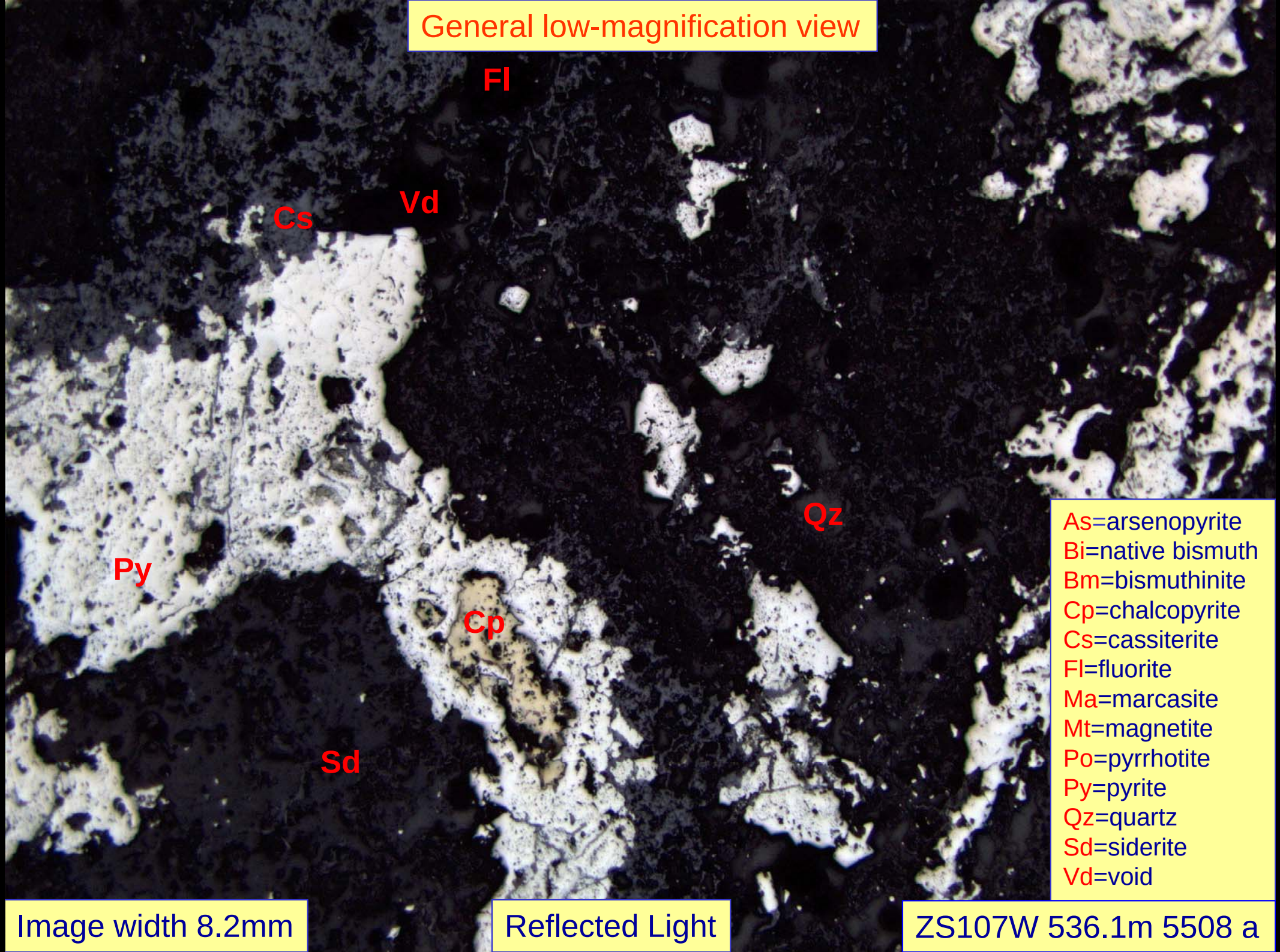
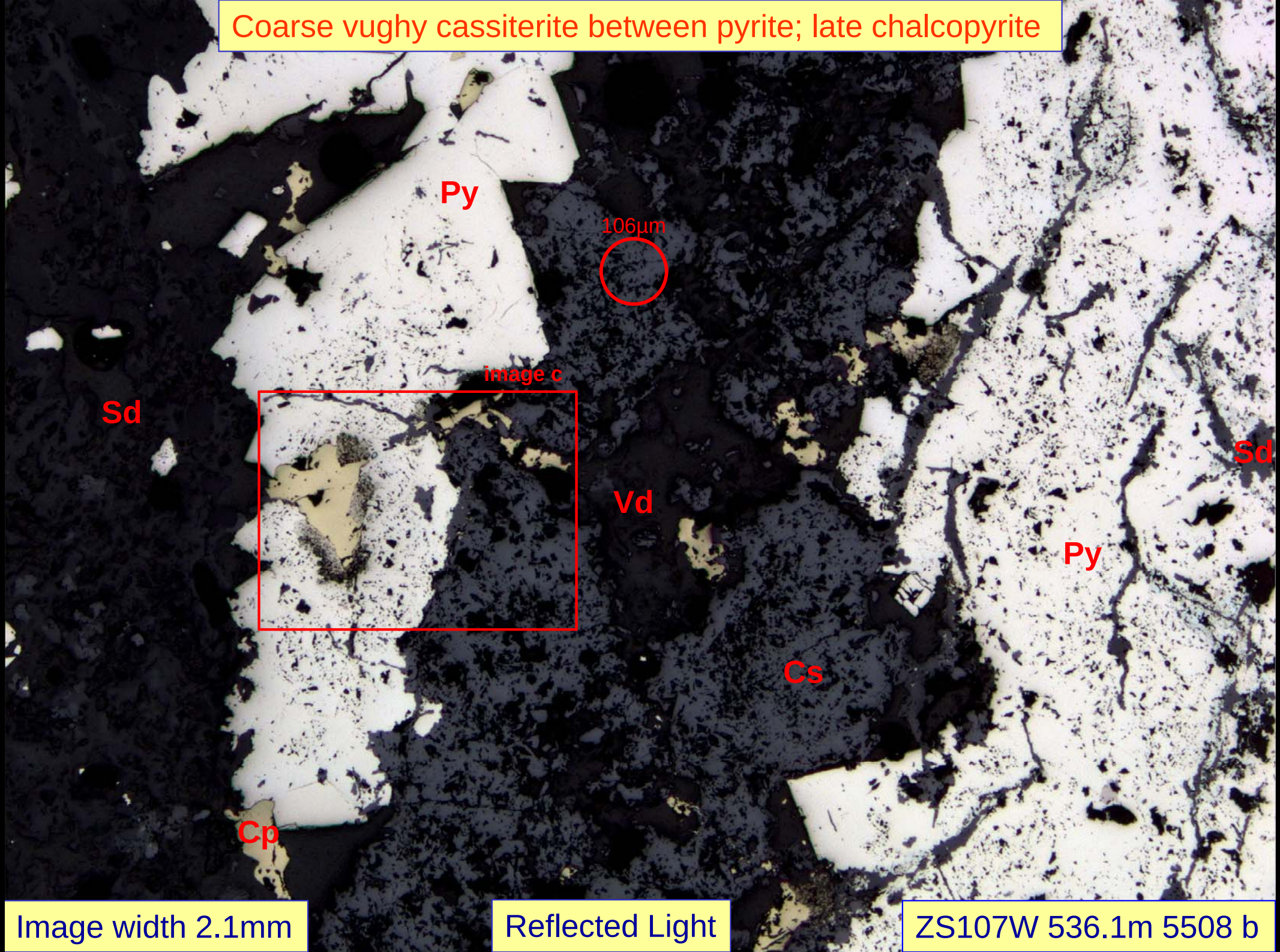
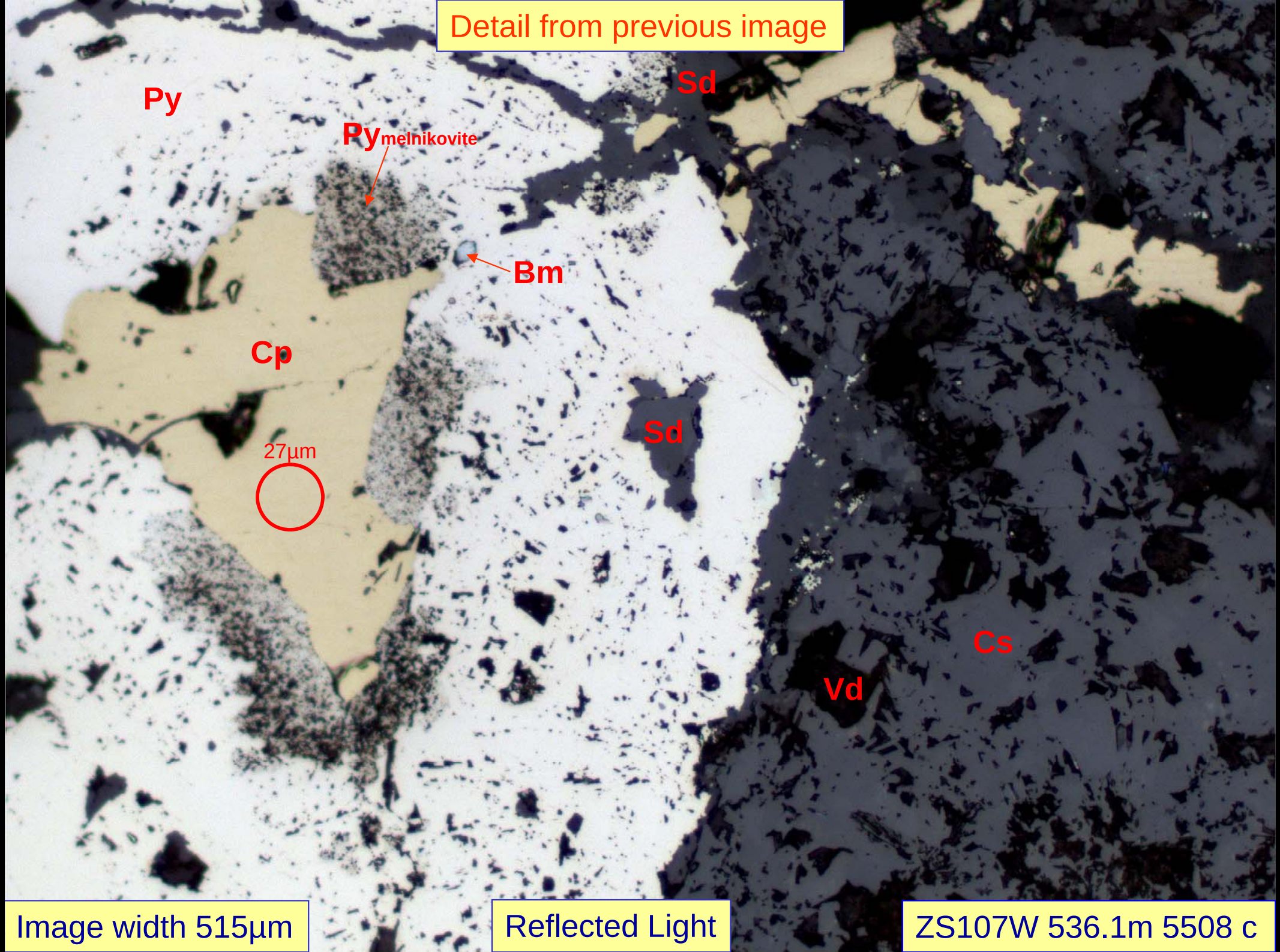


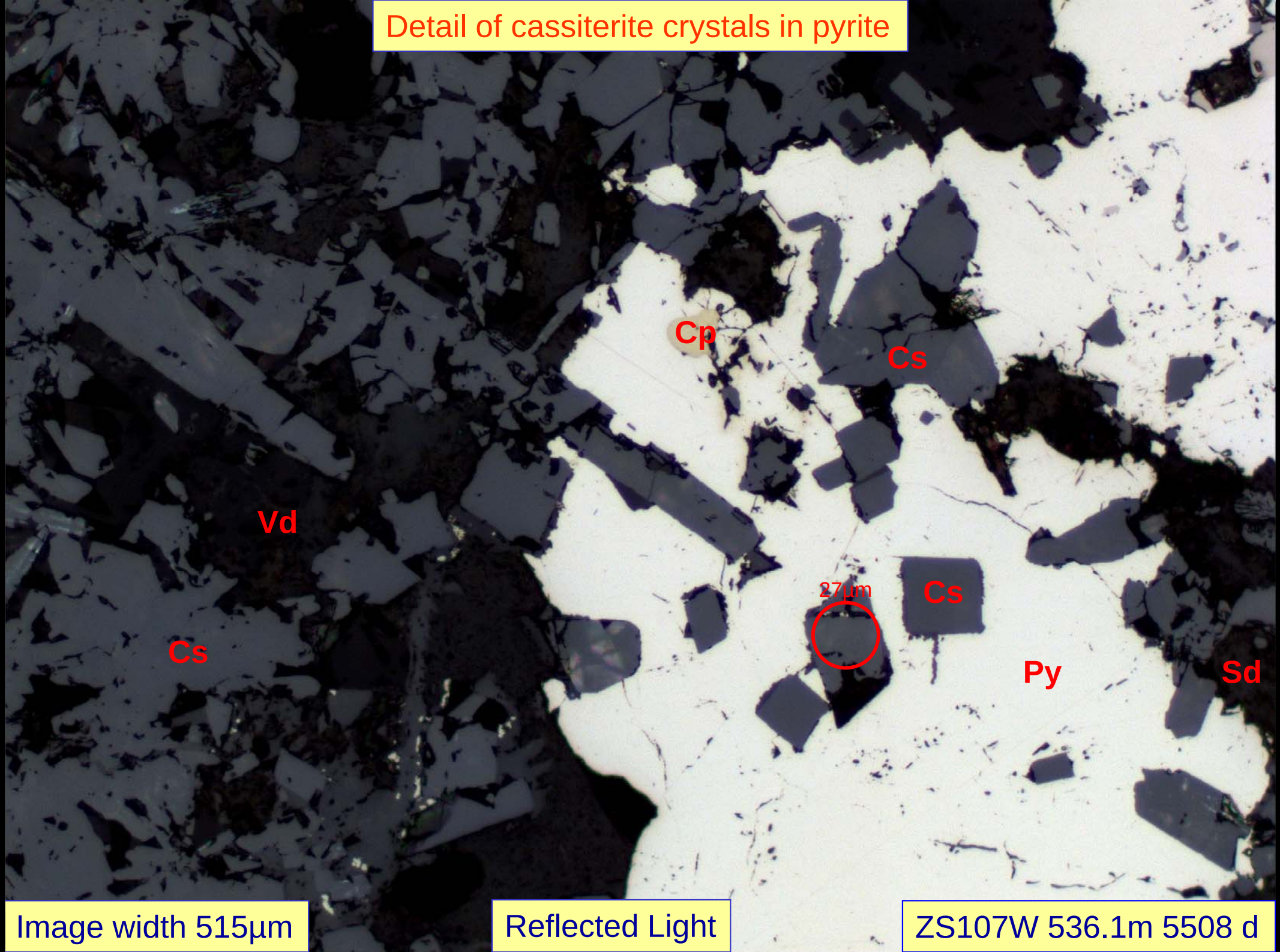
Image width ~95mm

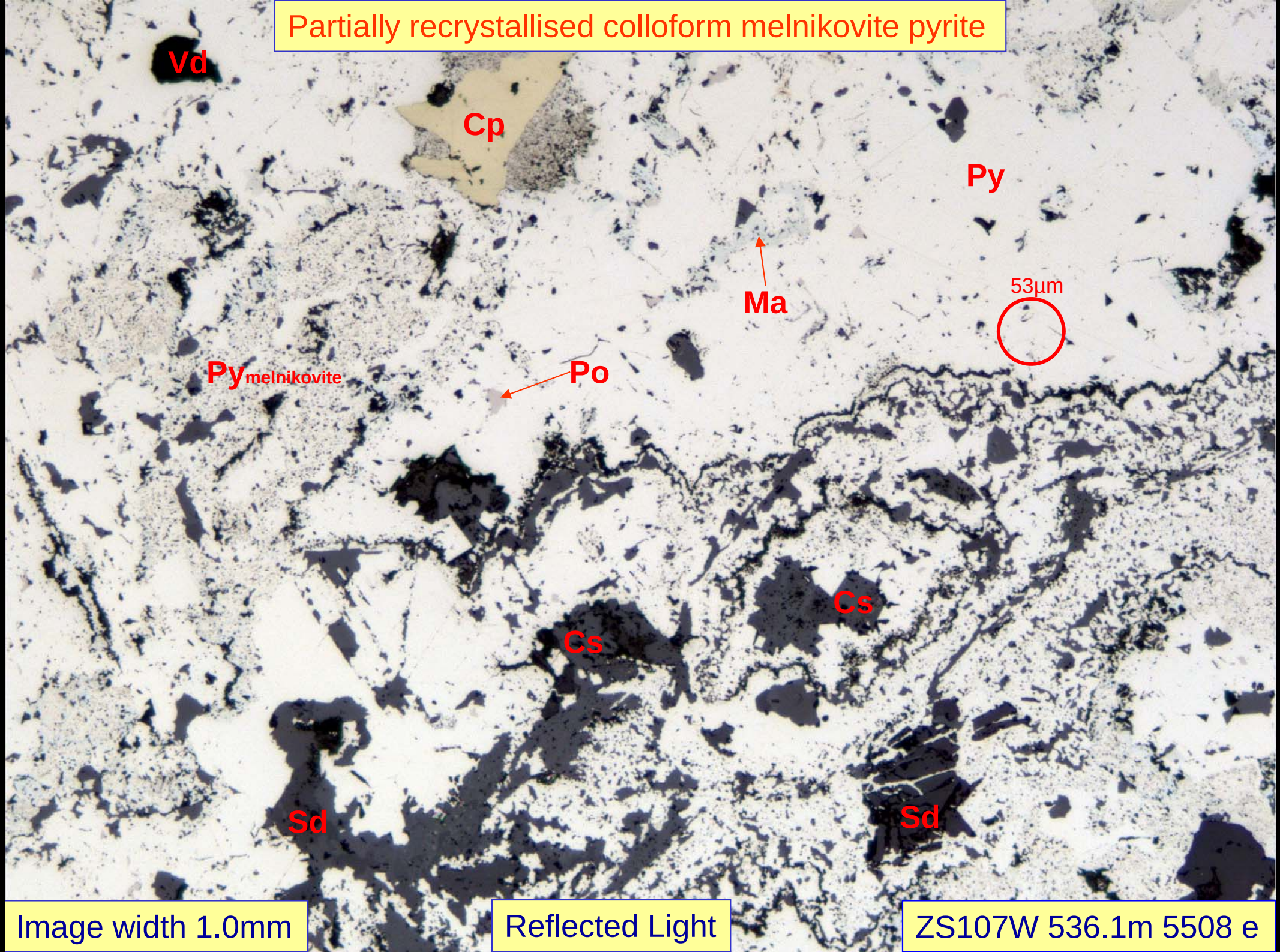
ZS107W 536.1m 5508

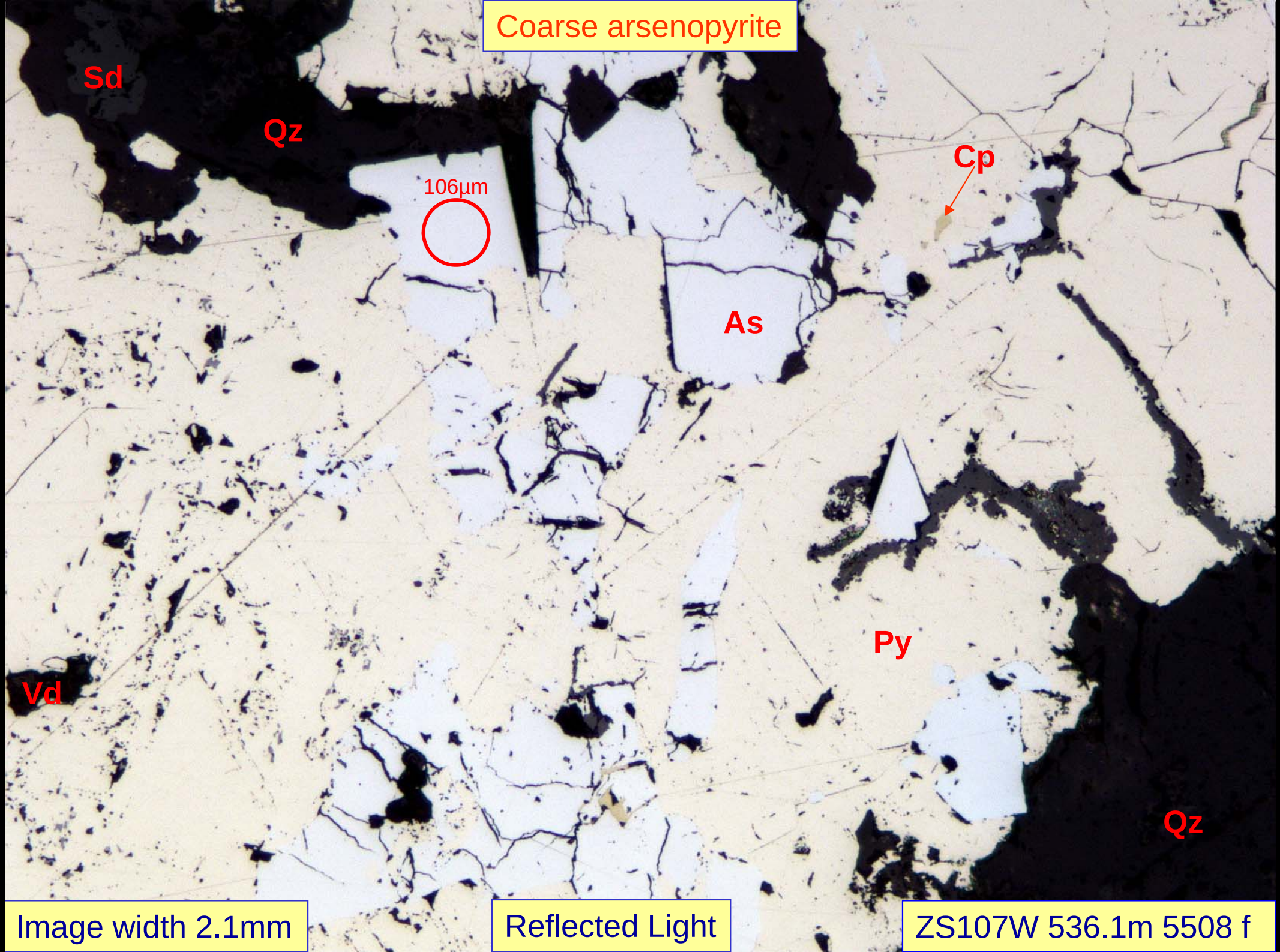

General low-magnification view
Fl
Vd
Cs
Qz
Py
Cp
Sd
As=arsenopyrite
Bi=native bismuth
Bm=bismuthinite
Cp=chalcopyrite
Cs=cassiterite
Fl=fluorite
Ma=marcasite
Mt=magnetite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Sd=siderite
Vd=void
Image width 8.2mm
Reflected Light
ZS107W 536.1m 5508 a

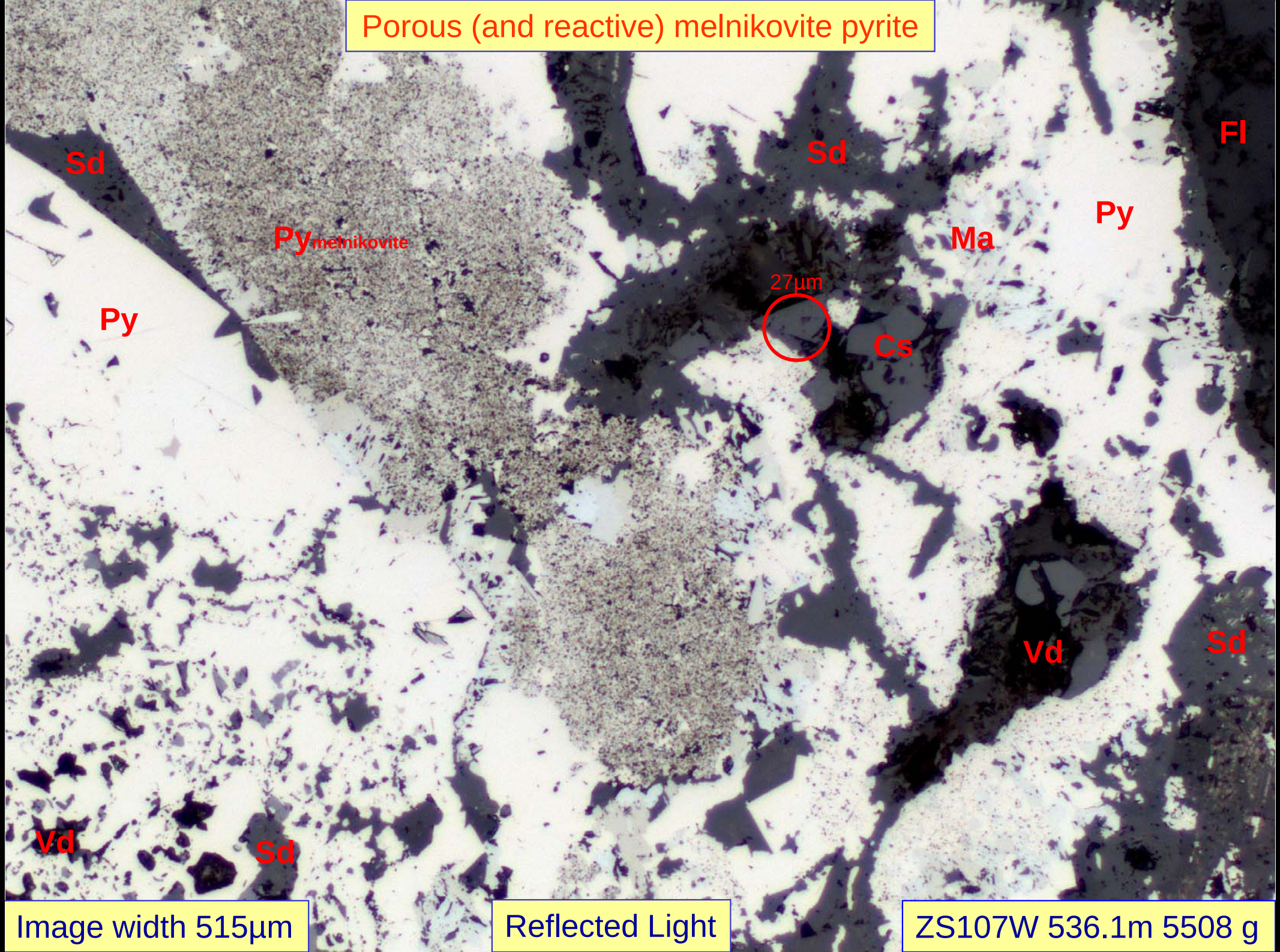

Coarse vughy cassiterite between pyrite; late chalcopyrite
Py
106µm
image c
Sd
Vd
Sd
Py
Cs
Cp
Image width 2.1mm
Reflected Light
ZS107W 536.1m 5508 b

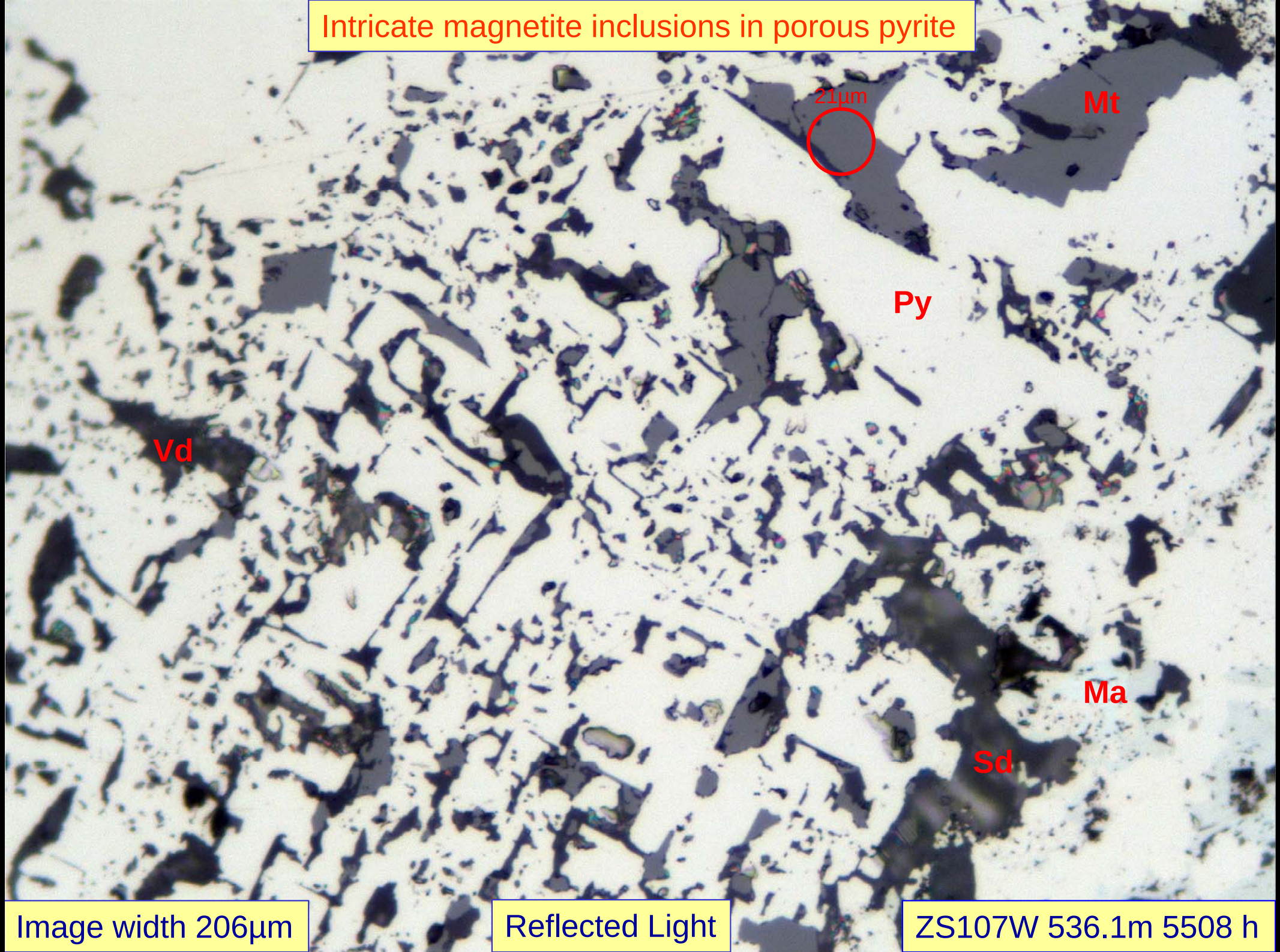

Detail from previous image
Py
Py melnikovite
Sd
Bm
Cp
Sd
27µm
Cs
Vd
Image width 515µm
Reflected Light
ZS107W 536.1m 5508 c

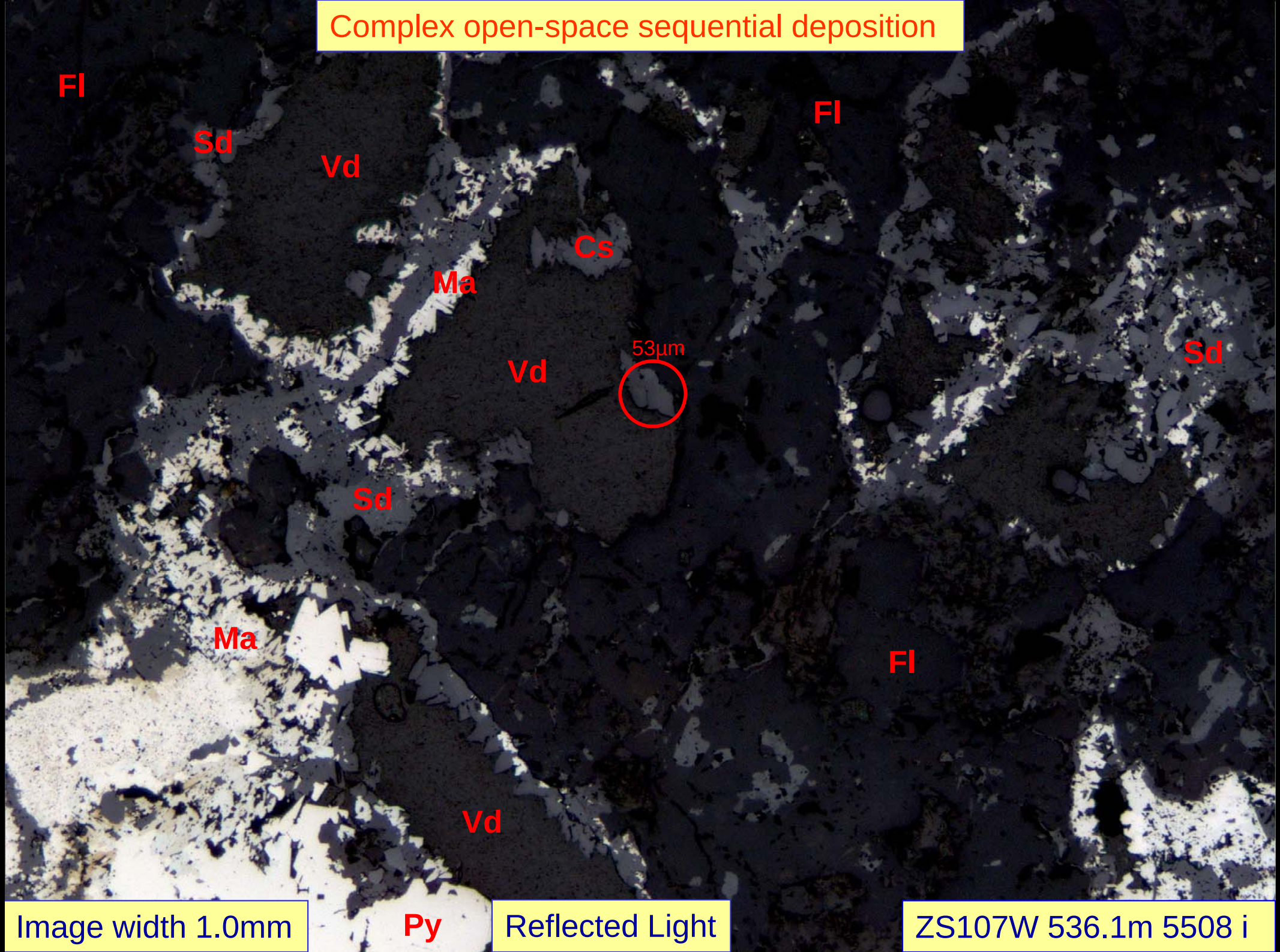

Detail of cassiterite crystals in pyrite
Cp
Cs
Vd
27µm
Cs
Cs
Py
Sd
Image width 515µm
Reflected Light
ZS107W 536.1m 5508 d

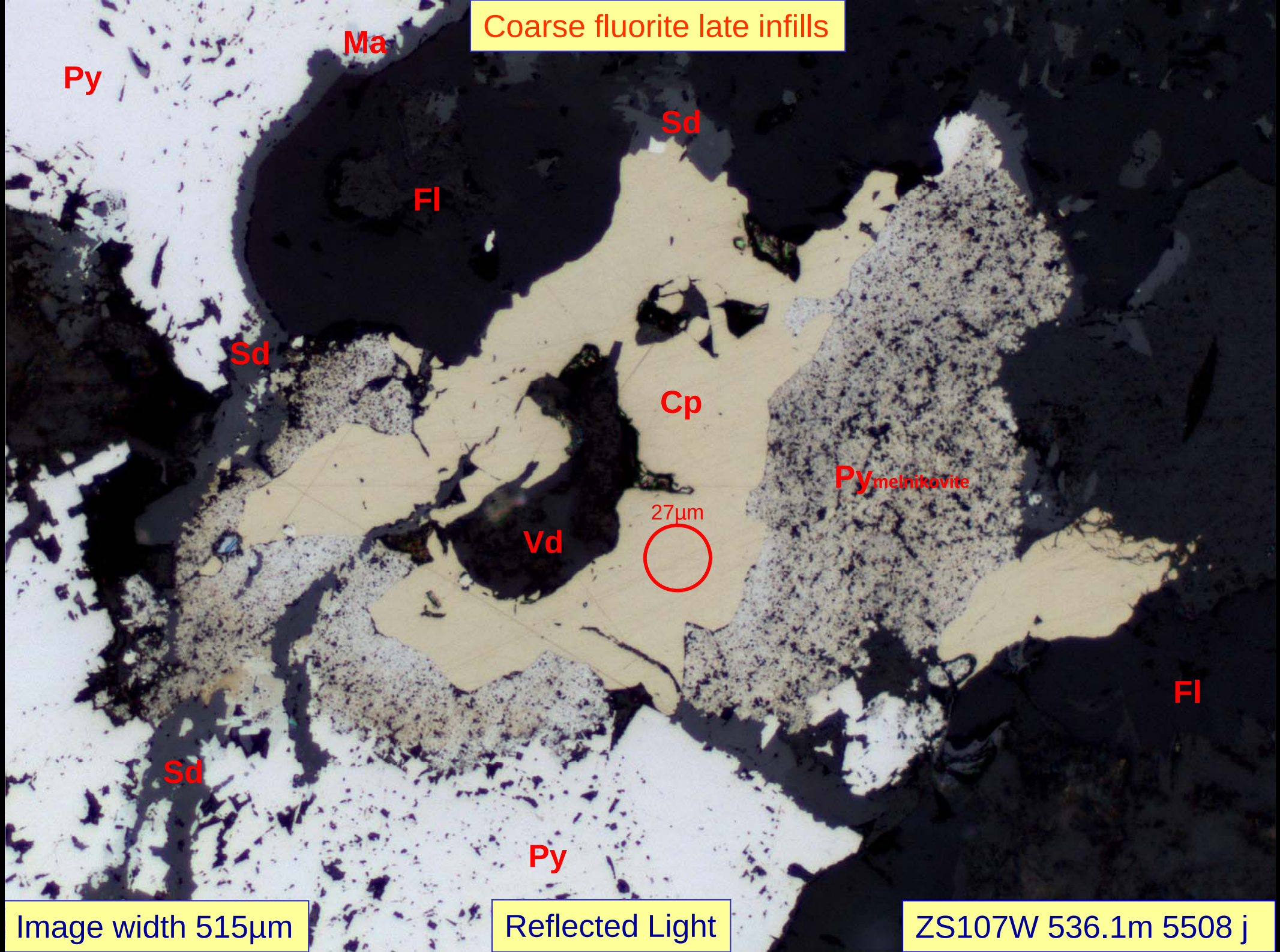

Partially recrystallised colloform melnikovite pyrite
Vd
Cp
Py
Ma
53µm
Py melnikovite
Po
Cs
Cs
Sd
Sd
Image width 1.0mm
Reflected Light
ZS107W 536.1m 5508 e

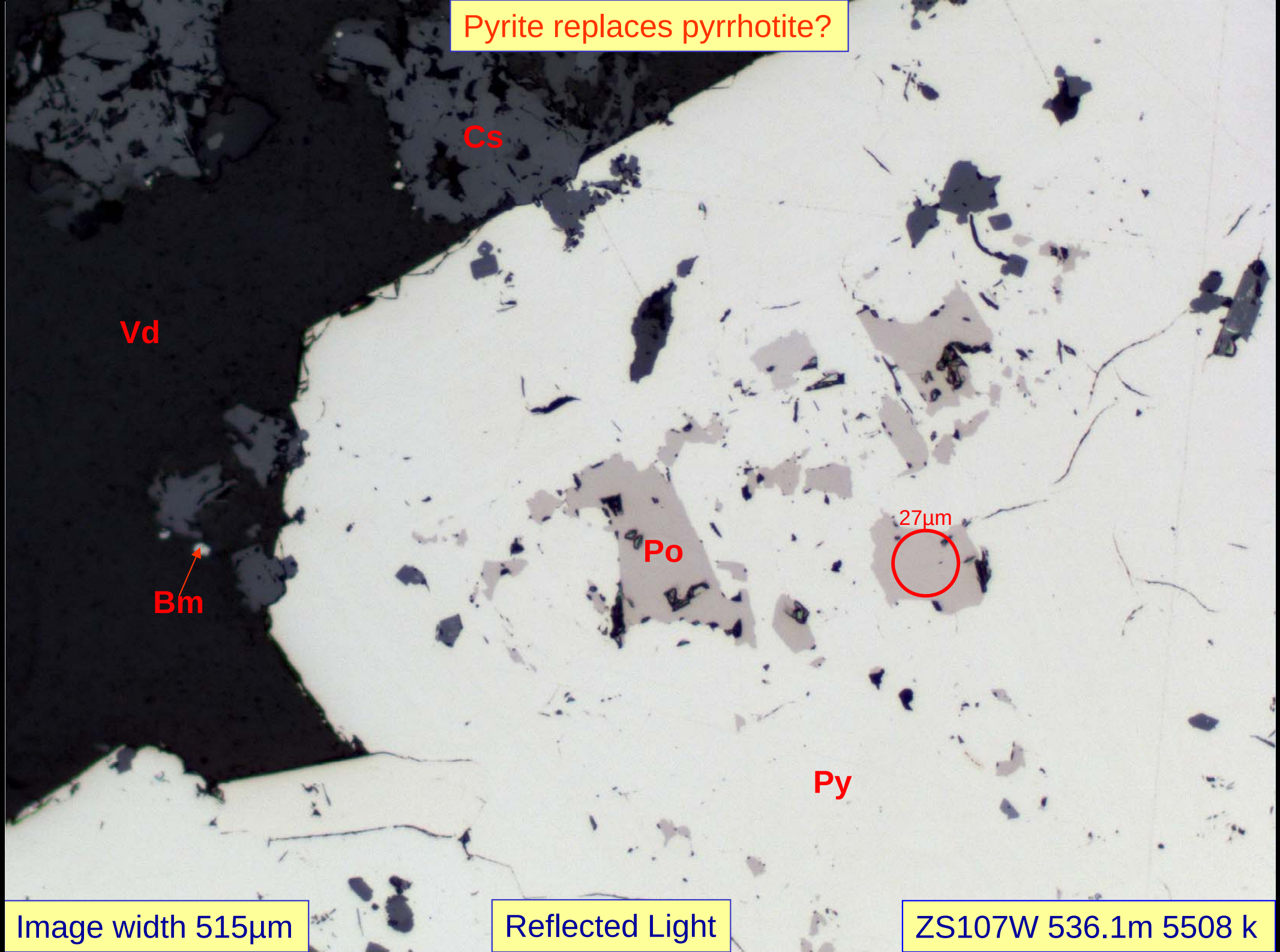

Coarse arsenopyrite
Sd
Qz
106µm
Cp
As
Py
Vd
Qz
Image width 2.1mm
Reflected Light
ZS107W 536.1m 5508 f

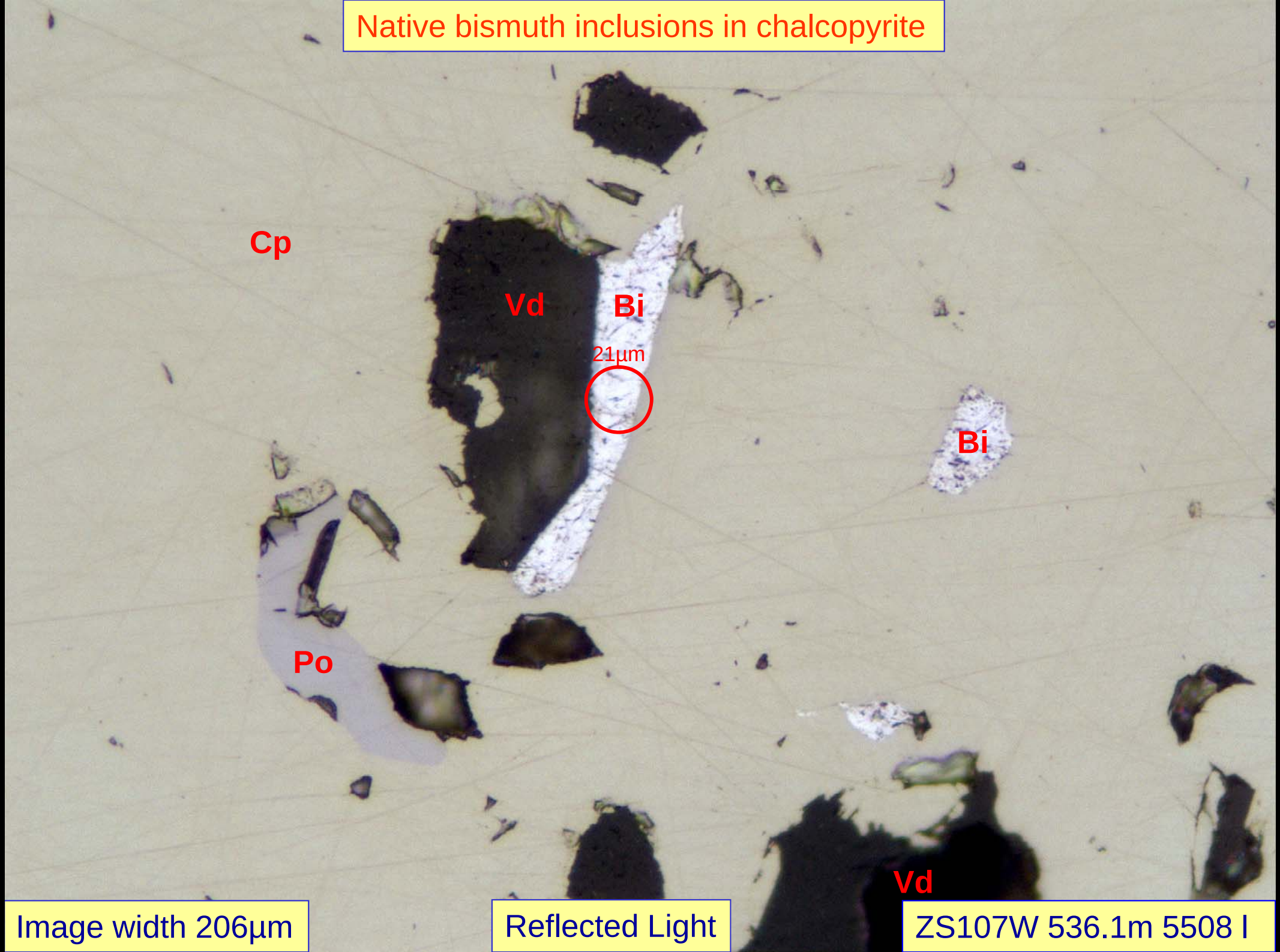

Porous (and reactive) melnikovite pyrite
Sd
Sd
Fl
Py
Ma
Py melnikovite
27µm
Py
Cs
Vd
Sd
Vd
Sd
Image width 515µm
Reflected Light
ZS107W 536.1m 5508 g

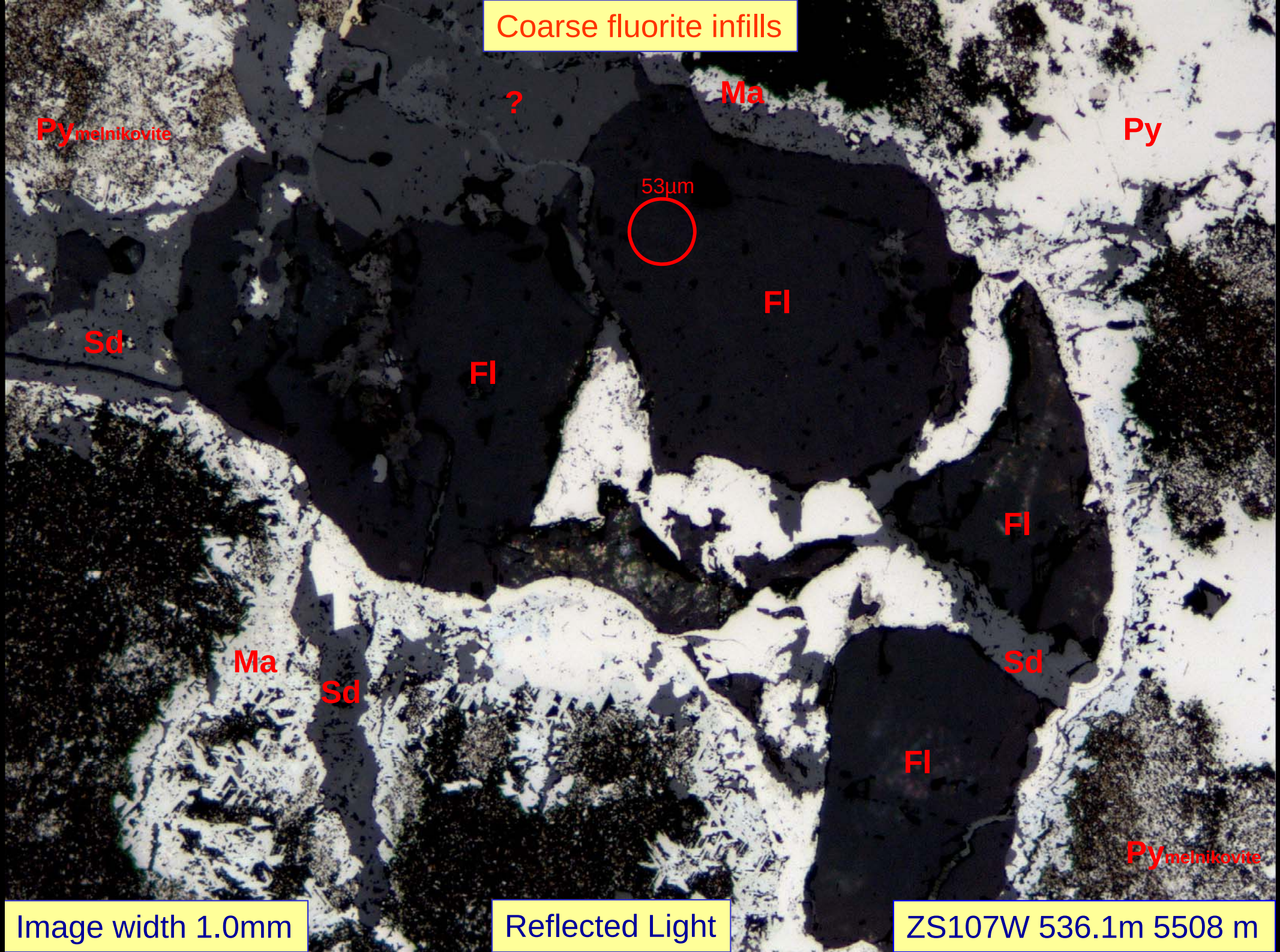

Intricate magnetite inclusions in porous pyrite
21µm
Mt
Py
Vd
Ma
Sd
Image width 206µm
Reflected Light
ZS107W 536.1m 5508 h

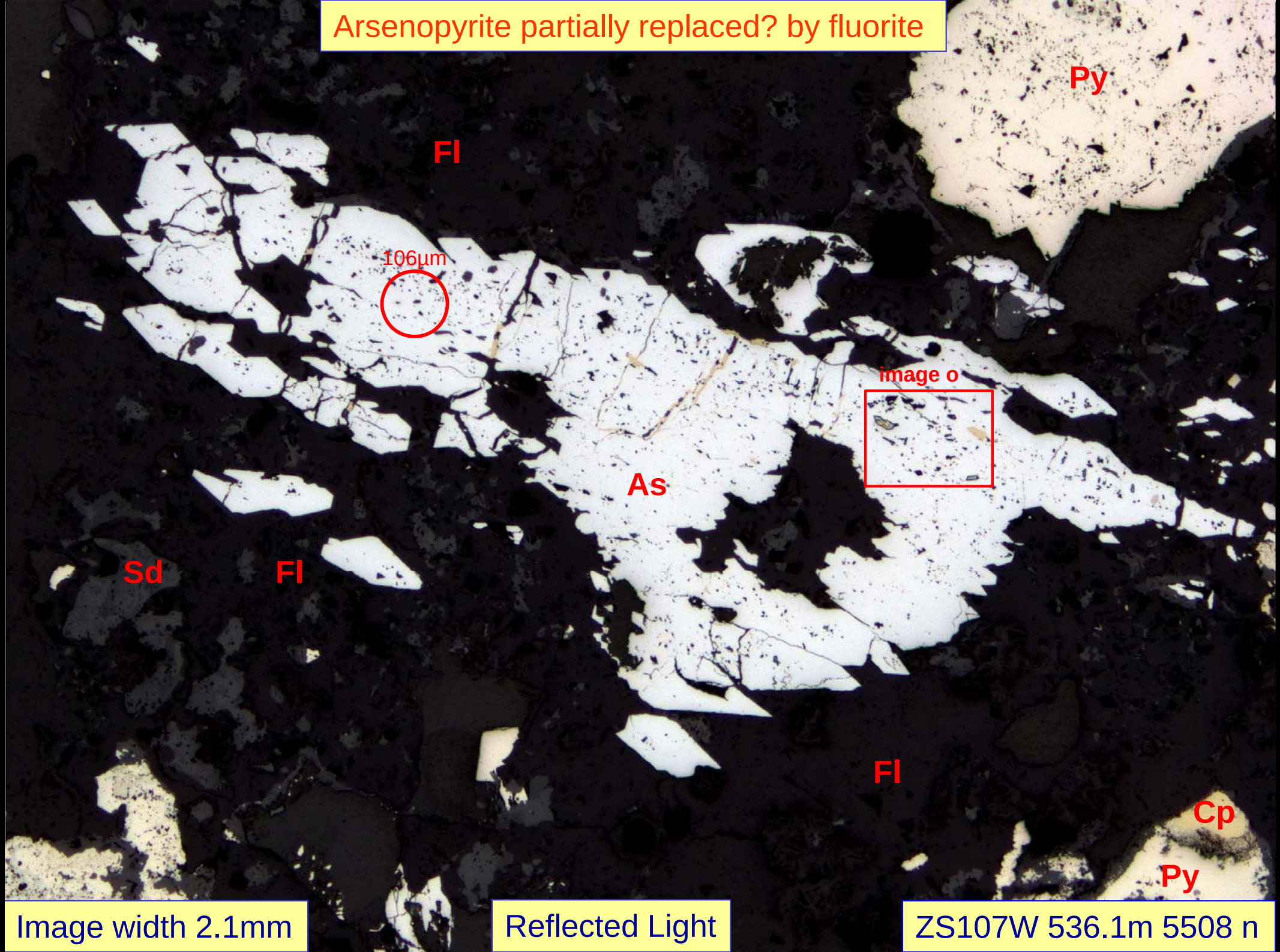

Complex open-space sequential deposition
Fl
Sd
Vd
Fl
Cs
Ma
53µm
Vd
Sd
Sd
Ma
Fl
Vd
Py
Image width 1.0mm
Reflected Light
ZS107W 536.1m 5508 i

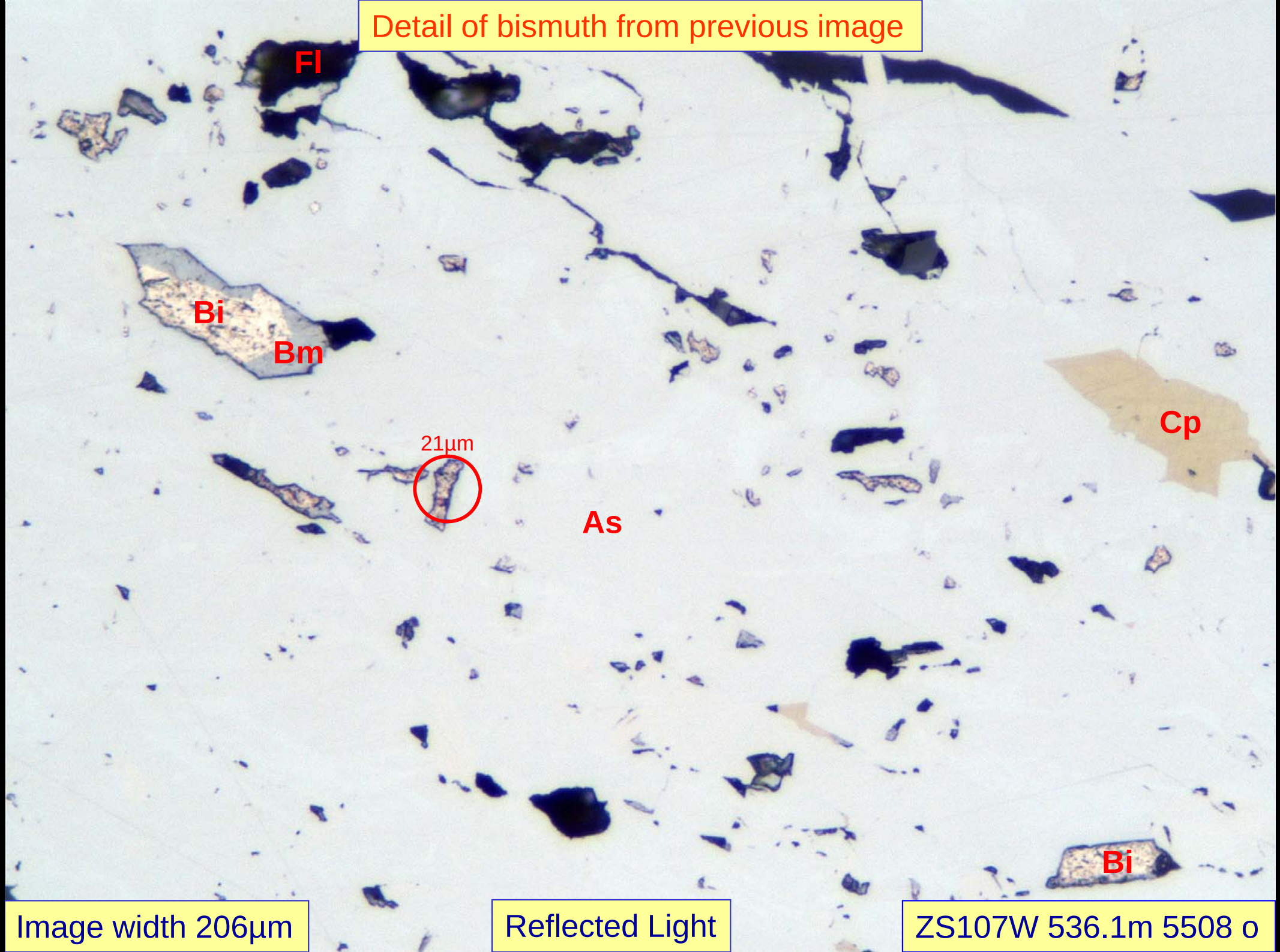

Coarse fluorite late infills
Py
Ma
Sd
Fl
Sd
Cp
Py melnikovite
27µm
Vd
Fl
Sd
Py
Image width 515µm
Reflected Light
ZS107W 536.1m 5508 j


Pyrite replaces pyrrhotite?
Cs
Vd
Bm
Po
27µm
Py
Image width 515µm
Reflected Light
ZS107W 536.1m 5508 k


Native bismuth inclusions in chalcopyrite
Cp
Vd
Bi
21µm
Bi
Po
Vd
Image width 206µm
Reflected Light
ZS107W 536.1m 5508 I


Coarse fluorite infills
?
Ma
Py melnikovite
Py
53µm
Fl
Sd
Fl
Fl
Ma
Sd
Sd
Fl
Py melnikovite
Image width 1.0mm
Reflected Light
ZS107W 536.1m 5508 m


Arsenopyrite partially replaced? by fluorite
Py
Fl
106µm
image o
As
Sd
Fl
Fl
Cp
Py
Image width 2.1mm
Reflected Light
ZS107W 536.1m 5508 n


Detail of bismuth from previous image
Fl
Bi
Bm
21µm
As
Cp
Bi
Image width 206µm
Reflected Light
ZS107W 536.1m 5508 o

PARTICLE MINERALOGY REPORT

Severn 5508

ZS107W 536.1m

GJMcA 31.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
26.3	0.0	4.0	0.0	0.0	0.0	0.0	69.6	**300**
67	0	19	0	10	4	0	79	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.52	6.23	19.9	0.03	19.1	0.01	
Actual		**3.40**		**0.16**	**27.3**	**0.09**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	47	0	8	0	0	0	65	
Binary	51	0	86	0	50	100	32	
Ternary	2	0	6	0	50	0	3	
Quat.y+	0	0	0	0	0	0	0	
Grains	39.0	0.0	17.7	0.0	1.0	0.3	87.3	1.45

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	0	0	0	100
Po	0		0	0	0	0	0
Cs	0	0		0	0	0	100
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	0	0	0	0	0		100
Ga	47	0	50	0	1	1	

TOTAL ASSOCIATION MATRIX

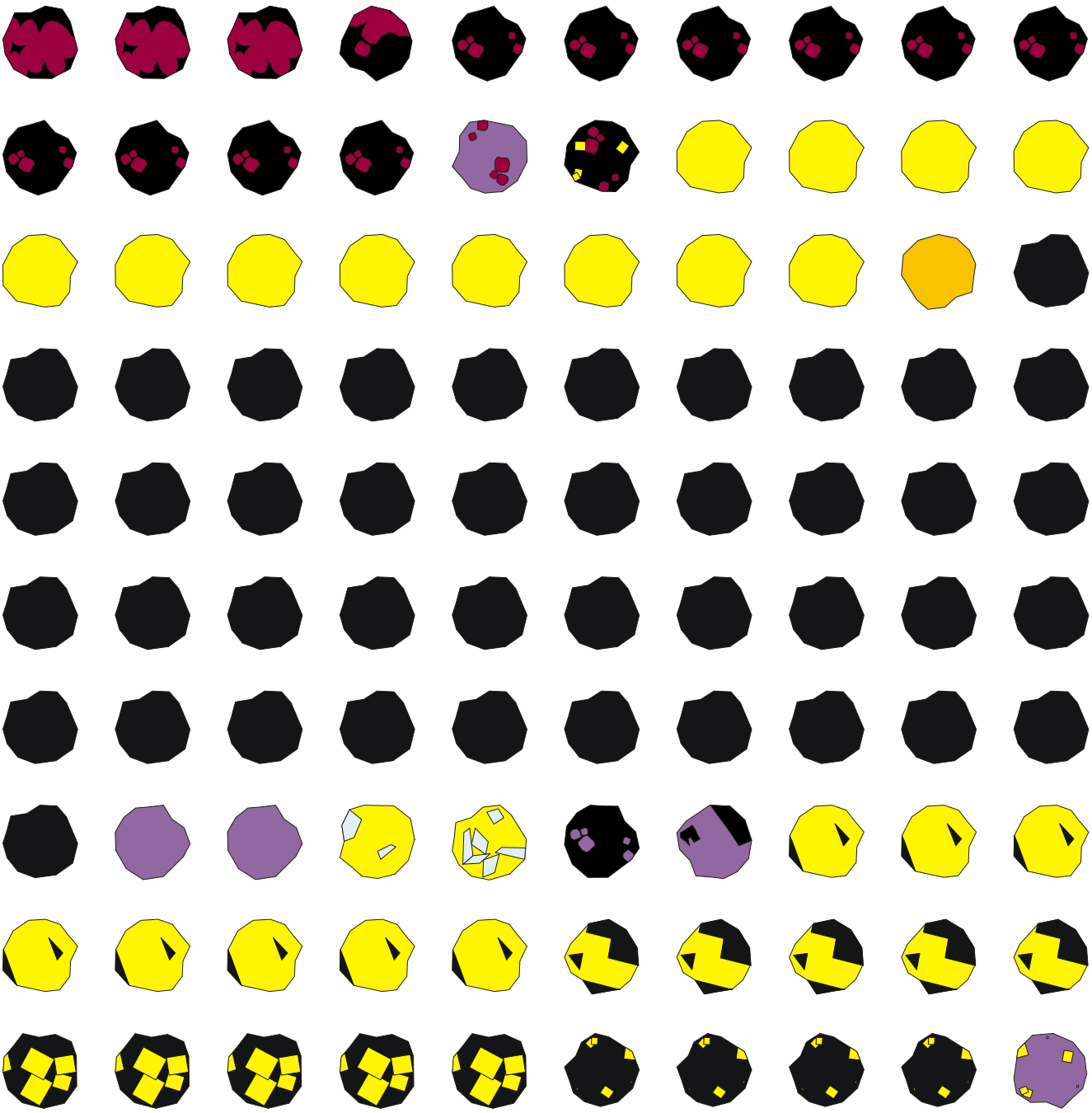
		Py	Po	Cs	St	Cp	As	Ga
	Py		0	2	0	0	0	53
	Po	0		0	0	0	0	0
of	**Cs**	4	0		0	2	0	92
all	**St**	0	0	0		0	0	0
	Cp	20	0	30	0		0	100
	As	0	0	0	0	0		100
	Ga	18	0	19	0	1	0	

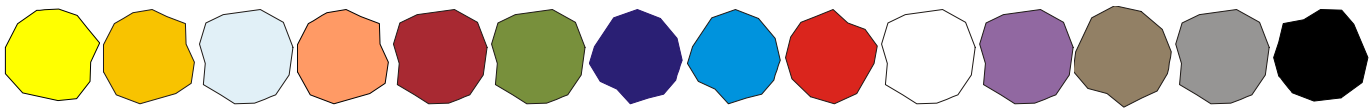
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	47		0	0	0	0	0	51	2	0
Po	0	0		0	0	0	0	0	0	0
Cs	8	0	0		0	0	0	86	6	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	50	50	0
As	0	0	0	0	0	0		100	0	0
Ga	65	15	0	16	0	0	0		3	0

Stellar Resources - Severn Drillhole Mineragraphy

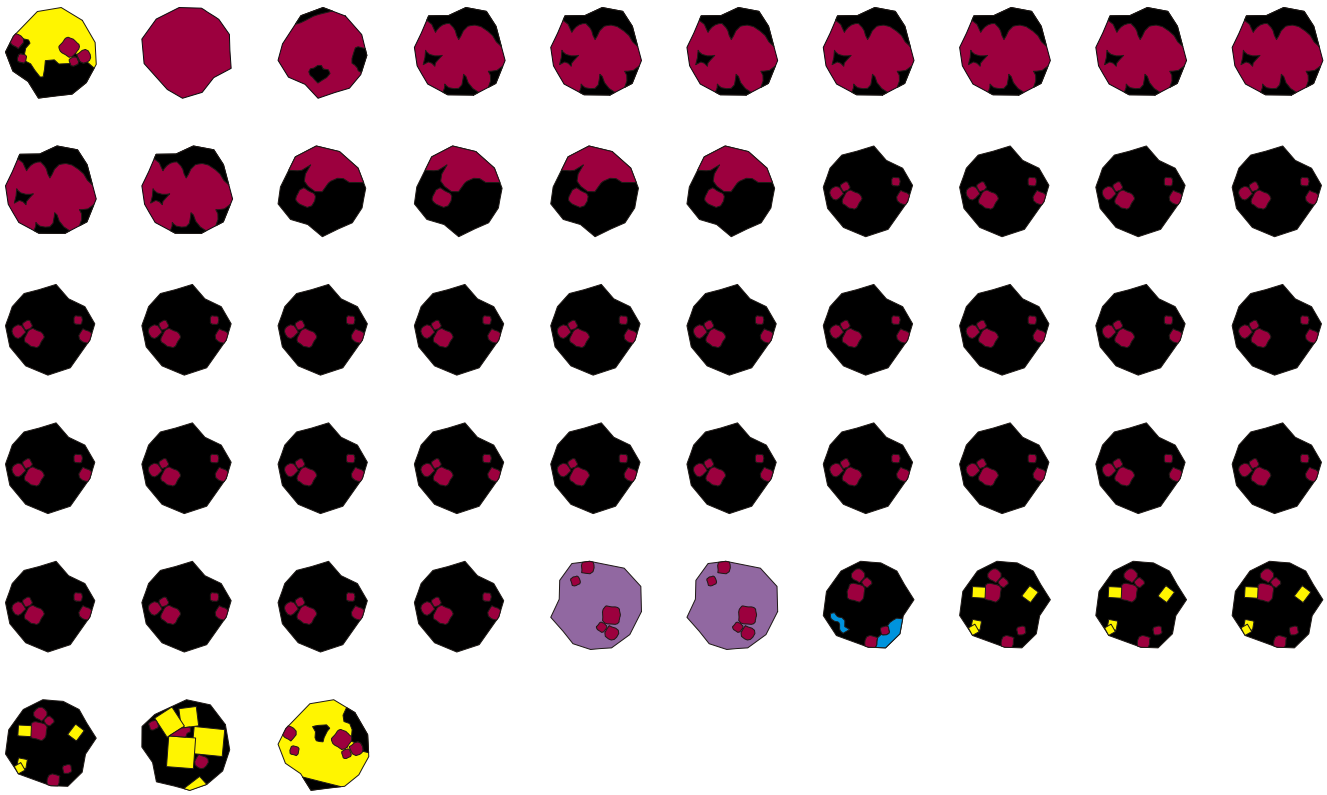
Severn 5508 **53µm mask** **January 2012**

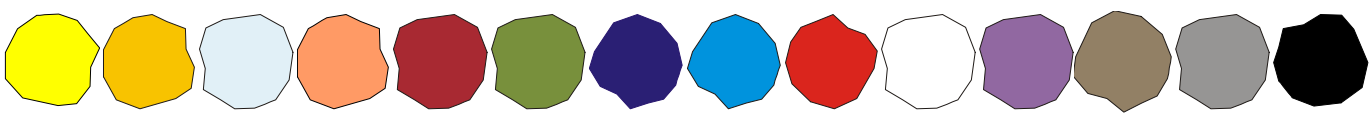




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5508 Sn Scan **53µm mask** **January 2012**





Core Scan

QXRD: 32% pyrite, 22% quartz, 16% siderite, 10% chlorite, 5% kaolinite, 5% muscovite

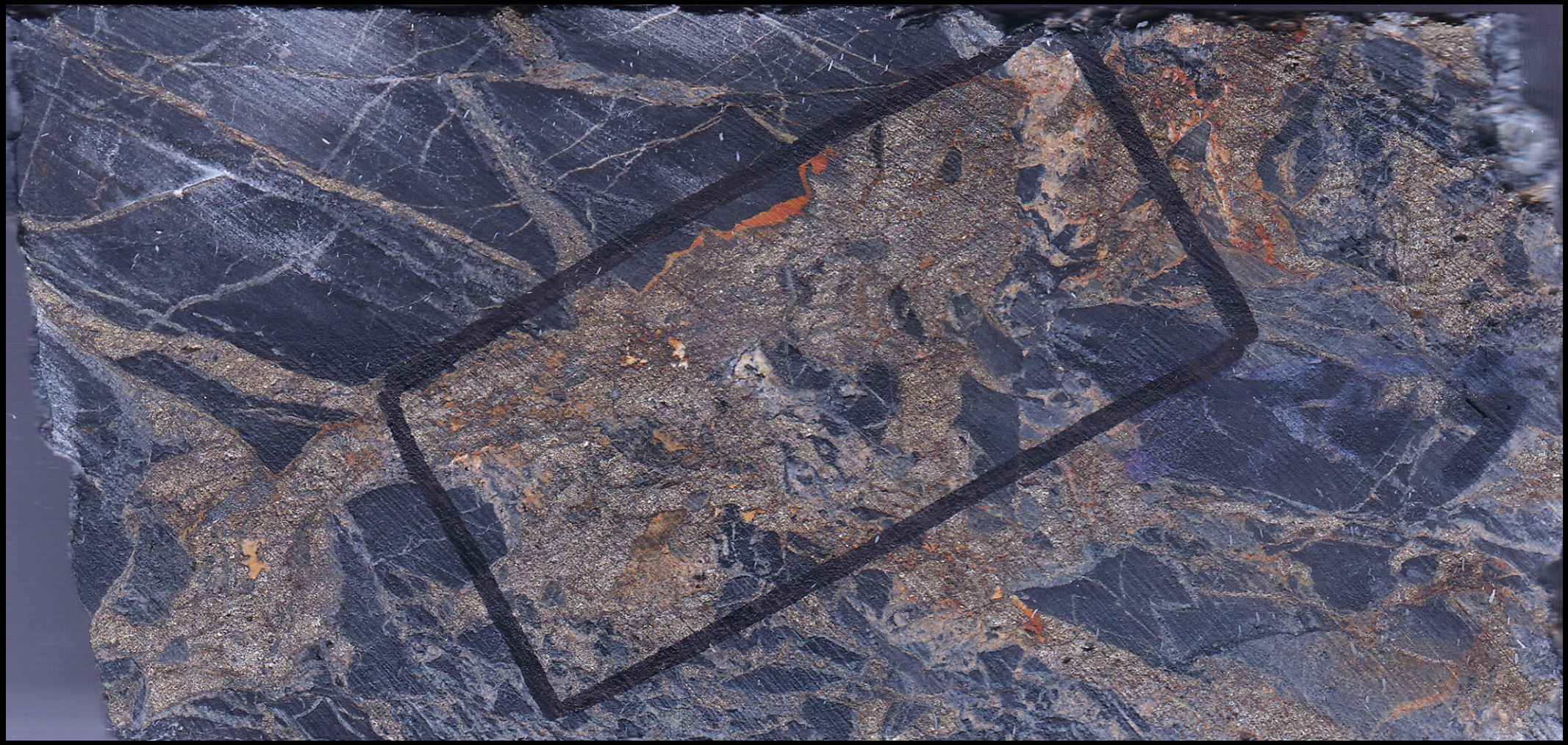
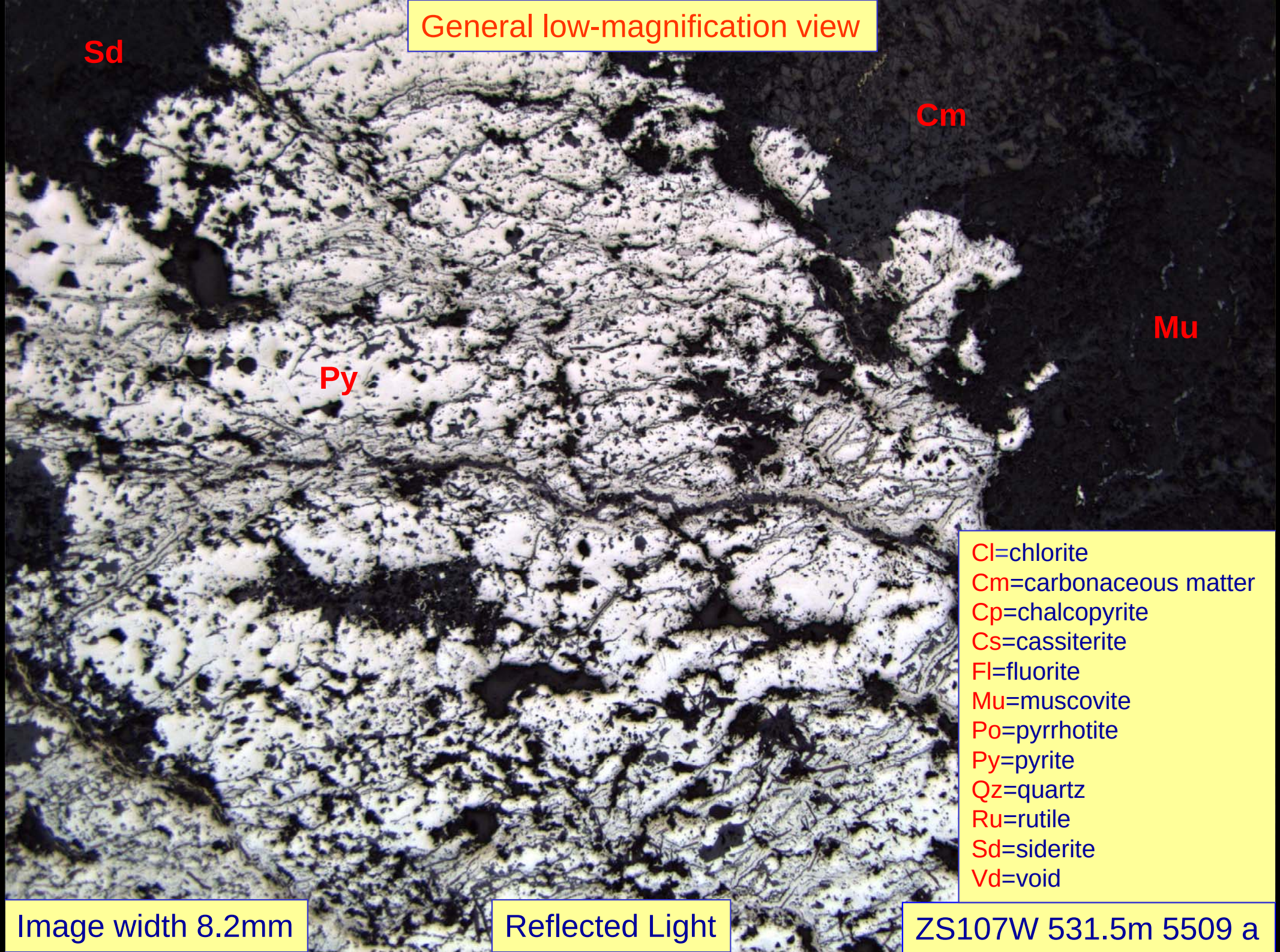
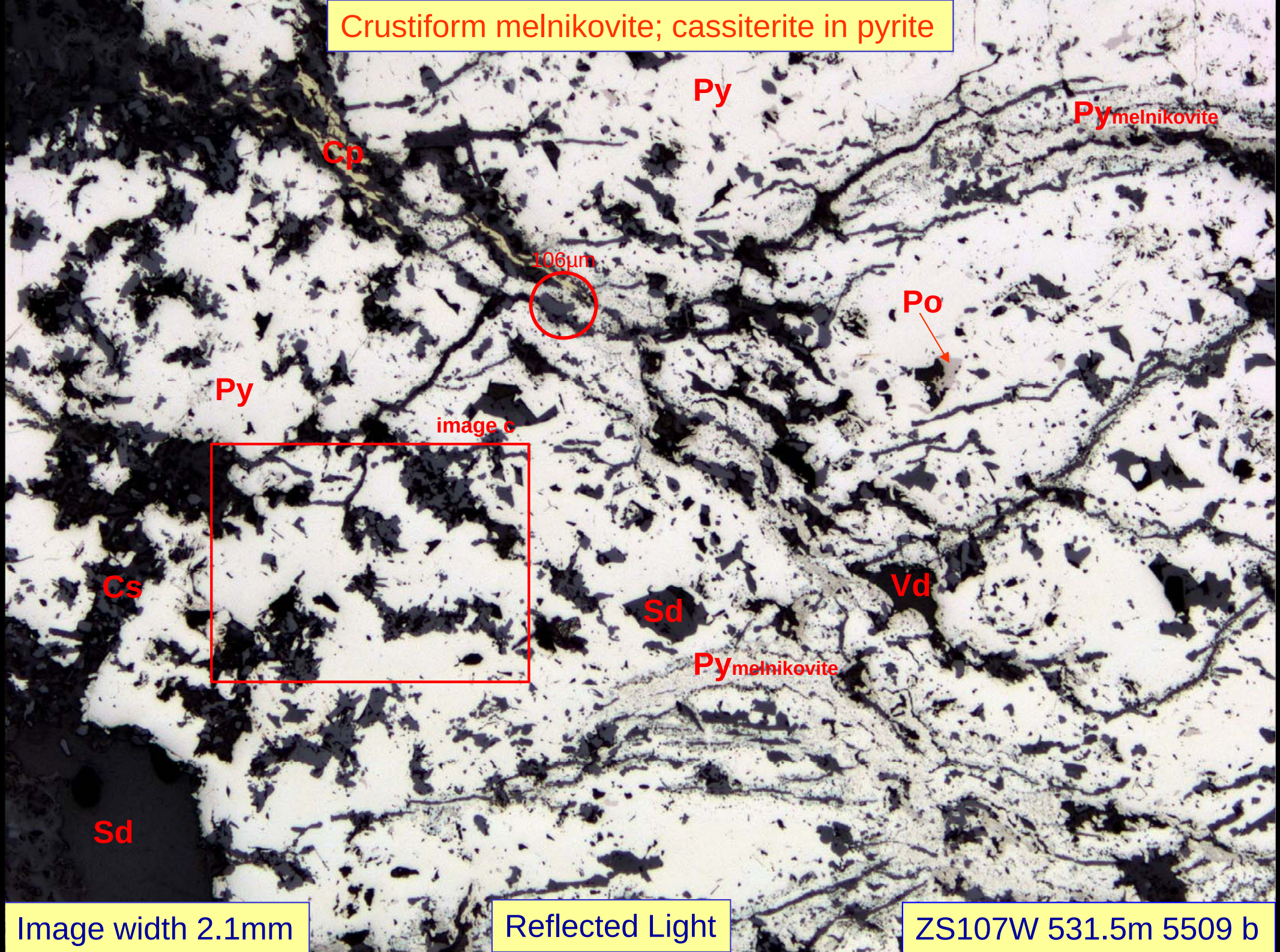


Image width ~95mm

ZS107W 531.5m 5509


General low-magnification view
Sd
Cm
Mu
Py
Cl=chlorite
Cm=carbonaceous matter
Cp=chalcopyrite
Cs=cassiterite
Fl=fluorite
Mu=muscovite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Sd=siderite
Vd=void
Image width 8.2mm
Reflected Light
ZS107W 531.5m 5509 a


Crustiform melnikovite; cassiterite in pyrite
Py
Py melnikovite
Cp
106µm
Po
Py
image c
Cs
Sd
Vd
Py melnikovite
Sd
Image width 2.1mm
Reflected Light
ZS107W 531.5m 5509 b

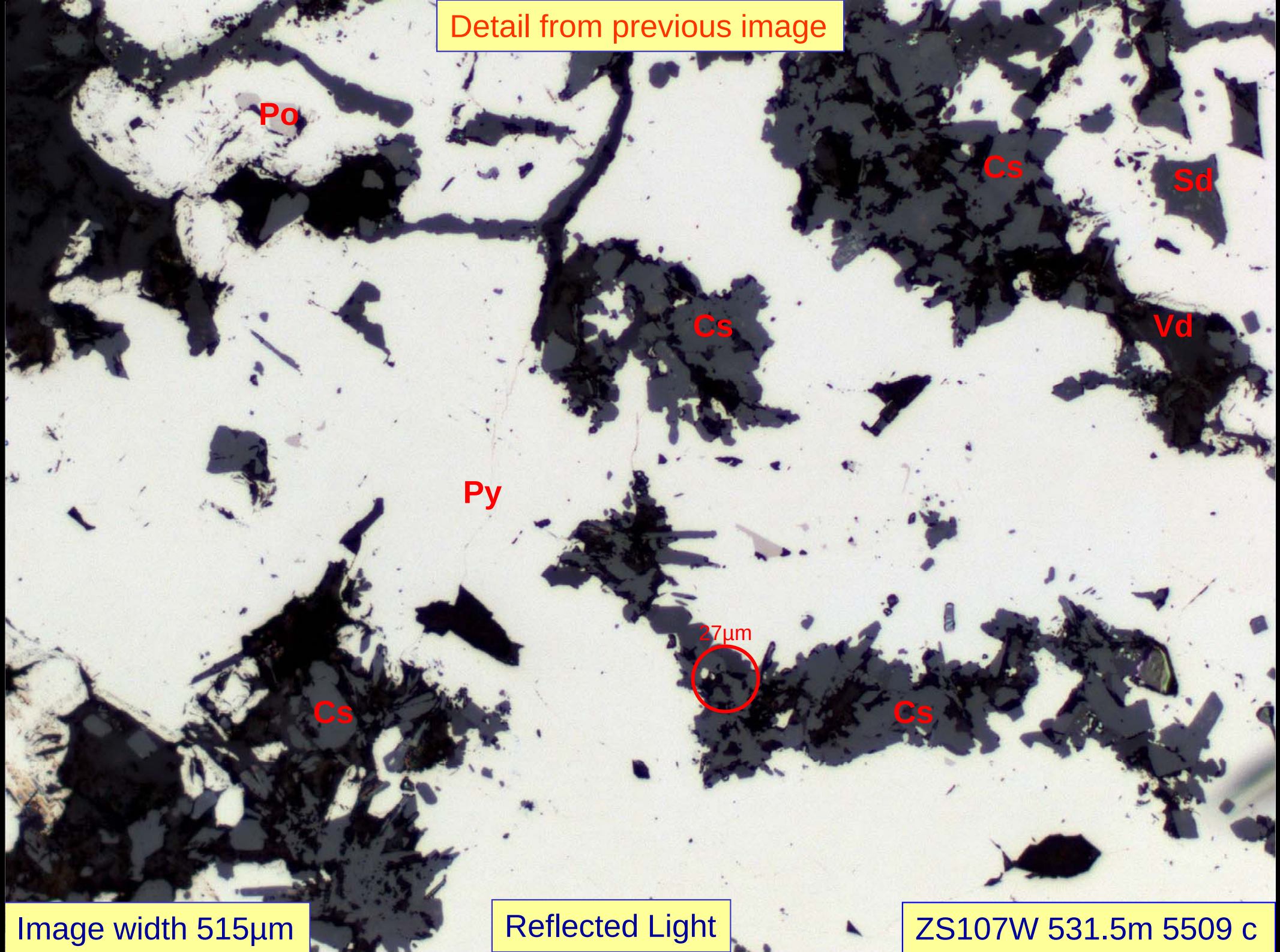
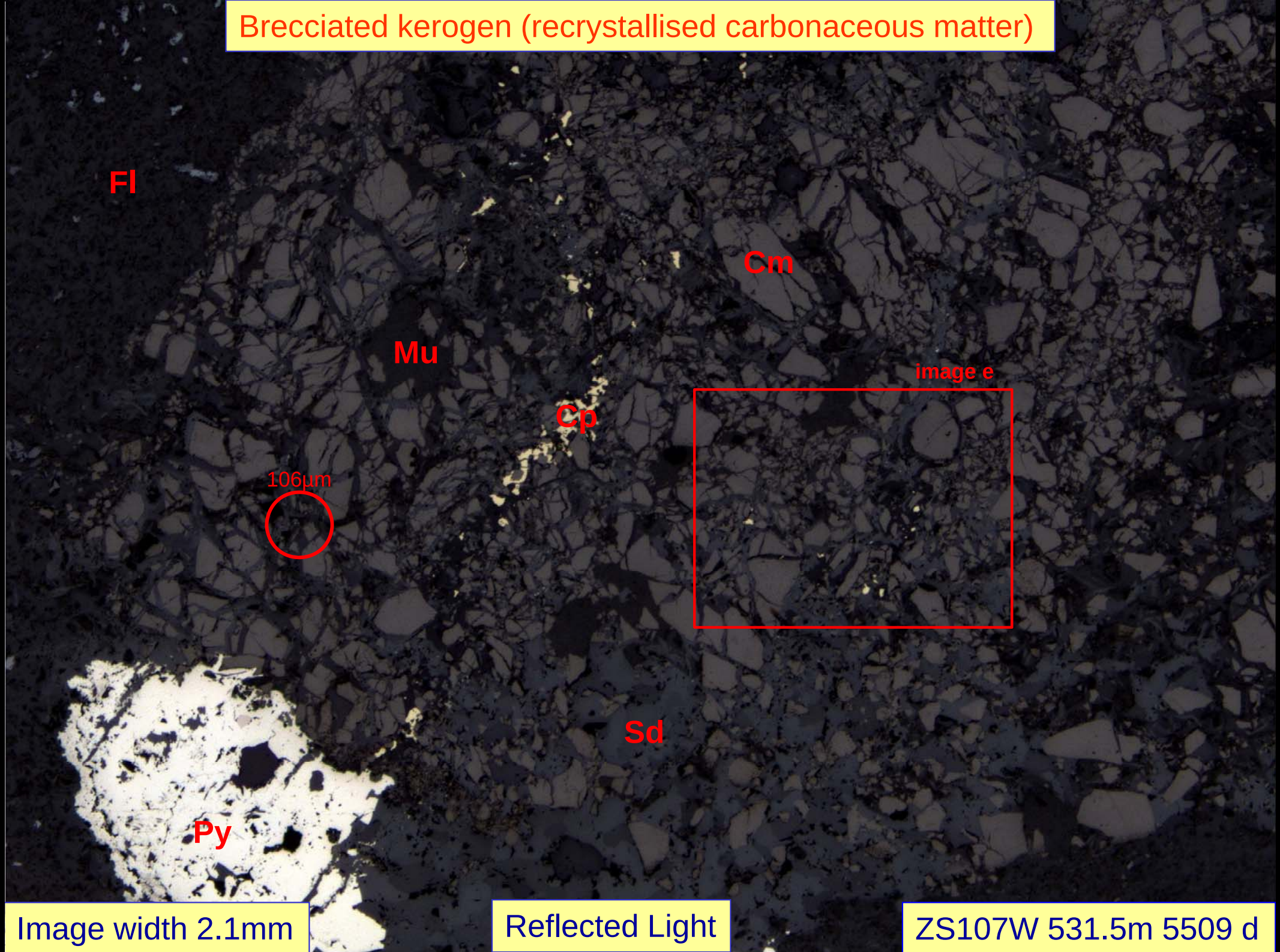
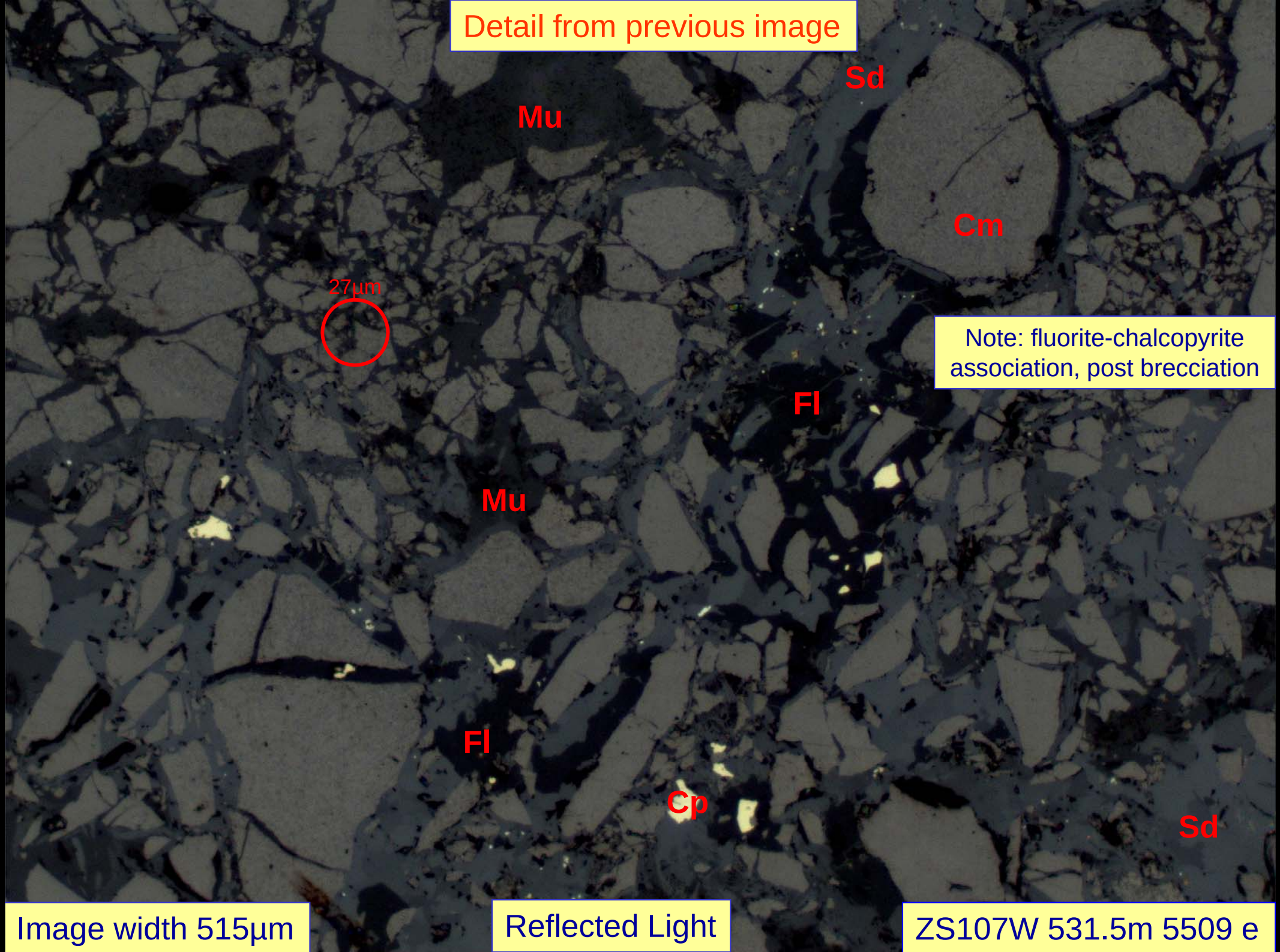


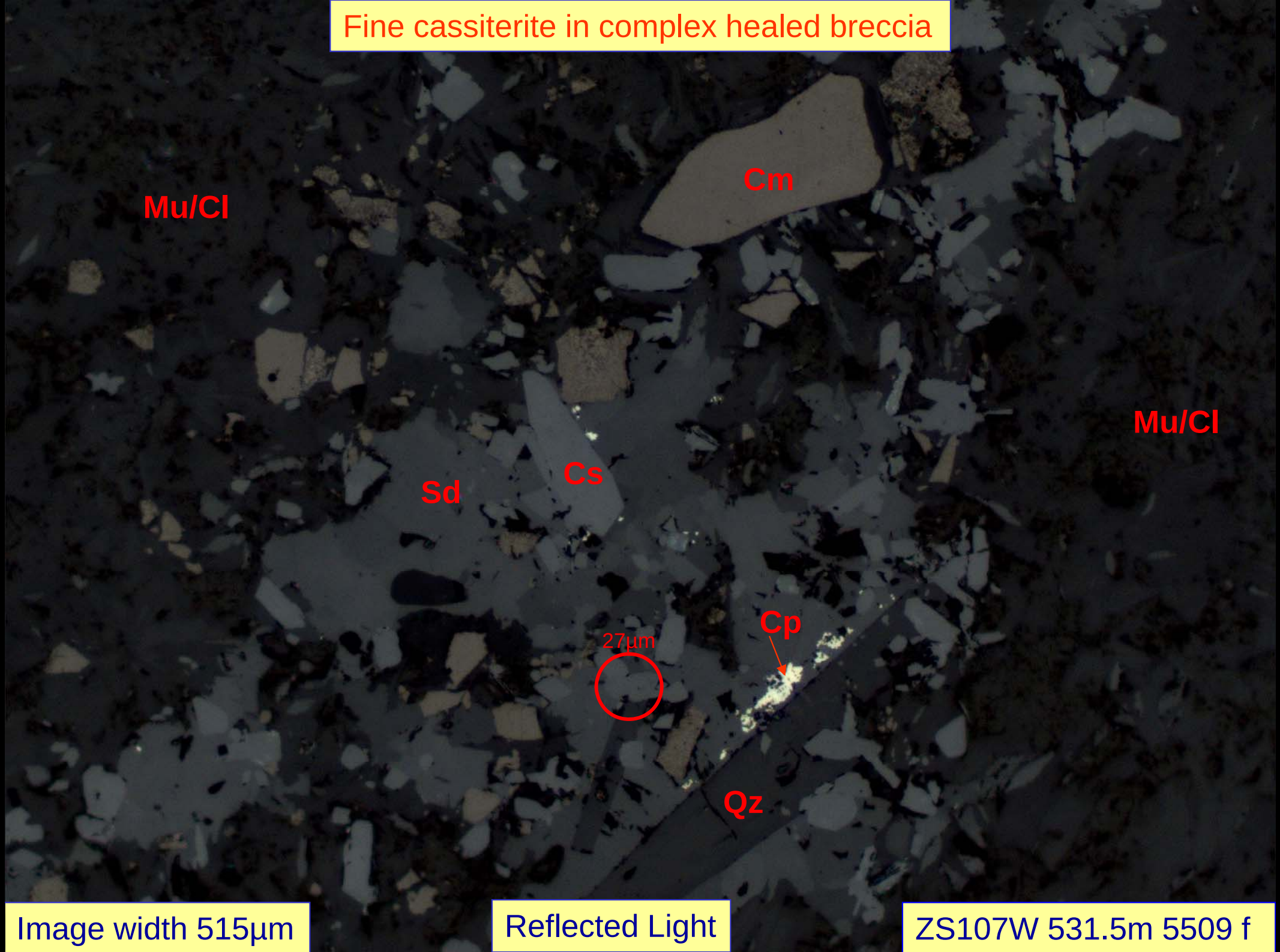
Image width 515µm

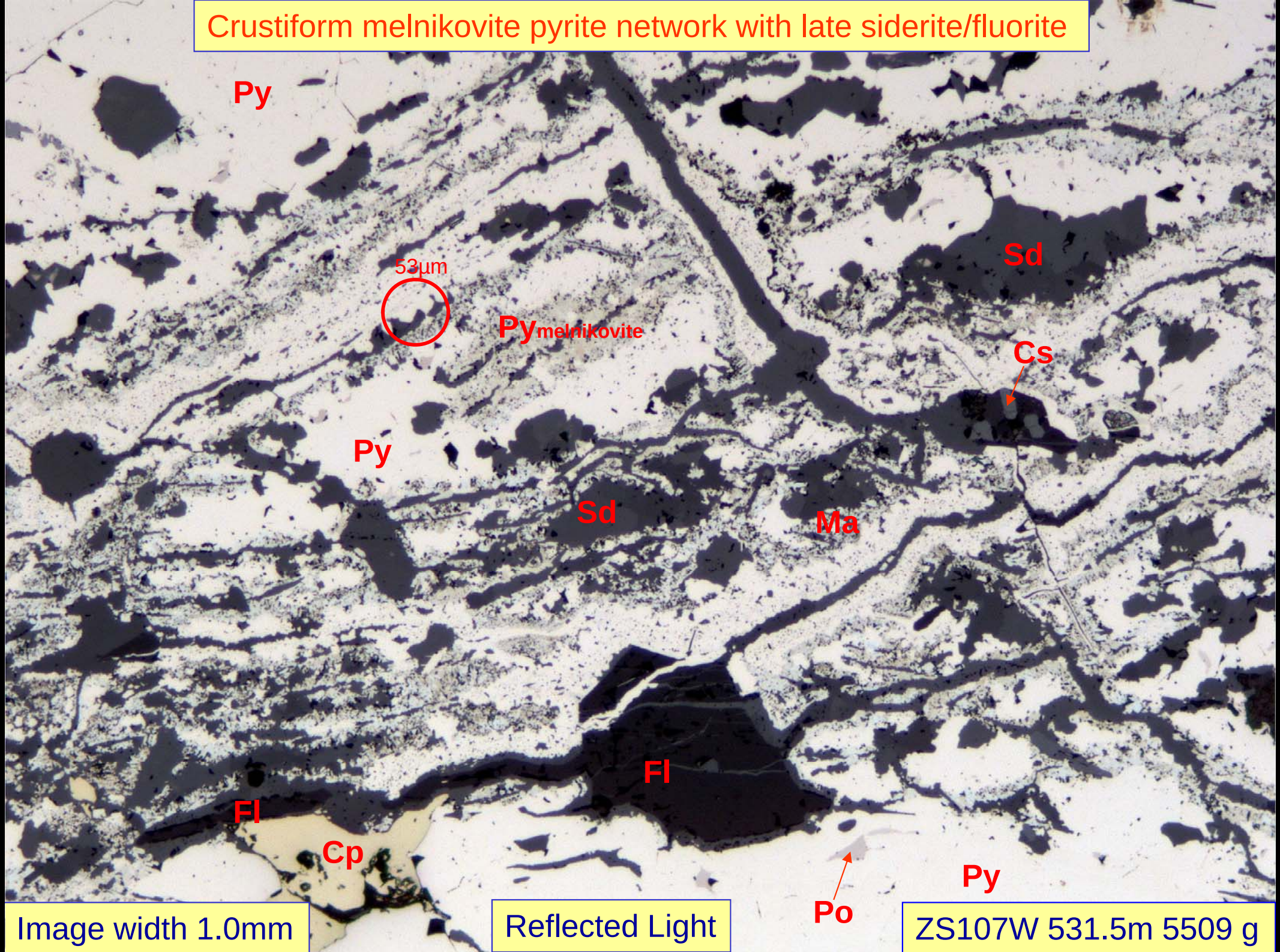
Reflected Light

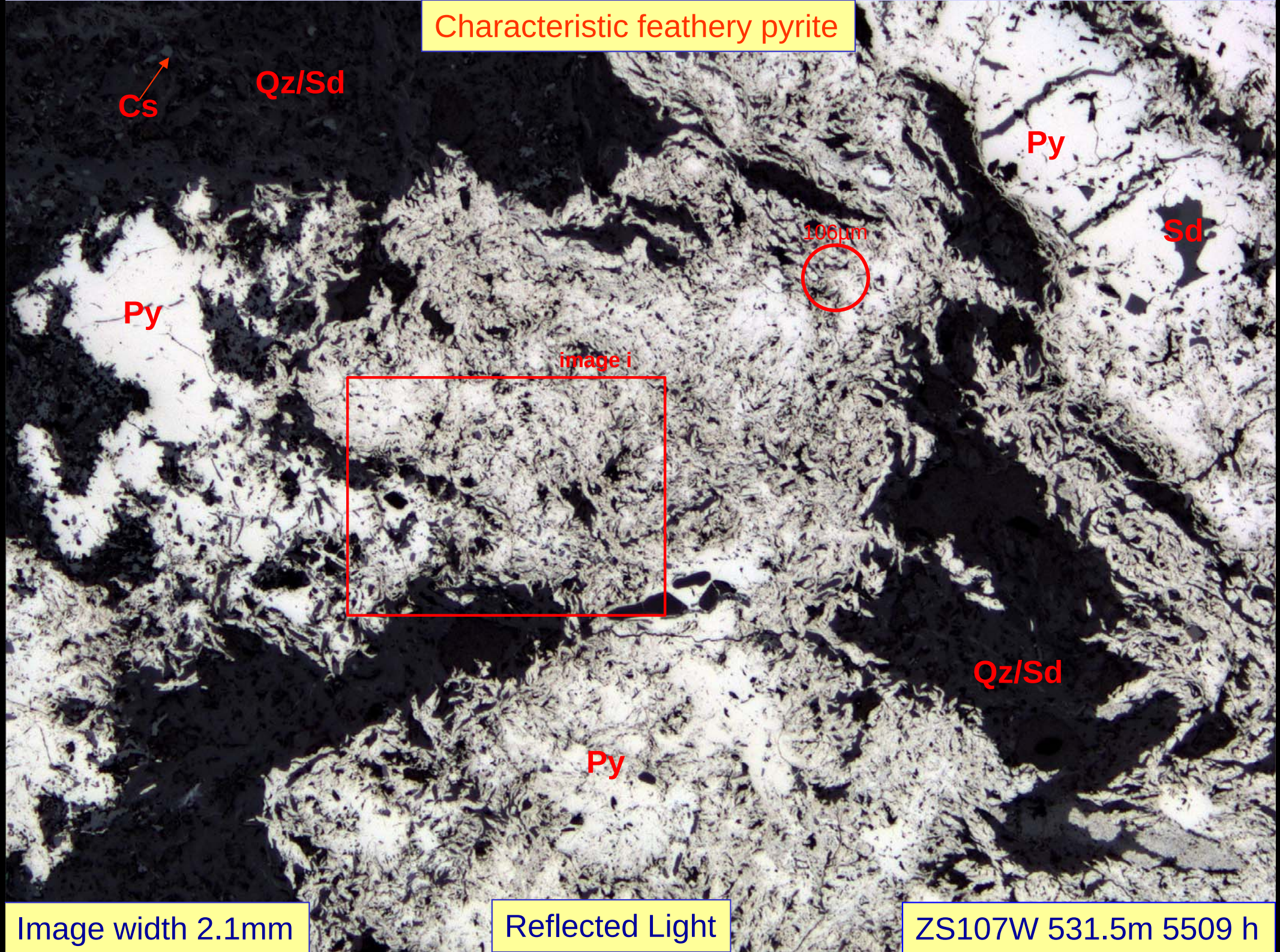
ZS107W 531.5m 5509 c

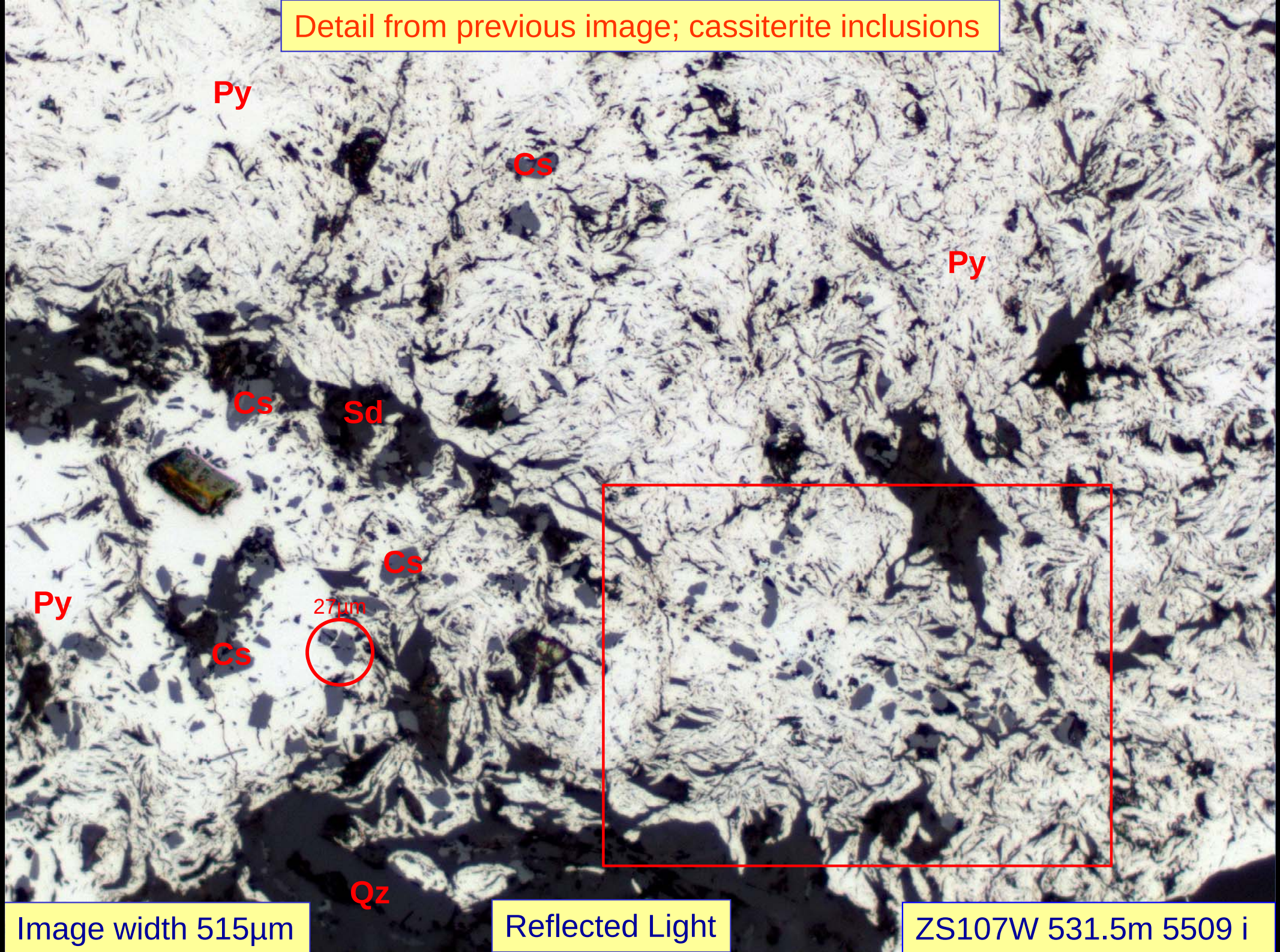

Brecciated kerogen (recrystallised carbonaceous matter)
Fl
Cm
Mu
image e
Cp
106µm
Sd
Py
Image width 2.1mm
Reflected Light
ZS107W 531.5m 5509 d

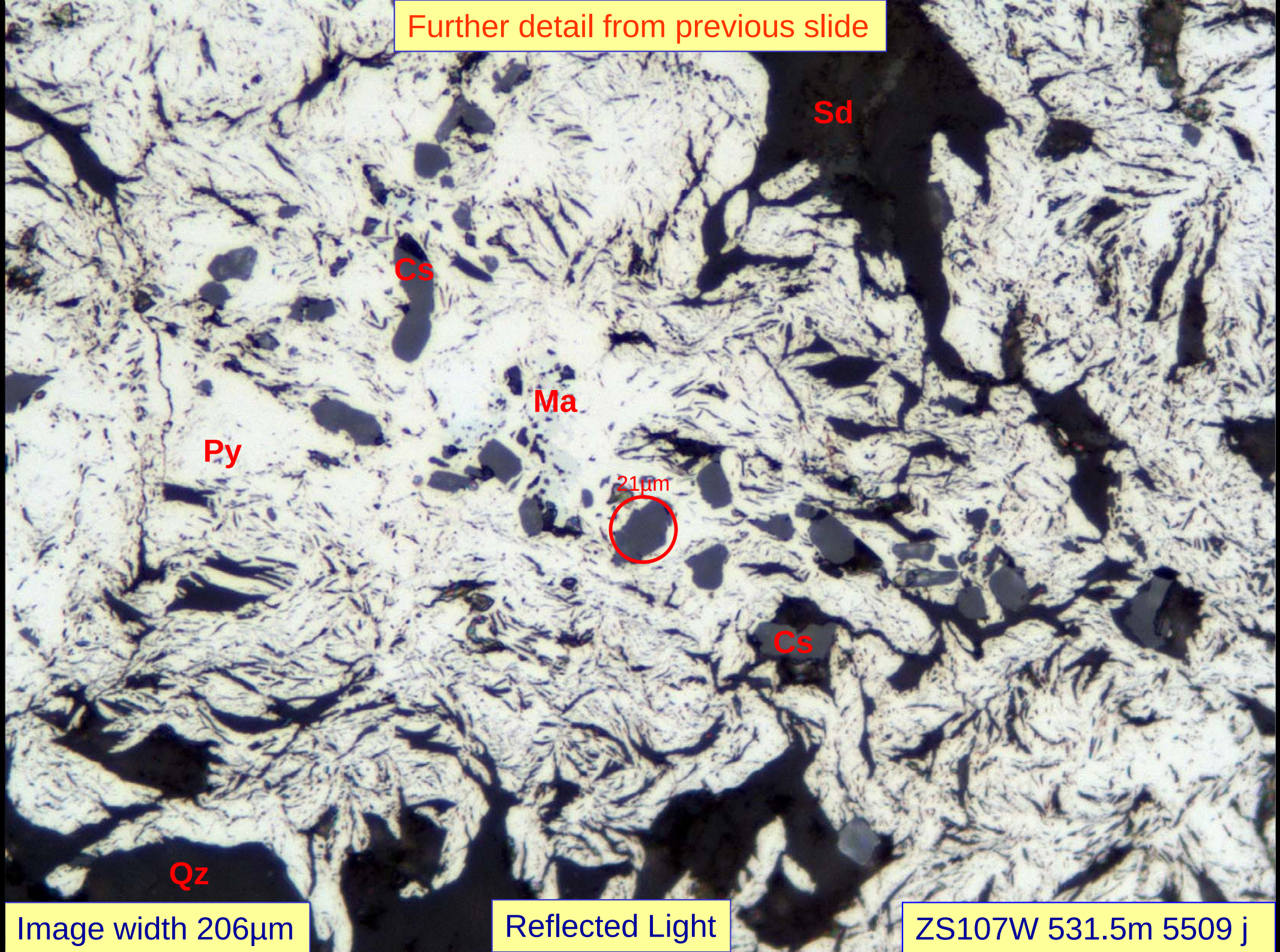

Detail from previous image
Sd
Mu
Cm
27µm
Note: fluorite-chalcopyrite association, post brecciation
Fl
Mu
Fl
Cp
Sd
Image width 515µm
Reflected Light
ZS107W 531.5m 5509 e

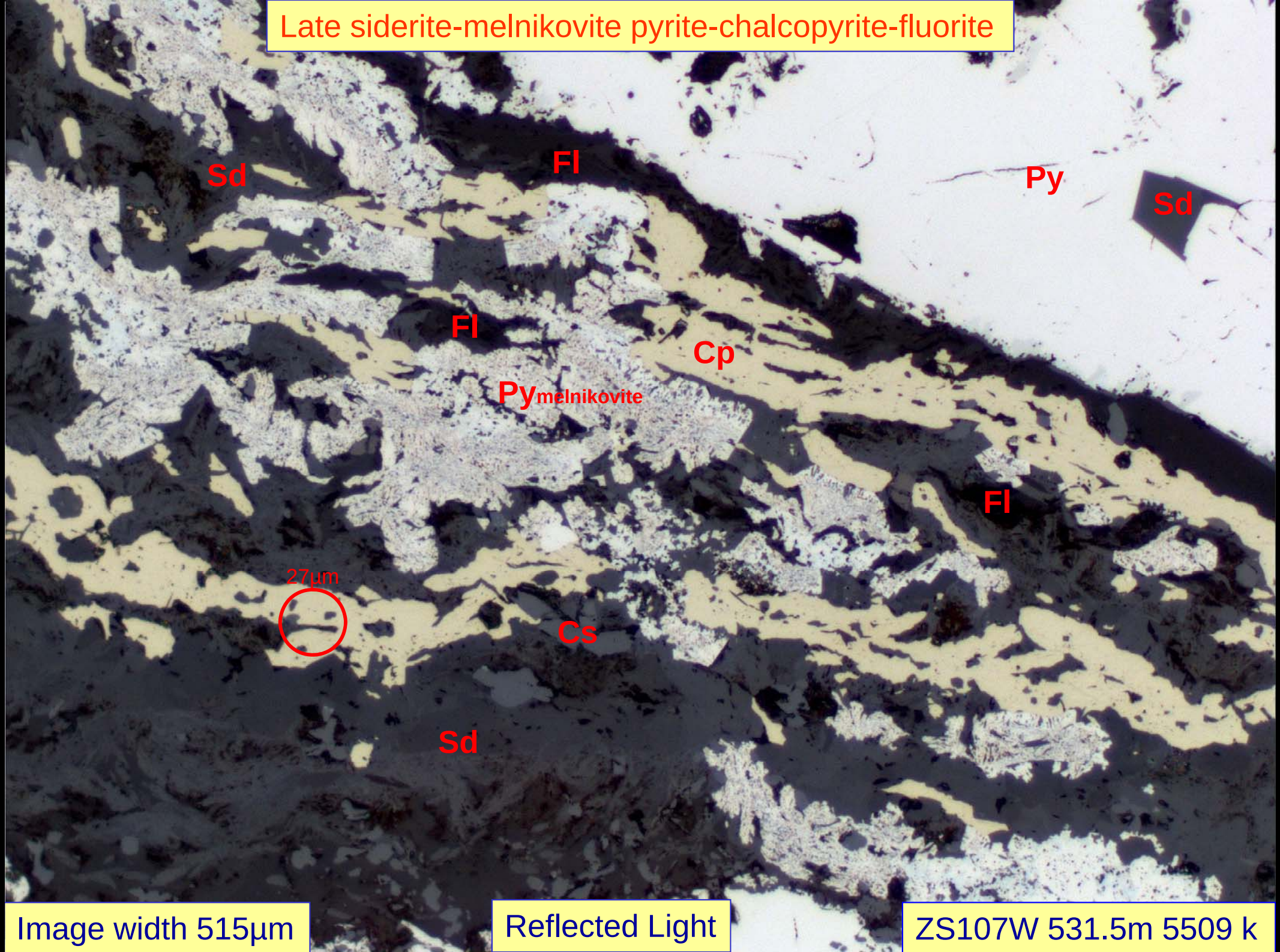

Fine cassiterite in complex healed breccia
Cm
Mu/Cl
Mu/Cl
Cs
Sd
27µm
Cp
Qz
Image width 515µm
Reflected Light
ZS107W 531.5m 5509 f

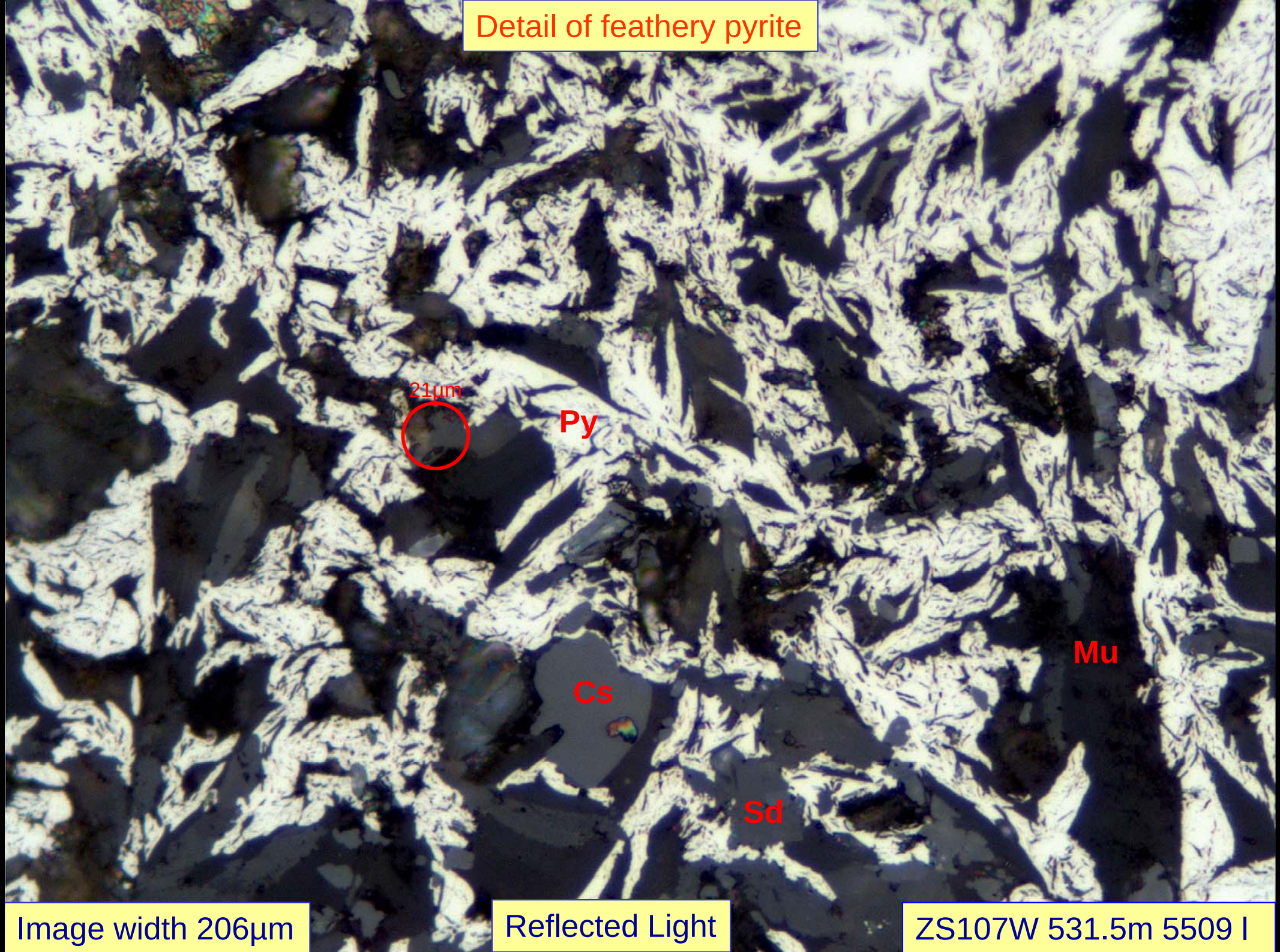

Crustiform melnikovite pyrite network with late siderite/fluorite
Py
53µm
Py melnikovite
Sd
Cs
Py
Sd
Ma
Fl
Fl
Cp
Py
Po
Image width 1.0mm
Reflected Light
ZS107W 531.5m 5509 g

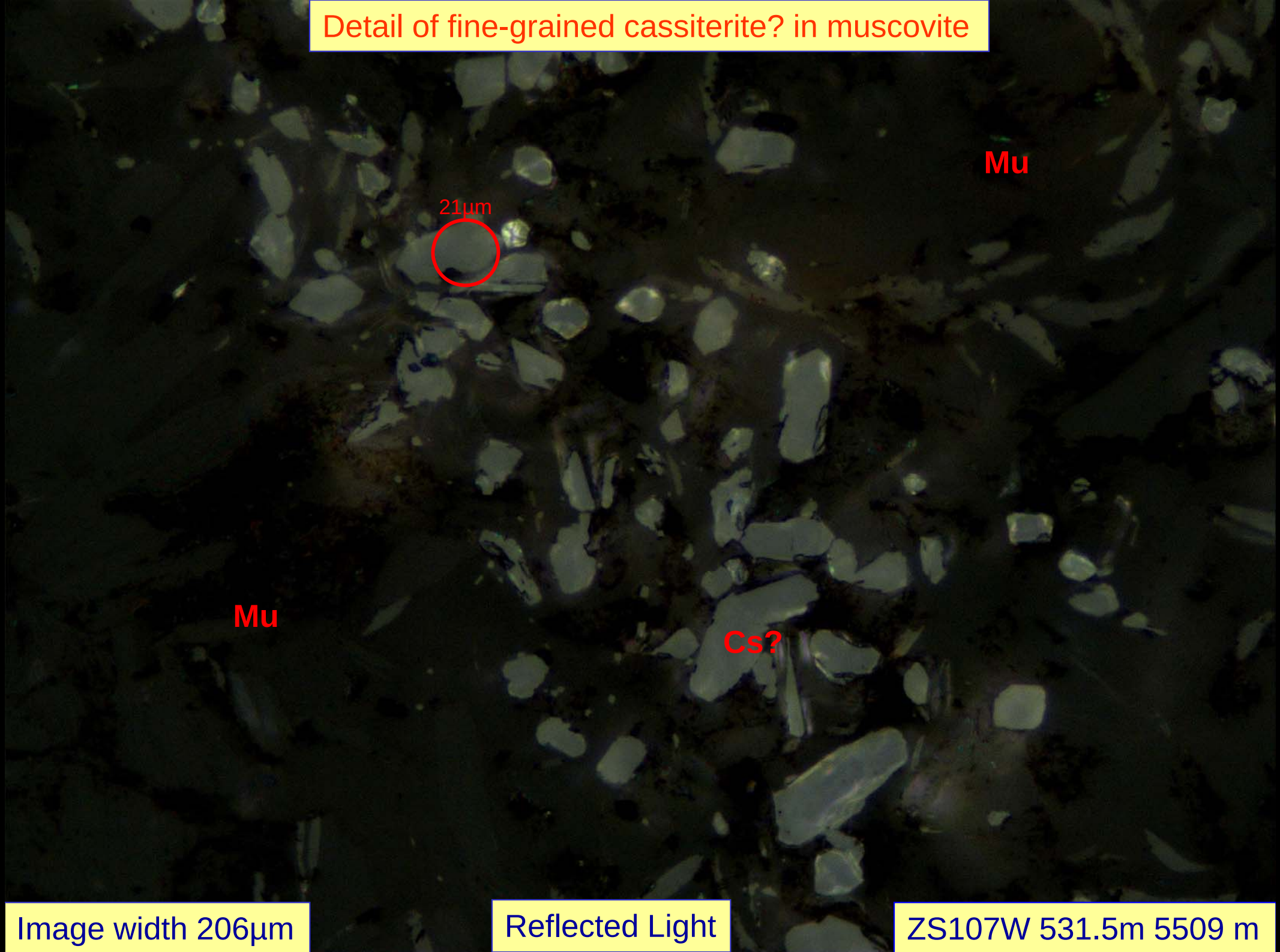

Characteristic feathery pyrite
Cs
Qz/Sd
Py
106µm
Sd
Py
image i
Qz/Sd
Py
Image width 2.1mm
Reflected Light
ZS107W 531.5m 5509 h

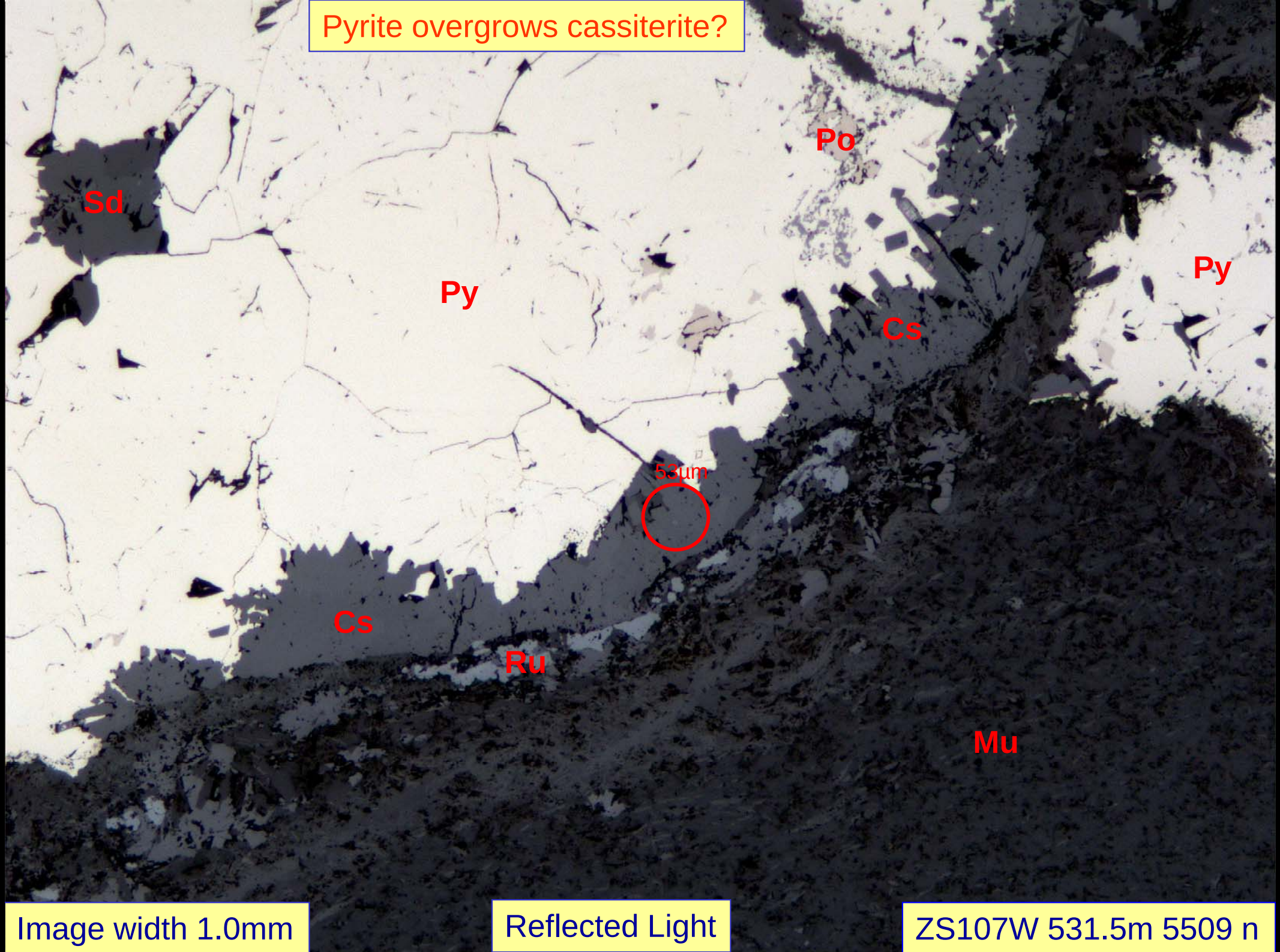

Detail from previous image; cassiterite inclusions
Py
Cs
Py
Cs
Sd
Cs
Py
27µm
Cs
Qz
Image width 515µm
Reflected Light
ZS107W 531.5m 5509 i


Further detail from previous slide
Sd
Cs
Ma
Py
21µm
Cs
Qz
Image width 206µm
Reflected Light
ZS107W 531.5m 5509 j


Late siderite-melnikovite pyrite-chalcopyrite-fluorite
Sd
Fl
Py
Sd
Fl
Cp
Py melnikovite
Fl
27µm
Cs
Sd
Image width 515µm
Reflected Light
ZS107W 531.5m 5509 k


Detail of feathery pyrite
21µm
Py
Cs
Sd
Mu
Image width 206µm
Reflected Light
ZS107W 531.5m 5509 I


Detail of fine-grained cassiterite? in muscovite
Mu
21µm
Mu
Cs?
Image width 206µm
Reflected Light
ZS107W 531.5m 5509 m


Pyrite overgrows cassiterite?
Sd
Py
Po
Py
Cs
53um
Cs
Ru
Mu
Image width 1.0mm
Reflected Light
ZS107W 531.5m 5509 n

PARTICLE MINERALOGY REPORT

Severn 5509

ZS107W 531.5m

GJMcA 4.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
37.7	0.4	1.1	0.0	0.0	0.2	0.0	60.6	**300**
74	10	10	0	10	8	0	71	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.87	1.56	26.3	0.02	31.1	0.07	
Actual		**1.55**		**0.02**	**22.9**	**0.06**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	30	0	0	0	0	0	76	
Binary	53	42	42	0	8	0	18	
Ternary	16	49	58	0	92	0	6	
Quat.y+	1	9	0	0	0	100	0	
Grains	51.0	3.7	11.3	0.0	2.0	0.3	85.7	1.54

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		8	6	0	0	0	86
Po	100		0	0	0	0	0
Cs	21	0		0	0	0	79
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	0	0	0	0	0		0
Ga	76	0	21	0	3	0	

TOTAL ASSOCIATION MATRIX

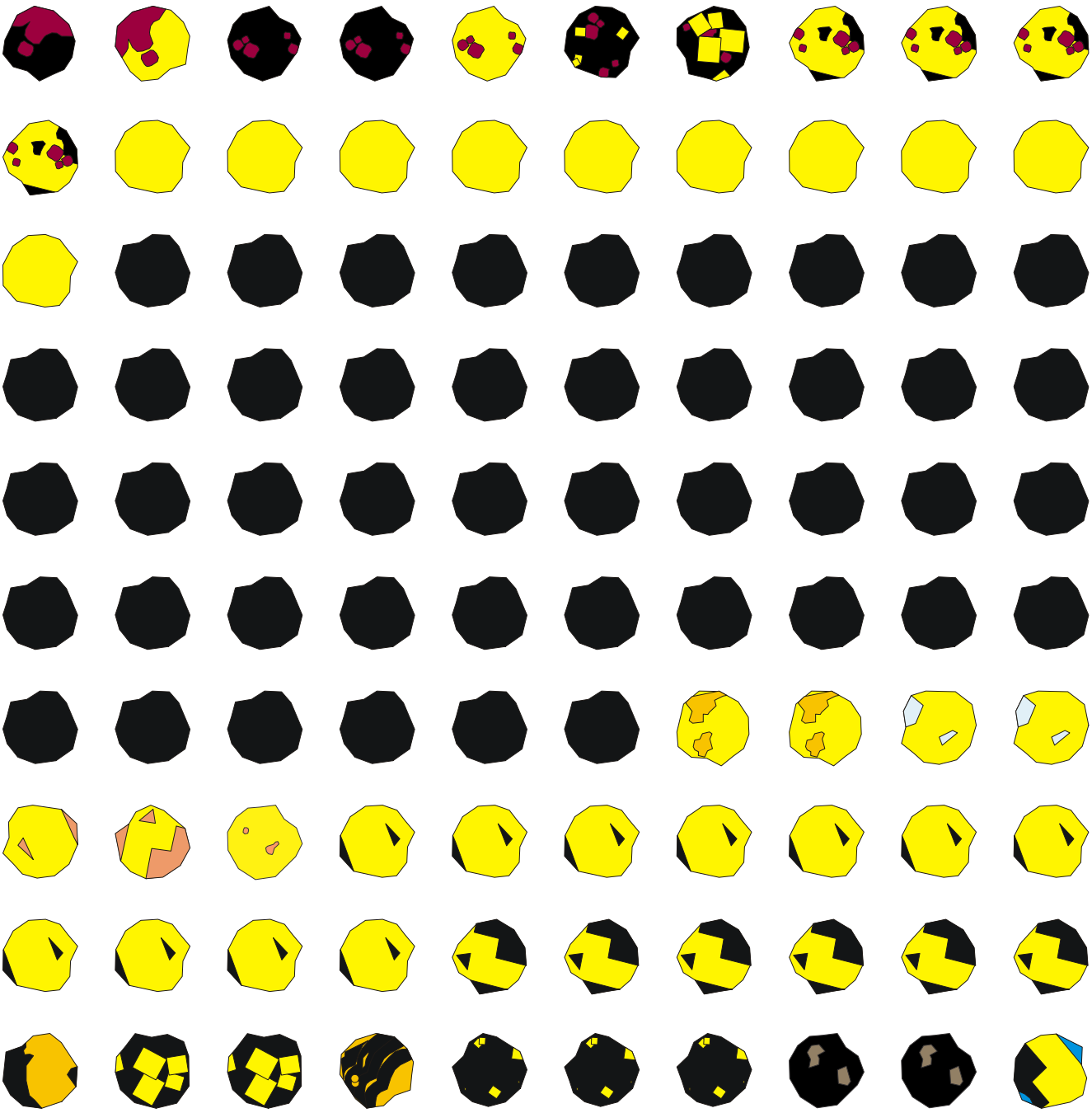
		Py	Po	Cs	St	Cp	As	Ga
	Py		8	14	0	3	1	63
	Po	100		0	0	0	9	58
of	**Cs**	67	0		0	0	0	91
all	**St**	0	0	0		0	0	0
	Cp	92	0	0	0		0	100
	As	100	100	0	0	0		100
	Ga	20	1	8	0	1	0	

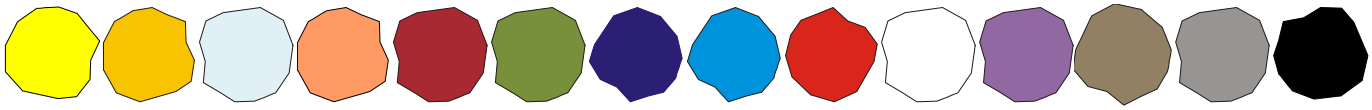
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	30		4	3	0	0	0	46	16	1
Po	0	42		0	0	0	0	0	49	9
Cs	0	9	0		0	0	0	33	58	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	8	92	0
As	0	0	0	0	0	0		0	0	100
Ga	76	14	0	4	0	1	0		6	0

Stellar Resources - Severn Drillhole Mineragraphy

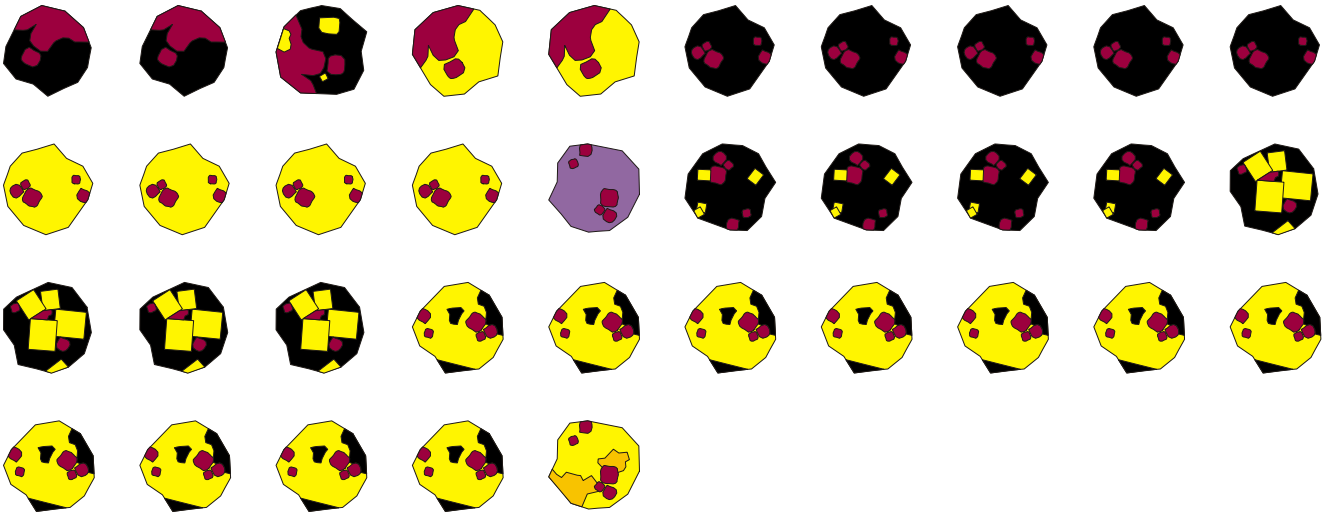
Severn 5509 **53µm mask** **January 2012**

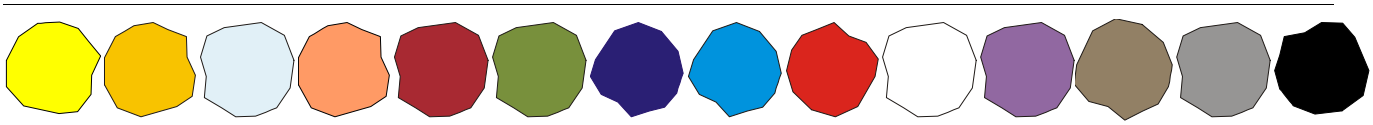




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5509 Sn Scan **53µm mask** **January 2012**



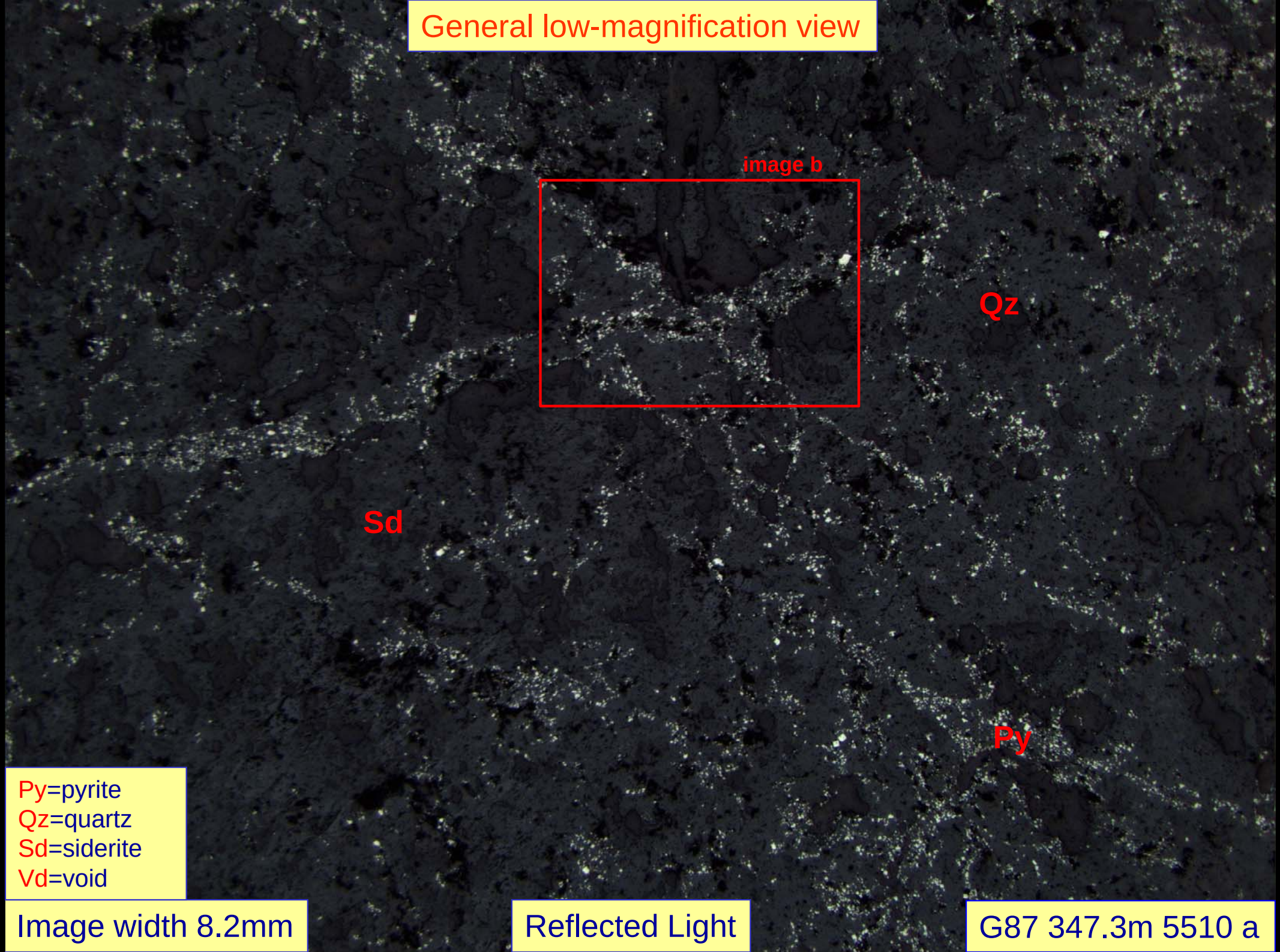


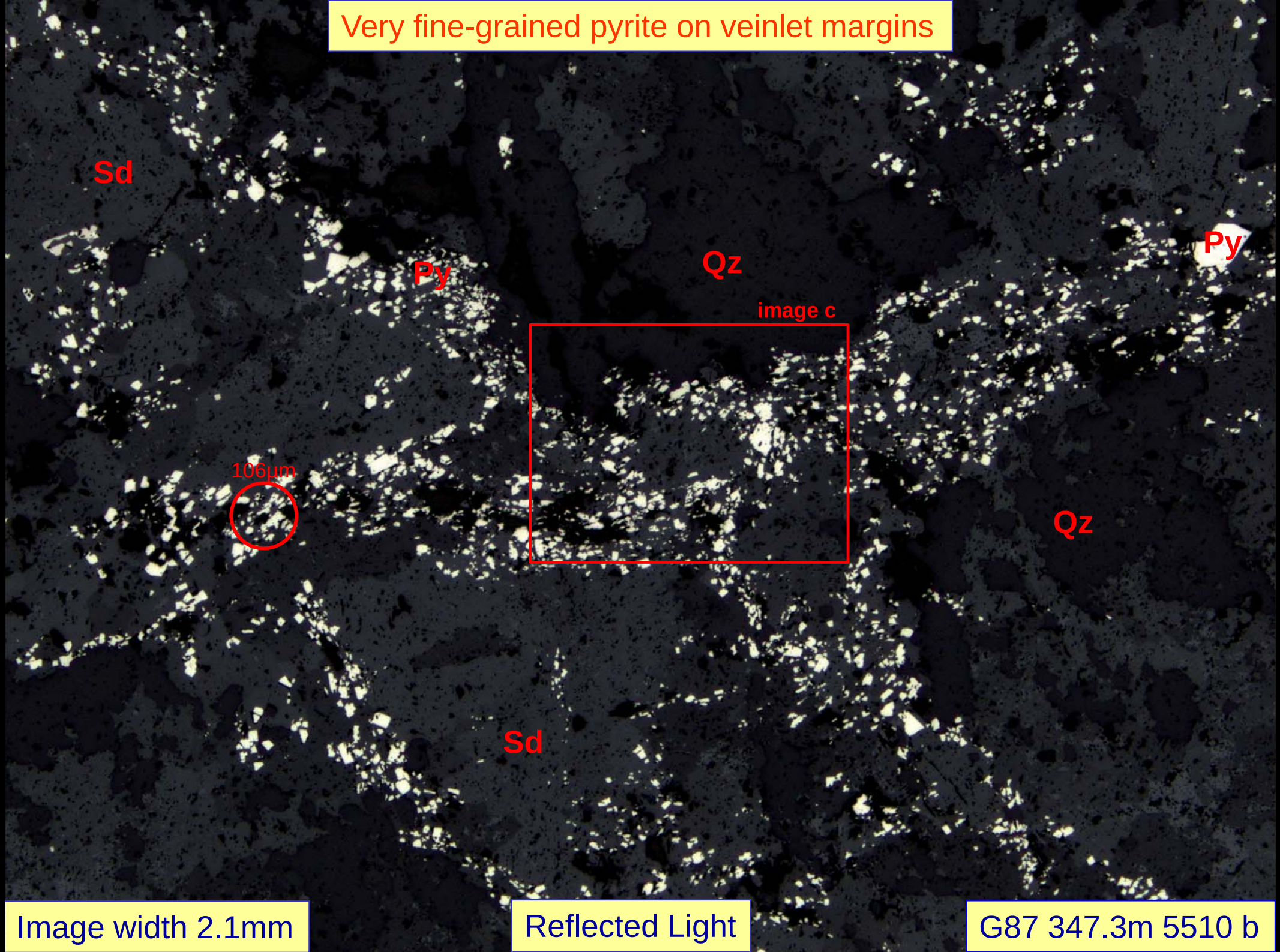
Core Scan

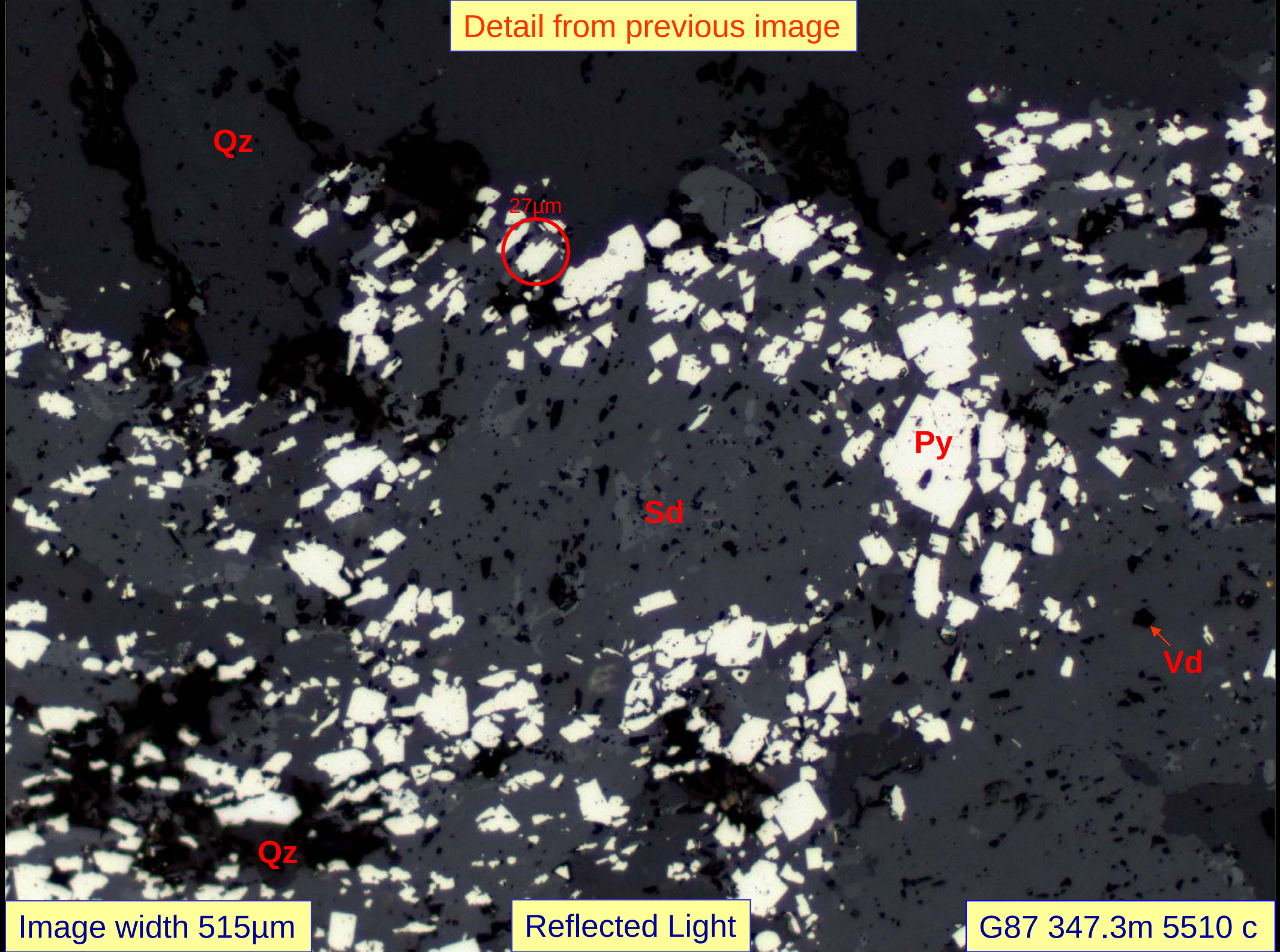
QXRD: 61% siderite, 16% quartz, 5% cassiterite, 5% muscovite, 3% pyrite, 3% apatite

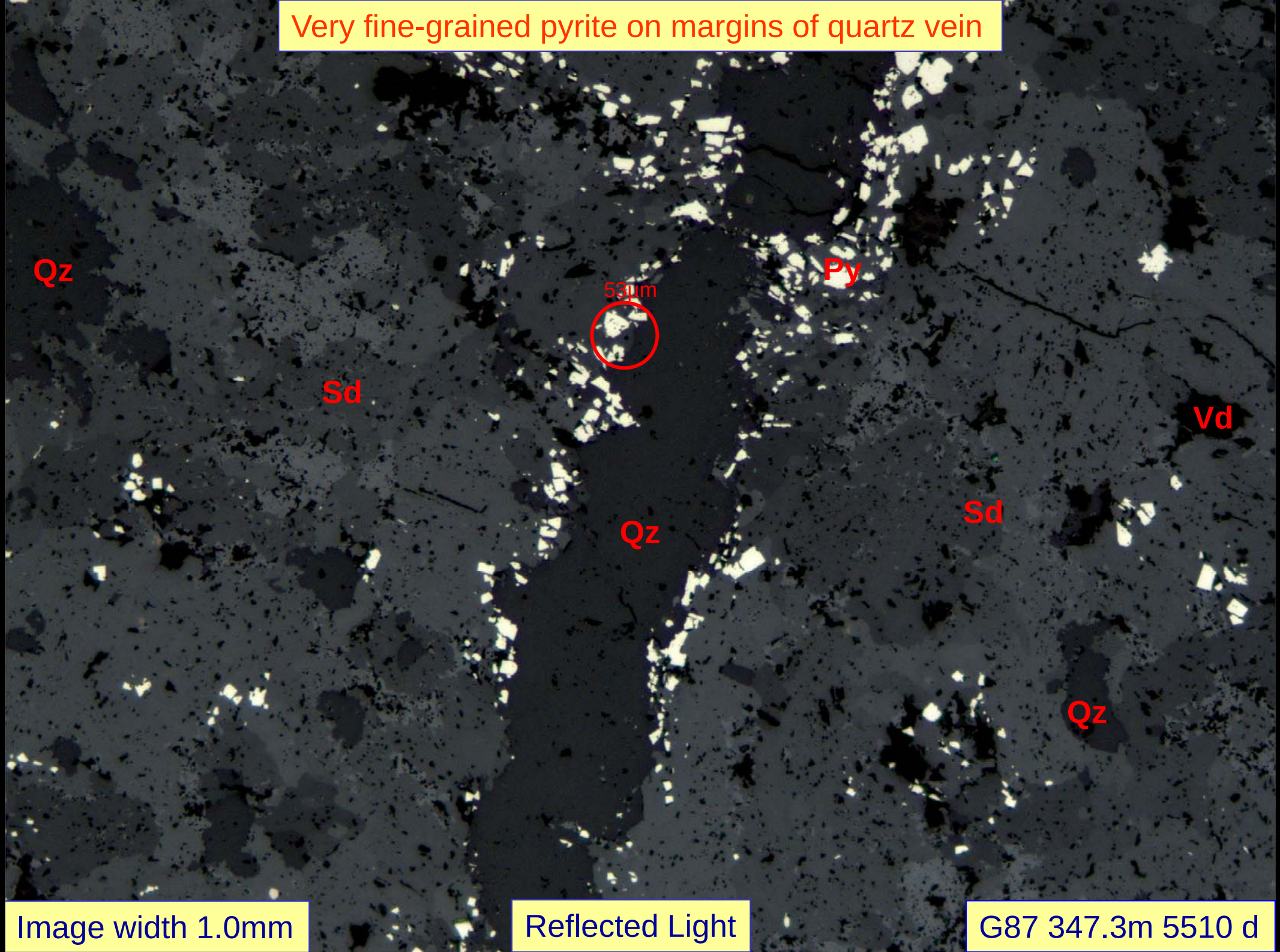
Image width ~70mm

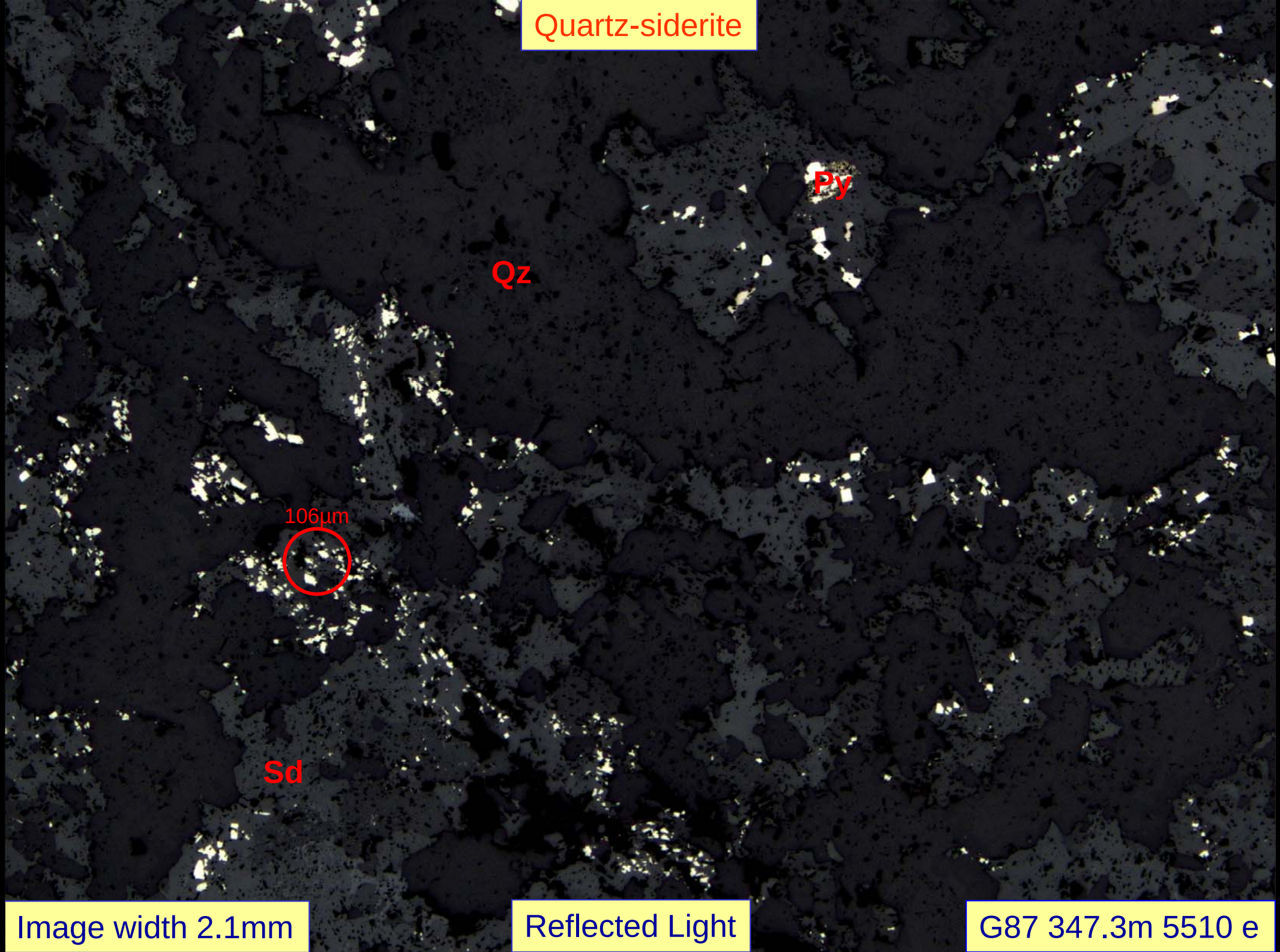
G87 347.3m 5510


General low-magnification view
image b
Qz
Sd
Py
Py=pyrite
Qz=quartz
Sd=siderite
Vd=void
Image width 8.2mm
Reflected Light
G87 347.3m 5510 a

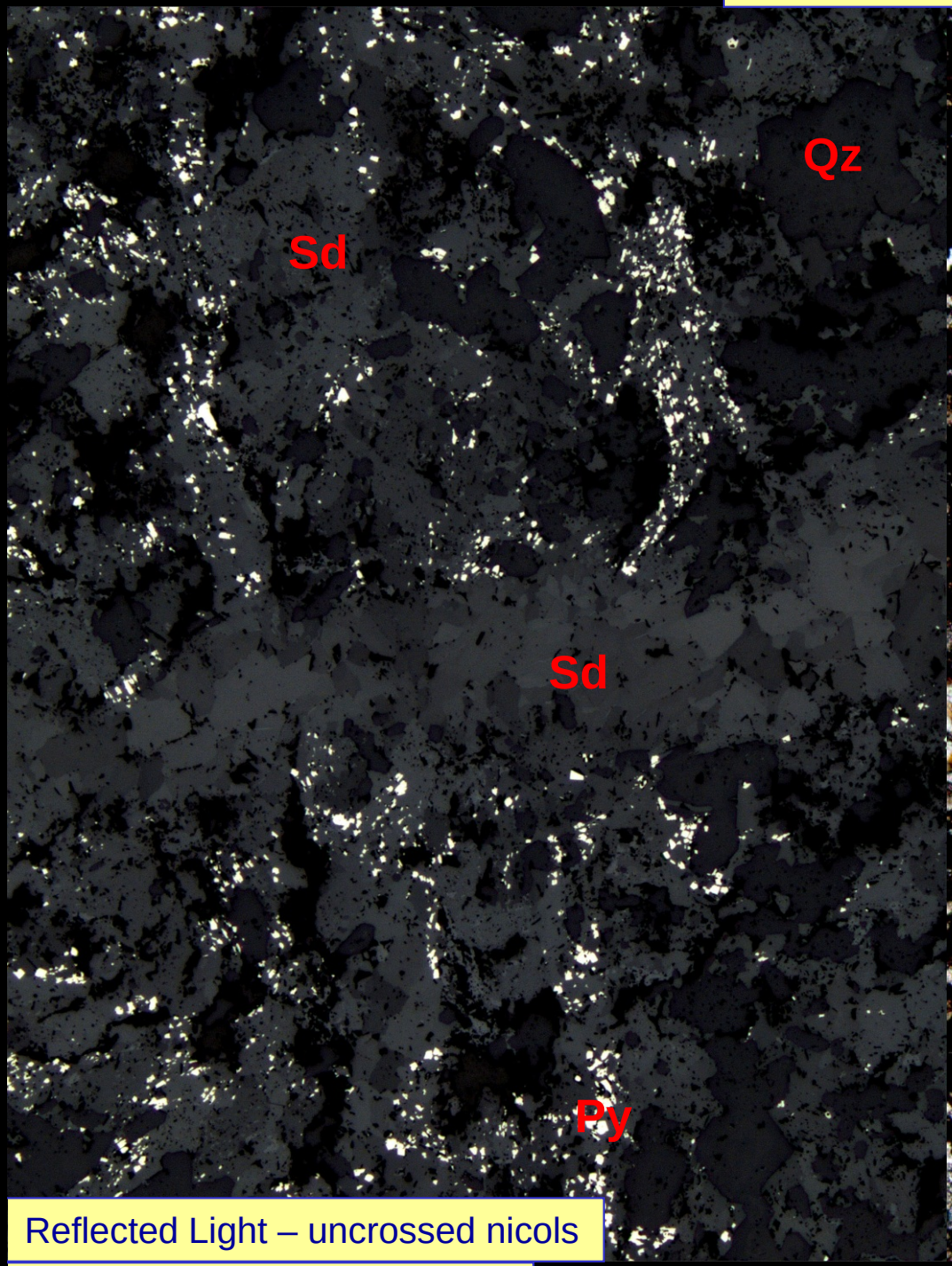

Very fine-grained pyrite on veinlet margins
Sd
Py
Qz
image c
Py
106µm
Qz
Sd
Image width 2.1mm
Reflected Light
G87 347.3m 5510 b


Detail from previous image
Qz
27µm
Py
Sd
Vd
Qz
Image width 515µm
Reflected Light
G87 347.3m 5510 c

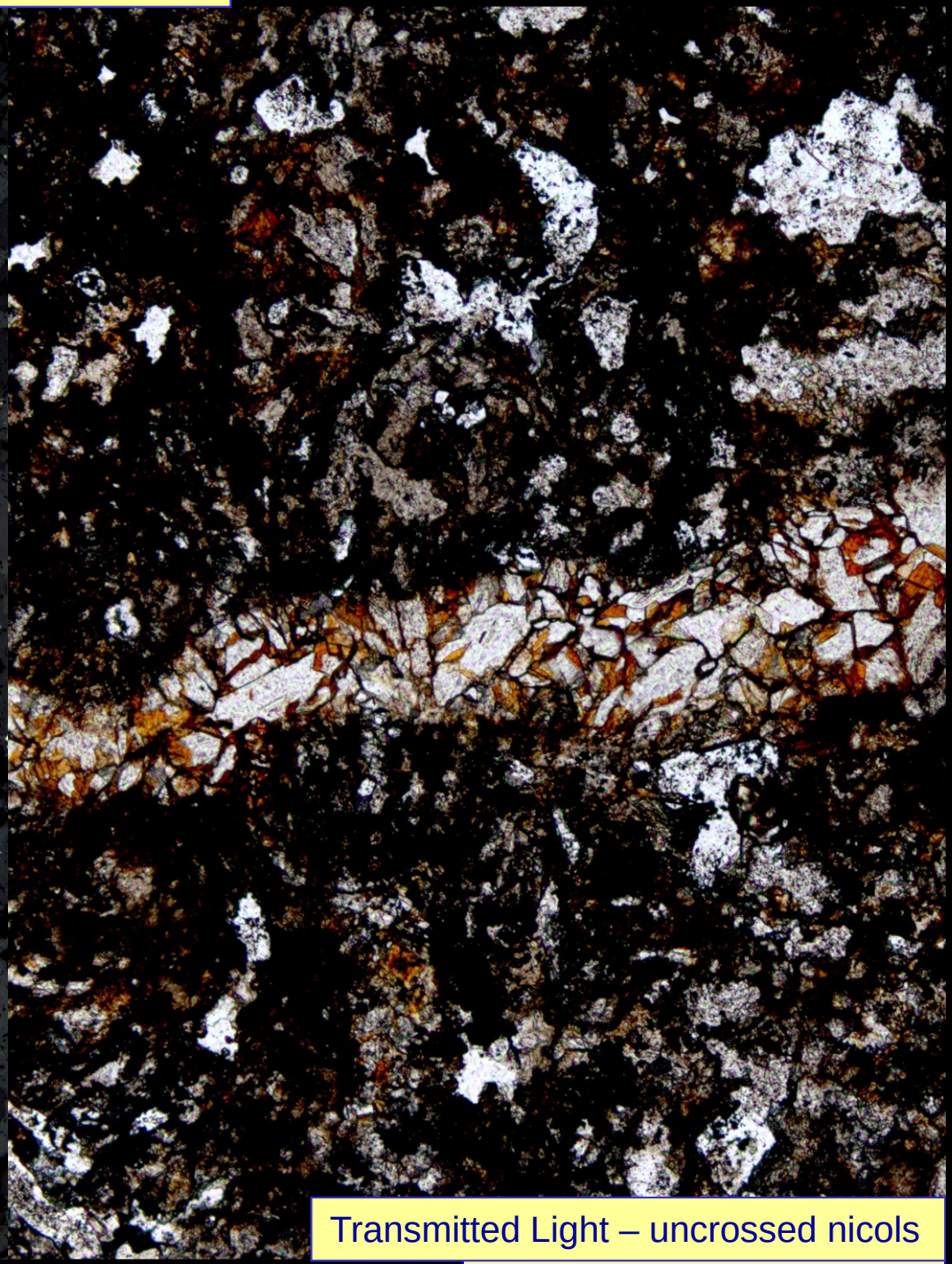

Very fine-grained pyrite on margins of quartz vein
Qz
Py
53µm
Sd
Vd
Qz
Sd
Qz
Image width 1.0mm
Reflected Light
G87 347.3m 5510 d


Quartz-siderite
Py
Qz
106µm
Sd
Image width 2.1mm
Reflected Light
G87 347.3m 5510 e

Late siderite veinlet



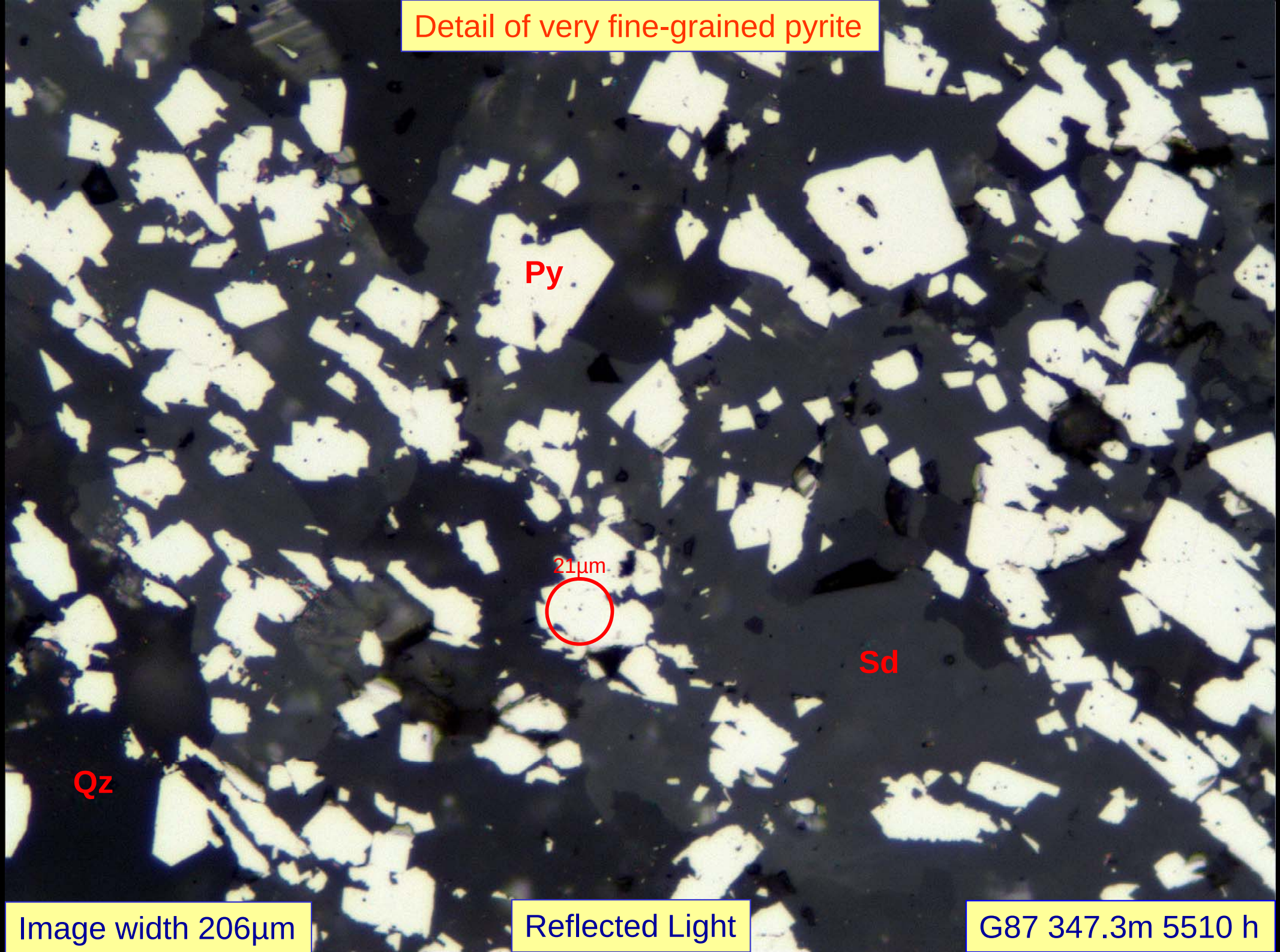
Reflected Light – uncrossed nicols



Transmitted Light – uncrossed nicols

Image width 2 x 1.6mm

G87 347.3m 5510 f/g


Detail of very fine-grained pyrite
Py
21µm
Sd
Qz
Image width 206µm
Reflected Light
G87 347.3m 5510 h

PARTICLE MINERALOGY REPORT

Severn 5510

G87 347.3m

GJMcA 4.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
2.9	0.0	2.1	0.0	0.0	0.0	0.0	95.0	**300**
10	2	15	0	0	0	0	95	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.23	3.46	2.4	0.00	17.4	0.00	
Actual		**5.78**		**0.01**	**28.9**	**0.01**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	0	0	16	0	0	0	66	
Binary	93	0	72	0	0	0	30	
Ternary	7	100	12	0	0	0	4	
Quat.y+	0	0	0	0	0	0	0	
Grains	29.7	0.7	11.7	0.0	0.0	0.0	99.7	1.42

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	0	0	0	100
Po	0		0	0	0	0	0
Cs	0	0		0	0	0	100
St	0	0	0		0	0	0
Cp	0	0	0	0		0	0
As	0	0	0	0	0		0
Ga	79	0	21	0	0	0	

TOTAL ASSOCIATION MATRIX

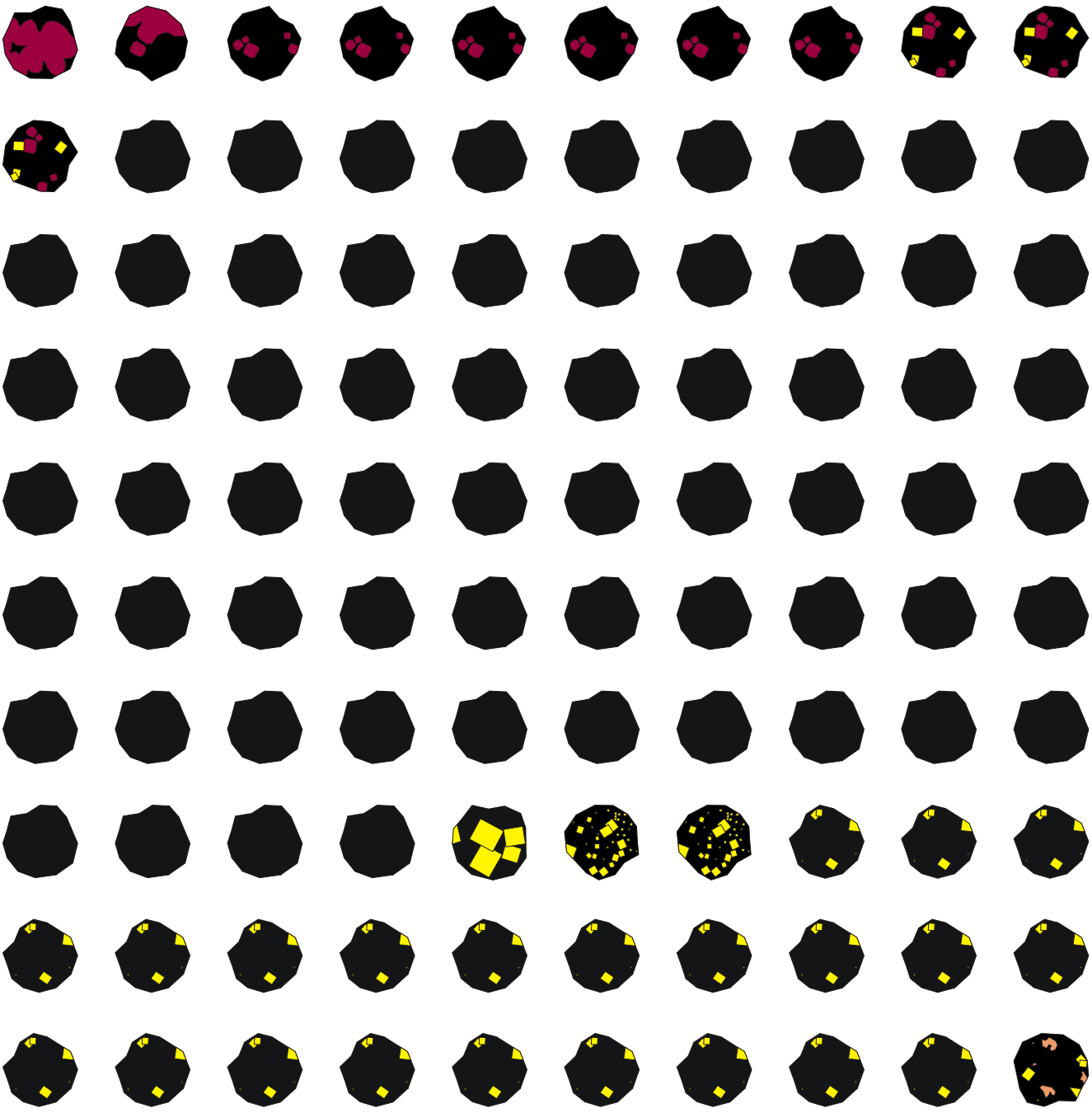
		Py	Po	Cs	St	Cp	As	Ga
	Py		1	7	0	0	0	100
	Po	100		0	0	0	0	100
of	**Cs**	12	0		0	0	0	84
all	**St**	0	0	0		0	0	0
	Cp	0	0	0	0		0	0
	As	0	0	0	0	0		0
	Ga	28	1	10	0	0	0	

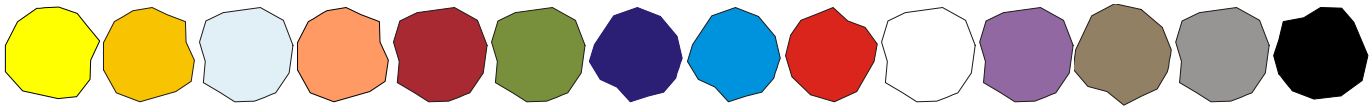
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	0		0	0	0	0	0	93	7	0
Po	0	0		0	0	0	0	0	100	0
Cs	16	0	0		0	0	0	72	12	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	0	0	0
As	0	0	0	0	0	0		0	0	0
Ga	66	24	0	6	0	0	0		4	0

Stellar Resources - Severn Drillhole Mineragraphy

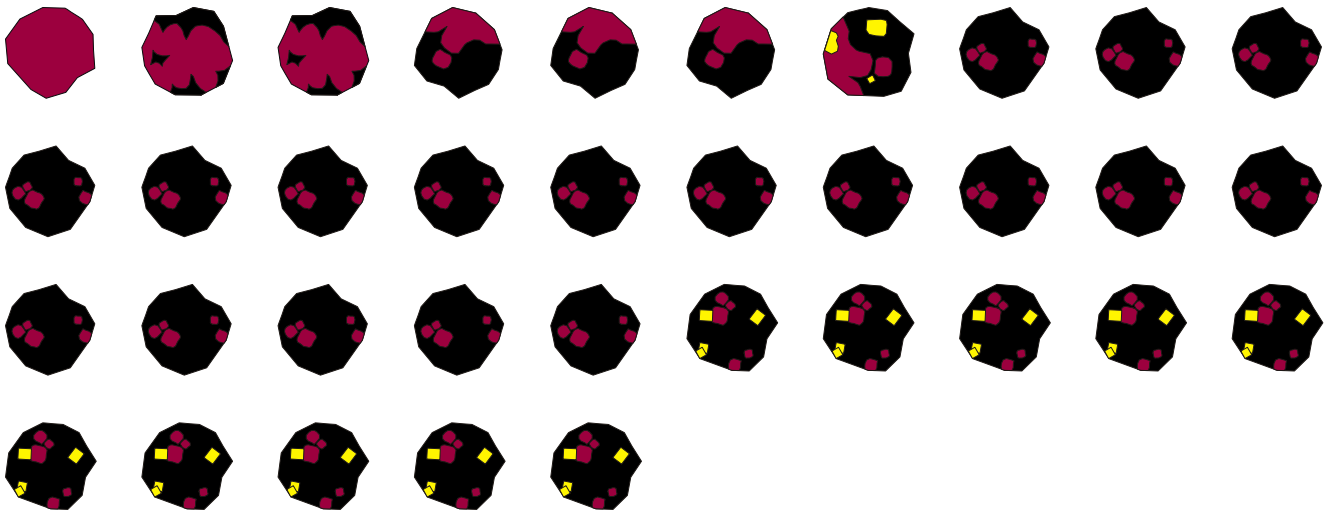
Severn 5510 **53µm mask** **January 2012**

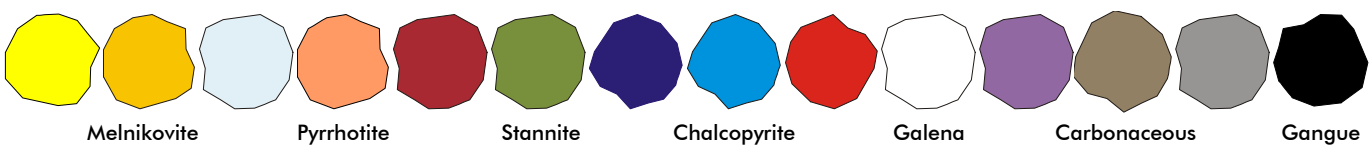




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5510 Sn Scan **53µm mask** **January 2012**



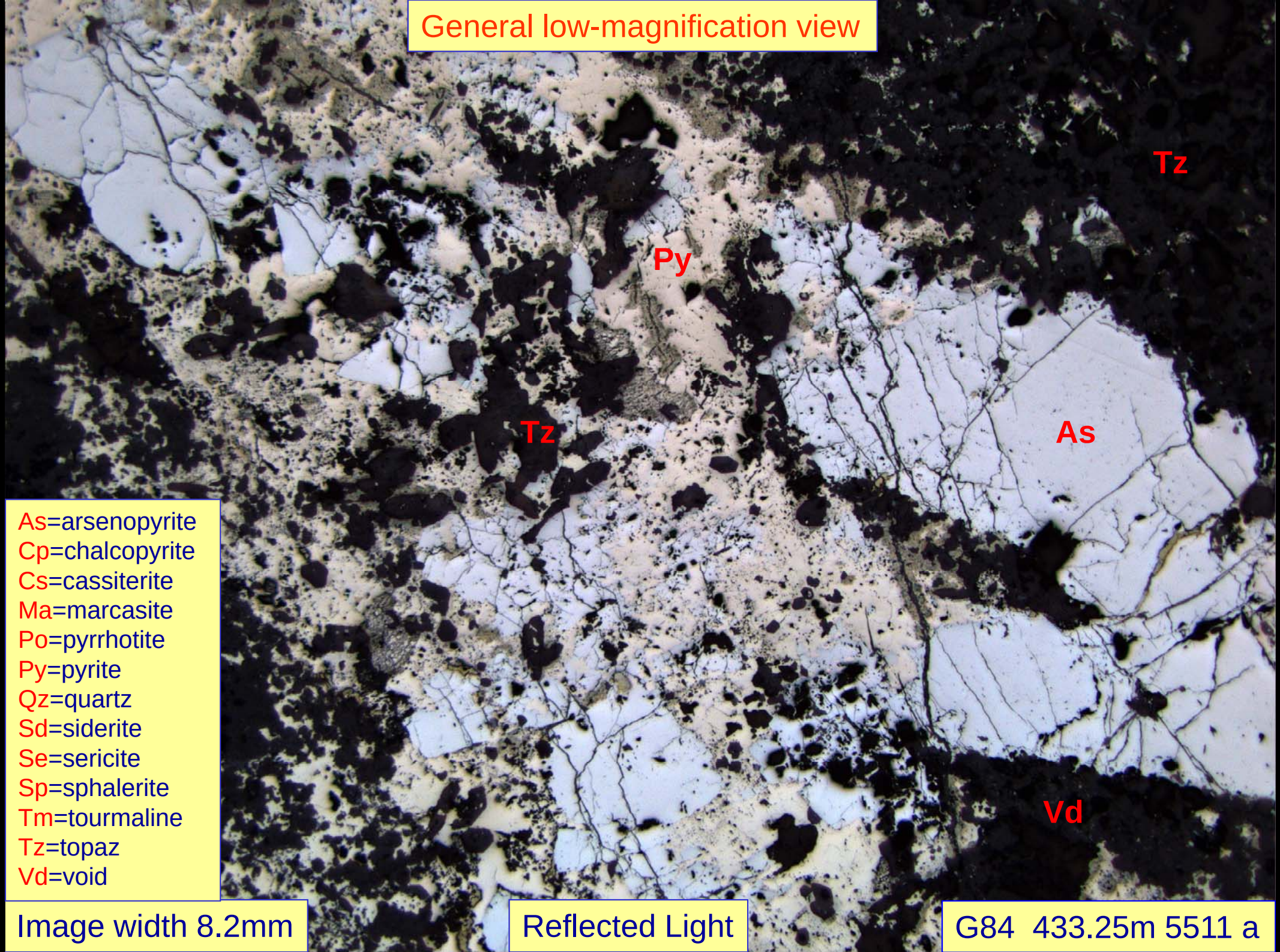


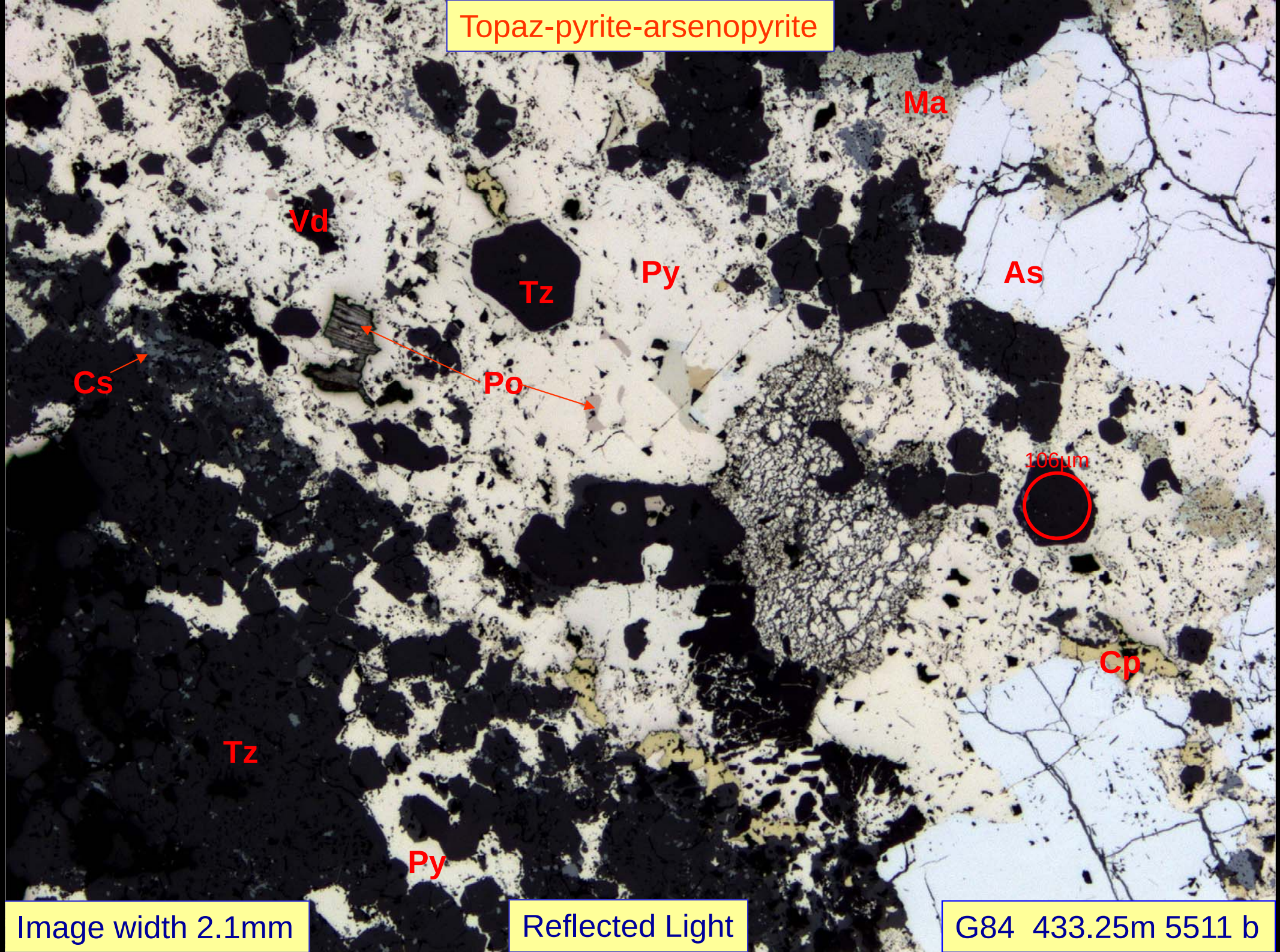
Core Scan

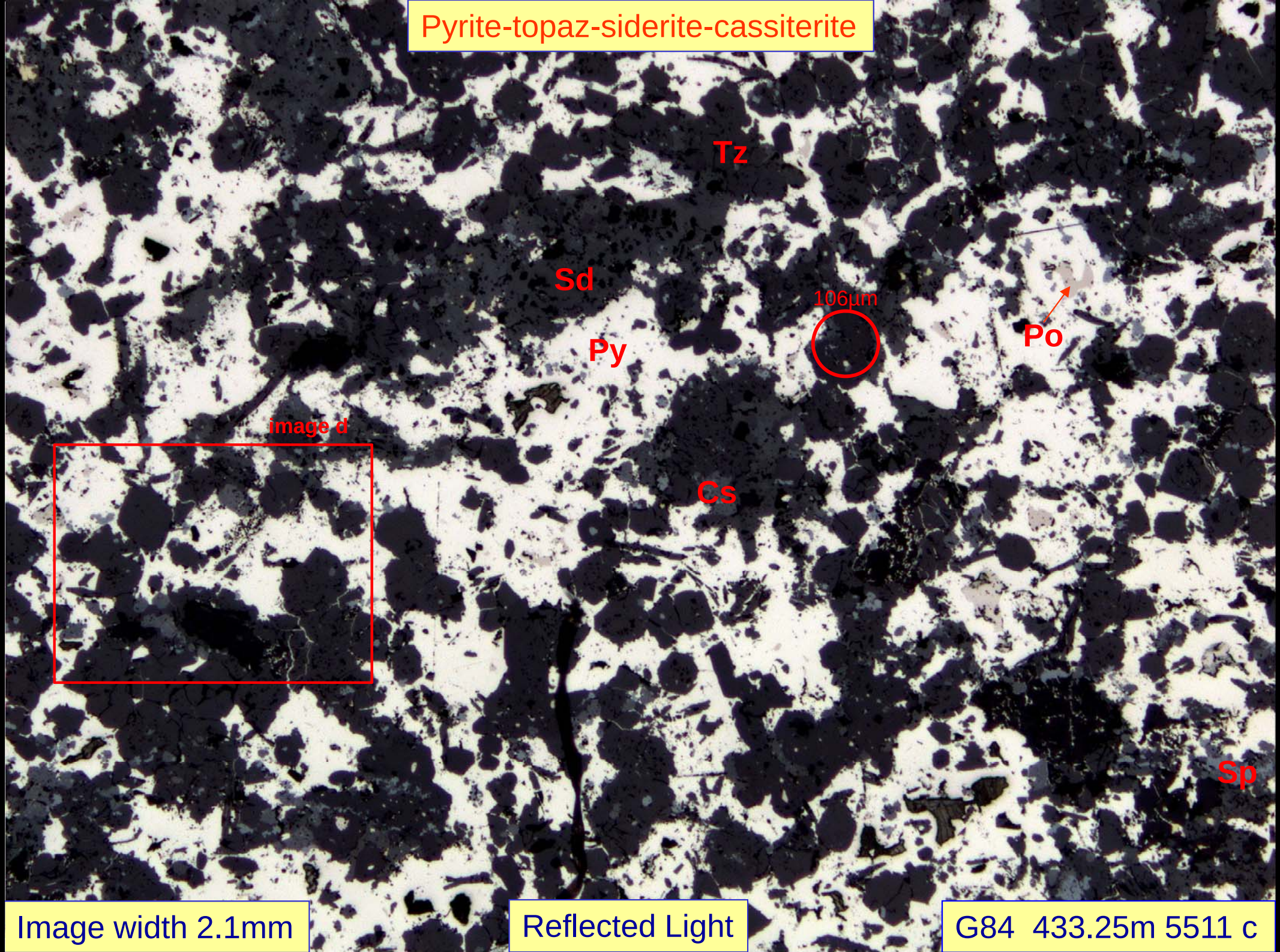
QXRD: 29% pyrite, 25% topaz, 18% quartz, 8% pyrrhotite, 5% siderite, 4% tourmaline

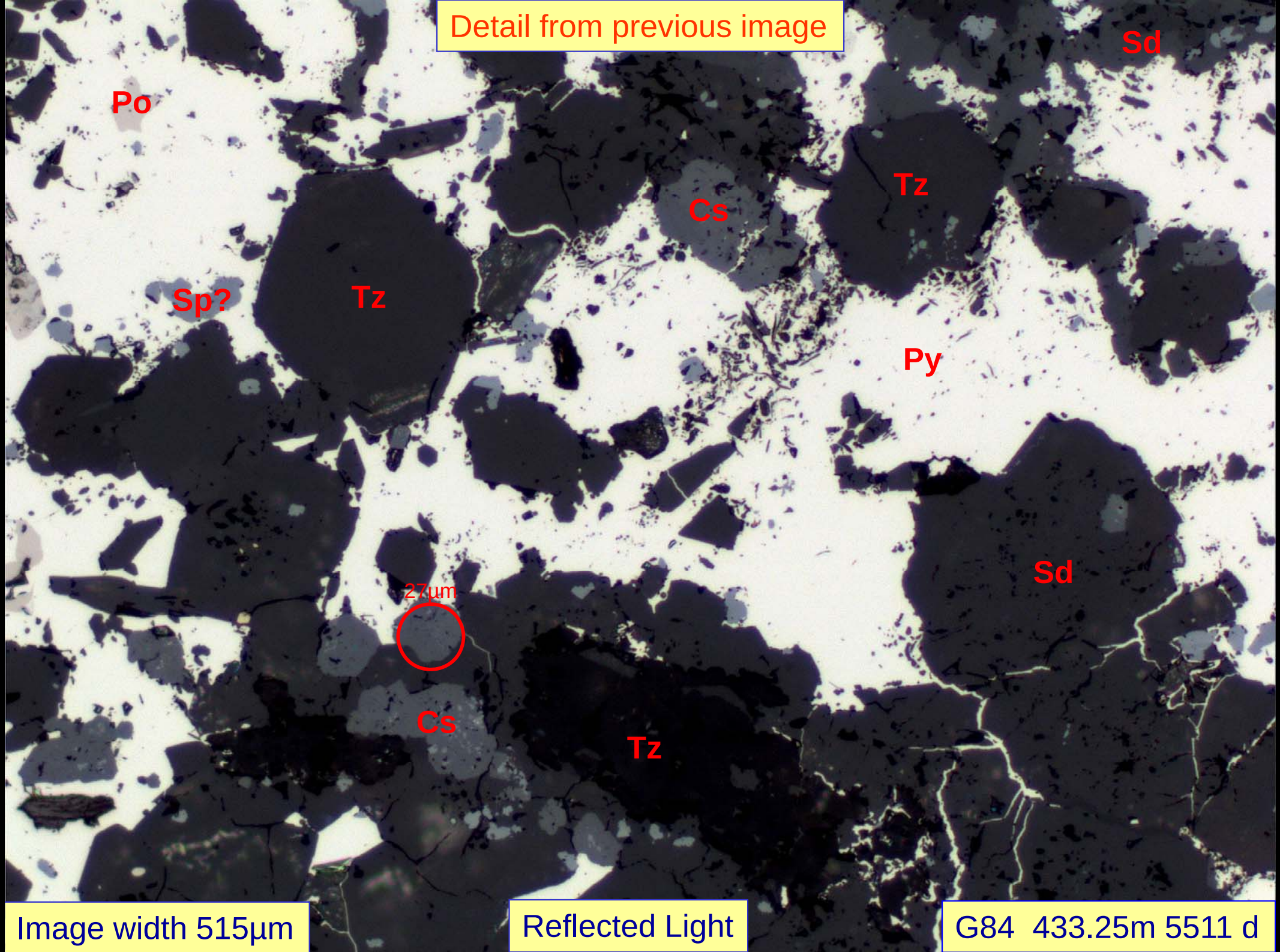
Image width ~75mm

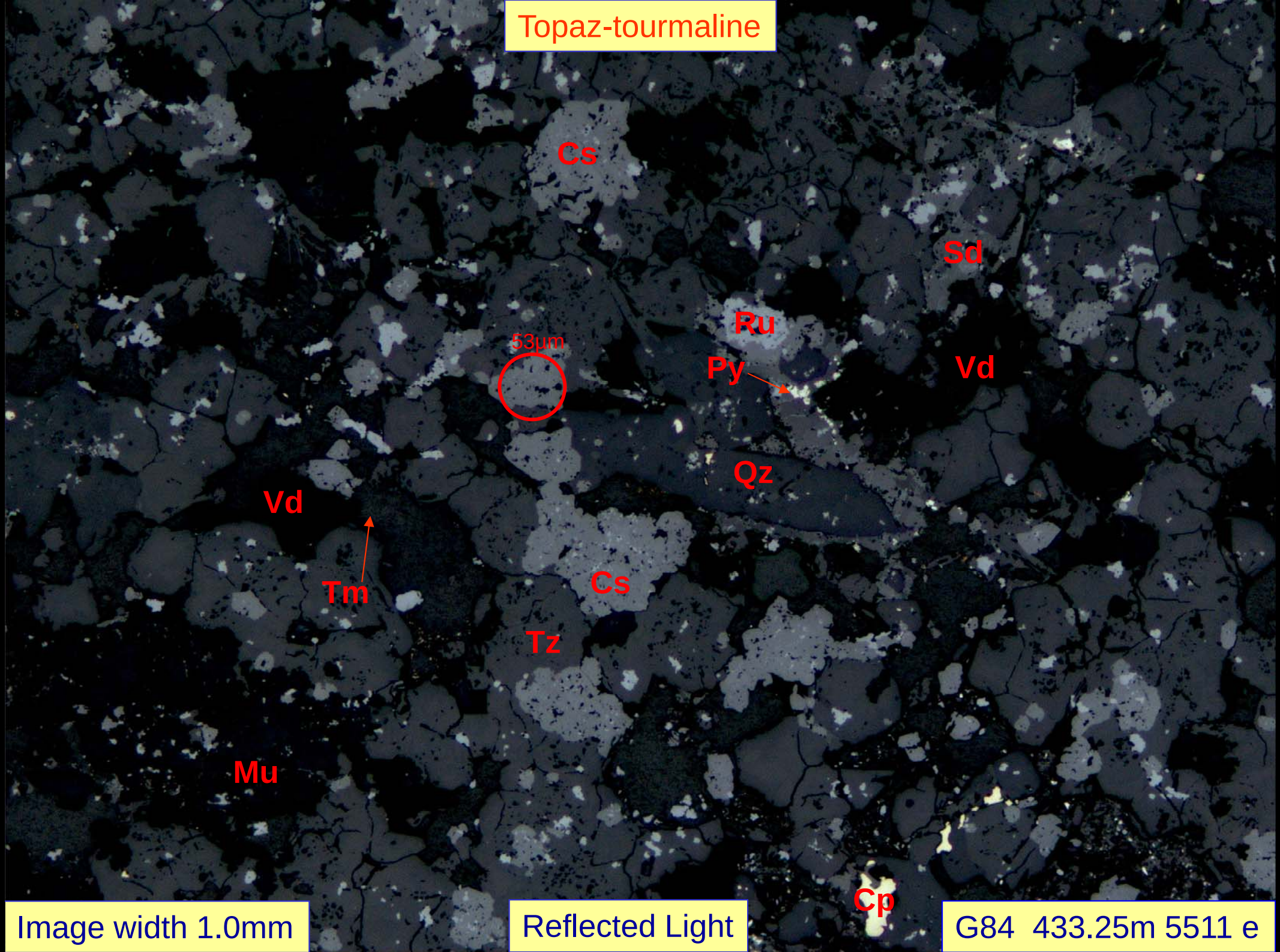
G84 433.25m 5511

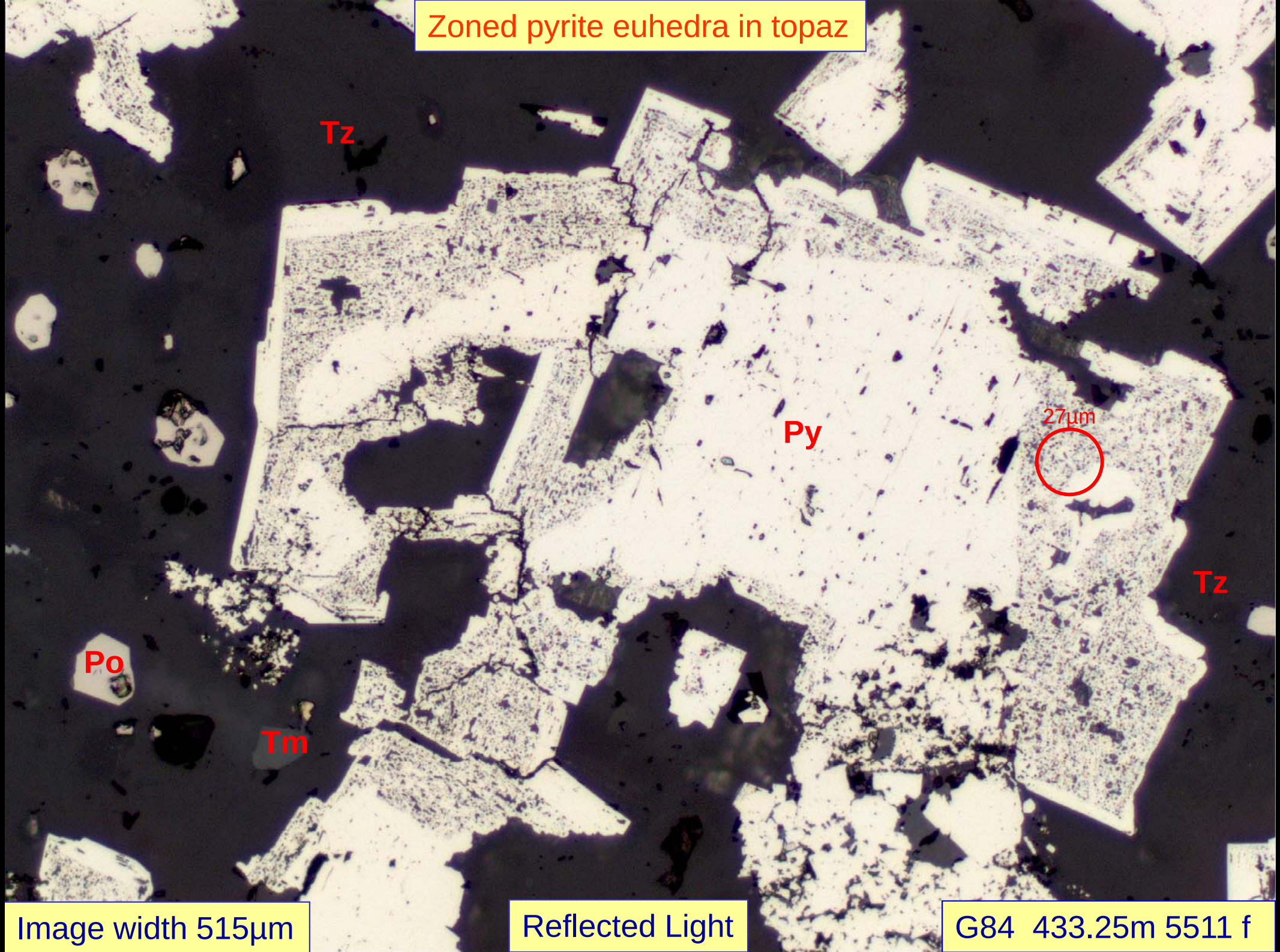

General low-magnification view
Tz
Py
Tz
As
Vd
As=arsenopyrite
Cp=chalcopyrite
Cs=cassiterite
Ma=marcasite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Sd=siderite
Se=sericite
Sp=sphalerite
Tm=tourmaline
Tz=topaz
Vd=void
Image width 8.2mm
Reflected Light
G84 433.25m 5511 a

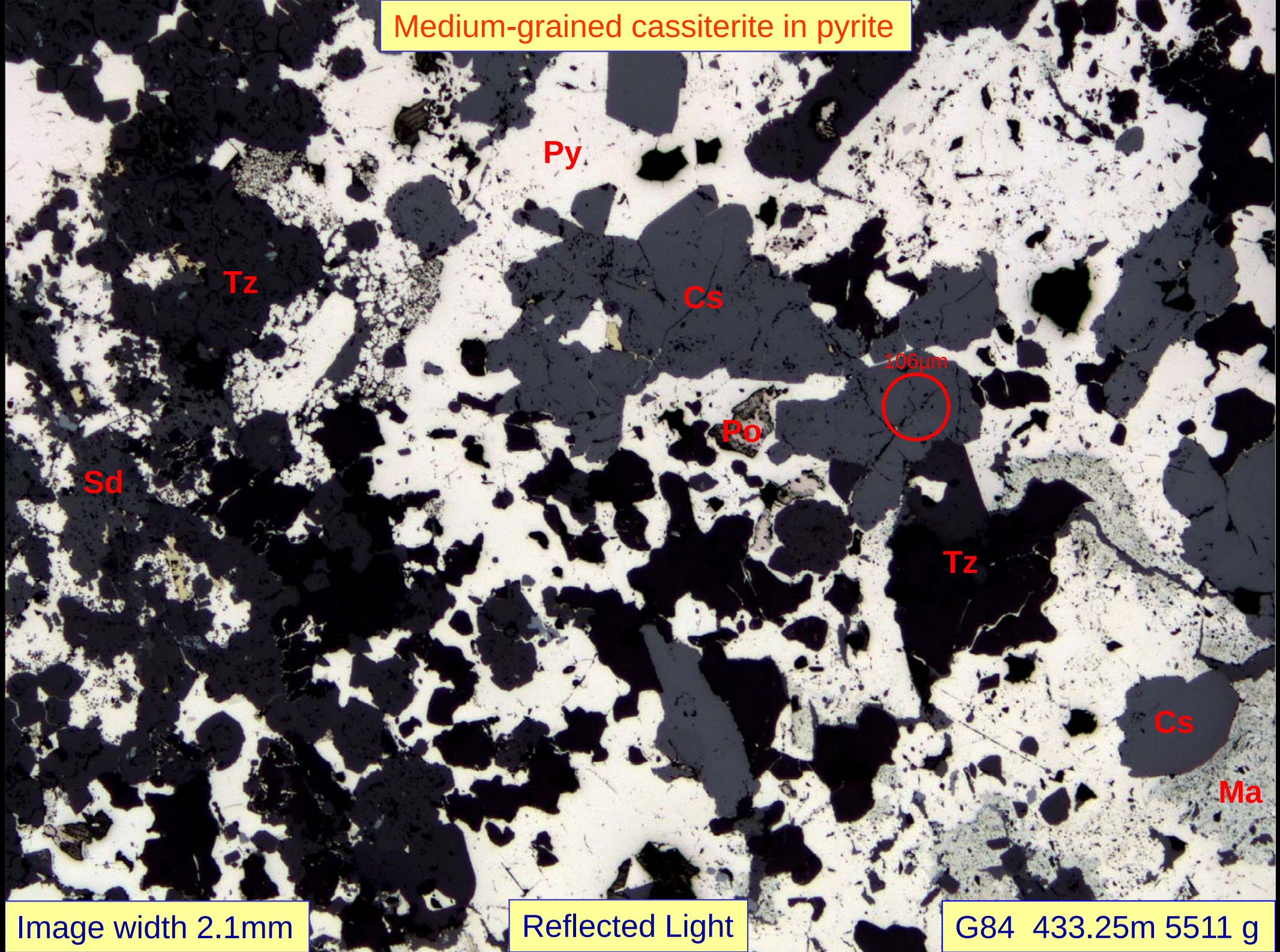

Topaz-pyrite-arsenopyrite
Ma
Vd
Tz
Py
As
Cs
Po
106µm
Cp
Tz
Py
Image width 2.1mm
Reflected Light
G84 433.25m 5511 b

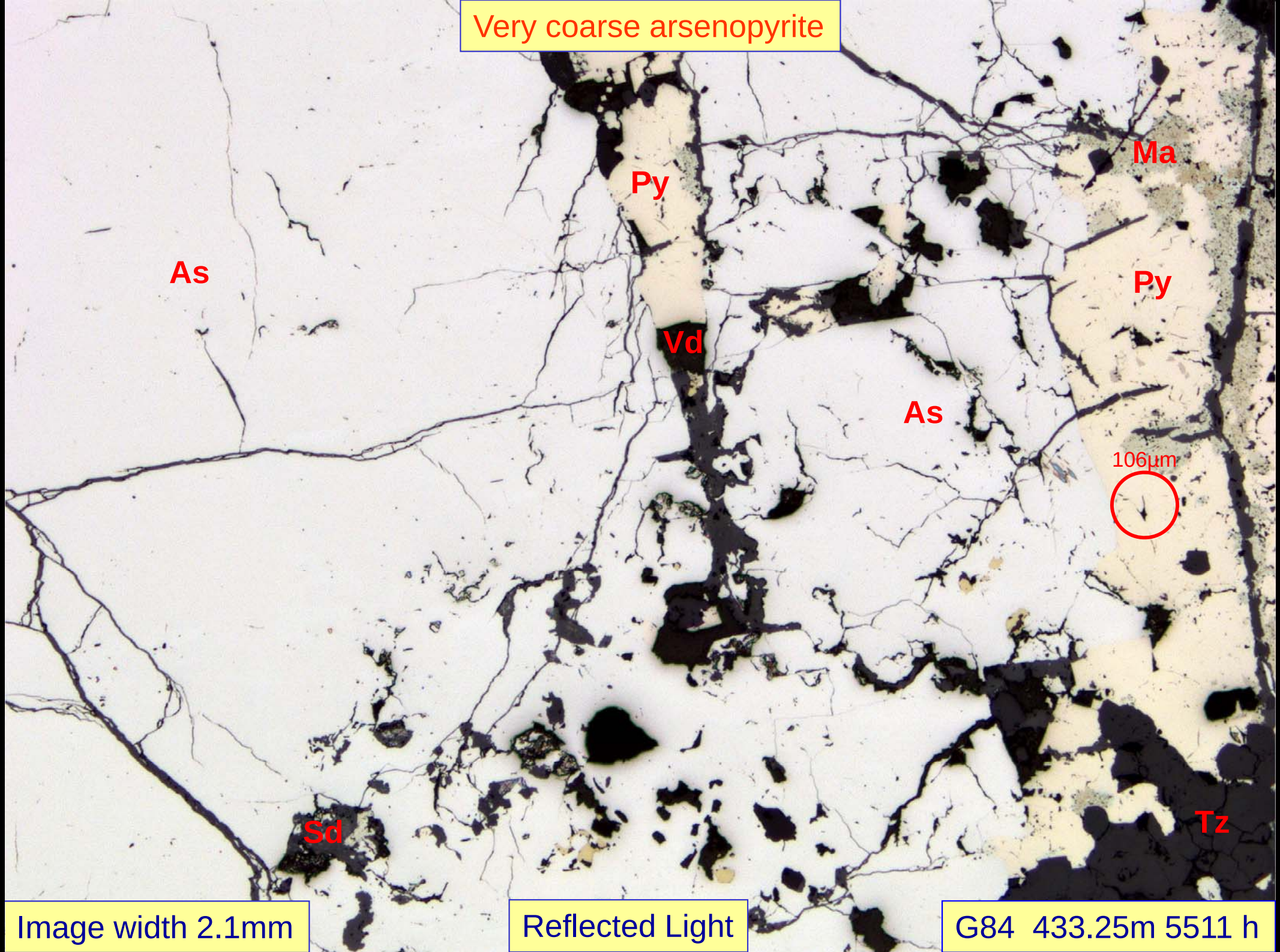

Pyrite-topaz-siderite-cassiterite
Tz
Sd
106µm
Po
Py
image d
Cs
Sp
Image width 2.1mm
Reflected Light
G84 433.25m 5511 c

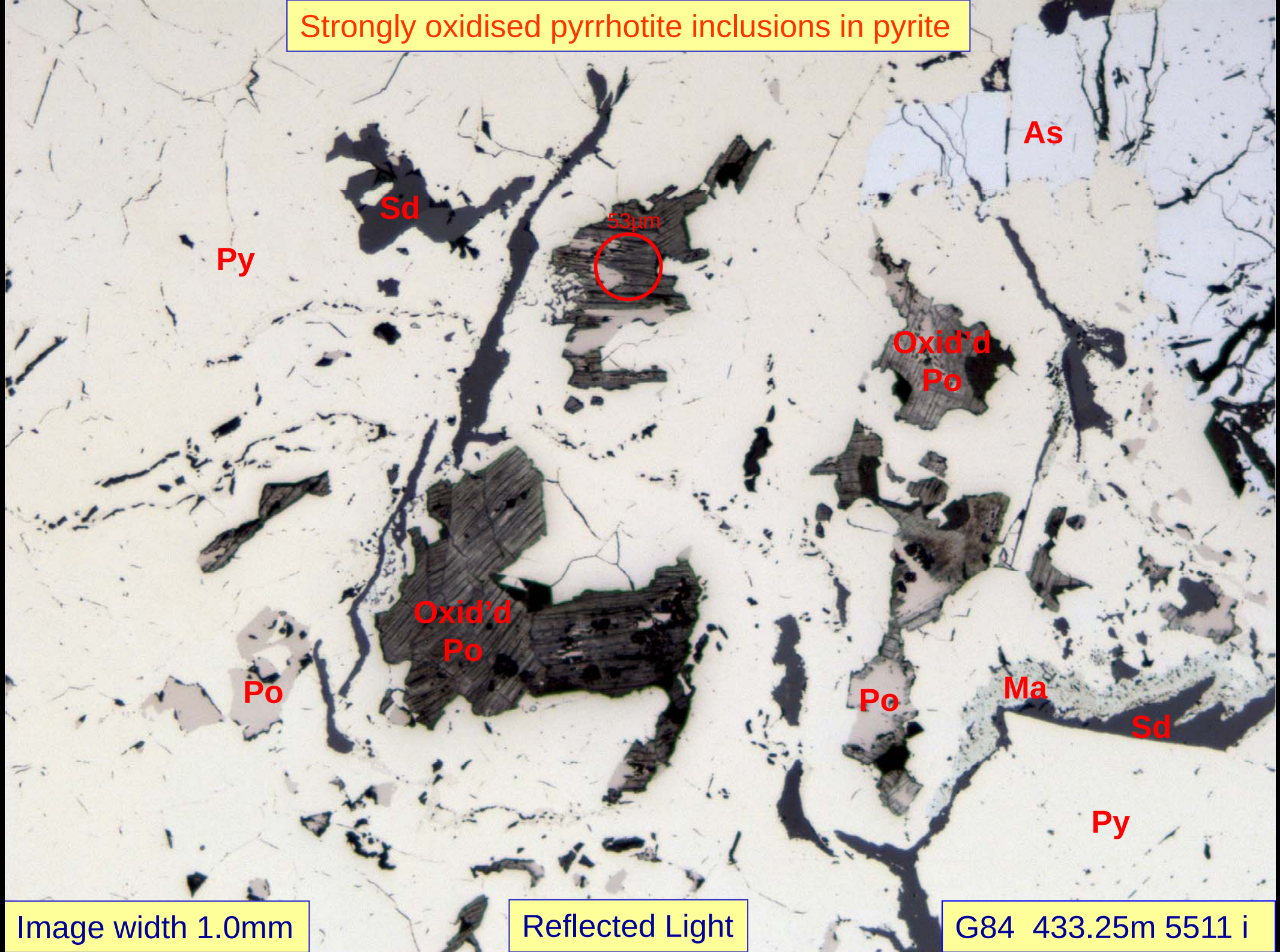

Detail from previous image
Sd
Po
Tz
Cs
Sp?
Tz
Py
27µm
Sd
Cs
Tz
Image width 515µm
Reflected Light
G84 433.25m 5511 d

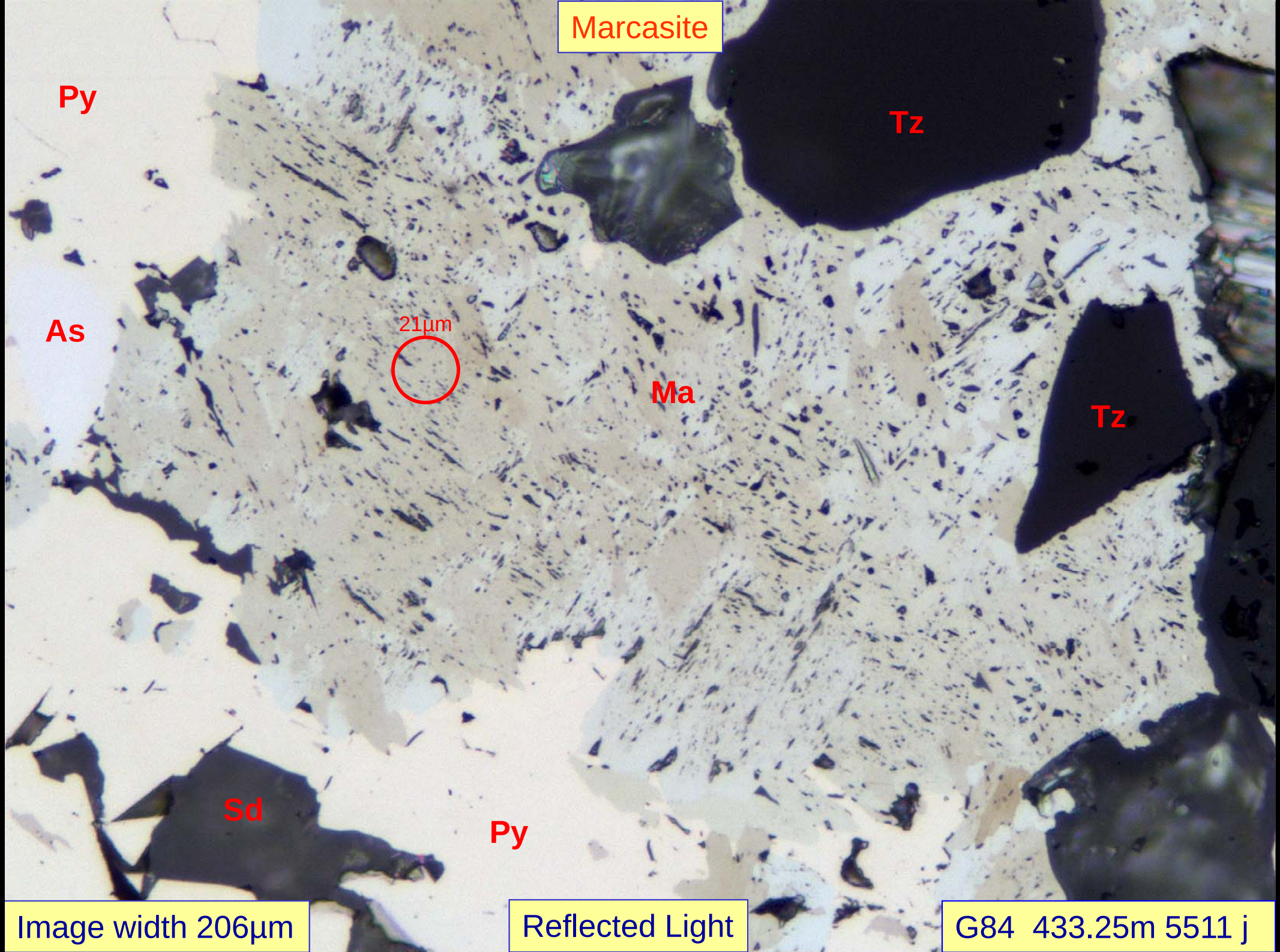

Topaz-tourmaline
Cs
Sd
Ru
53µm
Py
Vd
Vd
Qz
Tm
Cs
Tz
Mu
Cp
Image width 1.0mm
Reflected Light
G84 433.25m 5511 e


Zoned pyrite euhedra in topaz
Tz
Py
27µm
Tz
Po
Tm
Image width 515µm
Reflected Light
G84 433.25m 5511 f

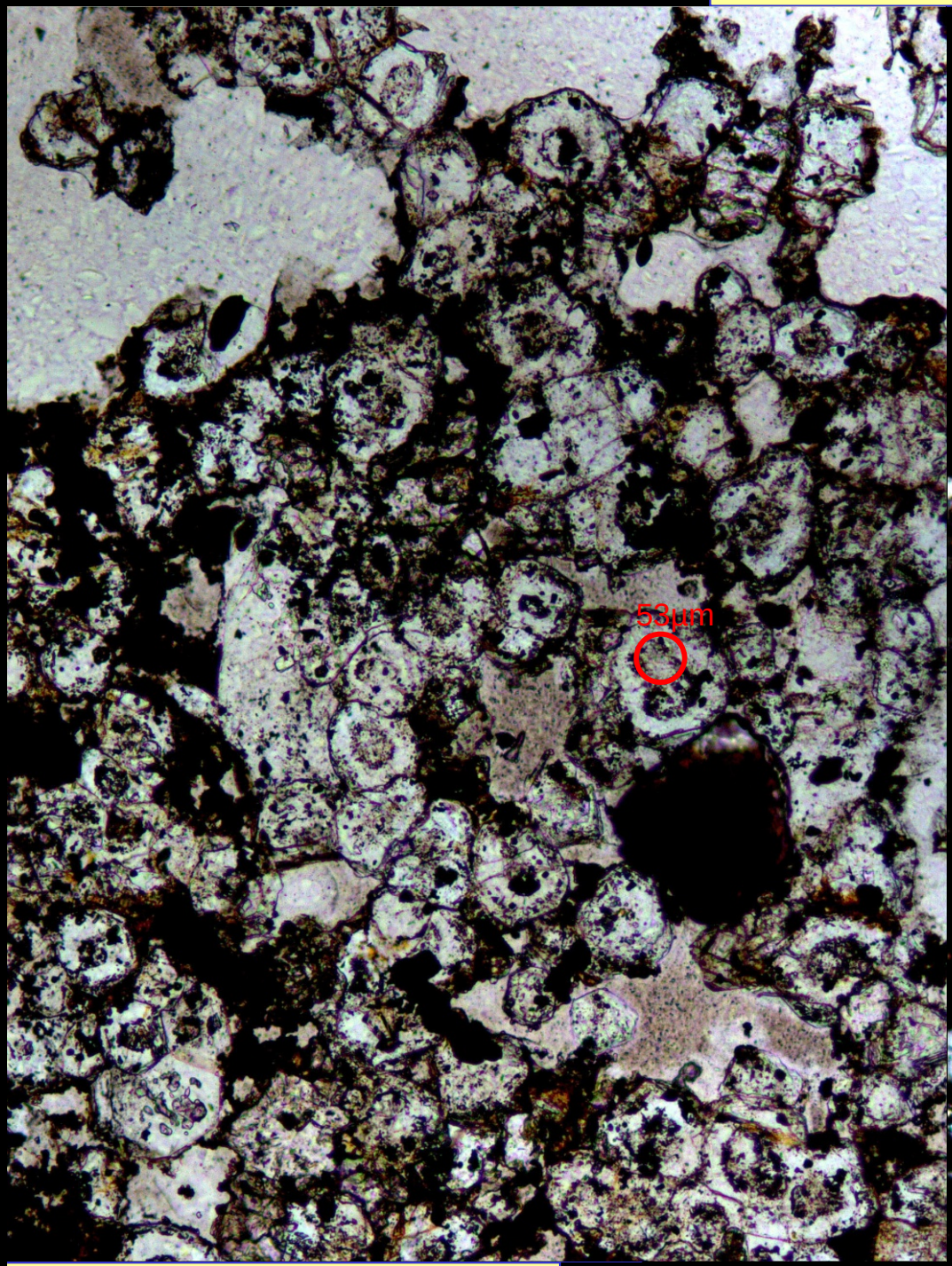

Medium-grained cassiterite in pyrite
Py
Tz
Cs
106µm
Po
Sd
Tz
Cs
Ma
Image width 2.1mm
Reflected Light
G84 433.25m 5511 g

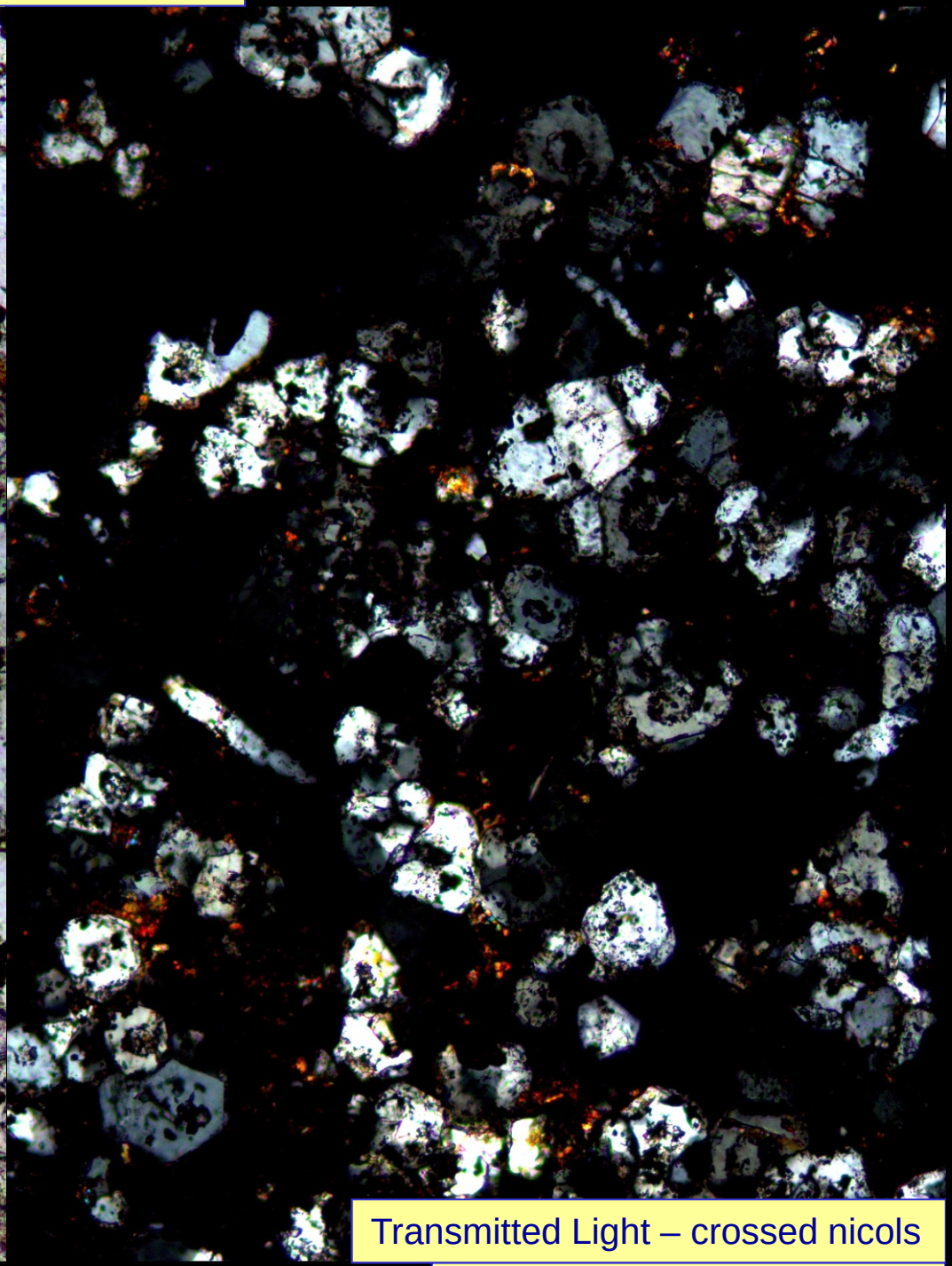

Very coarse arsenopyrite
Py
Ma
As
Py
Vd
As
106µm
Sd
Tz
Image width 2.1mm
Reflected Light
G84 433.25m 5511 h


Strongly oxidised pyrrhotite inclusions in pyrite
As
Sd
53µm
Py
Oxid'd
Po
Oxid'd
Po
Po
Po
Ma
Sd
Py
Image width 1.0mm
Reflected Light
G84 433.25m 5511 i


Marcasite
Py
Tz
As
21µm
Ma
Tz
Sd
Py
Image width 206µm
Reflected Light
G84 433.25m 5511 j

Zoned topaz crystals





Transmitted Light – crossed nicols

Image width 2 x 0.75mm

G84 433.25m 5511 k/l

PARTICLE MINERALOGY REPORT

Severn 5511

G84 433.25m

GJMcA 6.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
25.2	0.8	1.1	0.0	4.9	0.2	1.2	66.7	**300**
61	15	20	0	77	5	6	79	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.82	1.53	19.8	3.60	28.6	0.06	
Actual		**1.60**		**1.22**	**18.0**	**0.09**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	34	0	31	0	0	62	50	
Binary	52	55	31	0	73	37	40	
Ternary	12	43	19	0	21	1	9	
Quat.y+	2	1	19	0	6	1	1	
Grains	42.0	7.7	5.3	0.0	3.0	6.3	84.7	1.49

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		7	2	0	0	4	86
Po	11		0	0	0	0	89
Cs	10	0		0	0	5	85
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	63	0	18	0	0		20
Ga	39	11	4	0	6	1	

TOTAL ASSOCIATION MATRIX

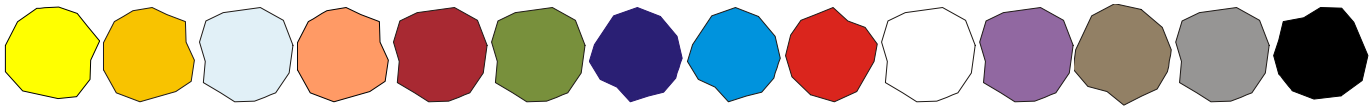
		Py	Po	Cs	St	Cp	As	Ga
	Py		8	5	0	1	4	59
	Po	13		34	0	0	0	94
of	**Cs**	35	3		0	7	8	64
all	**St**	0	0	0		0	0	0
	Cp	12	0	6	0		0	100
	As	24	0	7	0	0		9
	Ga	22	7	3	0	4	1	

DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	34		4	1	0	0	2	45	12	2
Po	0	6		0	0	0	0	49	43	1
Cs	31	3	0		0	0	2	27	19	19
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	73	21	6
As	62	23	0	7	0	0		7	1	1
Ga	50	16	4	2	0	2	0		9	1

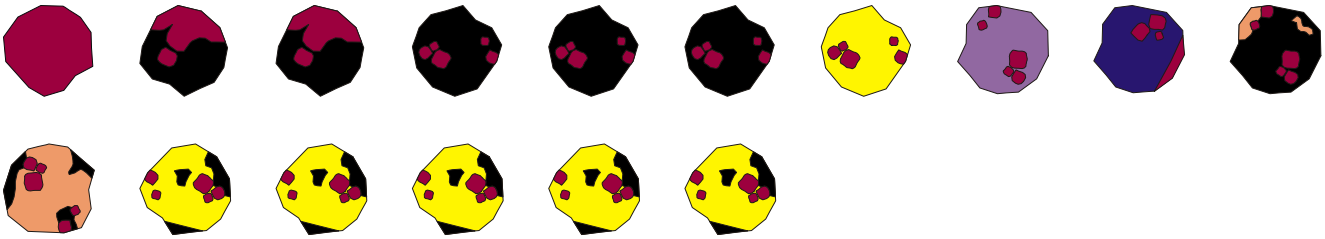
Stellar Resources - Severn Drillhole Mineragraphy

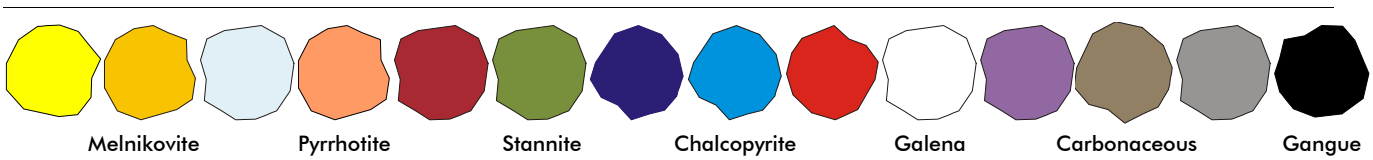
Severn 5511 **53µm mask** **January 2012**



Stellar Resources - Severn Drillhole Mineragraphy

Severn 5511 Sn Scan **53µm mask** **January 2012**



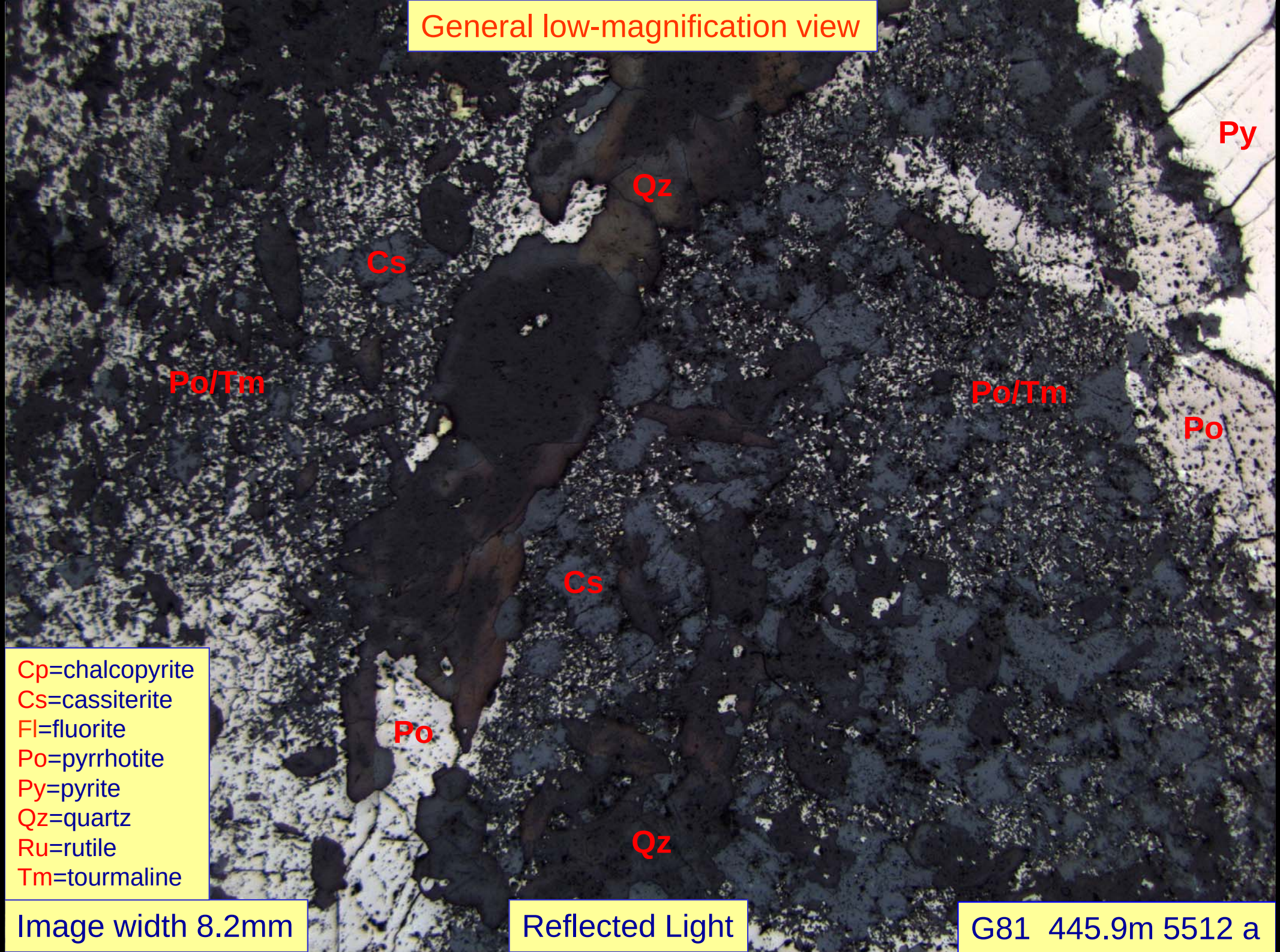


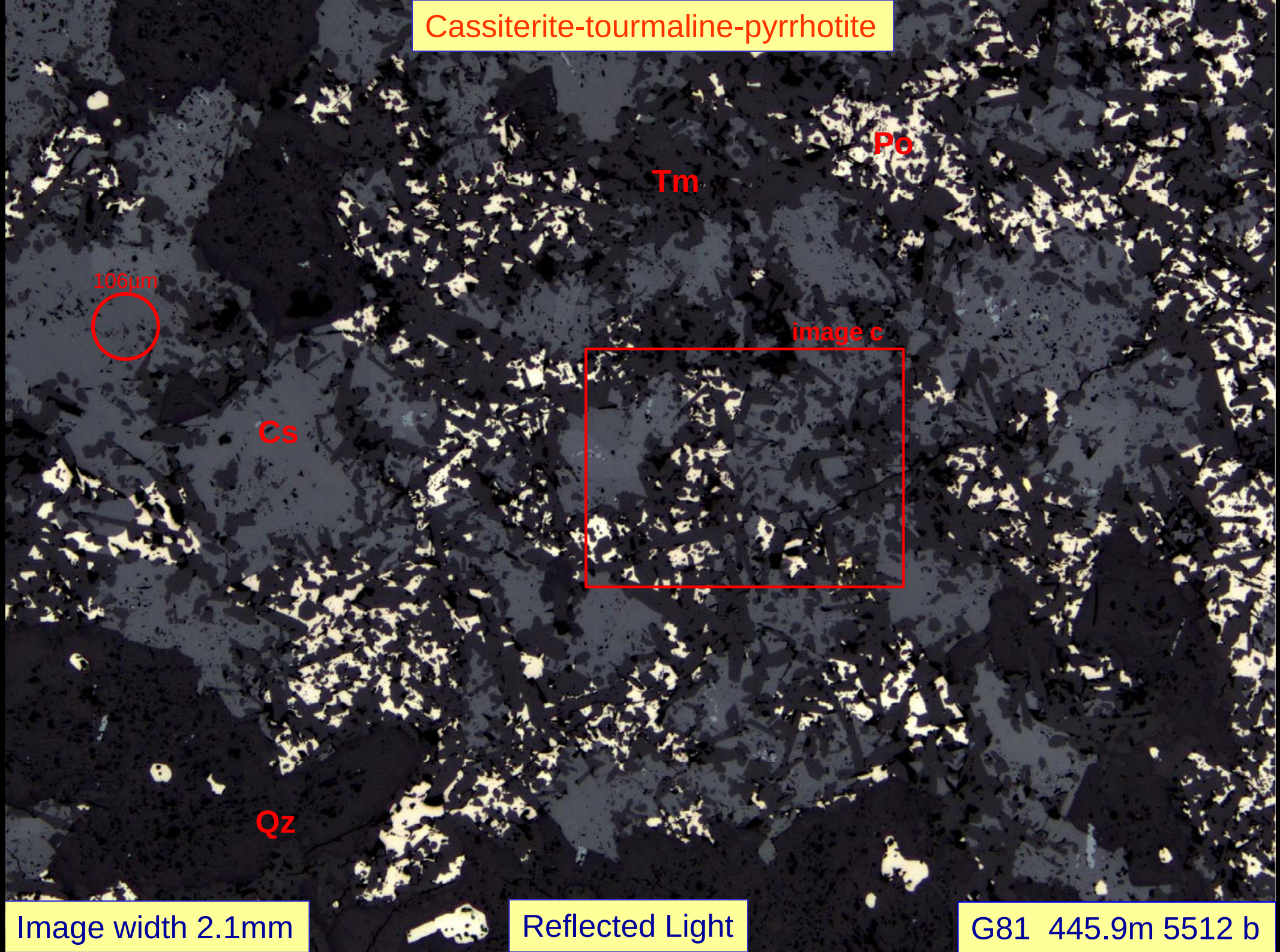
Core Scan

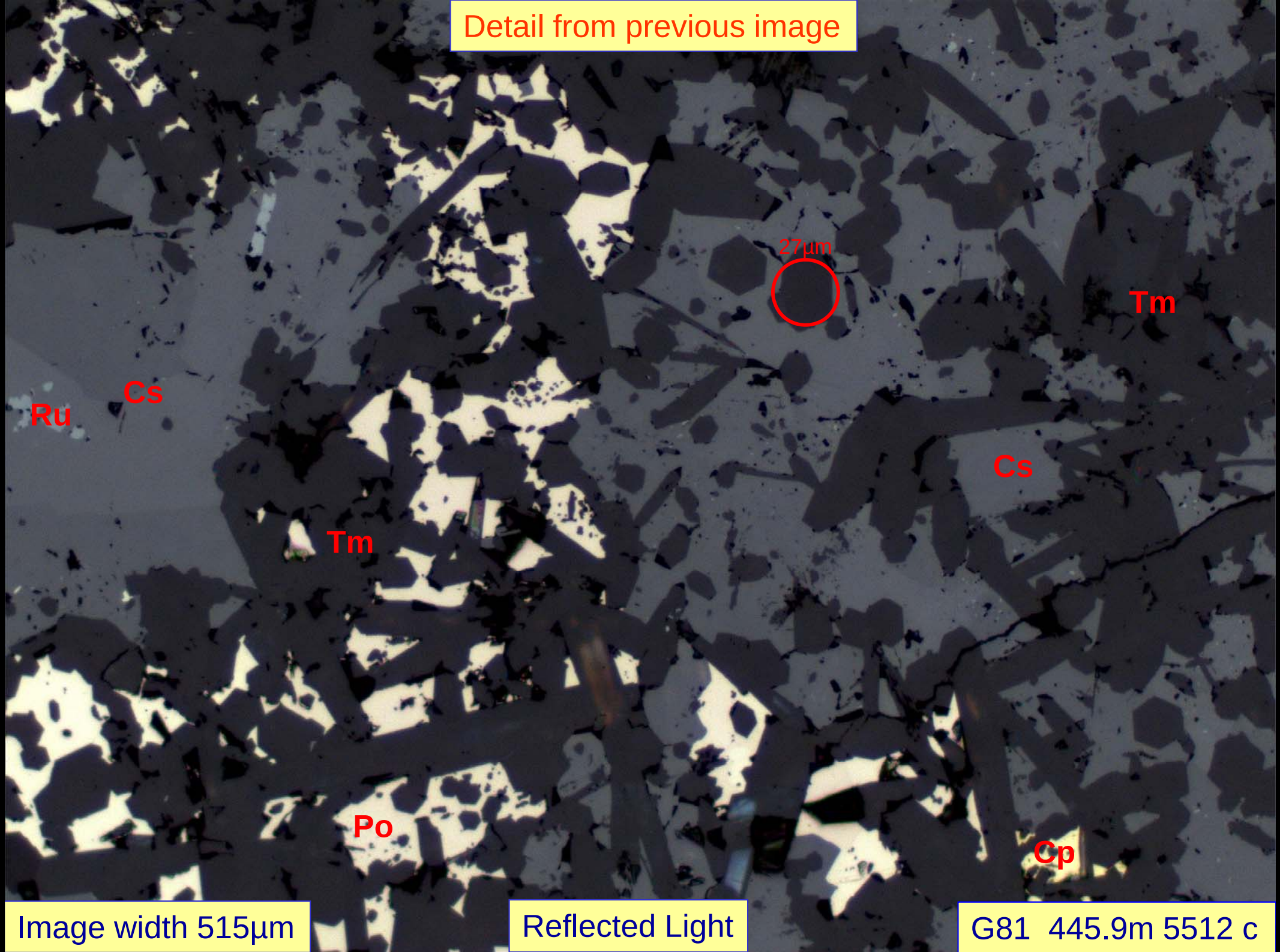
QXRD: 45% tourmaline, 23% pyrrhotite, 7% cassiterite, 6% pyrite

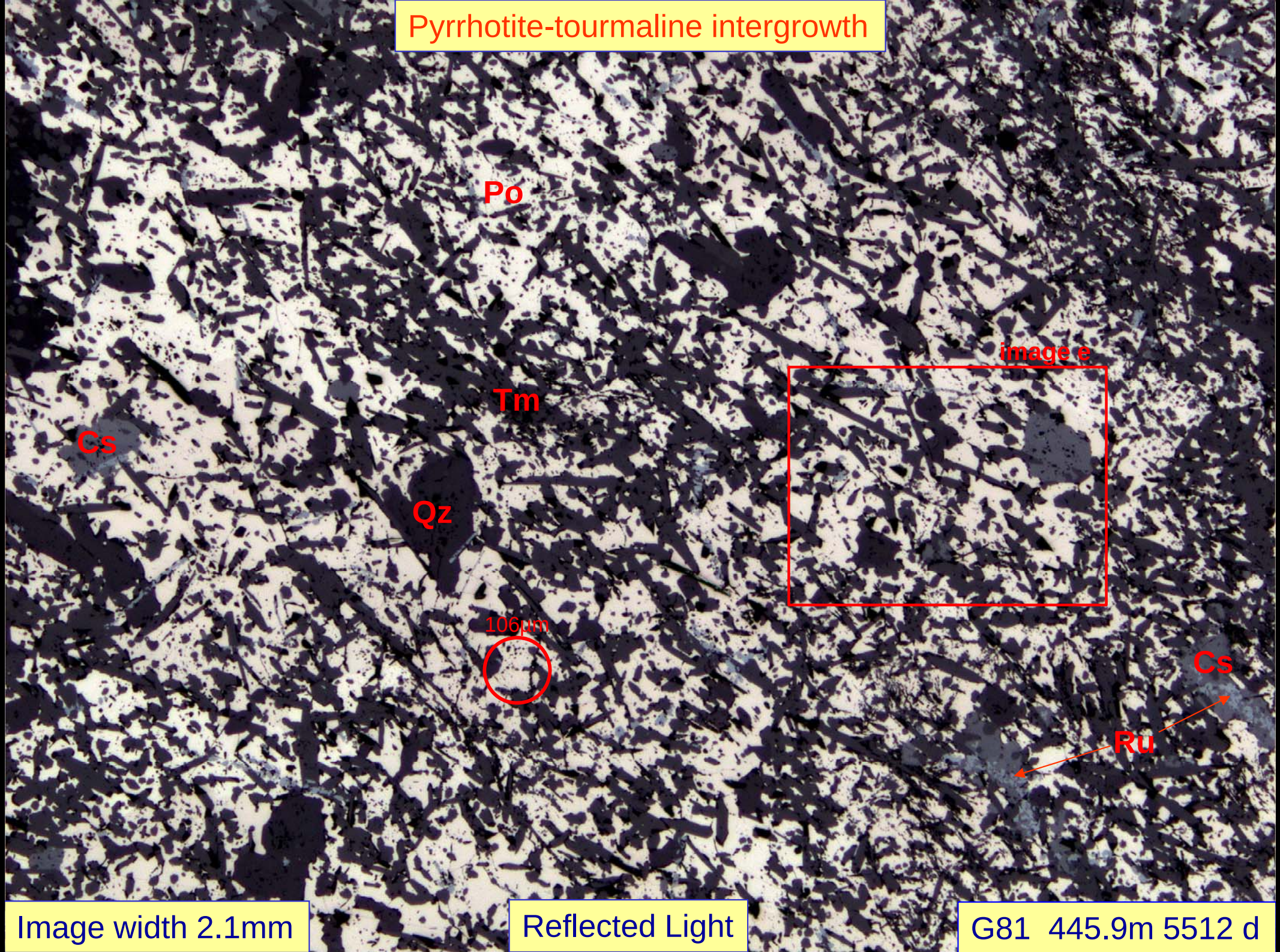
Image width ~95mm

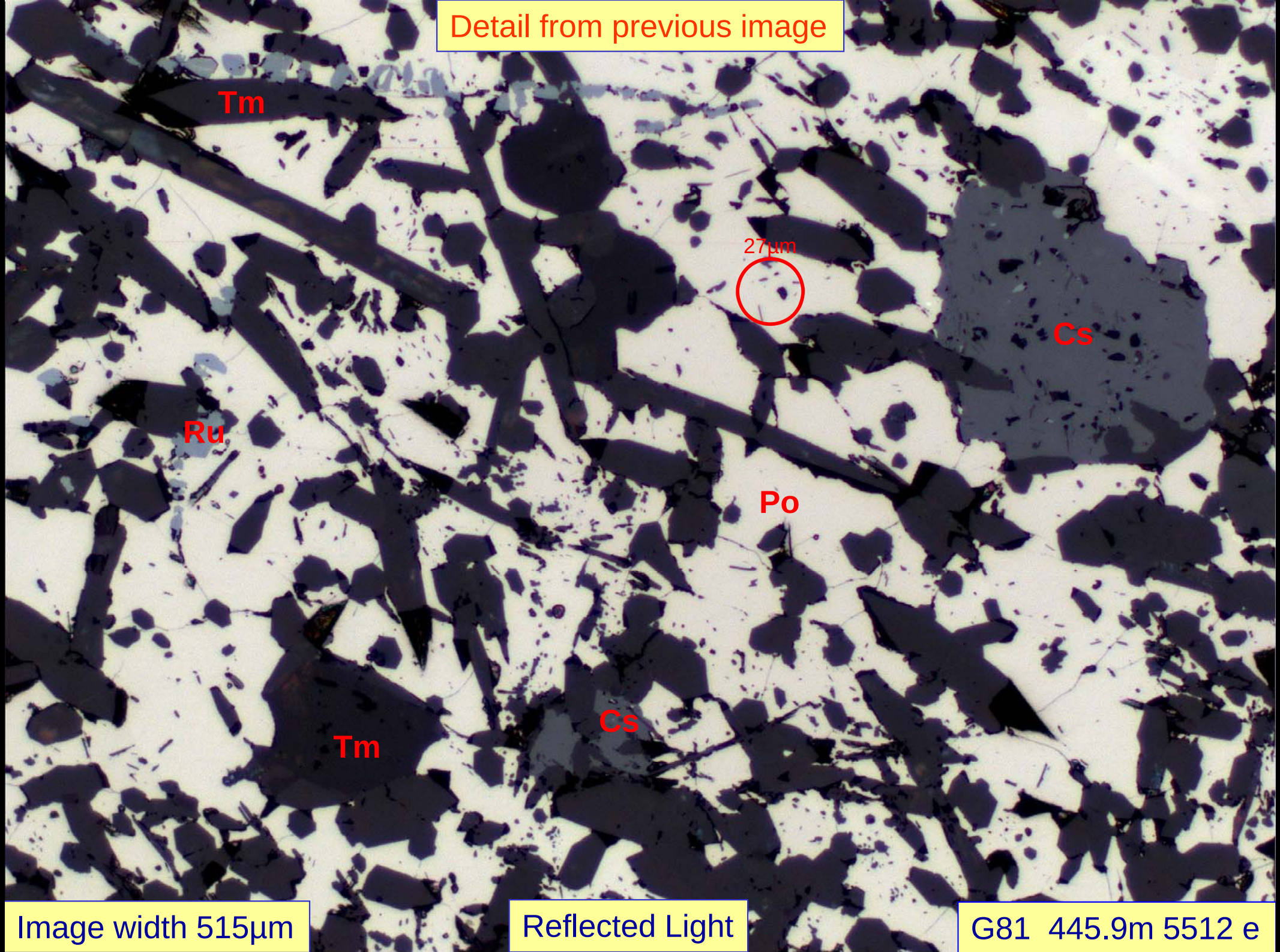
G81 445.9m 5512

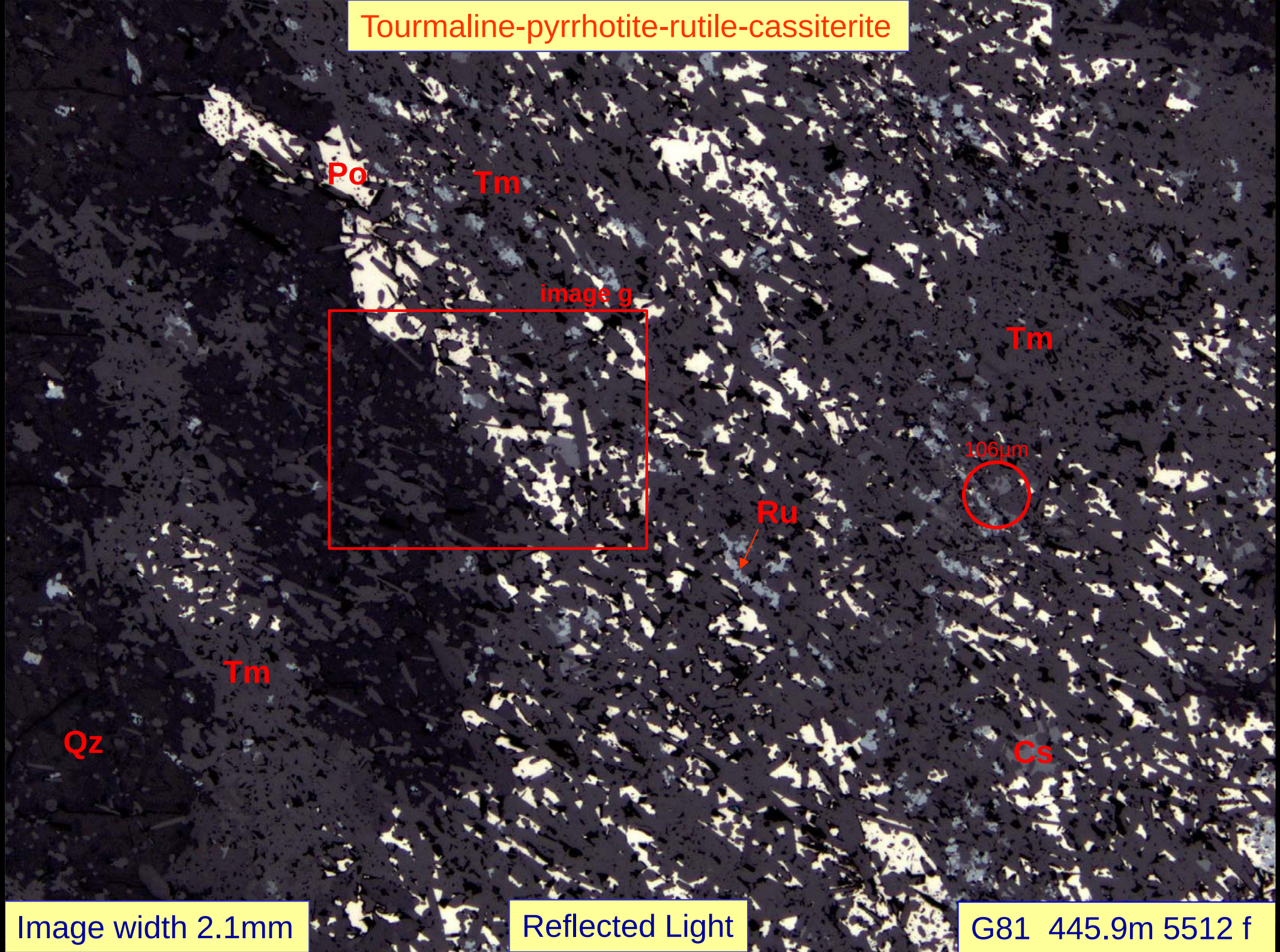

General low-magnification view
Py
Qz
Cs
Po/Tm
Po/Tm
Po
Cs
Po
Qz
Cp=chalcopyrite
Cs=cassiterite
Fl=fluorite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Tm=tourmaline
Image width 8.2mm
Reflected Light
G81 445.9m 5512 a

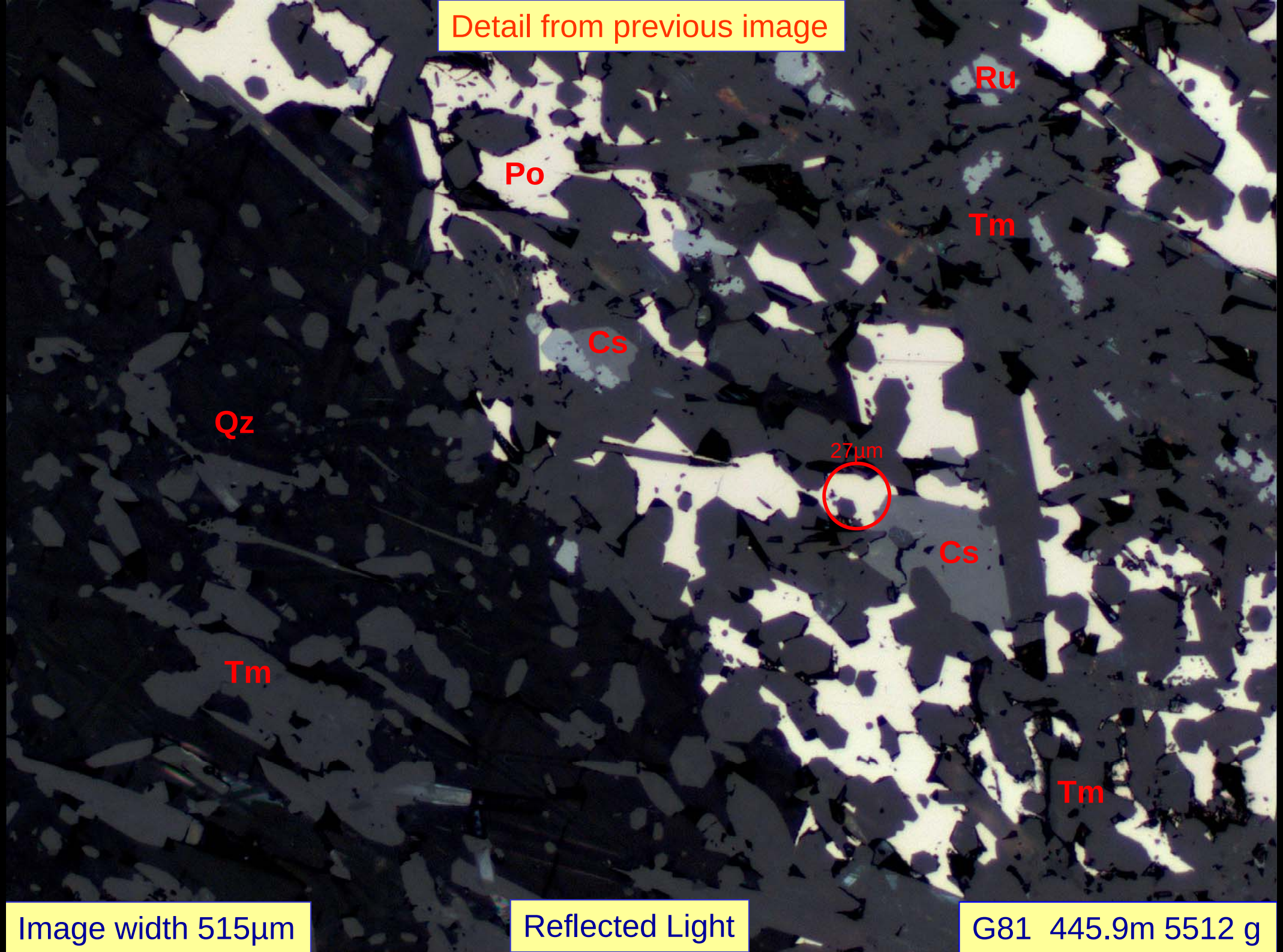

Cassiterite-tourmaline-pyrrhotite
Po
Tm
106µm
image c
Cs
Qz
Image width 2.1mm
Reflected Light
G81 445.9m 5512 b

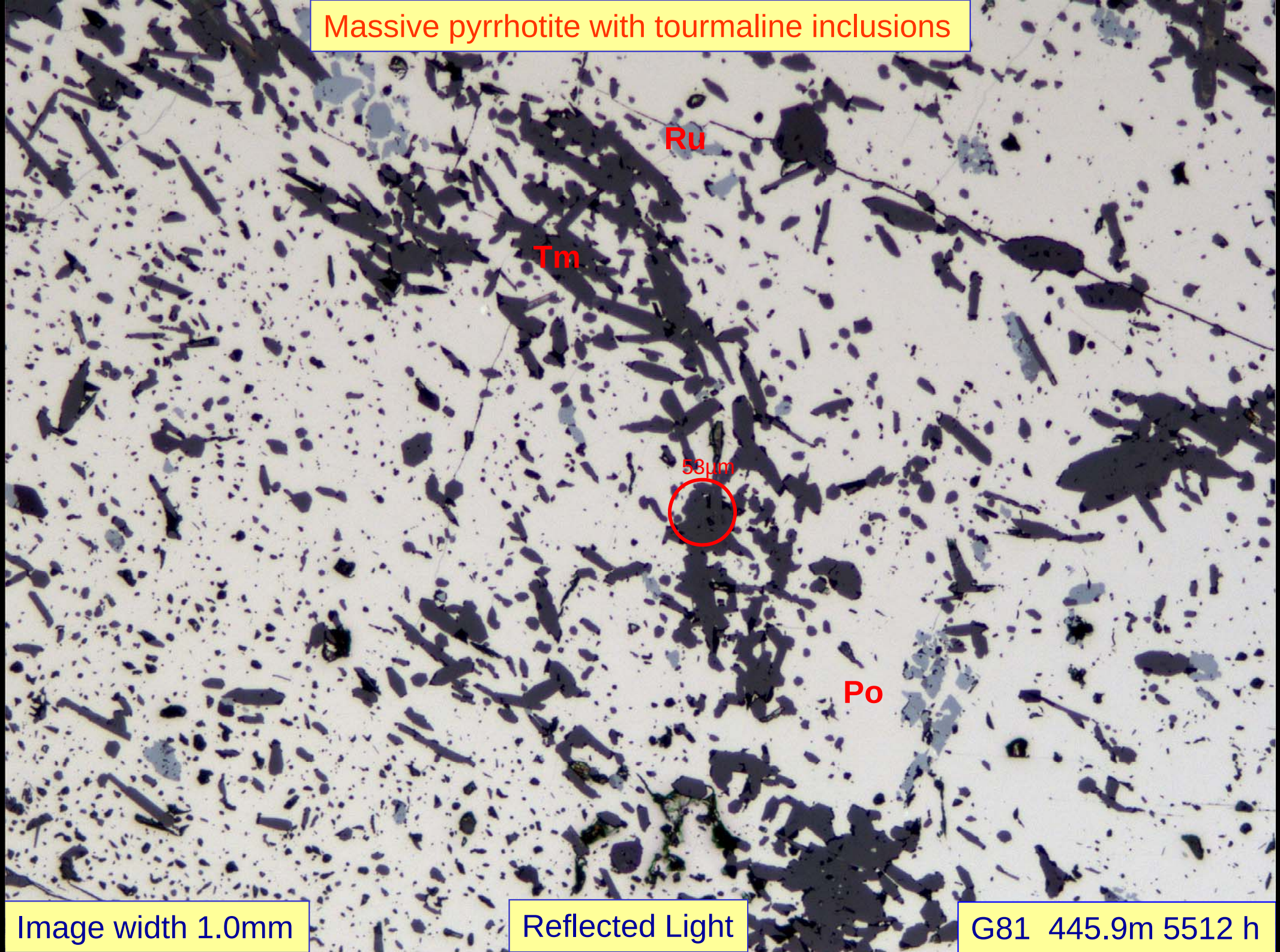

Detail from previous image
27µm
Tm
Ru
Cs
Cs
Tm
Po
Cp
Image width 515µm
Reflected Light
G81 445.9m 5512 c


Pyrrhotite-tourmaline intergrowth
Po
Tm
Cs
Qz
image e
106µm
Cs
Ru
Image width 2.1mm
Reflected Light
G81 445.9m 5512 d

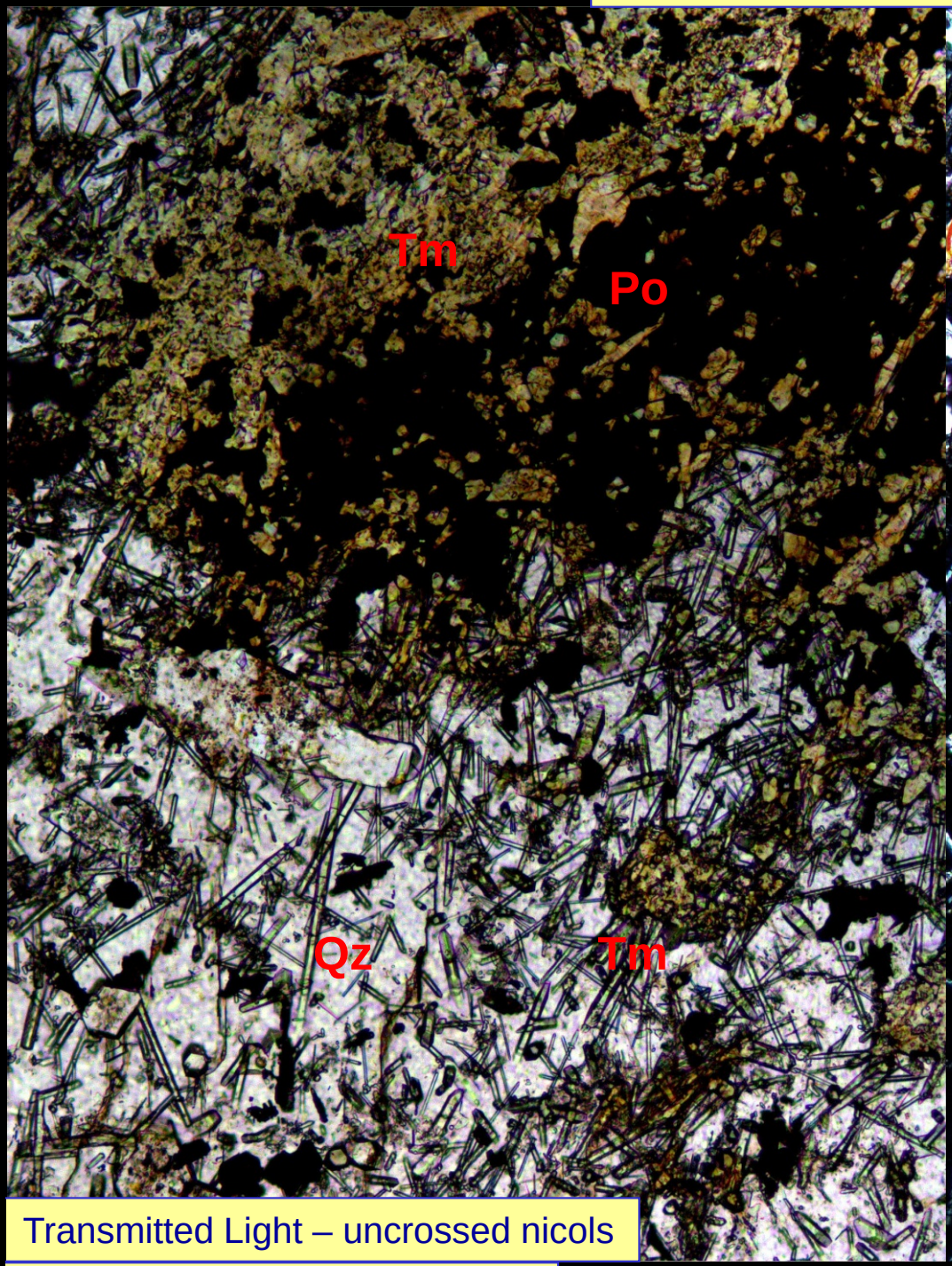

Detail from previous image
Tm
27µm
Cs
Ru
Po
Cs
Tm
Image width 515µm
Reflected Light
G81 445.9m 5512 e


Tourmaline-pyrrhotite-rutile-cassiterite
Po
Tm
image g
Tm
106µm
Ru
Tm
Qz
Cs
Image width 2.1mm
Reflected Light
G81 445.9m 5512 f

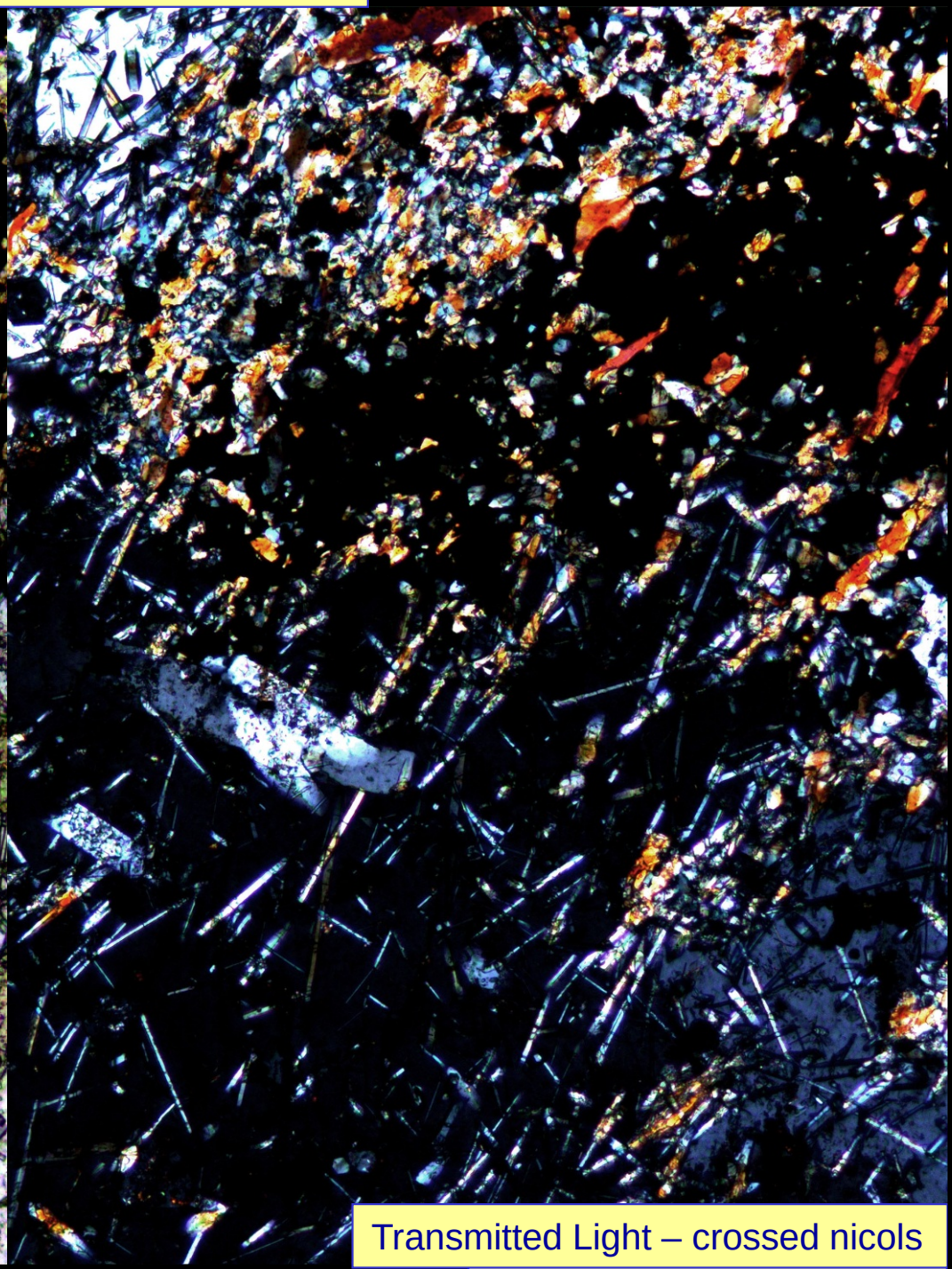

Detail from previous image
Ru
Po
Tm
Cs
Qz
27µm
Cs
Tm
Tm
Image width 515µm
Reflected Light
G81 445.9m 5512 g


Massive pyrrhotite with tourmaline inclusions
Ru
Tm
58µm
Po
Image width 1.0mm
Reflected Light
G81 445.9m 5512 h

Massive and acicular tourmaline



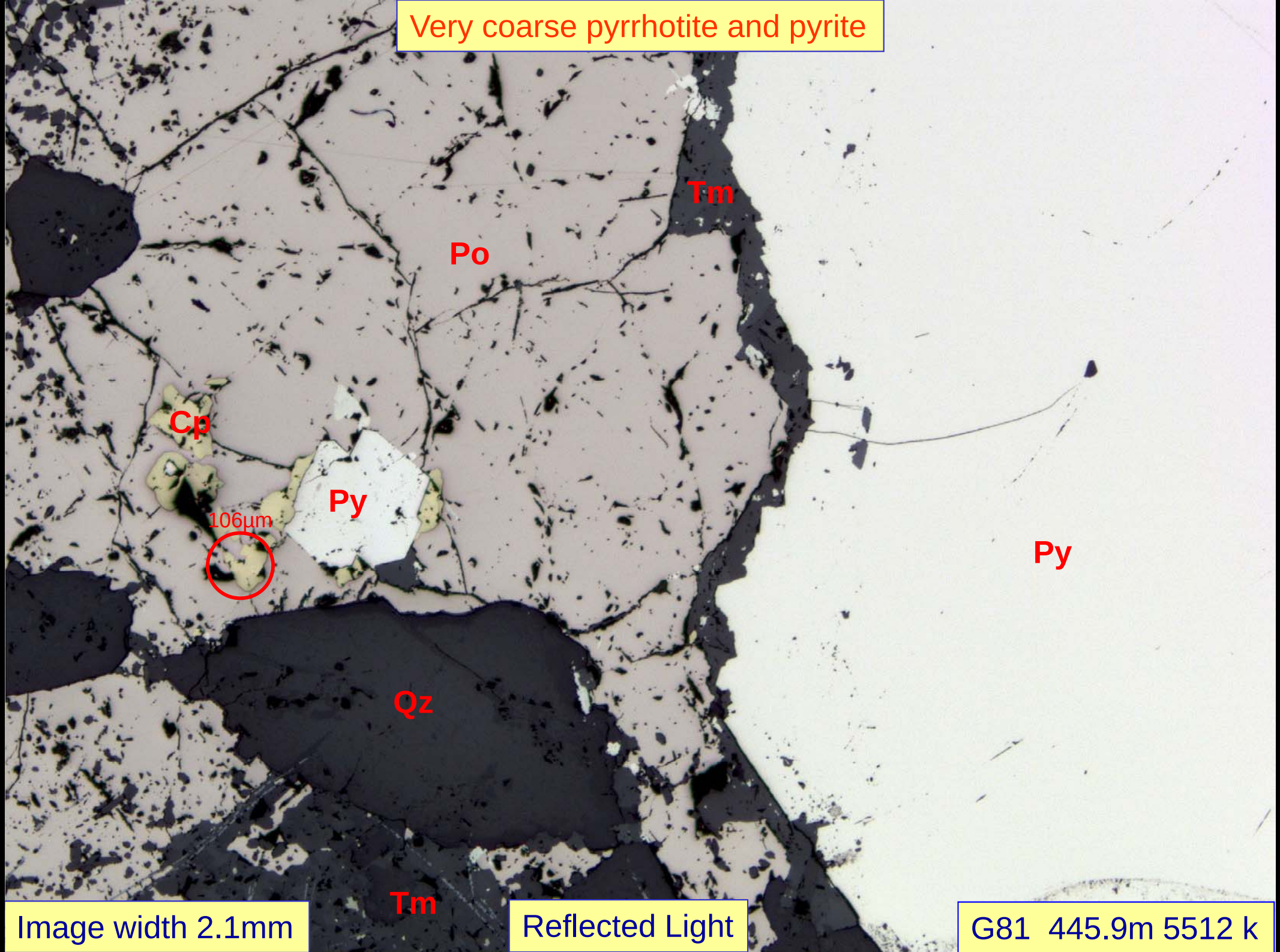
Transmitted Light – uncrossed nicols

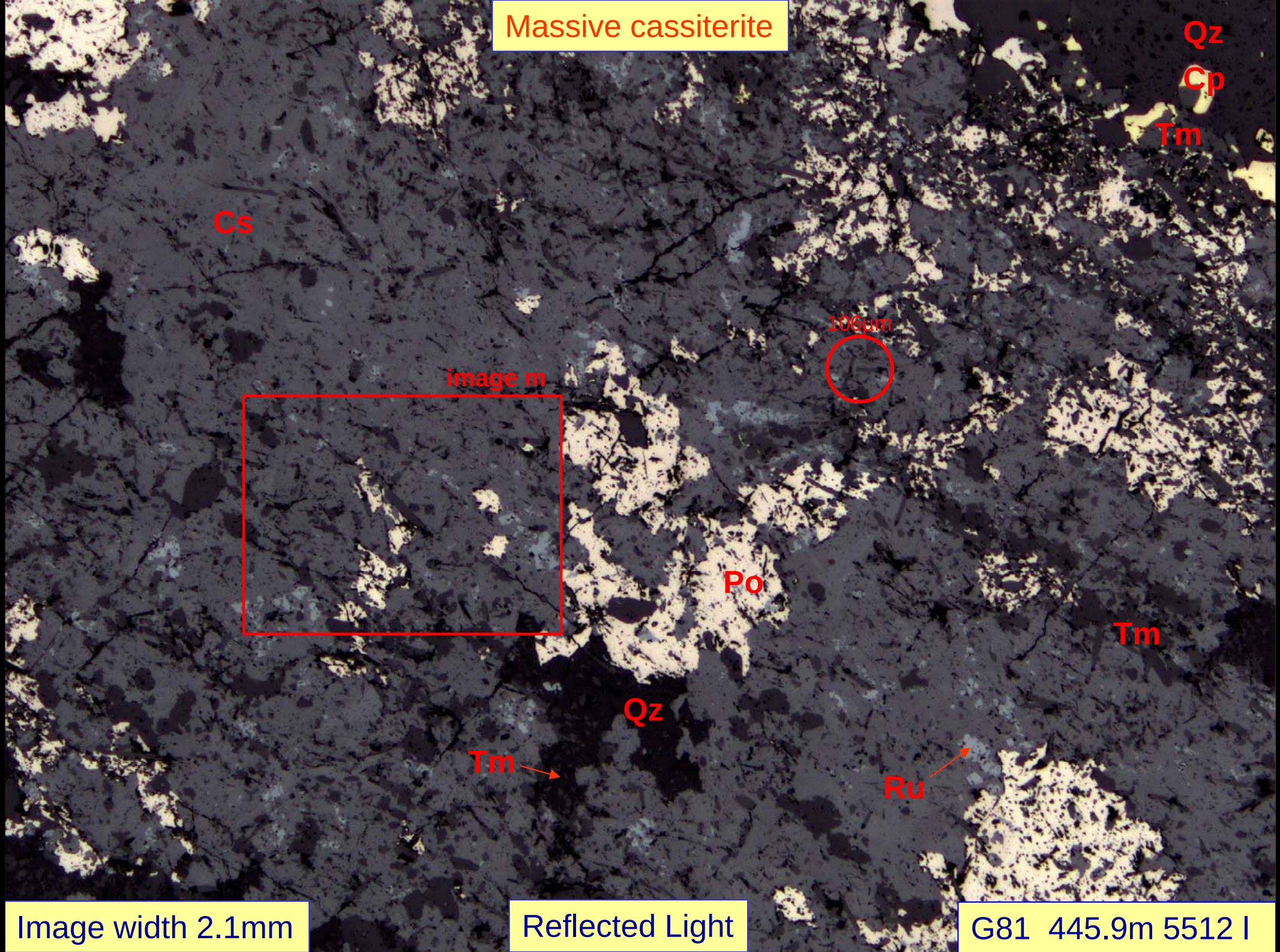


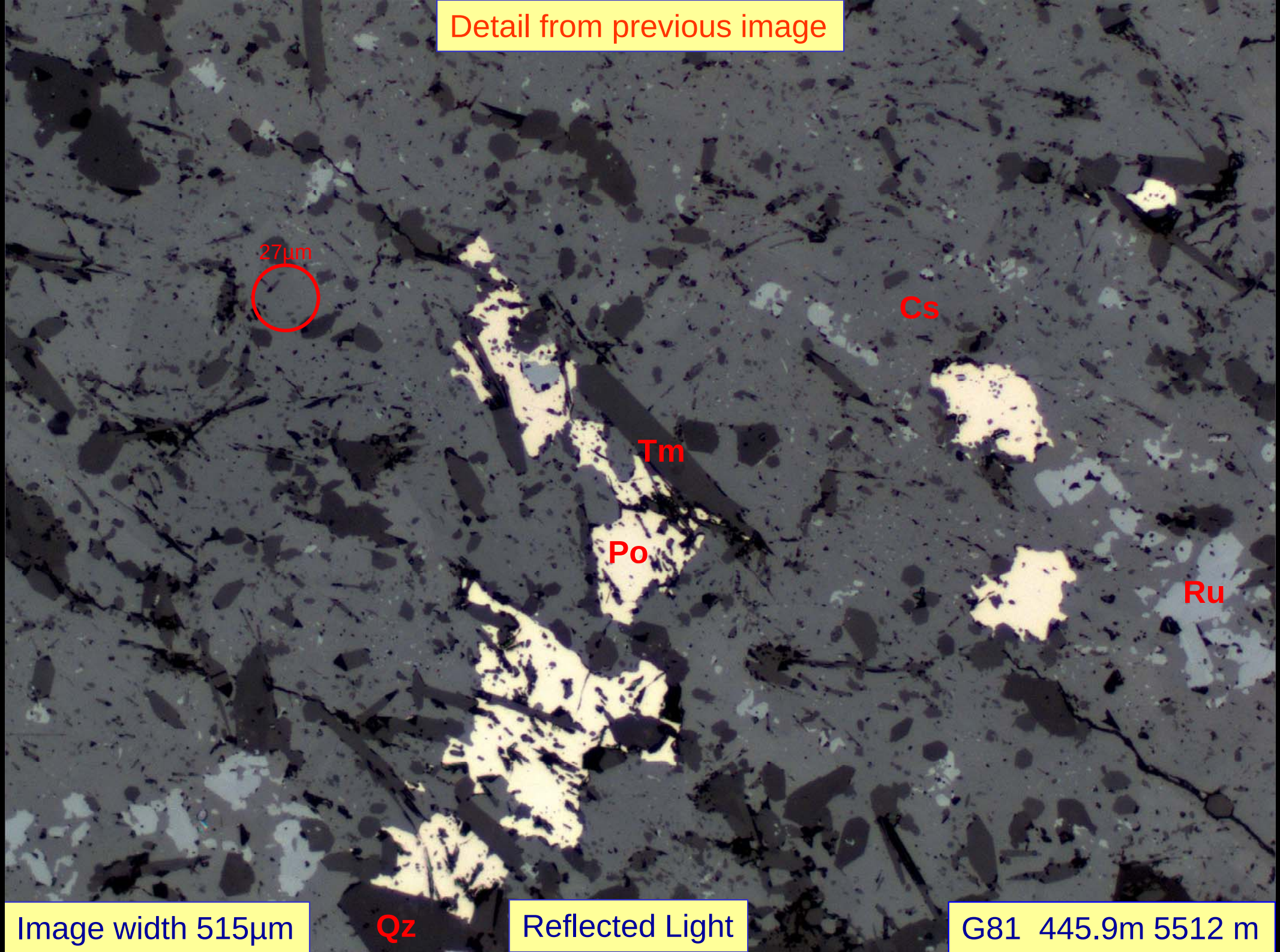
Transmitted Light – crossed nicols

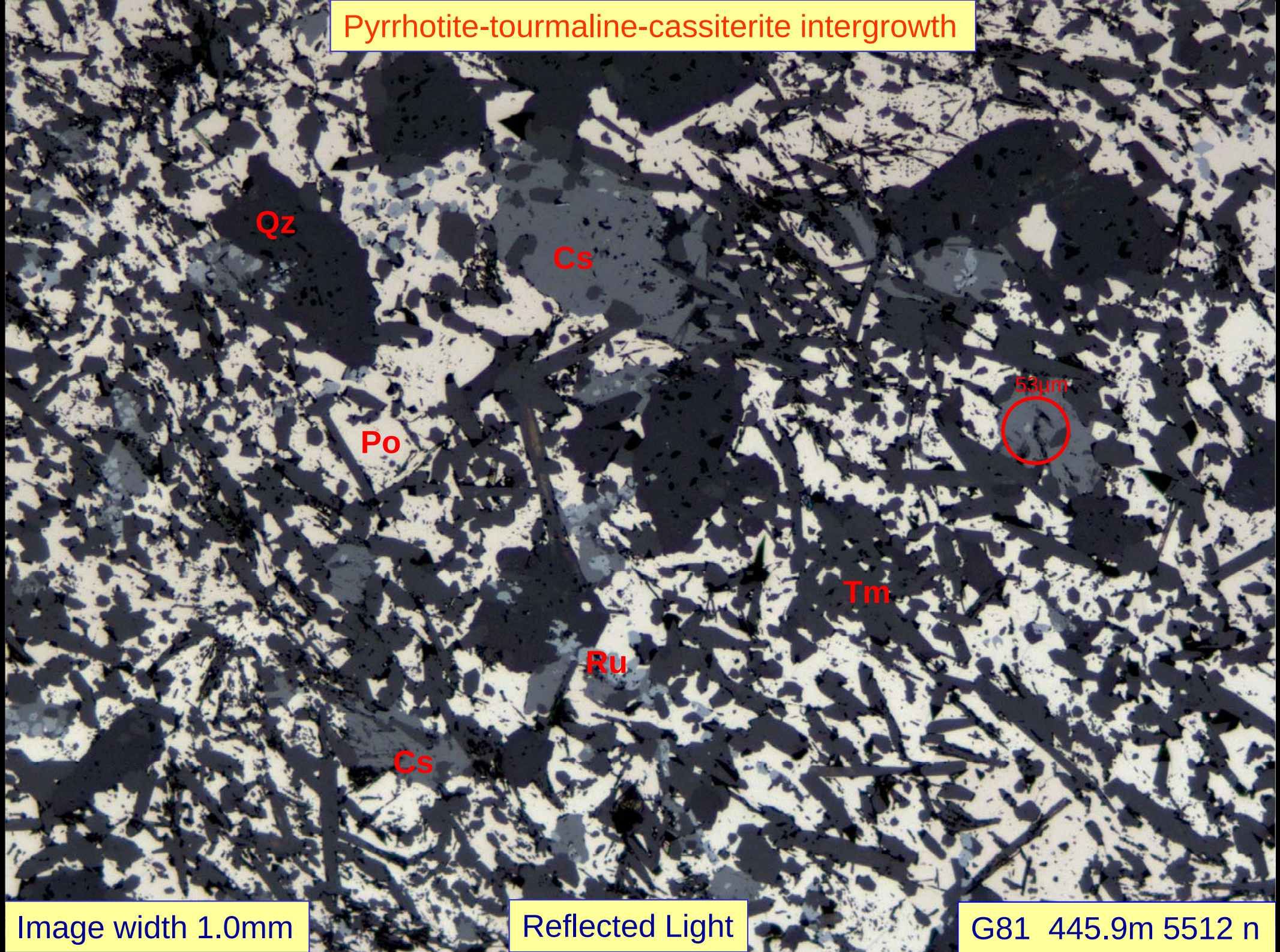
Image width 2 x 0.75mm

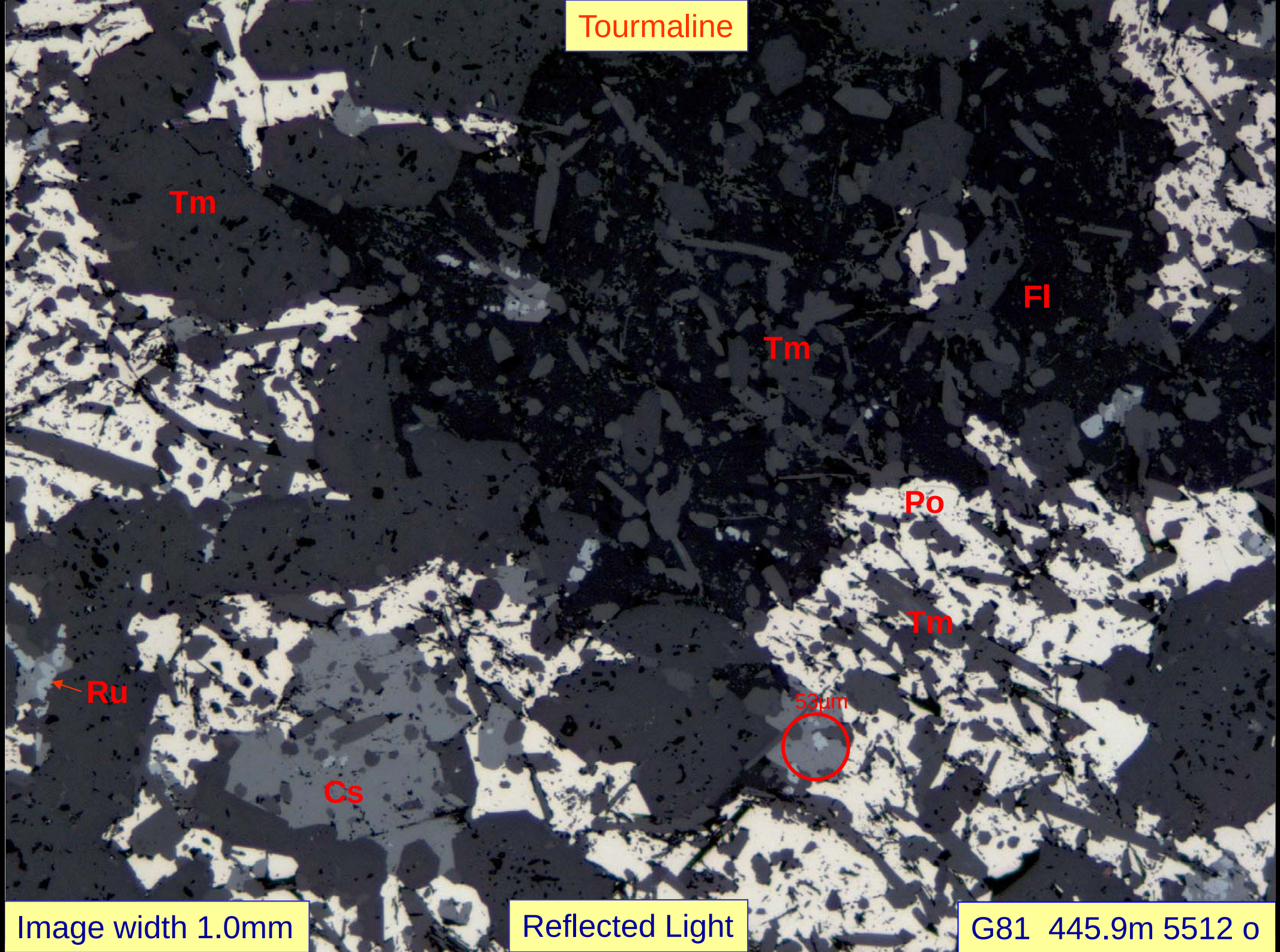
G81 445.9m 5512 i/j

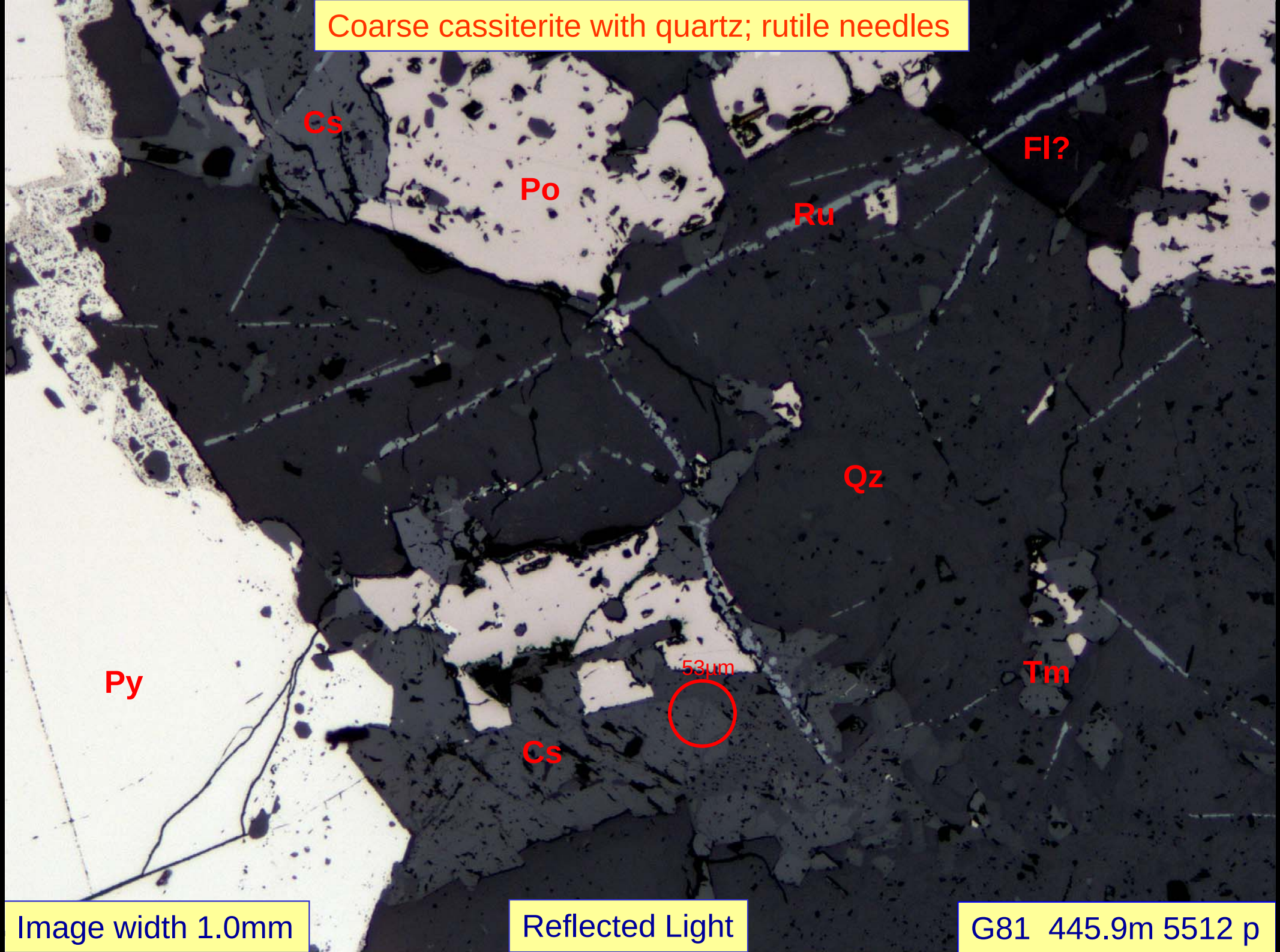

Very coarse pyrrhotite and pyrite
Tm
Po
Cp
Py
106µm
Py
Qz
Tm
Image width 2.1mm
Reflected Light
G81 445.9m 5512 k


Massive cassiterite
Qz
Cp
Tm
Cs
106µm
image m
Po
Tm
Qz
Tm
Ru
Image width 2.1mm
Reflected Light
G81 445.9m 5512 l


Detail from previous image
27µm
Cs
Tm
Po
Ru
Qz
Image width 515µm
Reflected Light
G81 445.9m 5512 m


Pyrrhotite-tourmaline-cassiterite intergrowth
Qz
Cs
53µm
Po
Tm
Ru
Cs
Image width 1.0mm
Reflected Light
G81 445.9m 5512 n


Tourmaline
Tm
Tm
Fl
Po
Tm
Ru
53µm
Cs
Image width 1.0mm
Reflected Light
G81 445.9m 5512 o


Coarse cassiterite with quartz; rutile needles
Cs
Po
Ru
Fl?
Qz
Py
53µm
Tm
Cs
Image width 1.0mm
Reflected Light
G81 445.9m 5512 p

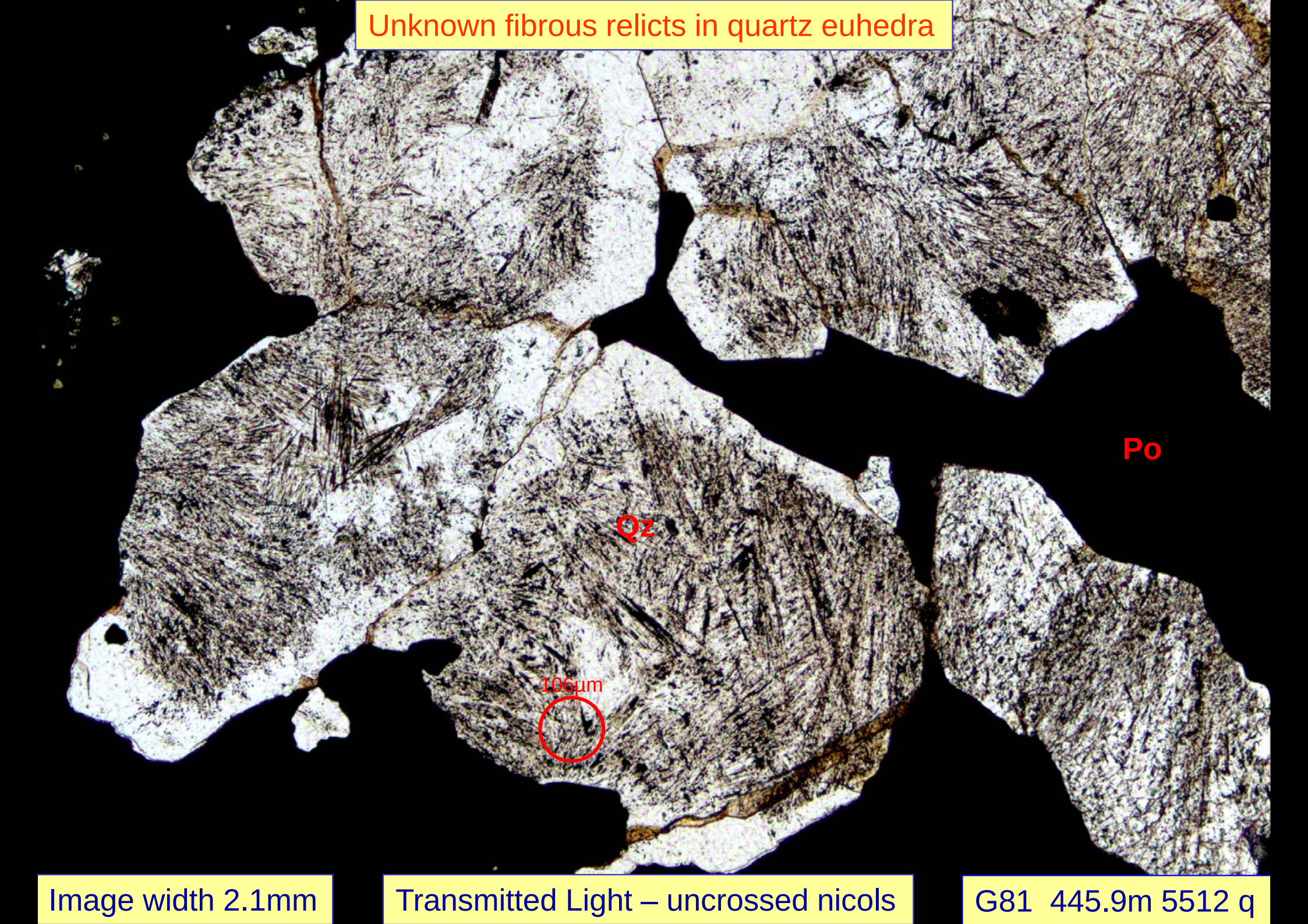


Image width 2.1mm

Transmitted Light – uncrossed nicols

G81 445.9m 5512 q

PARTICLE MINERALOGY REPORT

Severn 5512

G81 445.9m

GJMcA 9.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
2.1	17.0	4.9	0.0	0.0	0.0	0.0	76.0	**300**
55	36	29	3	0	10	0	79	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.58	7.43	10.2	0.00	25.6	0.02	
Actual		**7.04**		**0.01**	**21.5**	**0.06**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	96	8	14	0	0	0	57	
Binary	1	82	66	0	0	0	35	
Ternary	0	9	20	100	100	0	8	
Quat.y+	3	1	0	0	0	0	0	
Grains	2.7	46.3	16.0	0.3	0.3	0.0	96.0	1.62

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	0	0	0	100
Po	0		0	0	0	0	100
Cs	0	0		0	0	0	100
St	0	0	0		0	0	0
Cp	0	0	0	0		0	0
As	0	0	0	0	0		0
Ga	1	85	14	0	0	0	

TOTAL ASSOCIATION MATRIX

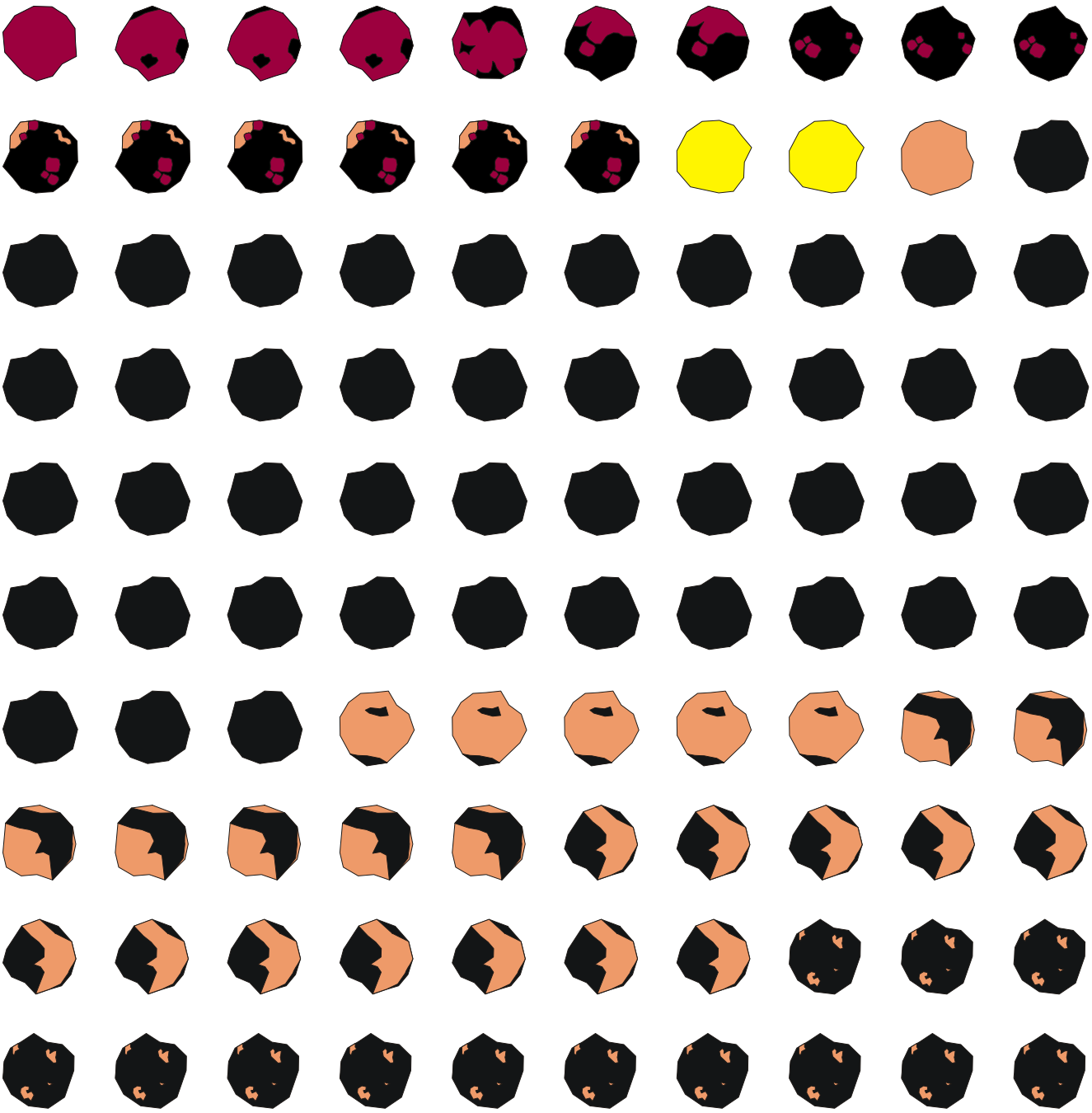
		Py	Po	Cs	St	Cp	As	Ga
	Py		3	3	0	0	0	4
	Po	1		9	0	1	0	92
of	**Cs**	0	20		0	0	0	86
all	**St**	0	0	100		0	0	100
	Cp	0	100	0	0		0	100
	As	0	0	0	0	0		0
	Ga	1	37	12	0	0	0	

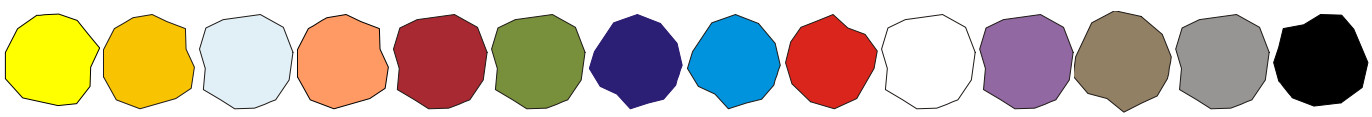
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	96		0	0	0	0	0	1	0	3
Po	8	0		0	0	0	0	82	9	1
Cs	14	0	0		0	0	0	66	20	0
St	0	0	0	0		0	0	0	100	0
Cp	0	0	0	0	0		0	0	100	0
As	0	0	0	0	0	0		0	0	0
Ga	57	0	30	5	0	0	0		8	0

Stellar Resources - Severn Drillhole Mineragraphy

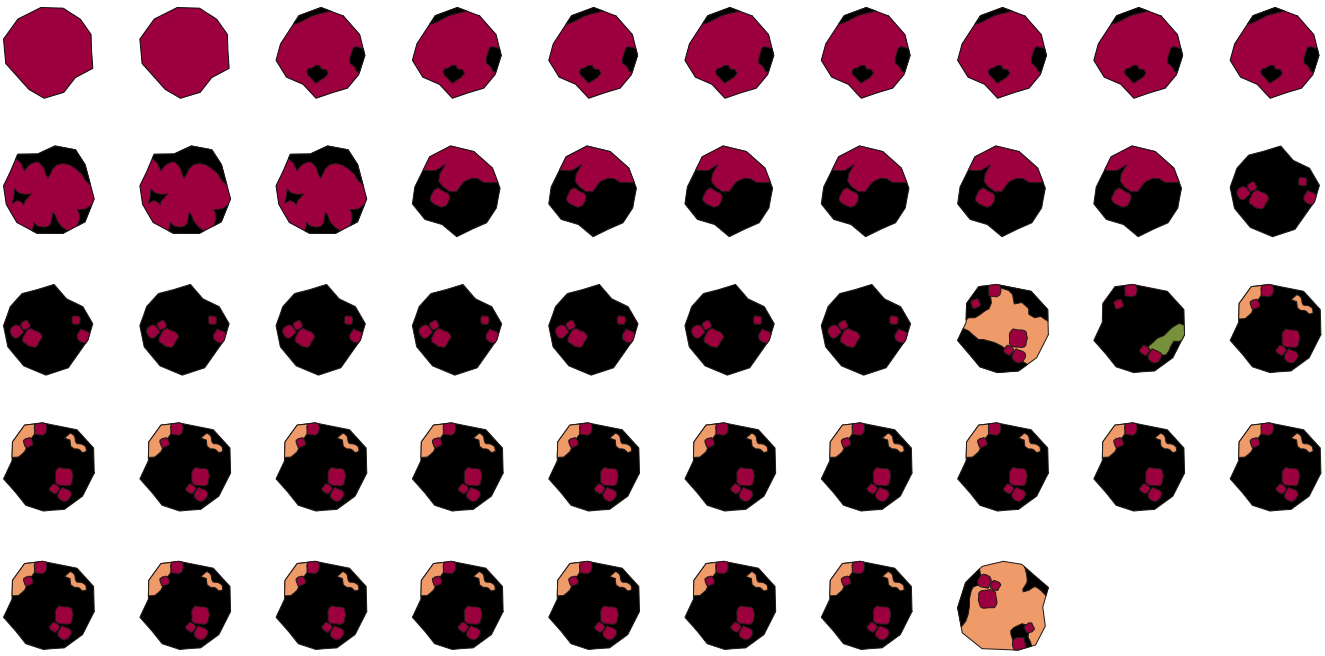
Severn 5512 **53µm mask** **January 2012**

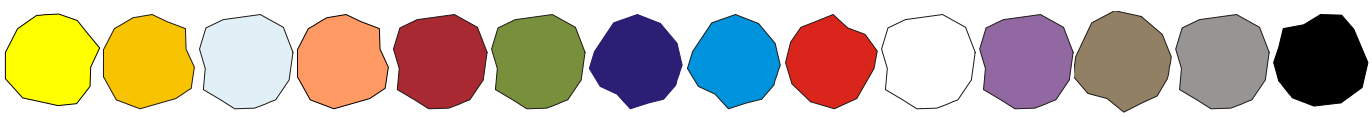




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5512 Sn Scan **53µm mask** **January 2012**



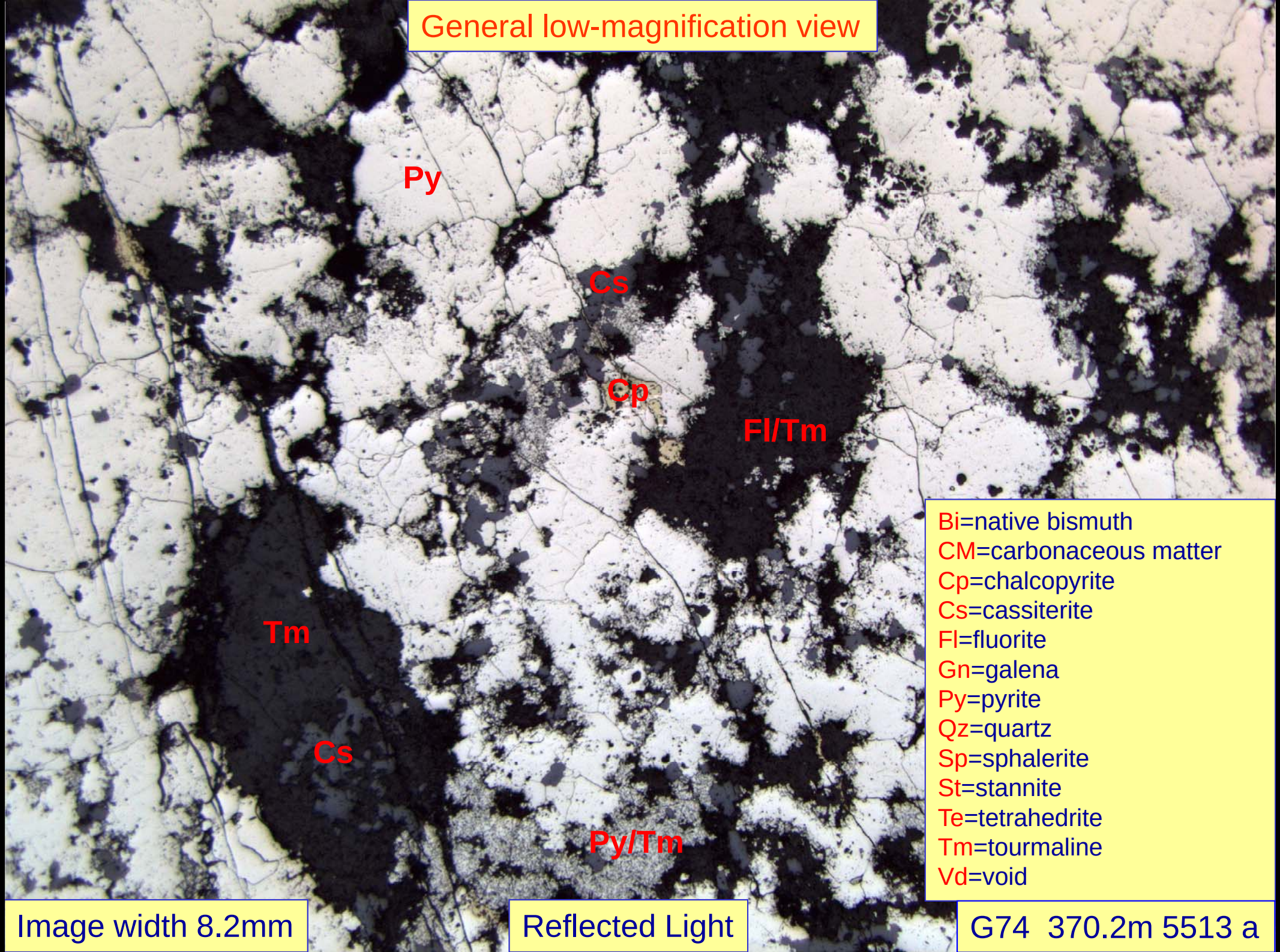


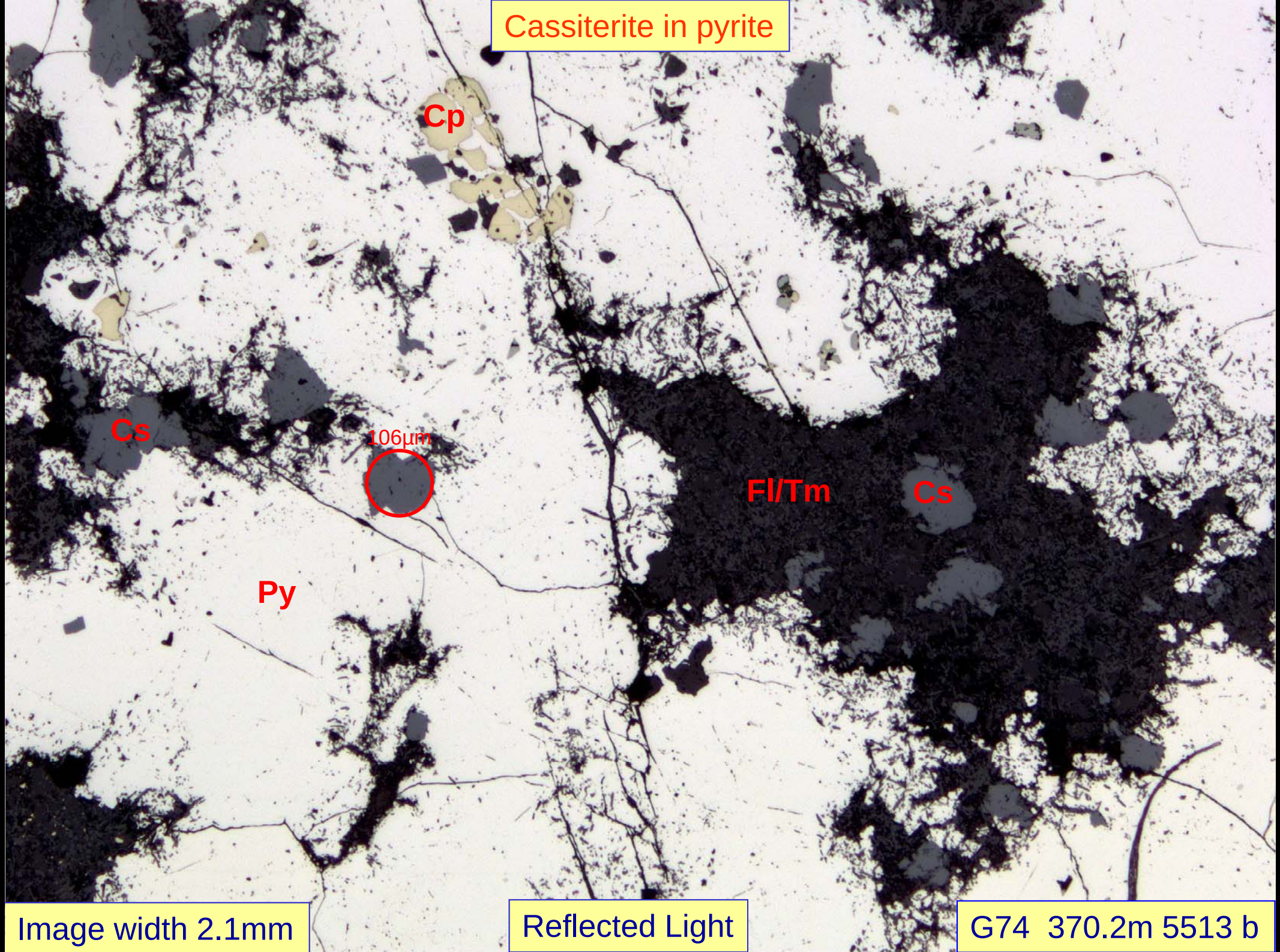
Core Scan

QXRD: 51% pyrite, 15% quartz, 10% tourmaline, 10% fluorite, 8% cassiterite

Image width ~120mm

G74 370.2m 5513


General low-magnification view
Py
Cs
Cp
Fl/Tm
Tm
Cs
Py/Tm
Bi=native bismuth
CM=carbonaceous matter
Cp=chalcopyrite
Cs=cassiterite
Fl=fluorite
Gn=galena
Py=pyrite
Qz=quartz
Sp=sphalerite
St=stannite
Te=tetrahedrite
Tm=tourmaline
Vd=void
Image width 8.2mm
Reflected Light
G74 370.2m 5513 a


Cassiterite in pyrite
Cp
Cs
106µm
Fl/Tm
Cs
Py
Image width 2.1mm
Reflected Light
G74 370.2m 5513 b

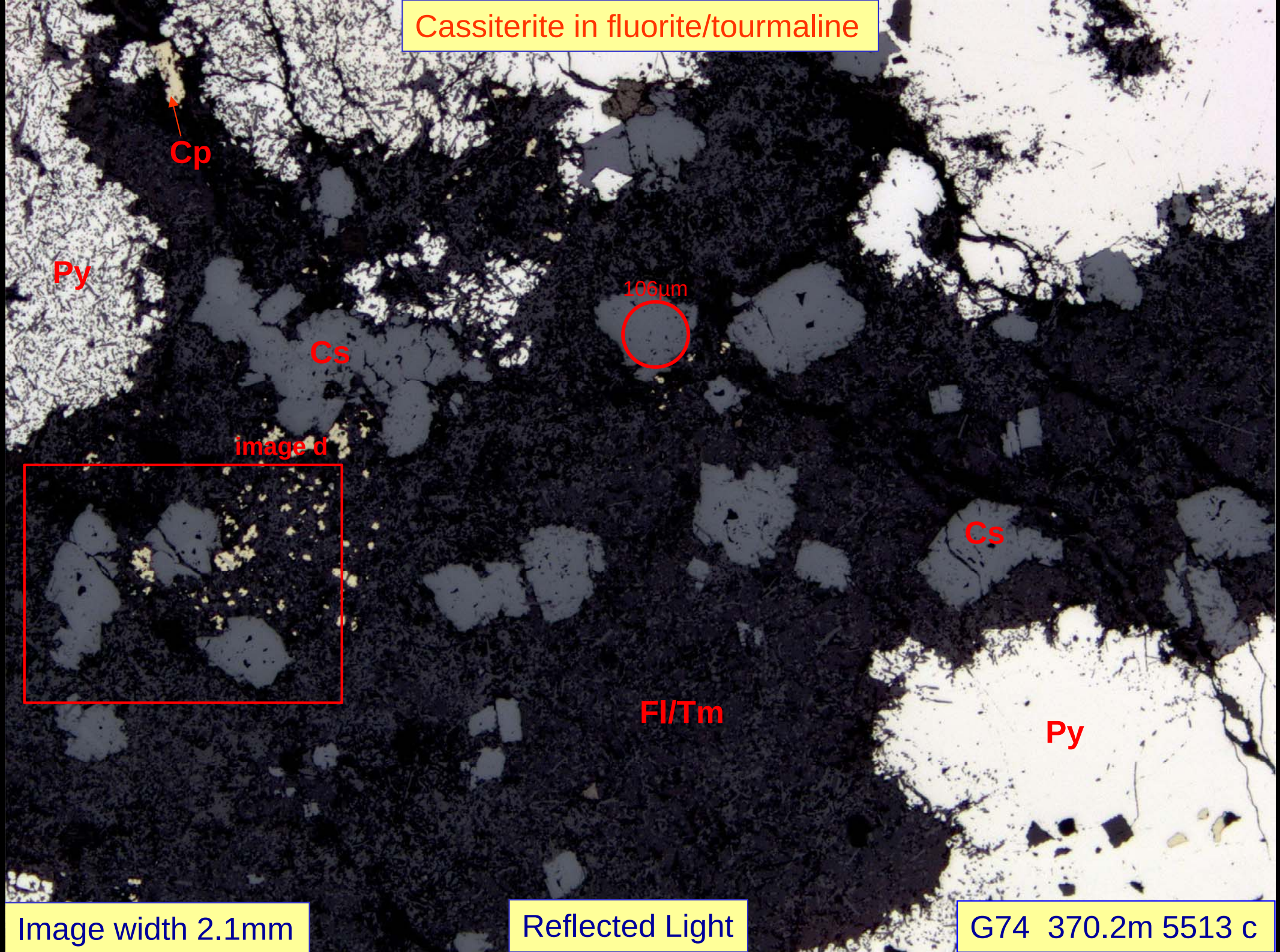
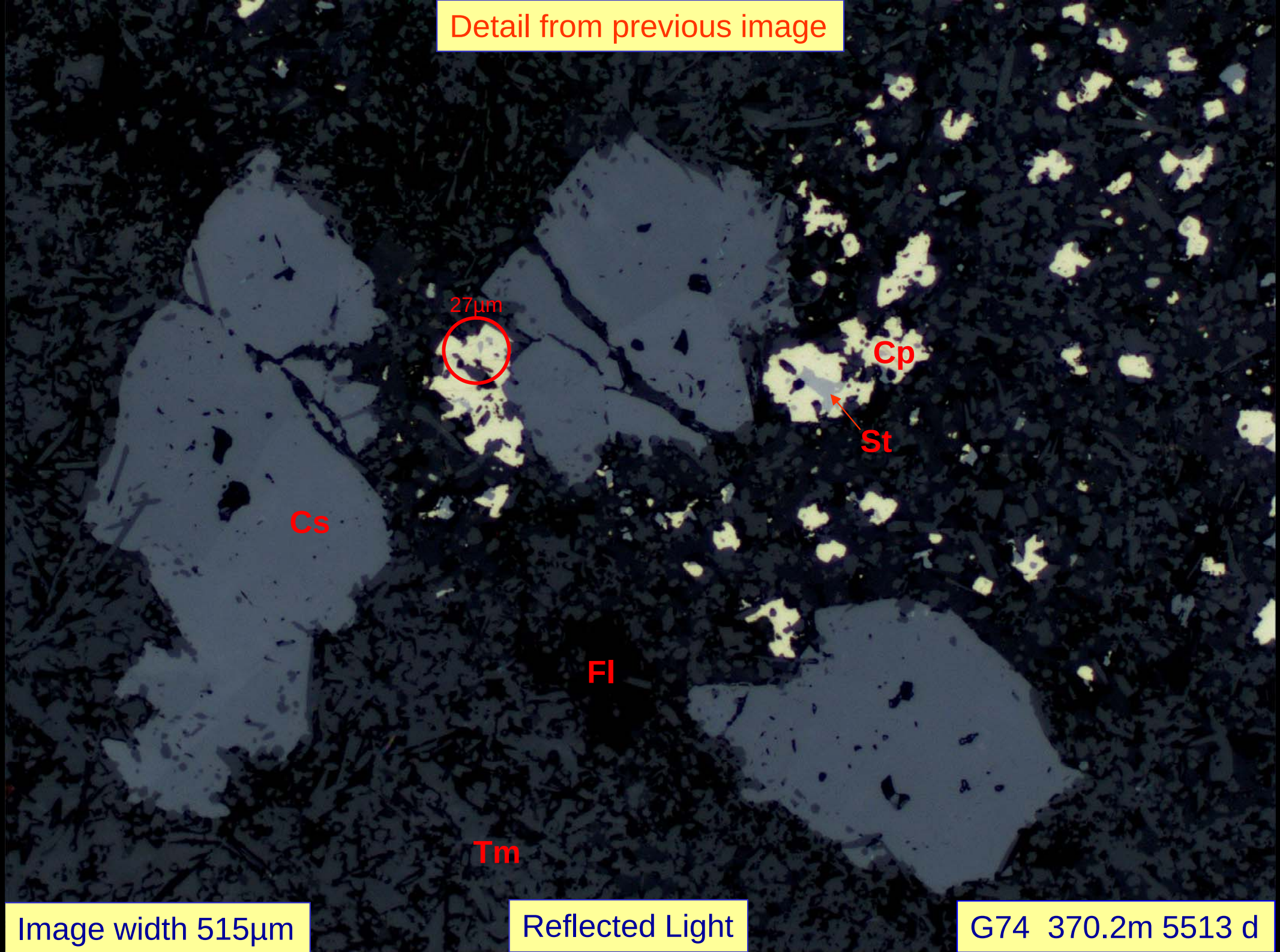
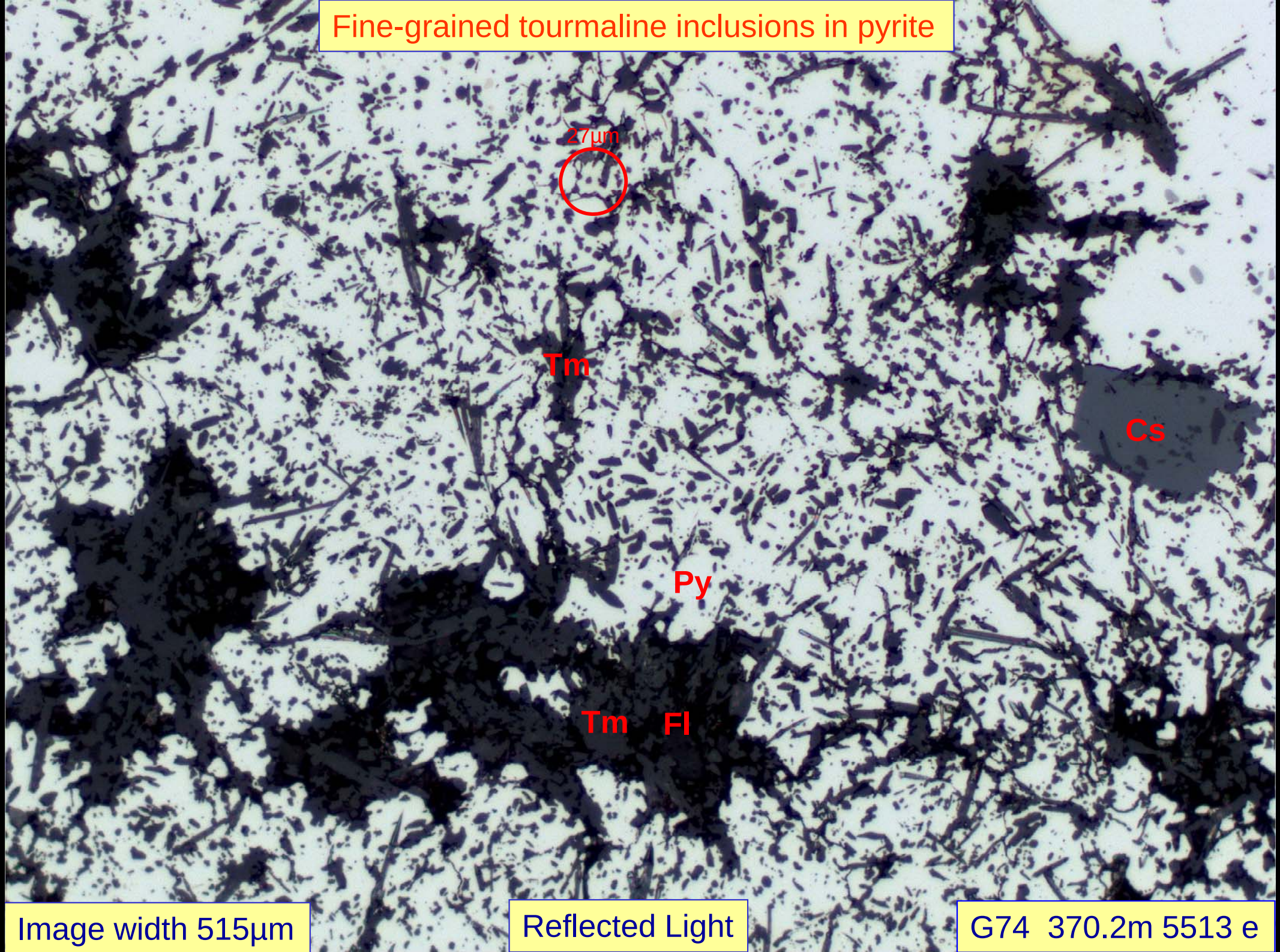


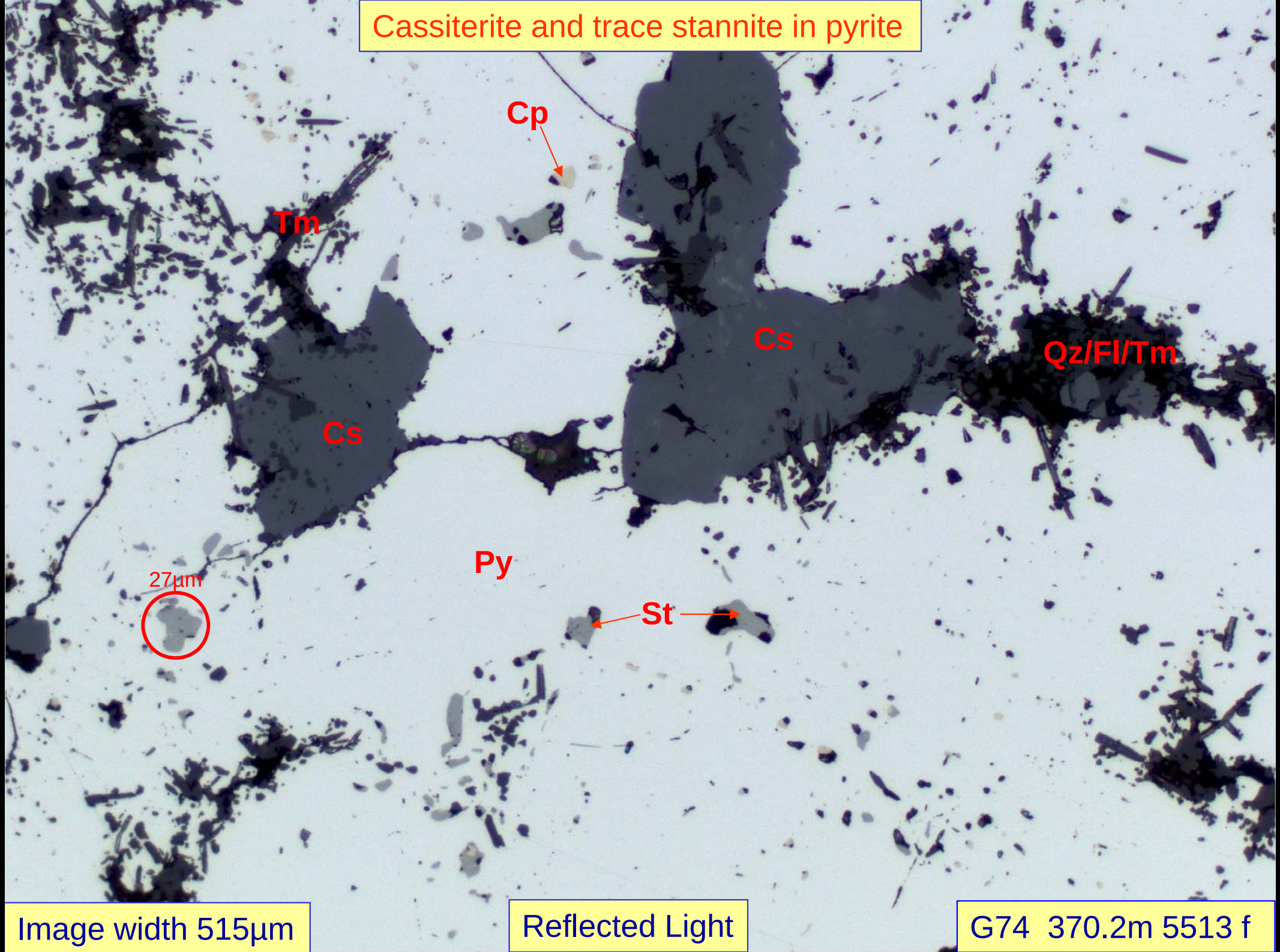
Image width 2.1mm

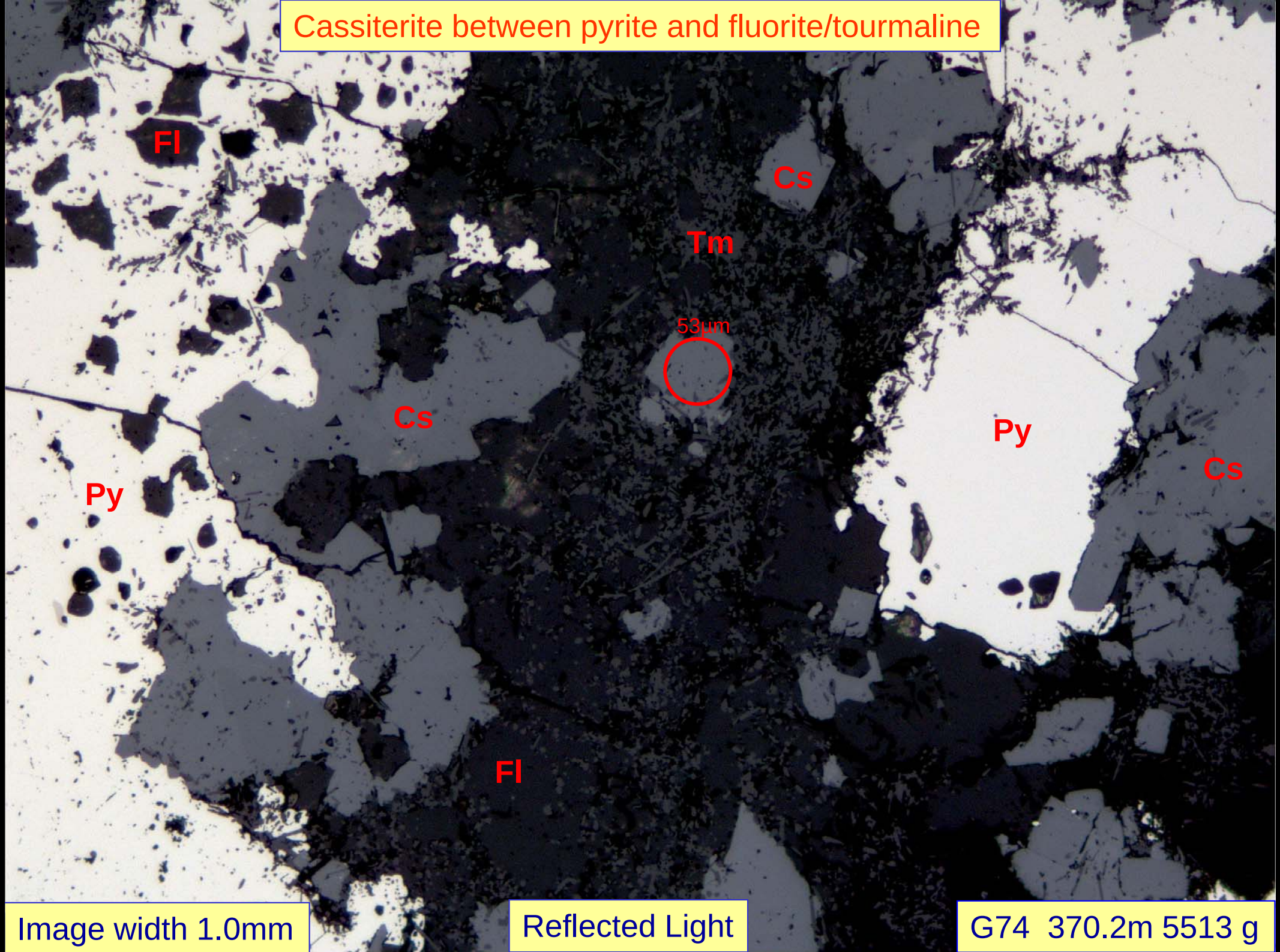
Reflected Light

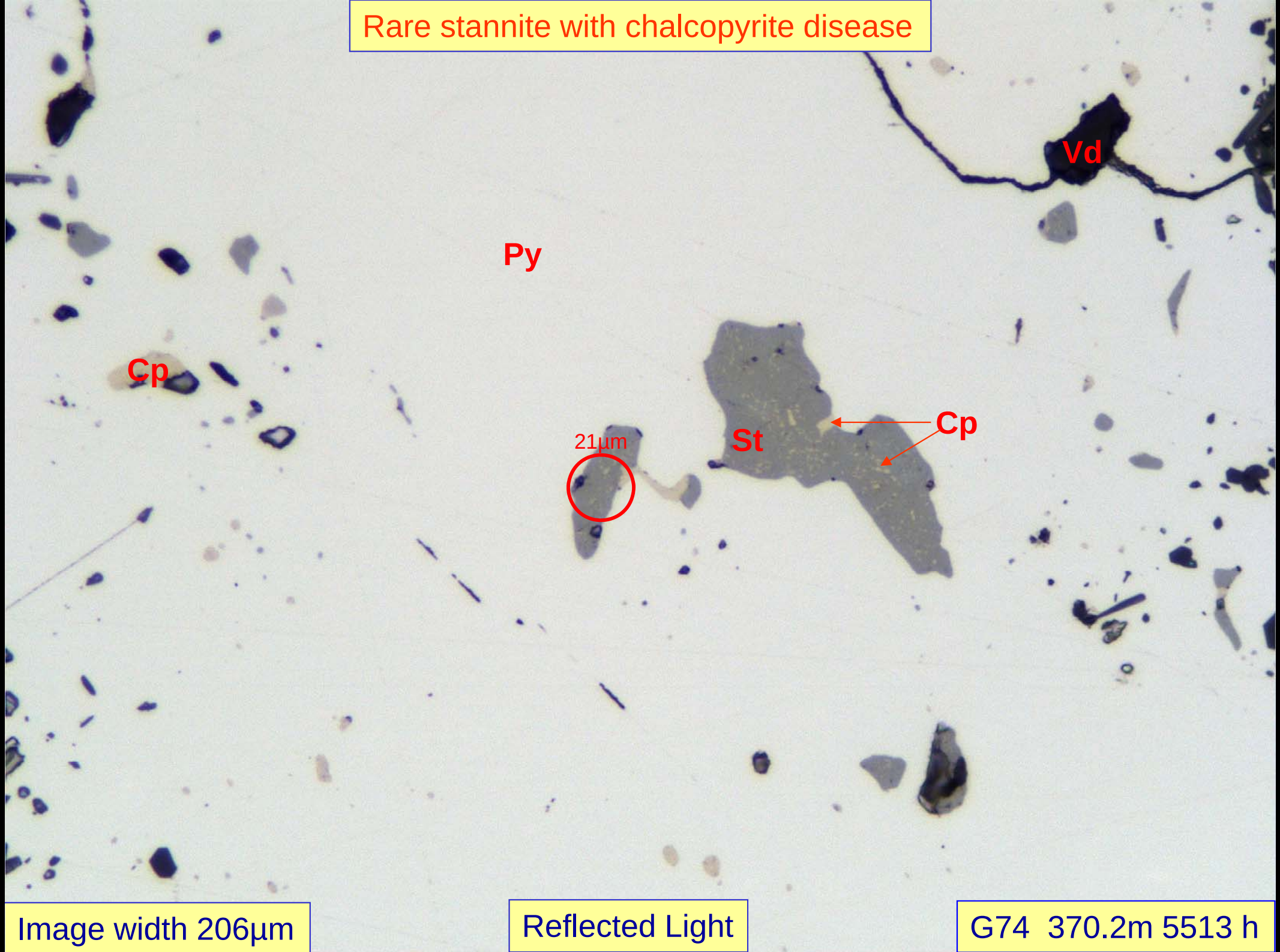
G74 370.2m 5513 c

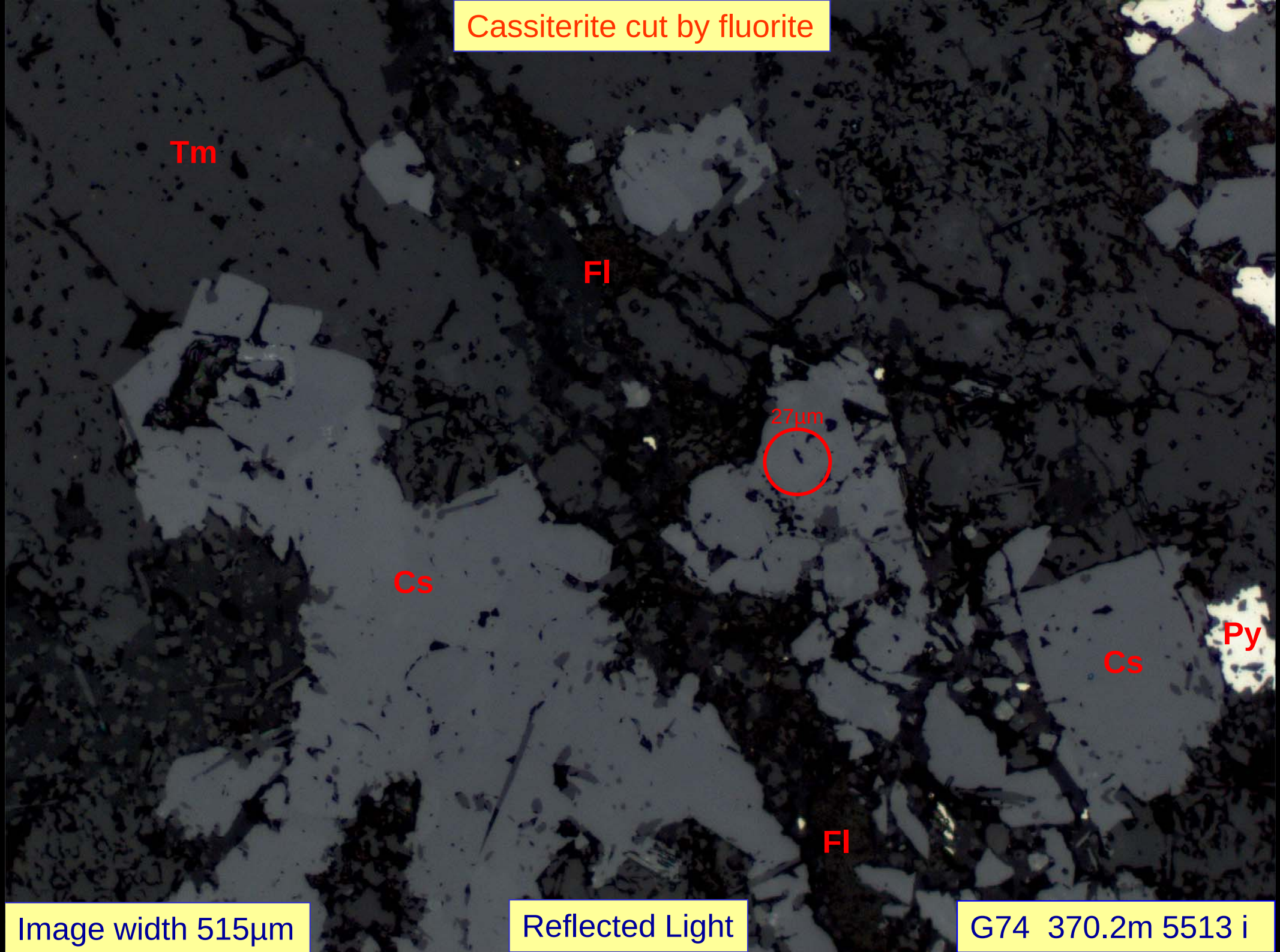

Detail from previous image
27µm
Cp
St
Cs
Fl
Tm
Image width 515µm
Reflected Light
G74 370.2m 5513 d

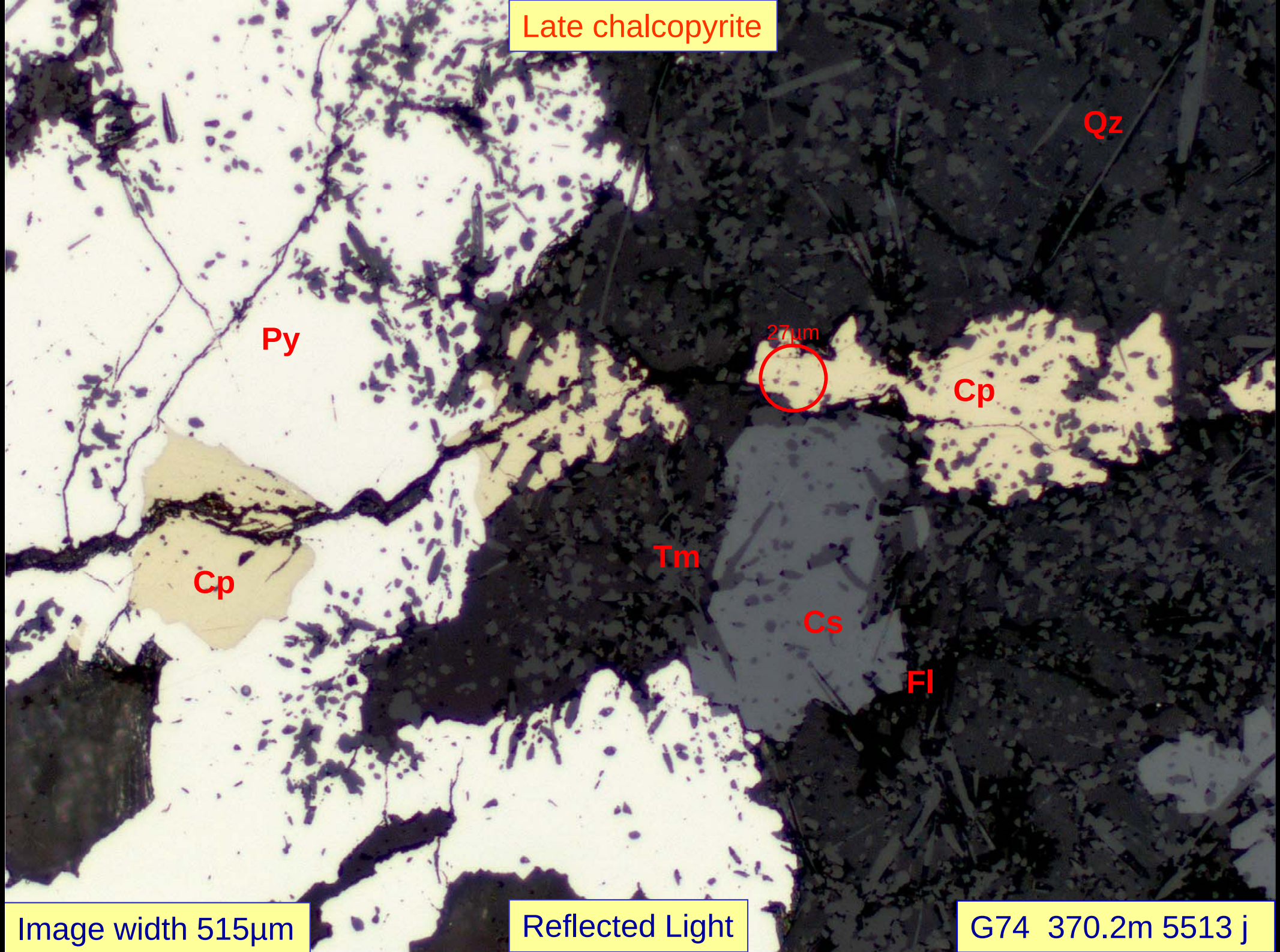

Fine-grained tourmaline inclusions in pyrite
27µm
Tm
Cs
Py
Tm
Fl
Image width 515µm
Reflected Light
G74 370.2m 5513 e

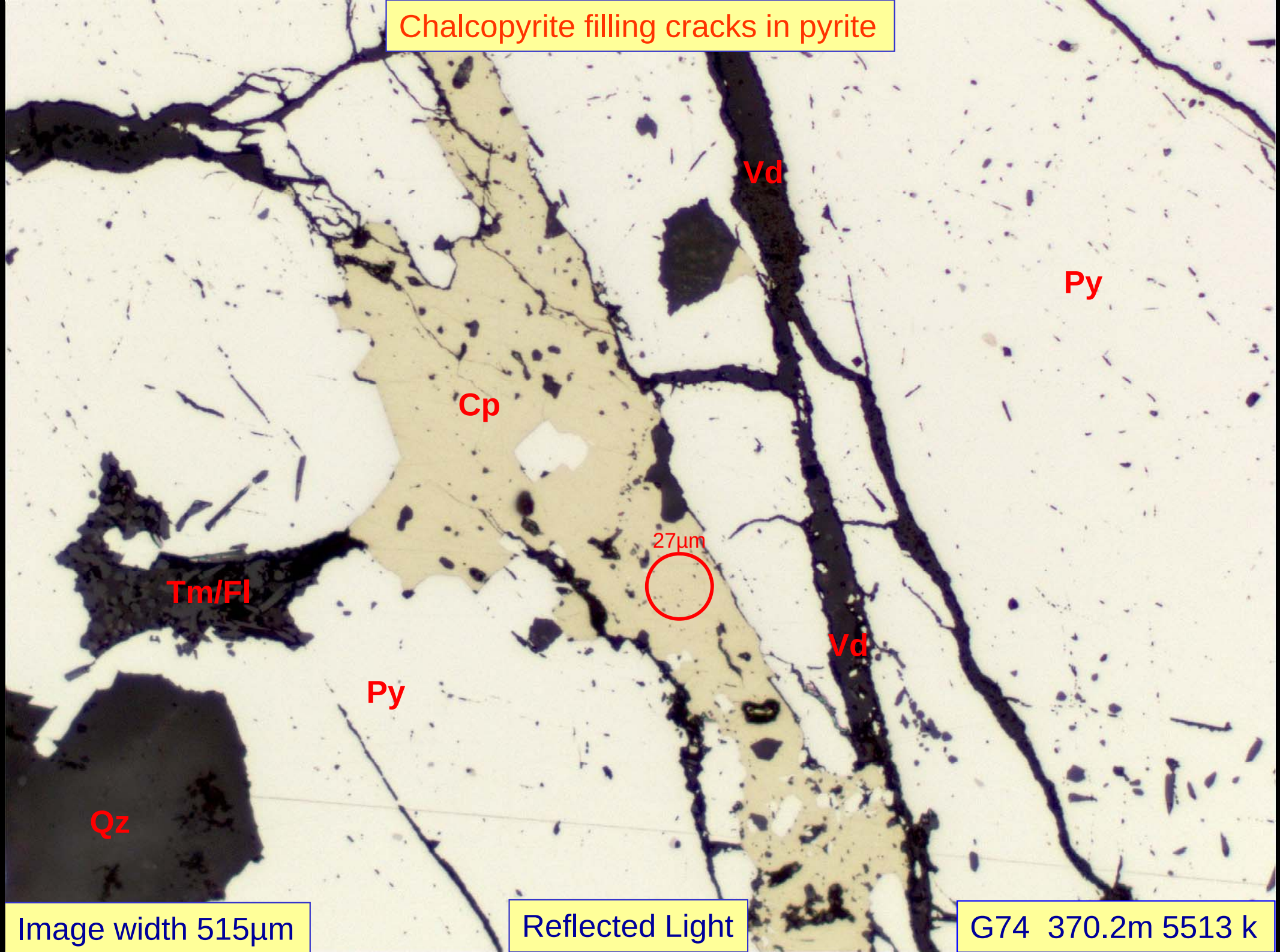

Cassiterite and trace stannite in pyrite
Cp
Tm
Cs
Cs
Qz/Fl/Tm
Py
27µm
St
Image width 515µm
Reflected Light
G74 370.2m 5513 f

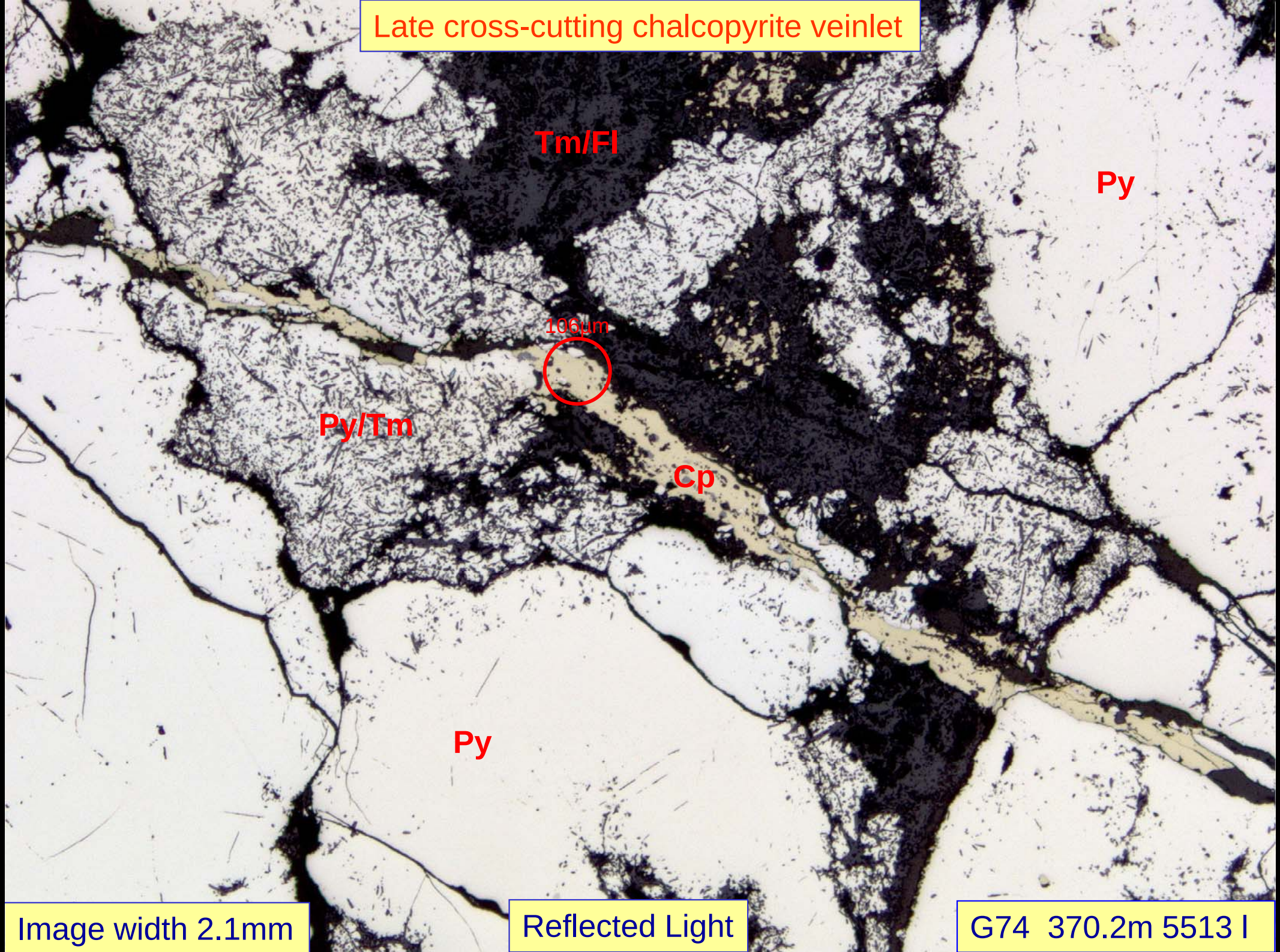

Cassiterite between pyrite and fluorite/tourmaline
Fl
Cs
Tm
53µm
Cs
Py
Py
Cs
Fl
Image width 1.0mm
Reflected Light
G74 370.2m 5513 g

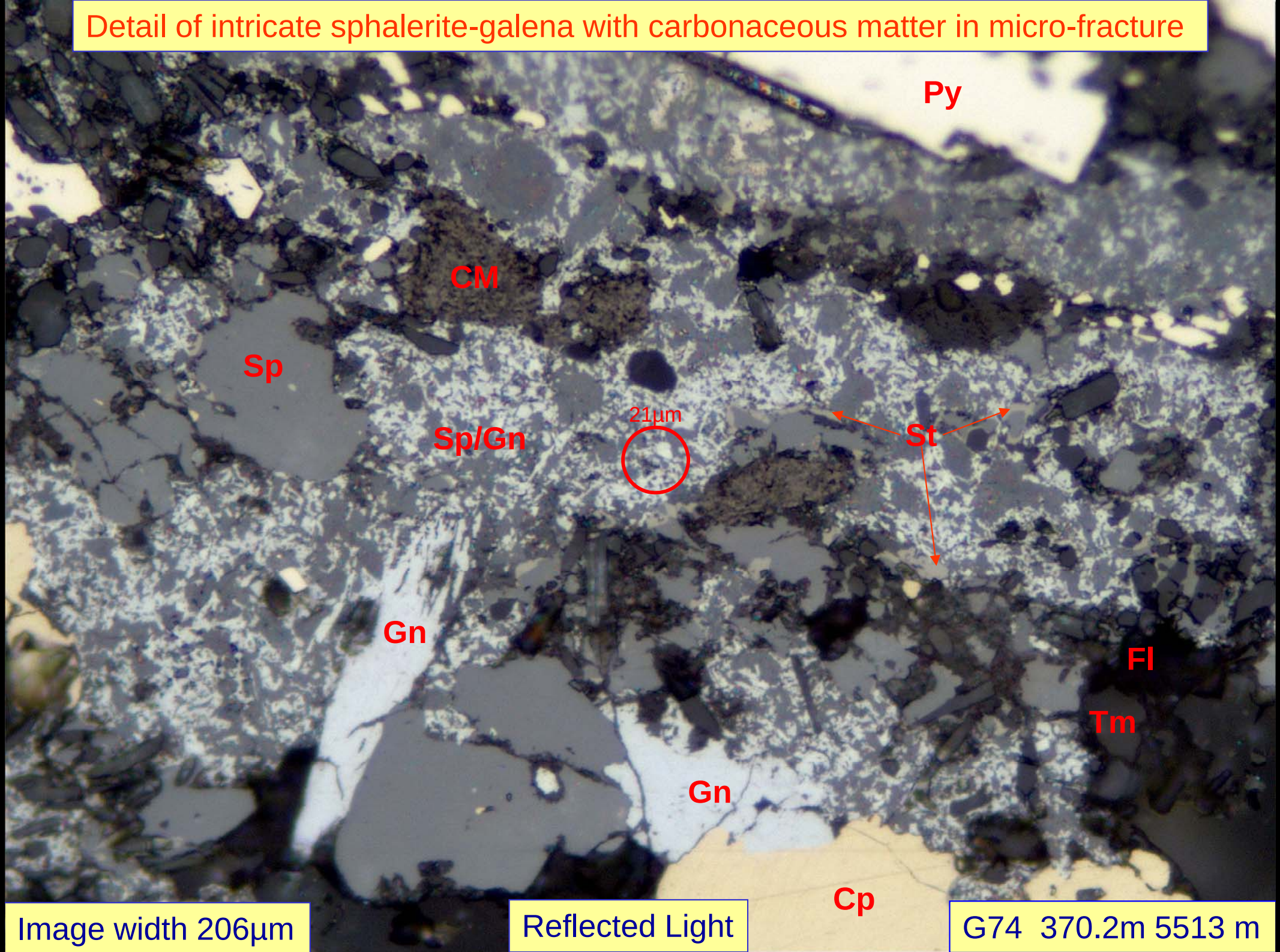

Rare stannite with chalcopyrite disease
Vd
Py
Cp
21µm
St
Cp
Image width 206µm
Reflected Light
G74 370.2m 5513 h

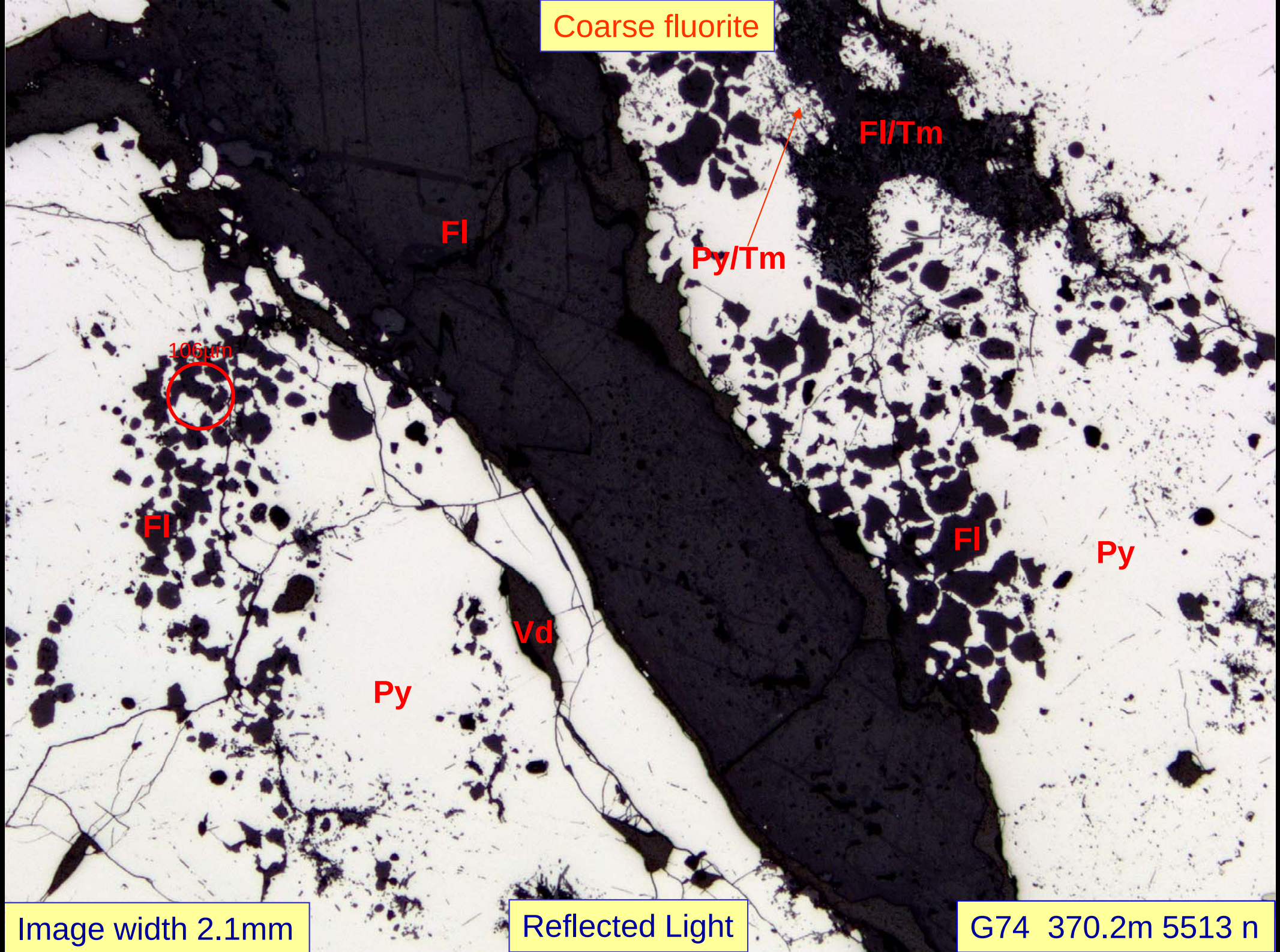

Cassiterite cut by fluorite
Tm
Fl
27µm
Cs
Cs
Py
Fl
Image width 515µm
Reflected Light
G74 370.2m 5513 i

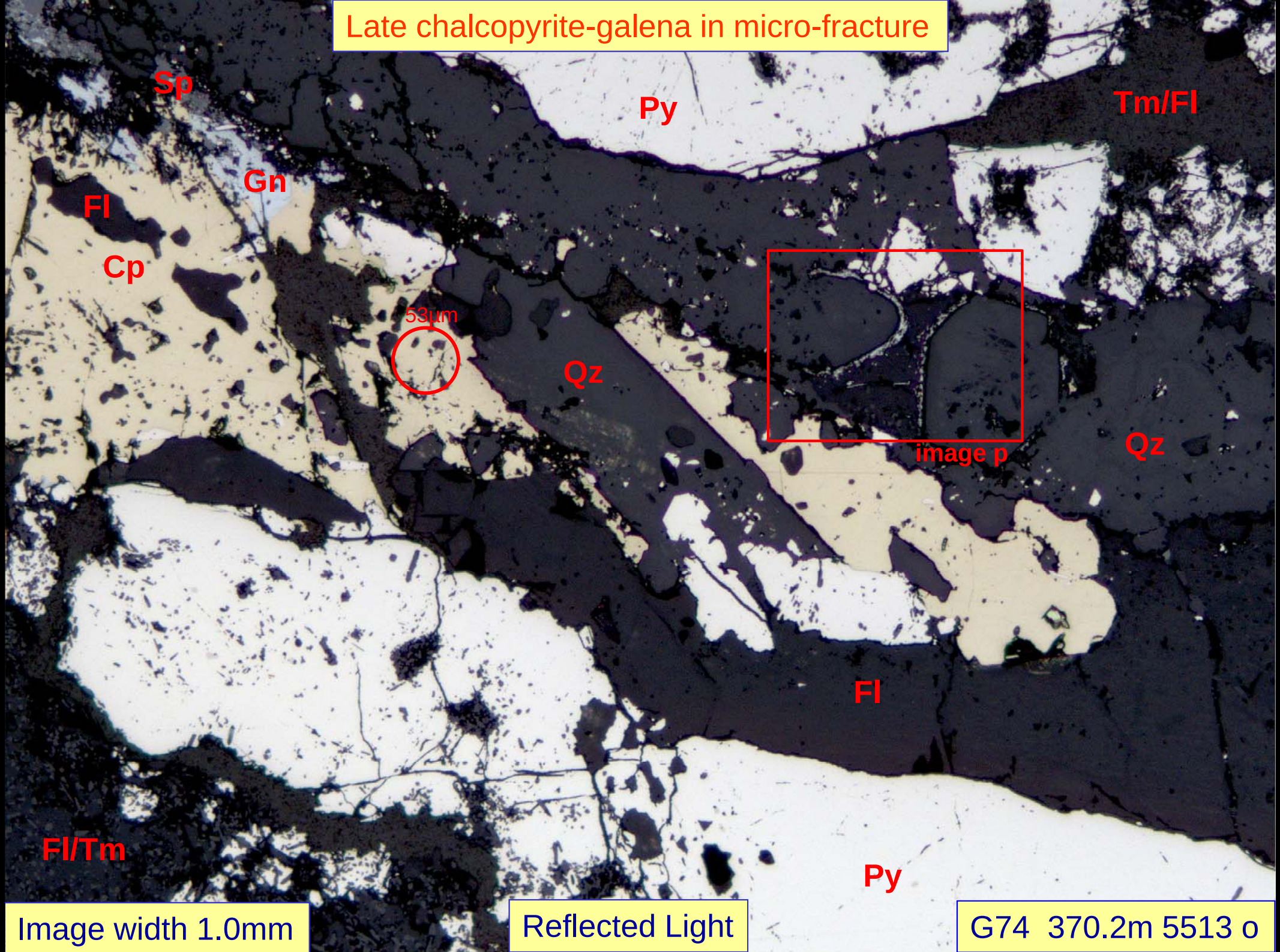

Late chalcopyrite
Qz
Py
27µm
Cp
Cp
Tm
Cs
Fl
Image width 515µm
Reflected Light
G74 370.2m 5513 j

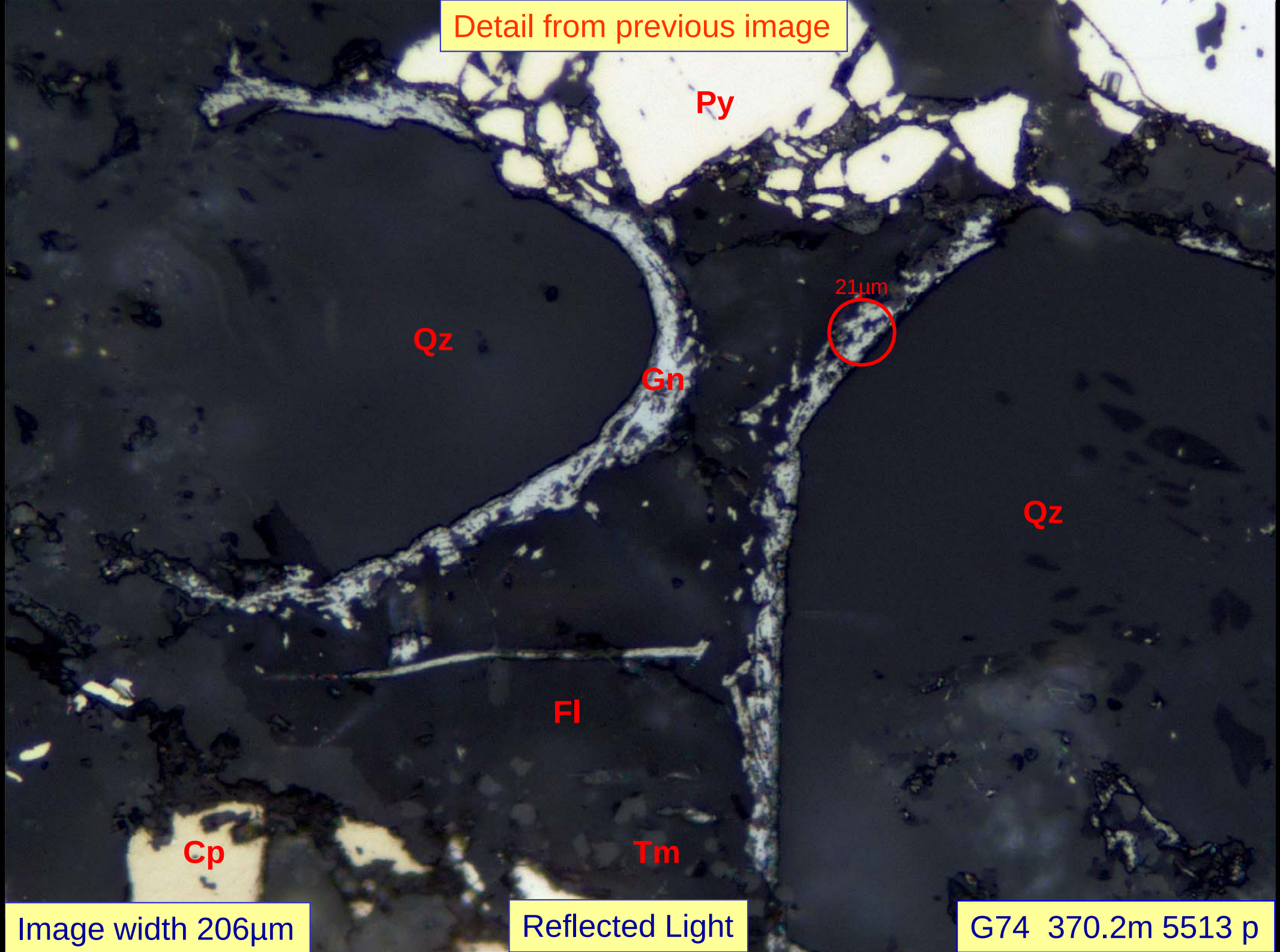

Chalcopyrite filling cracks in pyrite
Vd
Py
Cp
27µm
Tm/Fl
Vd
Py
Qz
Image width 515µm
Reflected Light
G74 370.2m 5513 k

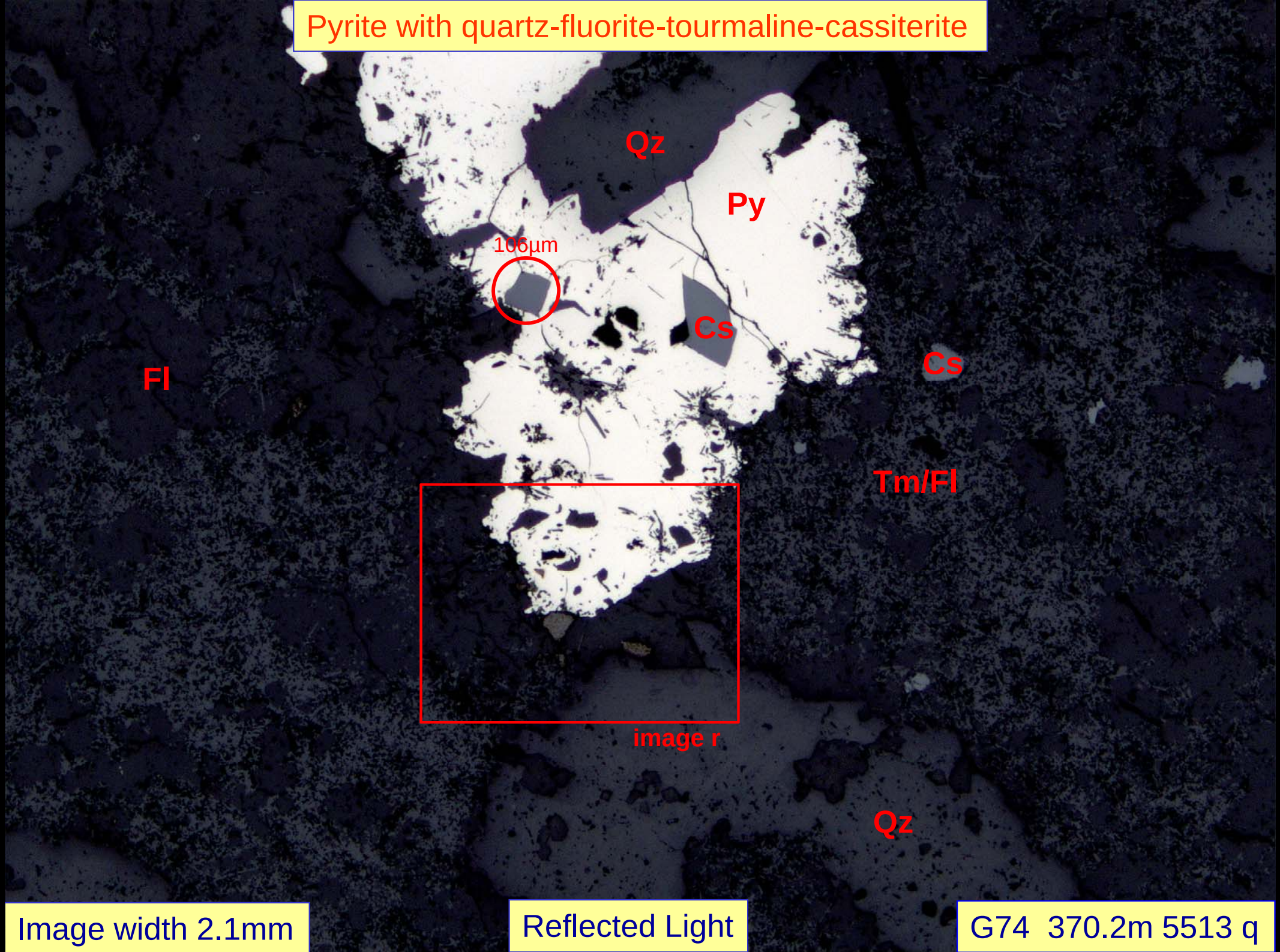

Late cross-cutting chalcopyrite veinlet
Tm/Fl
Py
106µm
Py/Tm
Cp
Py
Image width 2.1mm
Reflected Light
G74 370.2m 5513 l

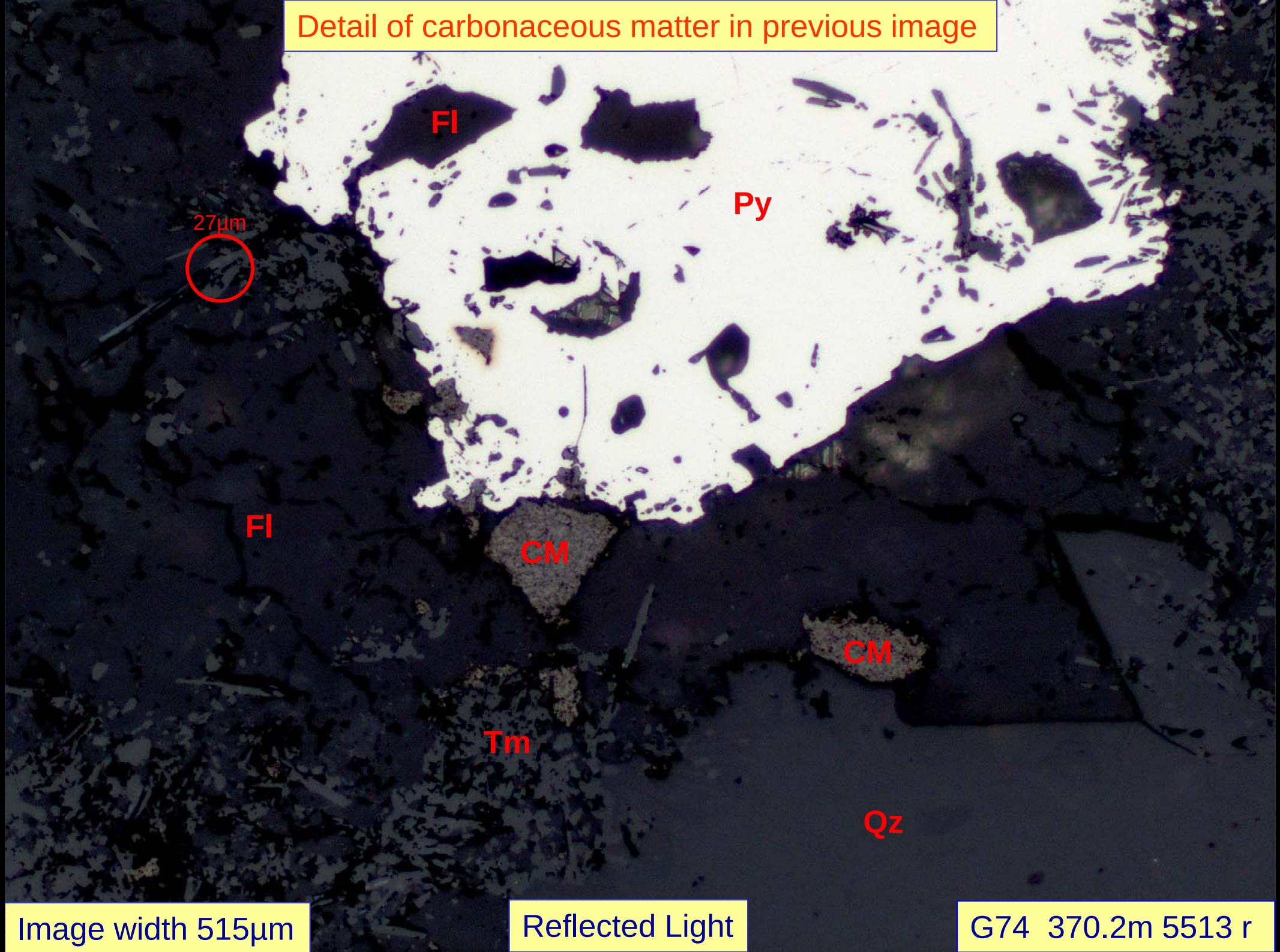

Detail of intricate sphalerite-galena with carbonaceous matter in micro-fracture
Py
CM
Sp
Sp/Gn
21µm
St
Gn
Fl
Tm
Gn
Cp
Image width 206µm
Reflected Light
G74 370.2m 5513 m

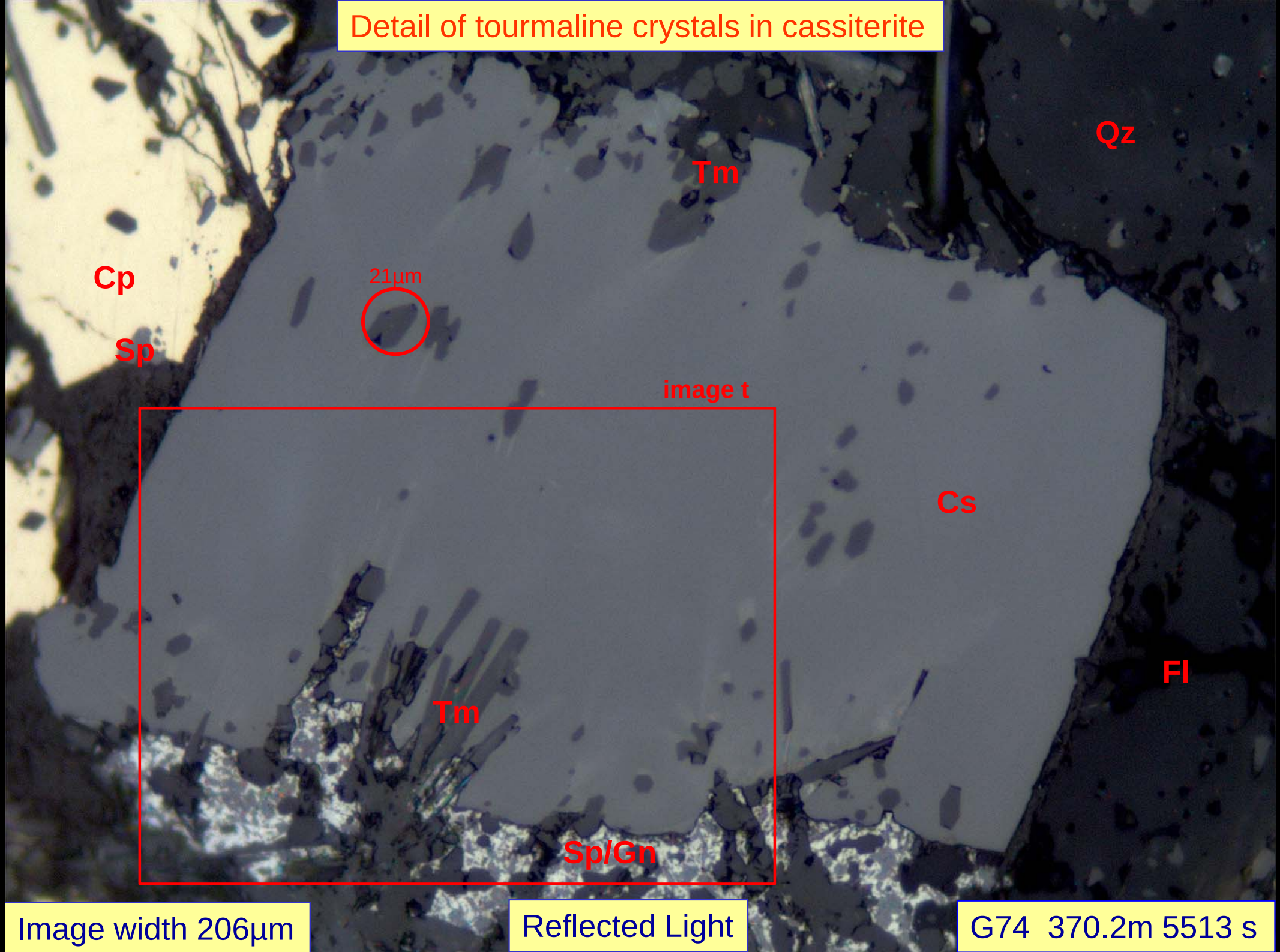

Coarse fluorite
Fl/Tm
Fl
Py/Tm
106µm
Fl
Fl
Py
Vd
Py
Image width 2.1mm
Reflected Light
G74 370.2m 5513 n

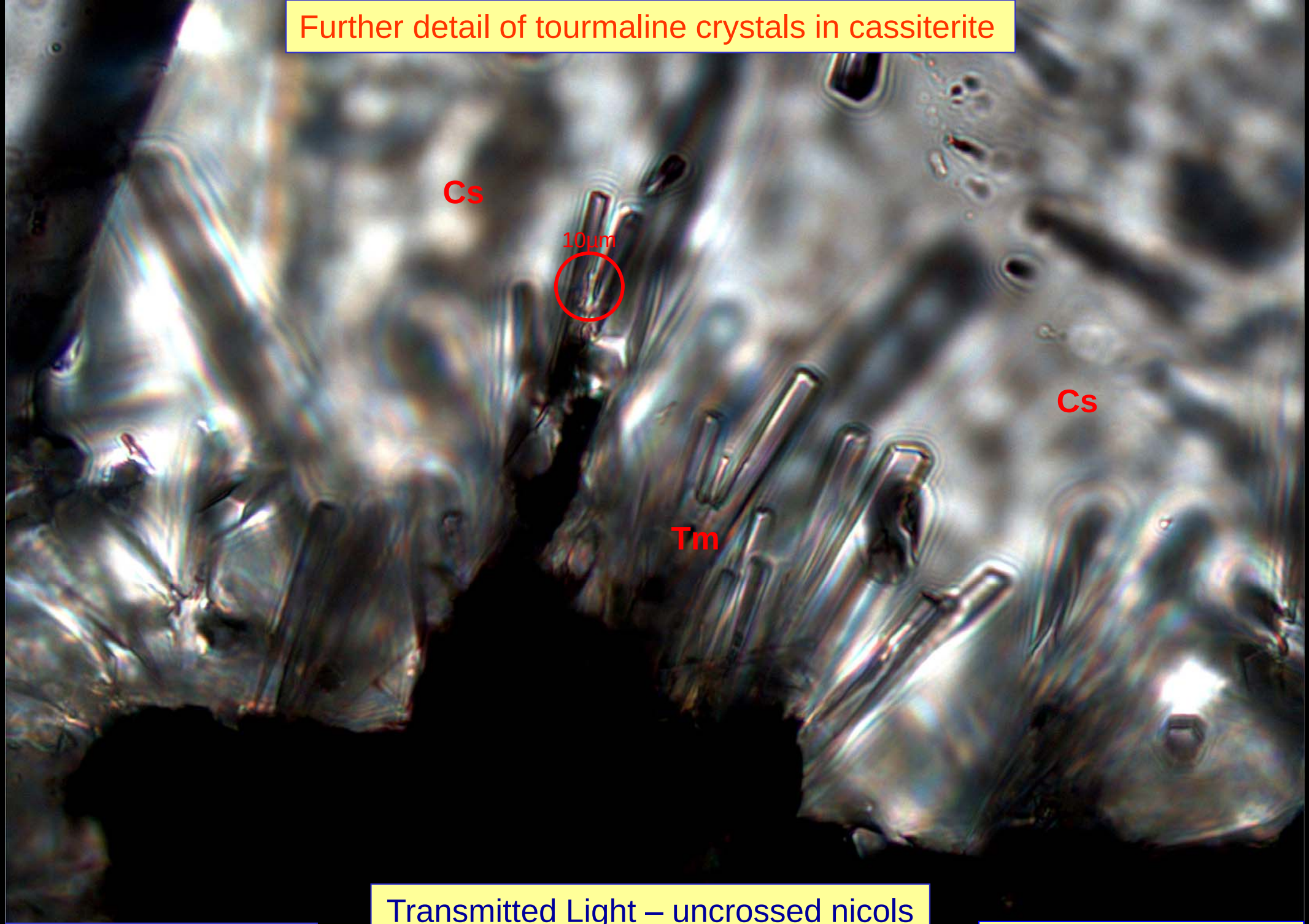

Late chalcopyrite-galena in micro-fracture
Sp
Py
Tm/Fl
Gn
Fl
Cp
53µm
Qz
image p
Qz
Fl
Fl/Tm
Py
Image width 1.0mm
Reflected Light
G74 370.2m 5513 o

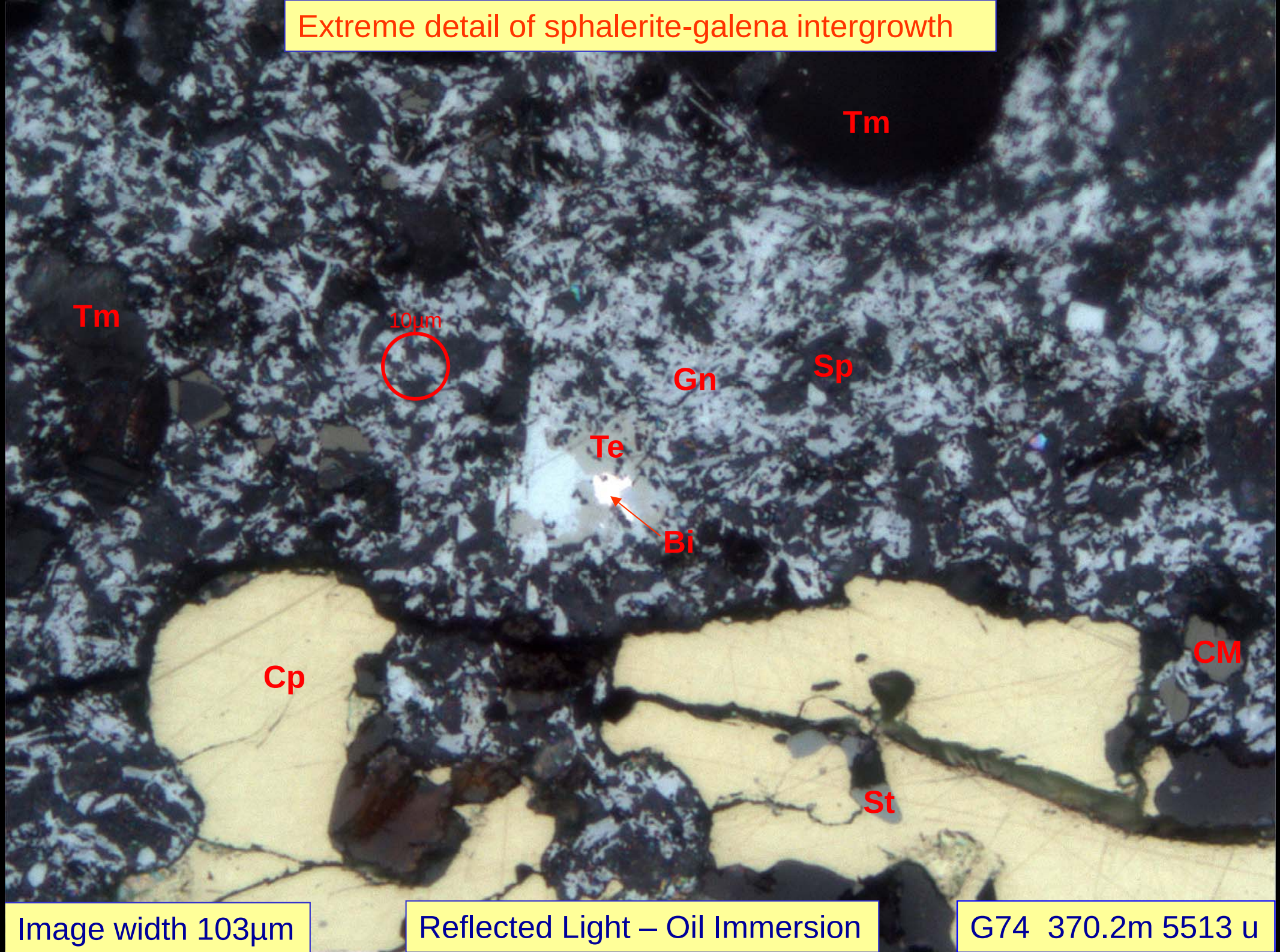

Detail from previous image
Py
21µm
Qz
Gn
Qz
Fl
Cp
Tm
Image width 206µm
Reflected Light
G74 370.2m 5513 p


Pyrite with quartz-fluorite-tourmaline-cassiterite
Qz
Py
106µm
Cs
Cs
Fl
Tm/Fl
image r
Qz
Image width 2.1mm
Reflected Light
G74 370.2m 5513 q


Detail of carbonaceous matter in previous image
Fl
Py
27µm
Fl
CM
CM
Tm
Qz
Image width 515µm
Reflected Light
G74 370.2m 5513 r


Detail of tourmaline crystals in cassiterite
Qz
Tm
Cp
21µm
Sp
image t
Cs
Fl
Tm
Sp/Gn
Image width 206µm
Reflected Light
G74 370.2m 5513 s


Further detail of tourmaline crystals in cassiterite
Cs
10µm
Cs
Tm
Image width 103µm
Transmitted Light – uncrossed nicols
Oil Immersion
G74 370.2m 5513 t


Extreme detail of sphalerite-galena intergrowth
Tm
Tm
10µm
Gn
Sp
Te
Bi
Cp
CM
St
Image width 103µm
Reflected Light – Oil Immersion
G74 370.2m 5513 u

PARTICLE MINERALOGY REPORT

Severn 5513

G74 370.2m

GJMcA 13.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
57.2	0.0	1.4	0.0	0.0	0.2	0.0	41.2	**300**
82	0	42	3	0	7	3	63	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	4.25	1.87	36.1	0.00	36.4	0.07	
Actual		**5.87**		**0.10**	**25.0**	**0.06**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	58	0	23	0	0	0	64	
Binary	38	0	58	83	85	0	34	
Ternary	4	0	19	17	15	0	2	
Quat.y+	0	0	0	0	0	0	0	
Grains	70.3	0.0	4.0	0.7	2.3	0.0	65.7	1.43

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	1	1	0	97
Po	0		0	0	0	0	0
Cs	0	0		0	0	0	100
St	100	0	0		0	0	0
Cp	11	0	0	0		0	89
As	0	0	0	0	0		0
Ga	88	0	6	0	6	0	

TOTAL ASSOCIATION MATRIX

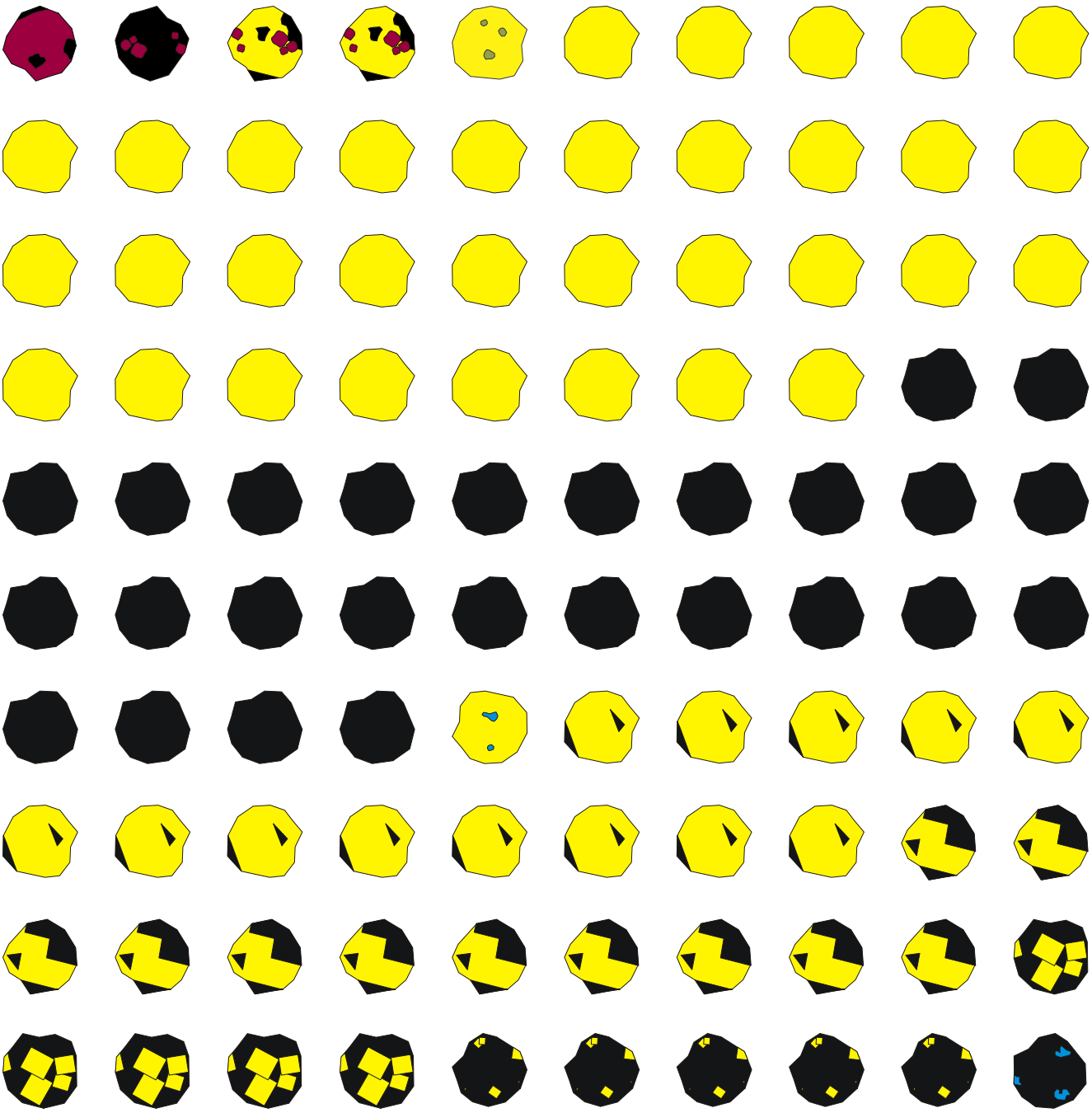
		Py	Po	Cs	St	Cp	As	Ga
	Py		0	2	1	1	0	41
	Po	0		0	0	0	0	0
of	**Cs**	19	0		0	0	0	77
all	**St**	100	0	0		0	0	17
	Cp	21	0	0	0		0	91
	As	0	0	0	0	0		0
	Ga	31	0	3	0	3	0	

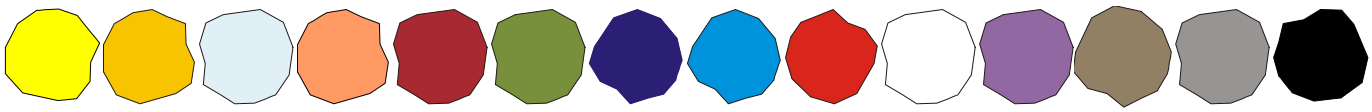
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	58		0	0	1	1	0	37	4	0
Po	0	0		0	0	0	0	0	0	0
Cs	23	0	0		0	0	0	58	19	0
St	0	83	0	0		0	0	0	17	0
Cp	0	9	0	0	0		0	75	15	0
As	0	0	0	0	0	0		0	0	0
Ga	64	30	0	2	0	2	0		2	0

Stellar Resources - Severn Drillhole Mineragraphy

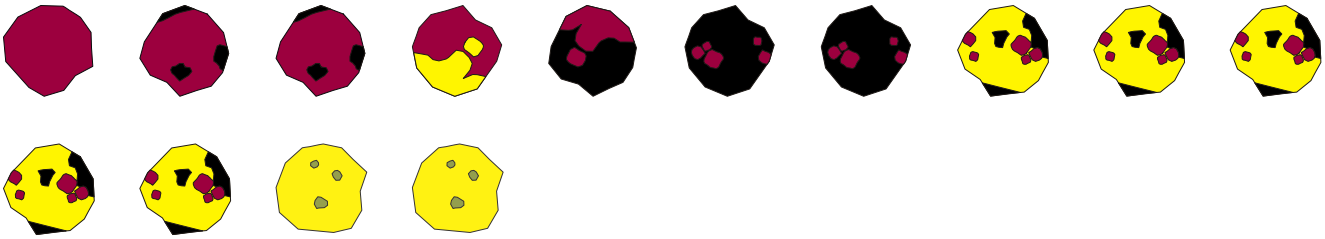
Severn 5513 **53µm mask** **January 2012**

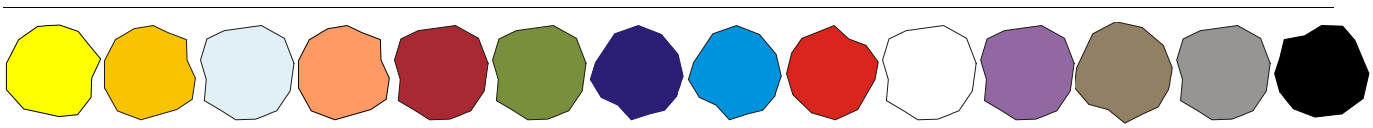




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5513 Sn Scan **53µm mask** **January 2012**



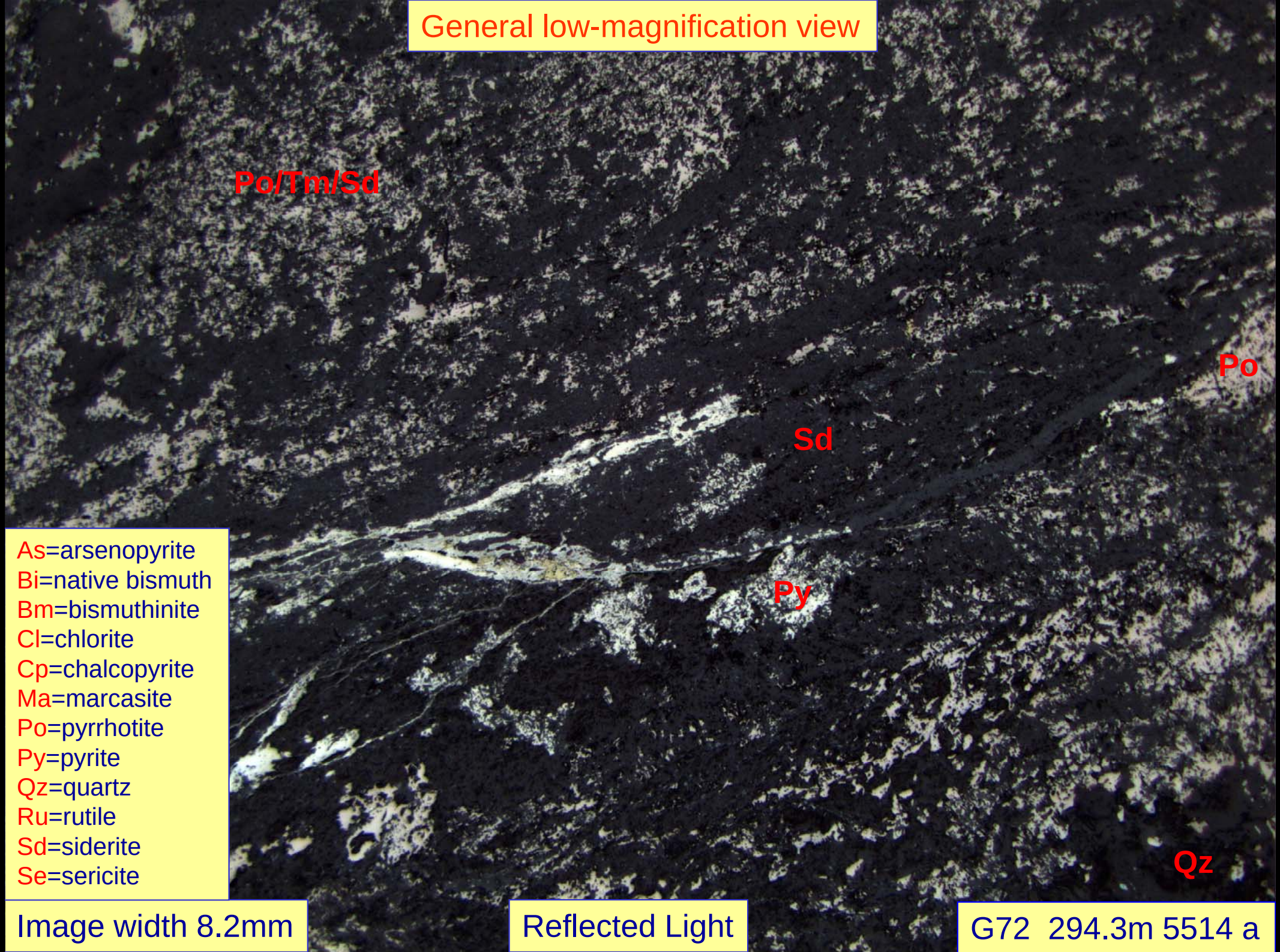


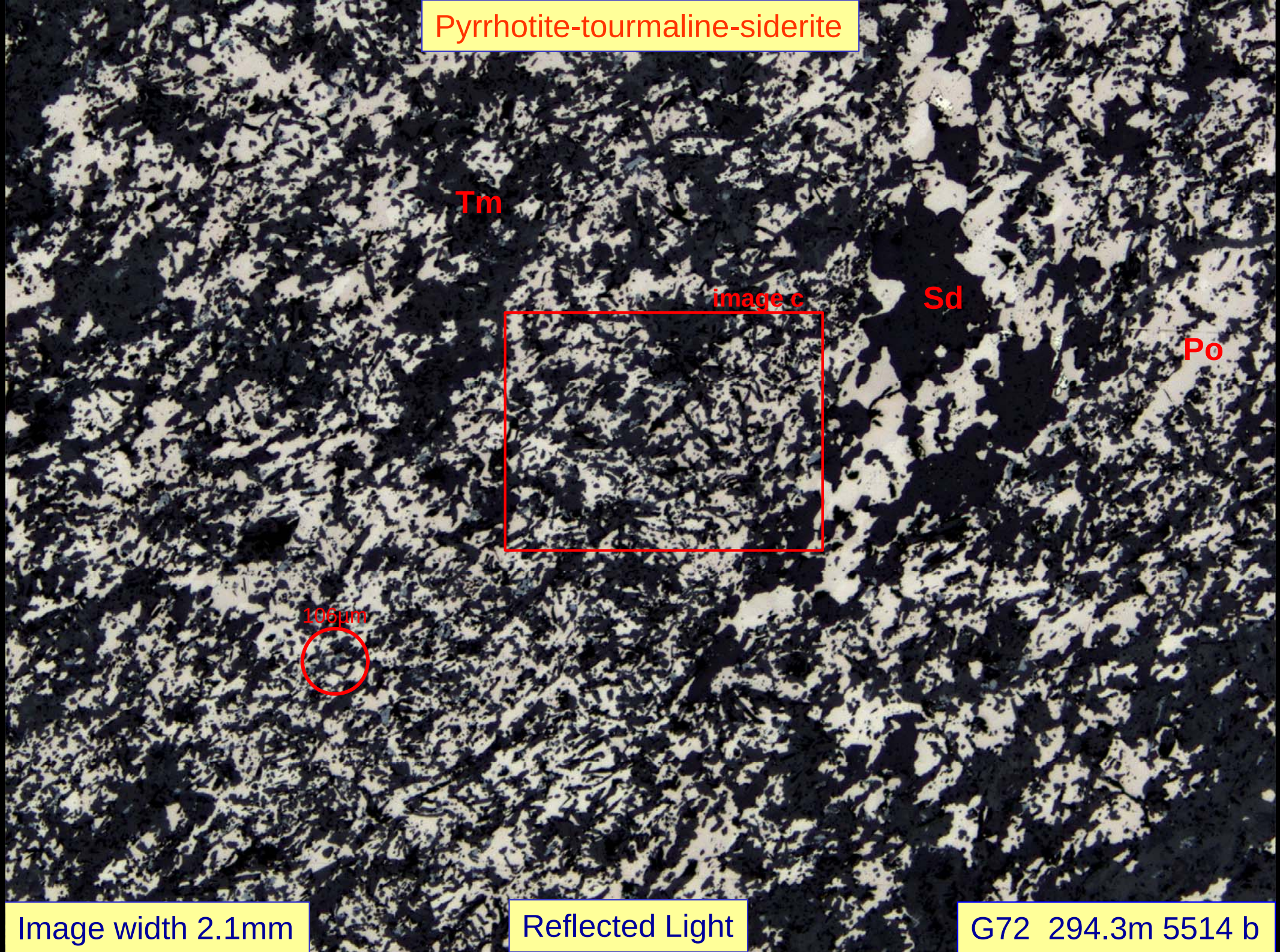
Core Scan

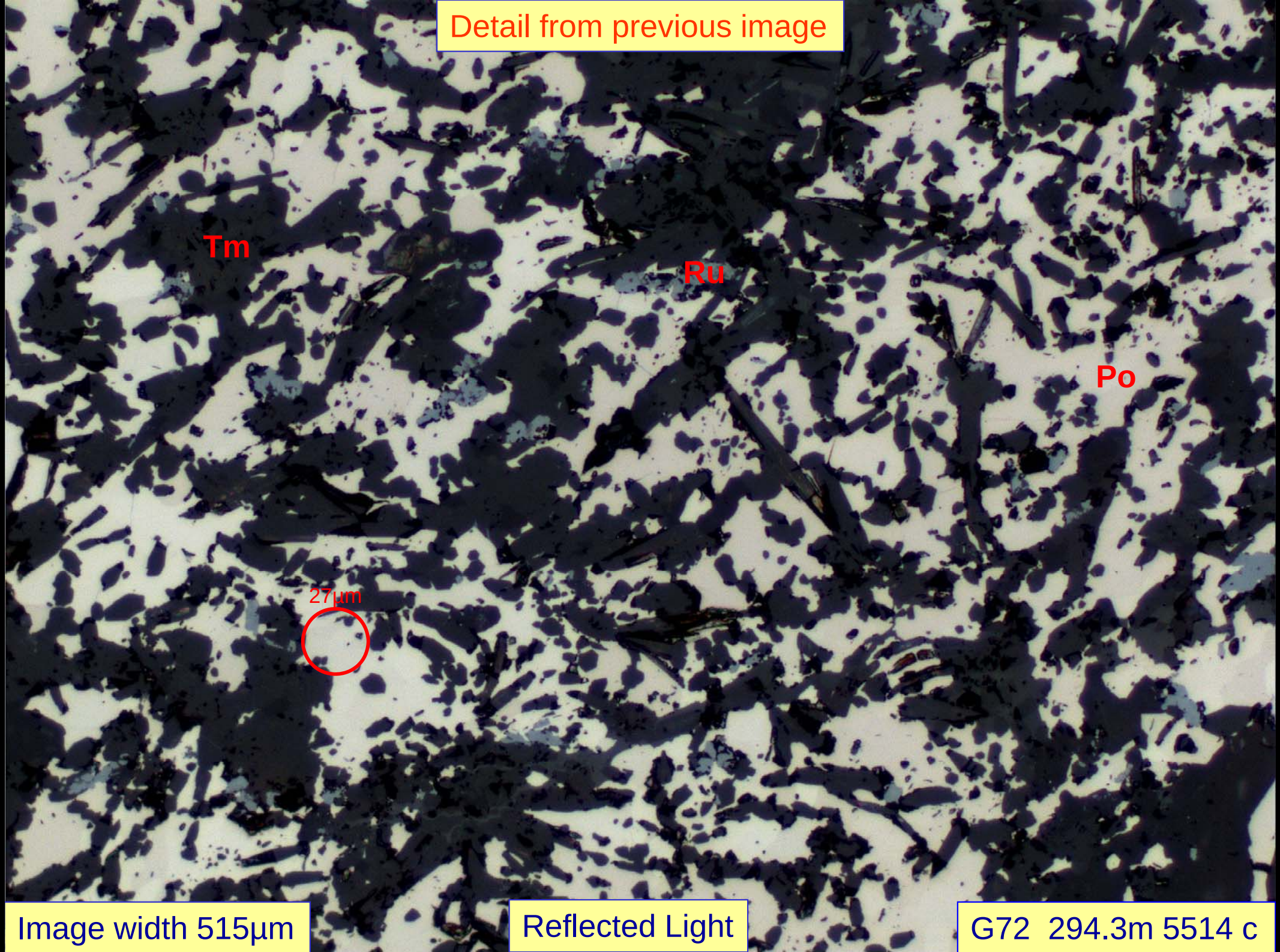
QXRD: 20% pyrrhotite, 16% pyrite, 15% quartz, 14% siderite, 10% chlorite, 9% tourmaline

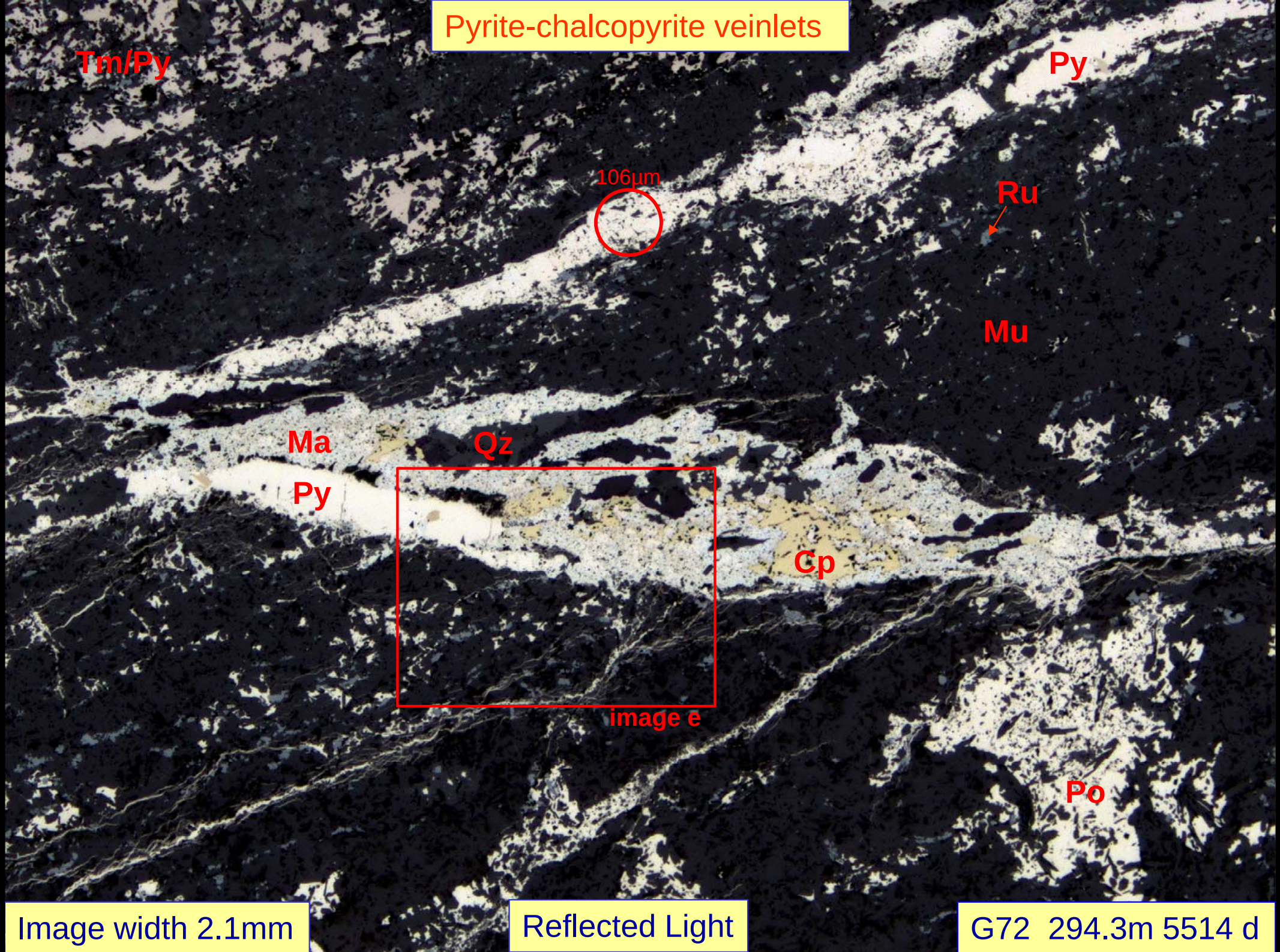
Image width ~125mm

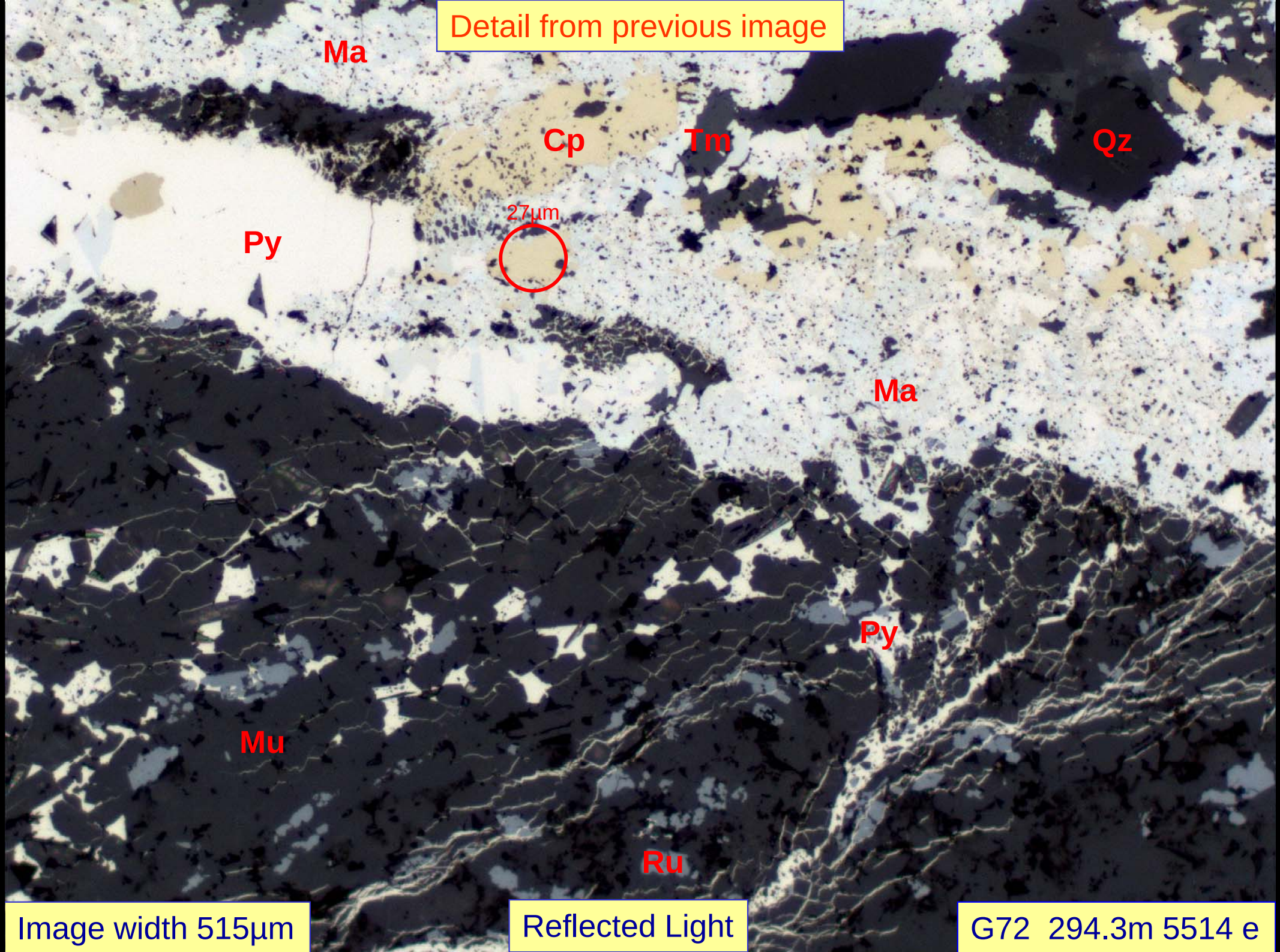
G72 294.3m 5514

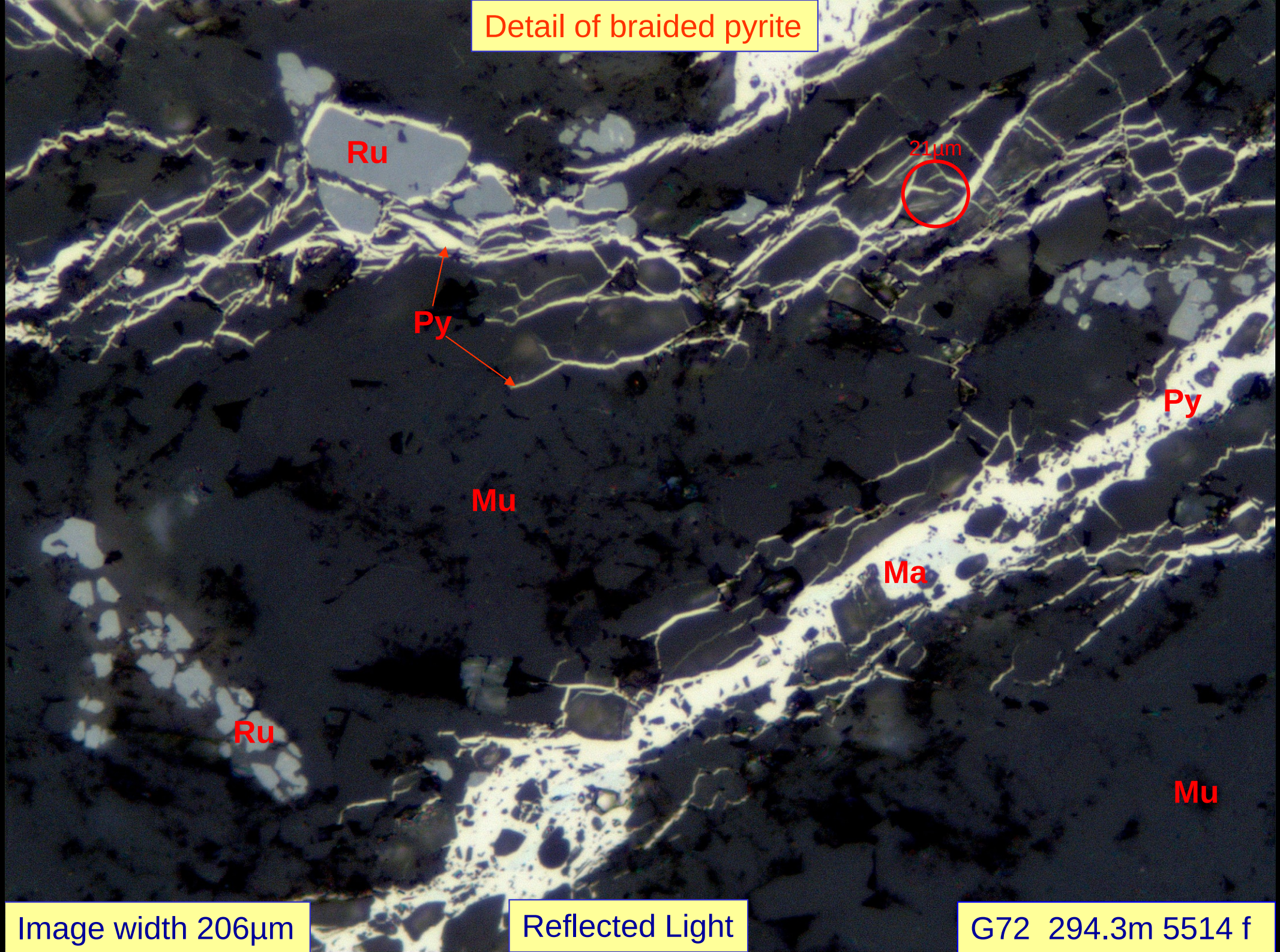

General low-magnification view
Po/Tm/Sd
Po
Sd
Py
Qz
As=arsenopyrite
Bi=native bismuth
Bm=bismuthinite
Cl=chlorite
Cp=chalcopyrite
Ma=marcasite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Sd=siderite
Se=sericite
Image width 8.2mm
Reflected Light
G72 294.3m 5514 a


Pyrrhotite-tourmaline-siderite
Tm
image c
Sd
Po
106µm
Image width 2.1mm
Reflected Light
G72 294.3m 5514 b

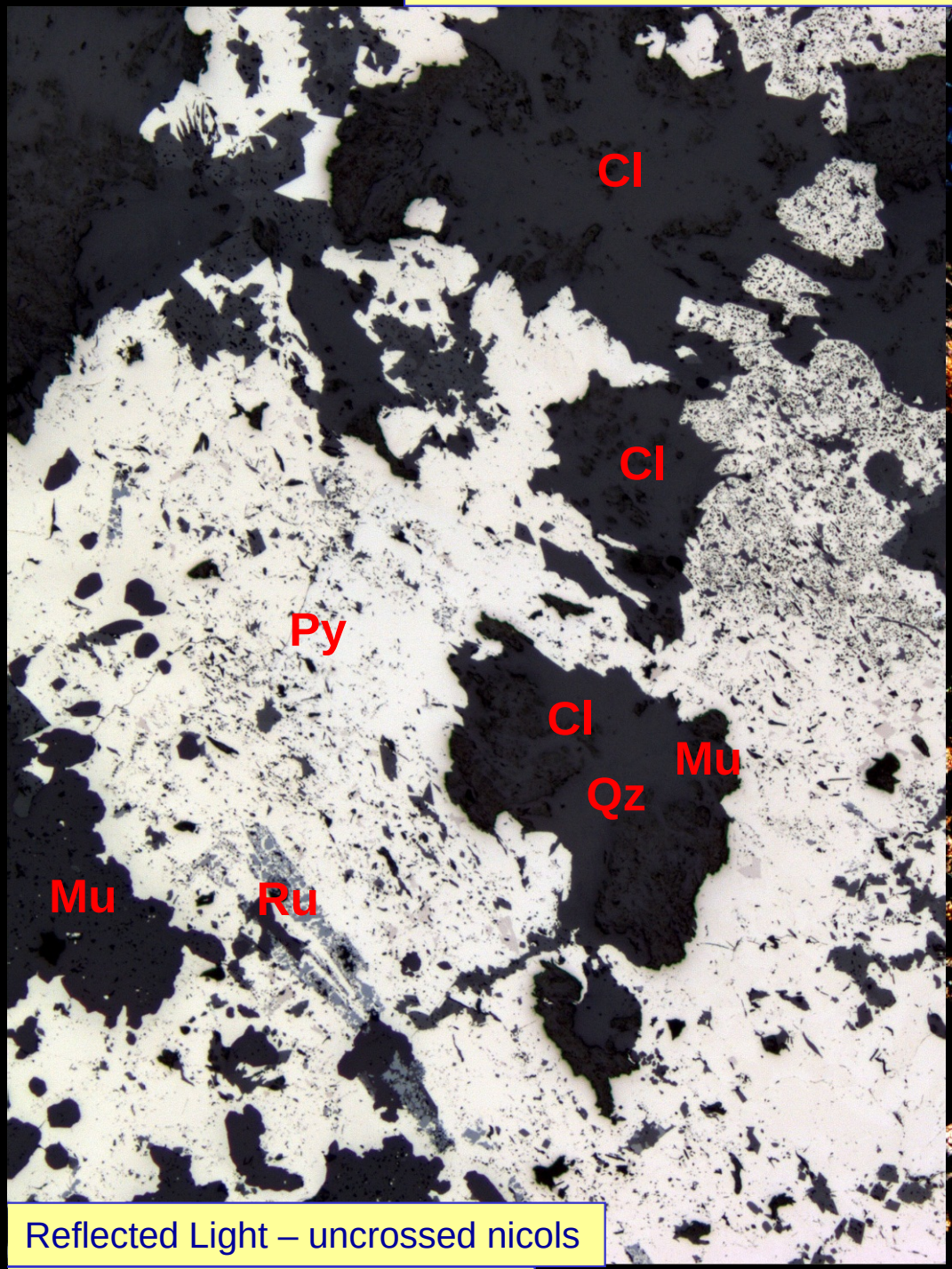

Detail from previous image
Tm
Ru
Po
27µm
Image width 515µm
Reflected Light
G72 294.3m 5514 c


Pyrite-chalcopyrite veinlets
Tm/Py
Py
106µm
Ru
Mu
Ma
Qz
Py
Cp
image e
Po
Image width 2.1mm
Reflected Light
G72 294.3m 5514 d

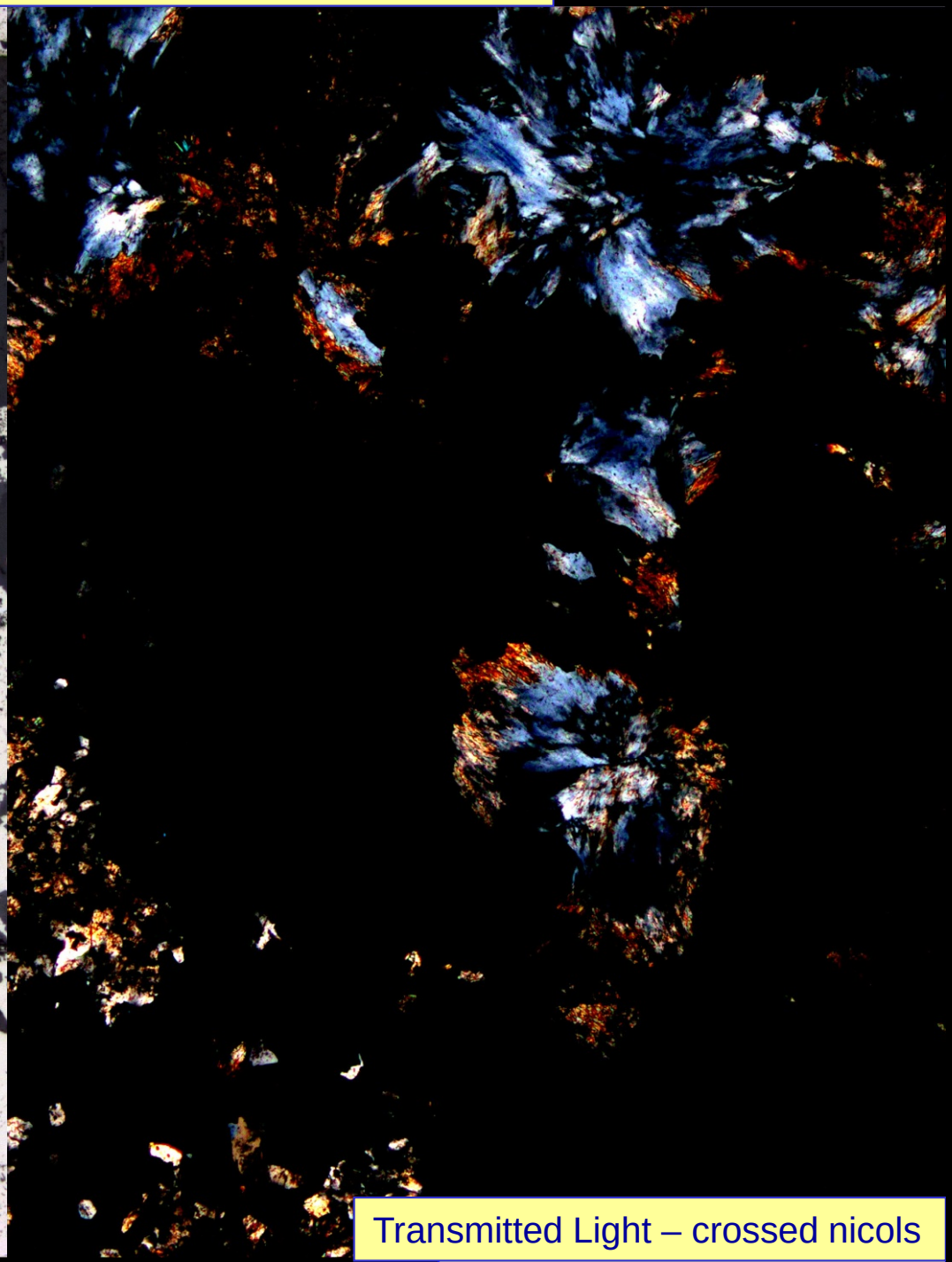

Detail from previous image
Ma
Cp
Tm
Qz
27µm
Py
Ma
Py
Mu
Ru
Image width 515µm
Reflected Light
G72 294.3m 5514 e


Detail of braided pyrite
Ru
21µm
Py
Py
Mu
Ma
Ru
Mu
Image width 206µm
Reflected Light
G72 294.3m 5514 f

Coarse chlorite with anomalous blue birefringence



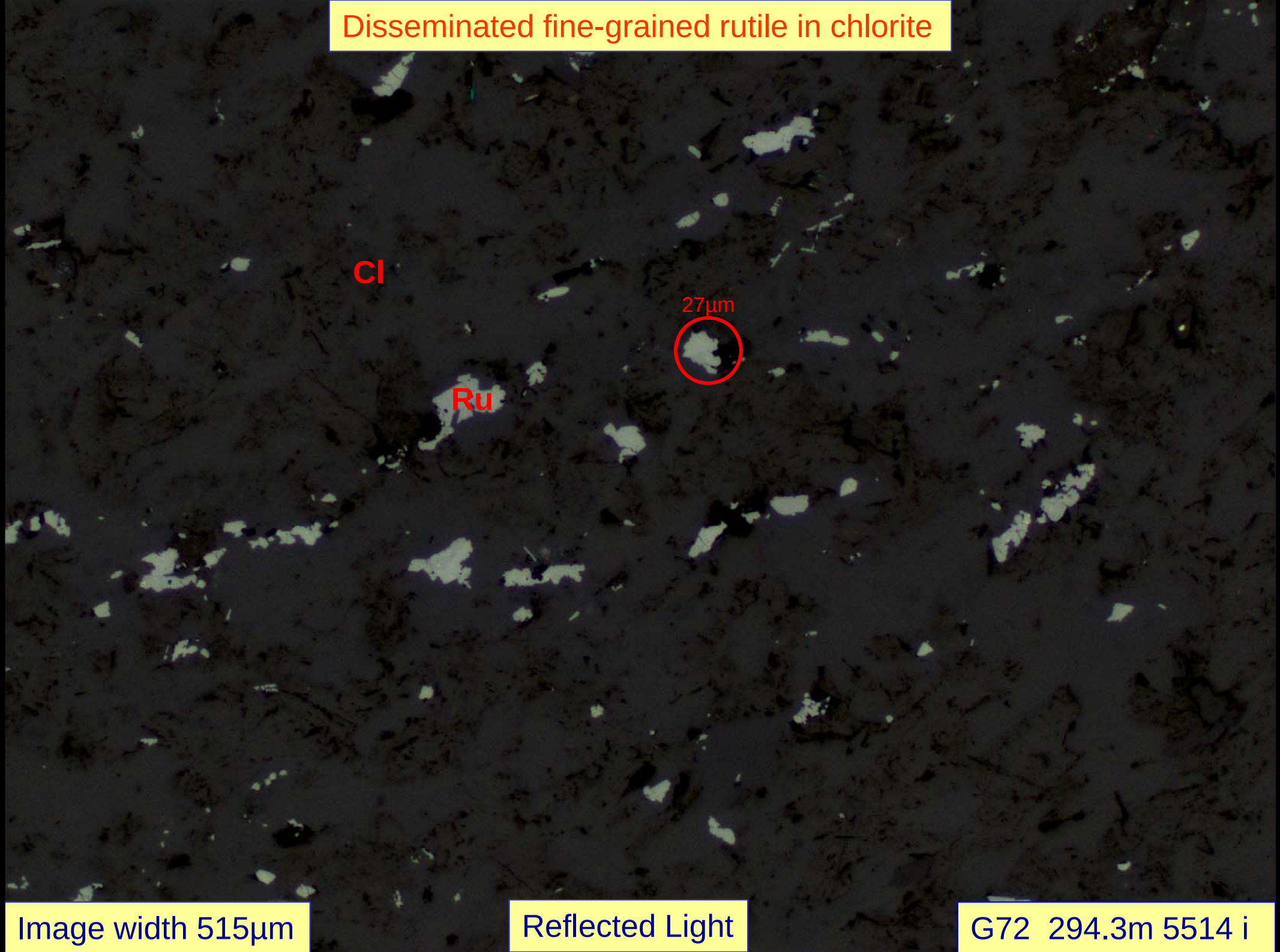
Reflected Light – uncrossed nicols

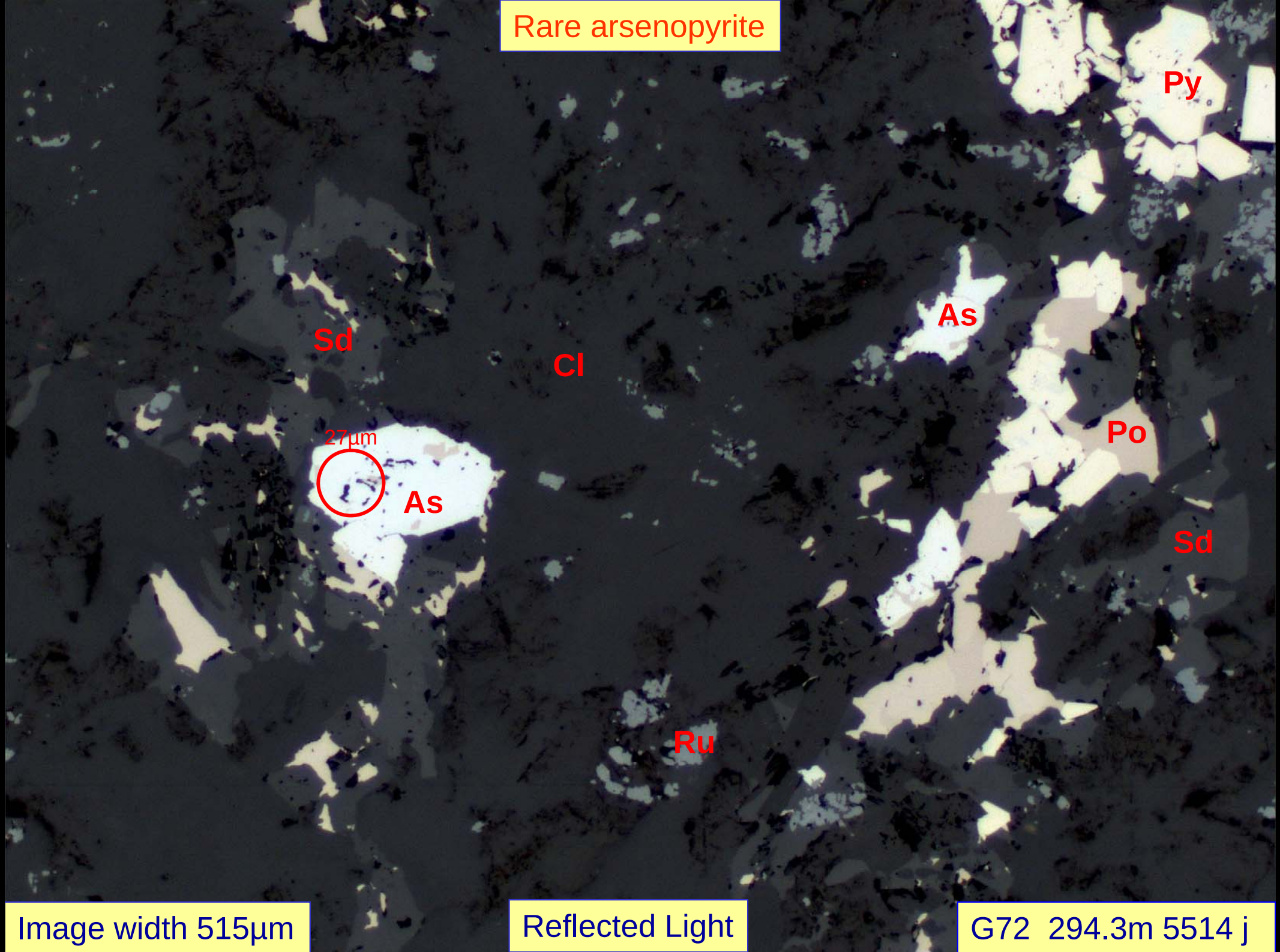


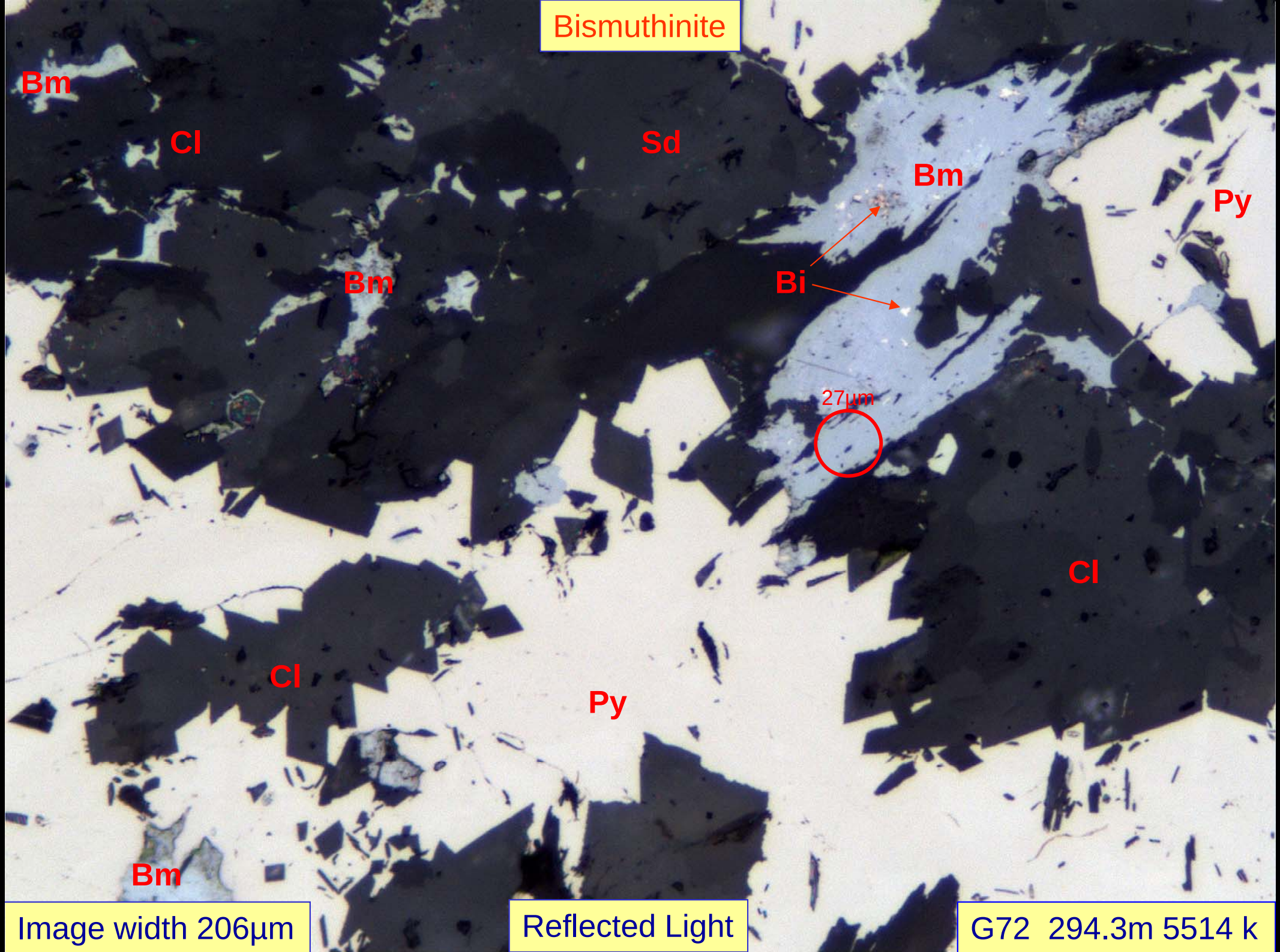
Transmitted Light – crossed nicols

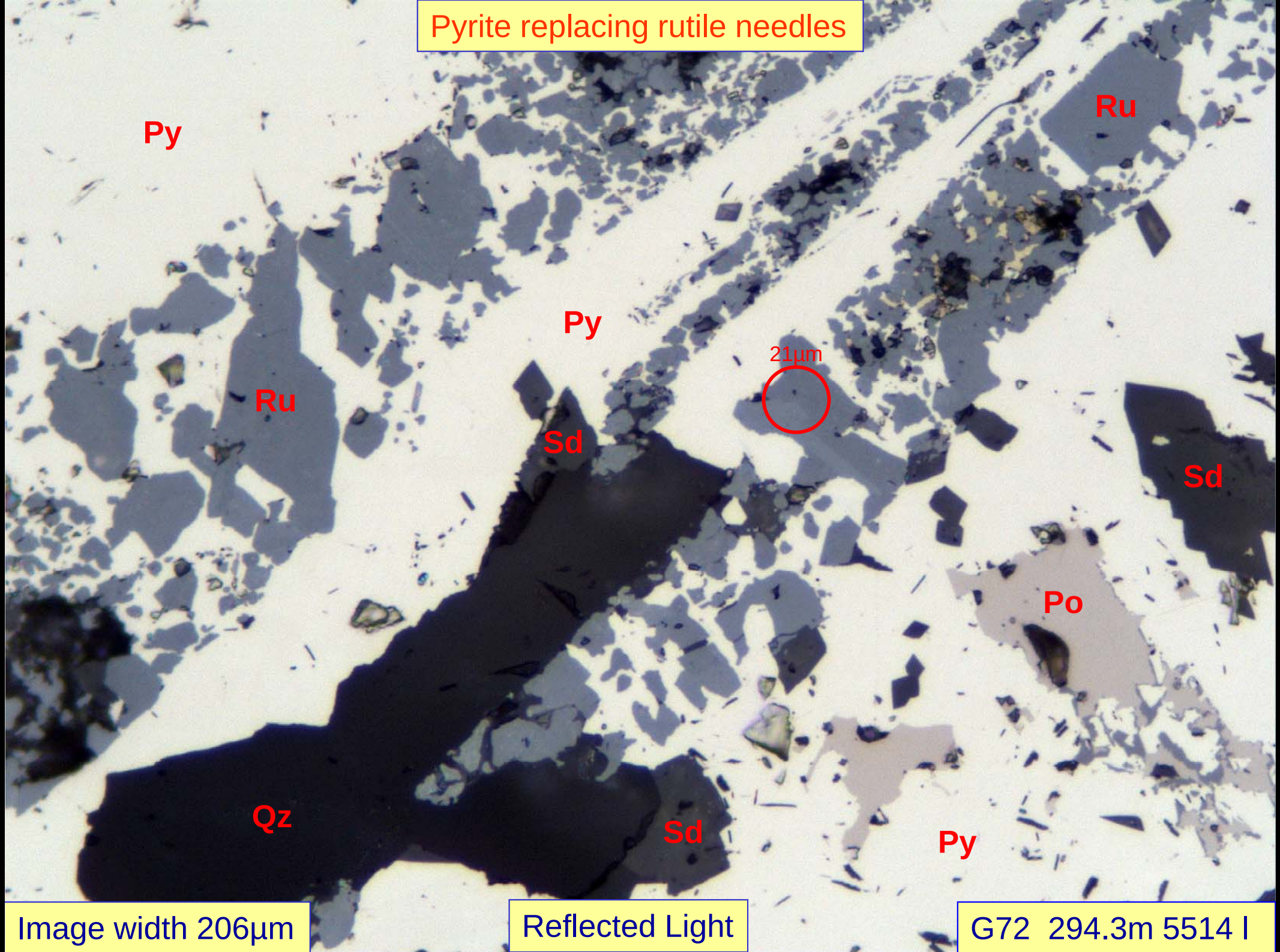
Image width 2 x 1.6mm

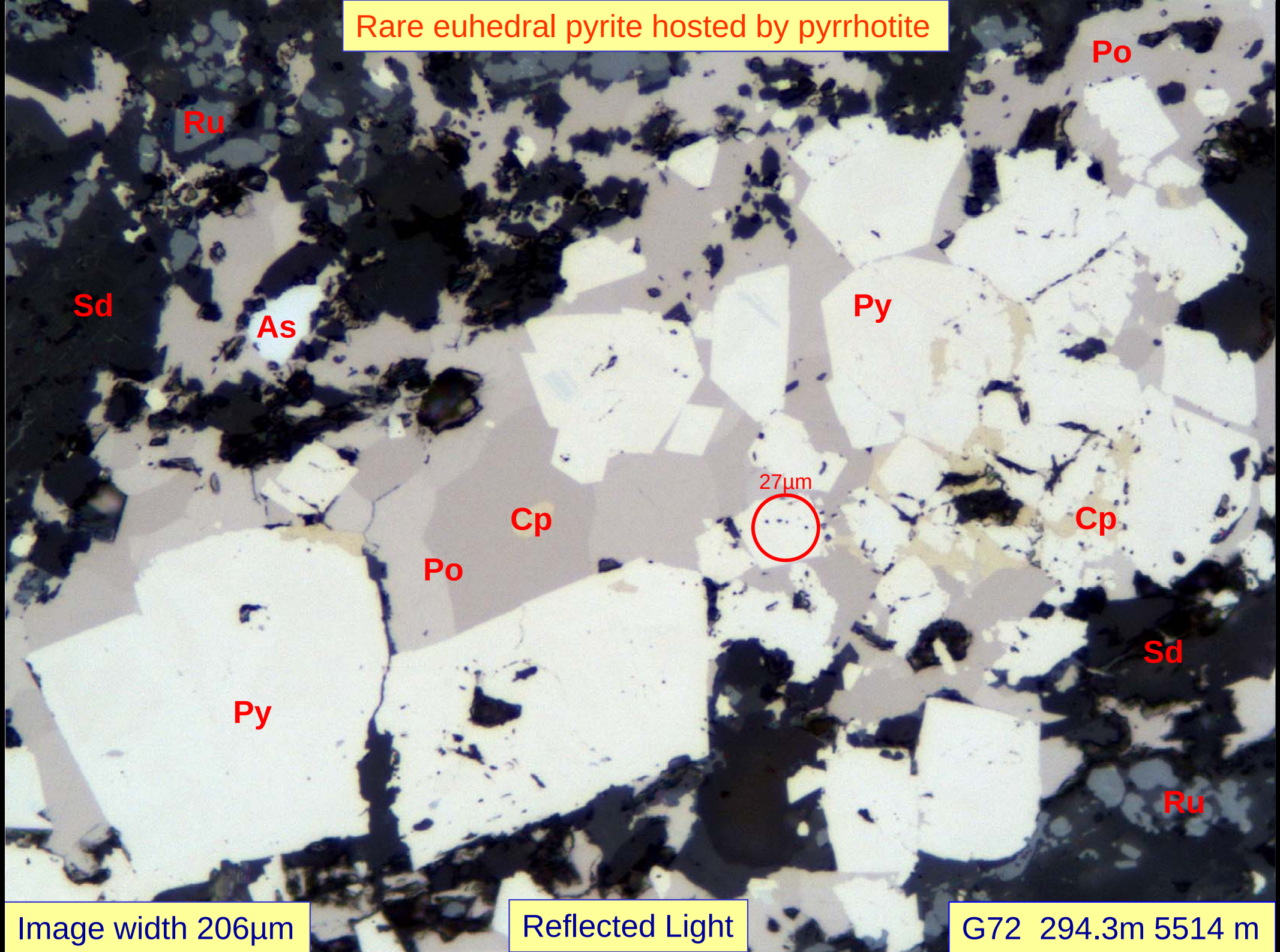
G72 294.3m 5514 g/h


Disseminated fine-grained rutile in chlorite
Cl
27µm
Ru
Image width 515µm
Reflected Light
G72 294.3m 5514 i


Rare arsenopyrite
Py
As
Sd
Cl
27µm
As
Po
Sd
Ru
Image width 515µm
Reflected Light
G72 294.3m 5514 j


Bismuthinite
Bm
Cl
Sd
Bm
Bm
Py
Bi
27µm
Cl
Cl
Py
Bm
Image width 206µm
Reflected Light
G72 294.3m 5514 k


Pyrite replacing rutile needles
Py
Ru
Py
21µm
Ru
Sd
Sd
Po
Qz
Sd
Py
Image width 206µm
Reflected Light
G72 294.3m 5514 l


Rare euhedral pyrite hosted by pyrrhotite
Po
Ru
Sd
As
Py
27µm
Cp
Cp
Po
Sd
Py
Ru
Image width 206µm
Reflected Light
G72 294.3m 5514 m

PARTICLE MINERALOGY REPORT

Severn 5514

G72 294.3m

GJMcA 17.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
3.0	10.3	0.0	0.0	0.0	0.1	0.0	86.7	**300**
40	29	0	0	0	7	0	88	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.31	0.00	8.0	0.00	24.3	0.02	
Actual		**0.56**		**0.00**	**25.2**	**0.03**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	34	0	0	0	0	0	70	
Binary	61	97	0	0	100	0	29	
Ternary	5	3	0	0	0	0	1	
Quat.y+	0	0	0	0	0	0	0	
Grains	7.7	32.0	0.0	0.0	0.7	0.0	99.0	1.39

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	0	0	0	100
Po	0		0	0	0	0	100
Cs	0	0		0	0	0	0
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	0	0	0	0	0		0
Ga	15	82	0	0	2	0	

TOTAL ASSOCIATION MATRIX

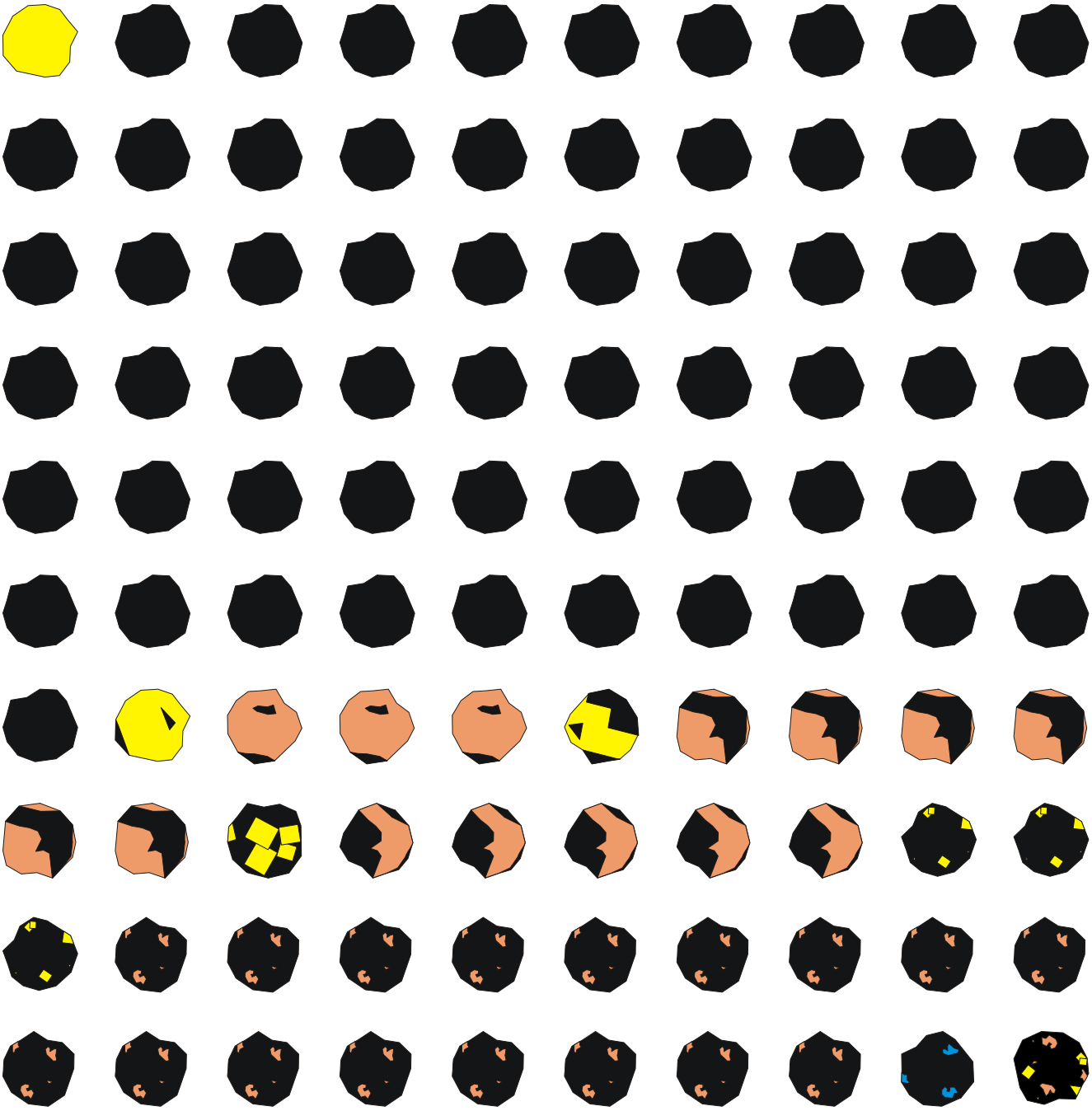
		Py	Po	Cs	St	Cp	As	Ga
	Py		5	0	0	0	0	66
	Po	3		0	0	0	0	100
of	**Cs**	0	0		0	0	0	0
all	**St**	0	0	0		0	0	0
	Cp	0	0	0	0		0	100
	As	0	0	0	0	0		0
	Ga	5	25	0	0	1	0	

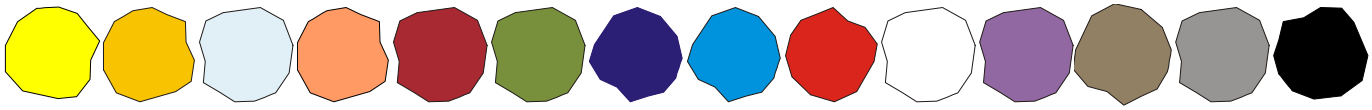
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	34		0	0	0	0	0	61	5	0
Po	0	0		0	0	0	0	97	3	0
Cs	0	0	0		0	0	0	0	0	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	100	0	0
As	0	0	0	0	0	0		0	0	0
Ga	70	4	24	0	0	1	0		1	0

Stellar Resources - Severn Drillhole Mineragraphy

Severn 5514 **53µm mask** **January 2012**



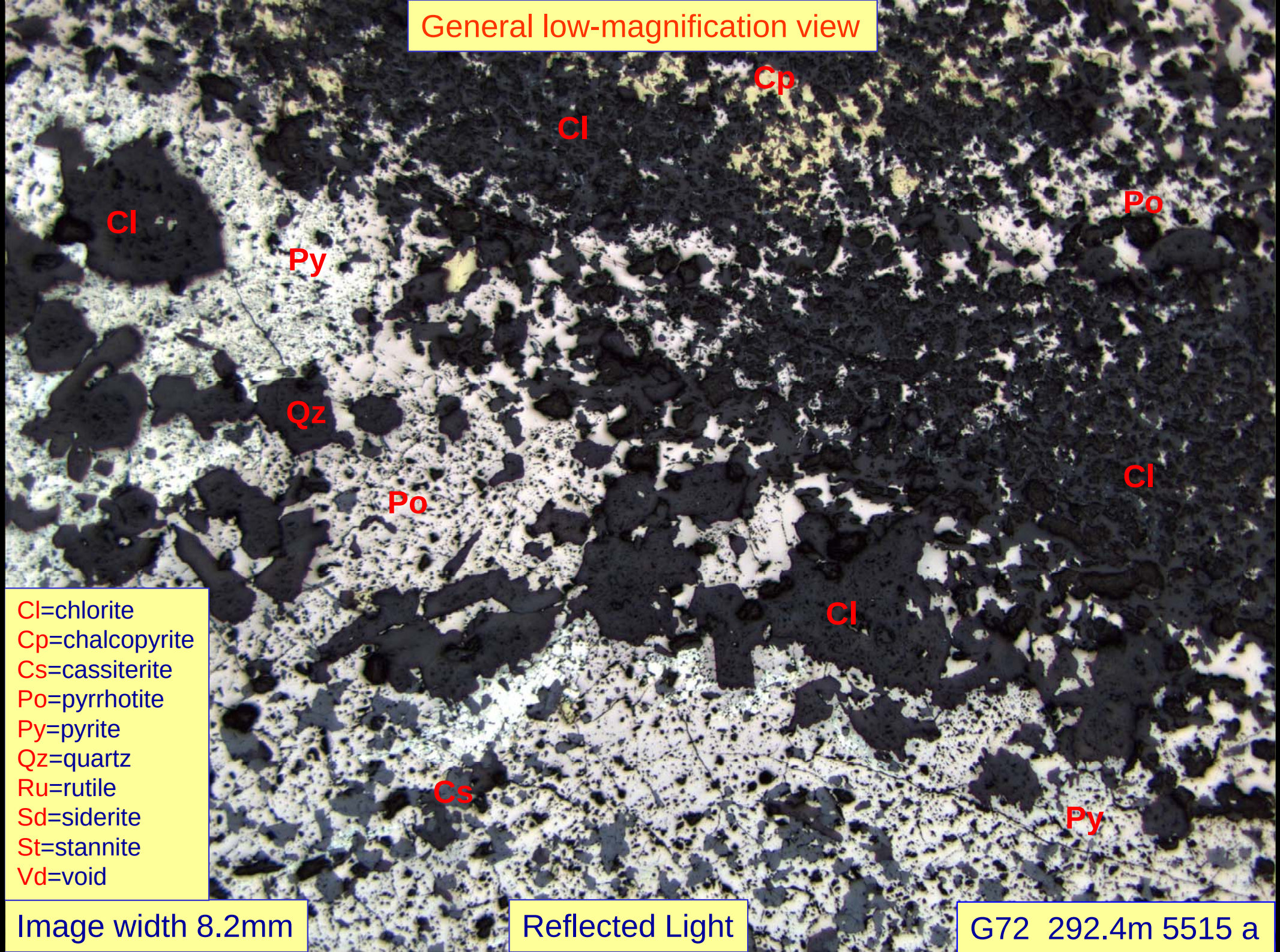


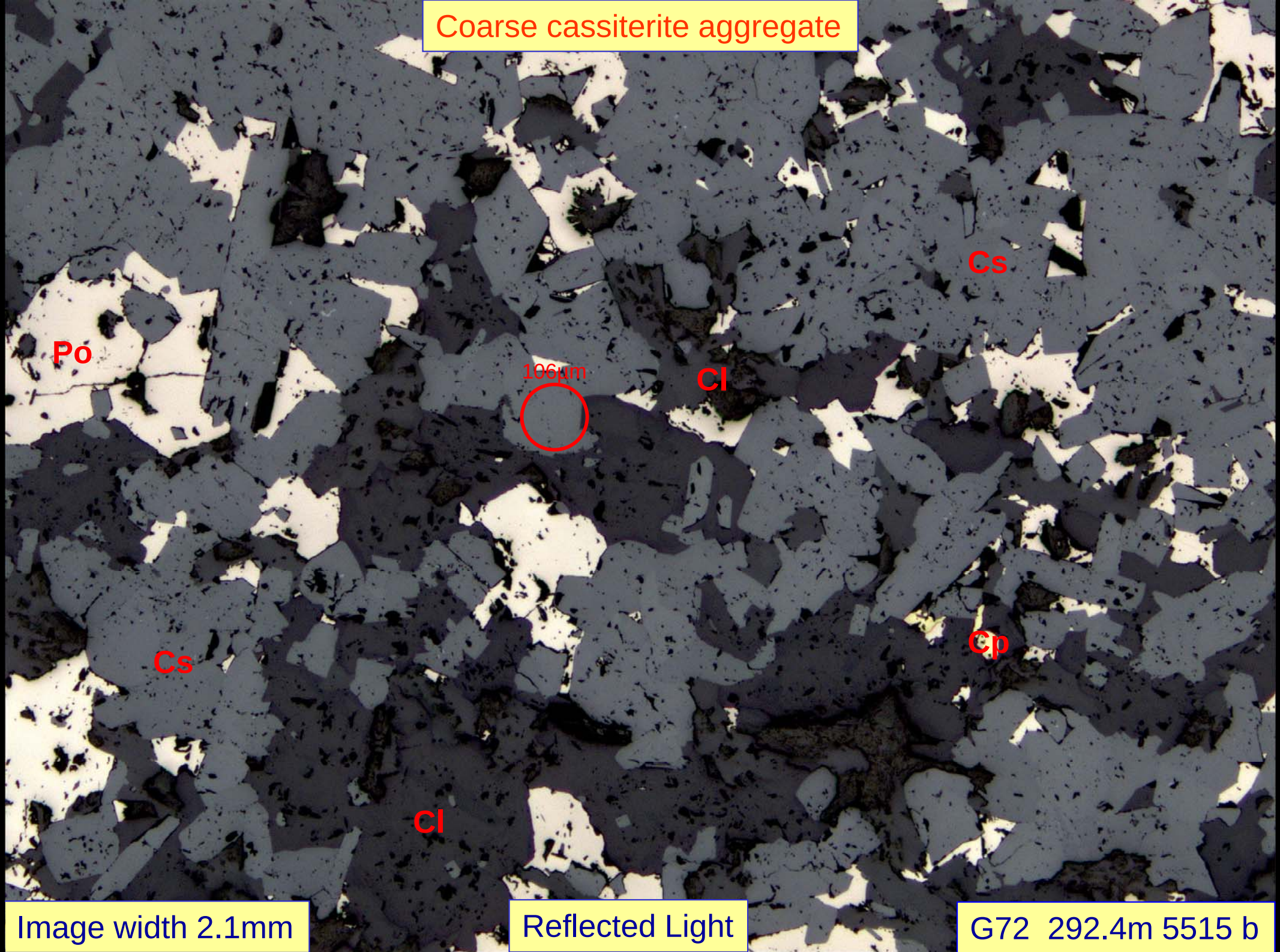
Core Scan

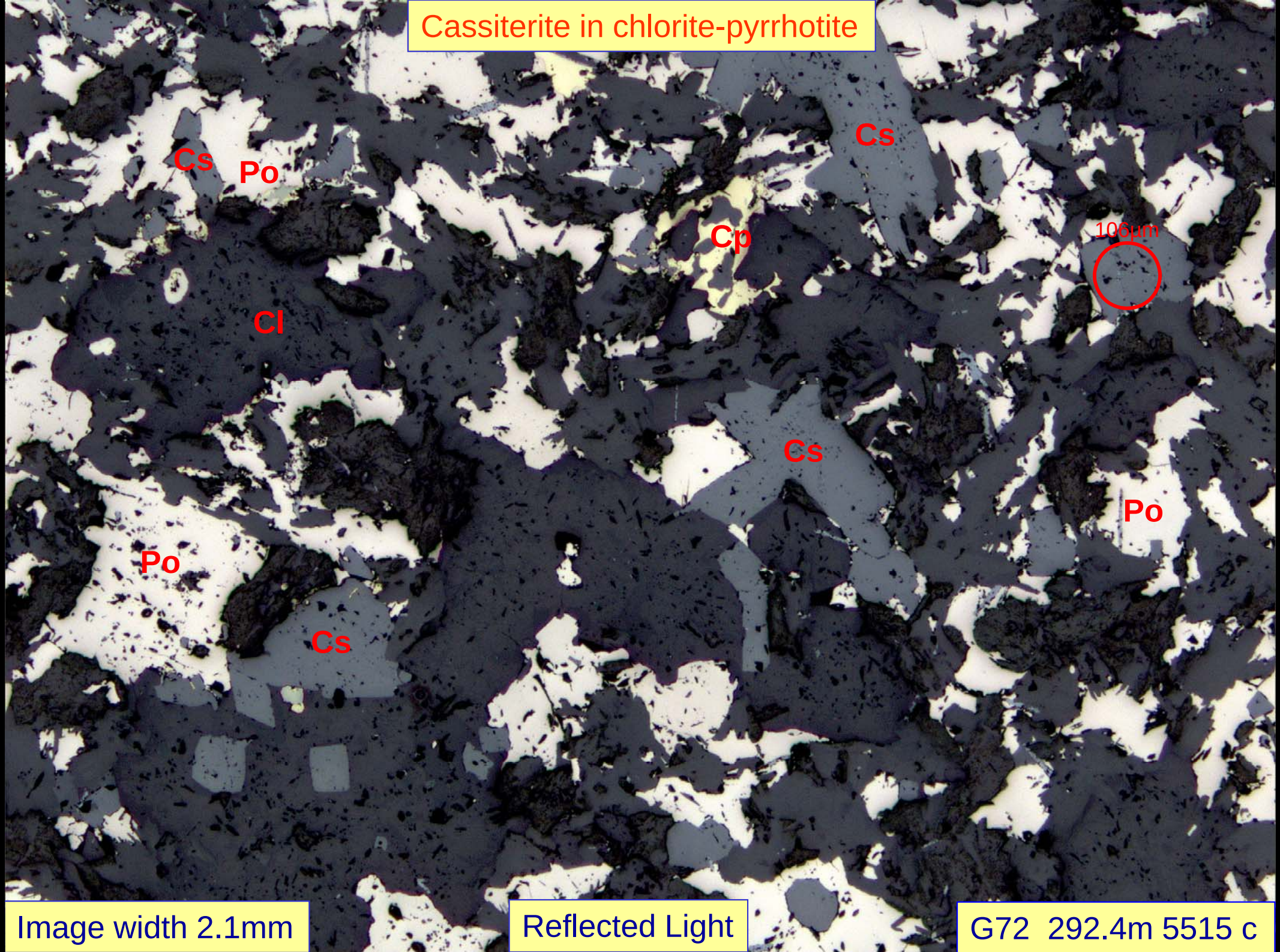
QXRD: 51% pyrrhotite, 19% chlorite, 9% kaolinite, 6% cassiterite, 4% quartz

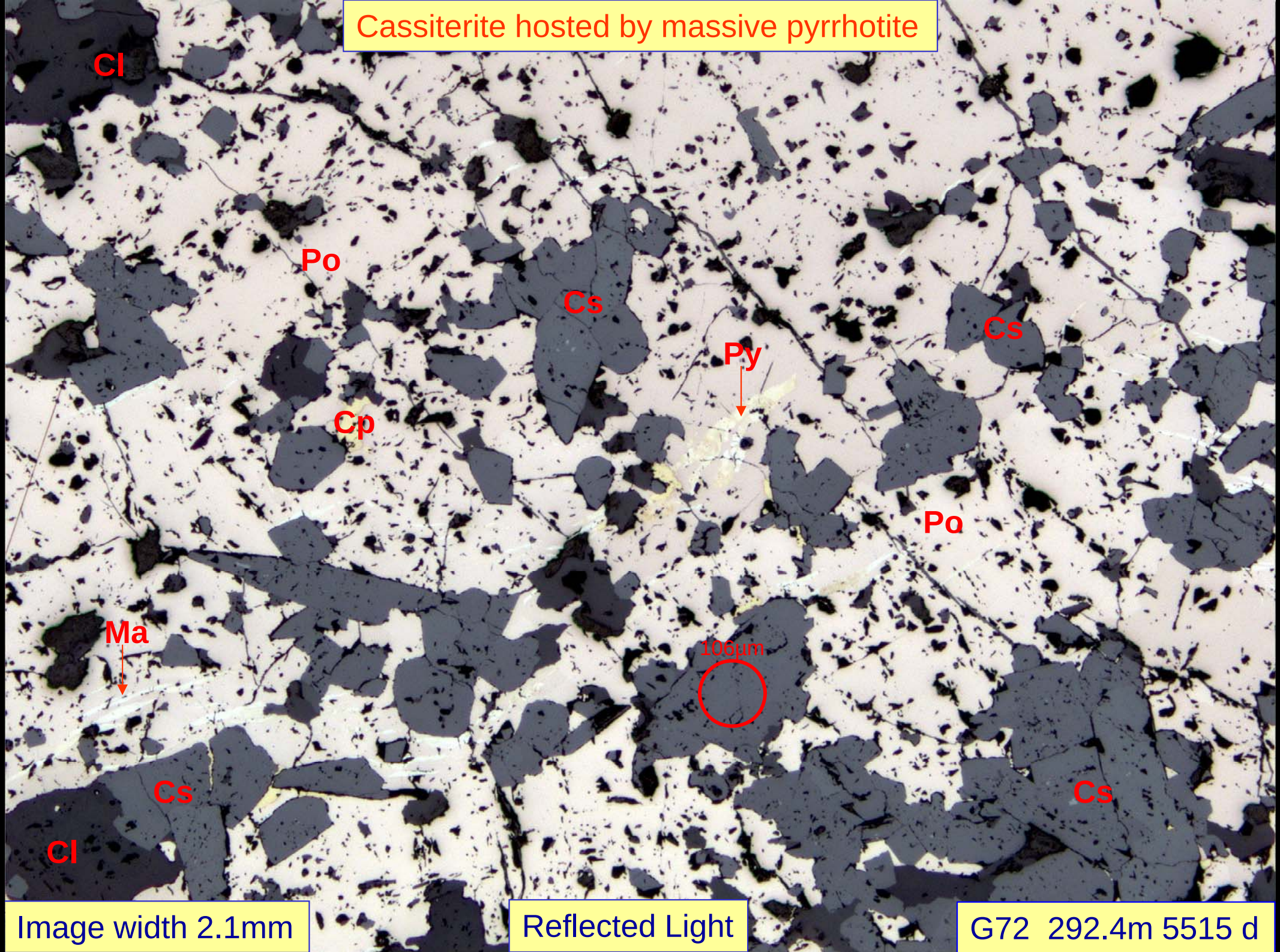
Image width ~75mm

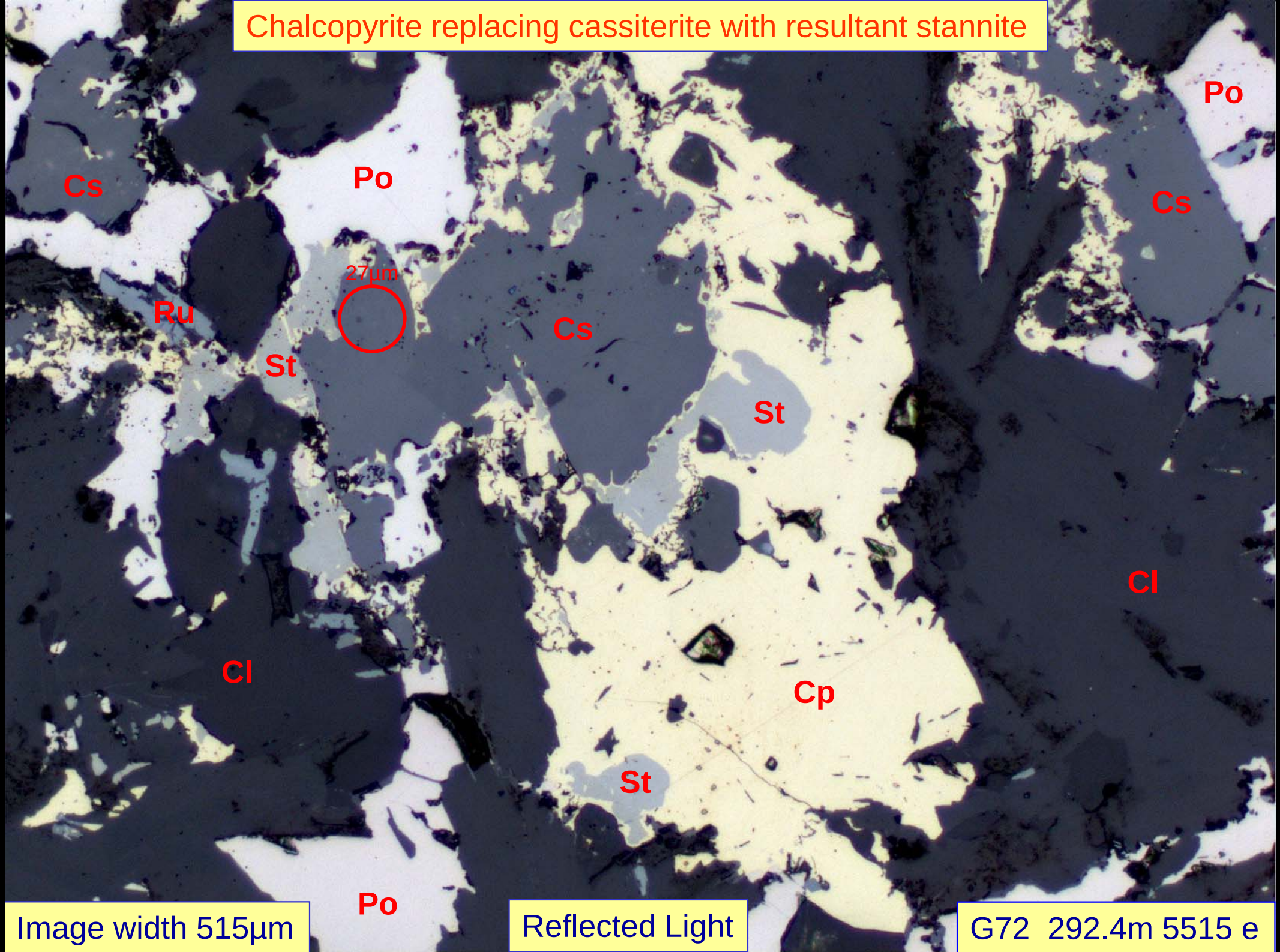
G72 292.4m 5515

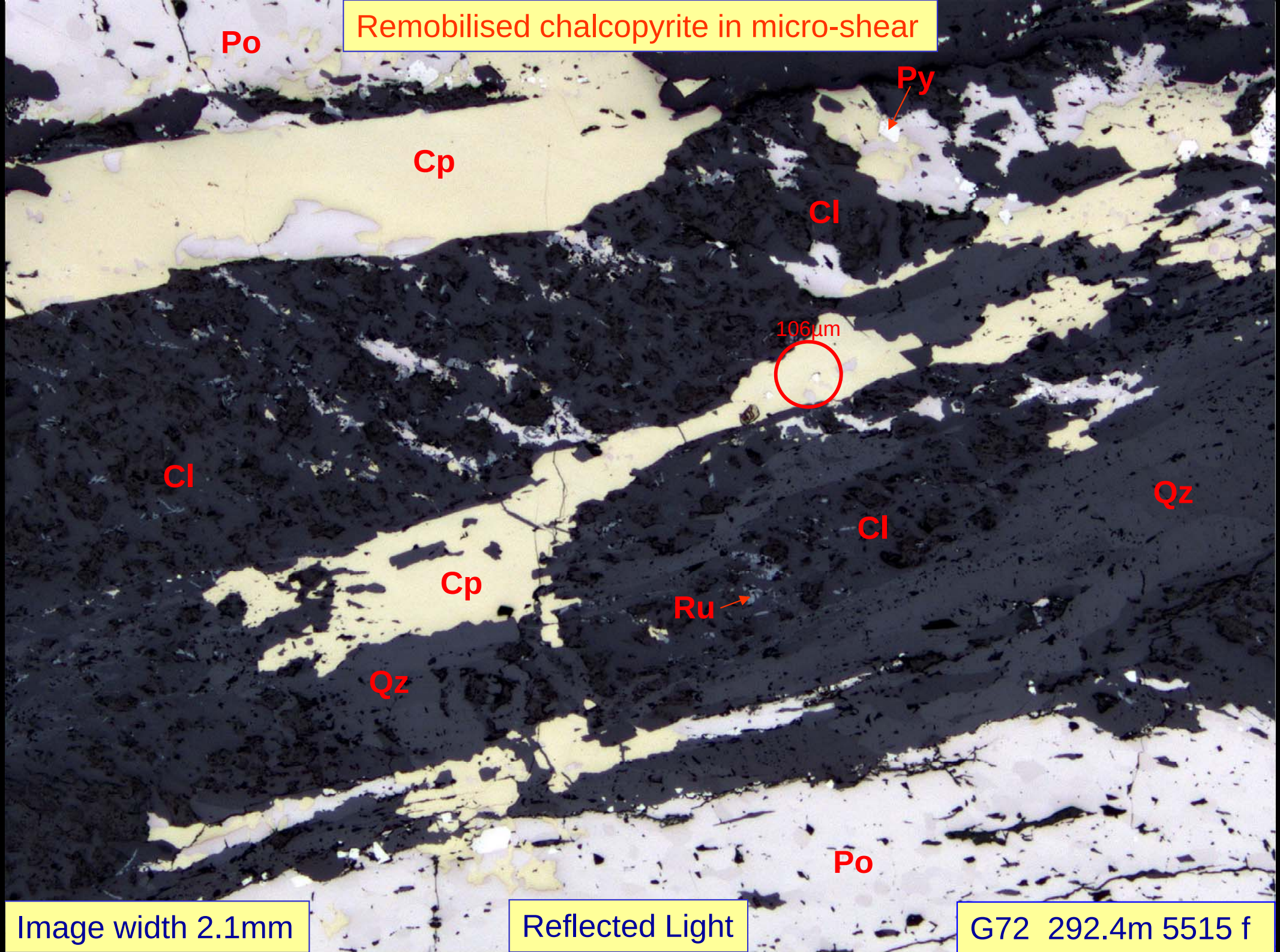

General low-magnification view
Cp
Cl
Cl
Po
Py
Qz
Cl
Po
Cl
Cs
Py
Cl=chlorite
Cp=chalcopyrite
Cs=cassiterite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Sd=siderite
St=stannite
Vd=void
Image width 8.2mm
Reflected Light
G72 292.4m 5515 a

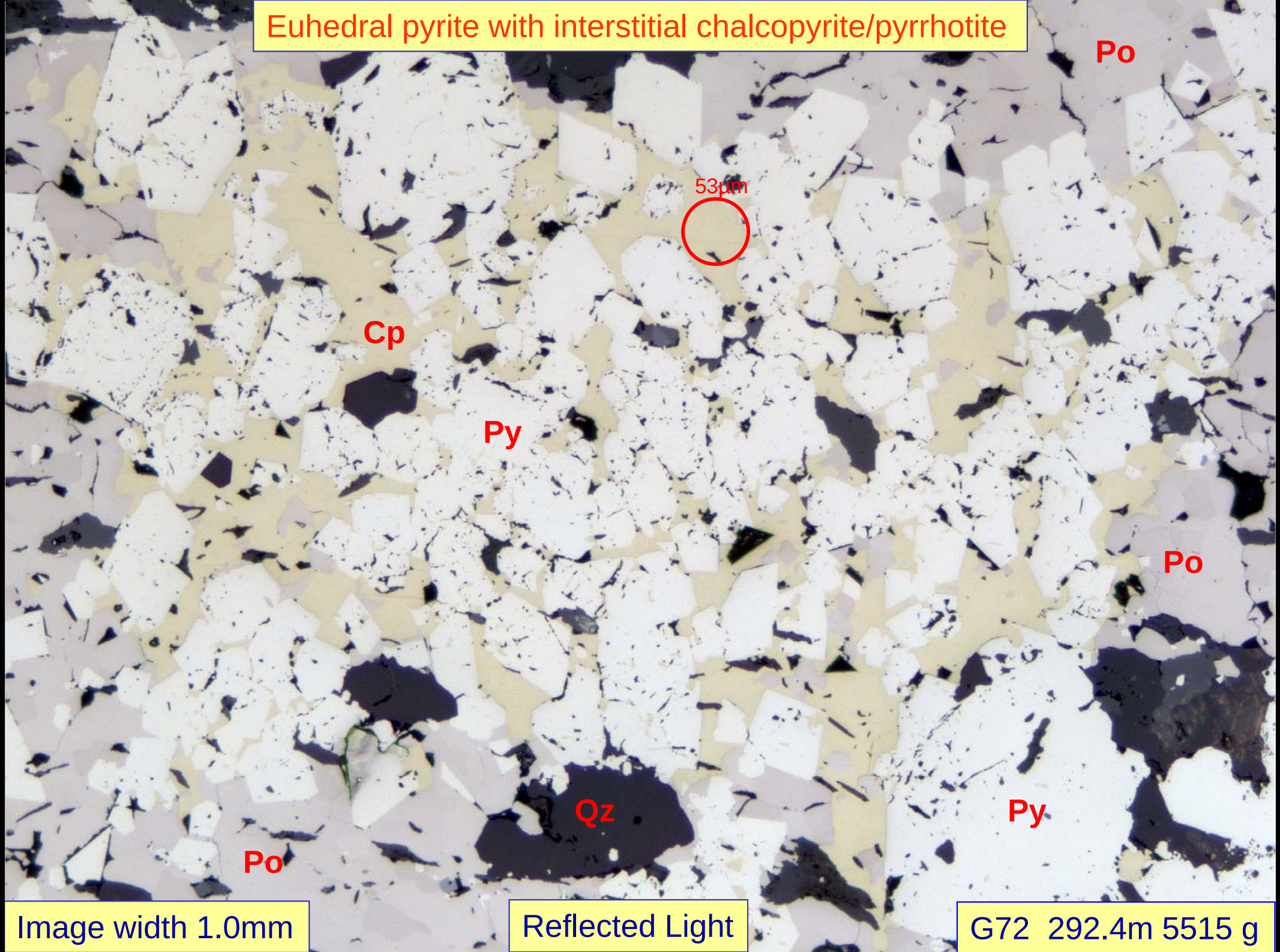

Coarse cassiterite aggregate
Po
106µm
Cl
Cs
Cp
Cs
Cl
Image width 2.1mm
Reflected Light
G72 292.4m 5515 b

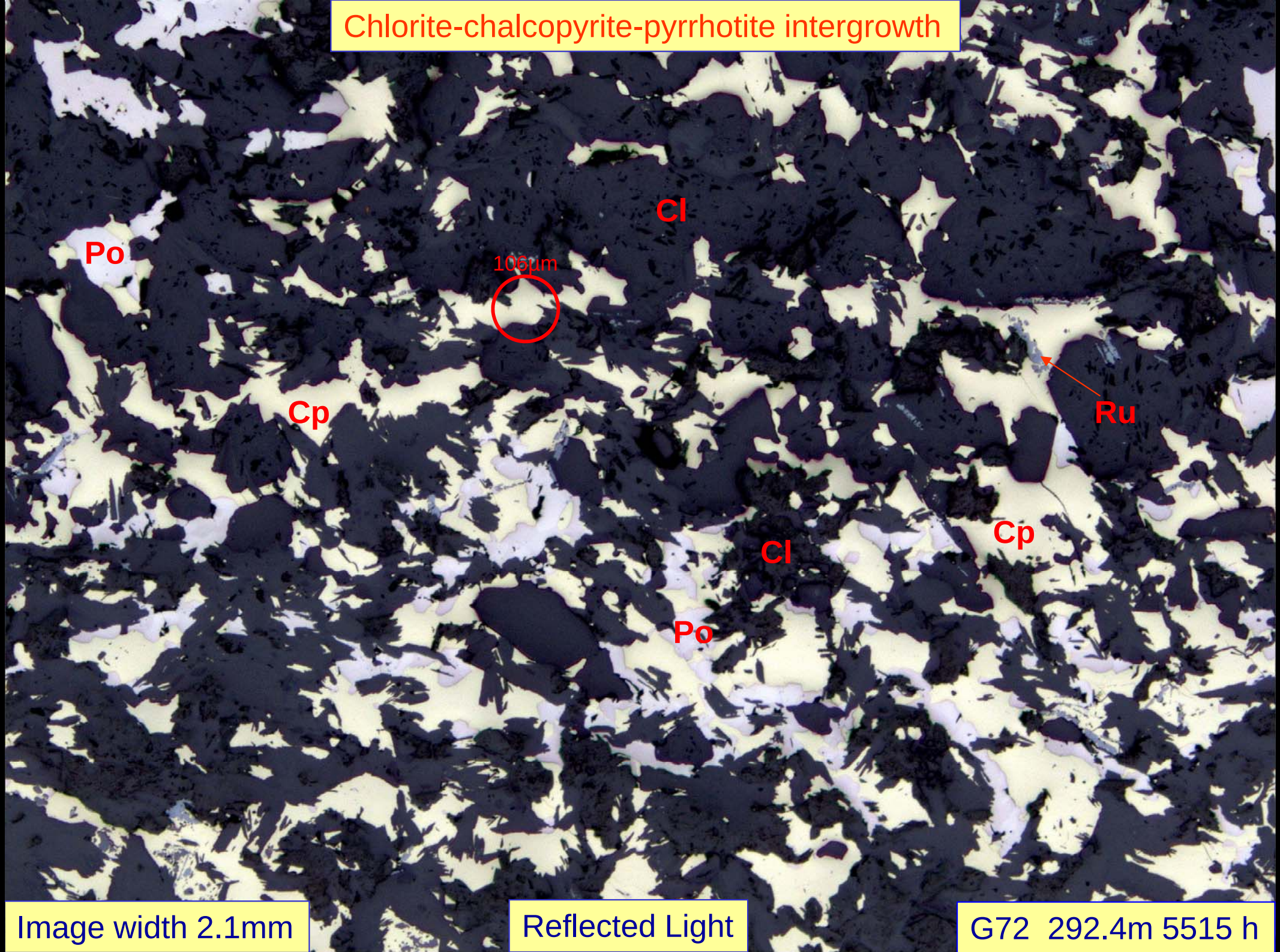

Cassiterite in chlorite-pyrrhotite
Cs
Po
Cs
Cp
106µm
Cl
Cs
Po
Po
Cs
Image width 2.1mm
Reflected Light
G72 292.4m 5515 c

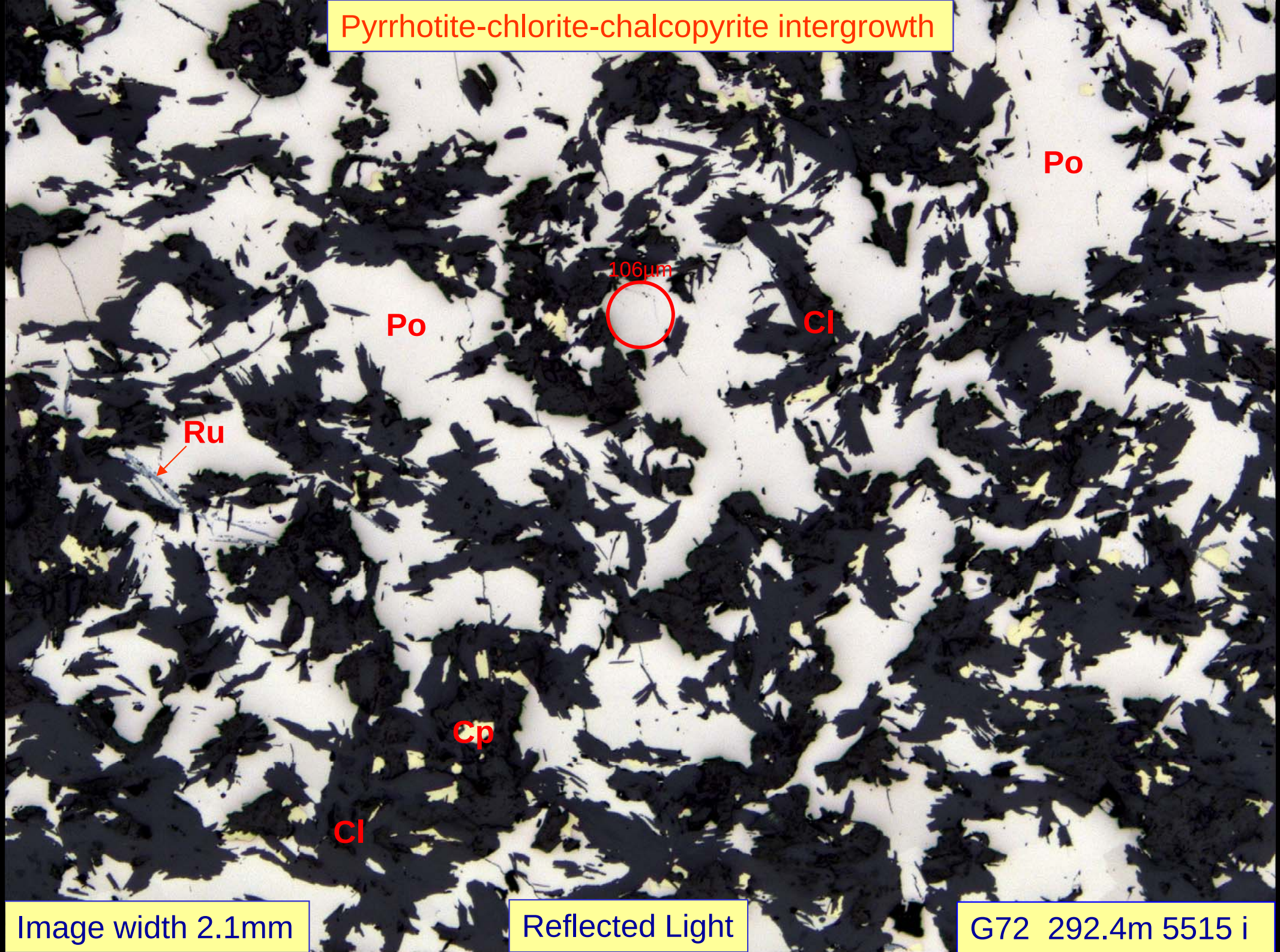

Cassiterite hosted by massive pyrrhotite
Cl
Po
Cs
Py
Cs
Cp
Po
Ma
106µm
Cs
Cs
Cl
Image width 2.1mm
Reflected Light
G72 292.4m 5515 d

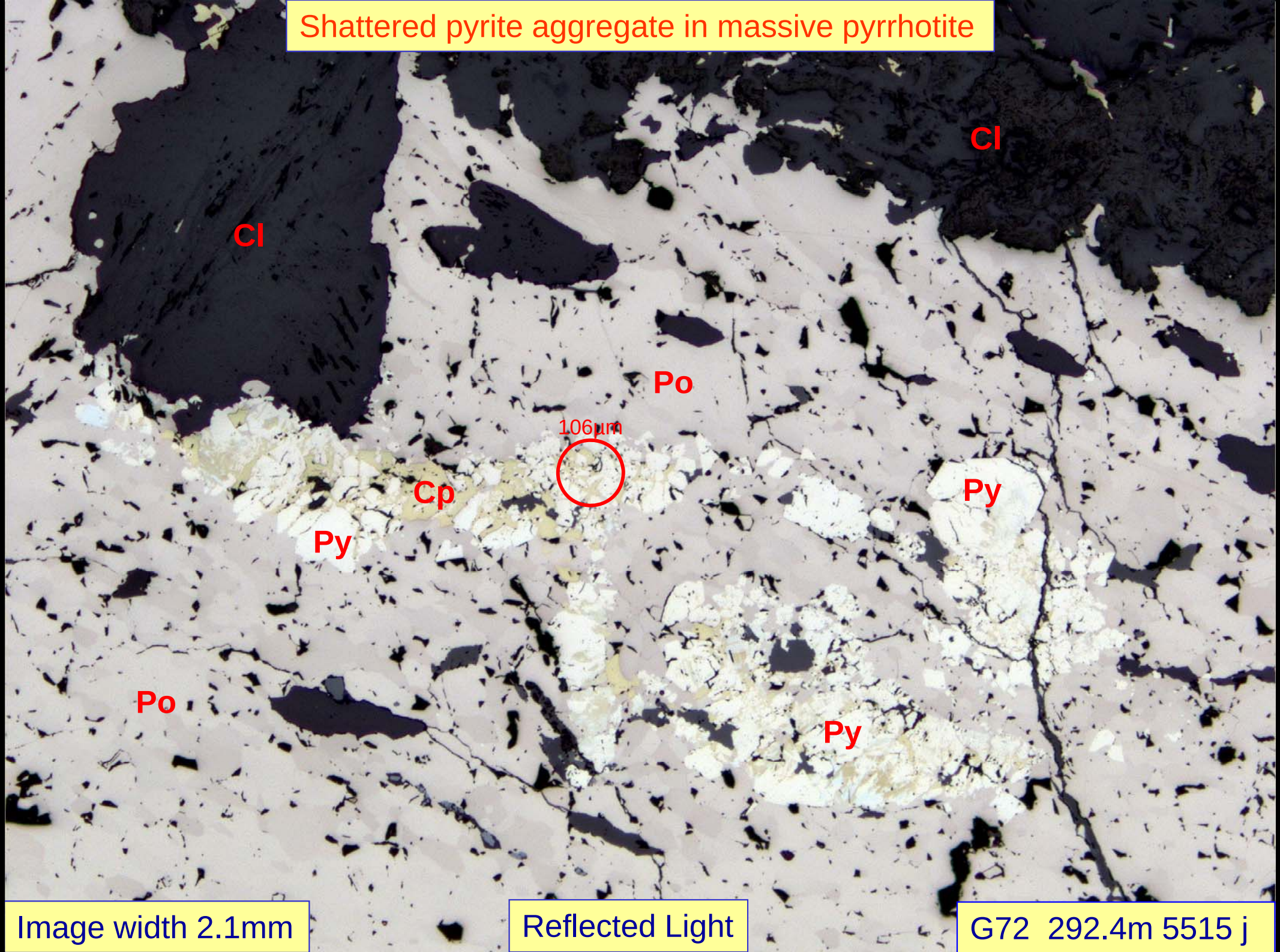

Chalcopyrite replacing cassiterite with resultant stannite
Cs
Po
27µm
Ru
St
Cs
St
Po
Cs
Cl
Cp
St
Cl
Po
Image width 515µm
Reflected Light
G72 292.4m 5515 e

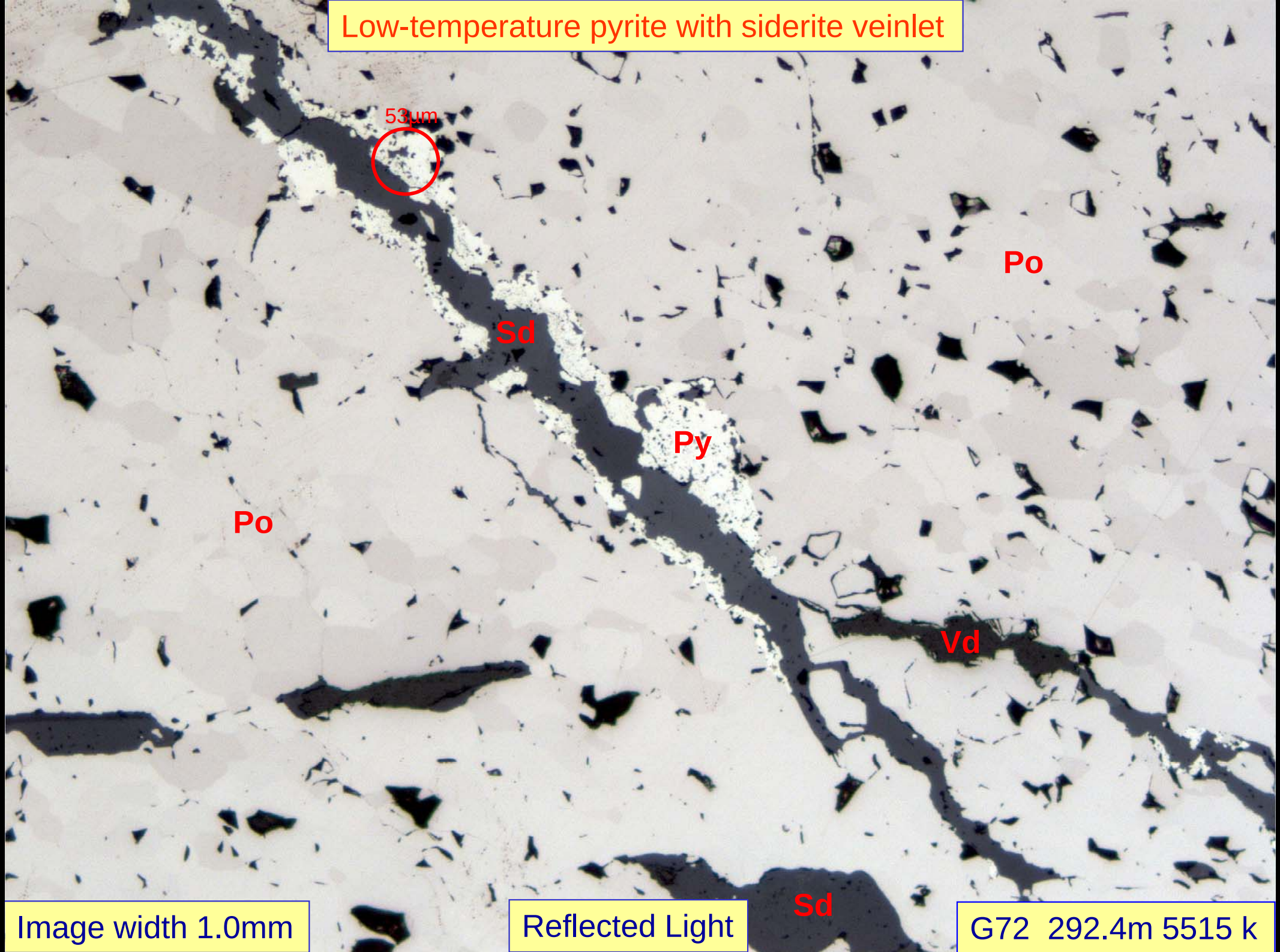

Remobilised chalcopyrite in micro-shear
Po
Py
Cp
Cl
106µm
Cl
Qz
Cl
Cp
Ru
Qz
Po
Image width 2.1mm
Reflected Light
G72 292.4m 5515 f

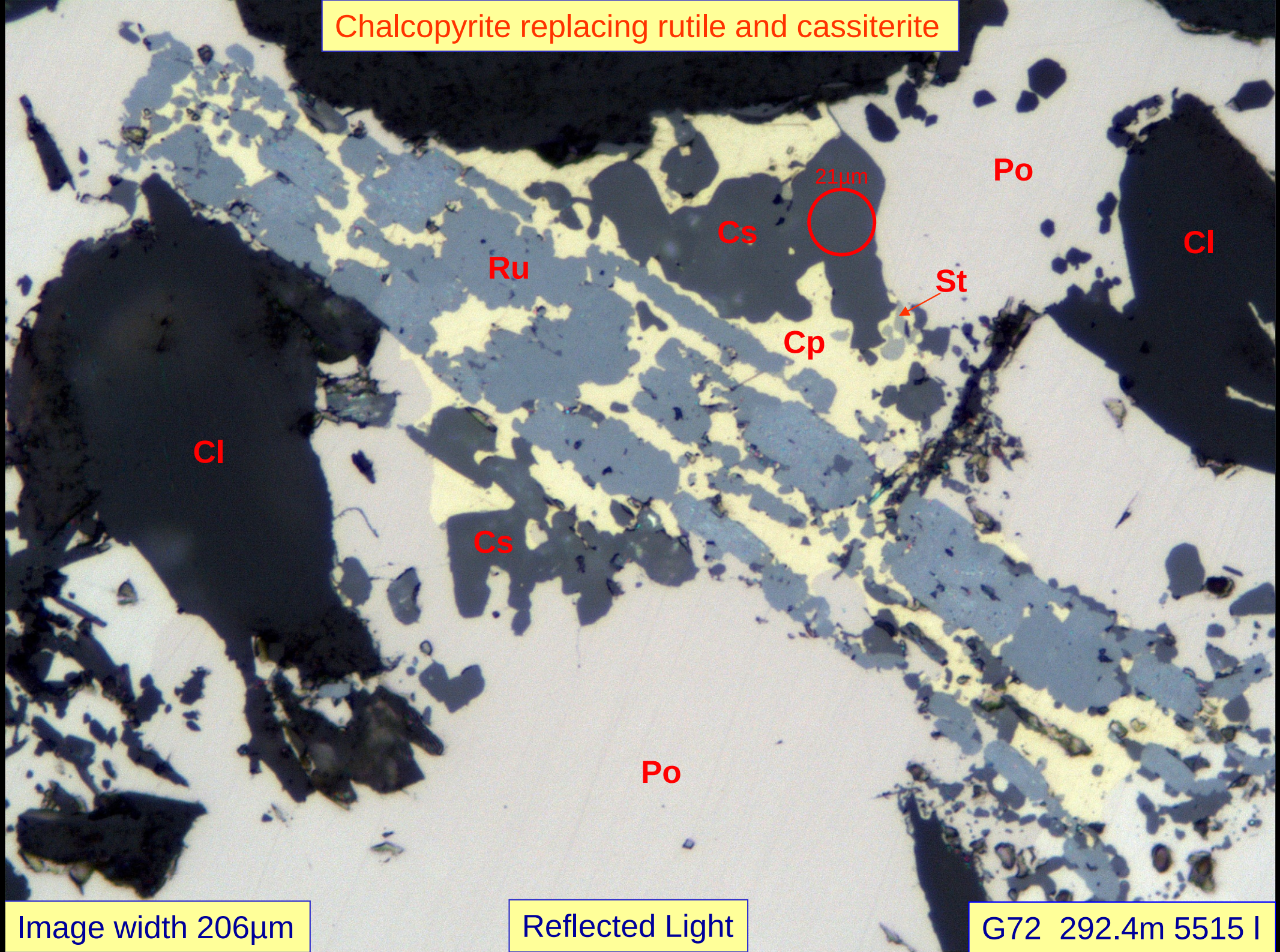

Euhedral pyrite with interstitial chalcopyrite/pyrrhotite
Po
53µm
Cp
Py
Po
Qz
Py
Po
Image width 1.0mm
Reflected Light
G72 292.4m 5515 g

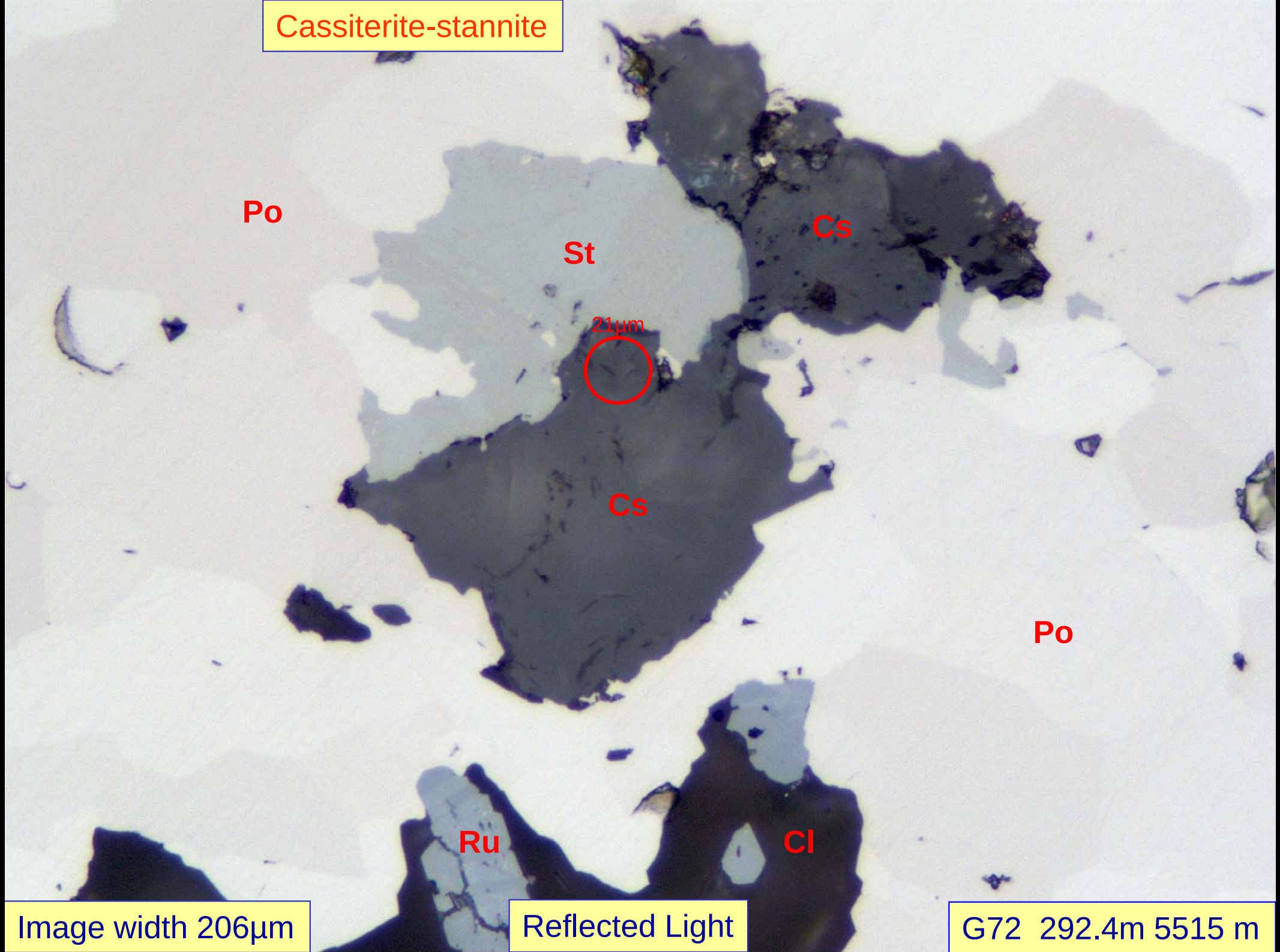

Chlorite-chalcopyrite-pyrrhotite intergrowth
Cl
Po
106µm
Cp
Ru
Cp
Cl
Po
Image width 2.1mm
Reflected Light
G72 292.4m 5515 h

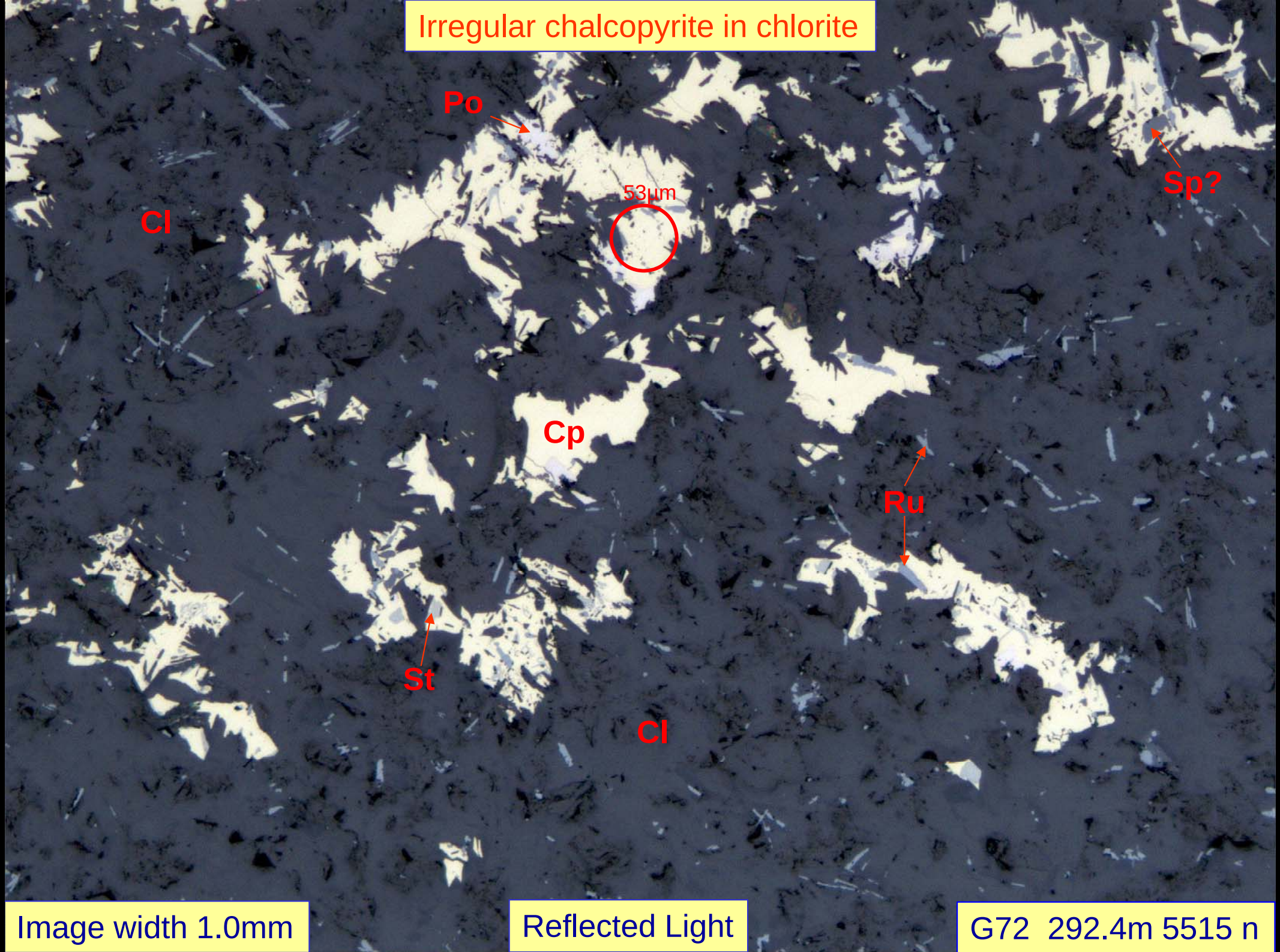

Pyrrhotite-chlorite-chalcopyrite intergrowth
Po
106µm
Po
Cl
Ru
Cp
Cl
Image width 2.1mm
Reflected Light
G72 292.4m 5515 i

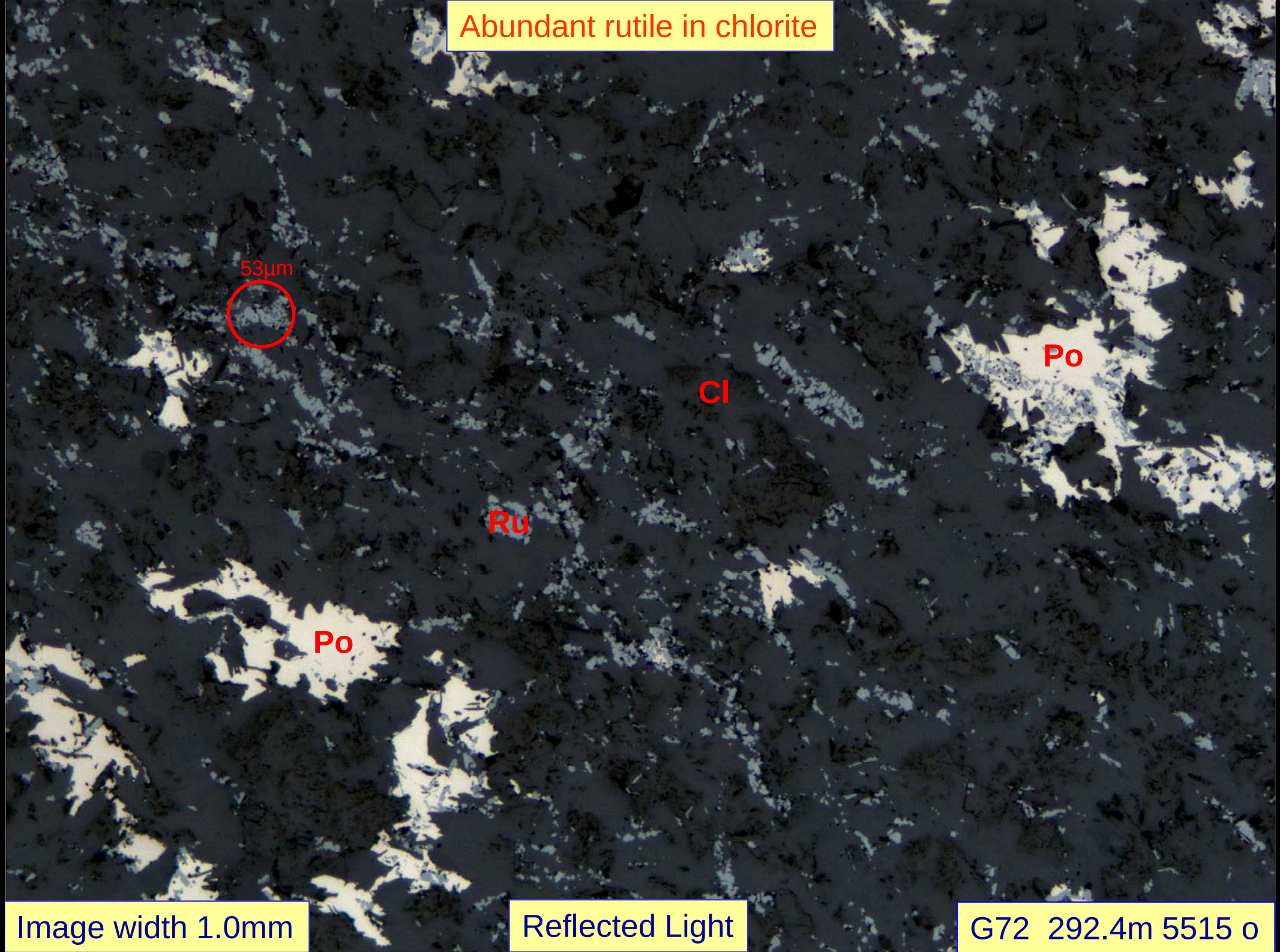

Shattered pyrite aggregate in massive pyrrhotite
Cl
Cl
Po
106µm
Cp
Py
Py
Po
Py
Image width 2.1mm
Reflected Light
G72 292.4m 5515 j


Low-temperature pyrite with siderite veinlet
53µm
Sd
Po
Py
Po
Vd
Sd
Image width 1.0mm
Reflected Light
G72 292.4m 5515 k

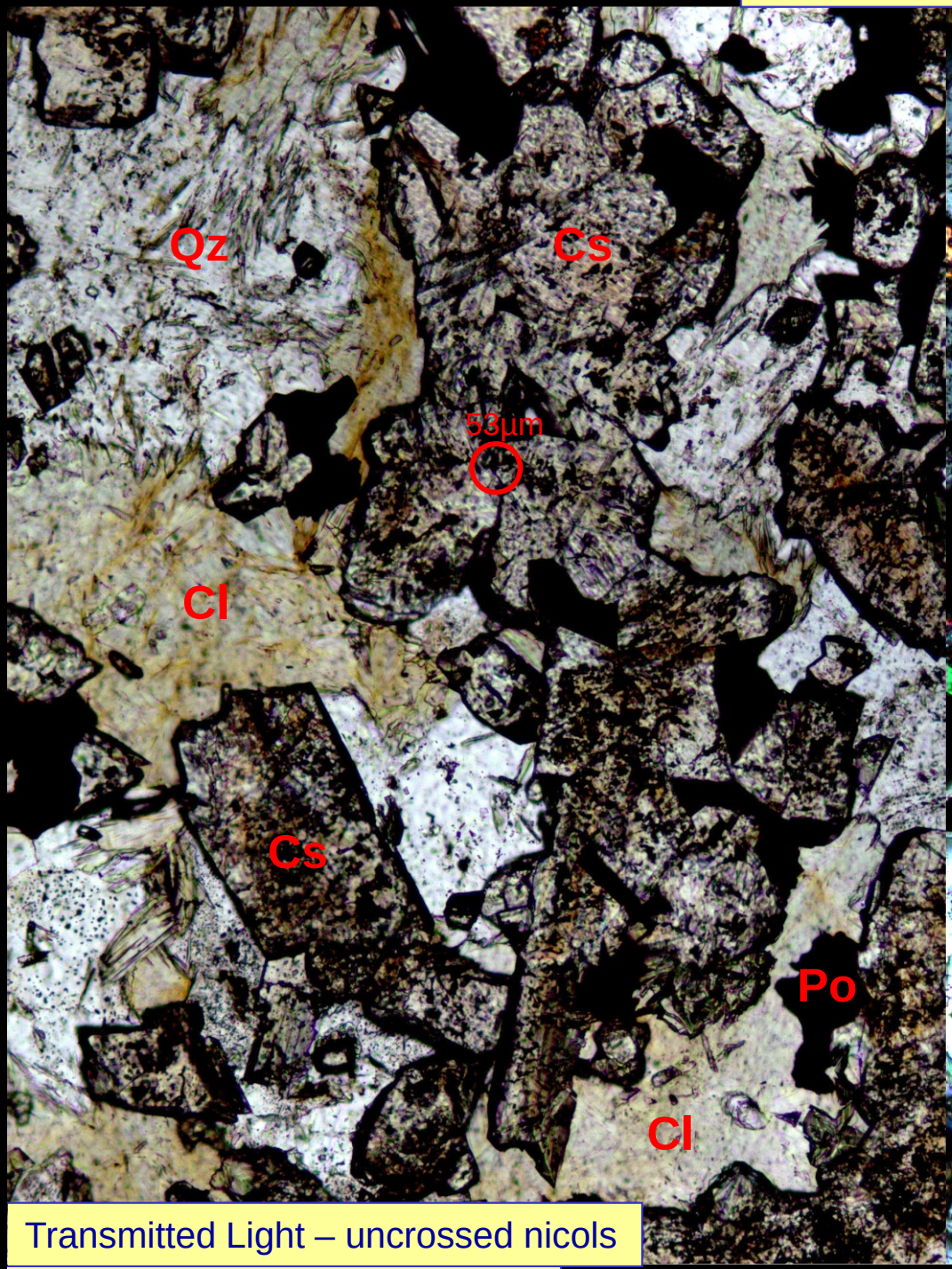

Chalcopyrite replacing rutile and cassiterite
21µm
Po
Cs
Cl
Ru
St
Cp
Cl
Cs
Po
Image width 206µm
Reflected Light
G72 292.4m 5515 l


Cassiterite-stannite
Po
St
Cs
21µm
Cs
Po
Ru
Cl
Image width 206µm
Reflected Light
G72 292.4m 5515 m

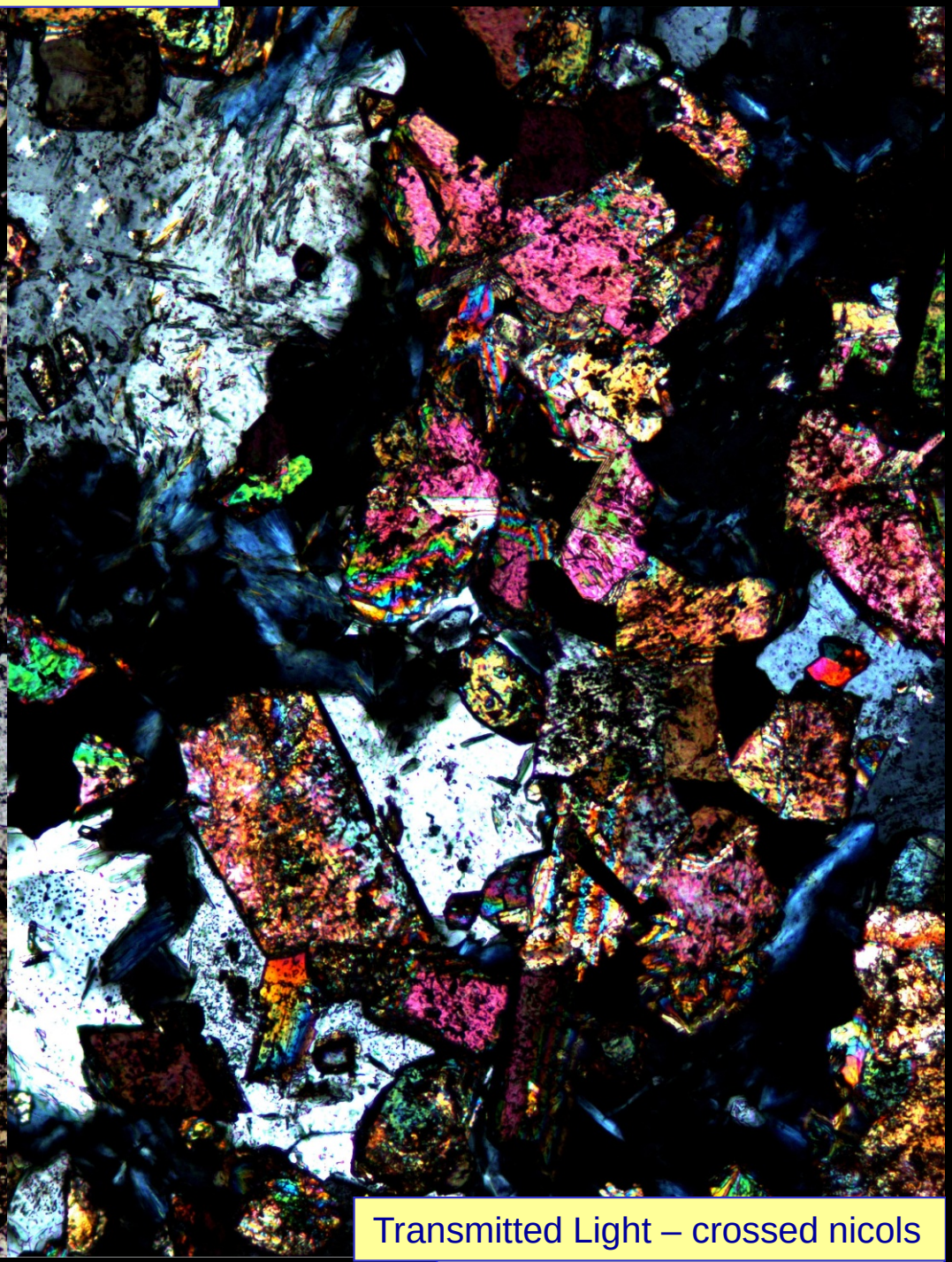

Irregular chalcopyrite in chlorite
Po
53µm
Sp?
Cl
Cp
Ru
St
Cl
Image width 1.0mm
Reflected Light
G72 292.4m 5515 n


Abundant rutile in chlorite
53µm
Po
Cl
Ru
Po
Image width 1.0mm
Reflected Light
G72 292.4m 5515 o

Coarse cassiterite



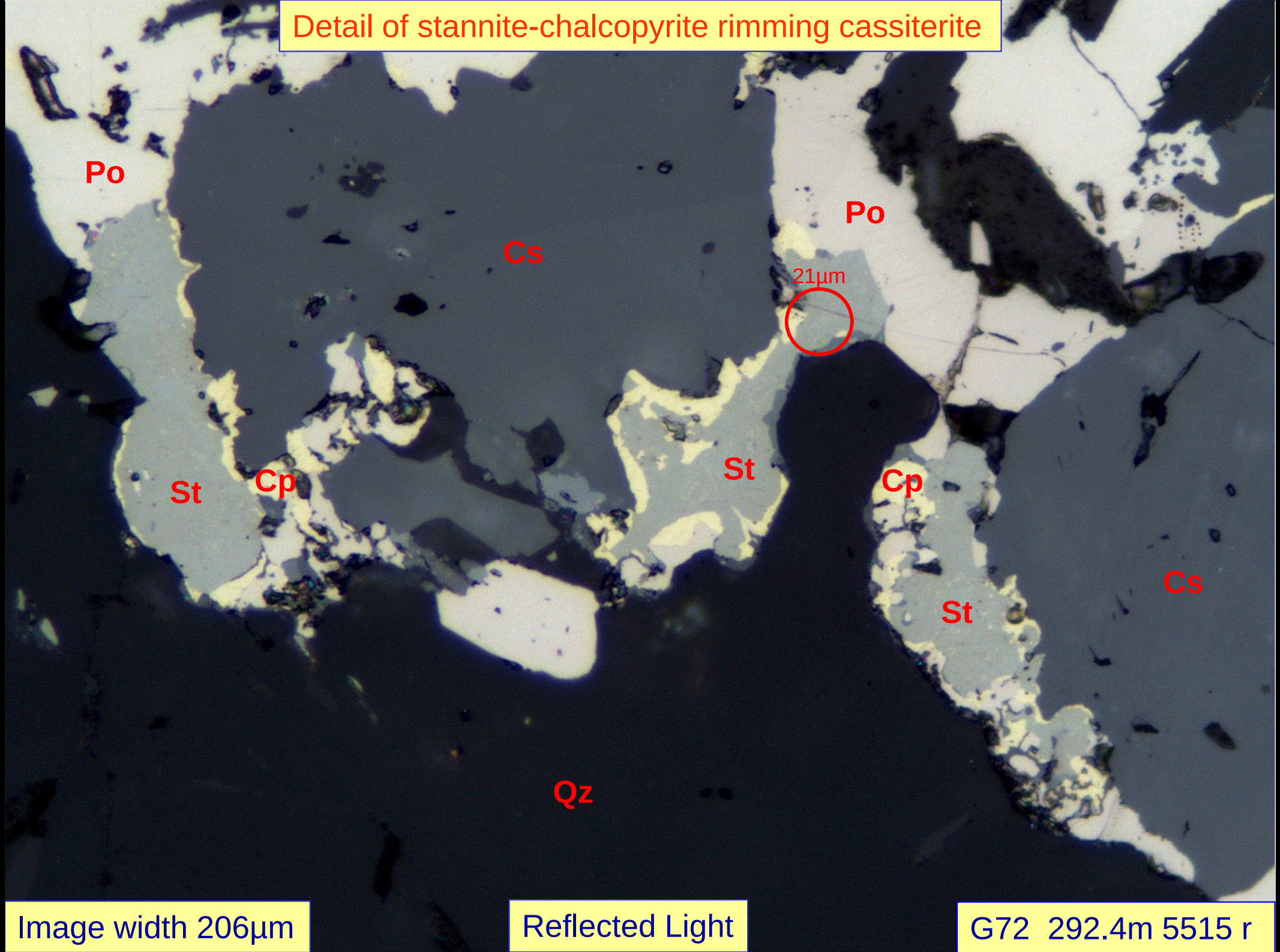
Transmitted Light – uncrossed nicols

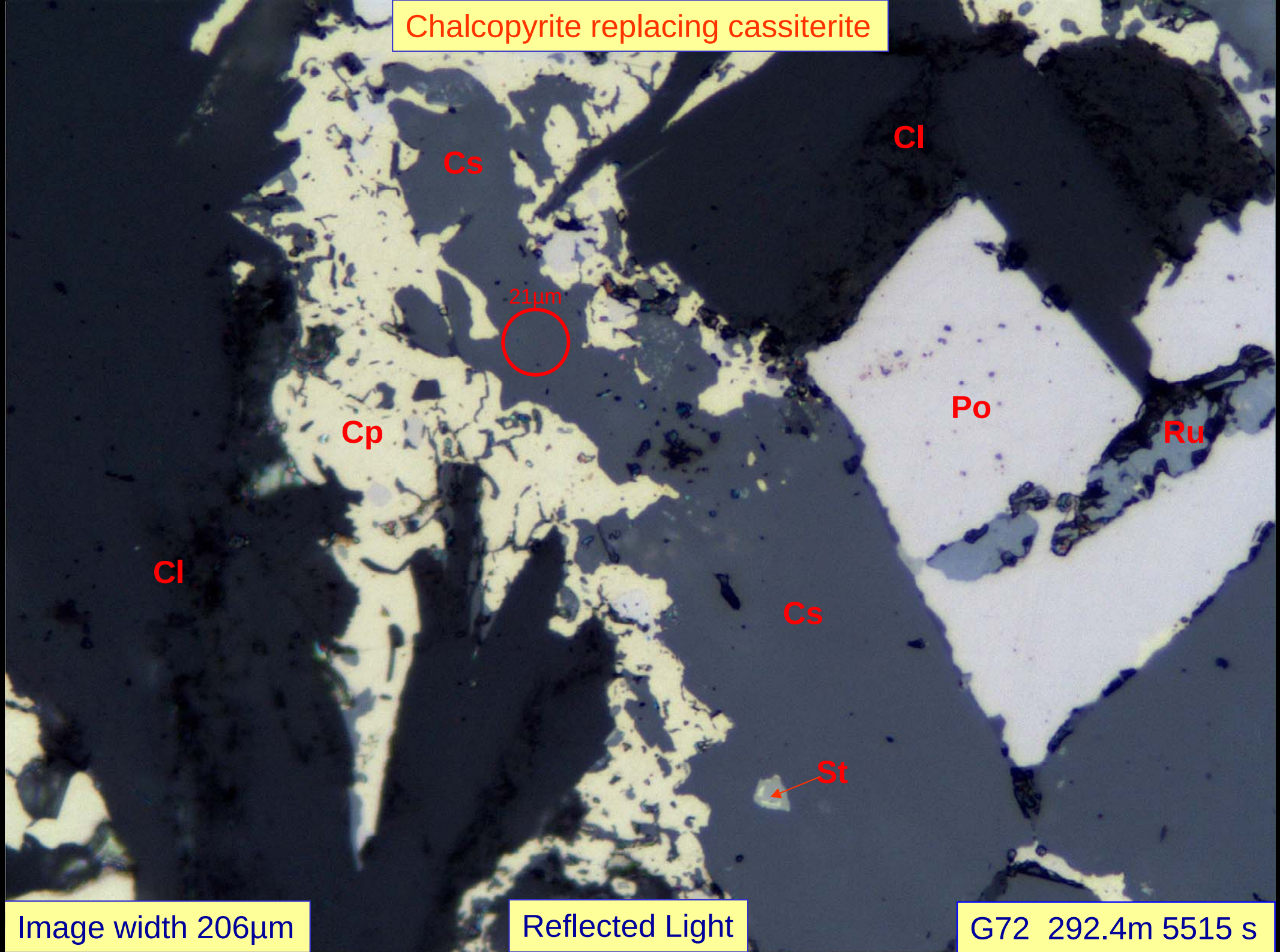


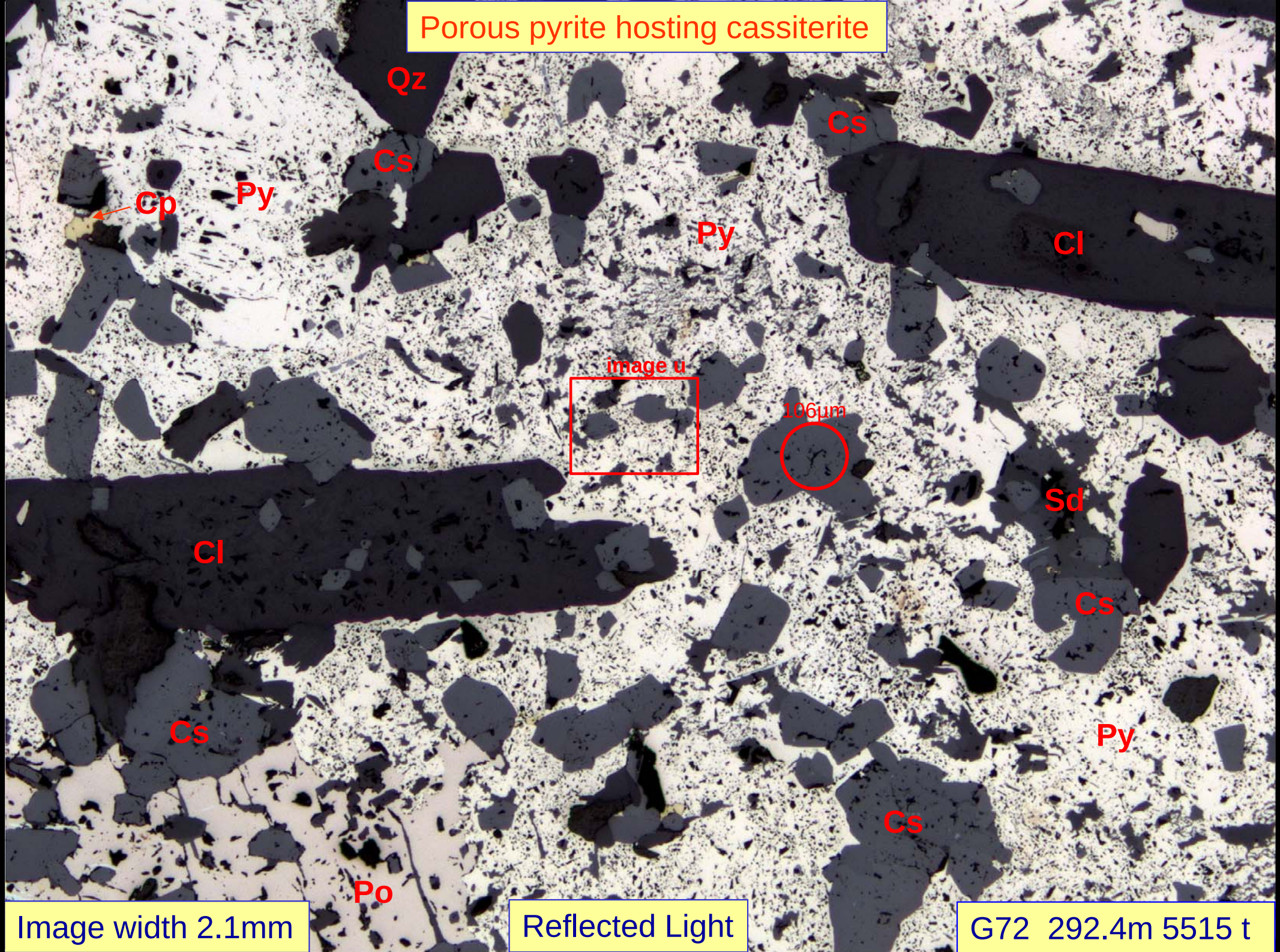
Transmitted Light – crossed nicols

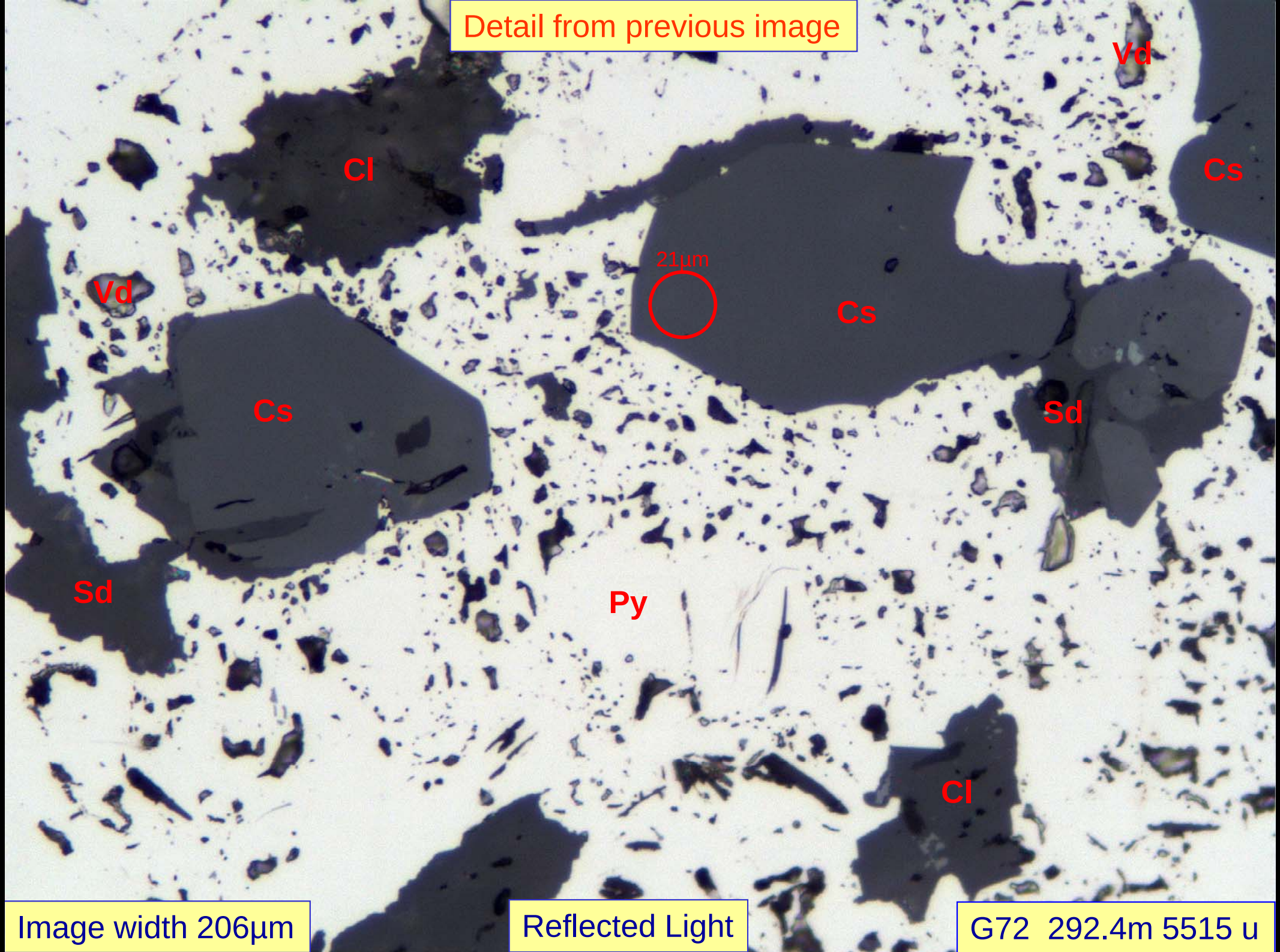
Image width 2 x 0.75mm

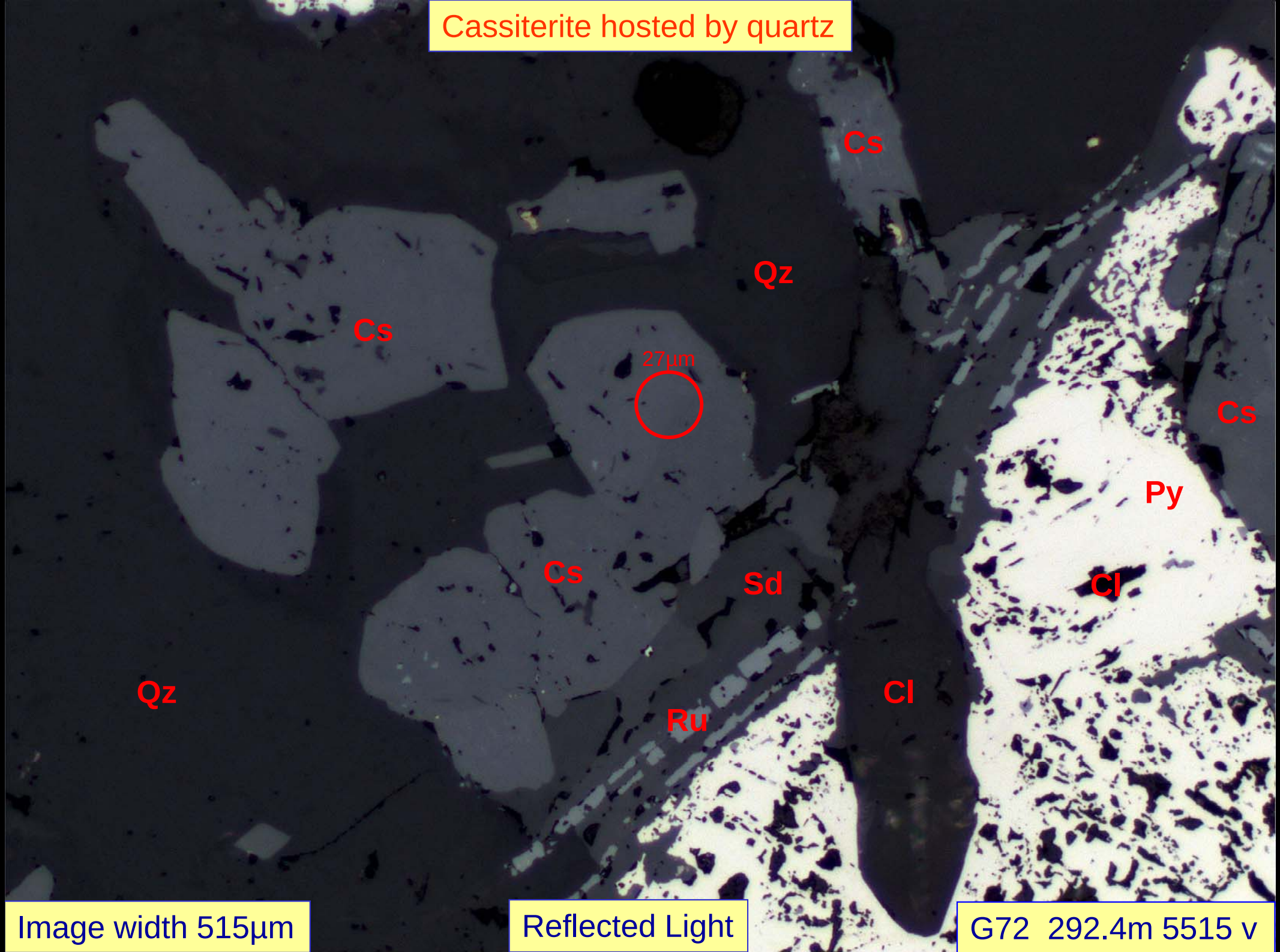
G72 292.4m 5515 p/q


Detail of stannite-chalcopyrite rimming cassiterite
Po
Cs
Po
21µm
St
Cp
St
Cp
Cs
St
Qz
Image width 206µm
Reflected Light
G72 292.4m 5515 r


Chalcopyrite replacing cassiterite
Cs
Cl
21µm
Cp
Po
Ru
Cl
Cs
St
Image width 206µm
Reflected Light
G72 292.4m 5515 s


Porous pyrite hosting cassiterite
Qz
Cs
Cs
Cp
Py
Py
Cl
image u
106µm
Sd
Cl
Cs
Cs
Py
Cs
Po
Image width 2.1mm
Reflected Light
G72 292.4m 5515 t


Detail from previous image
Vd
Cl
Cs
21µm
Vd
Cs
Cs
Sd
Sd
Py
Cl
Image width 206µm
Reflected Light
G72 292.4m 5515 u


Cassiterite hosted by quartz
Cs
Qz
Cs
27µm
Cs
Py
Cs
Sd
Cl
Qz
Cl
Ru
Image width 515µm
Reflected Light
G72 292.4m 5515 v

PARTICLE MINERALOGY REPORT

Severn 5515

G72 292.4m

GJMcA 19.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
0.7	32.4	1.9	0.0	0.0	1.2	0.0	63.8	**300**
23	59	39	4	0	13	1	77	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.68	2.81	17.0	0.00	34.3	0.47	
Actual		**4.52**		**0.01**	**33.2**	**0.66**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	46	44	36	0	0	0	64	
Binary	46	49	37	0	65	0	32	
Ternary	9	6	27	0	34	0	4	
Quat.y+	0	1	0	100	2	0	0	
Grains	2.0	53.7	3.7	0.3	7.3	0.0	83.0	1.50

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		5	0	0	0	0	95
Po	2		4	0	0	0	94
Cs	0	98		0	0	0	2
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	0	0	0	0	0		0
Ga	0	84	2	0	14	0	

TOTAL ASSOCIATION MATRIX

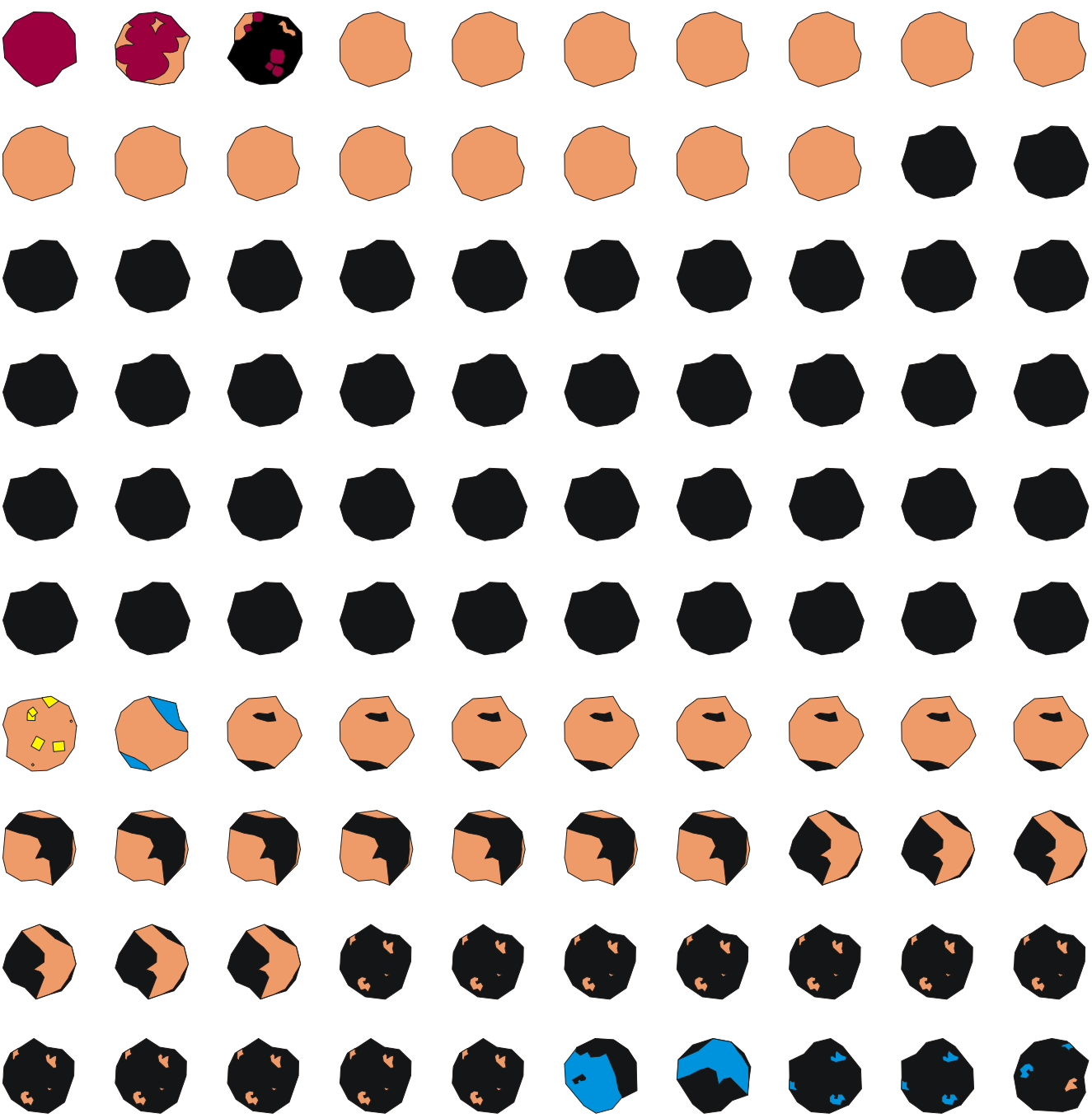
		Py	Po	Cs	St	Cp	As	Ga
	Py		11	0	0	0	0	52
	Po	3		3	1	5	0	53
of	**Cs**	0	63		0	0	0	28
all	**St**	0	100	0		100	0	100
	Cp	0	34	0	2		0	100
	As	0	0	0	0	0		0
	Ga	1	31	1	0	7	0	

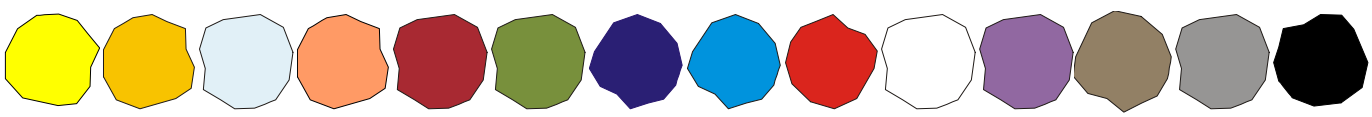
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	**Po**	**Cs**	**St**	**Cp**	**As**	**Ga**		
Py	46		2	0	0	0	0	43	9	0
Po	44	1		2	0	0	0	46	6	1
Cs	36	0	37		0	0	0	1	27	0
St	0	0	0	0		0	0	0	0	100
Cp	0	0	0	0	0		0	65	34	2
As	0	0	0	0	0	0		0	0	0
Ga	64	0	27	0	0	5	0		4	0

Stellar Resources - Severn Drillhole Mineragraphy

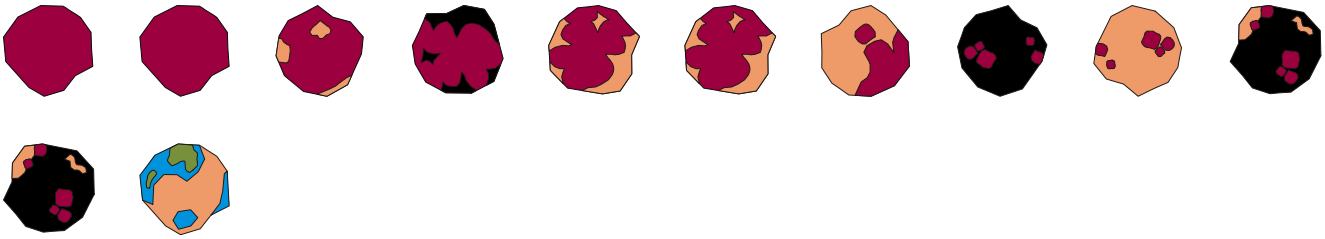
Severn 5515 **53µm mask** **January 2012**

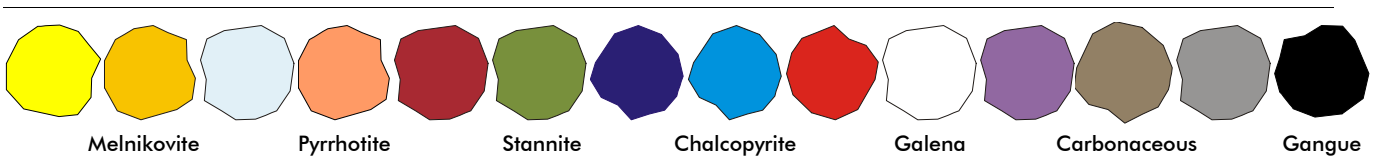




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5515 Sn Scan **53µm mask** **January 2012**





Core Scan

QXRD: 69% pyrrhotite, 14% cassiterite, 5% siderite, 3% chlorite, 2% kaolinite

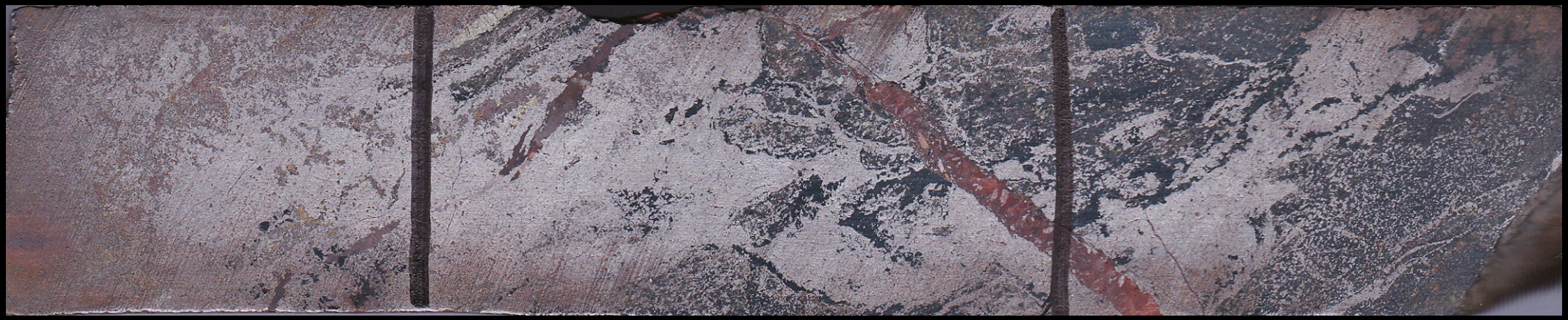
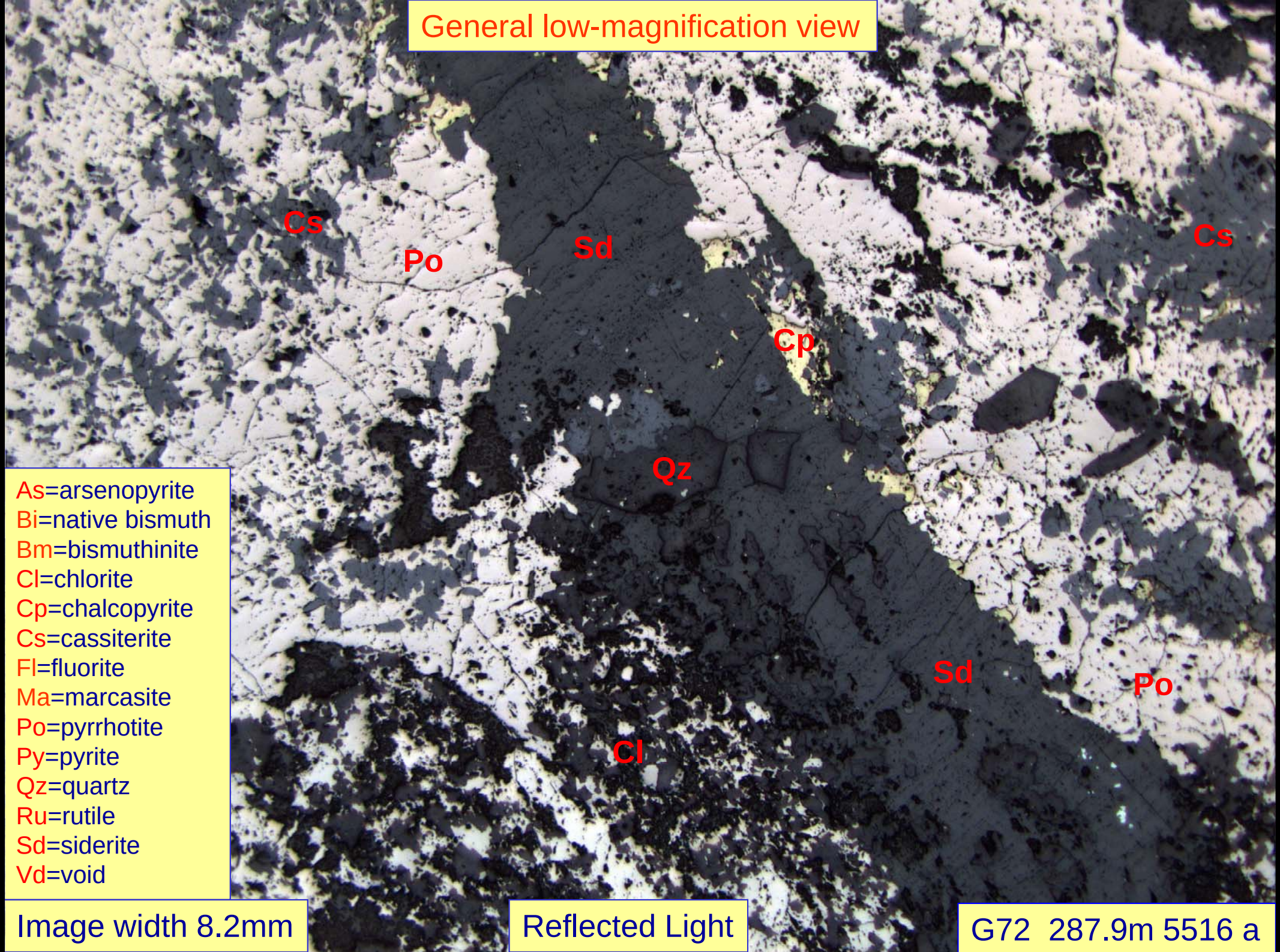
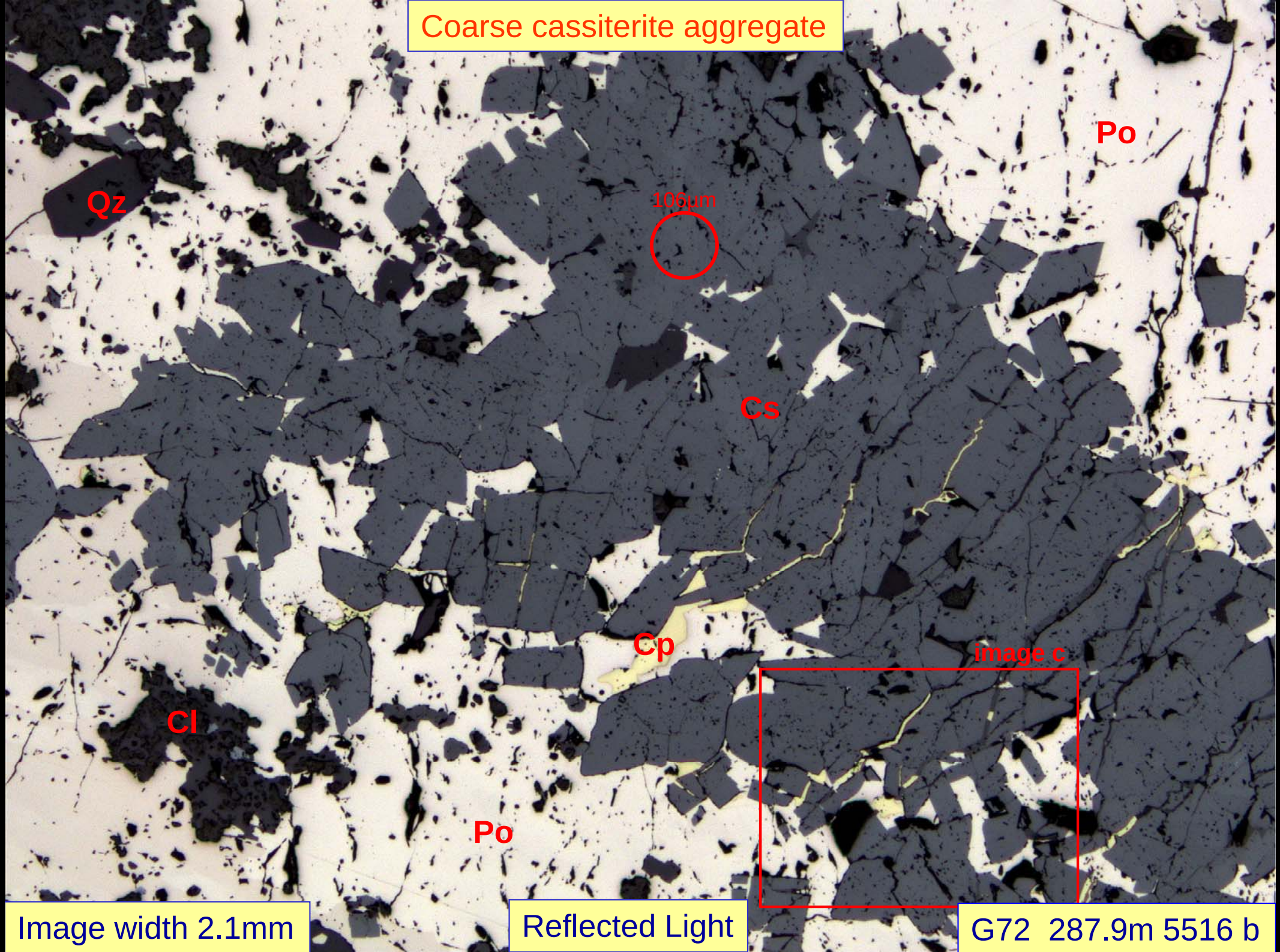
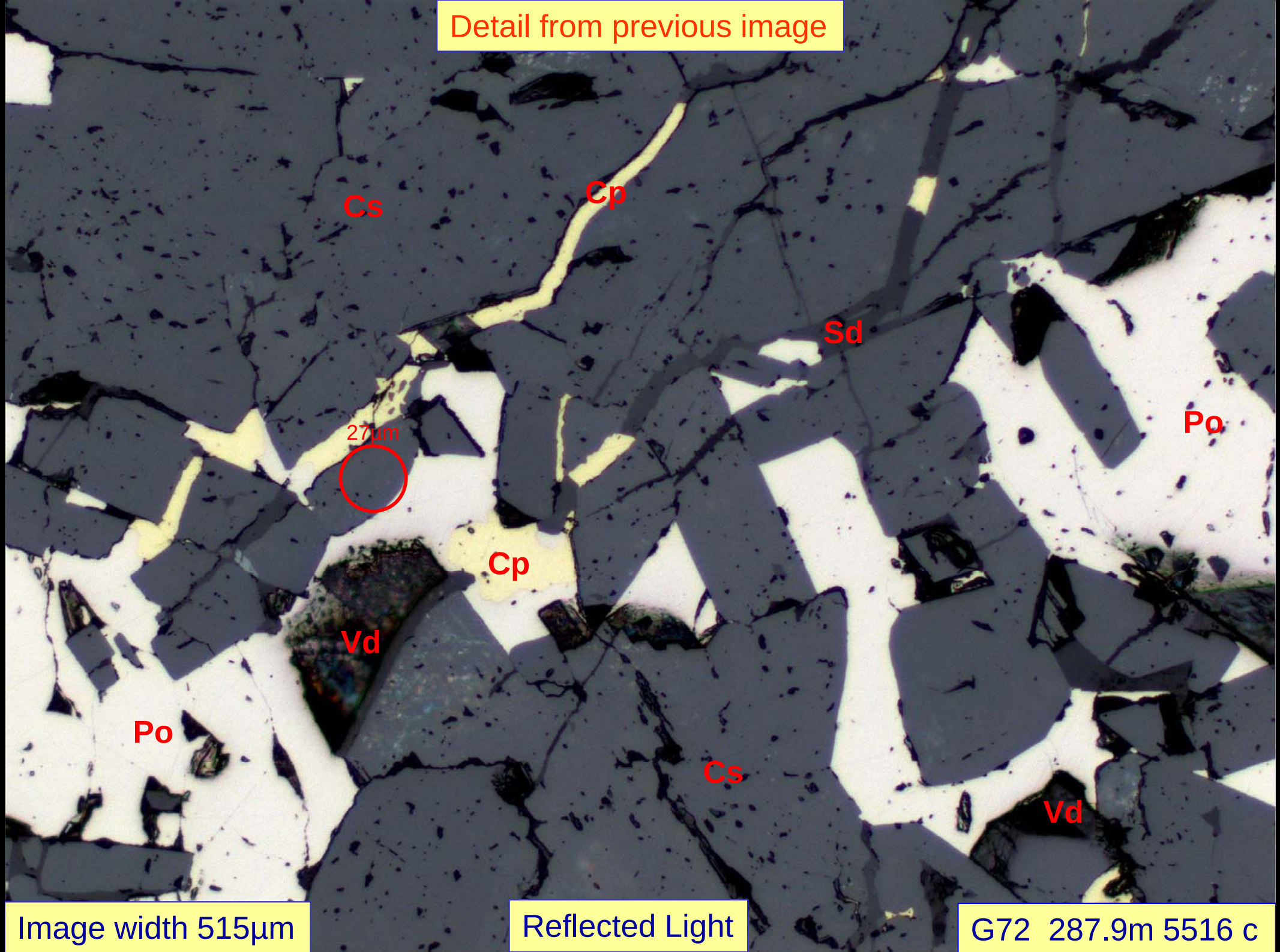


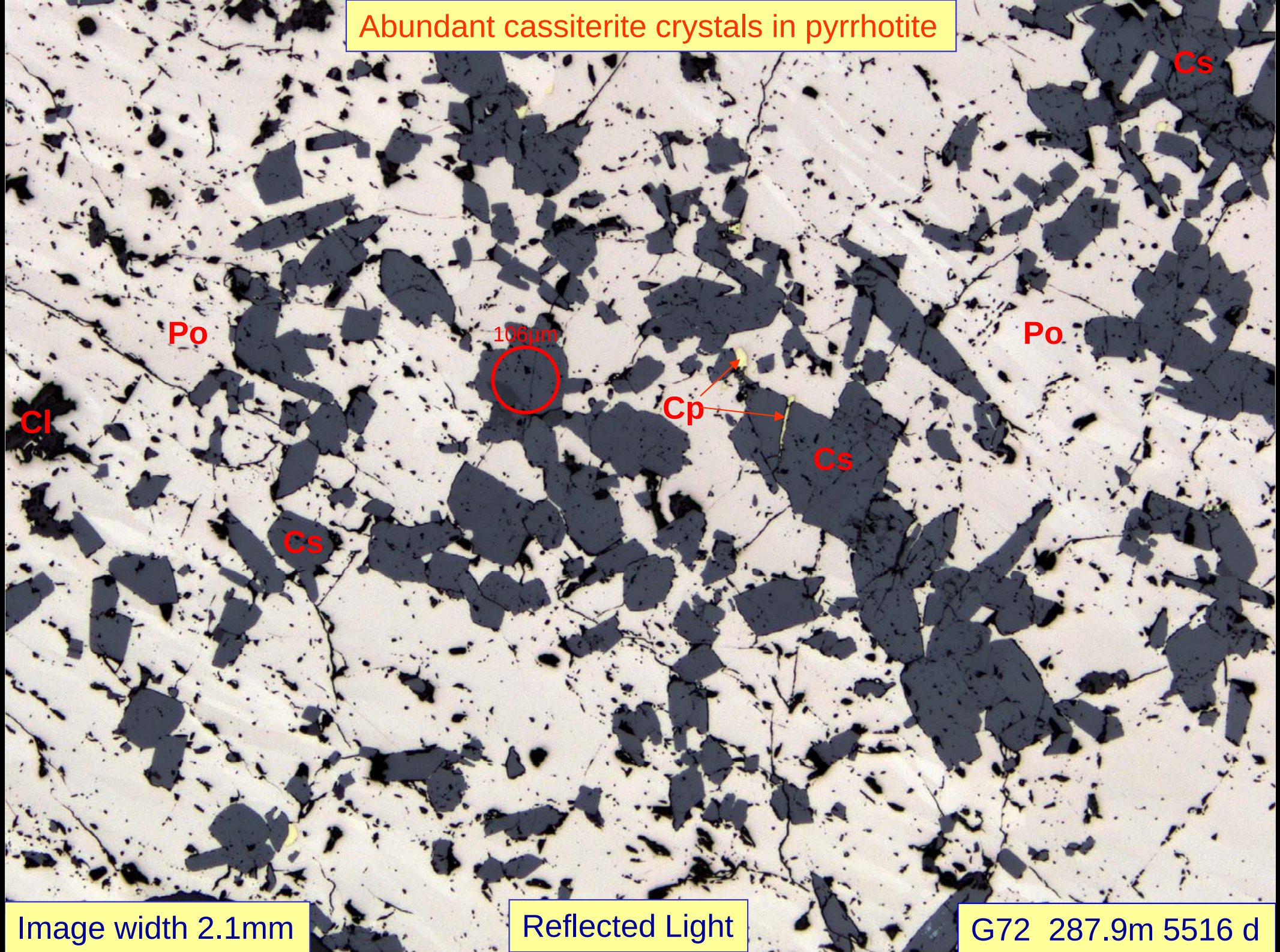
Image width ~115mm

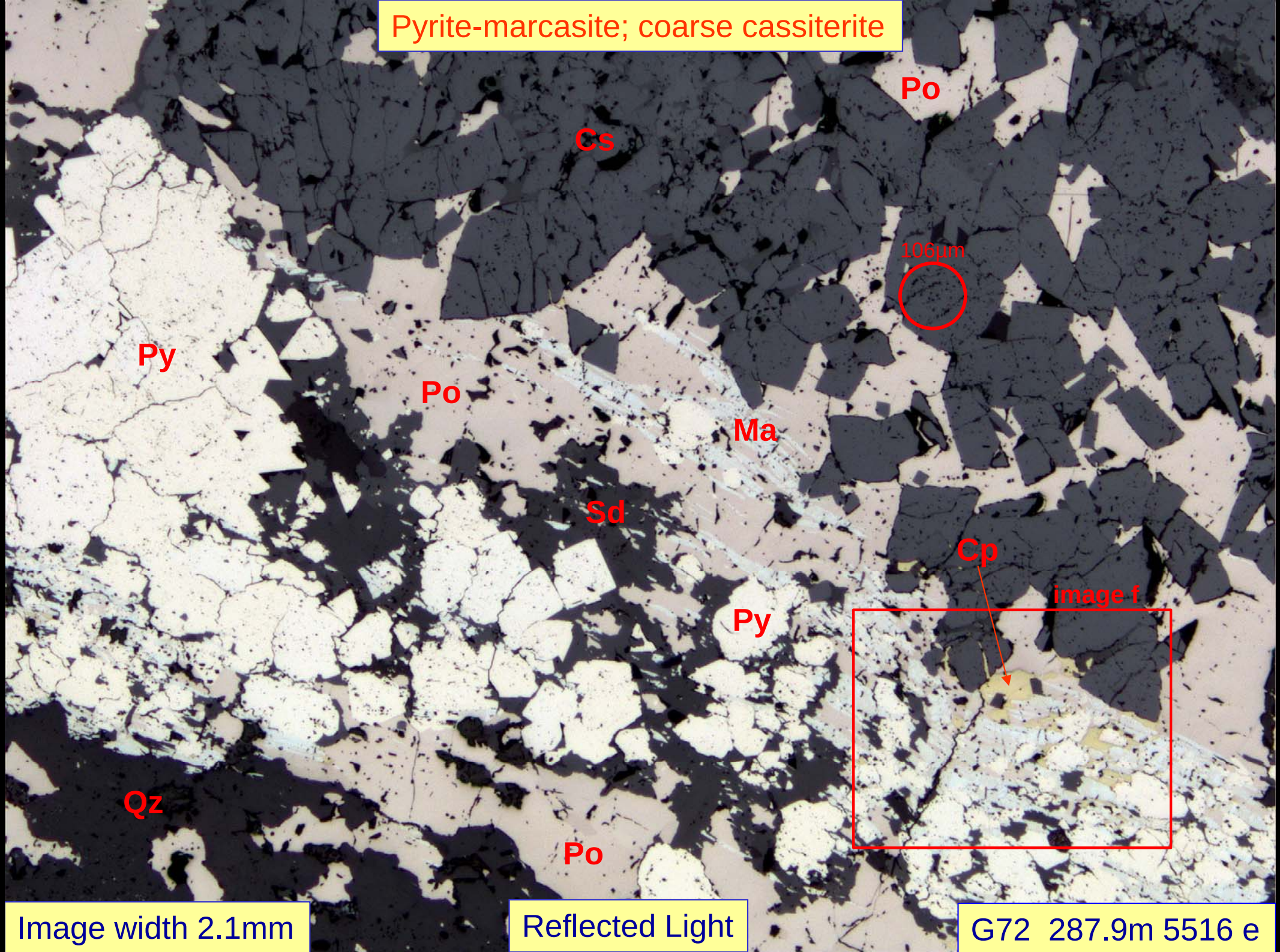
G72 287.9m 5516

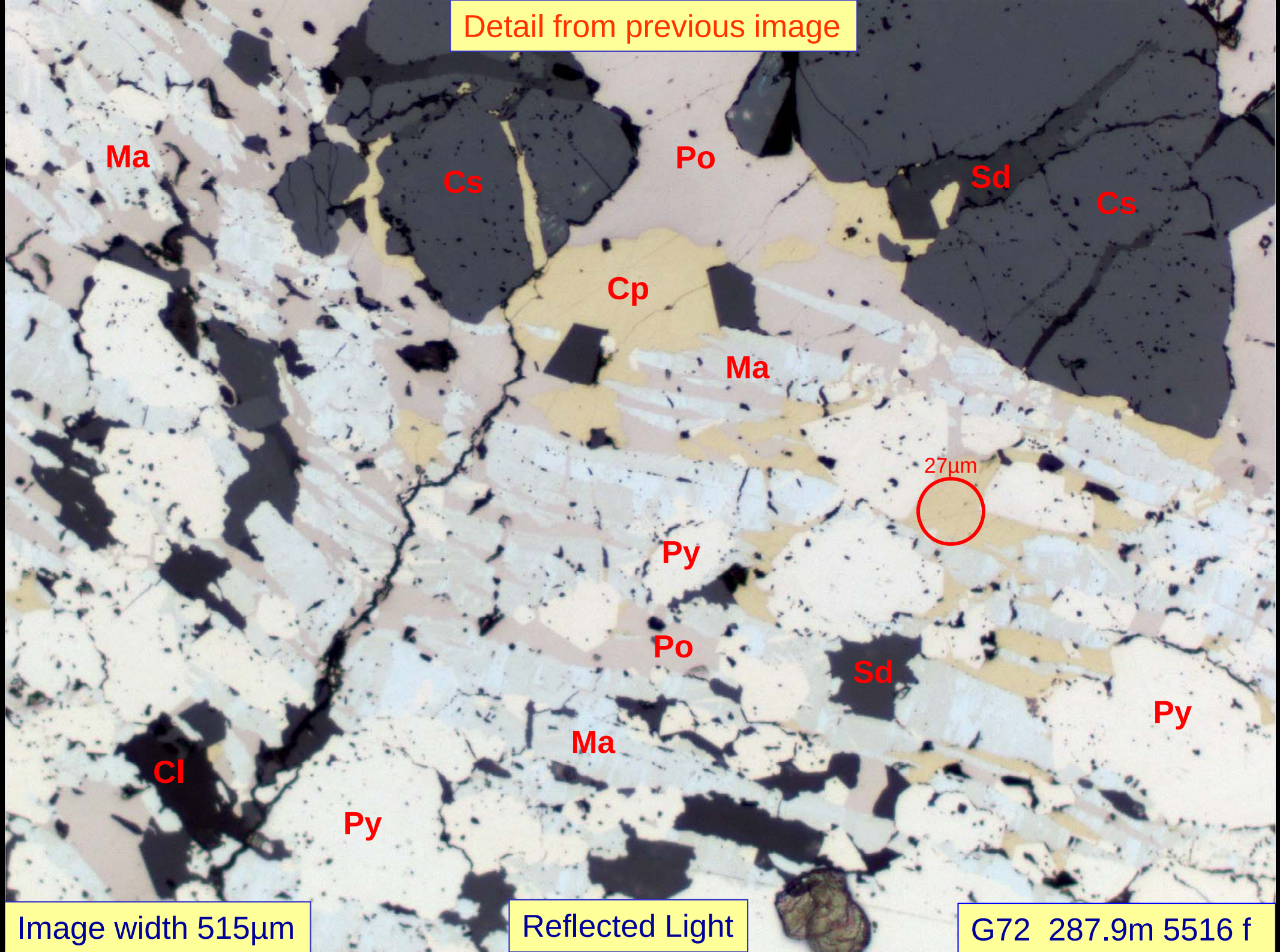

General low-magnification view
Cs
Po
Sd
Cp
Cs
Qz
Sd
Po
Cl
As=arsenopyrite
Bi=native bismuth
Bm=bismuthinite
Cl=chlorite
Cp=chalcopyrite
Cs=cassiterite
Fl=fluorite
Ma=marcasite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Sd=siderite
Vd=void
Image width 8.2mm
Reflected Light
G72 287.9m 5516 a

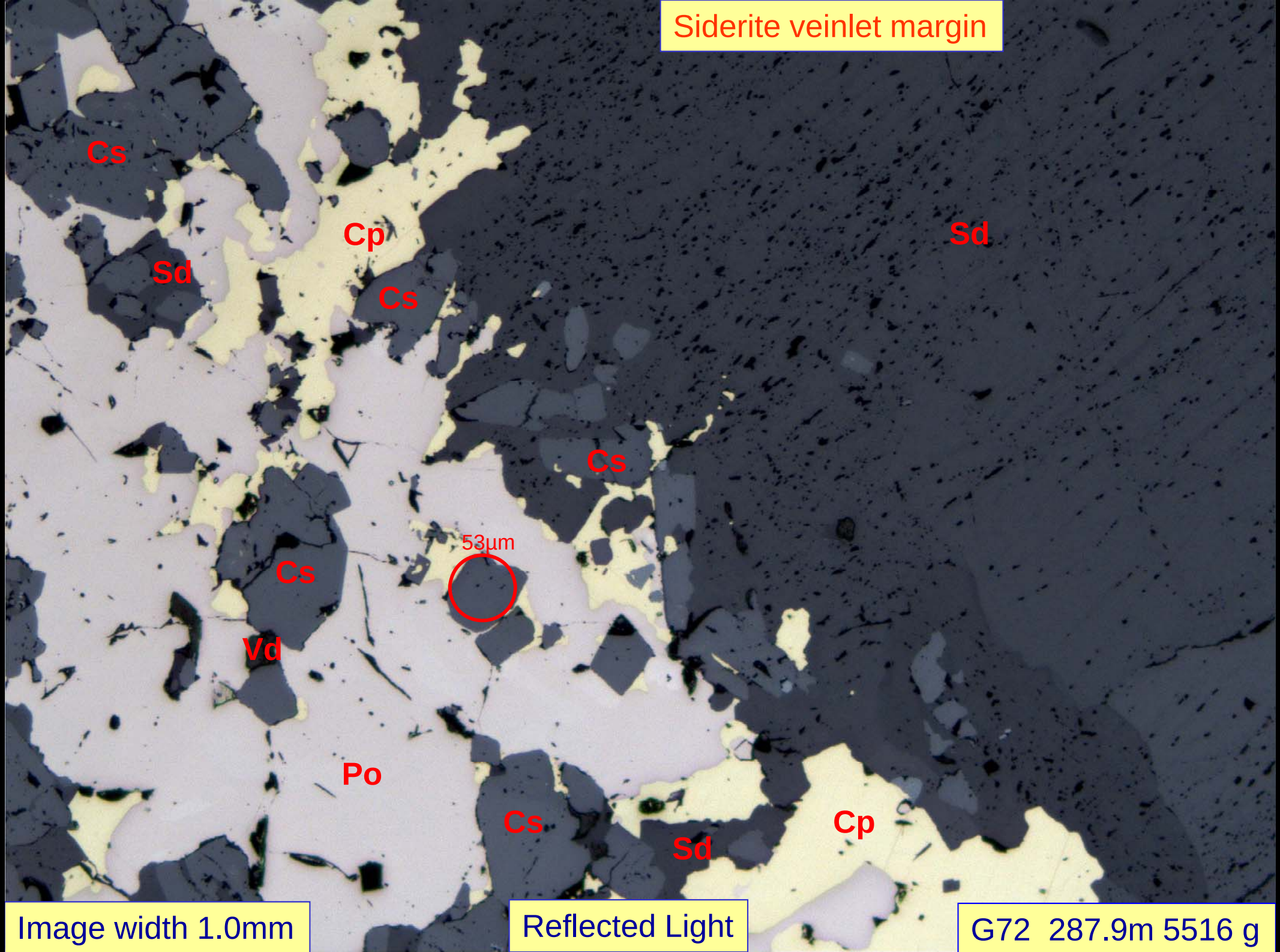

Coarse cassiterite aggregate
Po
Qz
106µm
Cs
Cp
image c
Cl
Po
Image width 2.1mm
Reflected Light
G72 287.9m 5516 b

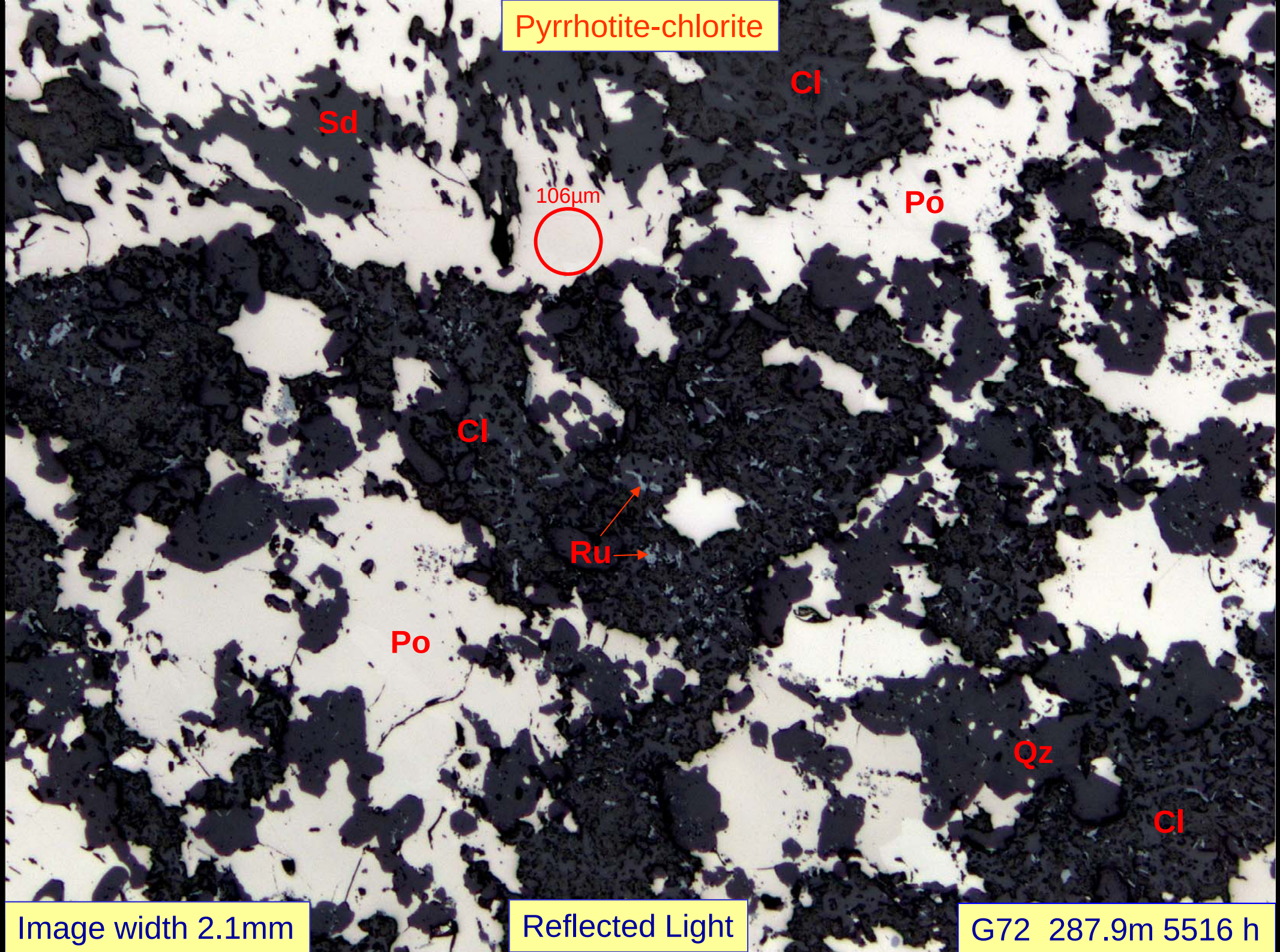

Detail from previous image
Cs
Cp
Sd
Po
27µm
Cp
Vd
Po
Cs
Vd
Image width 515µm
Reflected Light
G72 287.9m 5516 c

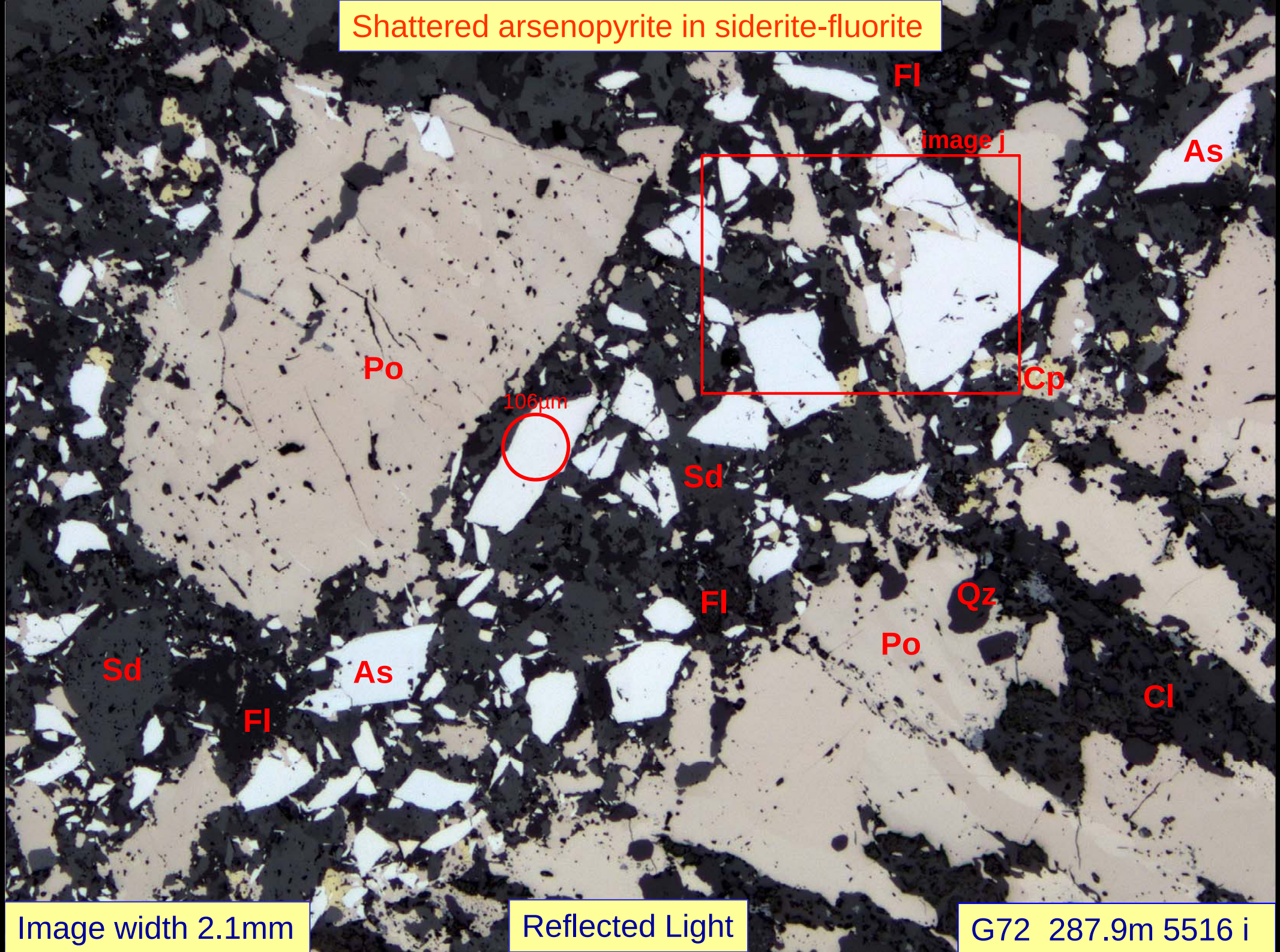

Abundant cassiterite crystals in pyrrhotite
Cs
Po
106µm
Po
Cp
Cl
Cs
Cs
Image width 2.1mm
Reflected Light
G72 287.9m 5516 d

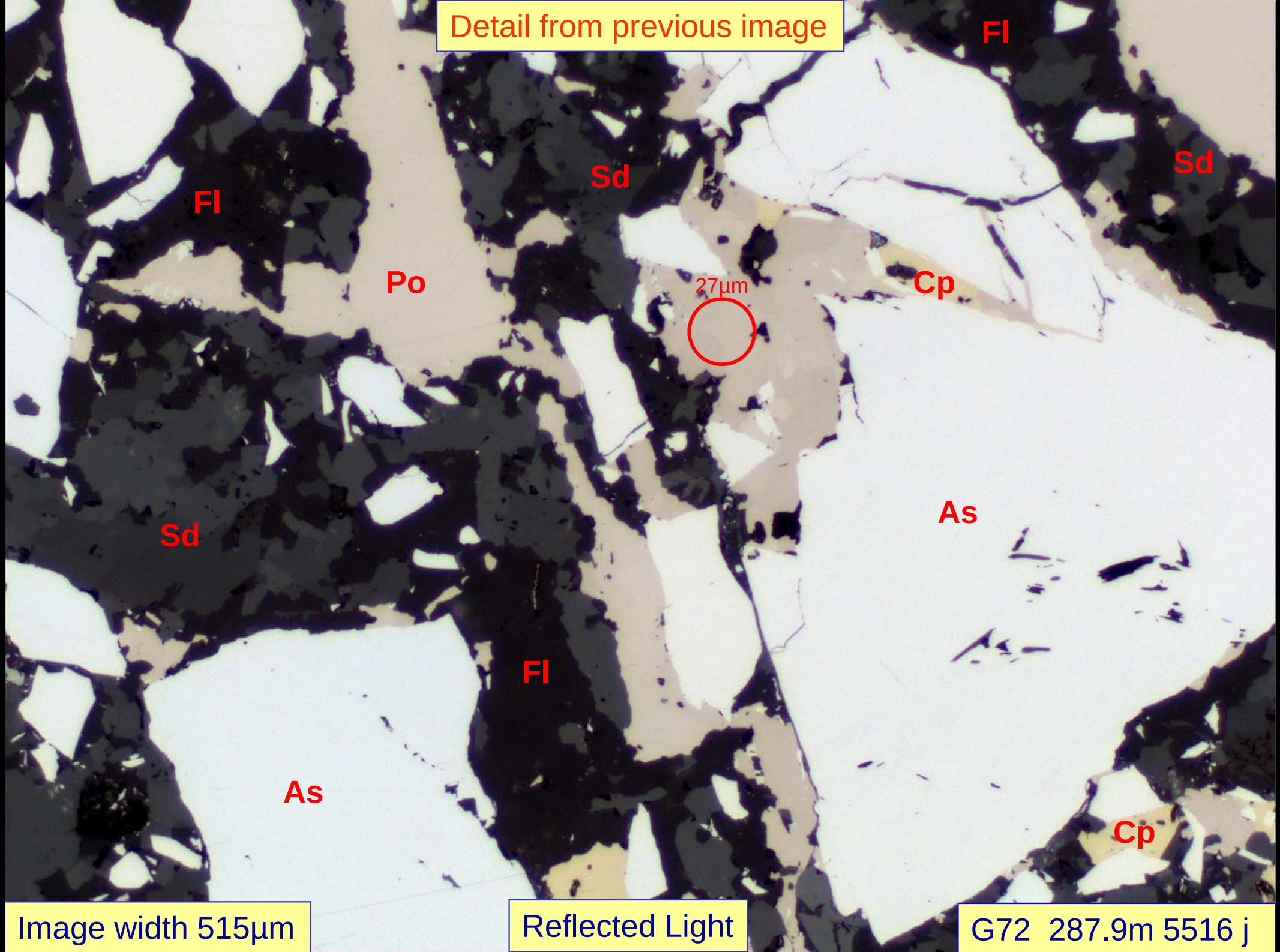

Pyrite-marcasite; coarse cassiterite
Po
Cs
106µm
Py
Po
Ma
Sd
Cp
image f
Py
Qz
Po
Image width 2.1mm
Reflected Light
G72 287.9m 5516 e

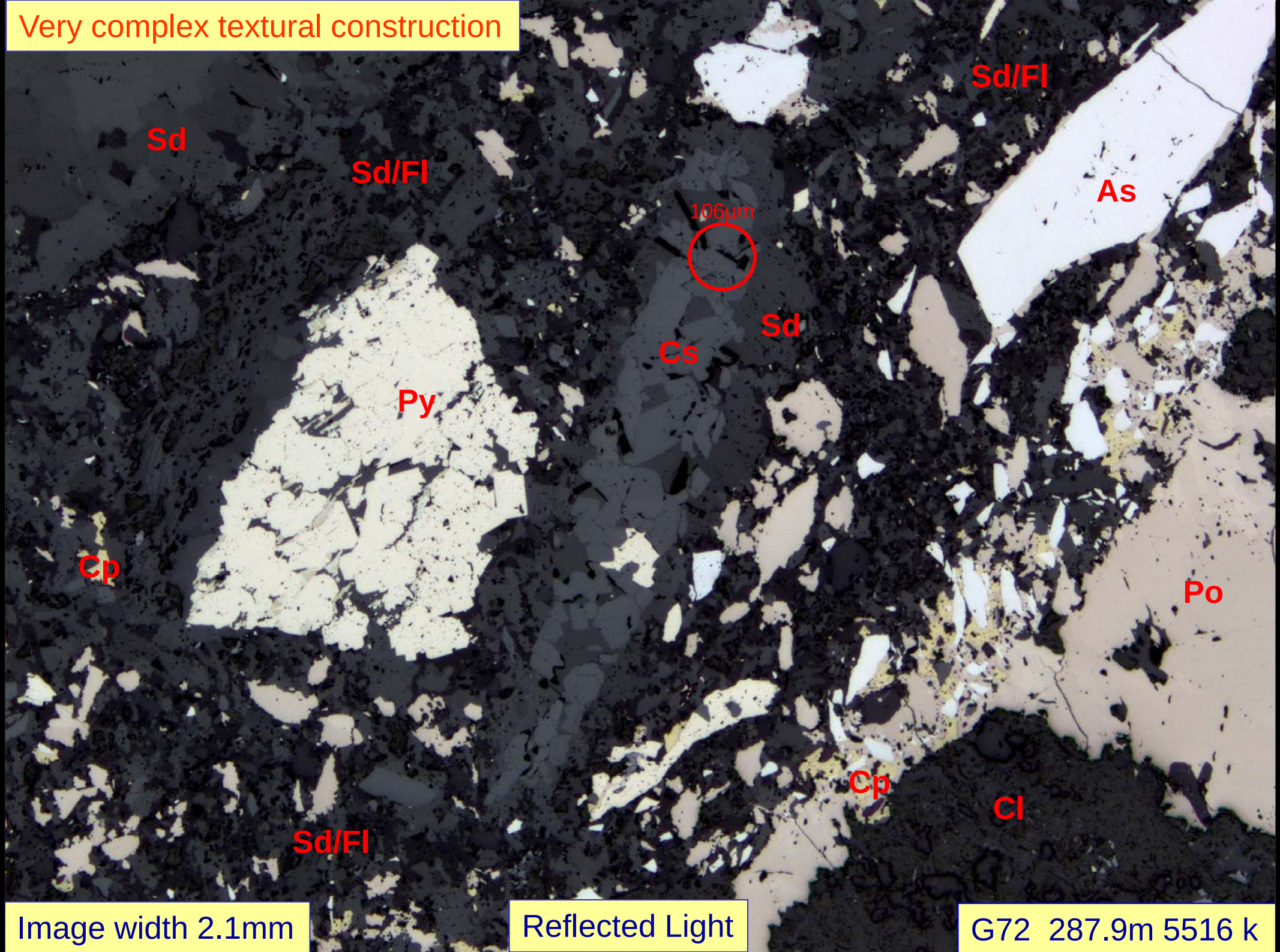

Detail from previous image
Ma
Cs
Po
Sd
Cs
Cp
Ma
27µm
Py
Po
Sd
Py
Ma
Cl
Py
Image width 515µm
Reflected Light
G72 287.9m 5516 f

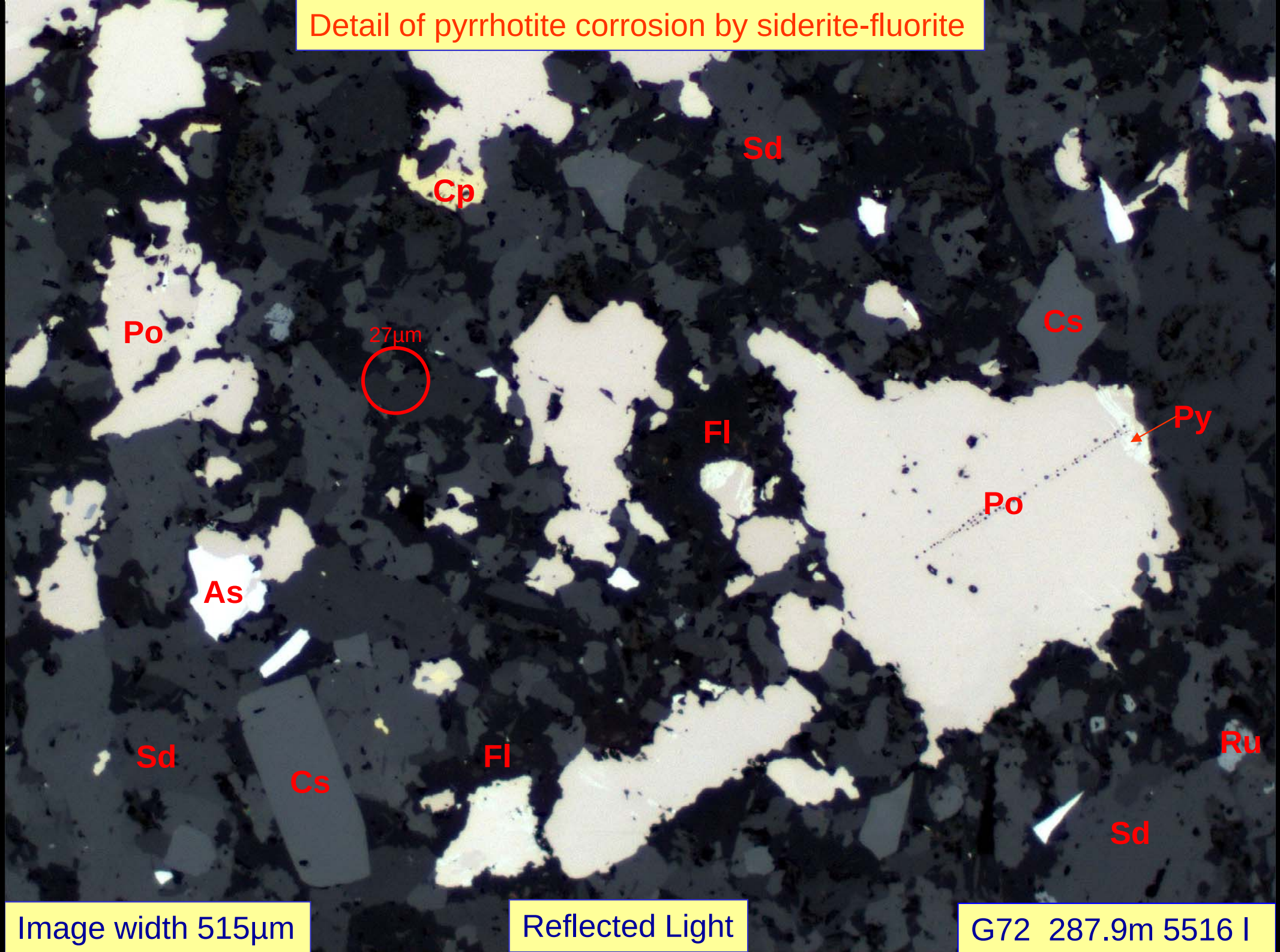

Siderite veinlet margin
Cs
Sd
Cp
Cs
Sd
Cs
53µm
Cs
Vd
Po
Cs
Sd
Cp
Image width 1.0mm
Reflected Light
G72 287.9m 5516 g

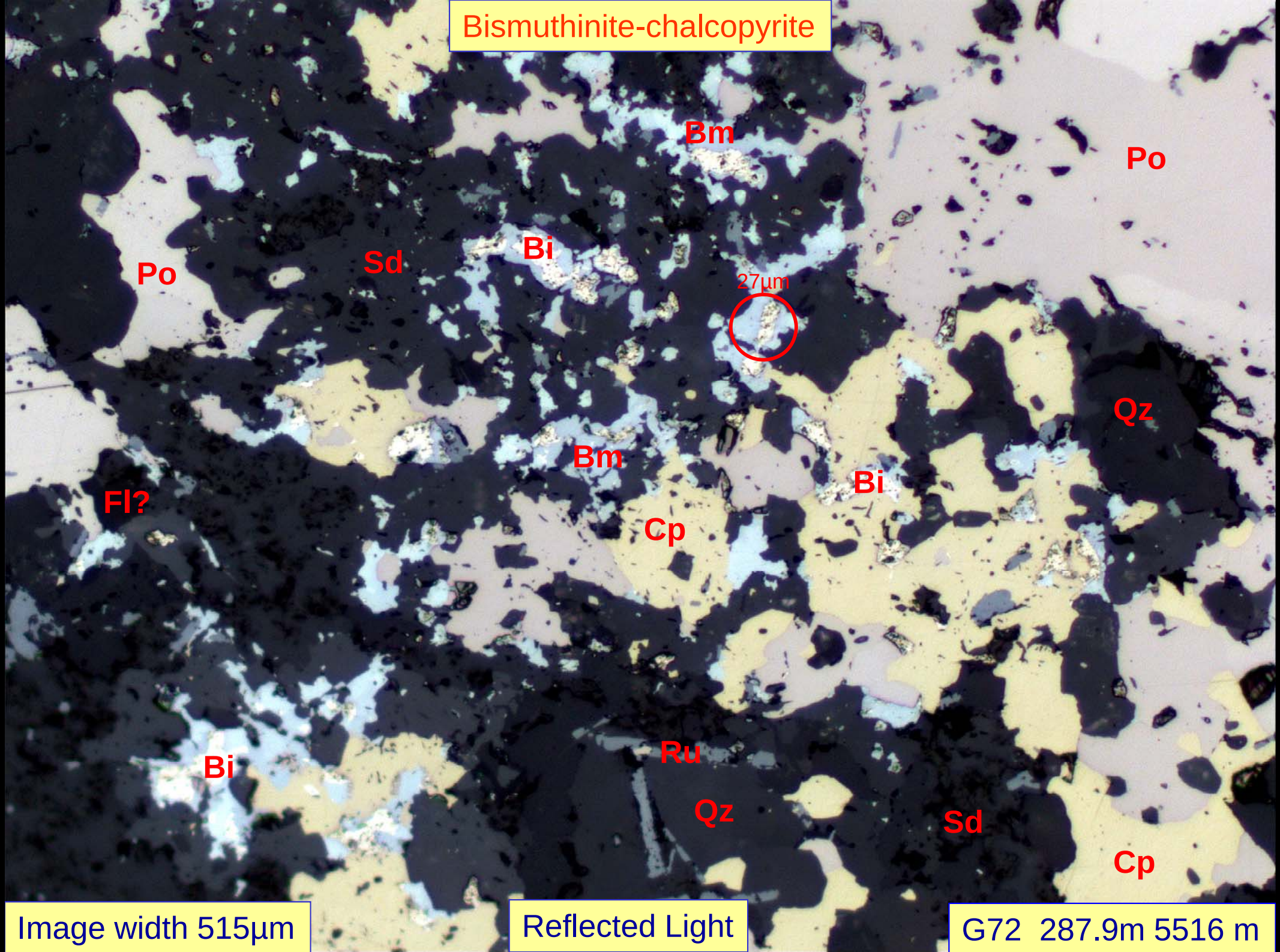

Pyrrhotite-chlorite
Cl
Sd
106µm
Po
Cl
Ru
Po
Qz
Cl
Image width 2.1mm
Reflected Light
G72 287.9m 5516 h

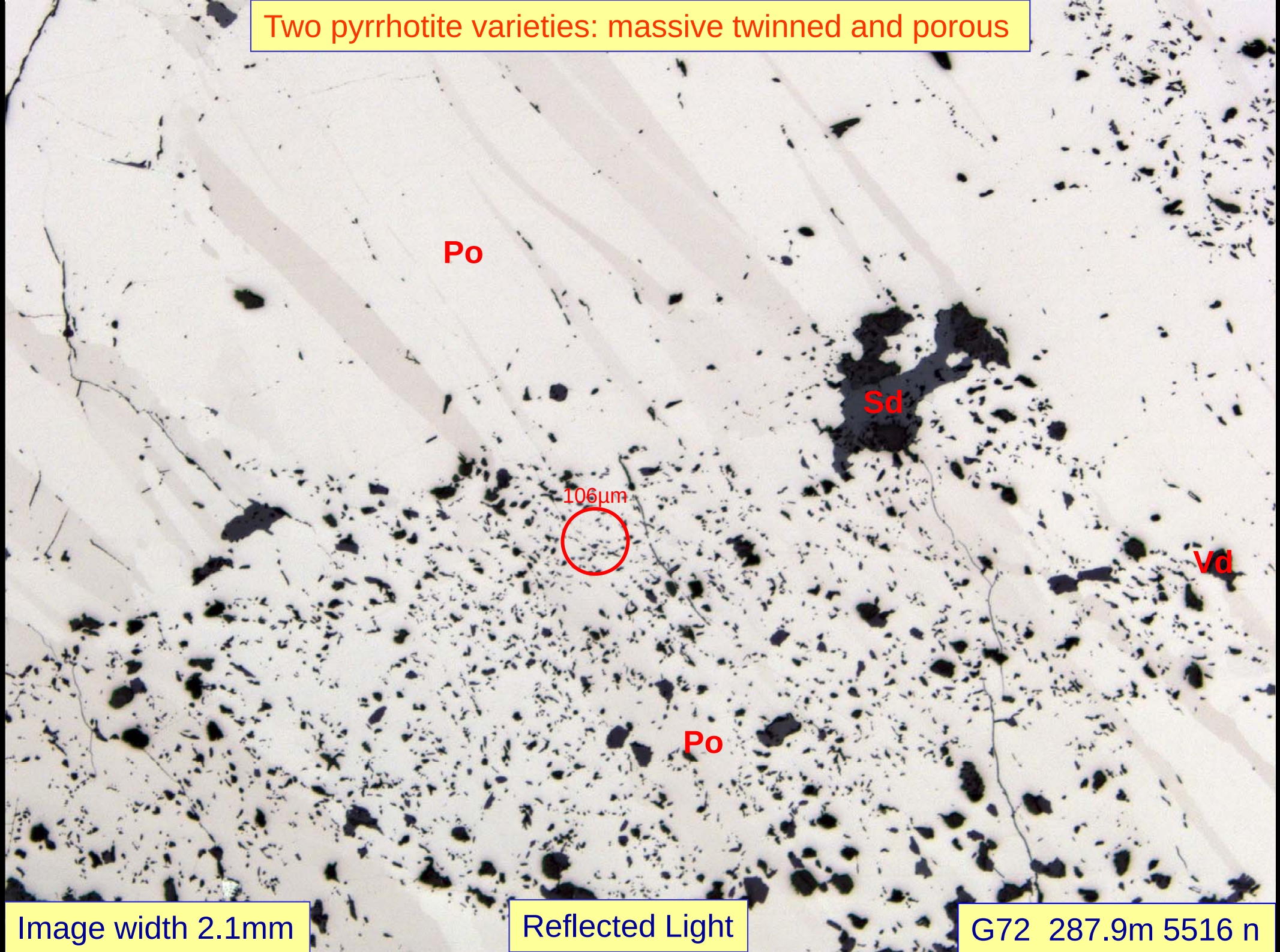

Shattered arsenopyrite in siderite-fluorite
Fl
image j
As
Po
106µm
Cp
Sd
Fl
Qz
Po
Sd
As
Fl
Cl
Image width 2.1mm
Reflected Light
G72 287.9m 5516 i

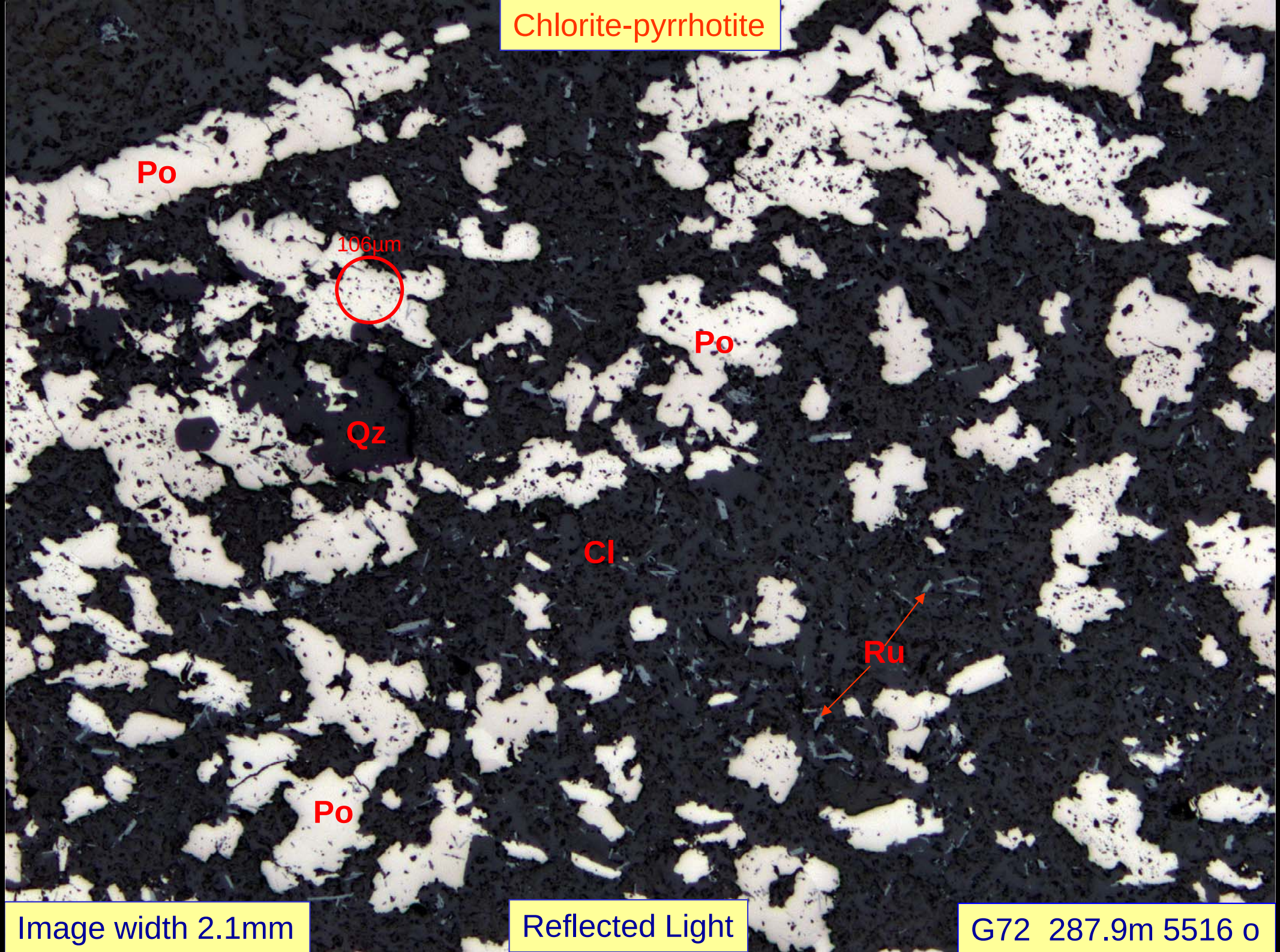

Detail from previous image
Fl
Sd
Fl
Sd
Po
27µm
Cp
As
Sd
Fl
As
Cp
Image width 515µm
Reflected Light
G72 287.9m 5516 j

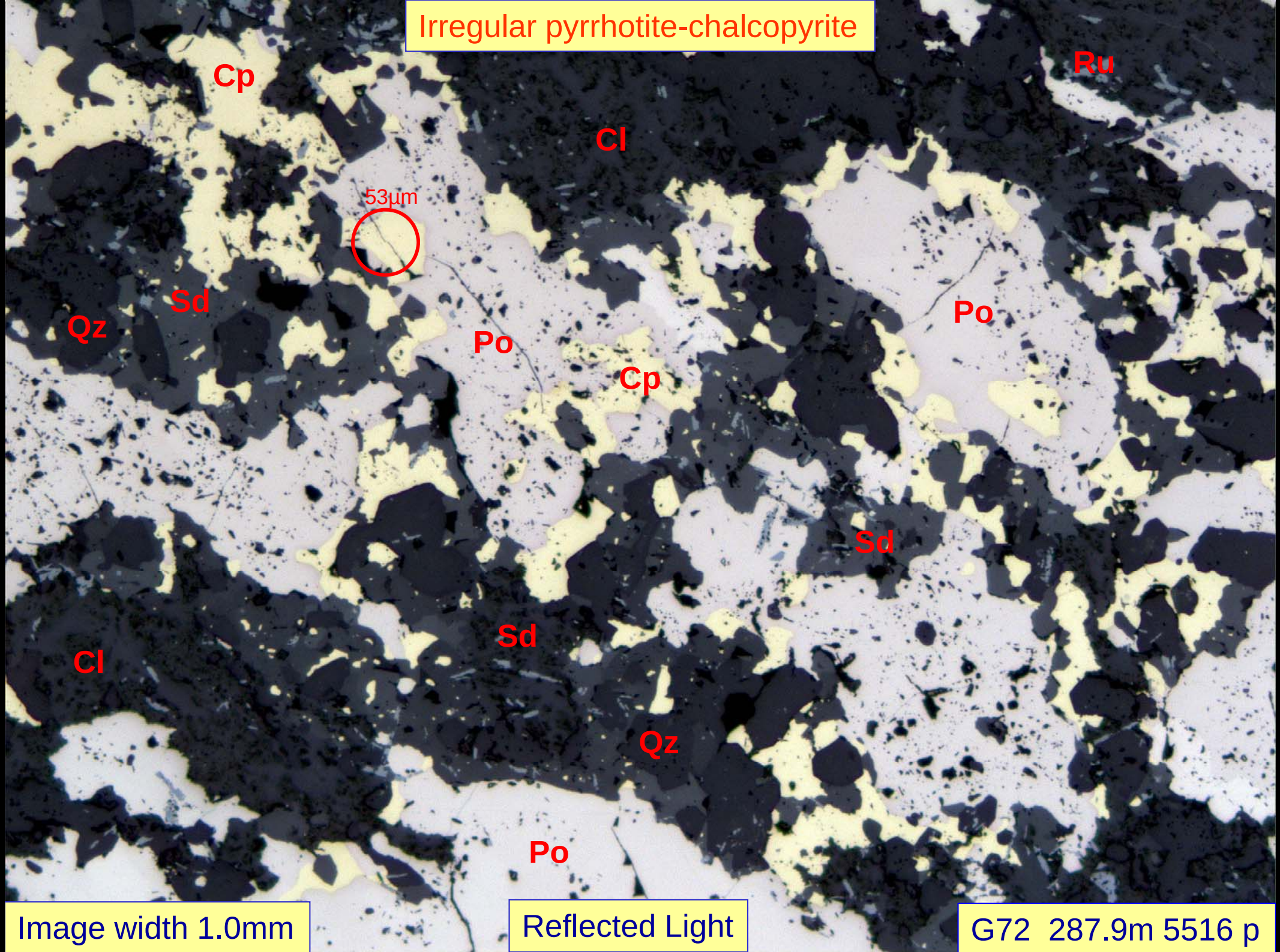

Very complex textural construction
Sd
Sd/Fl
106µm
Sd/Fl
As
Sd
Cs
Py
Cp
Po
Cp
Cl
Sd/Fl
Image width 2.1mm
Reflected Light
G72 287.9m 5516 k


Detail of pyrrhotite corrosion by siderite-fluorite
Sd
Cp
Po
27µm
Cs
Py
Fl
Po
As
Sd
Cs
Fl
Ru
Sd
Image width 515µm
Reflected Light
G72 287.9m 5516 l

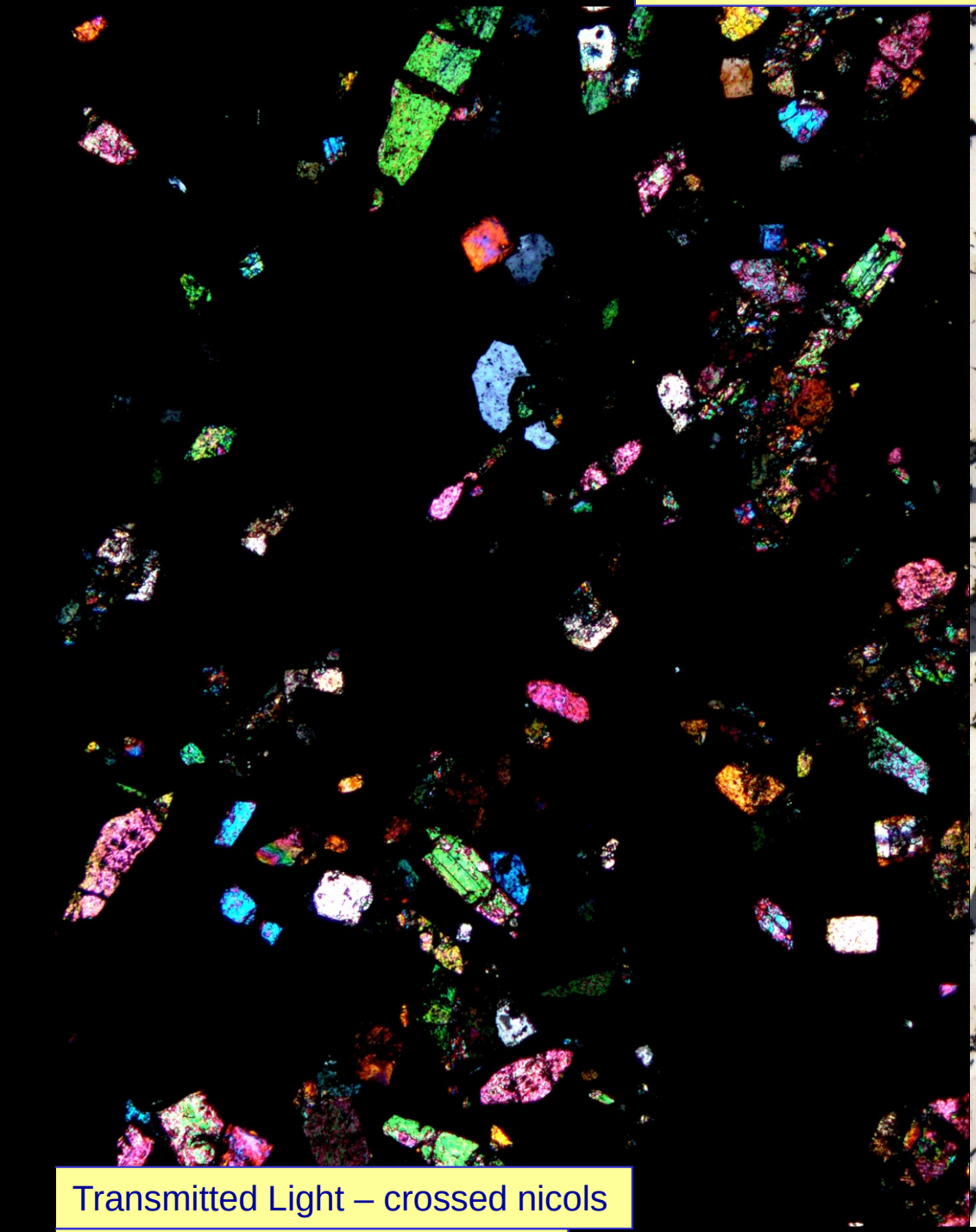

Bismuthinite-chalcopyrite
Bm
Po
Po
Sd
Bi
27µm
Qz
Bm
Bi
Fl?
Cp
Bi
Ru
Qz
Sd
Cp
Image width 515µm
Reflected Light
G72 287.9m 5516 m


Two pyrrhotite varieties: massive twinned and porous
Po
Sd
106µm
Vd
Po
Image width 2.1mm
Reflected Light
G72 287.9m 5516 n

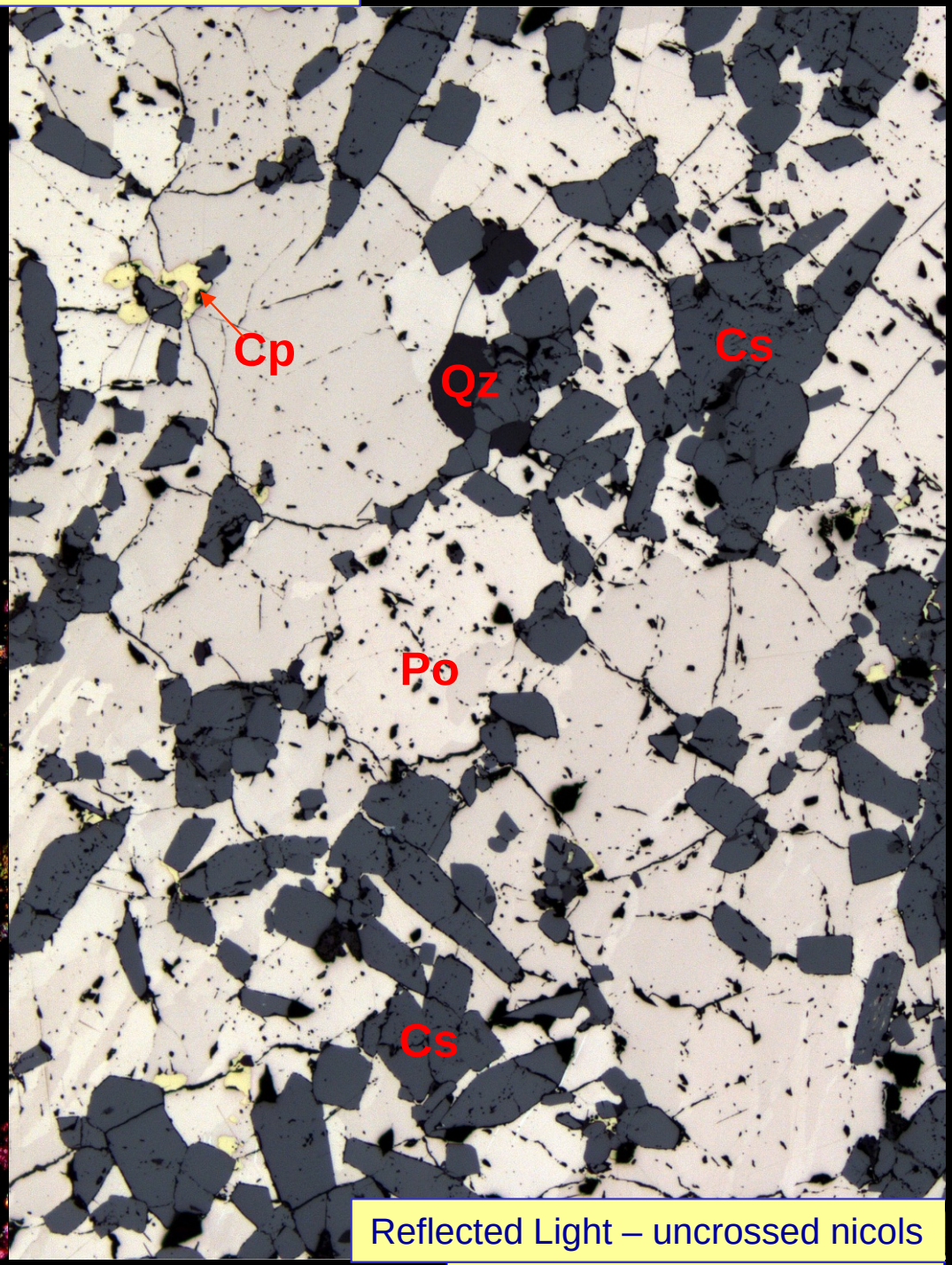

Chlorite-pyrrhotite
Po
106µm
Po
Qz
Cl
Ru
Po
Image width 2.1mm
Reflected Light
G72 287.9m 5516 o


Irregular pyrrhotite-chalcopyrite
Cp
Ru
Cl
53µm
Sd
Qz
Po
Po
Cp
Sd
Sd
Cl
Qz
Po
Image width 1.0mm
Reflected Light
G72 287.9m 5516 p

Cassiterite crystals in pyrrhotite



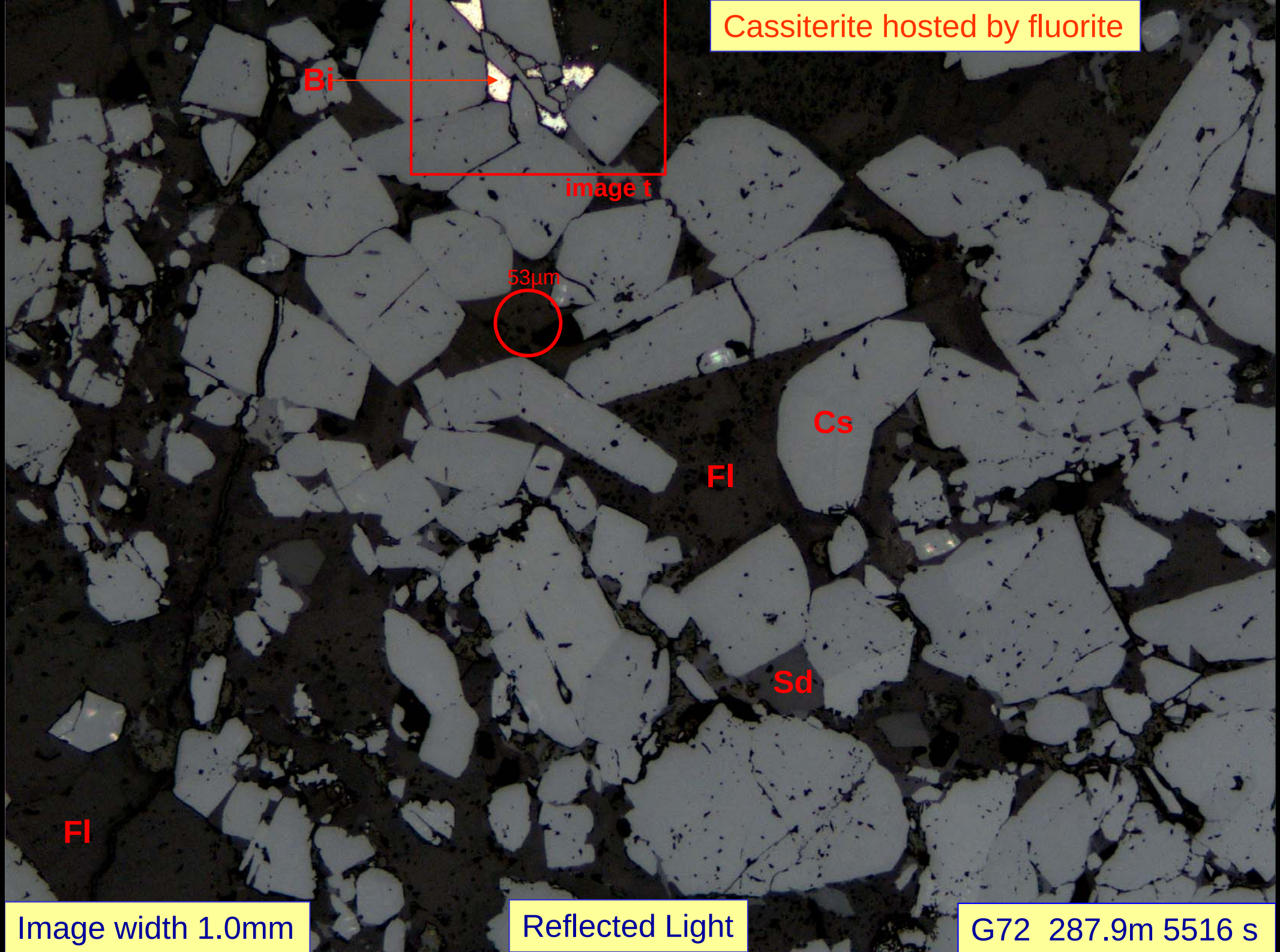
Transmitted Light – crossed nicols

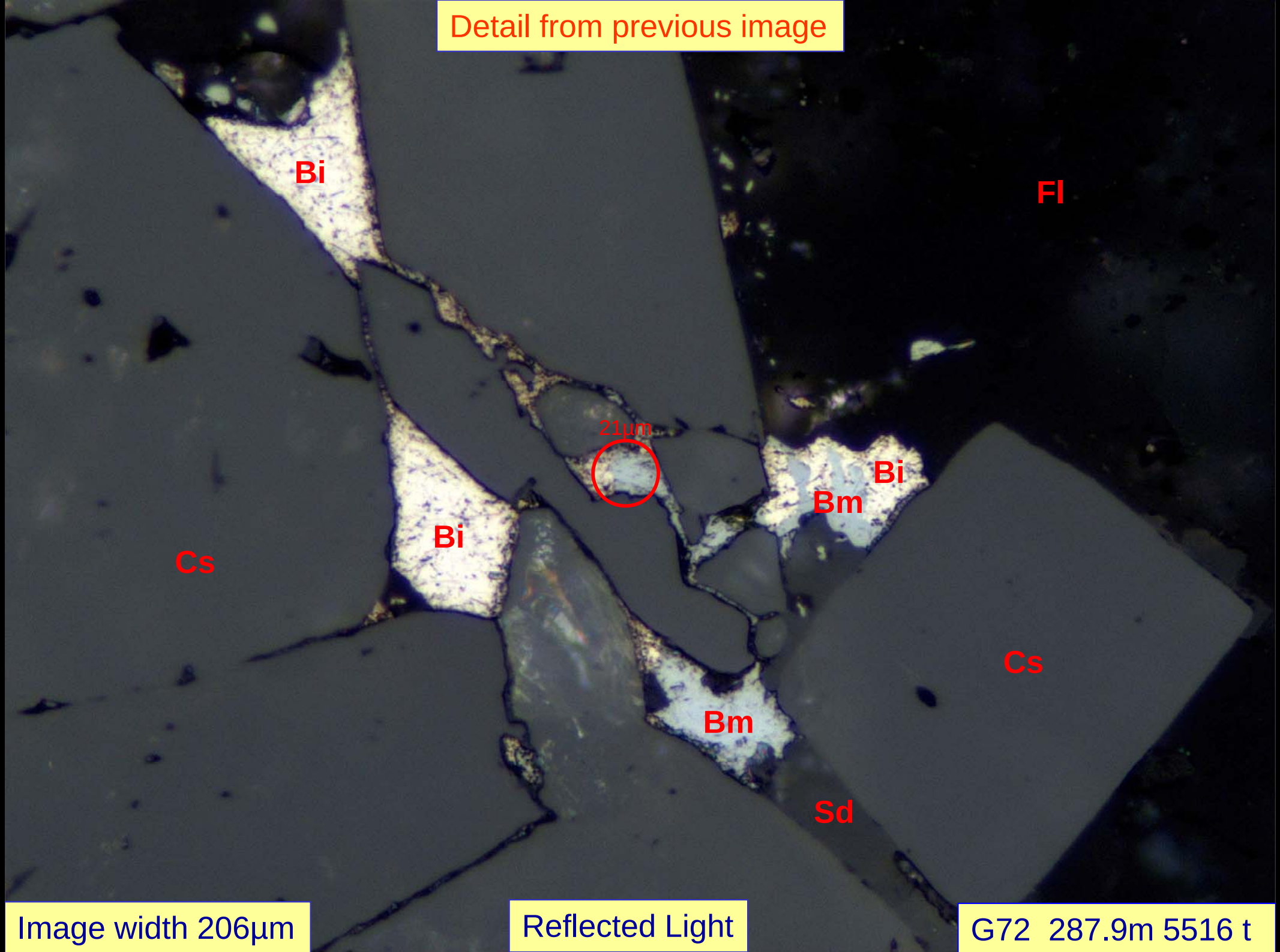


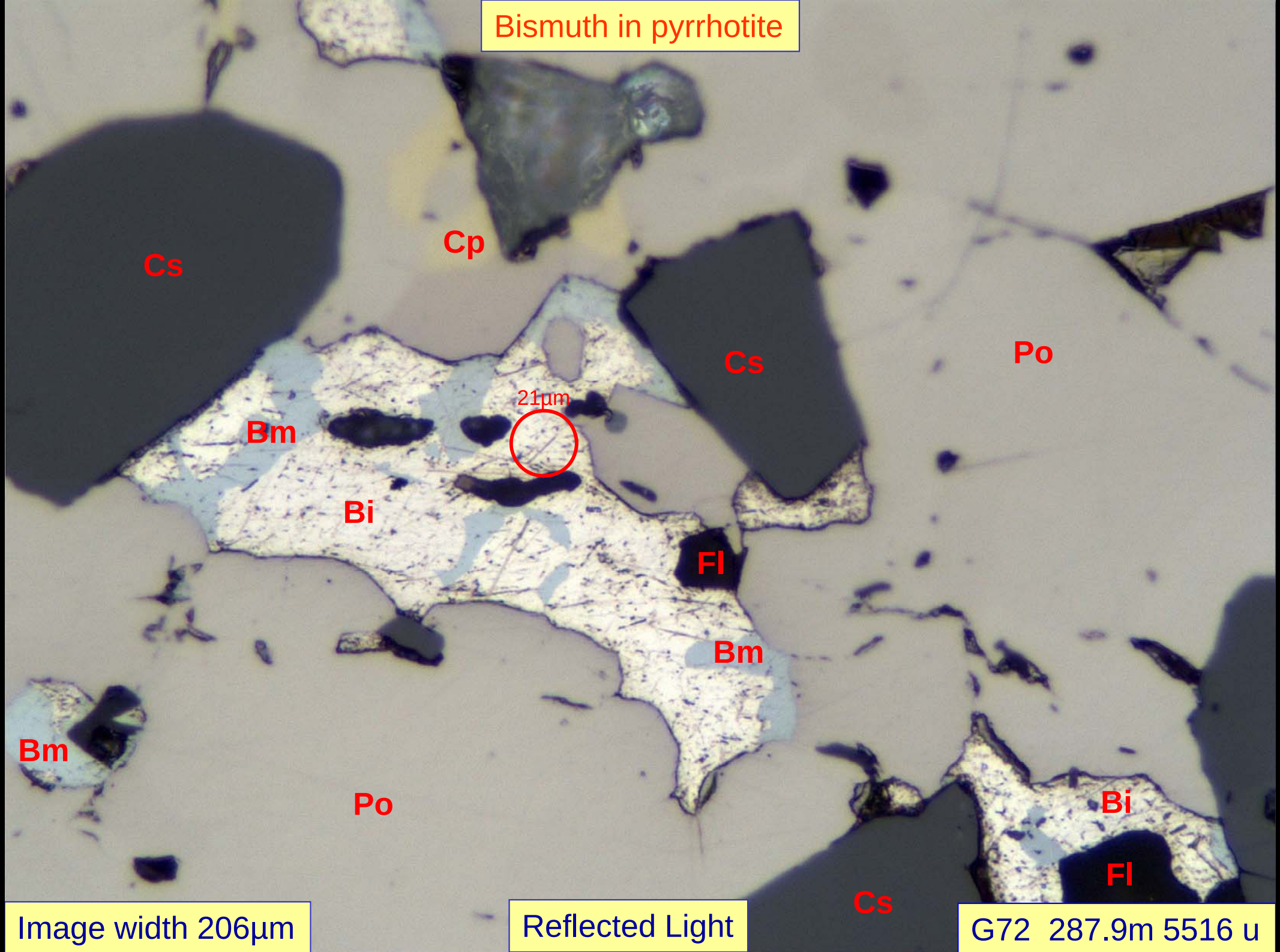
Reflected Light – uncrossed nicols

Image width 2 x 1.6mm

G72 287.9m 5516 q/r


Cassiterite hosted by fluorite
Bi
image t
53µm
Cs
Fl
Sd
Fl
Image width 1.0mm
Reflected Light
G72 287.9m 5516 s


Detail from previous image
Bi
Fl
21µm
Bi
Bm
Bi
Cs
Cs
Bm
Sd
Image width 206µm
Reflected Light
G72 287.9m 5516 t


Bismuth in pyrrhotite
Cs
Cp
Cs
Po
21µm
Bm
Bi
Fl
Bm
Bm
Po
Bi
Fl
Cs
Image width 206µm
Reflected Light
G72 287.9m 5516 u

PARTICLE MINERALOGY REPORT

Severn 5516

G72 287.9m

GJMcA 20.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
0.3	52.1	2.7	0.0	0.1	0.6	0.0	44.2	**300**
18	75	53	0	11	38	0	70	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	4.00	3.73	24.2	0.08	42.4	0.22	
Actual		**11.65**		**0.33**	**40.7**	**0.13**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	0	60	37	0	0	0	63	
Binary	5	37	54	0	97	15	34	
Ternary	13	3	9	0	3	61	2	
Quat.y+	83	0	0	0	0	24	0	
Grains	1.3	69.7	5.7	0.0	2.0	1.0	64.0	1.44

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		100	0	0	0	0	0
Po	2		7	0	1	0	90
Cs	0	84		0	0	0	16
St	0	0	0		0	0	0
Cp	0	69	0	0		0	31
As	0	0	0	0	0		100
Ga	0	94	1	0	3	2	

TOTAL ASSOCIATION MATRIX

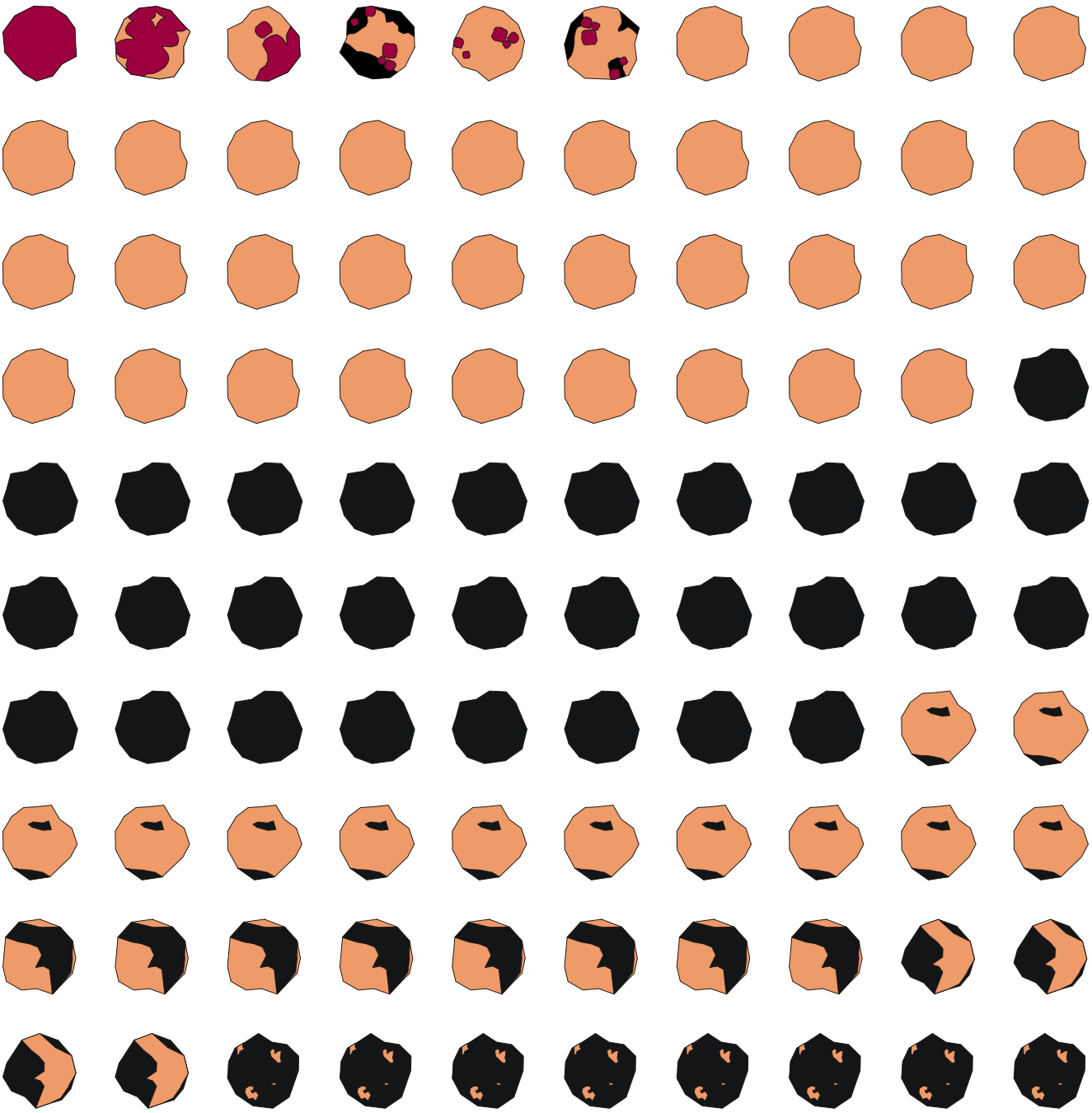
		Py	Po	Cs	St	Cp	As	Ga
	Py		100	0	0	0	92	85
	Po	1		5	0	1	0	36
of	**Cs**	0	54		0	0	0	17
all	**St**	0	0	0		0	0	0
	Cp	0	69	0	0		0	33
	As	85	85	0	0	0		39
	Ga	1	35	1	0	2	1	

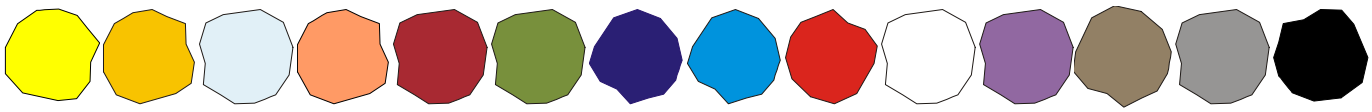
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	0		5	0	0	0	0	0	13	83
Po	60	1		3	0	1	0	33	3	0
Cs	37	0	46		0	0	0	9	9	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	67	0	0		0	31	3	0
As	0	0	0	0	0	0		15	61	24
Ga	63	0	32	0	0	1	1		2	0

Stellar Resources - Severn Drillhole Mineragraphy

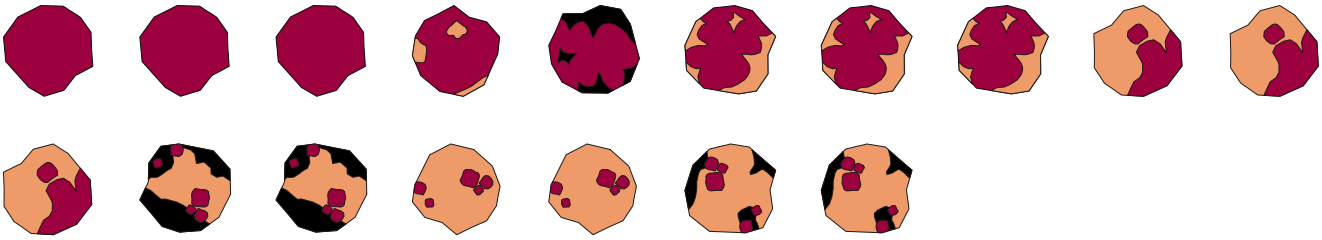
Severn 5516 **53µm mask** **January 2012**

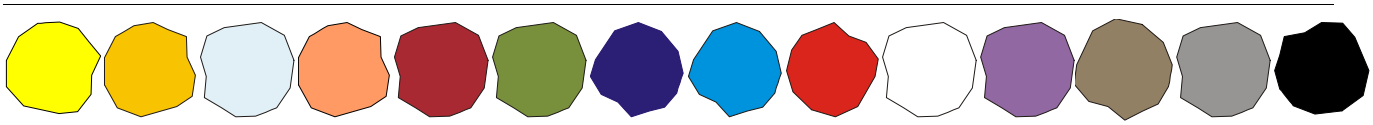




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5516 Sn Scan **53µm mask** **January 2012**



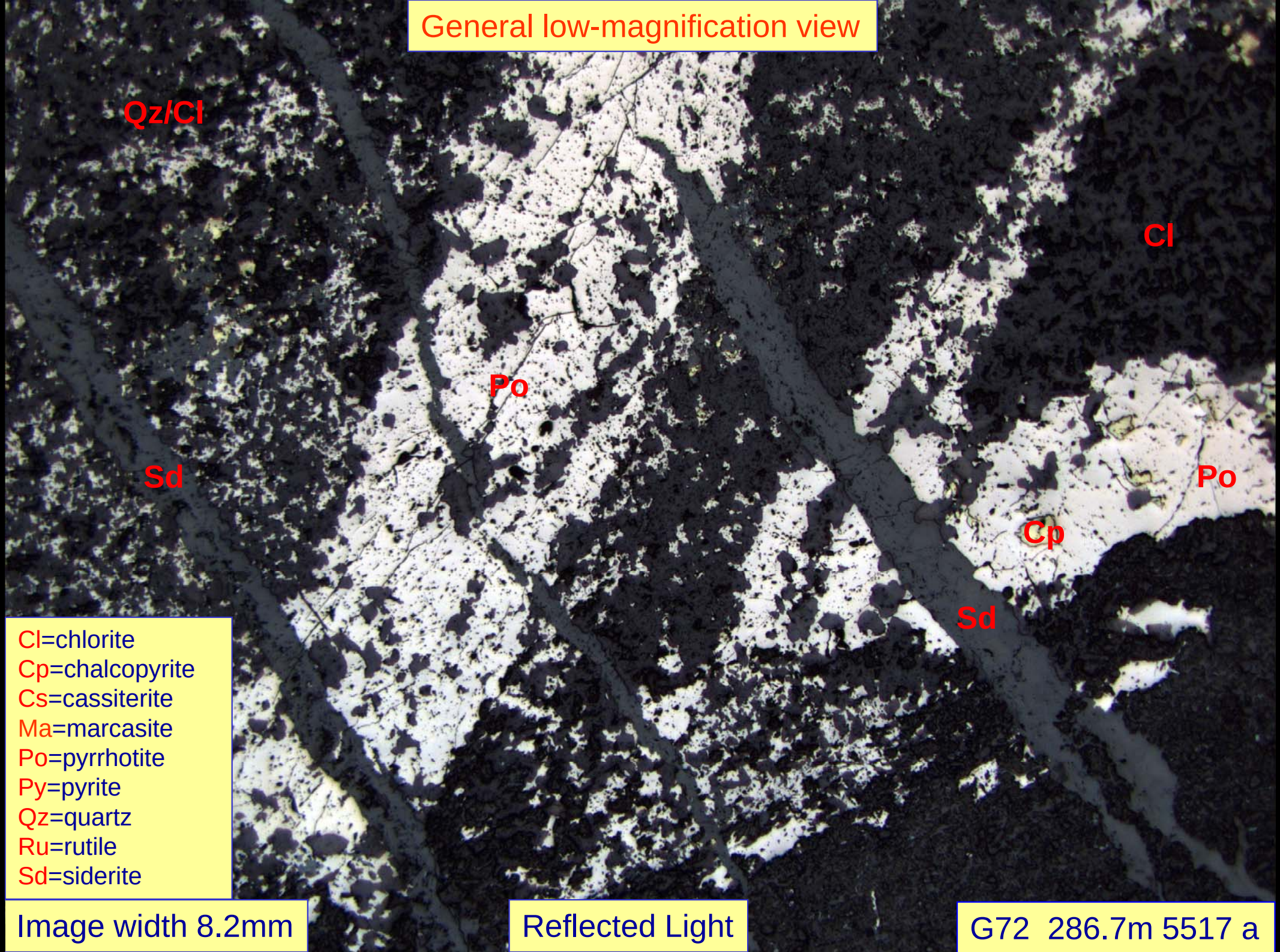


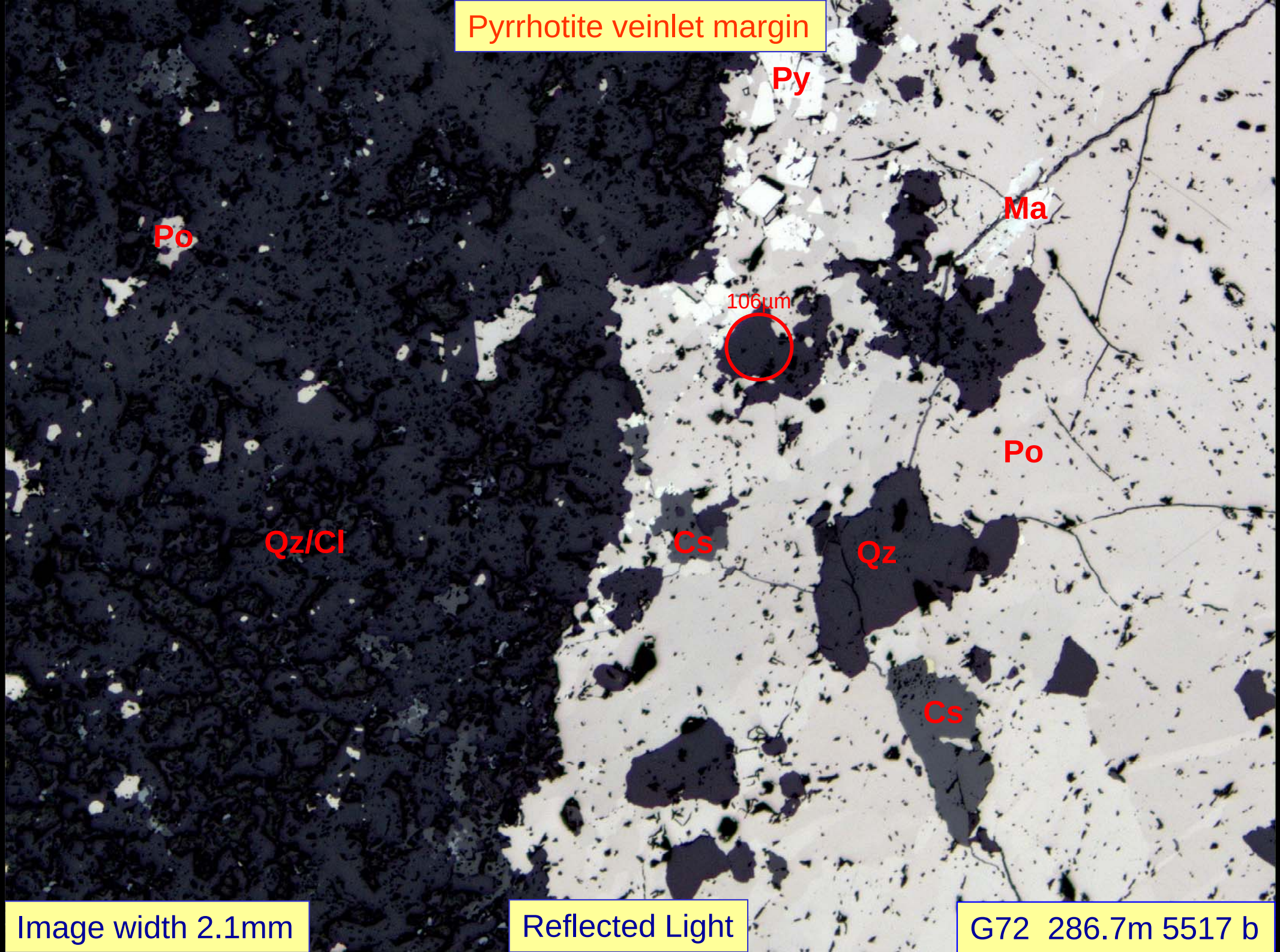
Core Scan

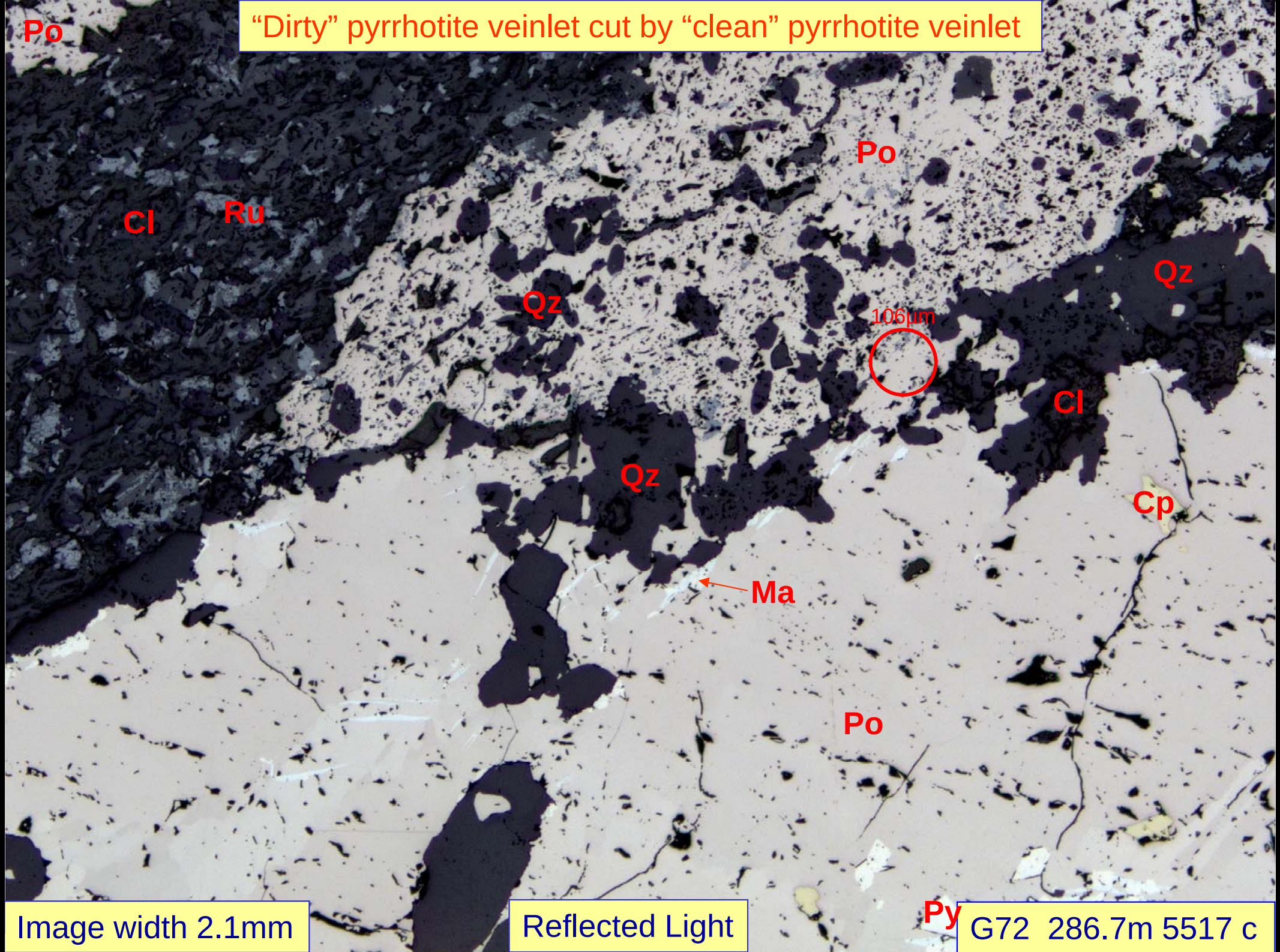
QXRD: 47% pyrrhotite, 17% quartz, 16% chlorite, 7% siderite, 4% talc, 3% kaolinite

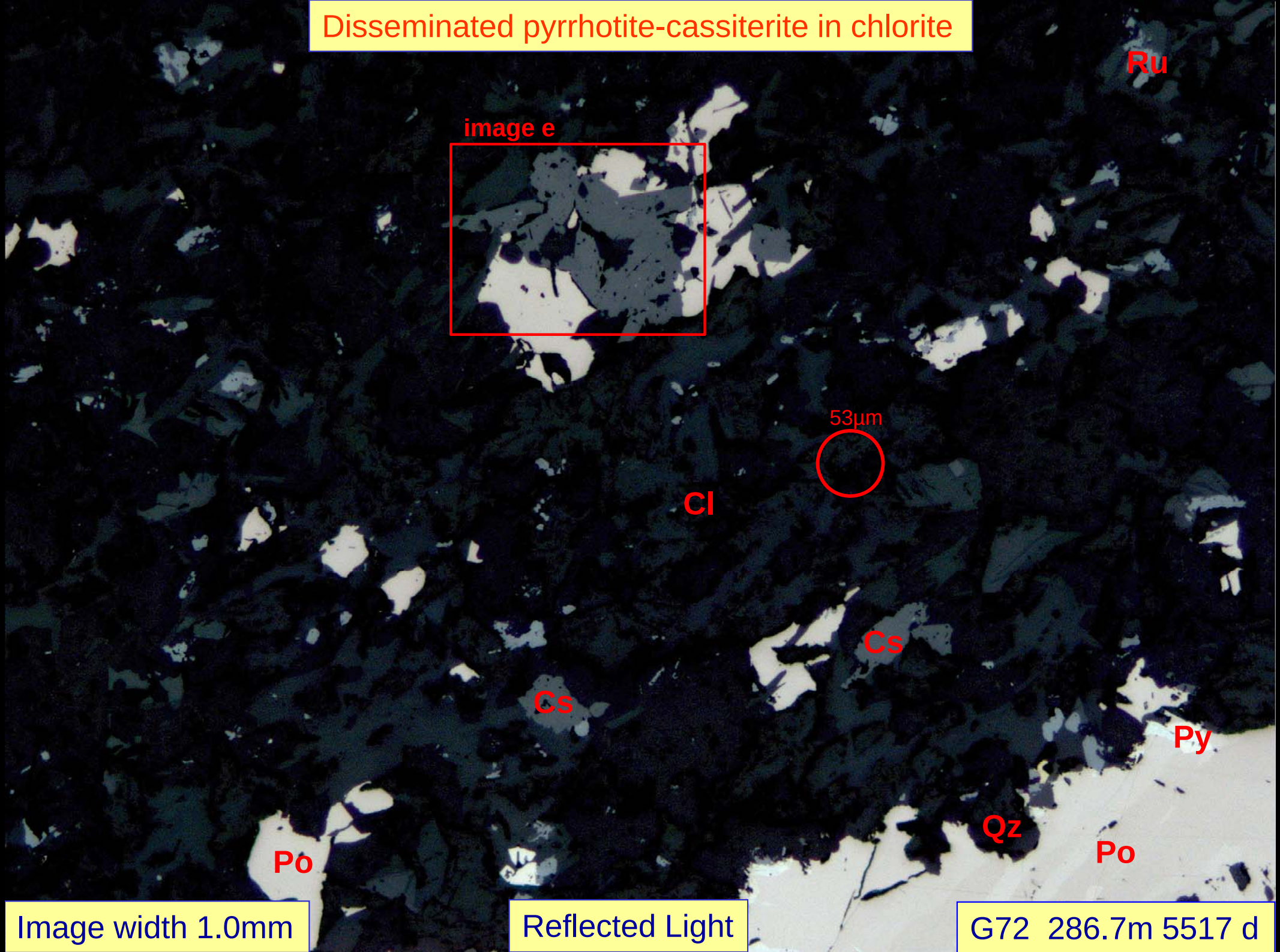
Image width ~115mm

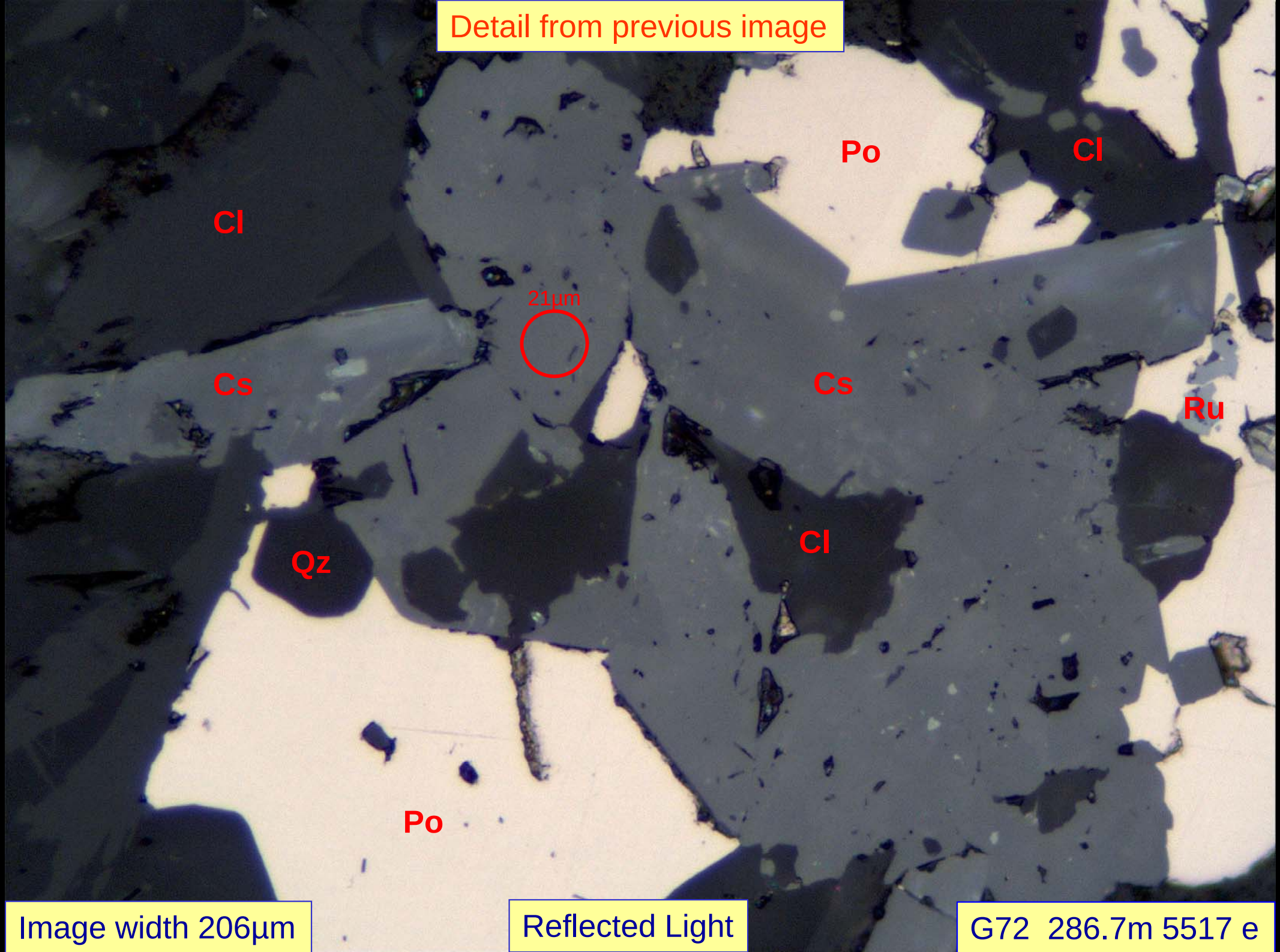
G72 286.7m 5517

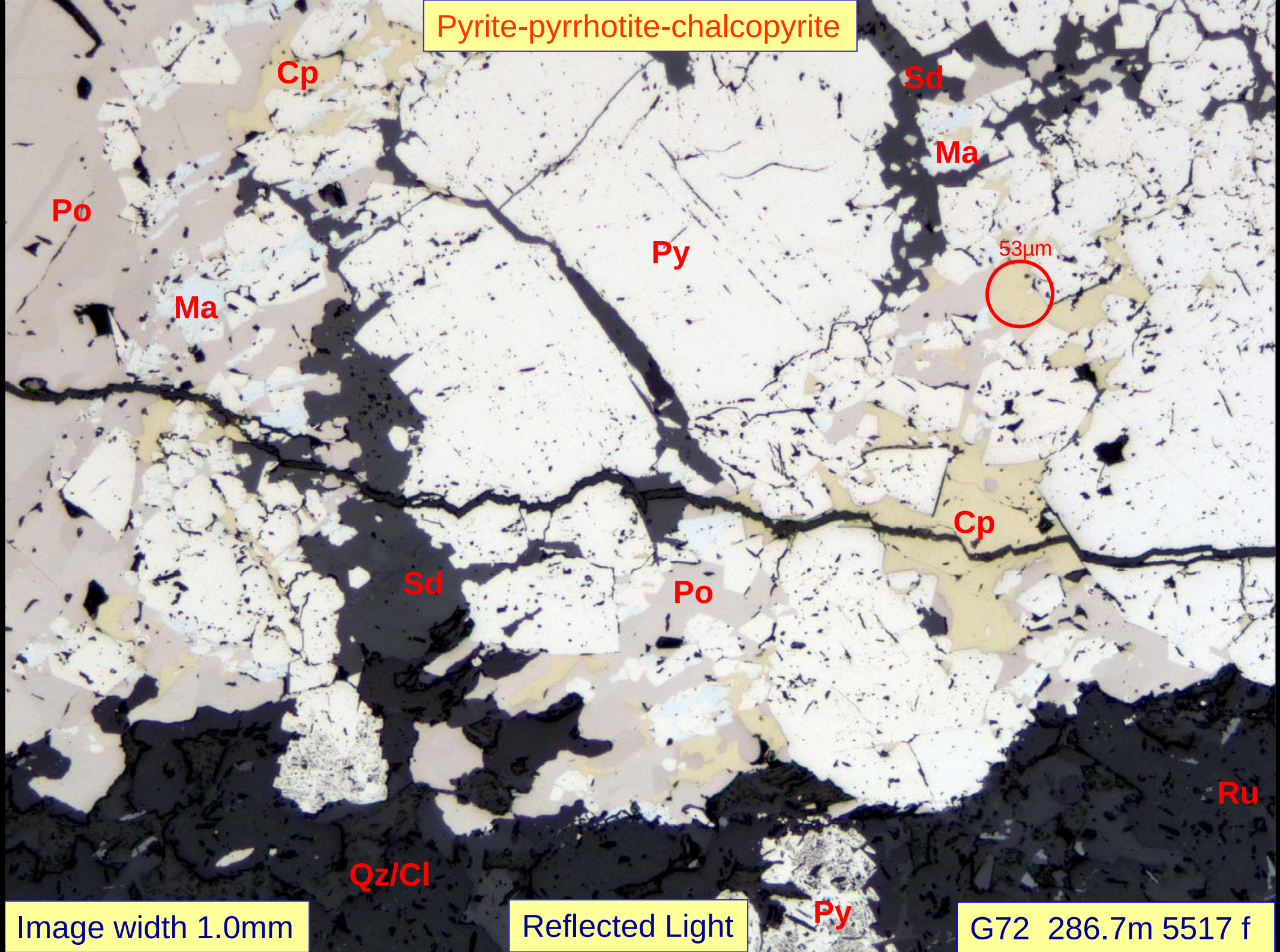

General low-magnification view
Qz/Cl
Cl
Po
Sd
Po
Cp
Sd
Cl=chlorite
Cp=chalcopyrite
Cs=cassiterite
Ma=marcasite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Sd=siderite
Image width 8.2mm
Reflected Light
G72 286.7m 5517 a

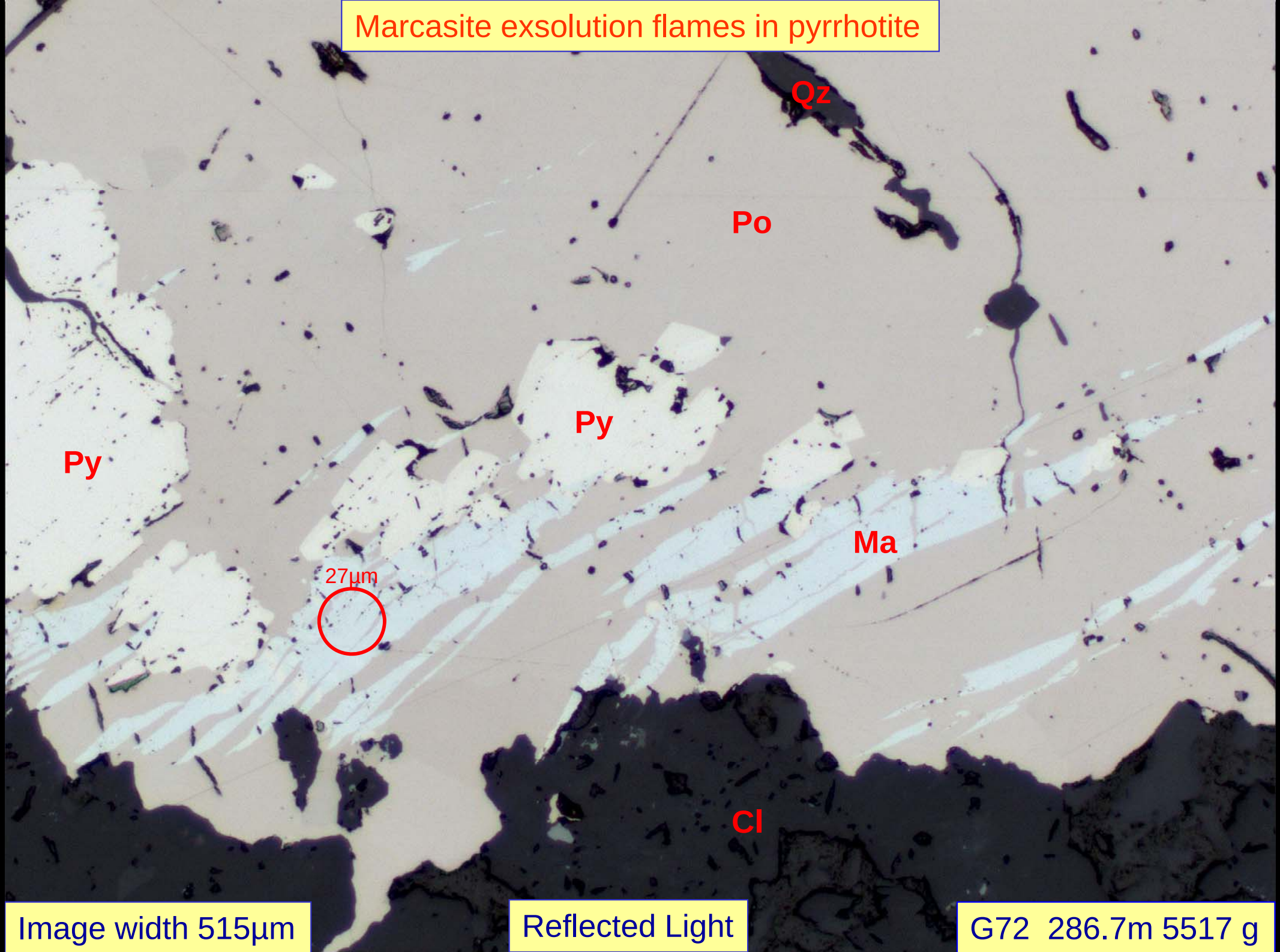

Pyrrhotite veinlet margin
Py
Ma
Po
106um
Po
Qz/Cl
Cs
Qz
Cs
Image width 2.1mm
Reflected Light
G72 286.7m 5517 b

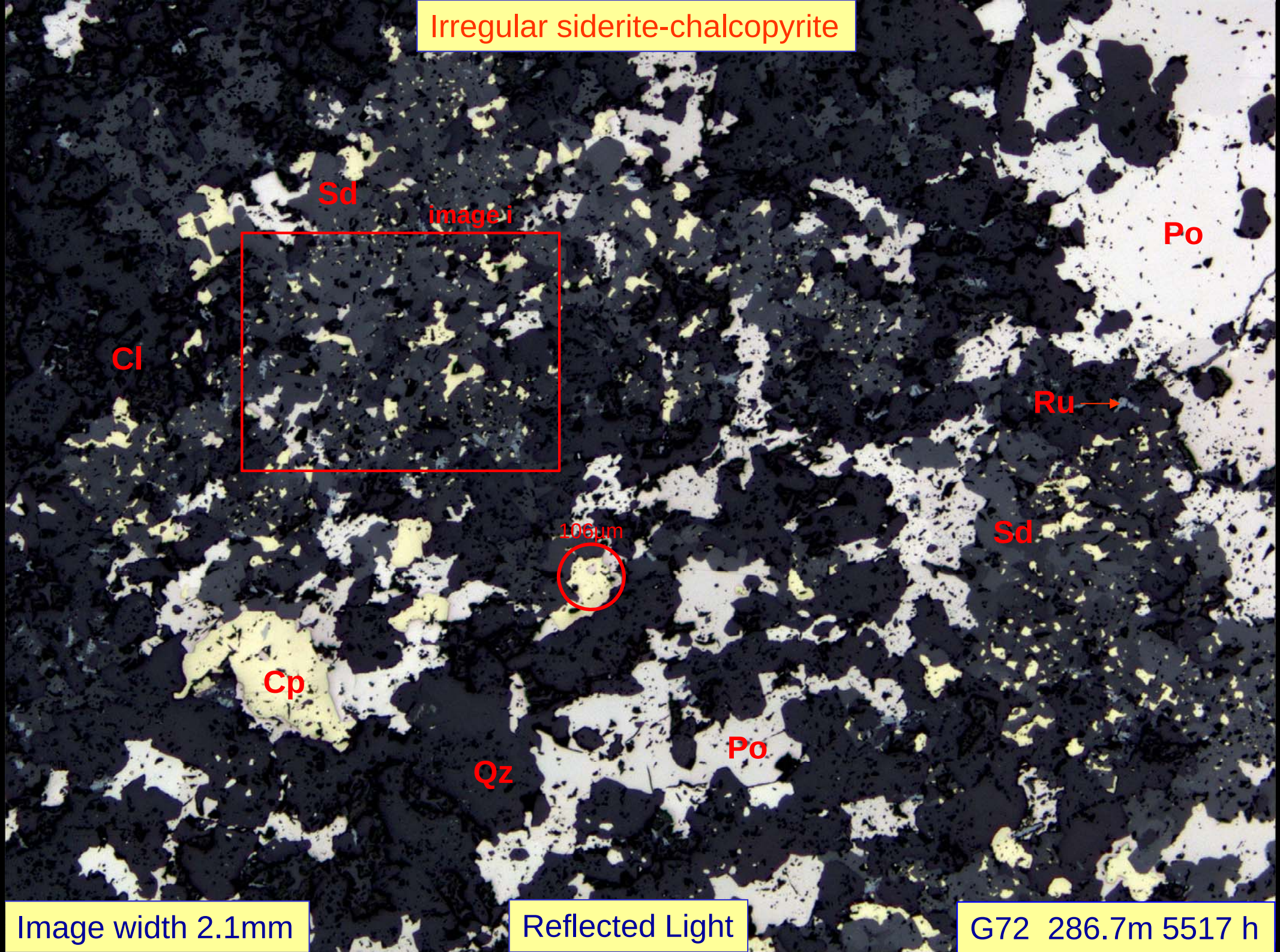

"Dirty" pyrrhotite veinlet cut by "clean" pyrrhotite veinlet
Po
Po
Cl
Ru
Qz
Qz
106µm
Cl
Qz
Cp
Ma
Po
Py
Image width 2.1mm
Reflected Light
G72 286.7m 5517 c

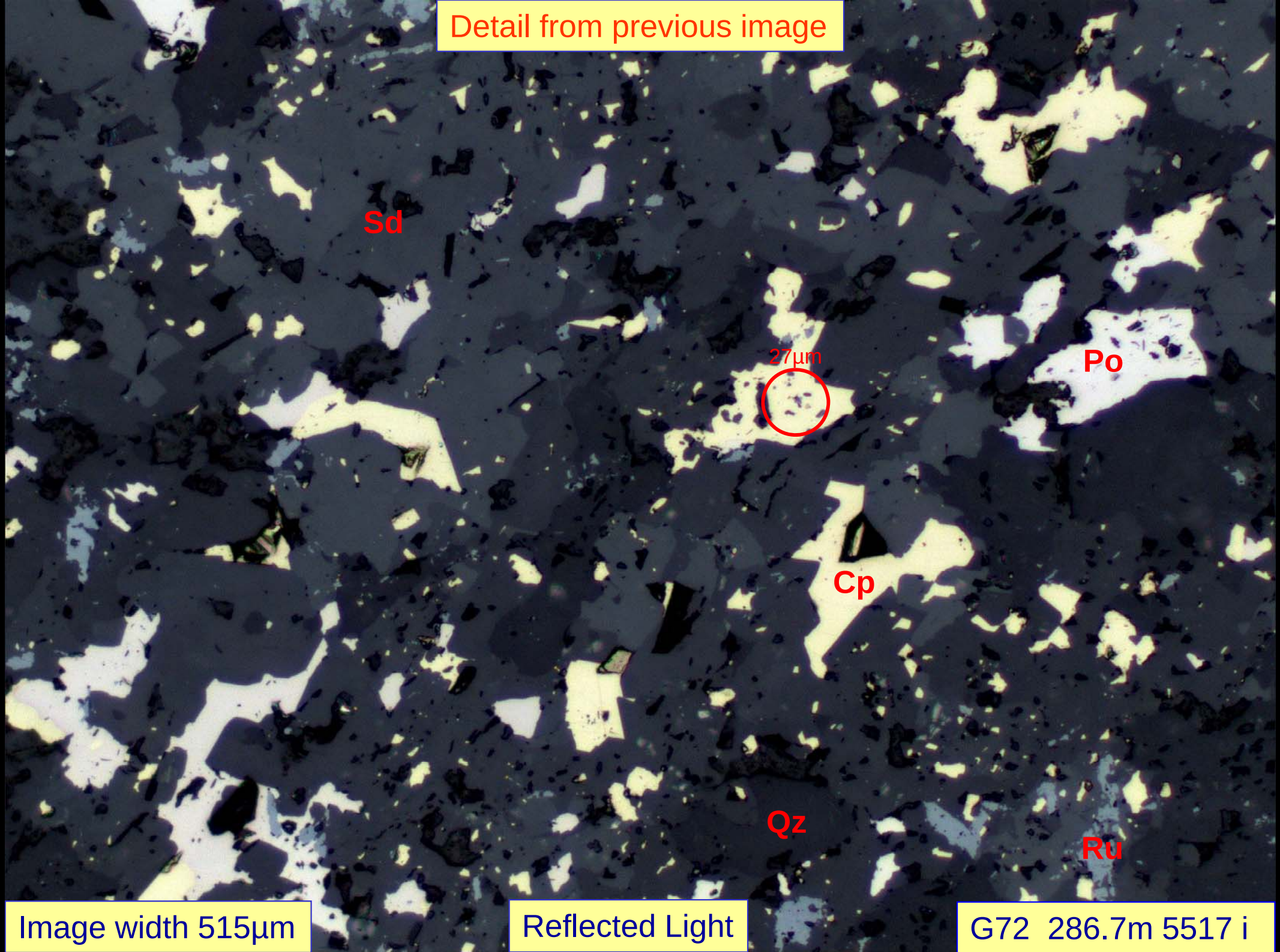

Disseminated pyrrhotite-cassiterite in chlorite
Ru
image e
53µm
Cl
Cs
Cs
Py
Qz
Po
Po
Image width 1.0mm
Reflected Light
G72 286.7m 5517 d

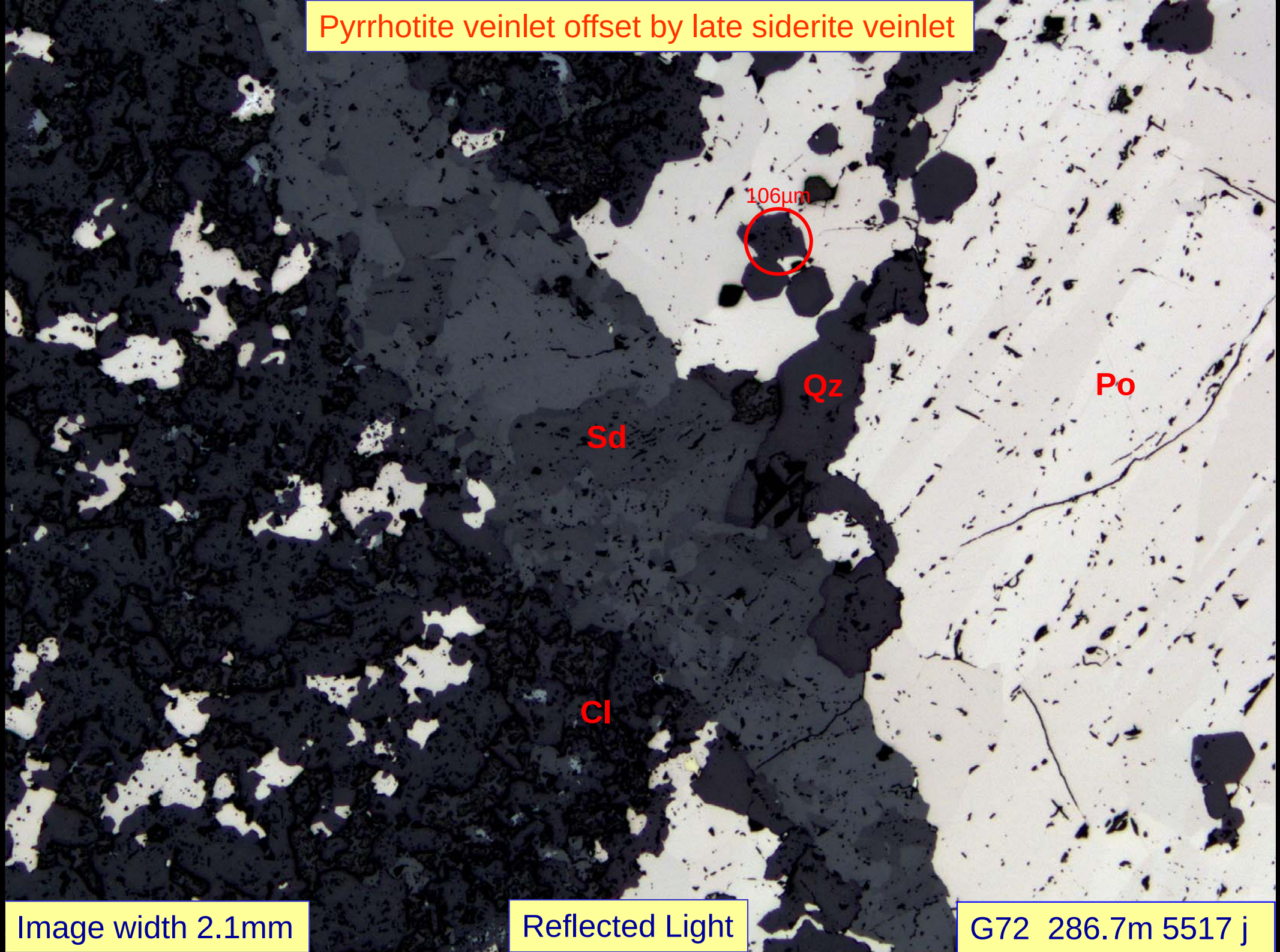

Detail from previous image
Po
Cl
Cl
21µm
Cs
Cs
Ru
Cl
Qz
Po
Image width 206µm
Reflected Light
G72 286.7m 5517 e

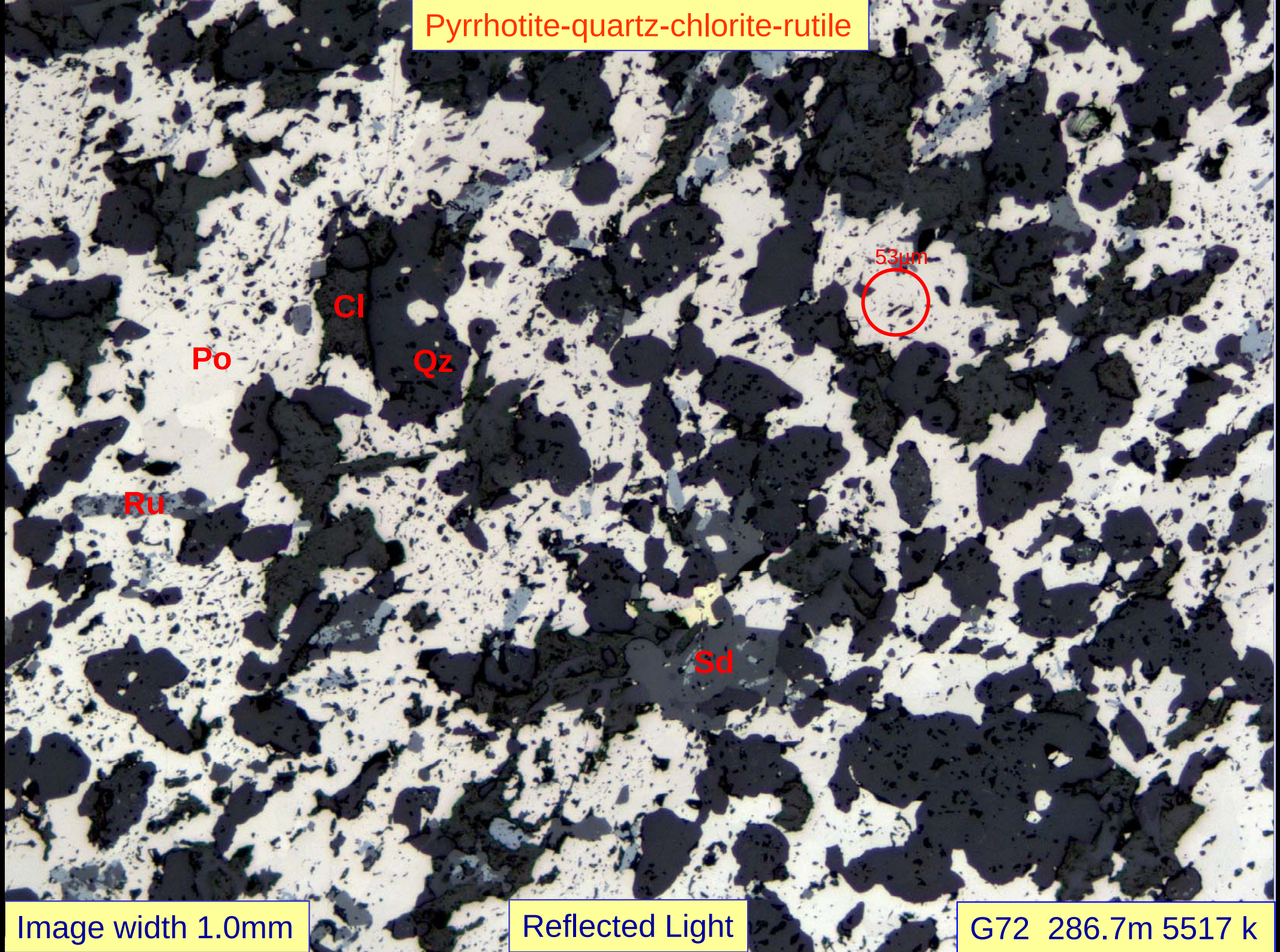

Pyrite-pyrrhotite-chalcopyrite
Cp
Sd
Ma
Po
Py
53µm
Ma
Cp
Sd
Po
Ru
Qz/Cl
Py
Image width 1.0mm
Reflected Light
G72 286.7m 5517 f

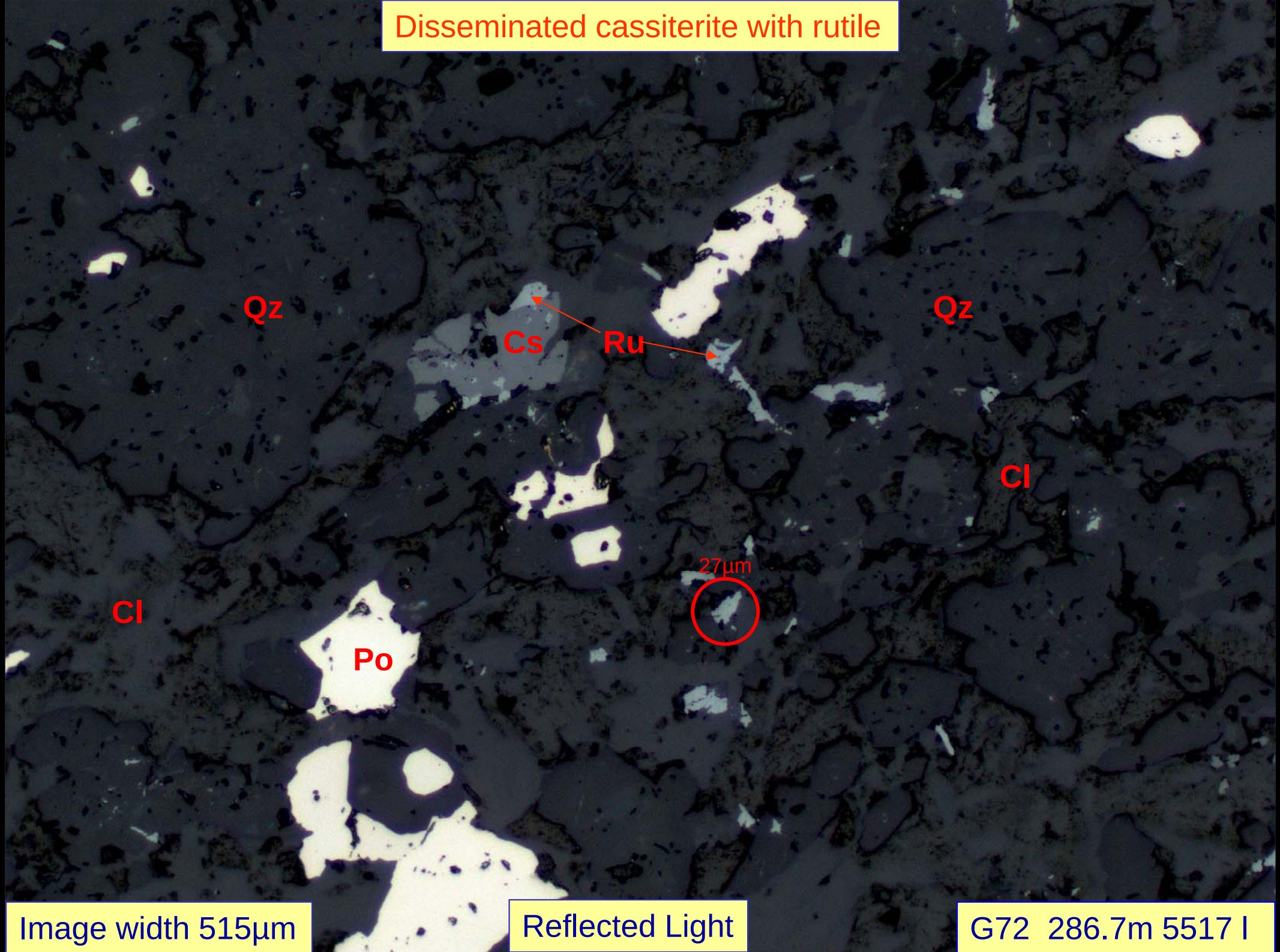

Marcasite exsolution flames in pyrrhotite
Qz
Po
Py
Py
Ma
27µm
Cl
Image width 515µm
Reflected Light
G72 286.7m 5517 g


Irregular siderite-chalcopyrite
Sd
image i
Po
Cl
Ru
106µm
Sd
Cp
Po
Qz
Image width 2.1mm
Reflected Light
G72 286.7m 5517 h


Detail from previous image
Sd
27µm
Po
Cp
Qz
Ru
Image width 515µm
Reflected Light
G72 286.7m 5517 i


Pyrrhotite veinlet offset by late siderite veinlet
106µm
Qz
Po
Sd
Cl
Image width 2.1mm
Reflected Light
G72 286.7m 5517 j


Pyrrhotite-quartz-chlorite-rutile
53µm
Cl
Po
Qz
Ru
Sd
Image width 1.0mm
Reflected Light
G72 286.7m 5517 k


Disseminated cassiterite with rutile
Qz
Cs
Ru
Qz
Cl
27µm
Cl
Po
Image width 515µm
Reflected Light
G72 286.7m 5517 I

PARTICLE MINERALOGY REPORT

Severn 5517

G72 286.7m

GJMcA 20.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
0.6	17.8	0.2	0.0	0.0	0.0	0.0	81.4	**300**
22	54	20	0	0	10	0	92	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.39	0.32	9.9	0.00	27.4	0.01	
Actual		**0.17**		**0.02**	**34.0**	**0.10**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	0	54	0	0	0	0	82	
Binary	99	44	100	0	100	0	18	
Ternary	1	1	0	0	0	0	0	
Quat.y+	0	0	0	0	0	0	0	
Grains	2.0	32.3	1.0	0.0	0.3	0.0	88.7	1.24

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		100	0	0	0	0	0
Po	10		3	0	0	0	87
Cs	0	58		0	0	0	42
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	0	0	0	0	0		0
Ga	0	94	4	0	2	0	

TOTAL ASSOCIATION MATRIX

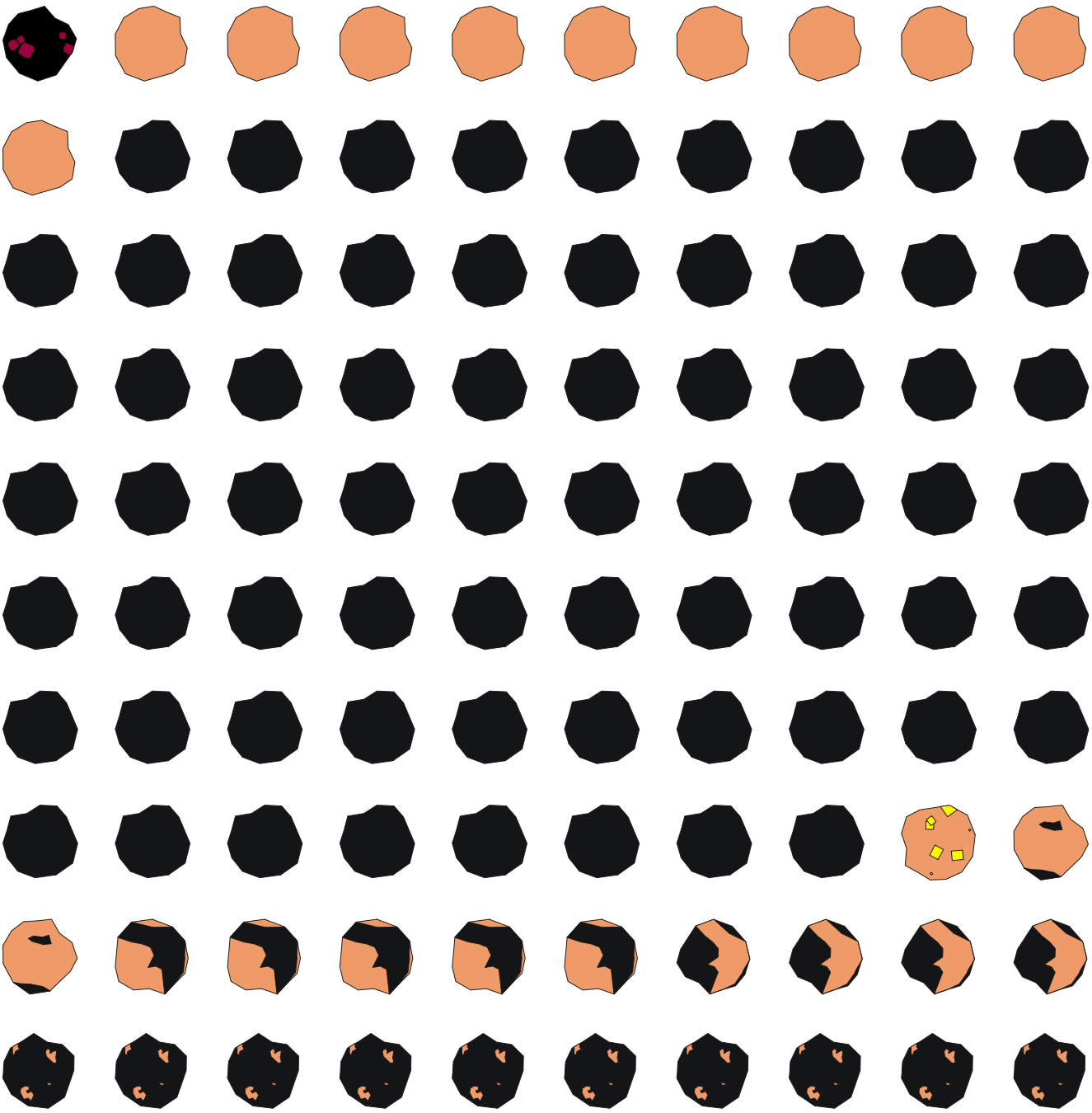
		Py	Po	Cs	St	Cp	As	Ga
	Py		100	0	0	0	0	1
	Po	6		1	0	0	0	40
of	**Cs**	0	58		0	0	0	42
all	**St**	0	0	0		0	0	0
	Cp	0	0	0	0		0	100
	As	0	0	0	0	0		0
	Ga	0	17	1	0	0	0	

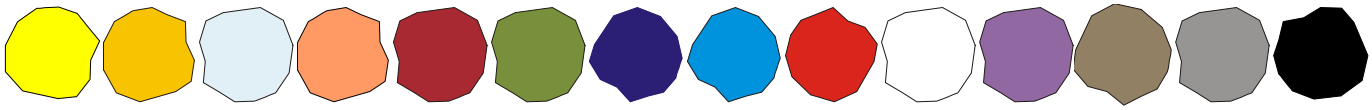
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	0		99	0	0	0	0	0	1	0
Po	54	4		1	0	0	0	39	1	0
Cs	0	0	58		0	0	0	42	0	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	100	0	0
As	0	0	0	0	0	0		0	0	0
Ga	82	0	17	1	0	0	0		0	0

Stellar Resources - Severn Drillhole Mineragraphy

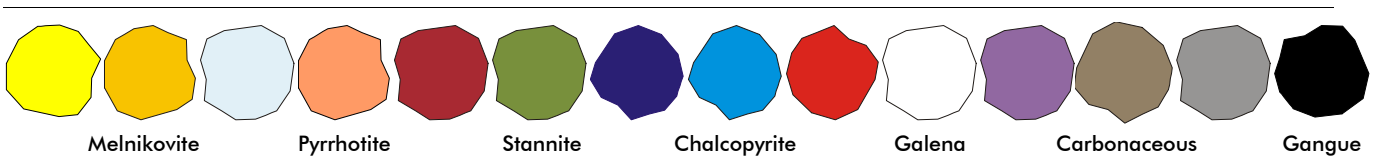
Severn 5517 **53µm mask** **January 2012**





Stellar Resources - Severn Drillhole Mineragraphy

Severn 5517 Sn Scan **53µm mask** **January 2012**



Core Scan

QXRD: 72% pyrrhotite, 9% quartz, 8% chlorite, 5% kaolinite

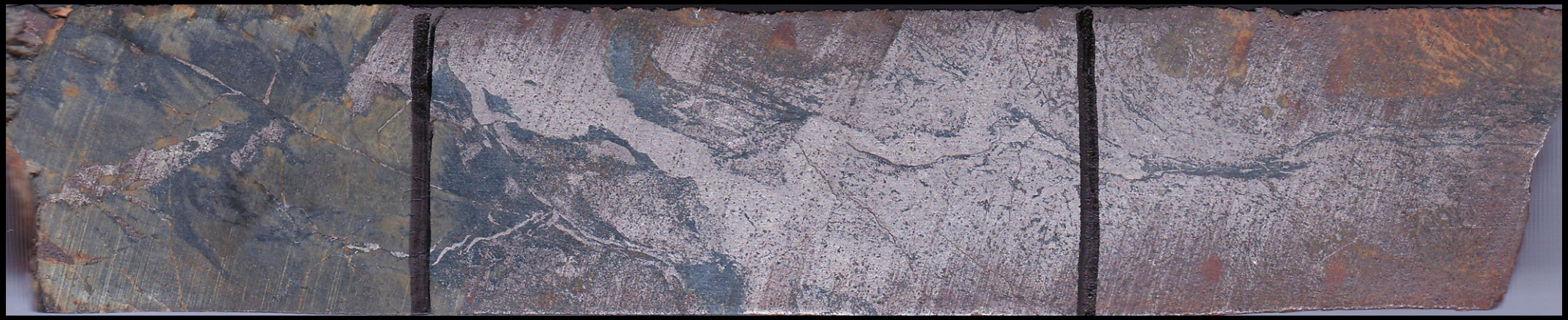
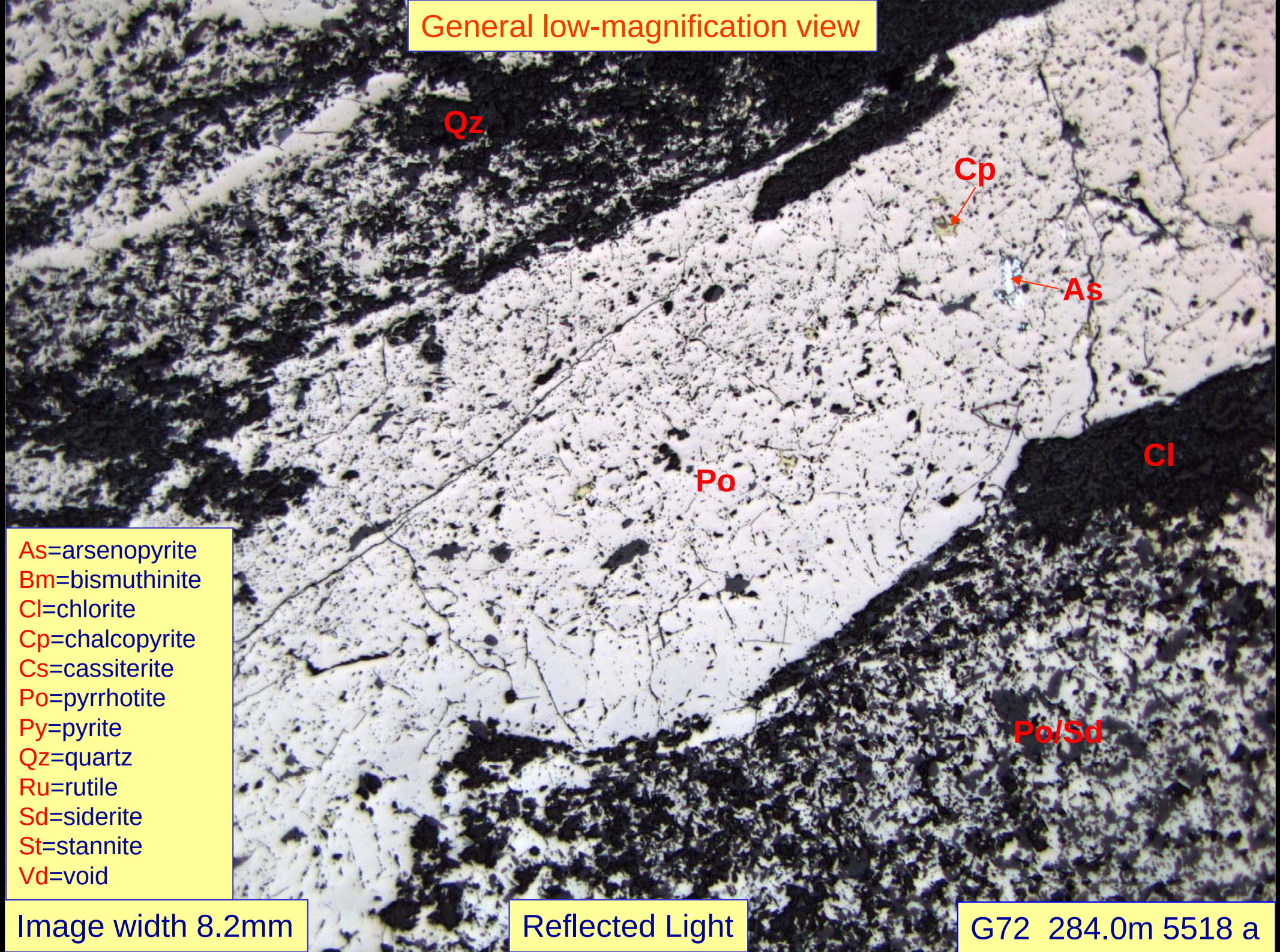
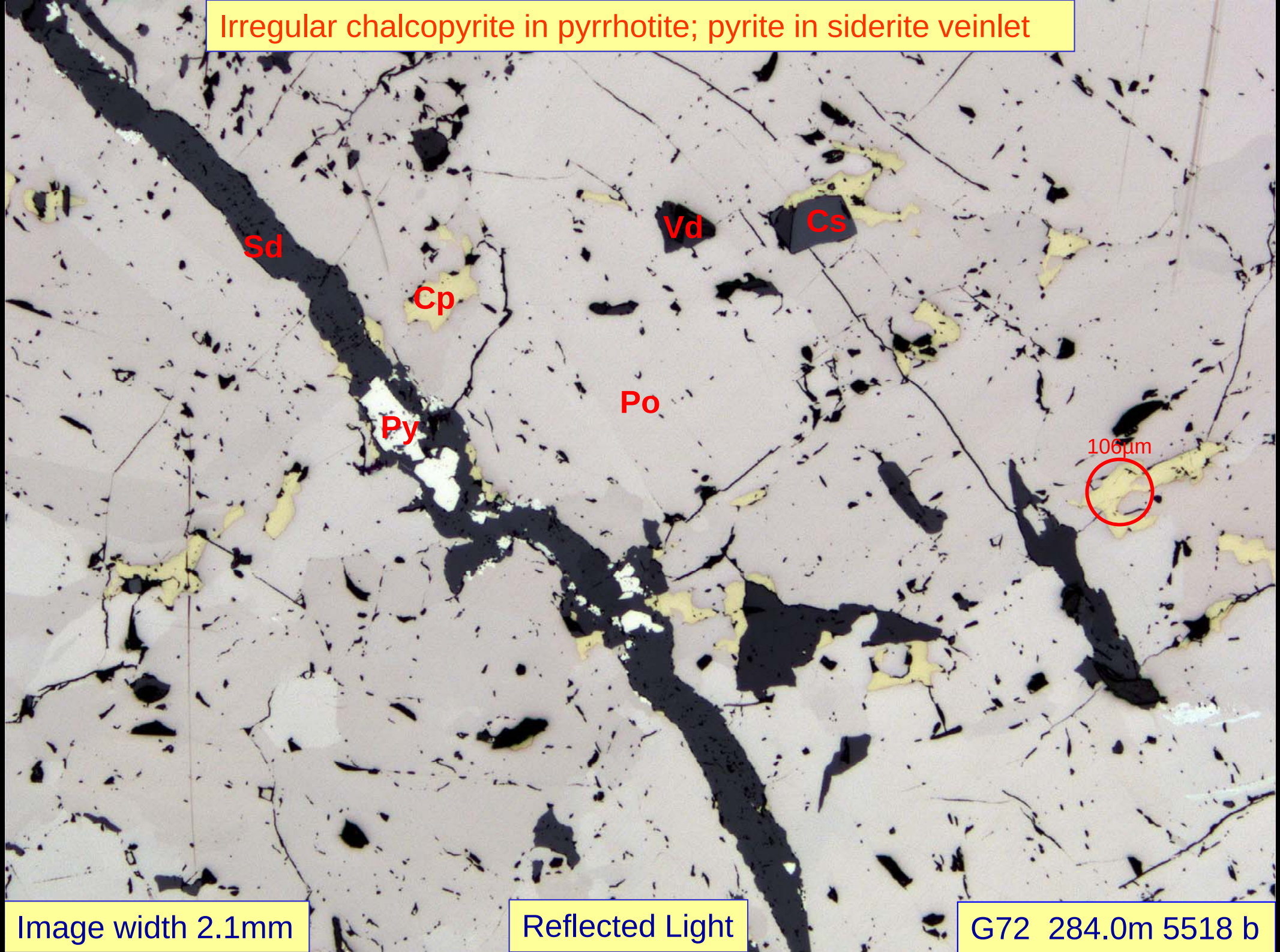
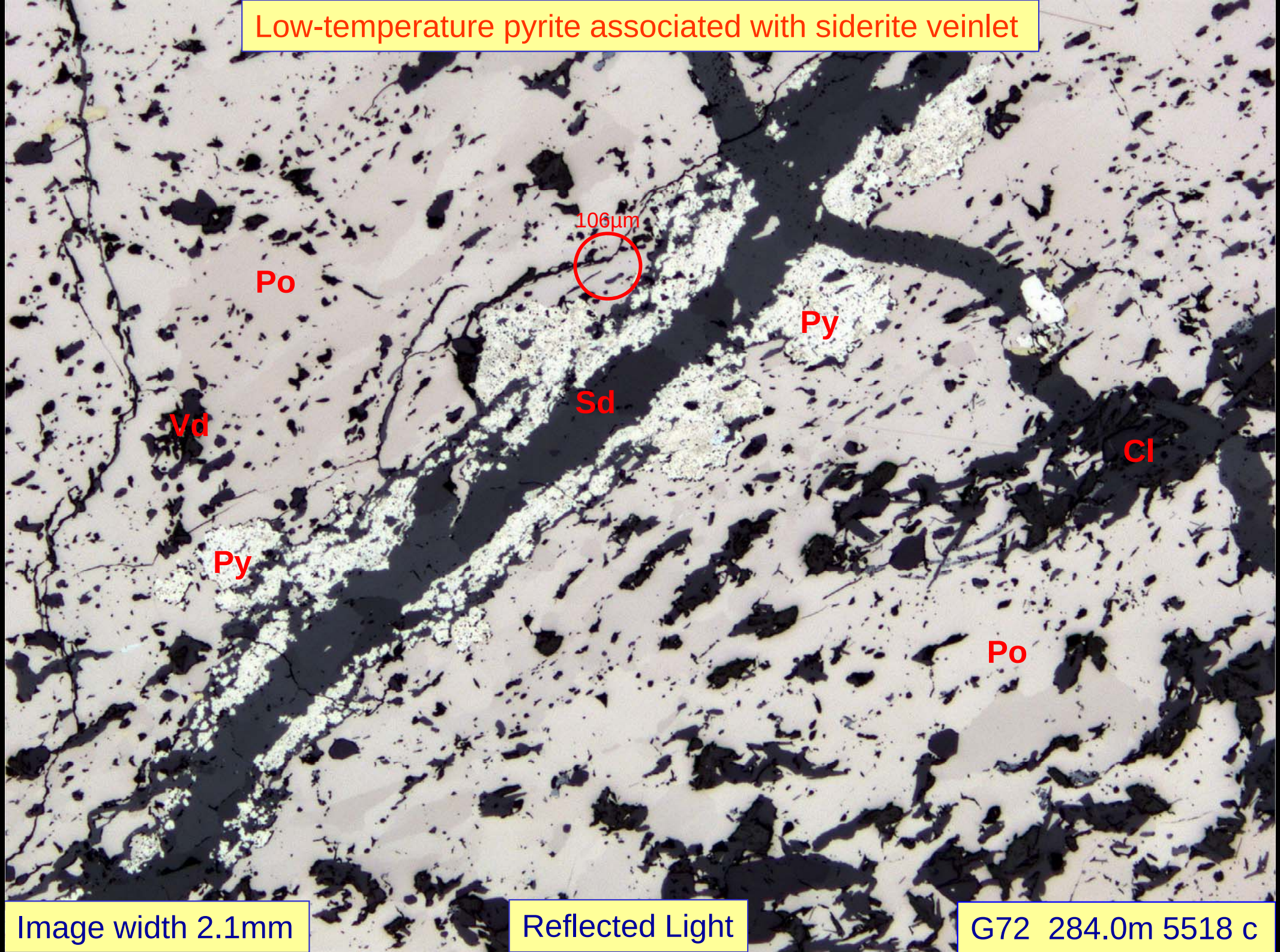


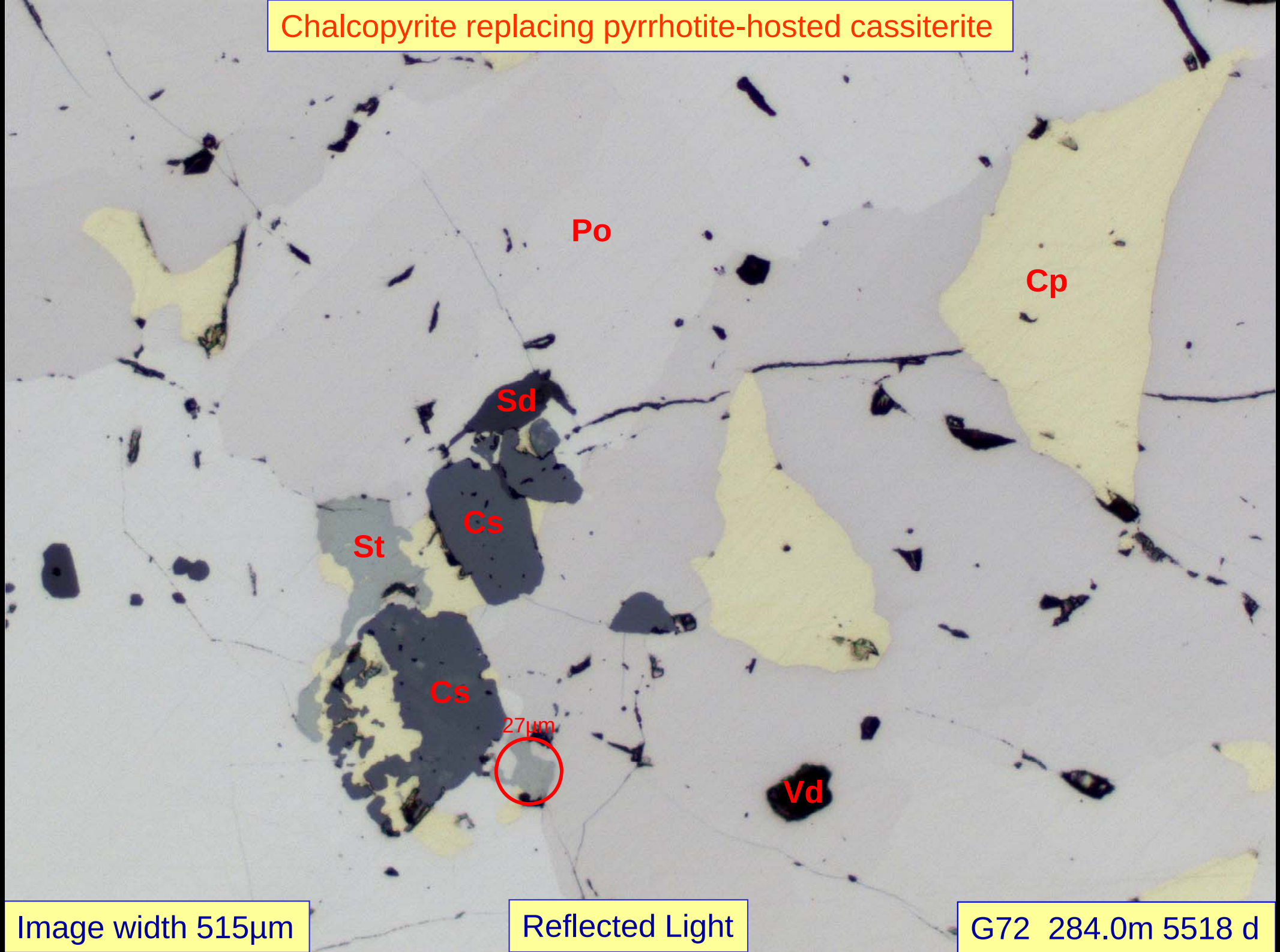
Image width ~115mm

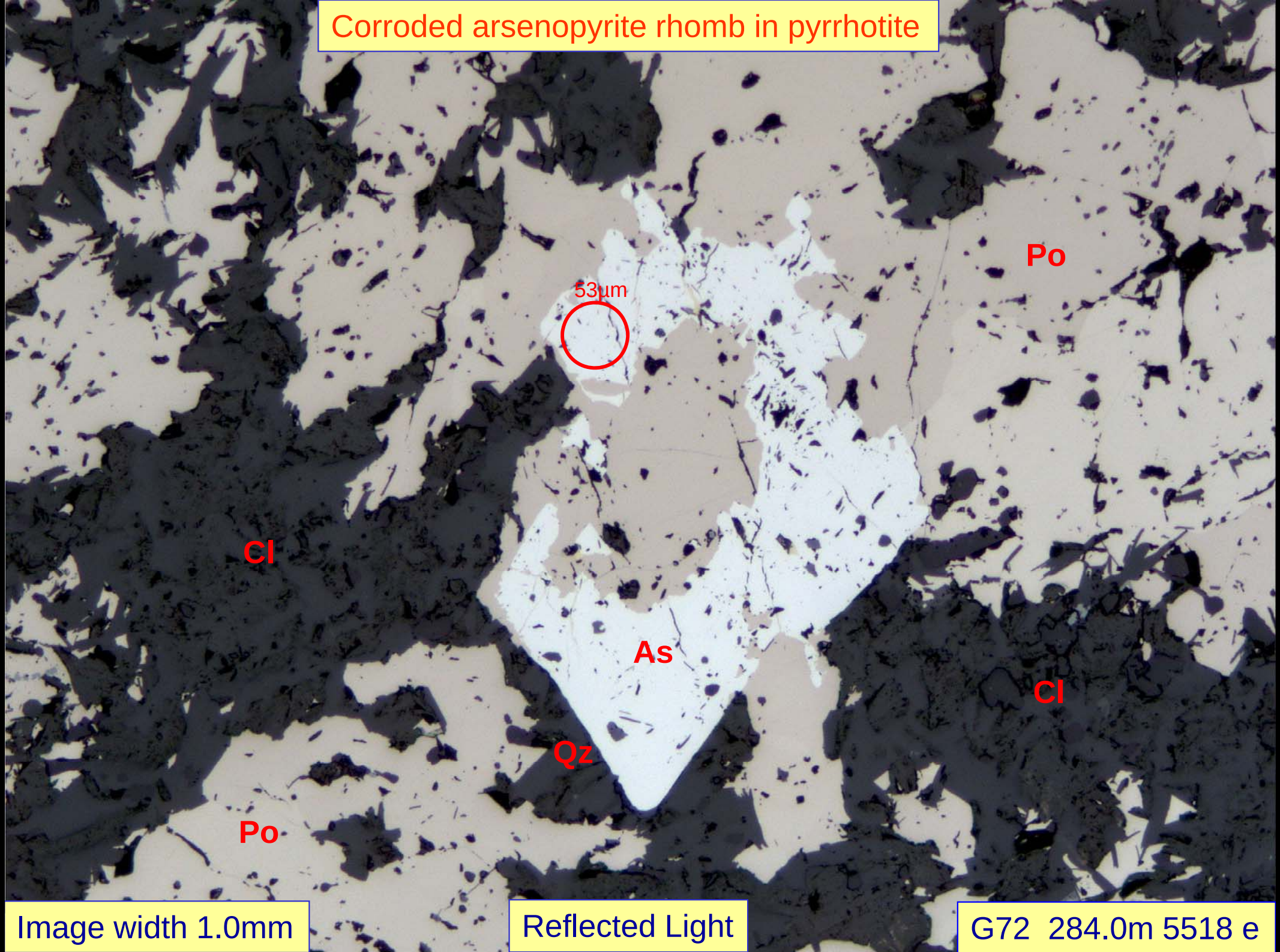
G72 284.0m 5518

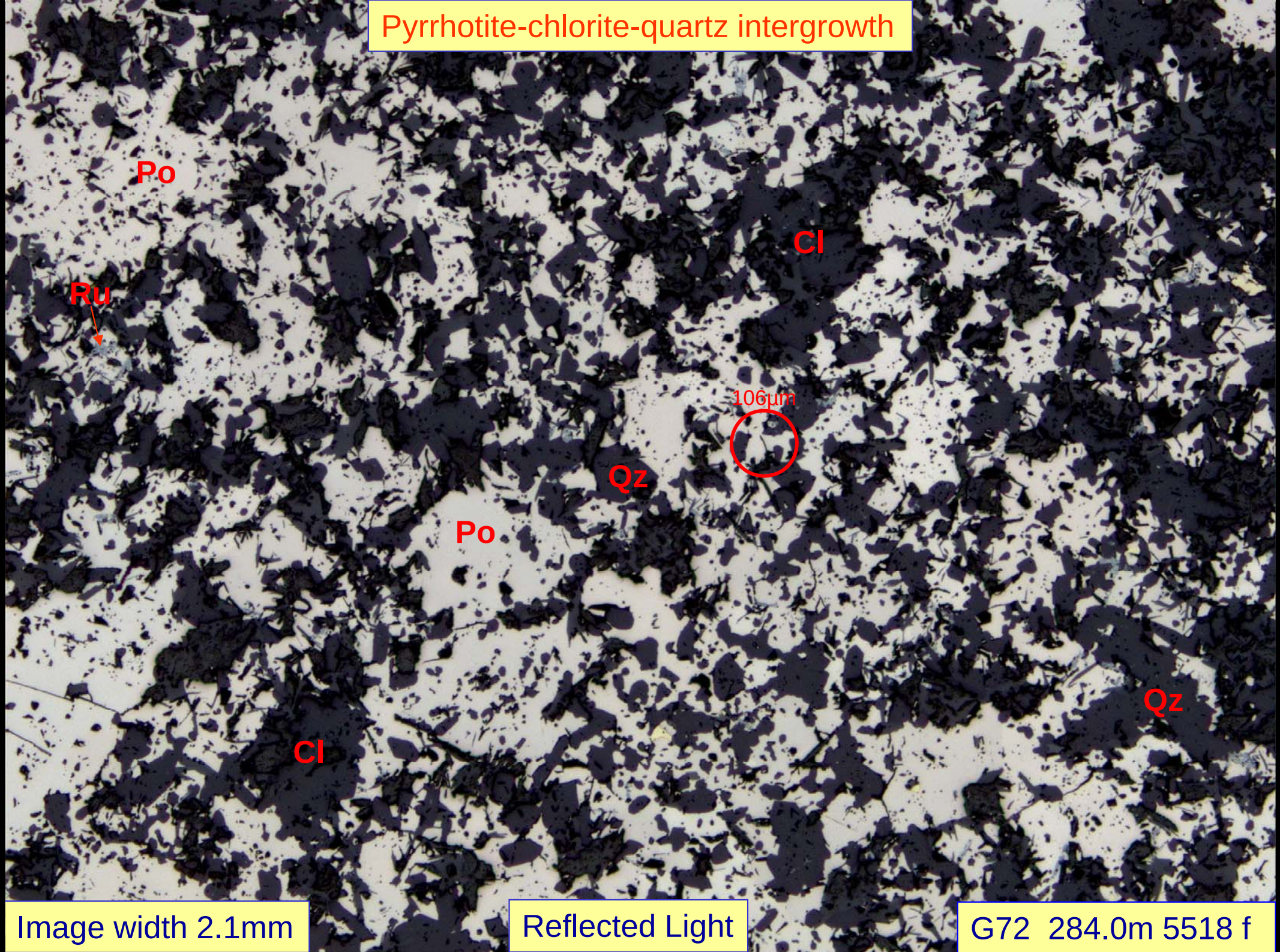

General low-magnification view
Qz
Cp
As
Cl
Po
Po/Sd
As=arsenopyrite
Bm=bismuthinite
Cl=chlorite
Cp=chalcopyrite
Cs=cassiterite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Sd=siderite
St=stannite
Vd=void
Image width 8.2mm
Reflected Light
G72 284.0m 5518 a

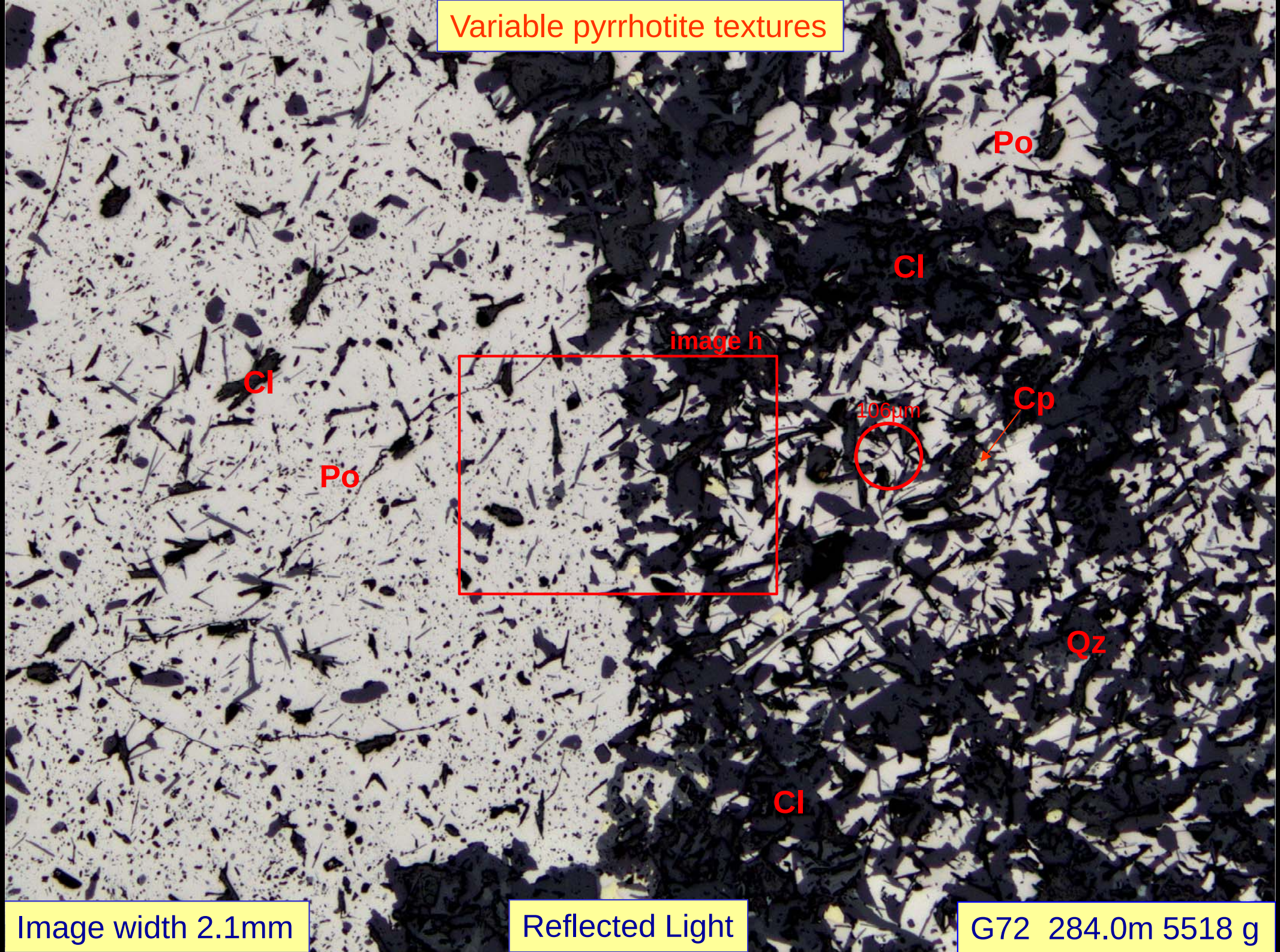

Irregular chalcopyrite in pyrrhotite; pyrite in siderite veinlet
Sd
Cp
Py
Po
Vd
Cs
106µm
Image width 2.1mm
Reflected Light
G72 284.0m 5518 b

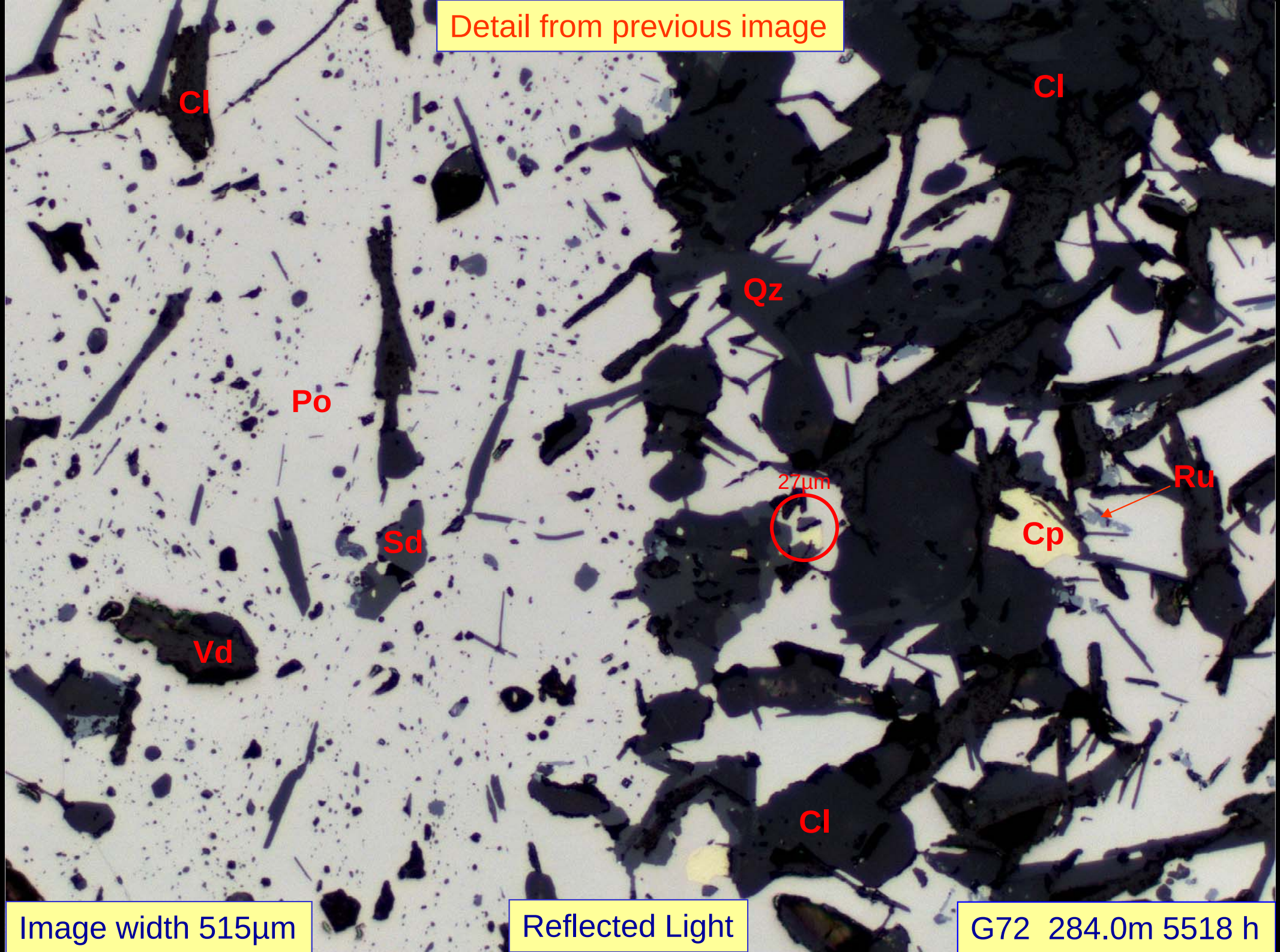

Low-temperature pyrite associated with siderite veinlet
106µm
Po
Py
Sd
Vd
Cl
Py
Po
Image width 2.1mm
Reflected Light
G72 284.0m 5518 c

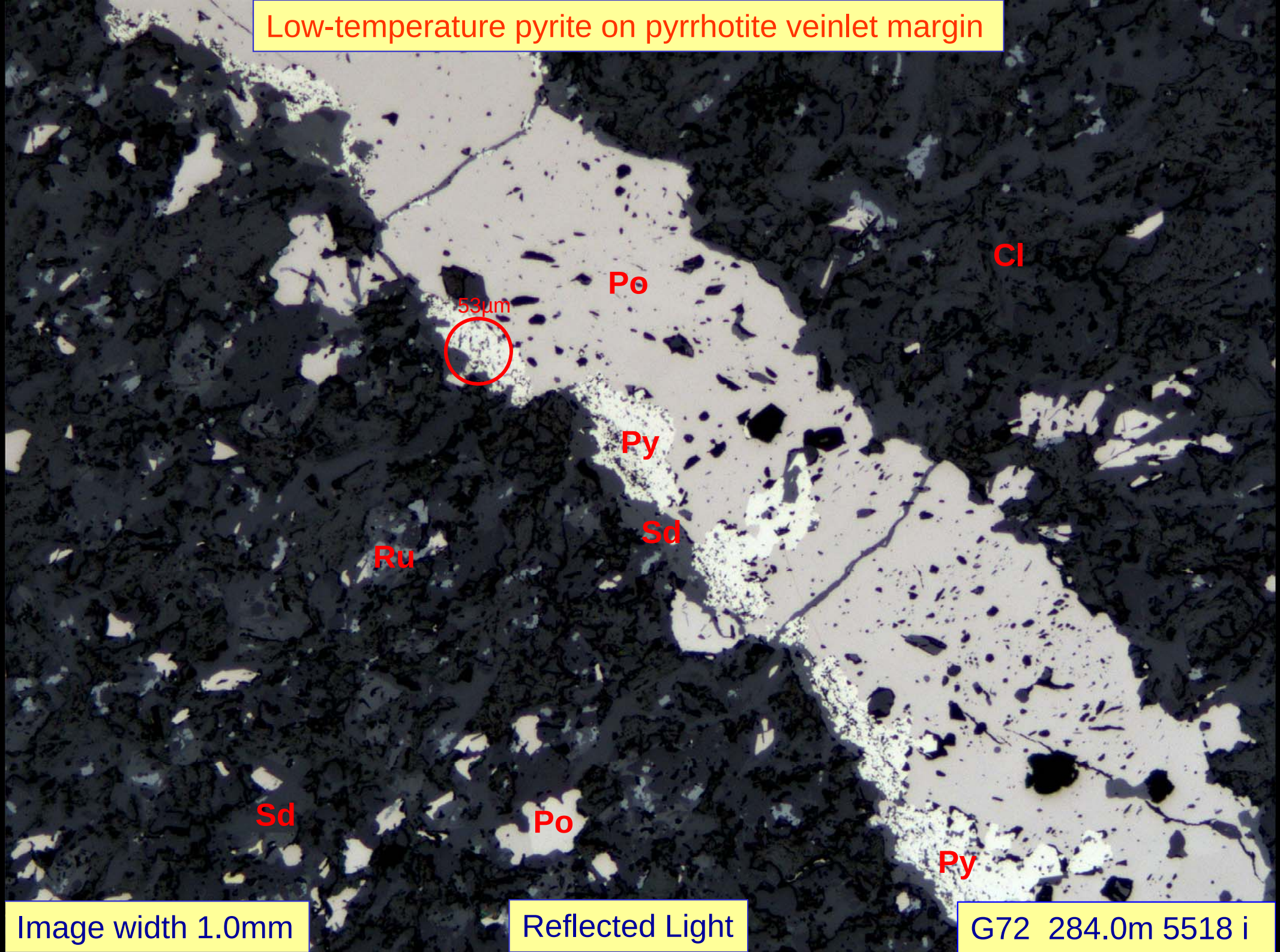

Chalcopyrite replacing pyrrhotite-hosted cassiterite
Po
Cp
Sd
Cs
St
Cs
27µm
Vd
Image width 515µm
Reflected Light
G72 284.0m 5518 d

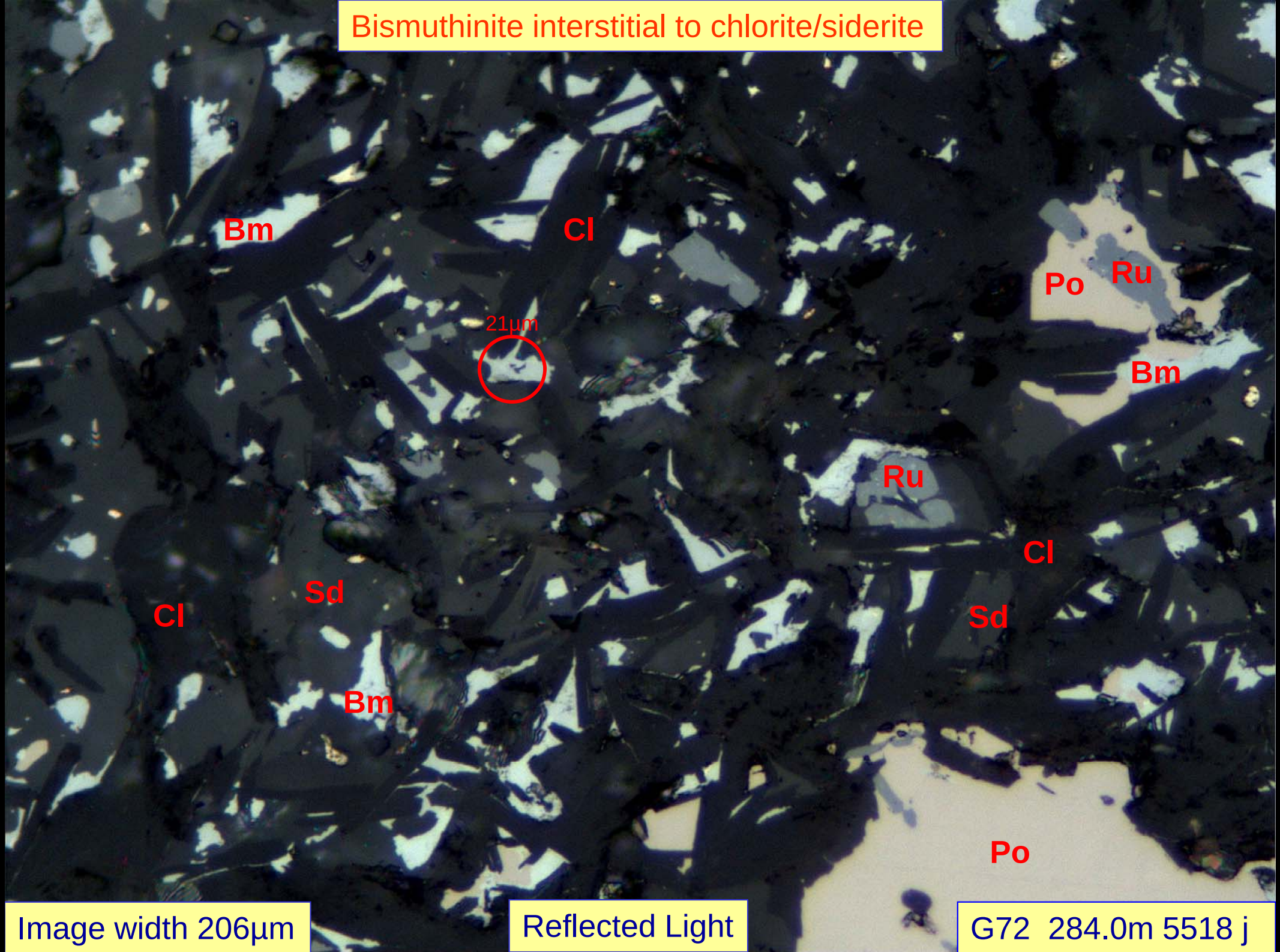

Corroded arsenopyrite rhomb in pyrrhotite
53µm
Po
Cl
As
Cl
Qz
Po
Image width 1.0mm
Reflected Light
G72 284.0m 5518 e

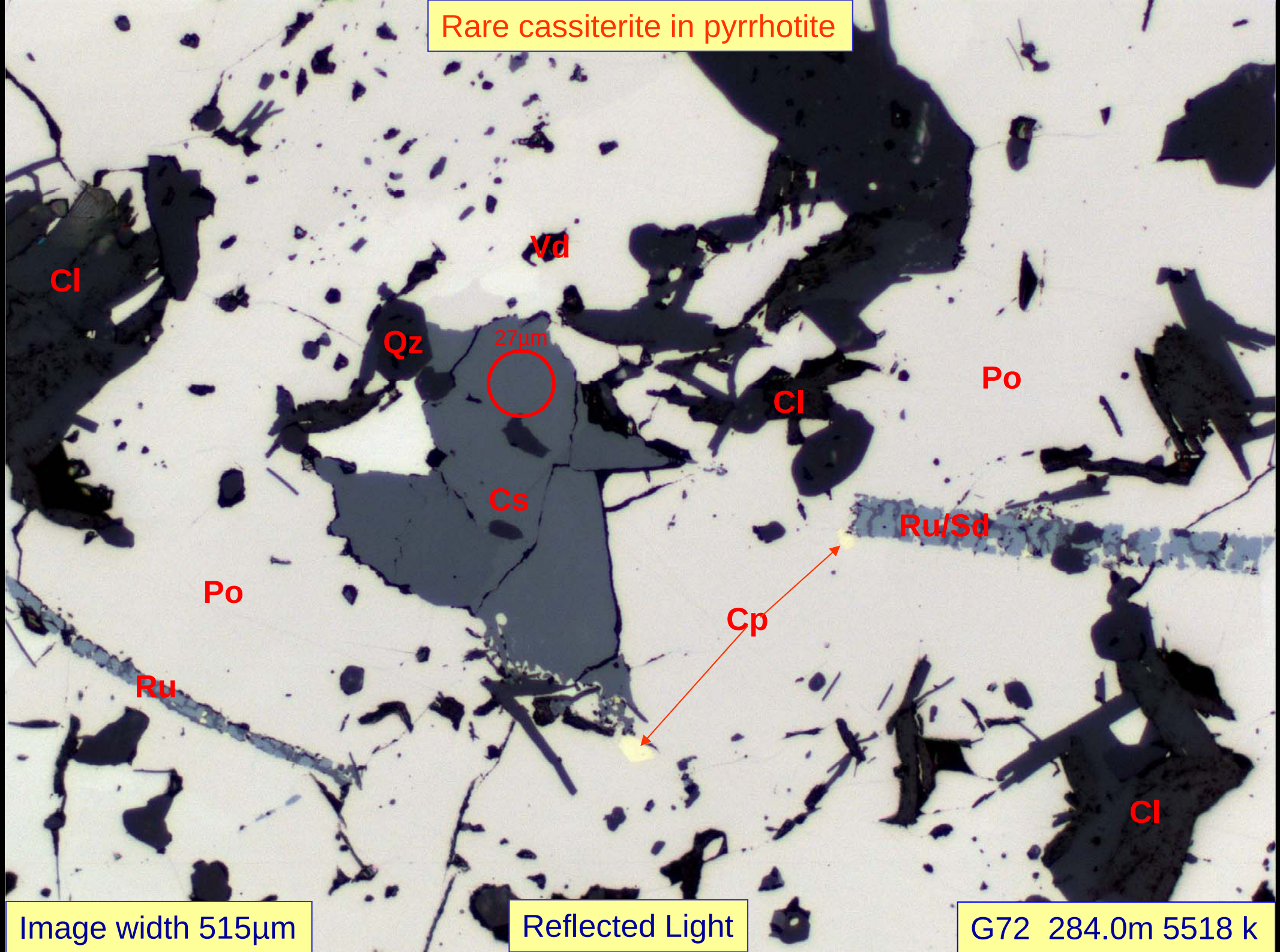

Pyrrhotite-chlorite-quartz intergrowth
Po
Cl
Ru
106µm
Qz
Po
Qz
Cl
Image width 2.1mm
Reflected Light
G72 284.0m 5518 f


Variable pyrrhotite textures
Po
Cl
image h
Cl
Po
106µm
Cp
Qz
Cl
Image width 2.1mm
Reflected Light
G72 284.0m 5518 g


Detail from previous image
Cl
Cl
Qz
Po
27µm
Ru
Cp
Sd
Vd
Cl
Image width 515µm
Reflected Light
G72 284.0m 5518 h


Low-temperature pyrite on pyrrhotite veinlet margin
Cl
Po
53µm
Py
Sd
Ru
Sd
Po
Py
Image width 1.0mm
Reflected Light
G72 284.0m 5518 i


Bismuthinite interstitial to chlorite/siderite
Bm
Cl
21µm
Po
Ru
Bm
Ru
Cl
Sd
Cl
Sd
Bm
Po
Image width 206µm
Reflected Light
G72 284.0m 5518 j


Rare cassiterite in pyrrhotite
Vd
Cl
Qz
27µm
Po
Cl
Cs
Ru/Sd
Po
Cp
Ru
Cl
Image width 515µm
Reflected Light
G72 284.0m 5518 k

PARTICLE MINERALOGY REPORT

Severn 5518

G72 284.0m

GJMcA 25.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
0.0	60.4	0.0	0.0	0.0	0.8	0.0	38.8	**300**
1	73	2	0	0	18	0	51	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	4.02	0.05	27.7	0.00	47.1	0.27	
Actual		**0.07**		**0.06**	**36.9**	**0.00**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	0	39	0	0	0	0	46	
Binary	0	57	0	0	15	0	49	
Ternary	33	3	100	0	74	0	5	
Quat.y+	67	0	0	0	10	0	0	
Grains	0.7	82.3	1.7	0.0	4.0	0.0	75.3	1.64

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	0	0	0	0
Po	0		0	0	2	0	98
Cs	0	0		0	0	0	0
St	0	0	0		0	0	0
Cp	0	100	0	0		0	0
As	0	0	0	0	0		0
Ga	0	100	0	0	0	0	

TOTAL ASSOCIATION MATRIX

		Py	Po	Cs	St	Cp	As	Ga
	Py		100	0	0	67	0	100
	Po	0		2	0	2	0	60
of	**Cs**	0	100		0	30	0	70
all	**St**	0	0	0		0	0	0
	Cp	10	100	42	0		0	43
	As	0	0	0	0	0		0
	Ga	1	54	0	0	5	0	

DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	0		0	0	0	0	0	0	33	67
Po	39	0		0	0	1	0	56	3	0
Cs	0	0	0		0	0	0	0	100	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	15	0	0		0	0	74	10
As	0	0	0	0	0	0		0	0	0
Ga	46	0	49	0	0	0	0		5	0

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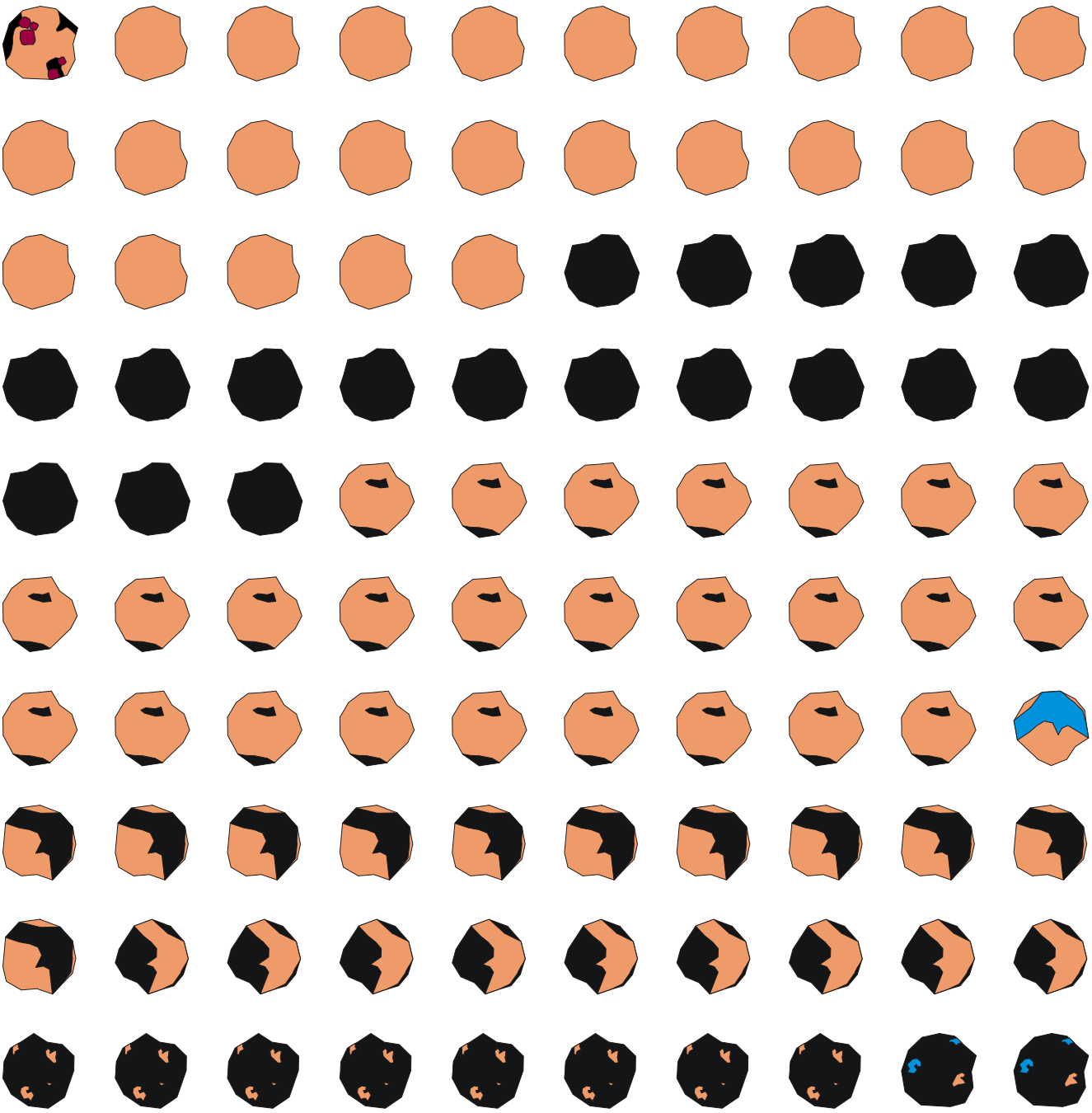
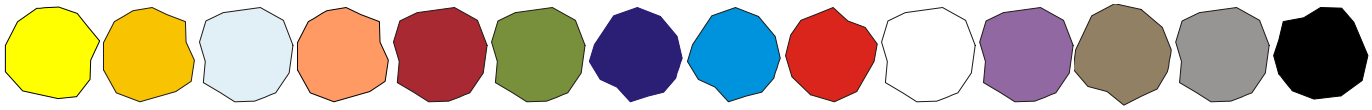
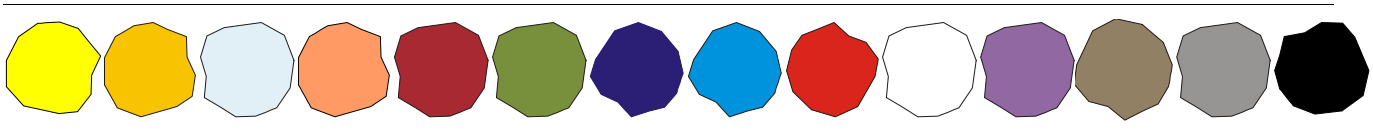
Severn 5518 **53µm mask** **January 2012**





Stellar Resources - Severn Drillhole Mineragraphy

Severn 5518 Sn Scan **53µm mask** **January 2012**



Core Scan

QXRD: 38% pyrrhotite, 21% pyrite, 12% siderite, 12% quartz, 9% cassiterite, 3% apatite

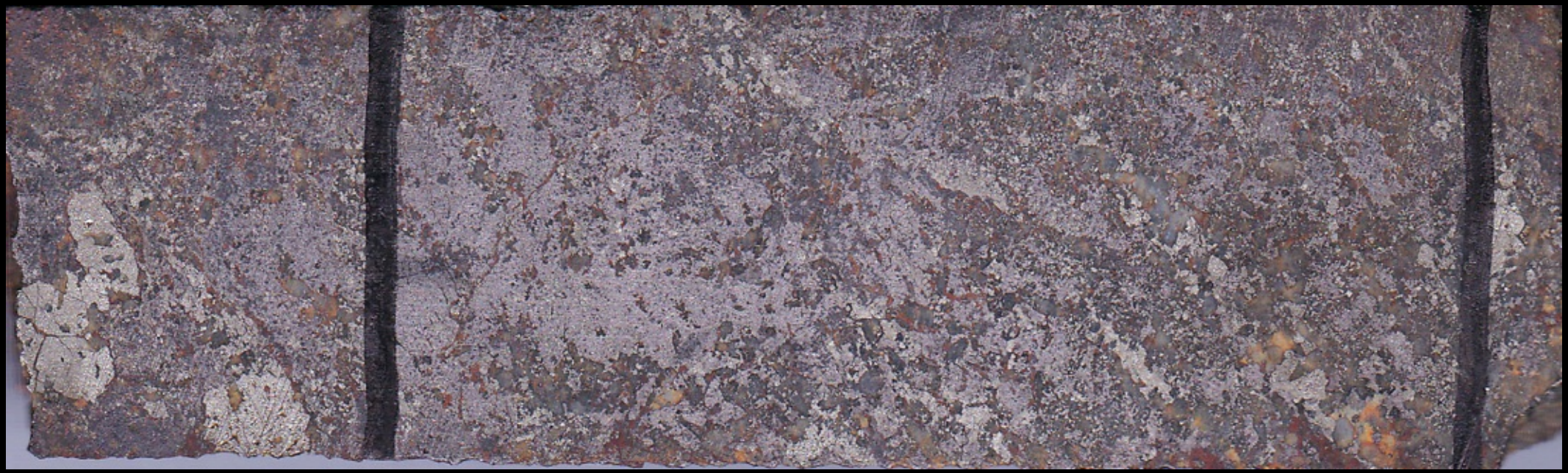
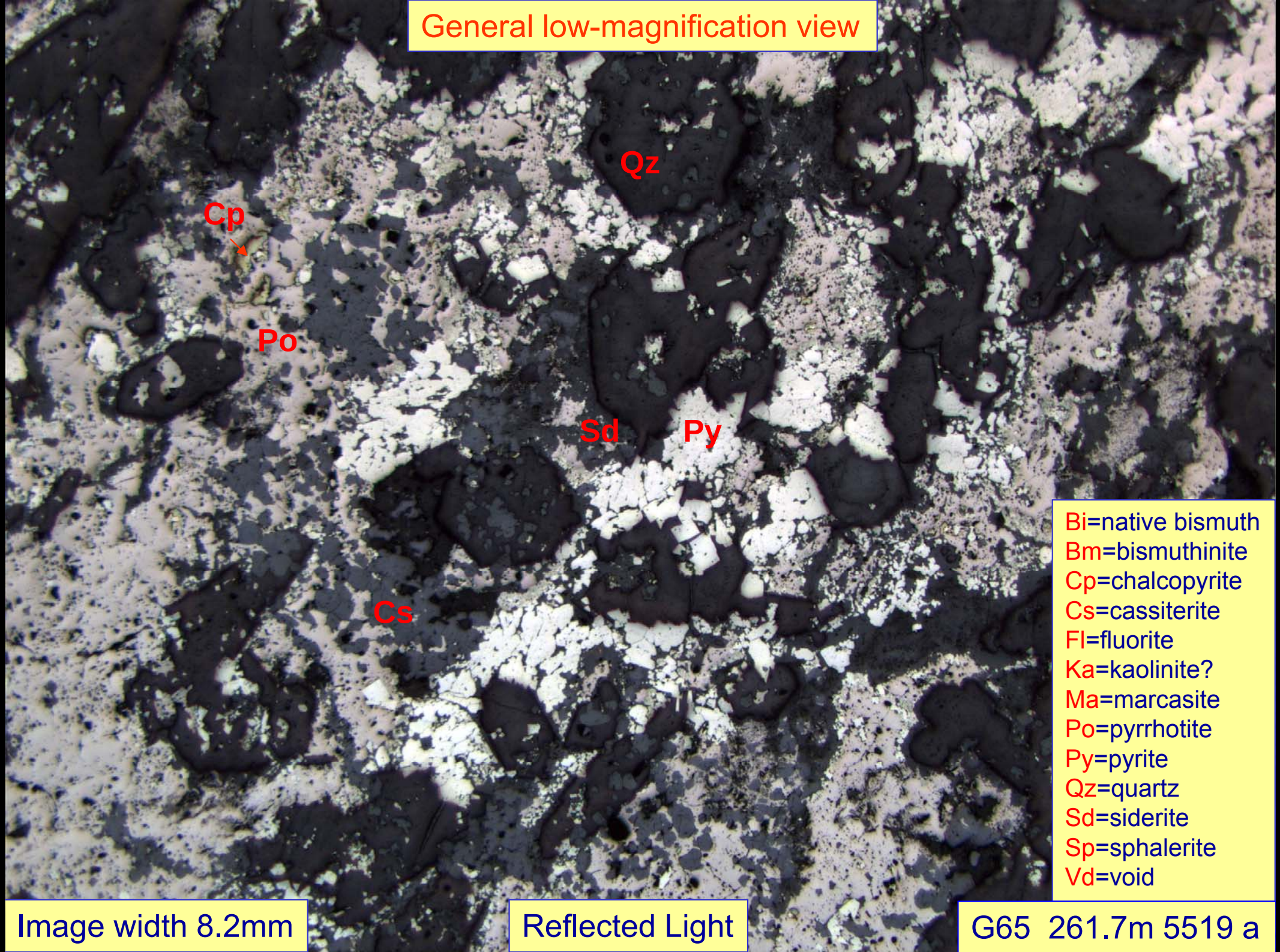
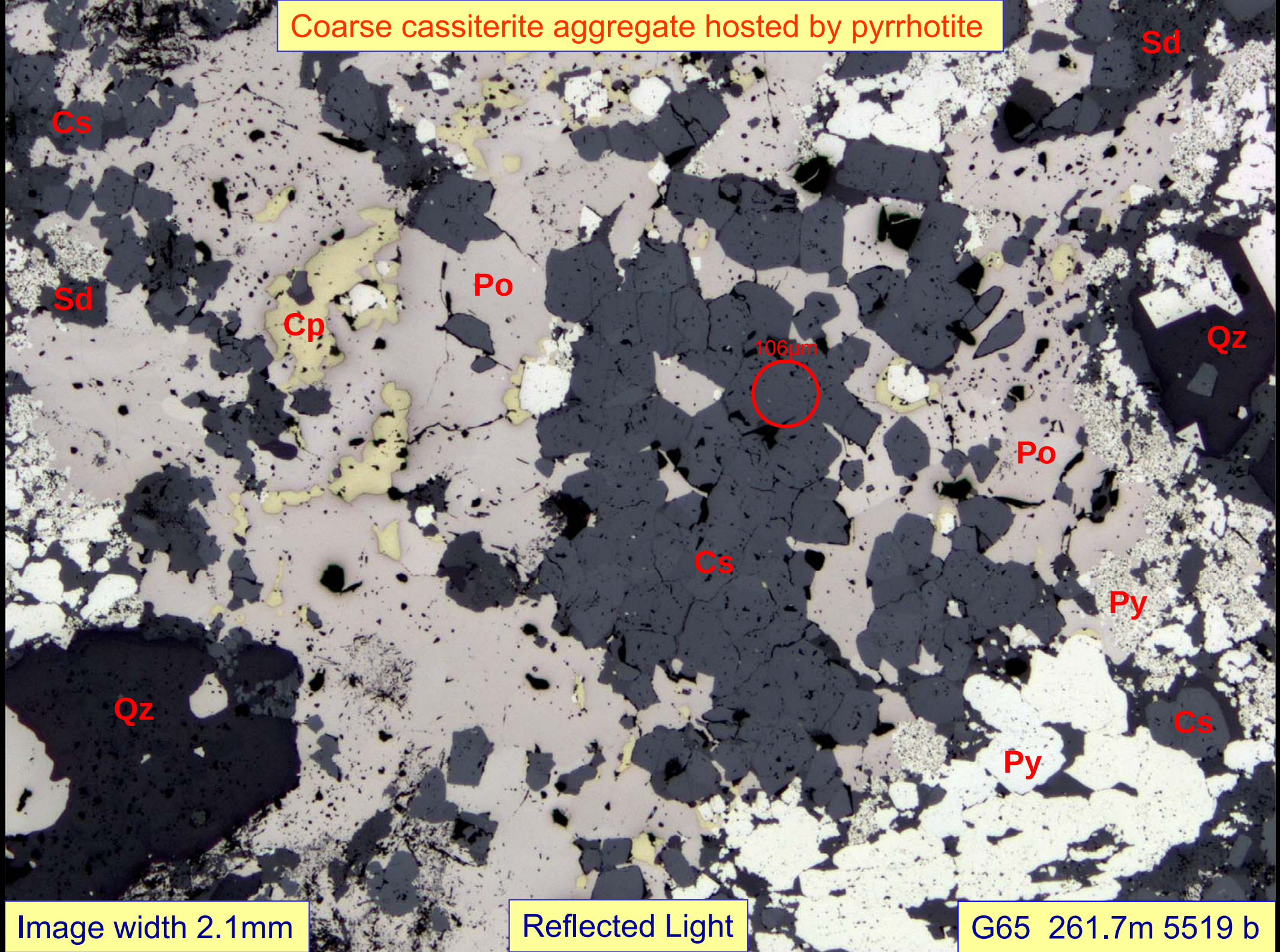
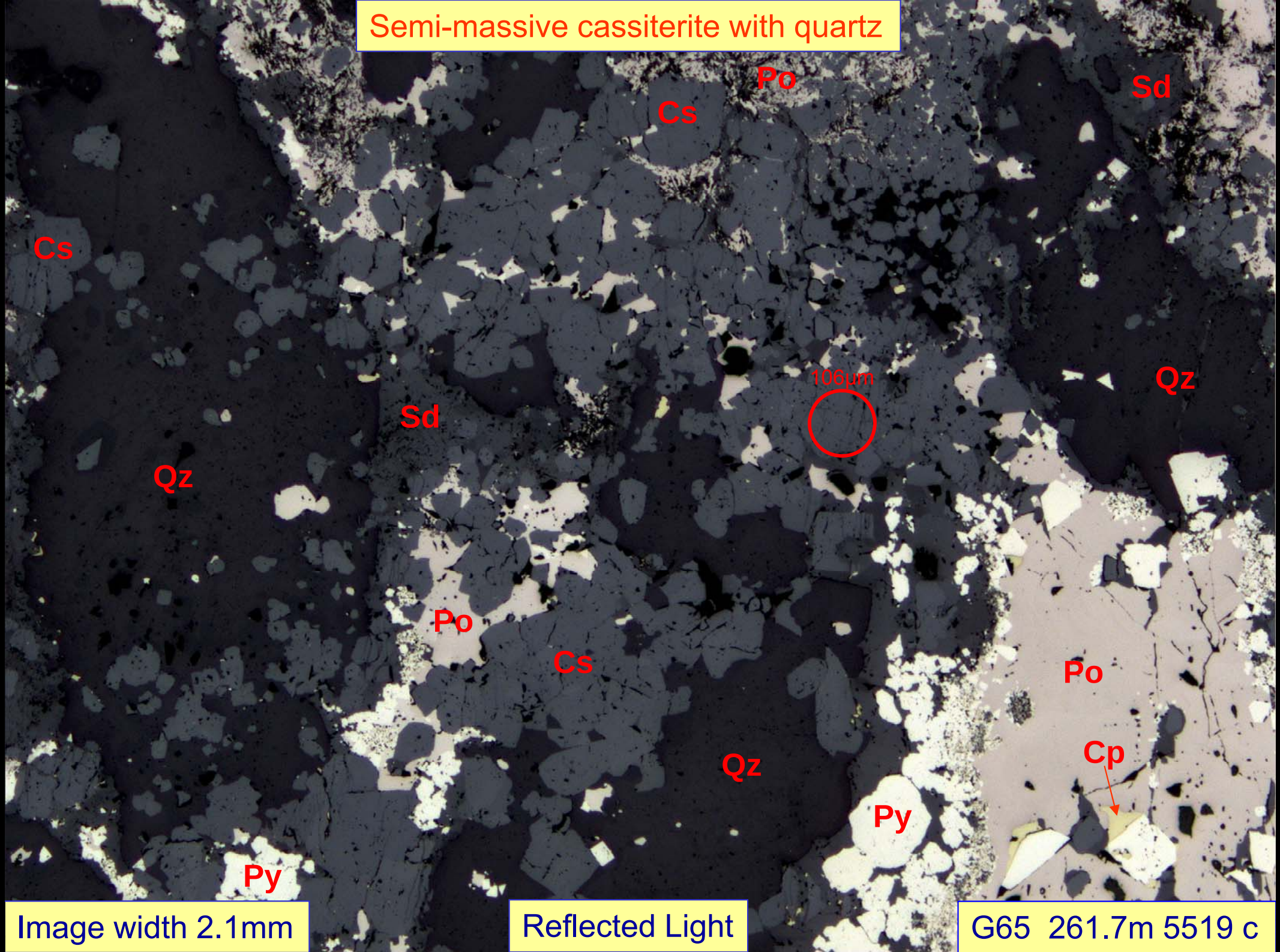


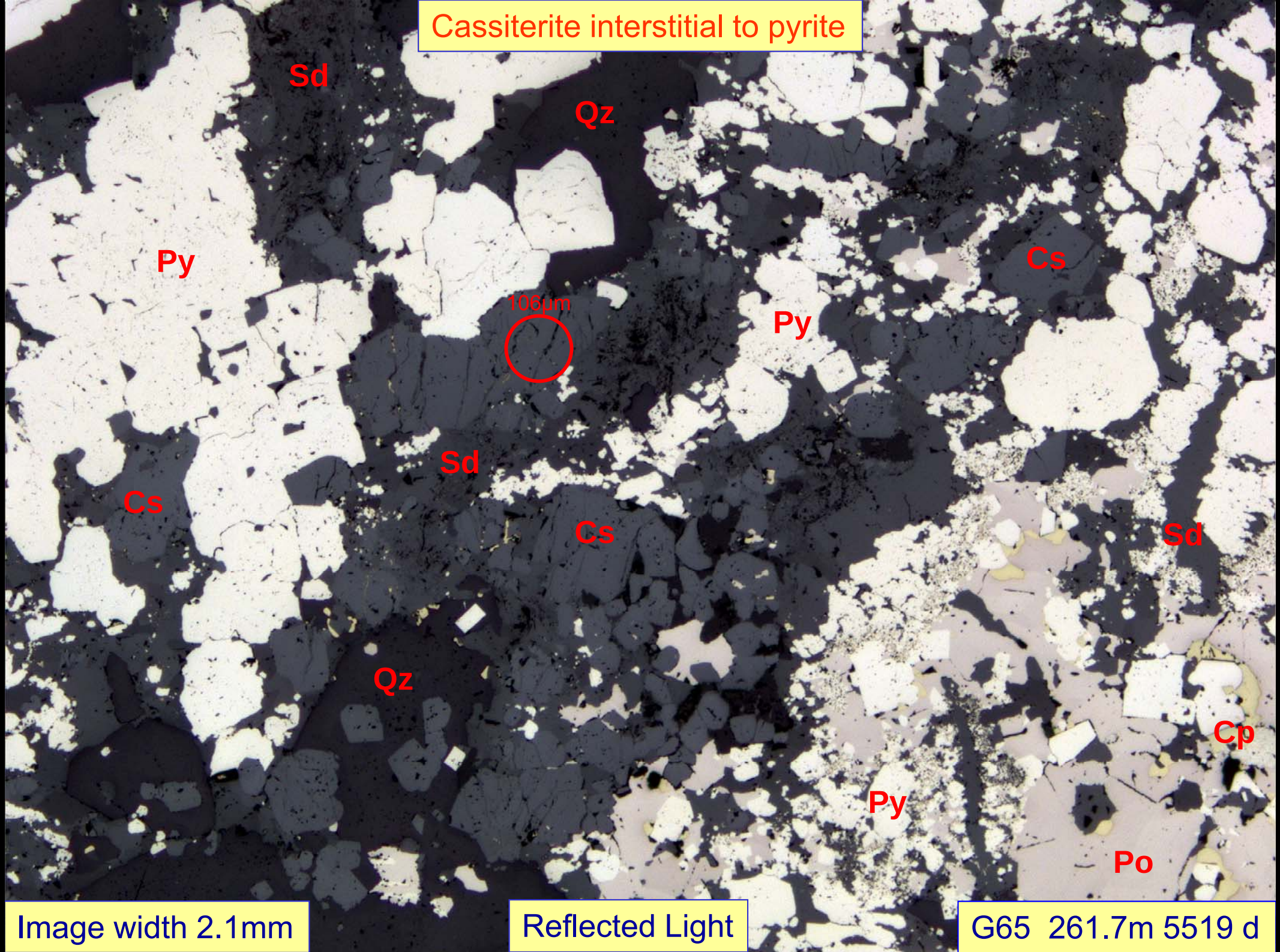
Image width ~70mm

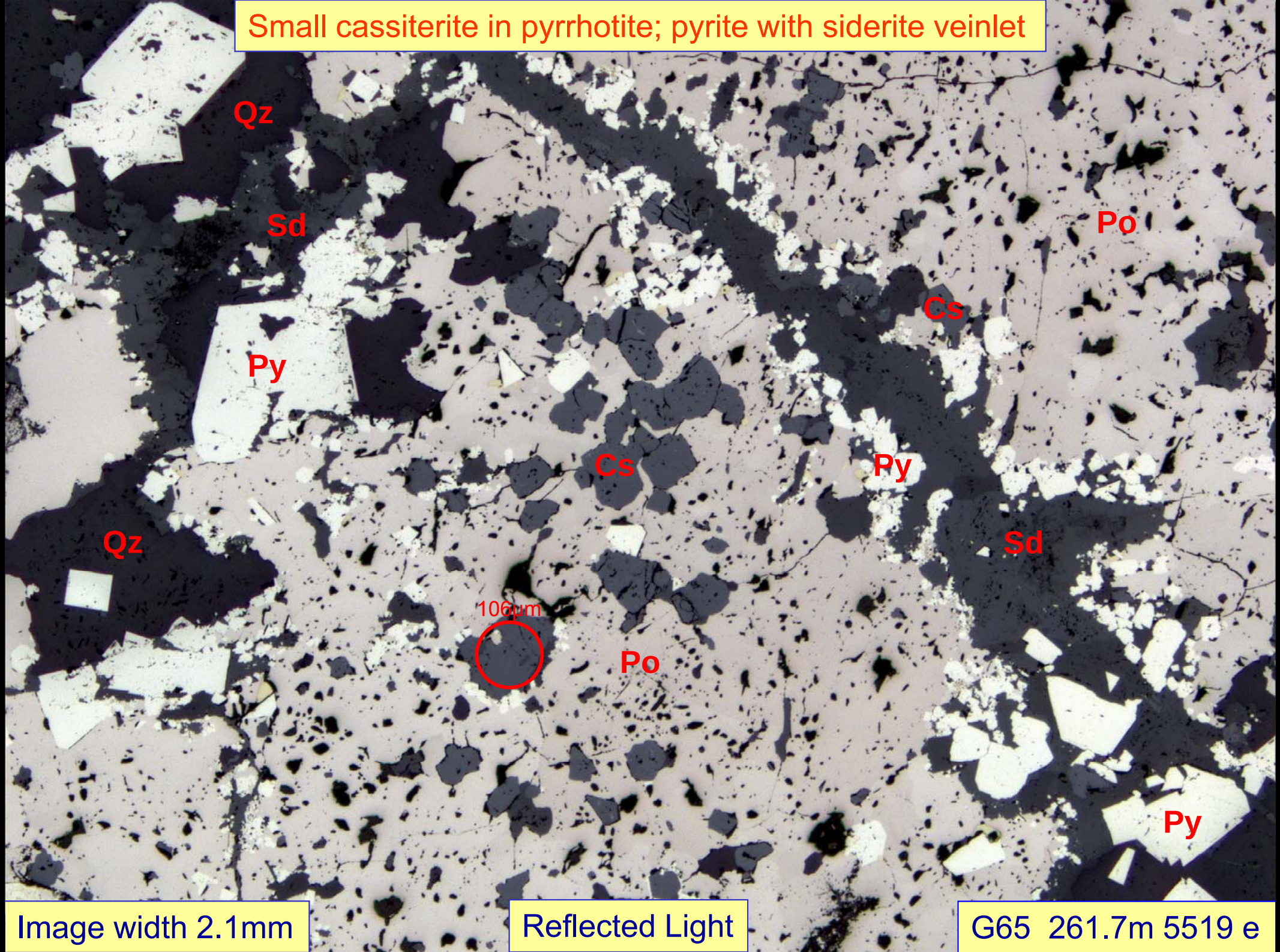
G65 261.7m 5519

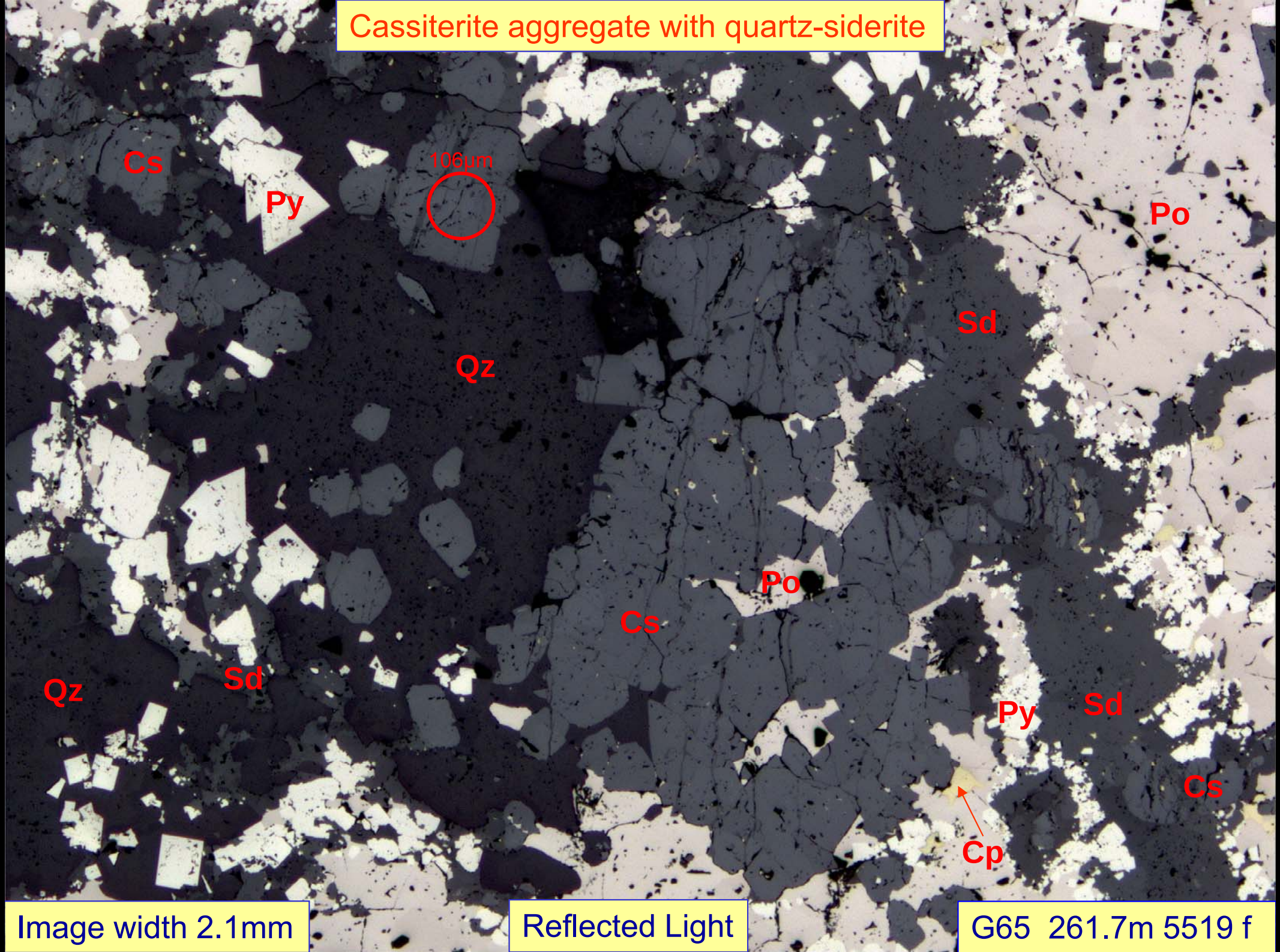

General low-magnification view
Qz
Cp
Po
Sd
Py
Cs
Bi=native bismuth
Bm=bismuthinite
Cp=chalcopyrite
Cs=cassiterite
Fl=fluorite
Ka=kaolinite?
Ma=marcasite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Sd=siderite
Sp=sphalerite
Vd=void
Image width 8.2mm
Reflected Light
G65 261.7m 5519 a

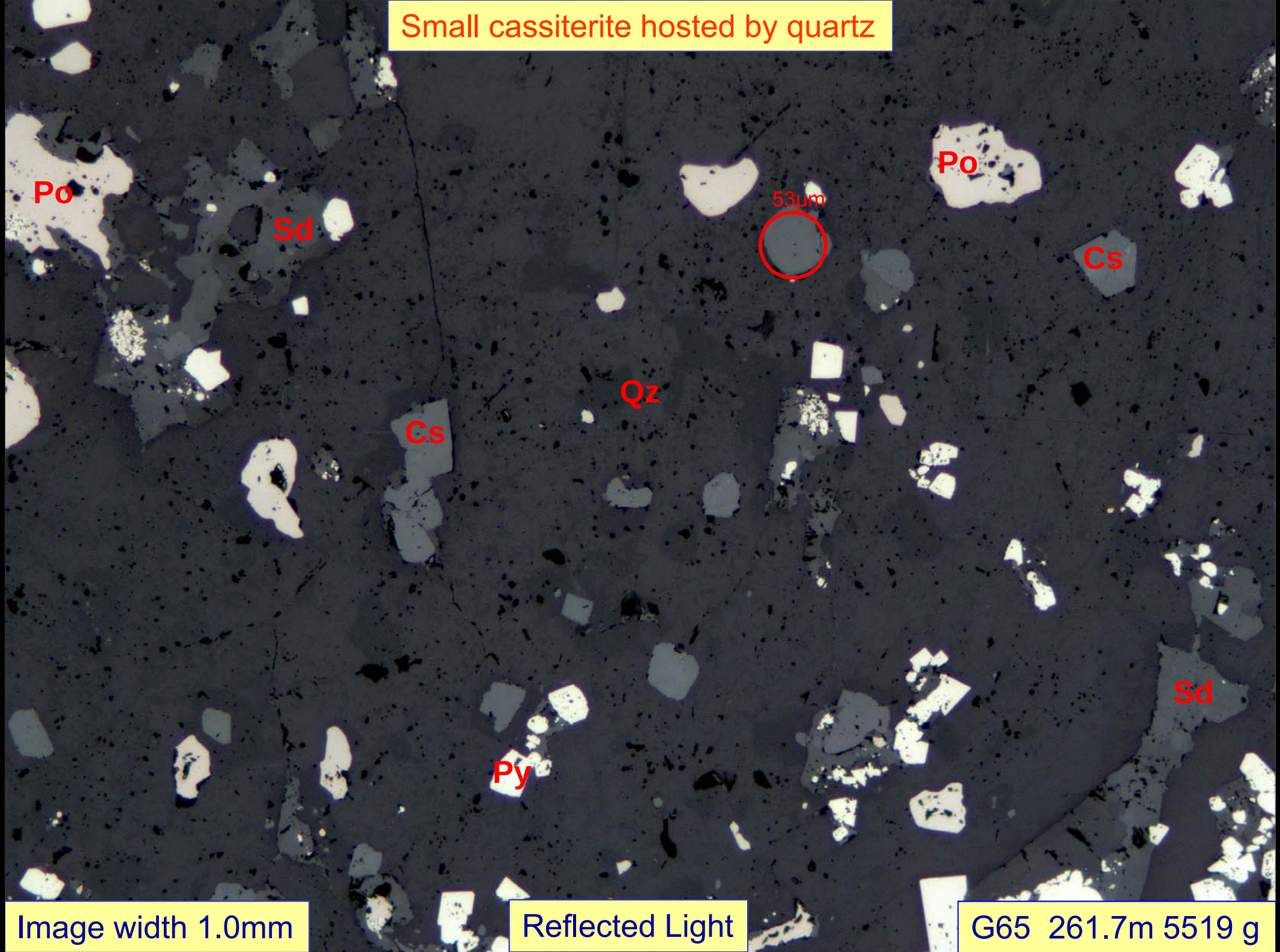

Coarse cassiterite aggregate hosted by pyrrhotite
Sd
Cs
Sd
Po
Cp
106µm
Qz
Po
Cs
Py
Qz
Cs
Py
Image width 2.1mm
Reflected Light
G65 261.7m 5519 b

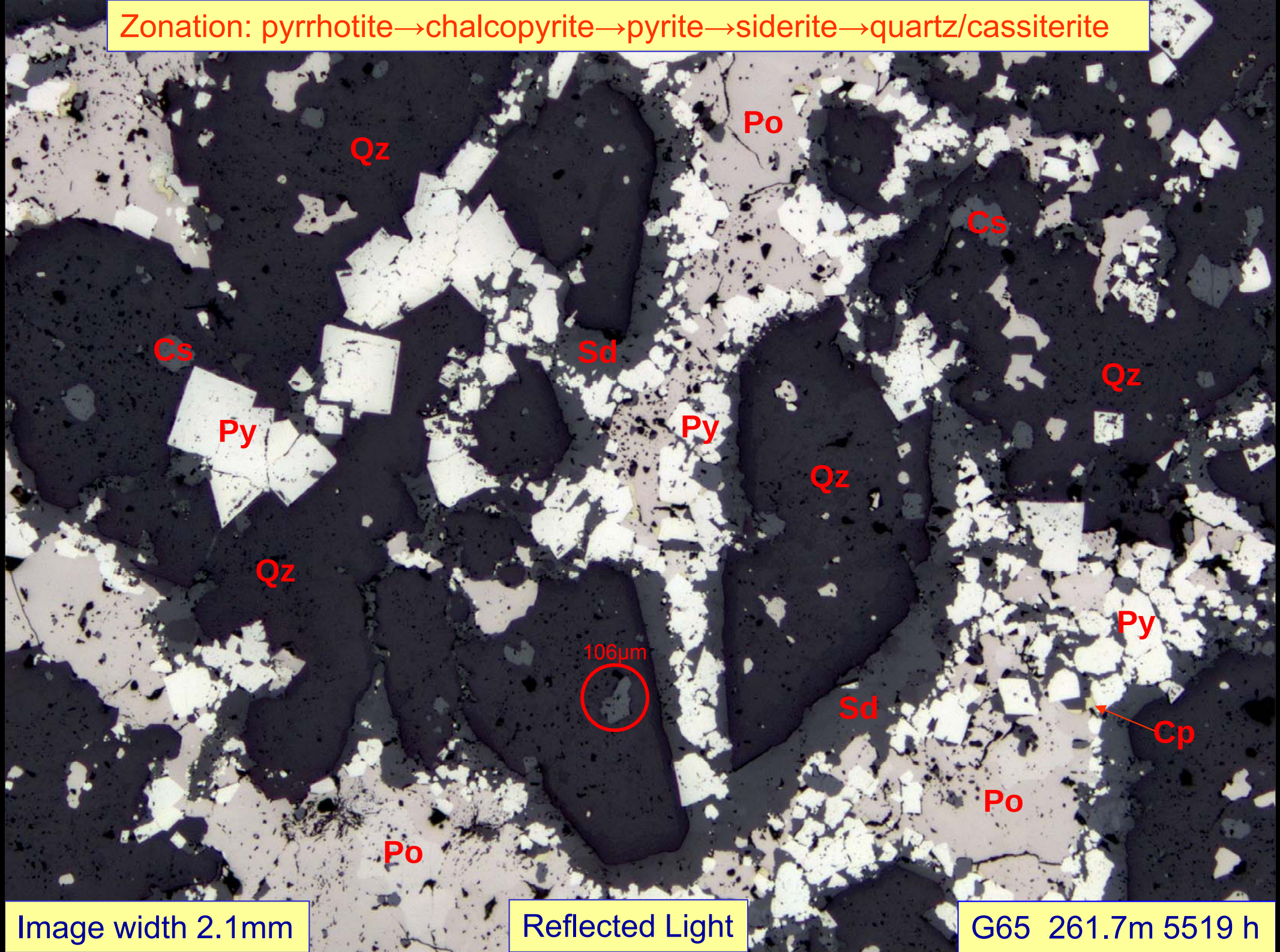

Semi-massive cassiterite with quartz
Po
Cs
Sd
Cs
106µm
Qz
Sd
Qz
Po
Cs
Po
Cp
Qz
Py
Py
Image width 2.1mm
Reflected Light
G65 261.7m 5519 c

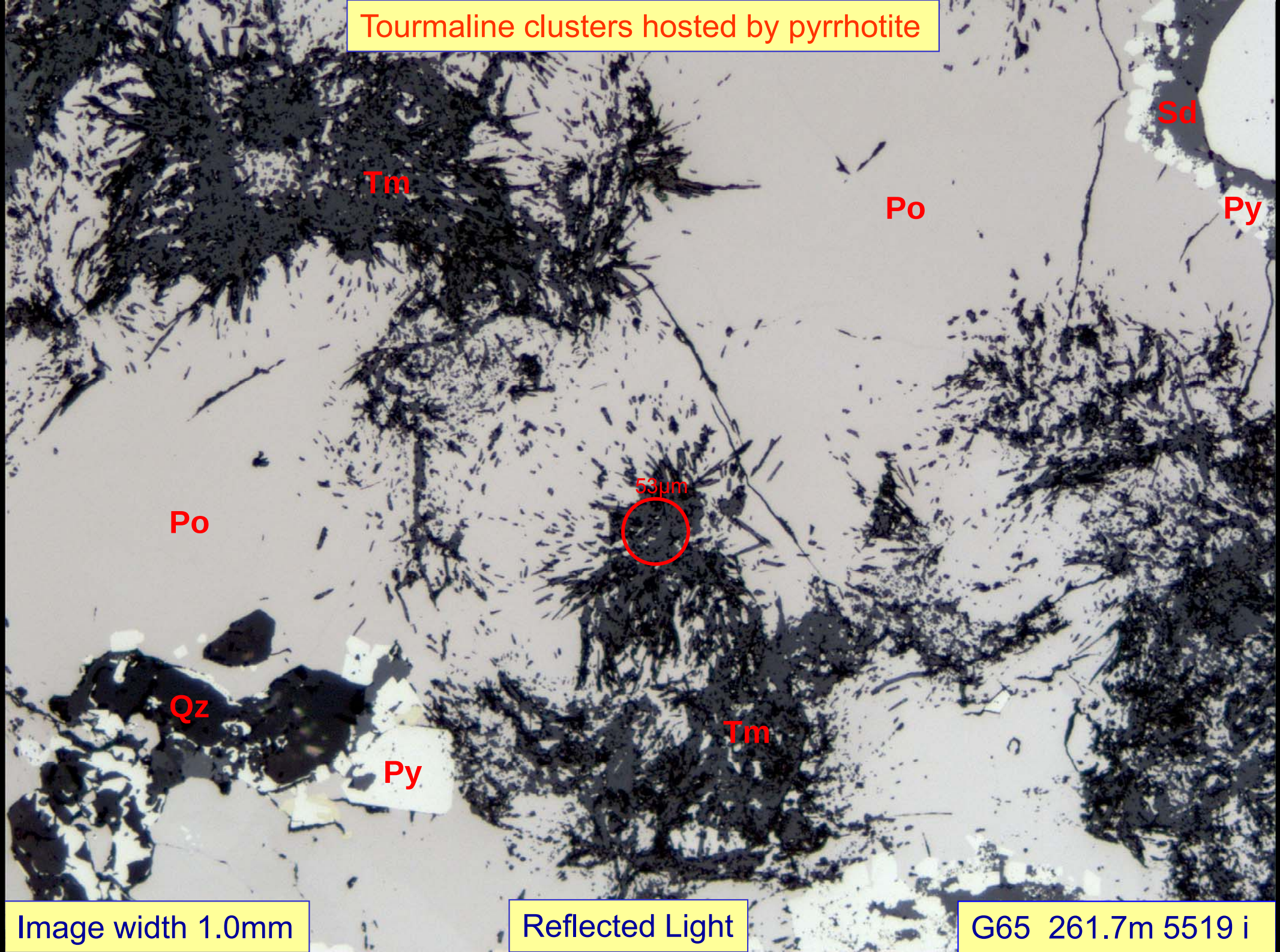

Cassiterite interstitial to pyrite
Sd
Qz
Py
Cs
106µm
Py
Sd
Cs
Cs
Sd
Qz
Cp
Py
Po
Image width 2.1mm
Reflected Light
G65 261.7m 5519 d

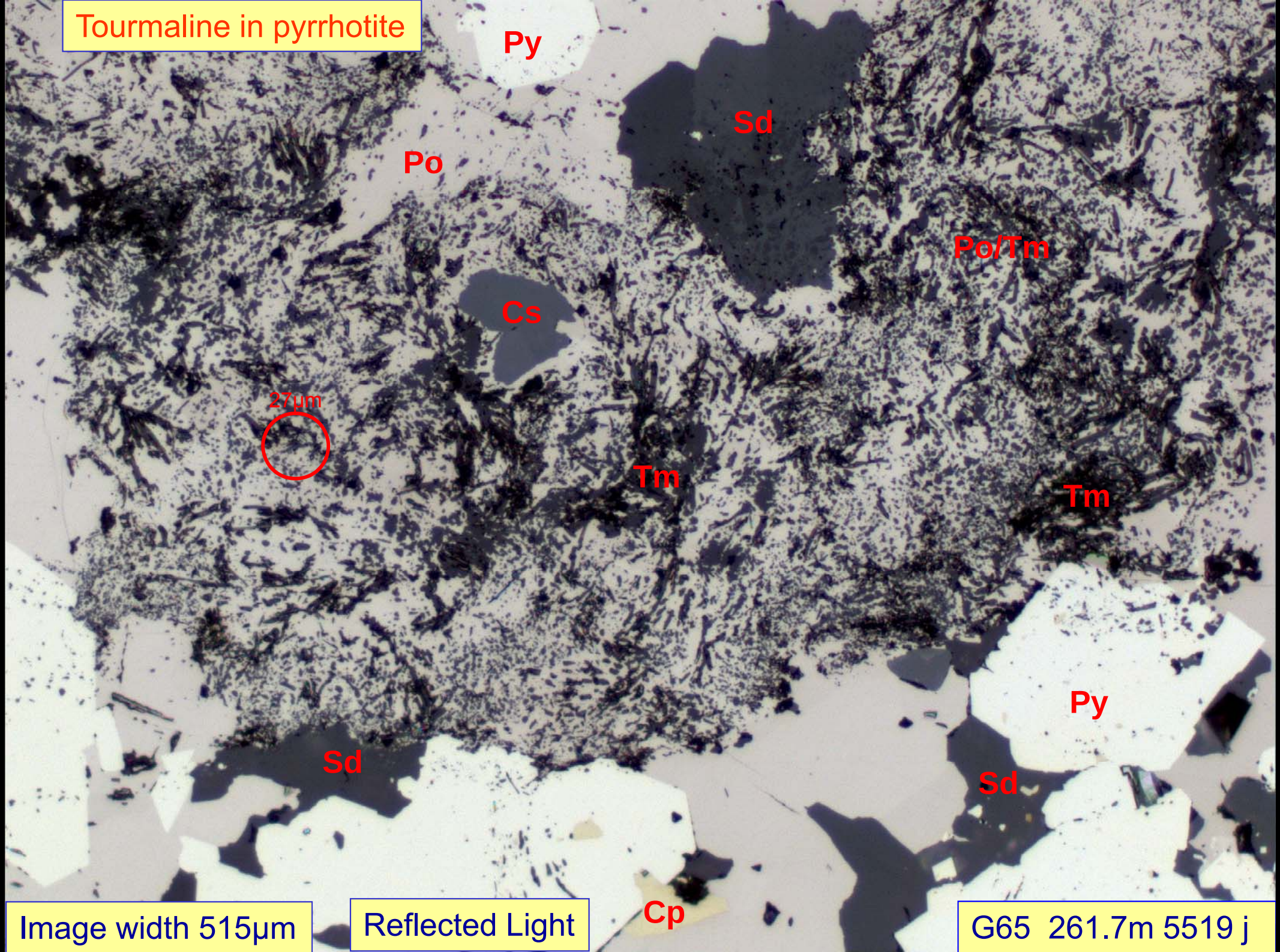

Small cassiterite in pyrrhotite; pyrite with siderite veinlet
Qz
Sd
Po
Cs
Py
Cs
Py
Qz
Sd
106µm
Po
Py
Image width 2.1mm
Reflected Light
G65 261.7m 5519 e

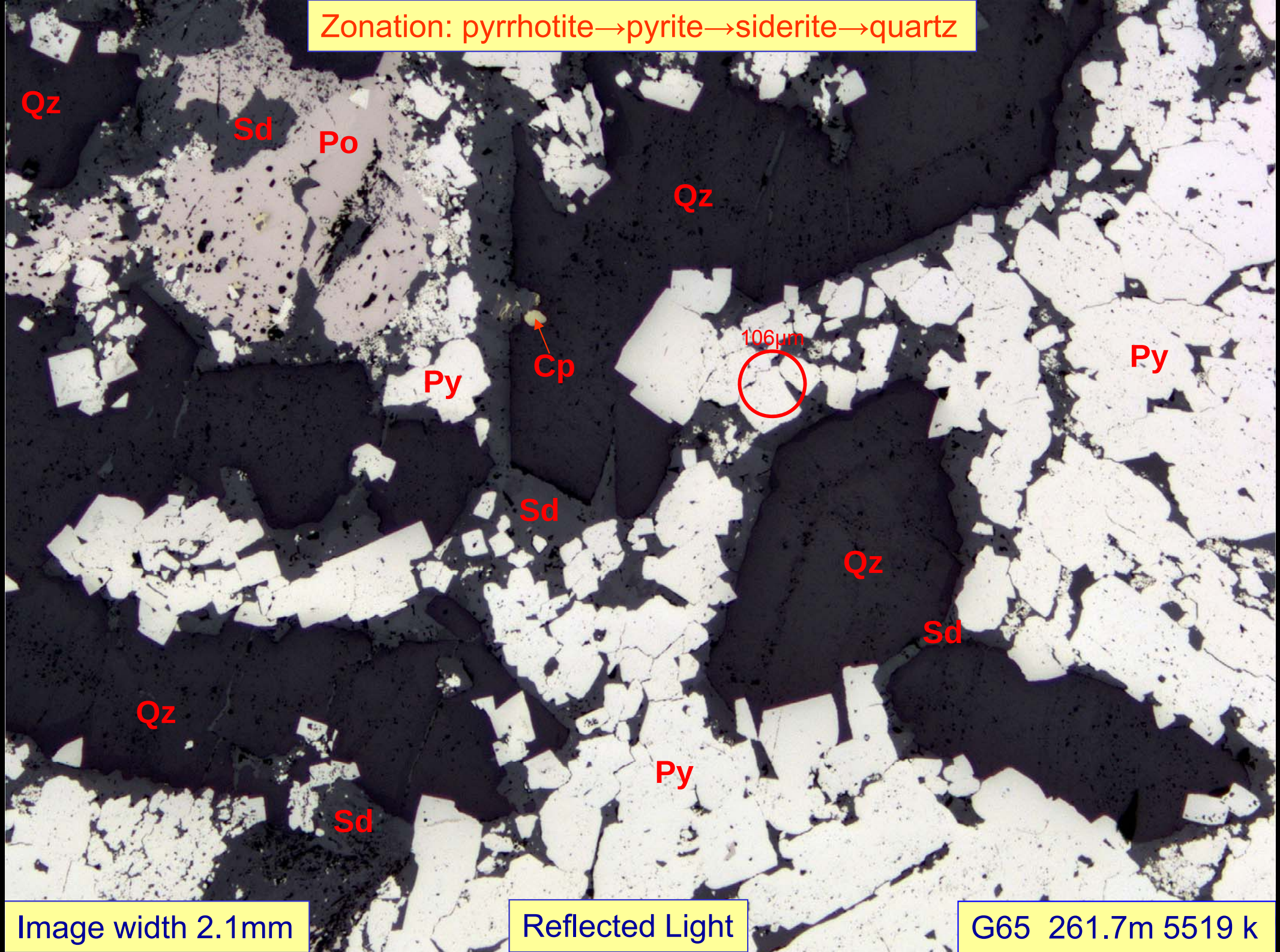

Cassiterite aggregate with quartz-siderite
Cs
Py
106µm
Po
Sd
Qz
Po
Cs
Qz
Sd
Py
Sd
Cs
Cp
Image width 2.1mm
Reflected Light
G65 261.7m 5519 f

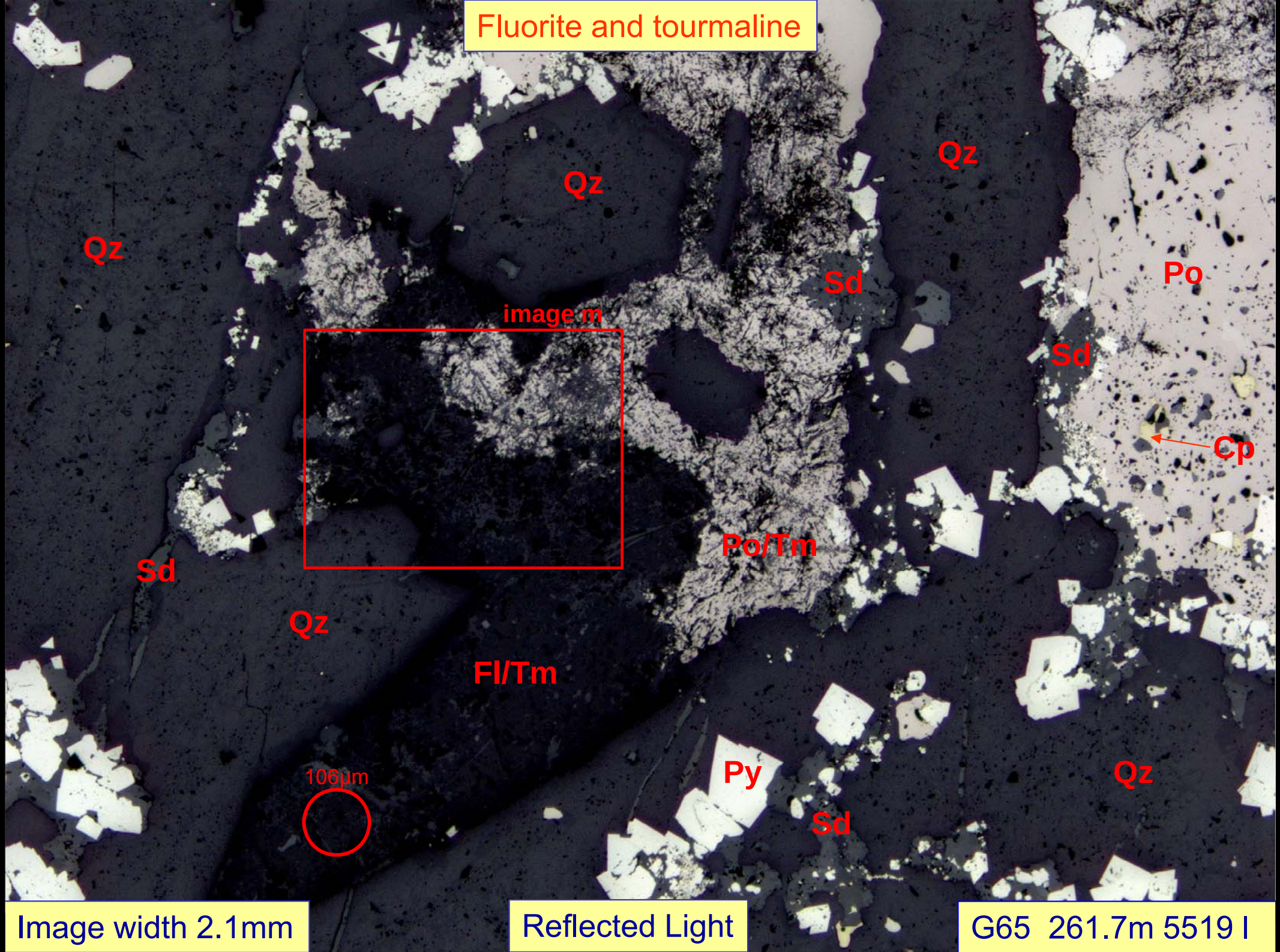

Small cassiterite hosted by quartz
Po
Sd
53um
Po
Cs
Qz
Cs
Sd
Py
Image width 1.0mm
Reflected Light
G65 261.7m 5519 g

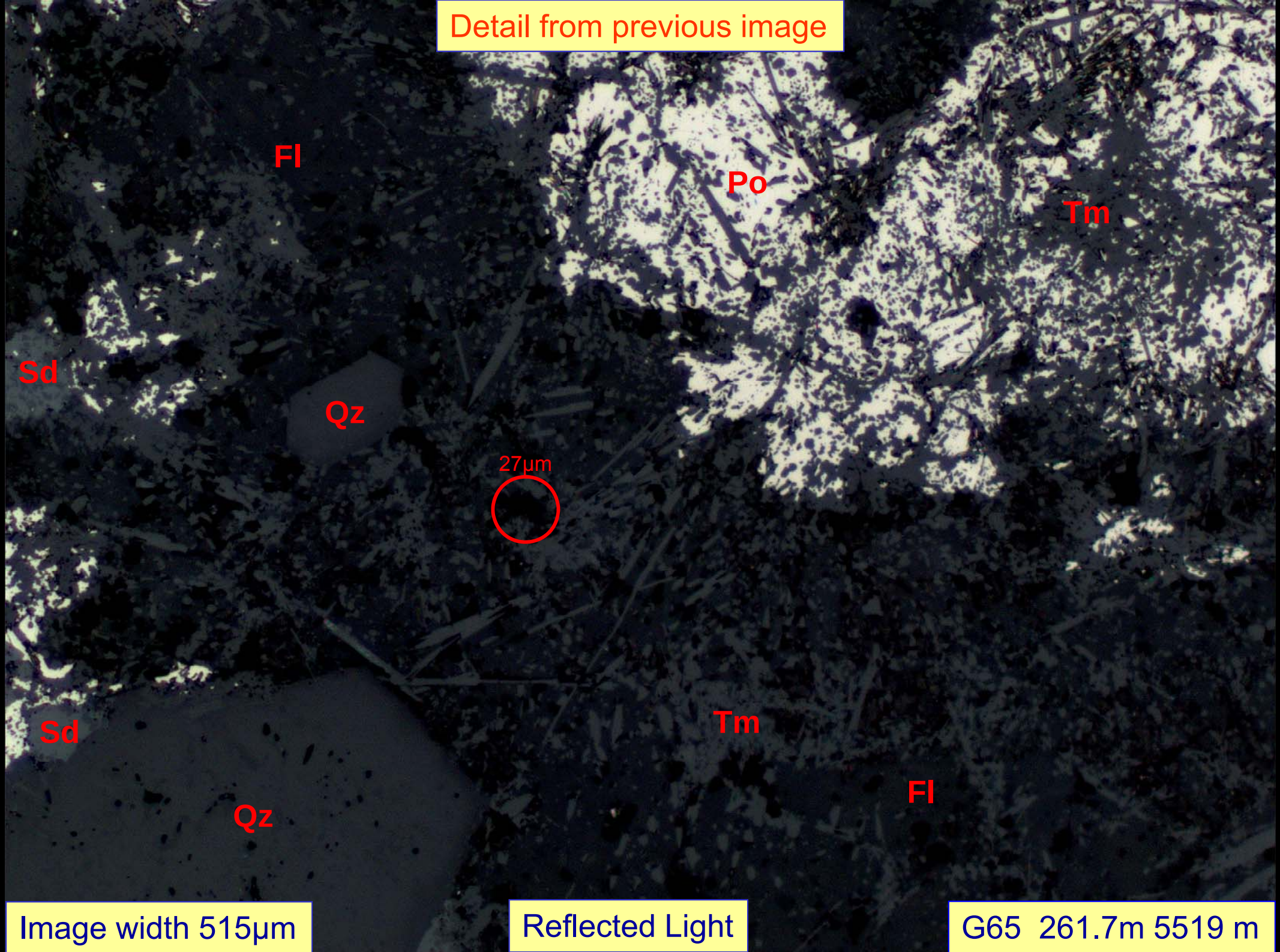

Zonation: pyrrhotite→chalcopyrite→pyrite→siderite→quartz/cassiterite
Po
Qz
Cs
Cs
Sd
Qz
Py
Py
Qz
Qz
106µm
Py
Sd
Cp
Po
Po
Image width 2.1mm
Reflected Light
G65 261.7m 5519 h

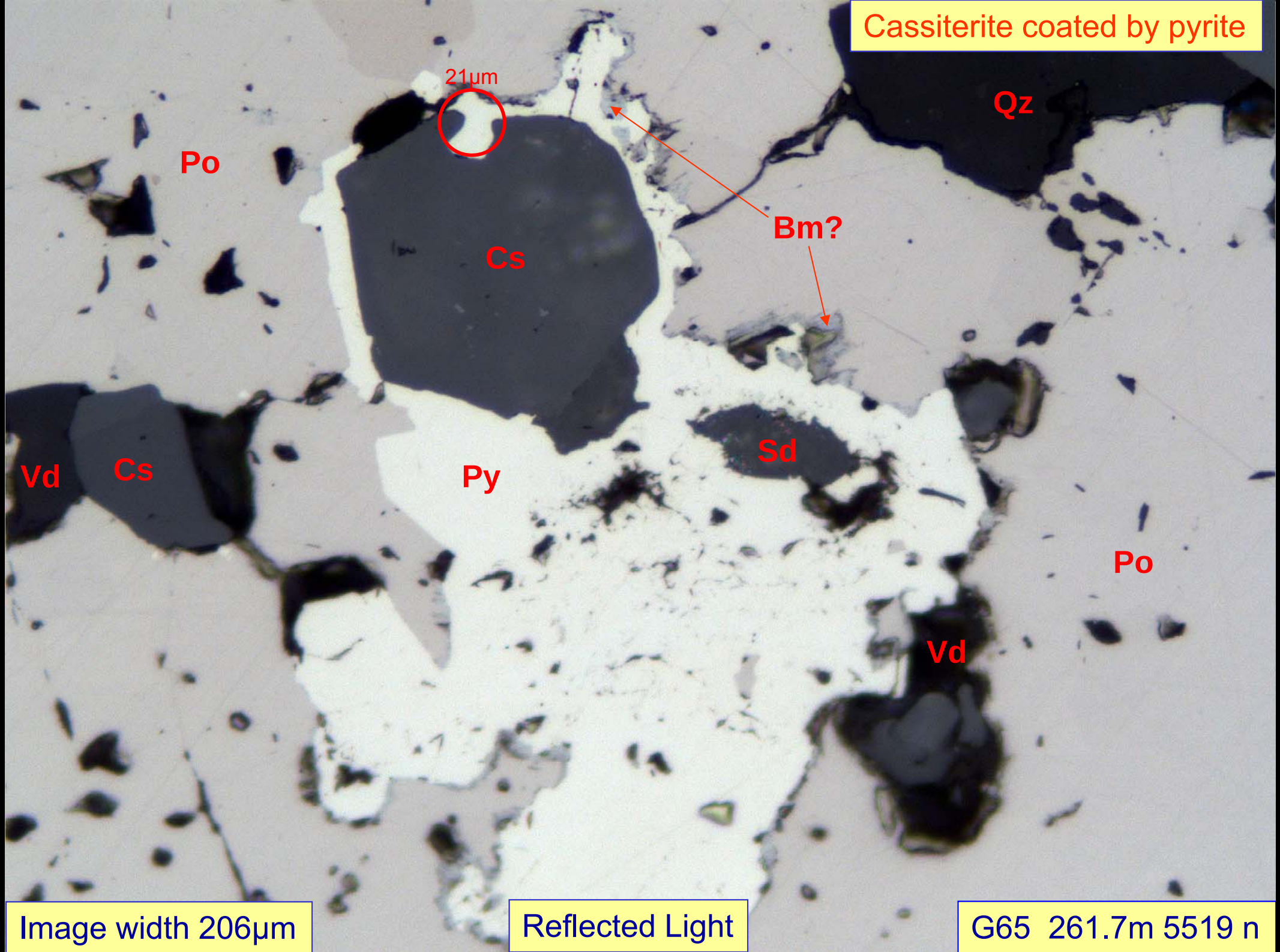

Tourmaline clusters hosted by pyrrhotite
Tm
Po
Sd
Py
53µm
Po
Qz
Py
Tm
Image width 1.0mm
Reflected Light
G65 261.7m 5519 i


Tourmaline in pyrrhotite
Py
Sd
Po
Po/Tm
Cs
27 µm
Tm
Tm
Py
Sd
Sd
Cp
Image width 515µm
Reflected Light
G65 261.7m 5519 j


Zonation: pyrrhotite→pyrite→siderite→quartz
Qz
Sd
Po
Qz
Cp
106µm
Py
Py
Sd
Qz
Sd
Qz
Py
Sd
Image width 2.1mm
Reflected Light
G65 261.7m 5519 k


Fluorite and tourmaline
Qz
Qz
Qz
Qz
Sd
Sd
Po
image m
Cp
Po/Tm
Sd
Qz
Fl/Tm
106µm
Py
Sd
Qz
Image width 2.1mm
Reflected Light
G65 261.7m 5519 I


Detail from previous image
Fl
Po
Tm
Sd
Qz
27µm
Sd
Tm
Fl
Qz
Image width 515µm
Reflected Light
G65 261.7m 5519 m


Cassiterite coated by pyrite
21µm
Qz
Po
Bm?
Cs
Sd
Vd
Cs
Py
Po
Vd
Image width 206µm
Reflected Light
G65 261.7m 5519 n

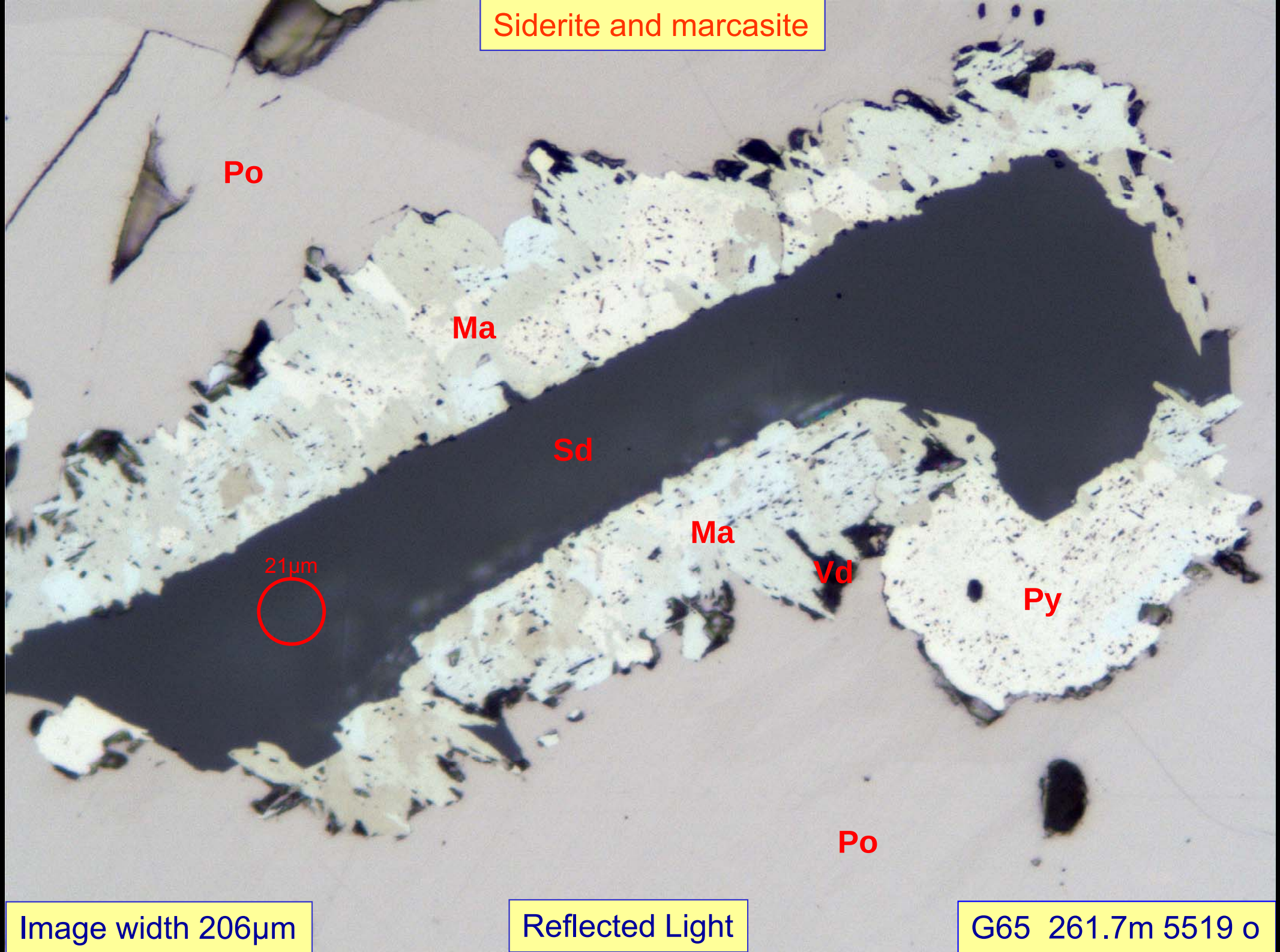
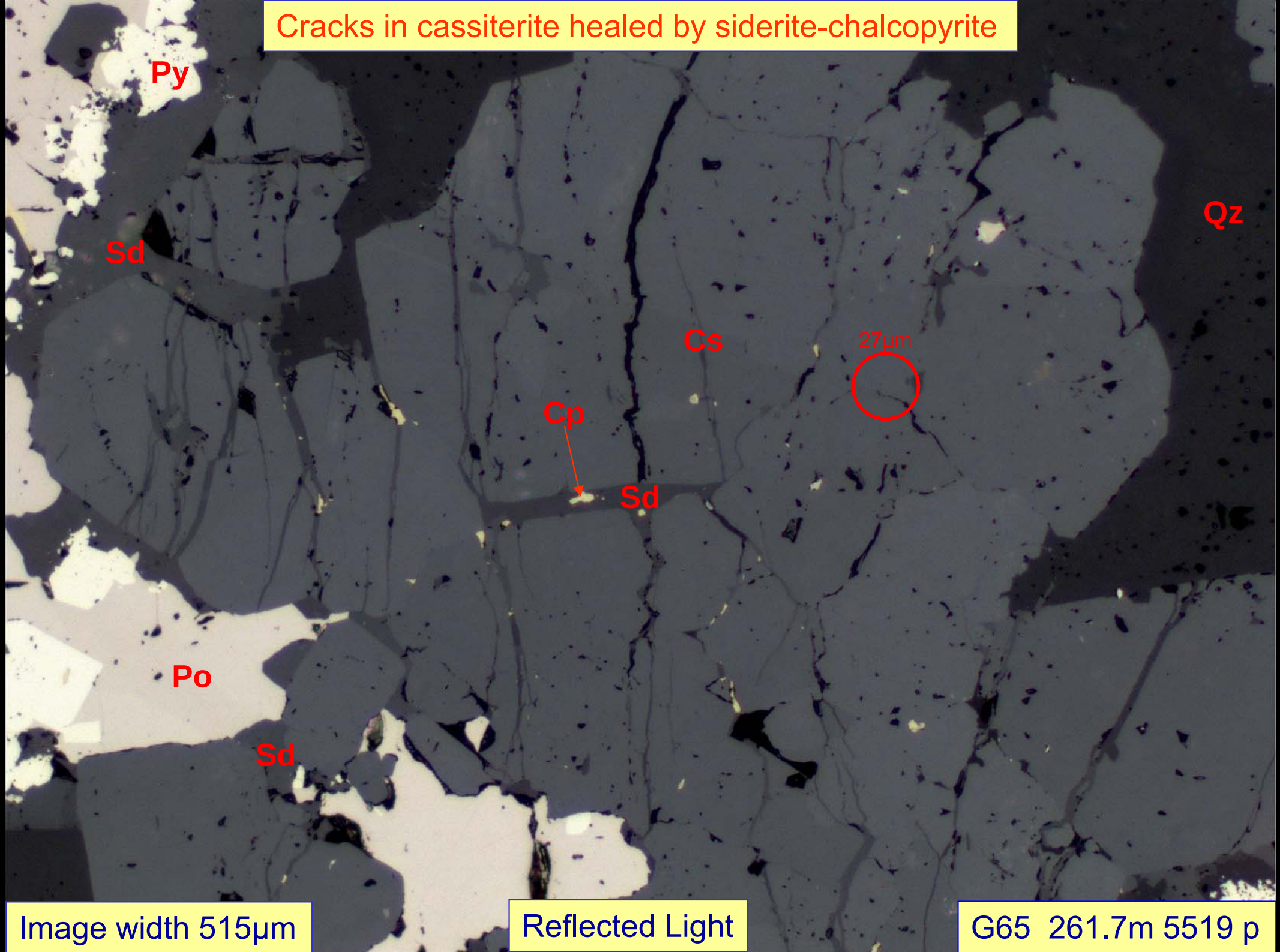
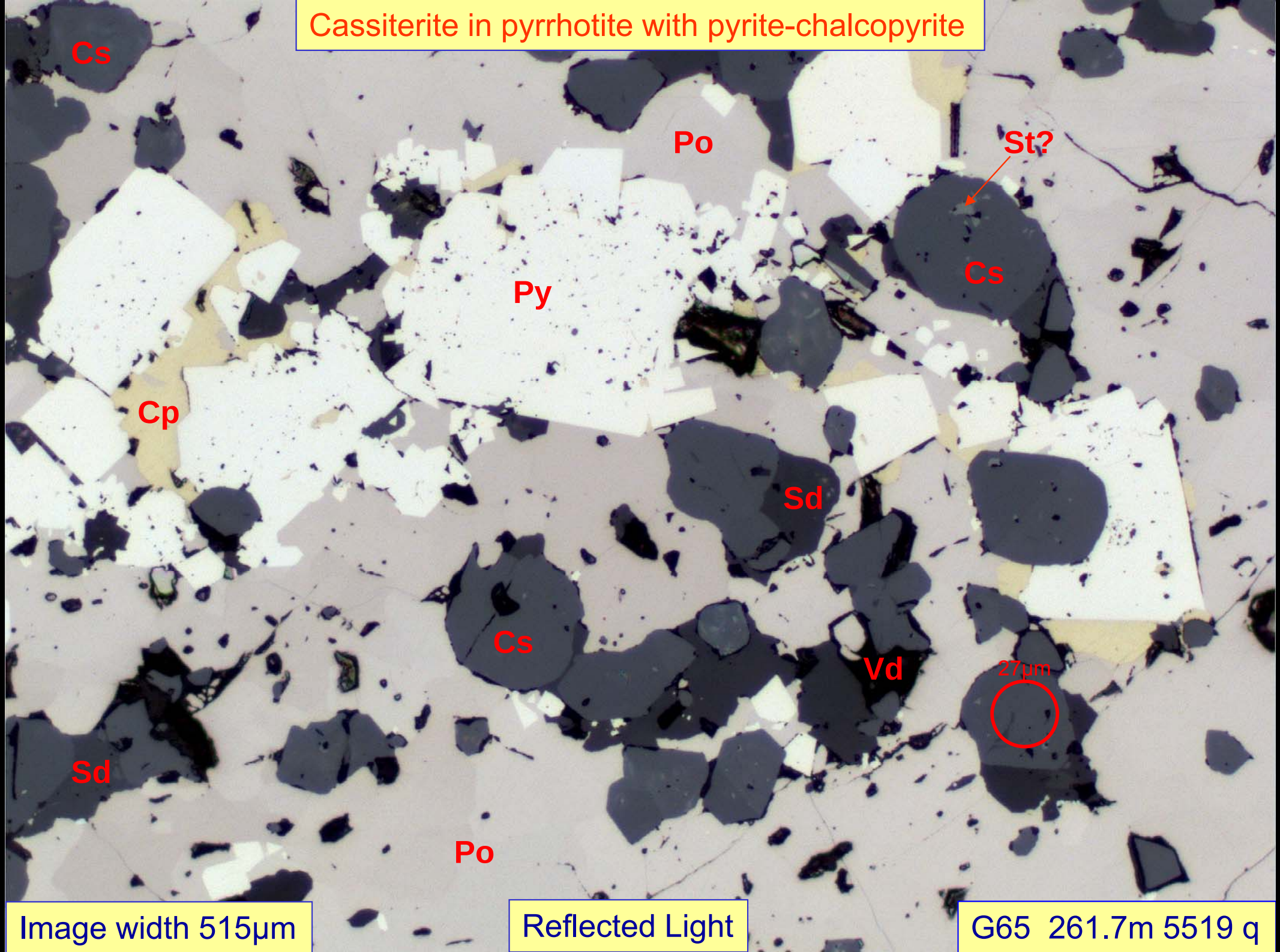


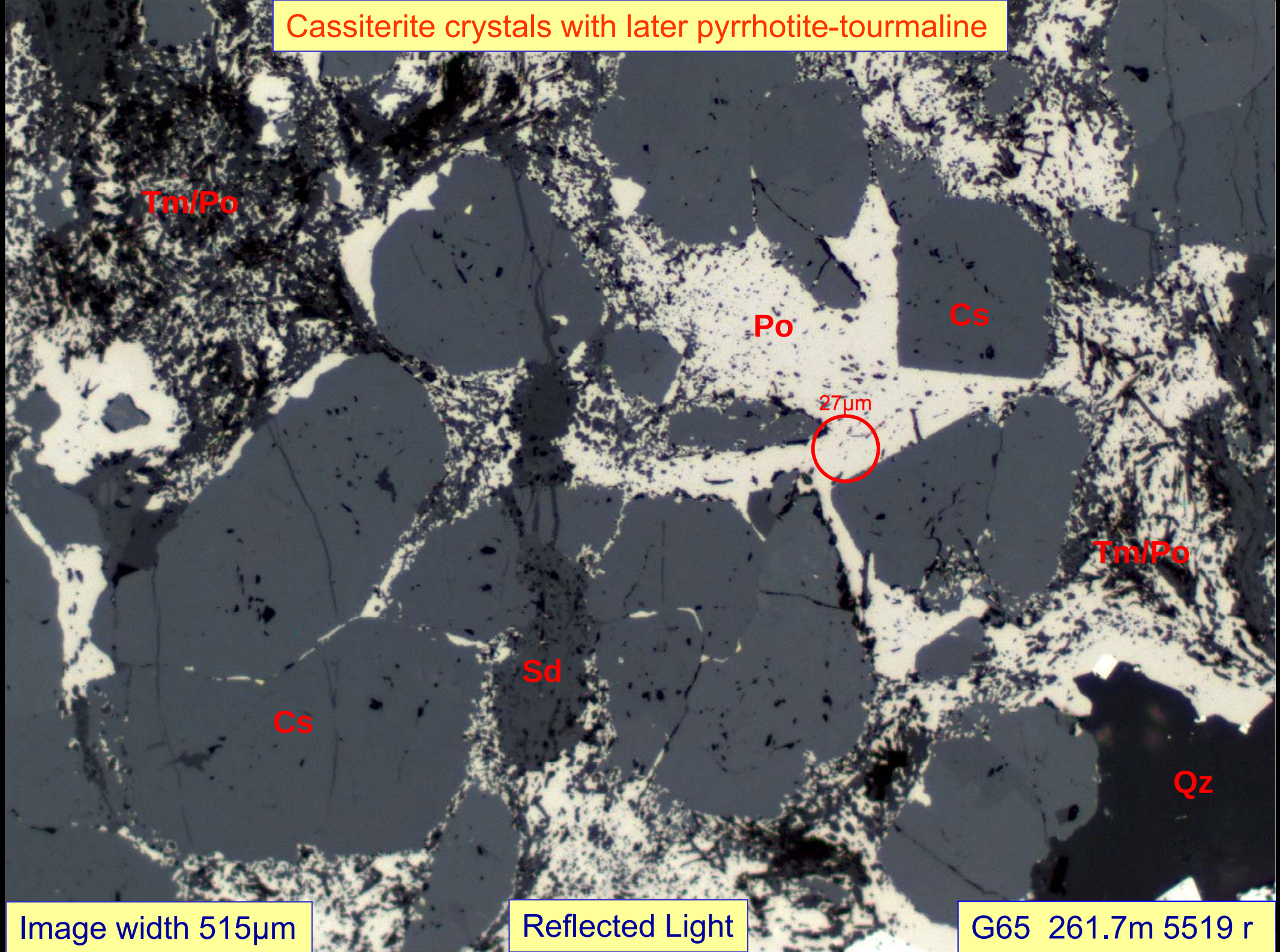
Image width 206µm

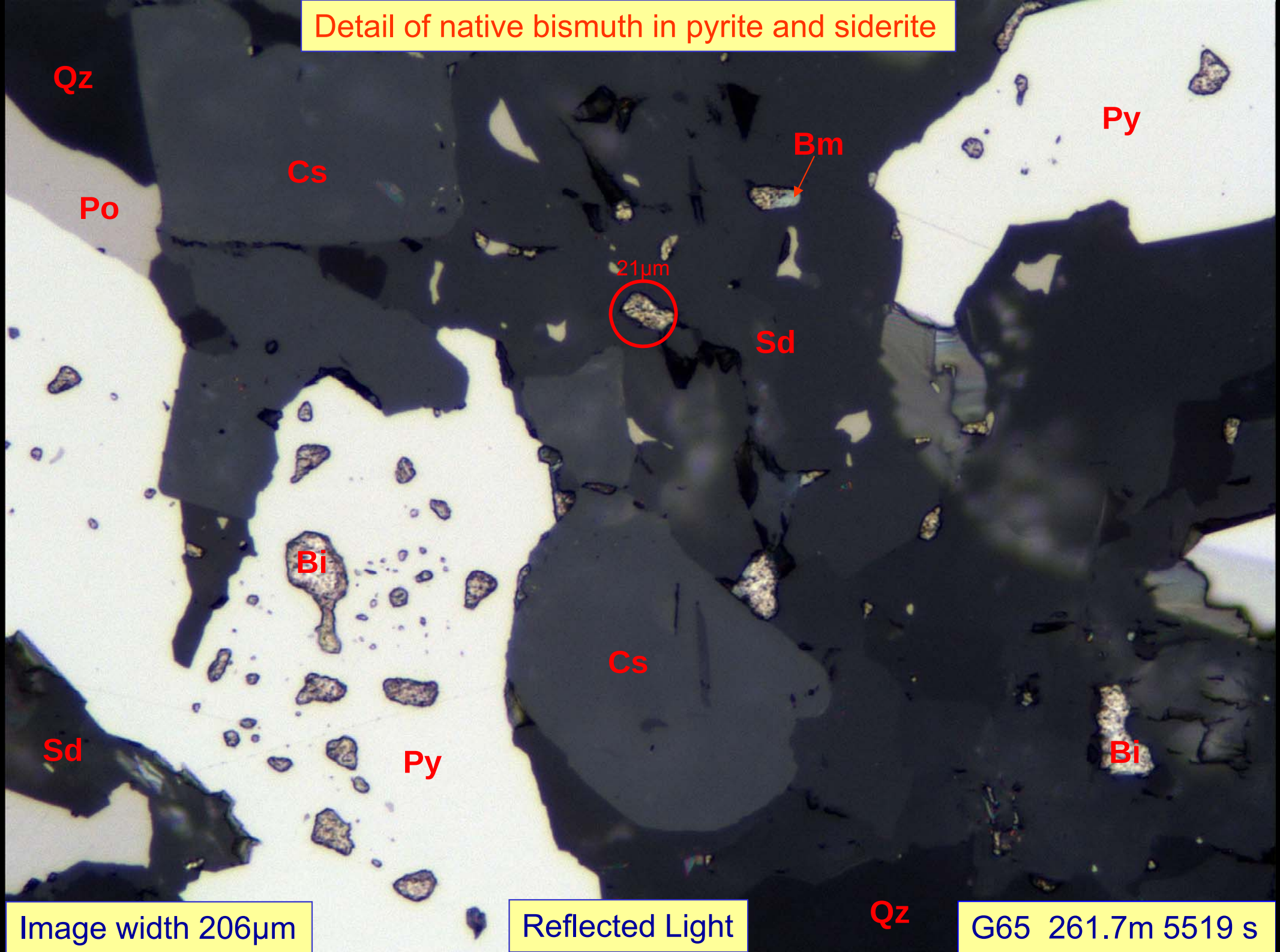
Reflected Light

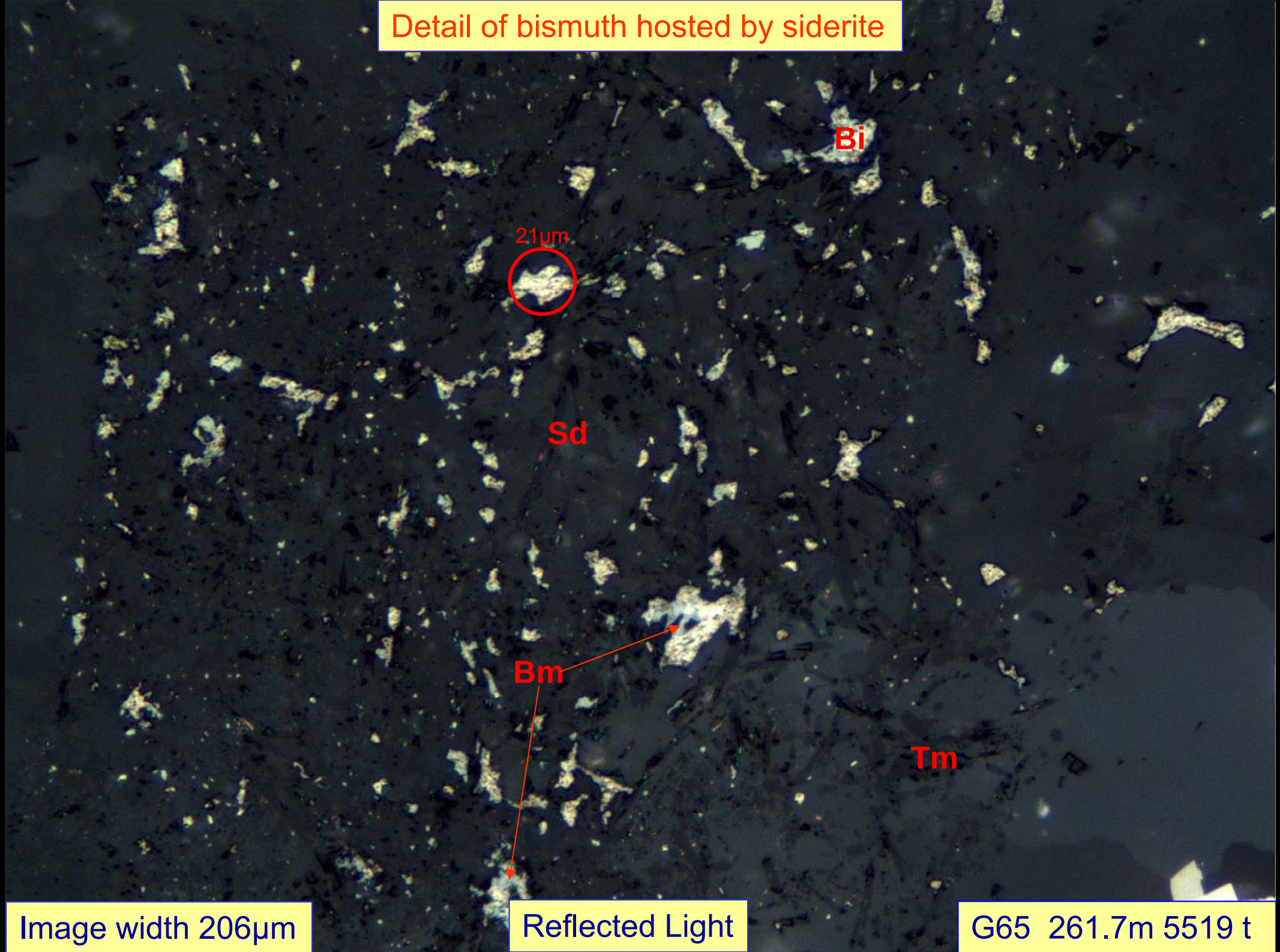
G65 261.7m 5519 o

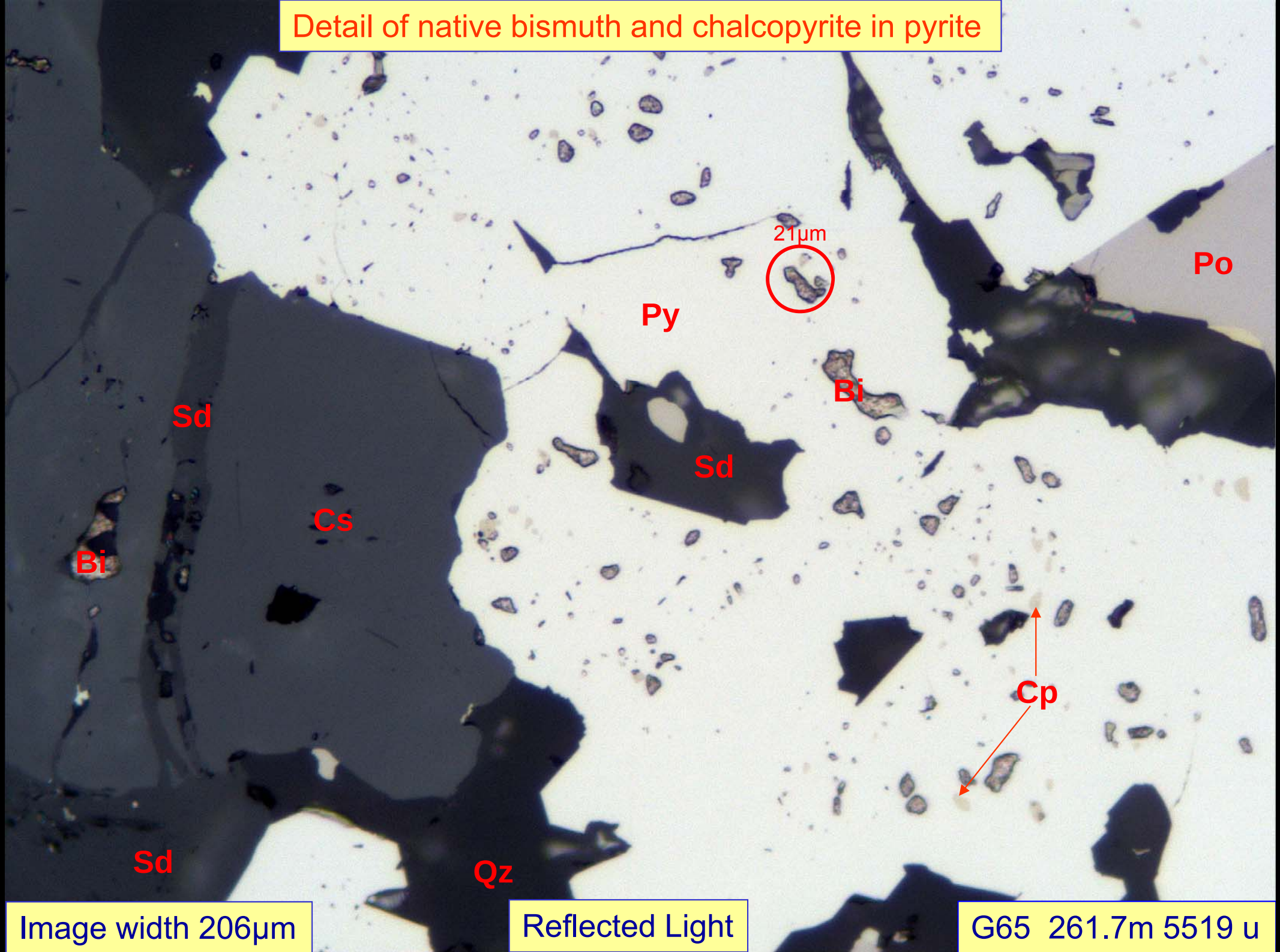

Cracks in cassiterite healed by siderite-chalcopyrite
Py
Sd
Qz
Cs
27µm
Cp
Sd
Po
Sd
Image width 515µm
Reflected Light
G65 261.7m 5519 p

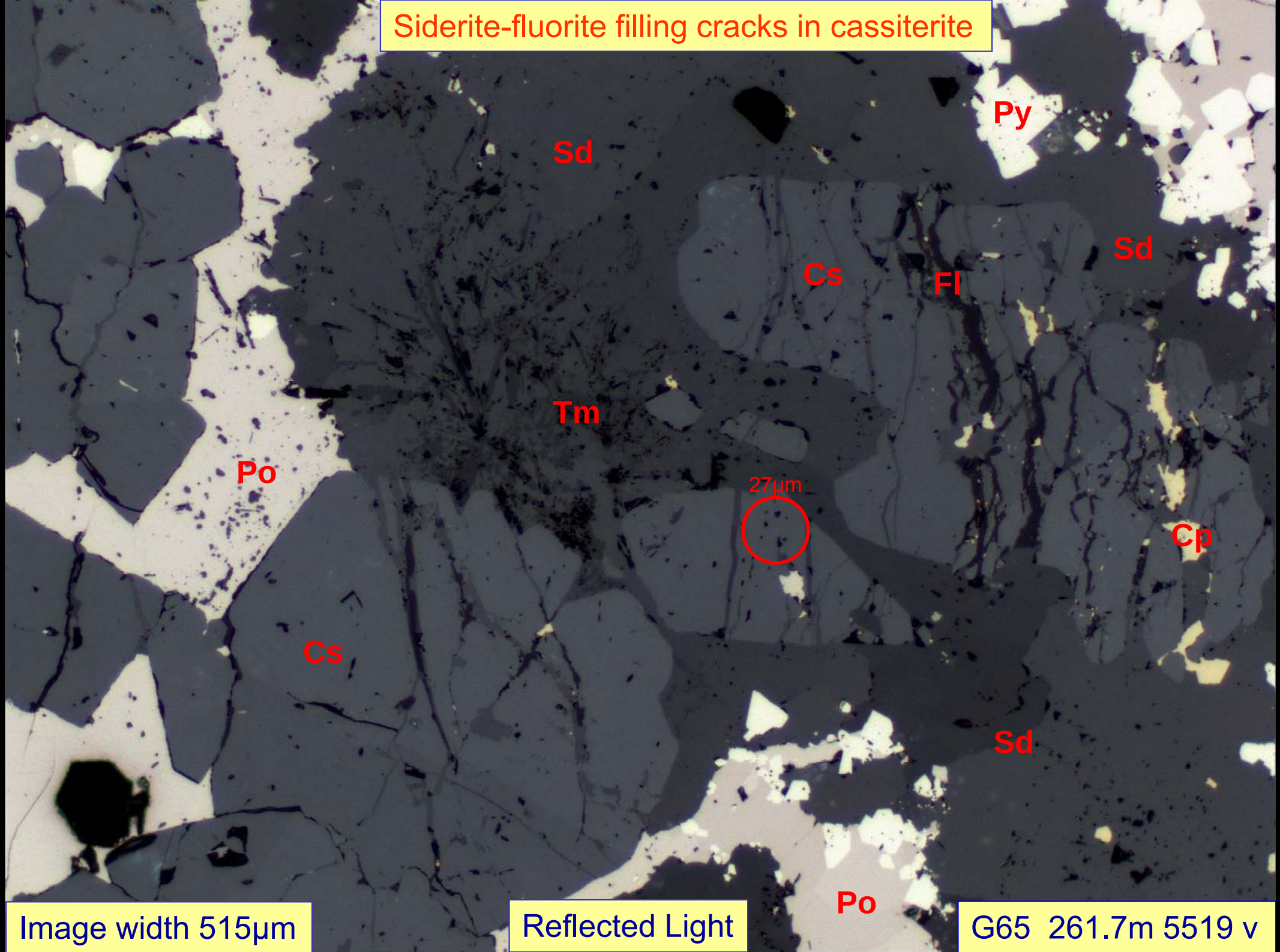

Cassiterite in pyrrhotite with pyrite-chalcopyrite
Cs
Po
St?
Py
Cs
Cp
Sd
Cs
Vd
27µm
Sd
Po
Image width 515µm
Reflected Light
G65 261.7m 5519 q

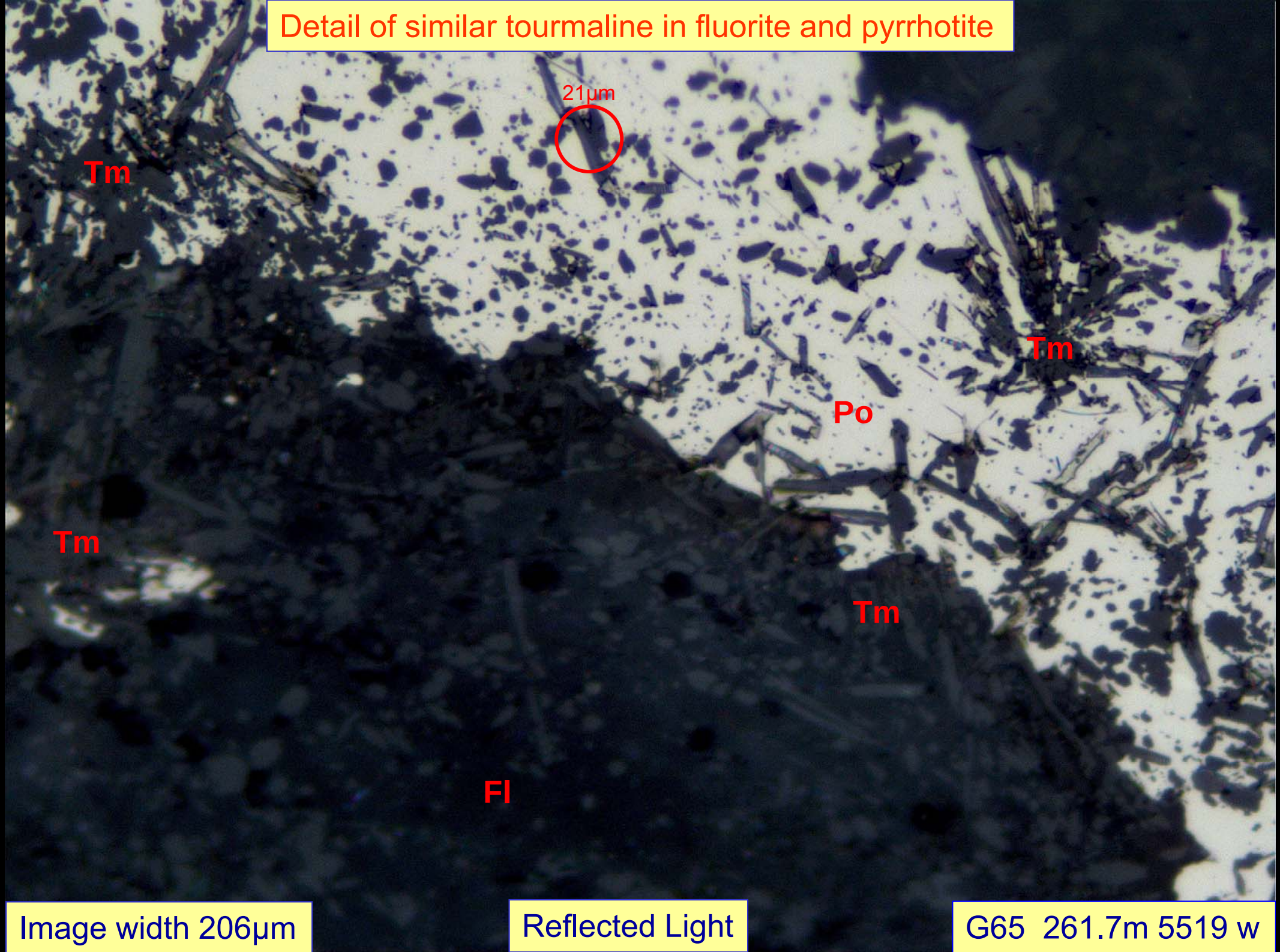

Cassiterite crystals with later pyrrhotite-tourmaline
Tm/Po
Po
Cs
27µm
Tm/Po
Sd
Cs
Qz
Image width 515µm
Reflected Light
G65 261.7m 5519 r

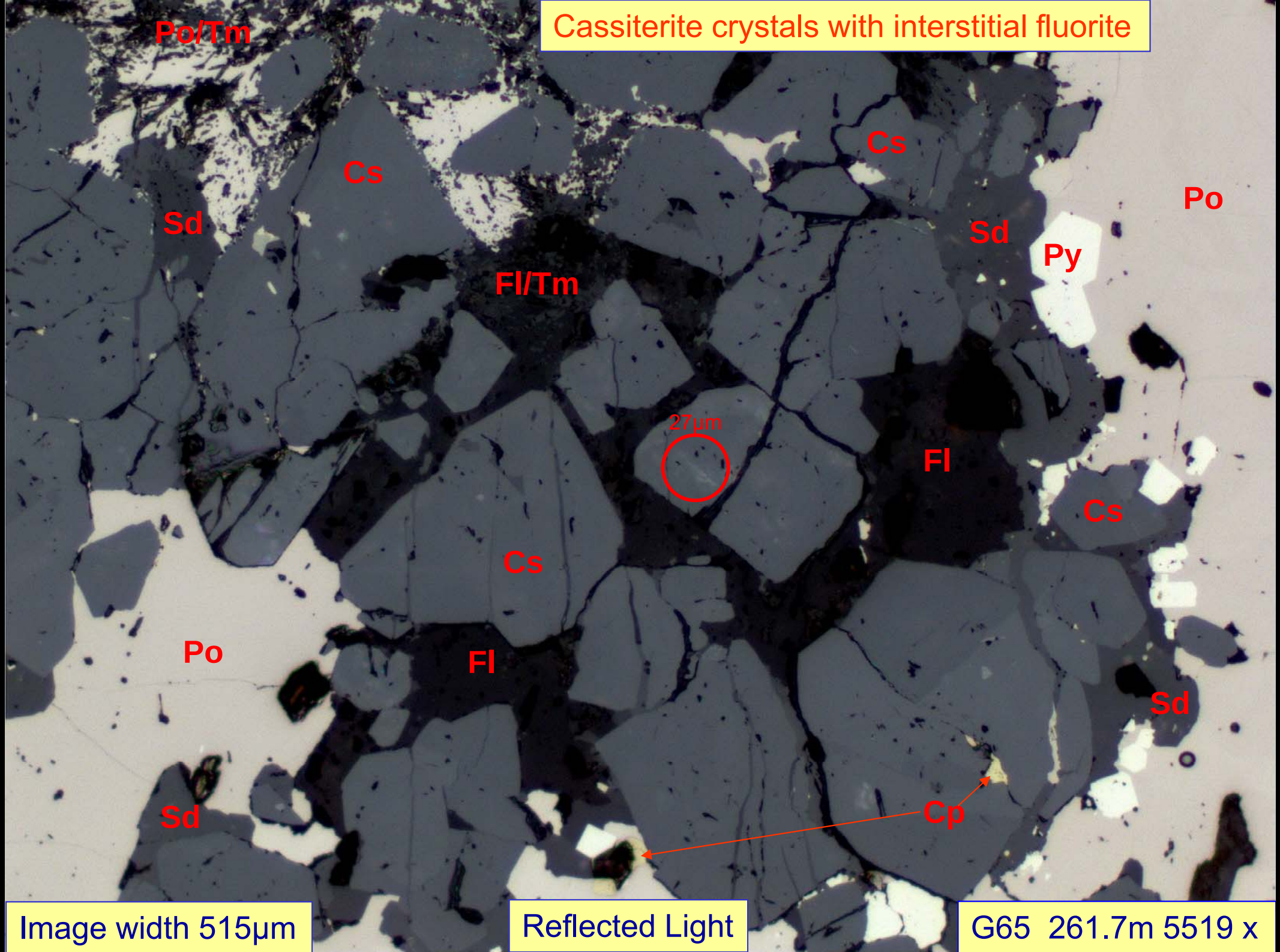

Detail of native bismuth in pyrite and siderite
Qz
Py
Bm
Cs
Po
21µm
Sd
Bi
Cs
Sd
Py
Bi
Qz
Image width 206µm
Reflected Light
G65 261.7m 5519 s


Detail of bismuth hosted by siderite
Bi
21µm
Sd
Bm
Tm
Image width 206µm
Reflected Light
G65 261.7m 5519 t


Detail of native bismuth and chalcopyrite in pyrite
21µm
Po
Py
Bi
Sd
Sd
Cs
Bi
Cp
Sd
Qz
Image width 206µm
Reflected Light
G65 261.7m 5519 u


Siderite-fluorite filling cracks in cassiterite
Py
Sd
Sd
Cs
Fl
Tm
Po
27µm
Cp
Cs
Sd
Po
Image width 515µm
Reflected Light
G65 261.7m 5519 v


Detail of similar tourmaline in fluorite and pyrrhotite
21µm
Tm
Tm
Po
Tm
Tm
Fl
Image width 206µm
Reflected Light
G65 261.7m 5519 w


Cassiterite crystals with interstitial fluorite
Po/Tm
Cs
Sd
Fl/Tm
Cs
Sd
Py
Po
27µm
Fl
Cs
Cs
Po
Fl
Sd
Sd
Cp
Image width 515µm
Reflected Light
G65 261.7m 5519 x

PARTICLE MINERALOGY REPORT

Severn 5519

G65 261.7m

GJMcA 27.1.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
17.6	34.5	4.0	0.0	0.0	0.4	0.0	43.6	**300**
44	64	36	0	0	6	0	59	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	4.11	5.26	26.9	0.00	38.9	0.13	
Actual		**7.39**		**0.00**	**38.3**	**0.00**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	19	47	8	0	0	0	44	
Binary	62	34	57	0	14	0	41	
Ternary	17	14	24	0	80	0	13	
Quat.y+	2	4	11	0	6	0	2	
Grains	39.7	53.0	11.0	0.0	4.3	0.0	73.3	1.81

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		7	0	0	3	0	90
Po	19		7	0	3	0	72
Cs	0	22		0	0	0	78
St	0	0	0		0	0	0
Cp	33	67	0	0		0	0
As	0	0	0	0	0		0
Ga	52	41	7	0	0	0	

TOTAL ASSOCIATION MATRIX

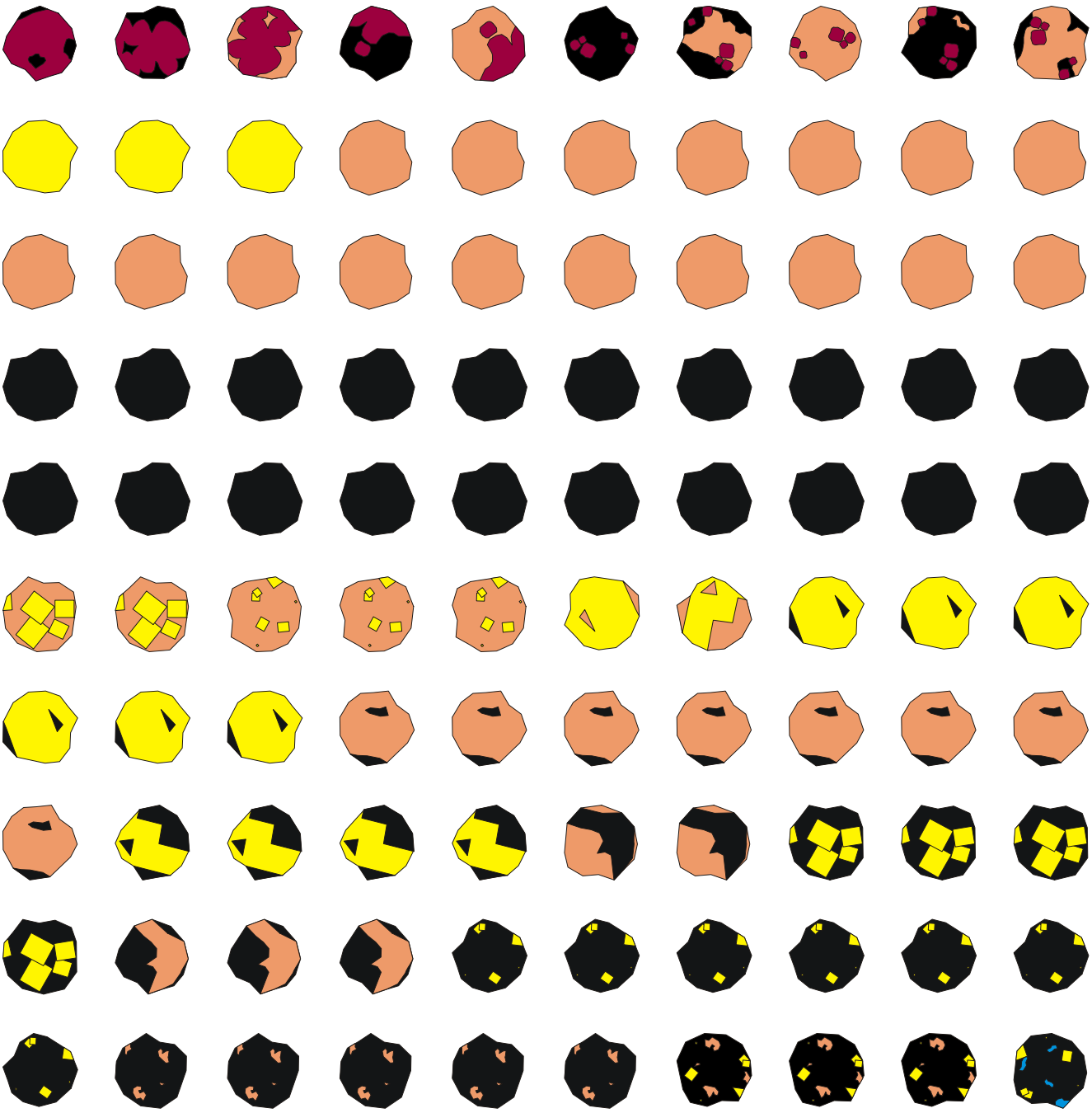
		Py	Po	Cs	St	Cp	As	Ga
	Py		22	3	0	4	0	73
	Po	20		10	0	4	0	41
of	**Cs**	19	47		0	5	0	66
all	**St**	0	0	0		0	0	0
	Cp	44	89	11	0		0	49
	As	0	0	0	0	0		0
	Ga	32	29	7	0	3	0	

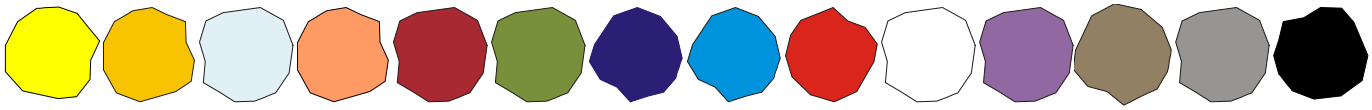
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	19		4	0	0	2	0	55	17	2
Po	47	6		2	0	1	0	25	14	4
Cs	8	0	13		0	0	0	44	24	11
St	0	0	0	0		0	0	0	0	0
Cp	0	5	9	0	0		0	0	80	6
As	0	0	0	0	0	0		0	0	0
Ga	44	21	17	3	0	0	0		13	2

Stellar Resources - Severn Drillhole Mineragraphy

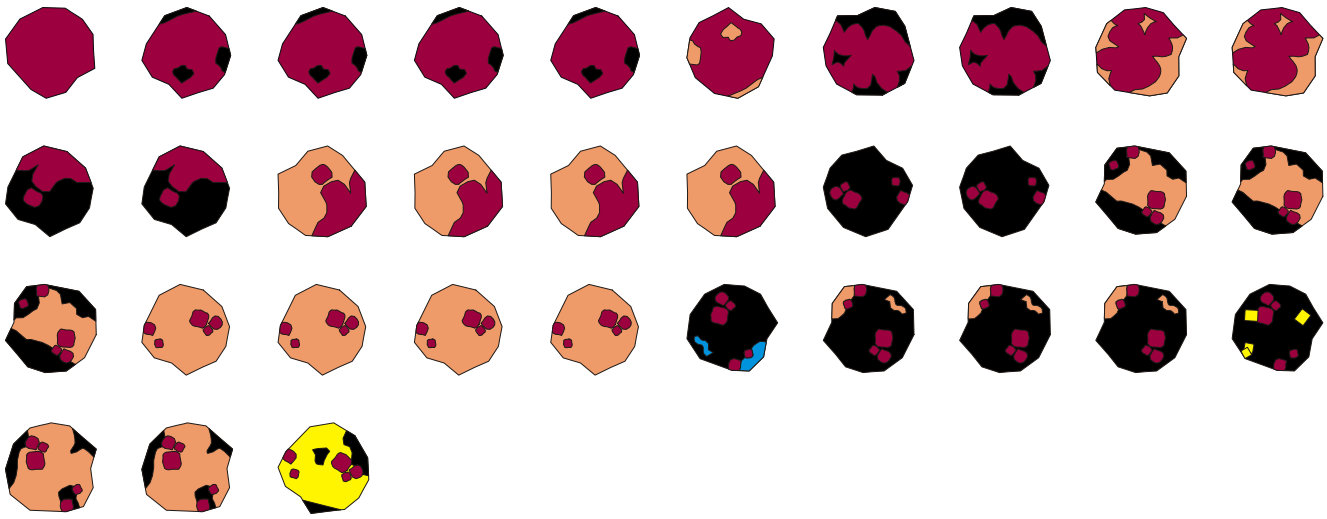
Severn 5519 **53µm mask** **January 2012**

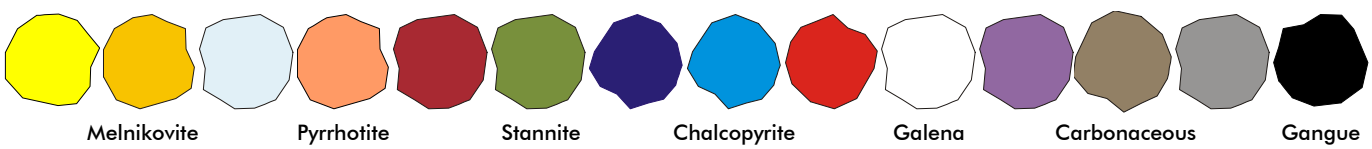




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5519 Sn Scan **53µm mask** **January 2012**





Core Scan

QXRD: 21% siderite, 18% chlorite, 18% quartz, 16% pyrite, 7% muscovite, 3% kaolinite

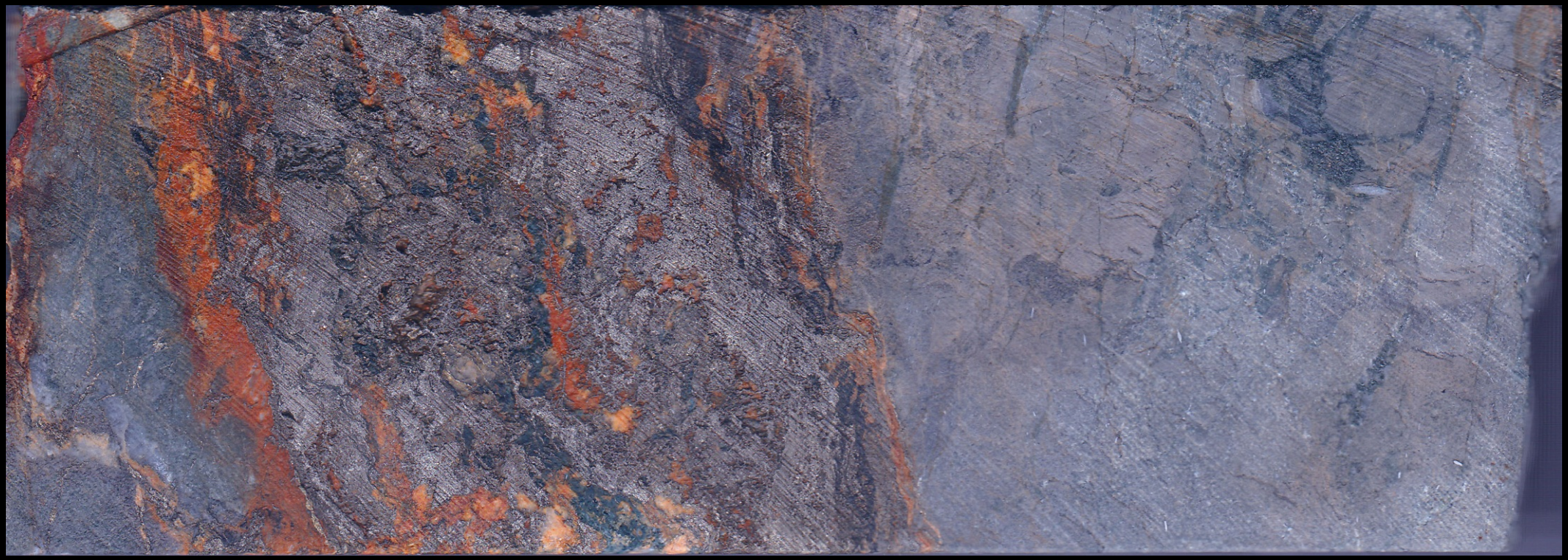
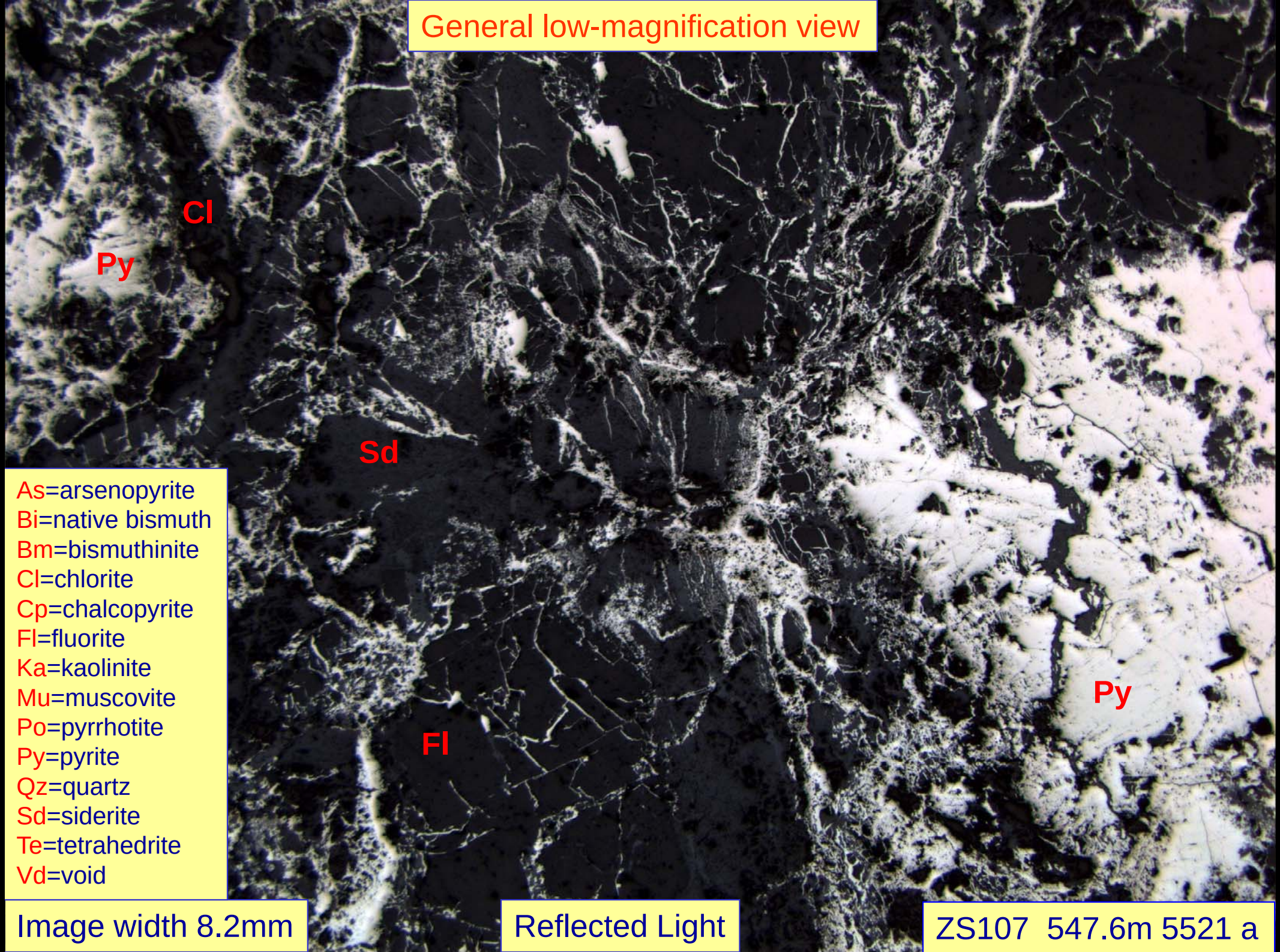


Image width ~135mm

ZS107 547.6m 5521

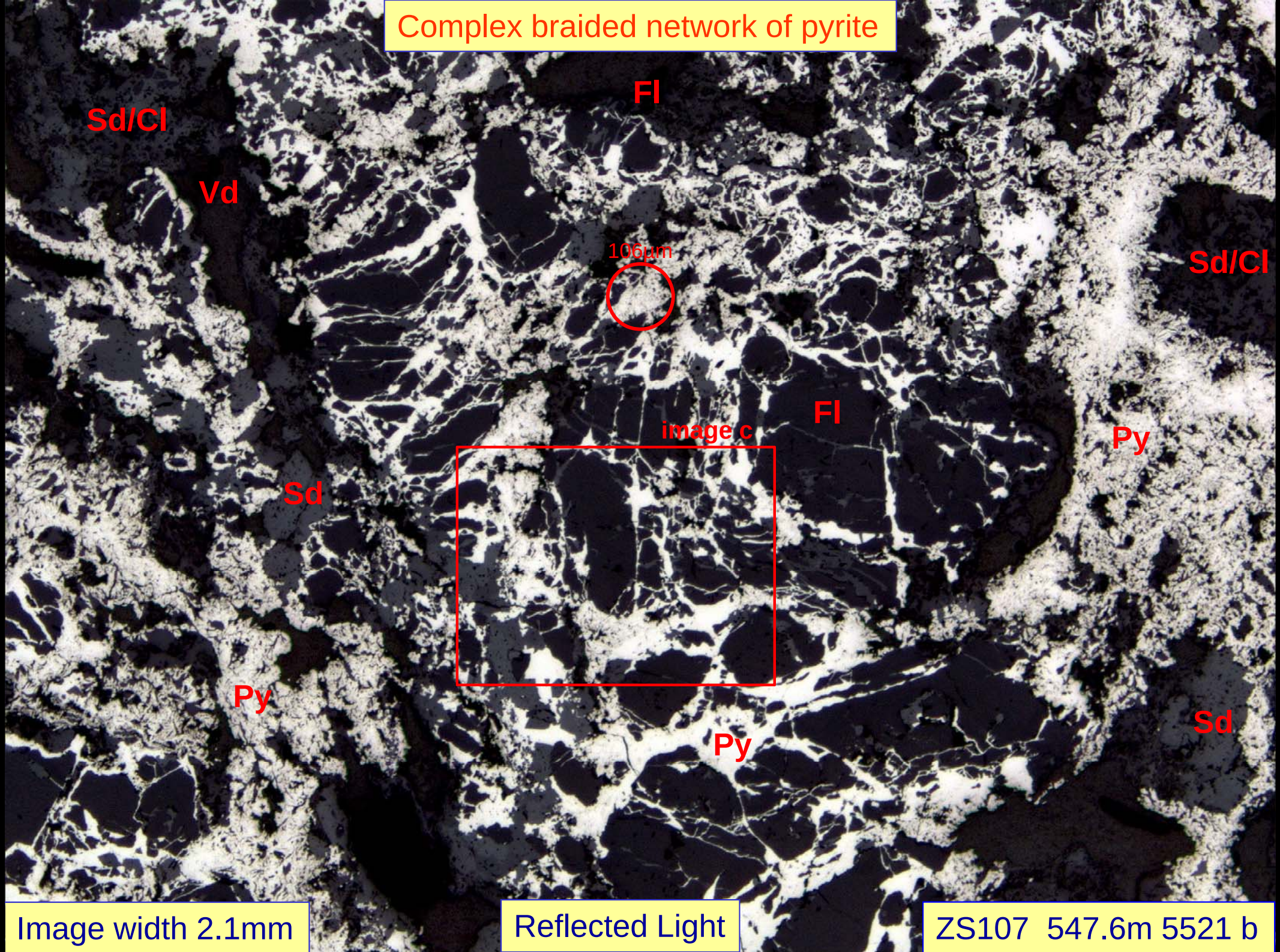


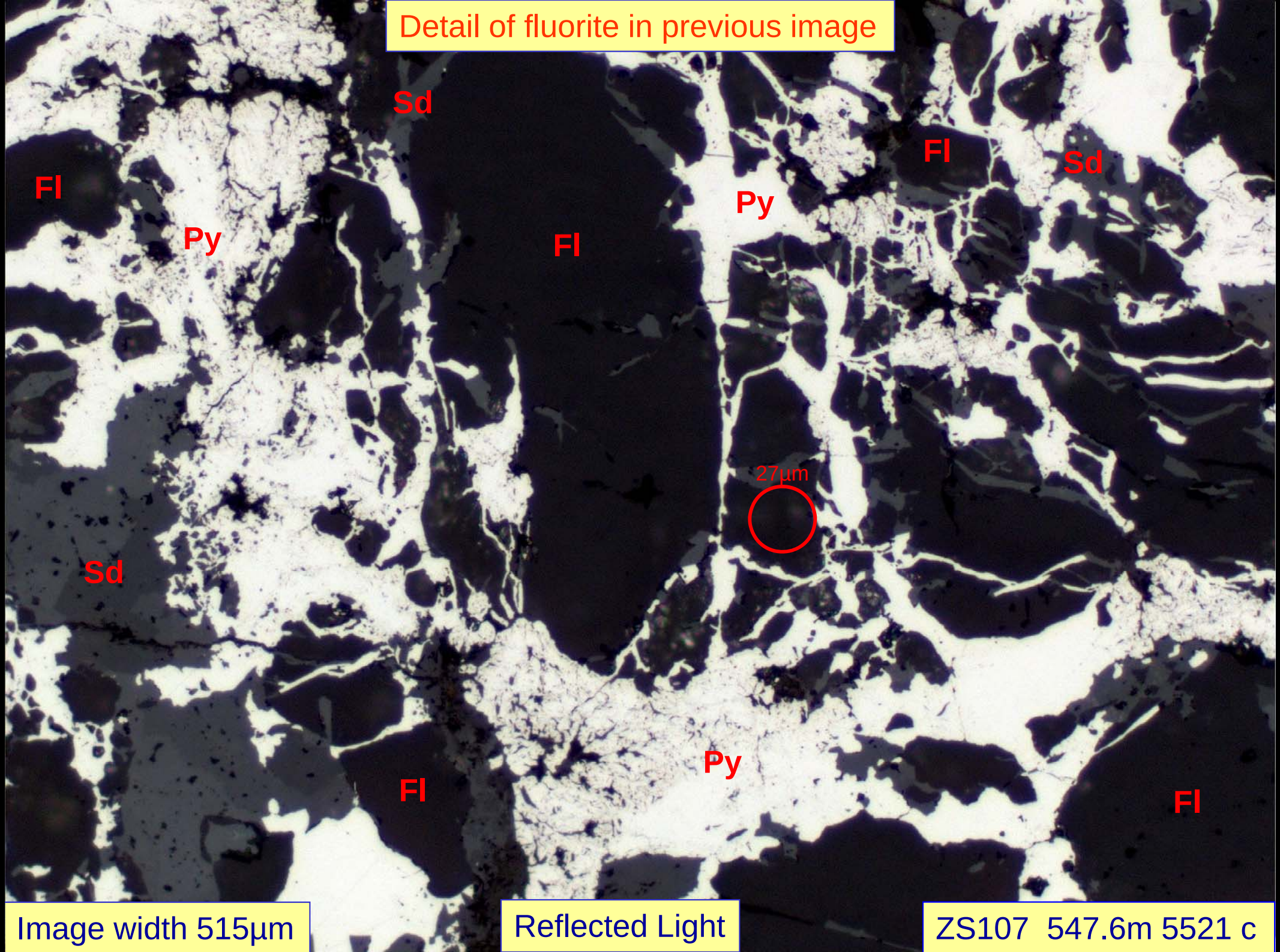
As=arsenopyrite
Bi=native bismuth
Bm=bismuthinite
Cl=chlorite
Cp=chalcopyrite
Fl=fluorite
Ka=kaolinite
Mu=muscovite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Sd=siderite
Te=tetrahedrite
Vd=void

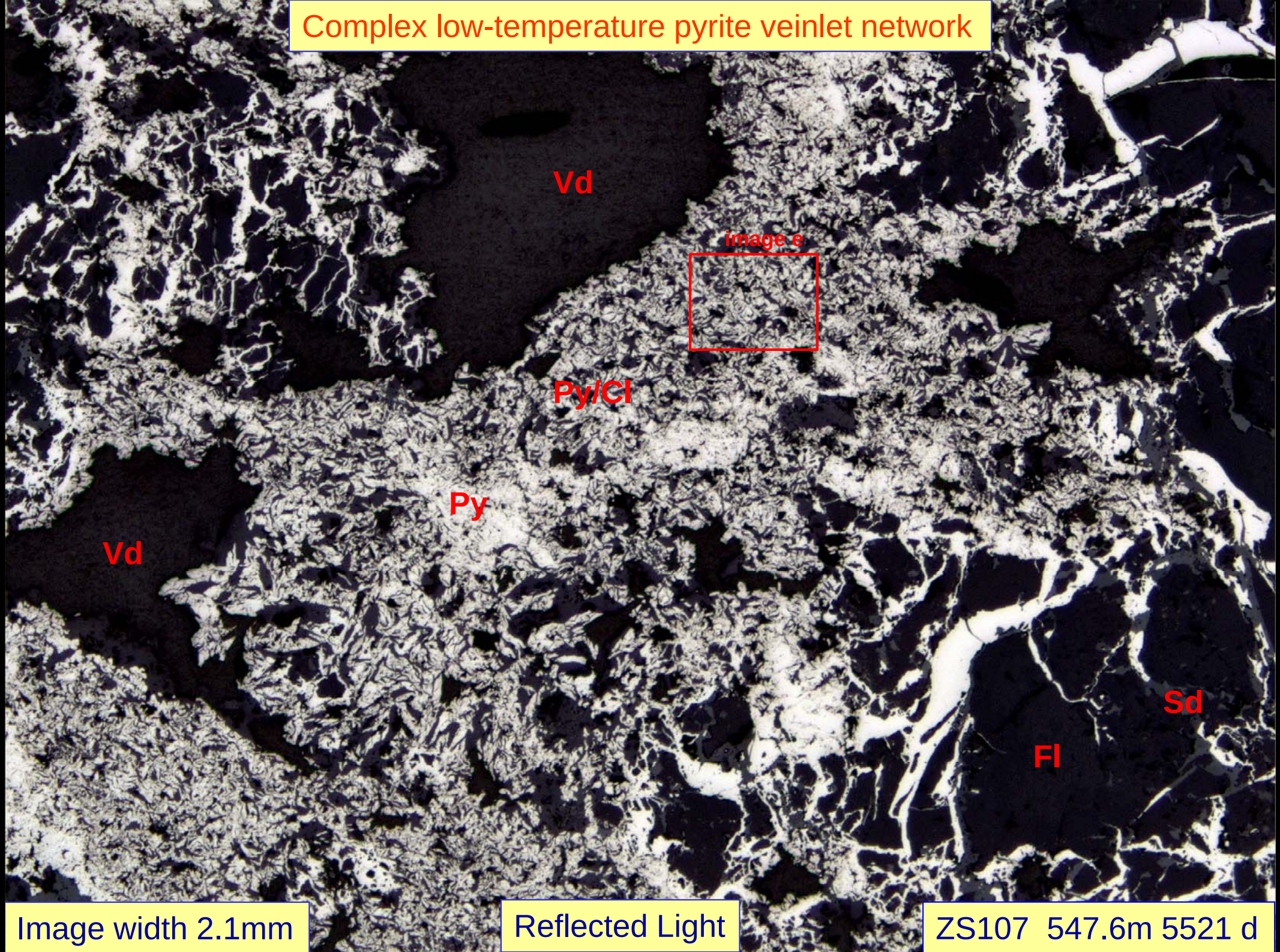
Image width 8.2mm

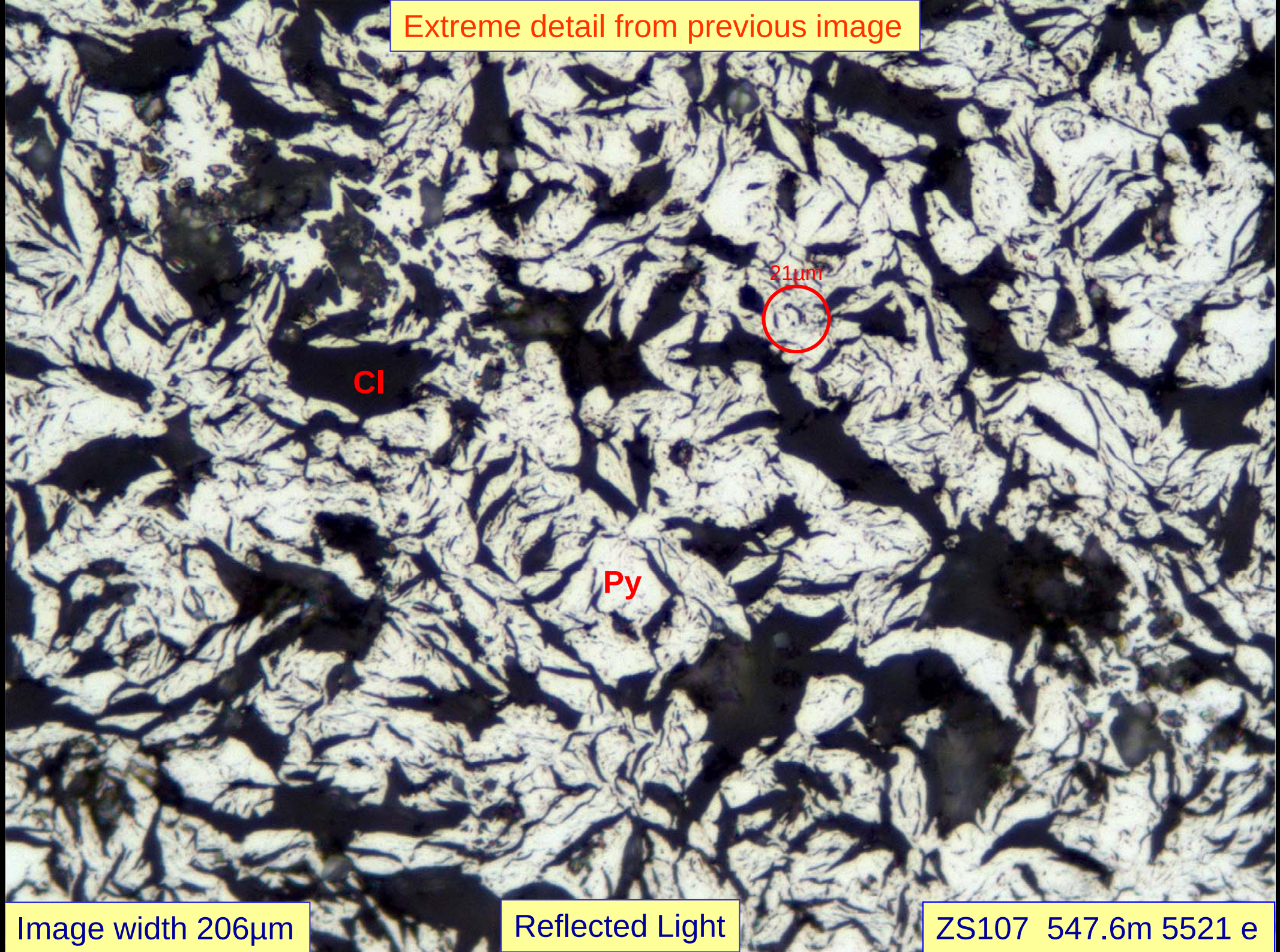
Reflected Light

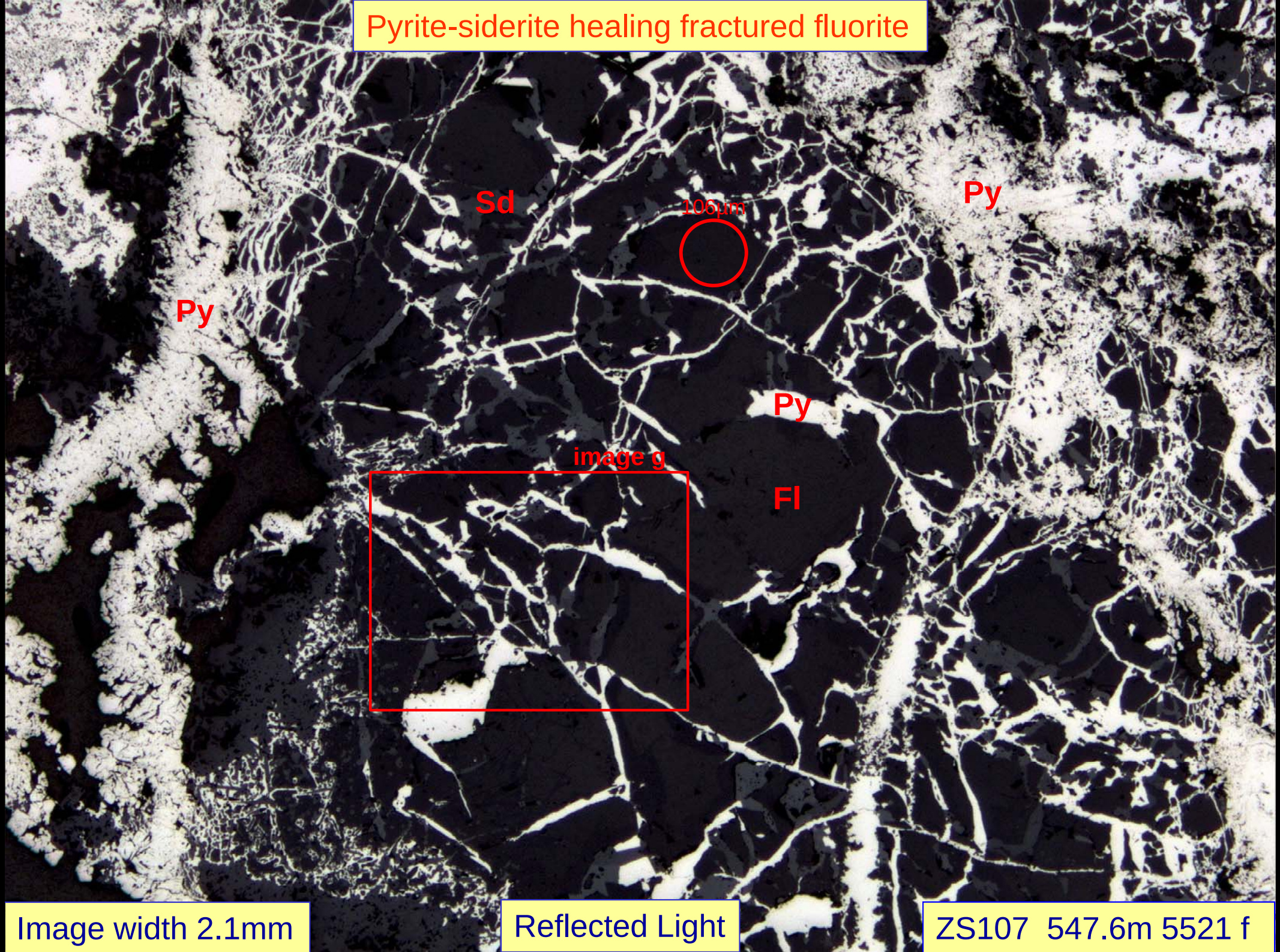
ZS107 547.6m 5521 a

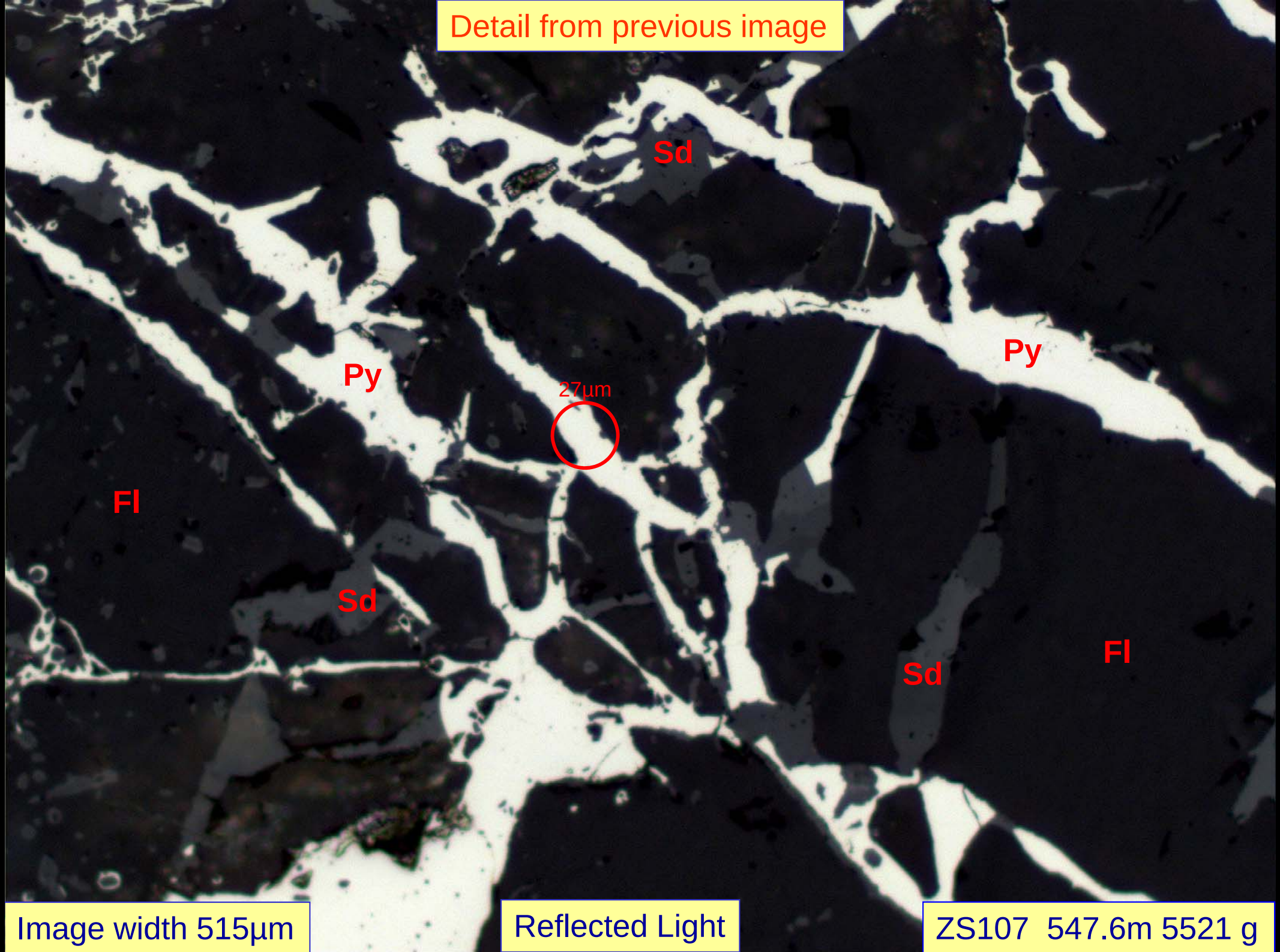

Complex braided network of pyrite
Fl
Sd/Cl
Vd
106µm
Sd/Cl
Fl
image c
Py
Sd
Py
Py
Sd
Image width 2.1mm
Reflected Light
ZS107 547.6m 5521 b

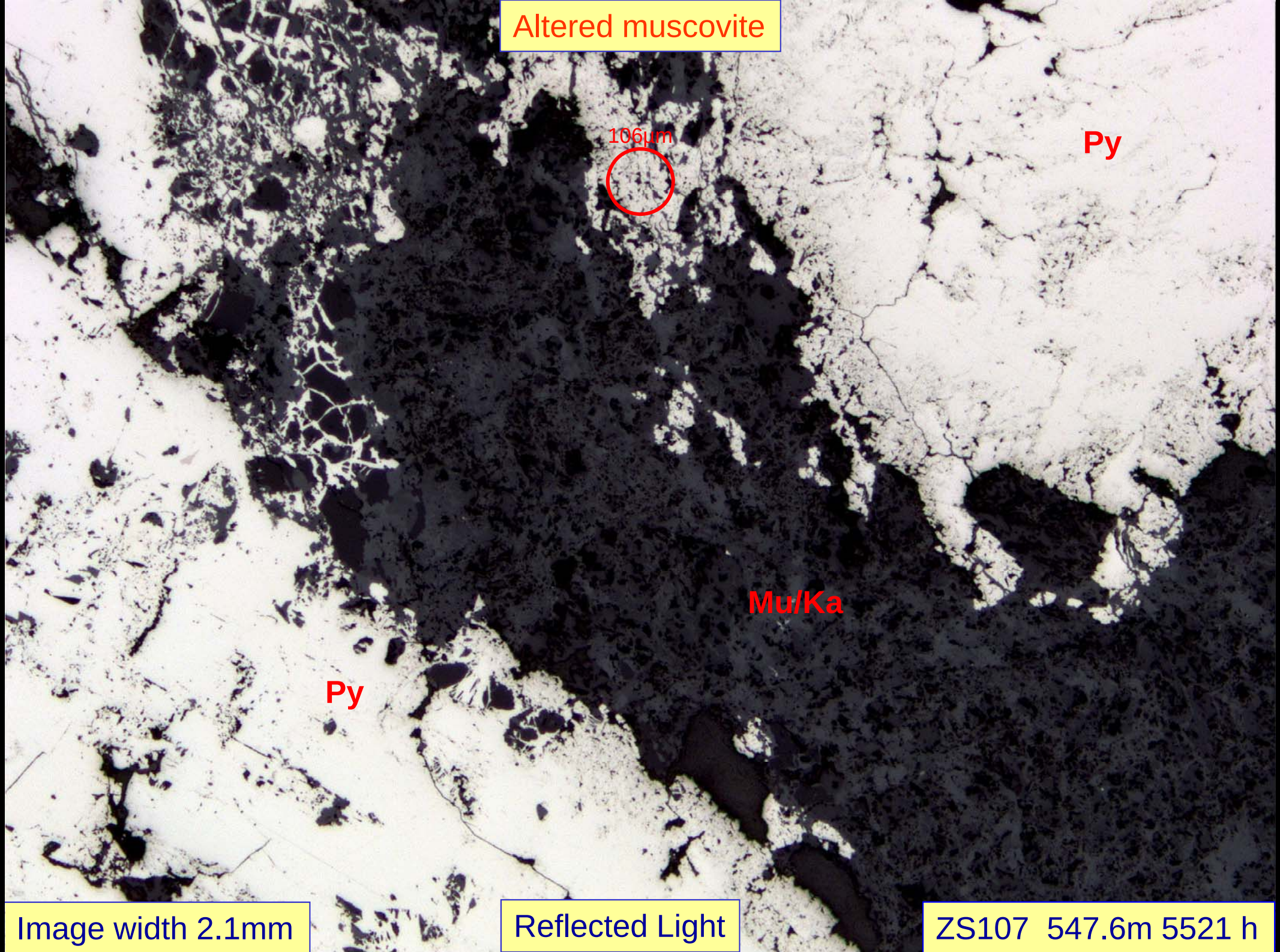

Detail of fluorite in previous image
Sd
Fl
Py
Fl
Fl
Sd
Py
27µm
Sd
Fl
Py
Fl
Image width 515µm
Reflected Light
ZS107 547.6m 5521 c

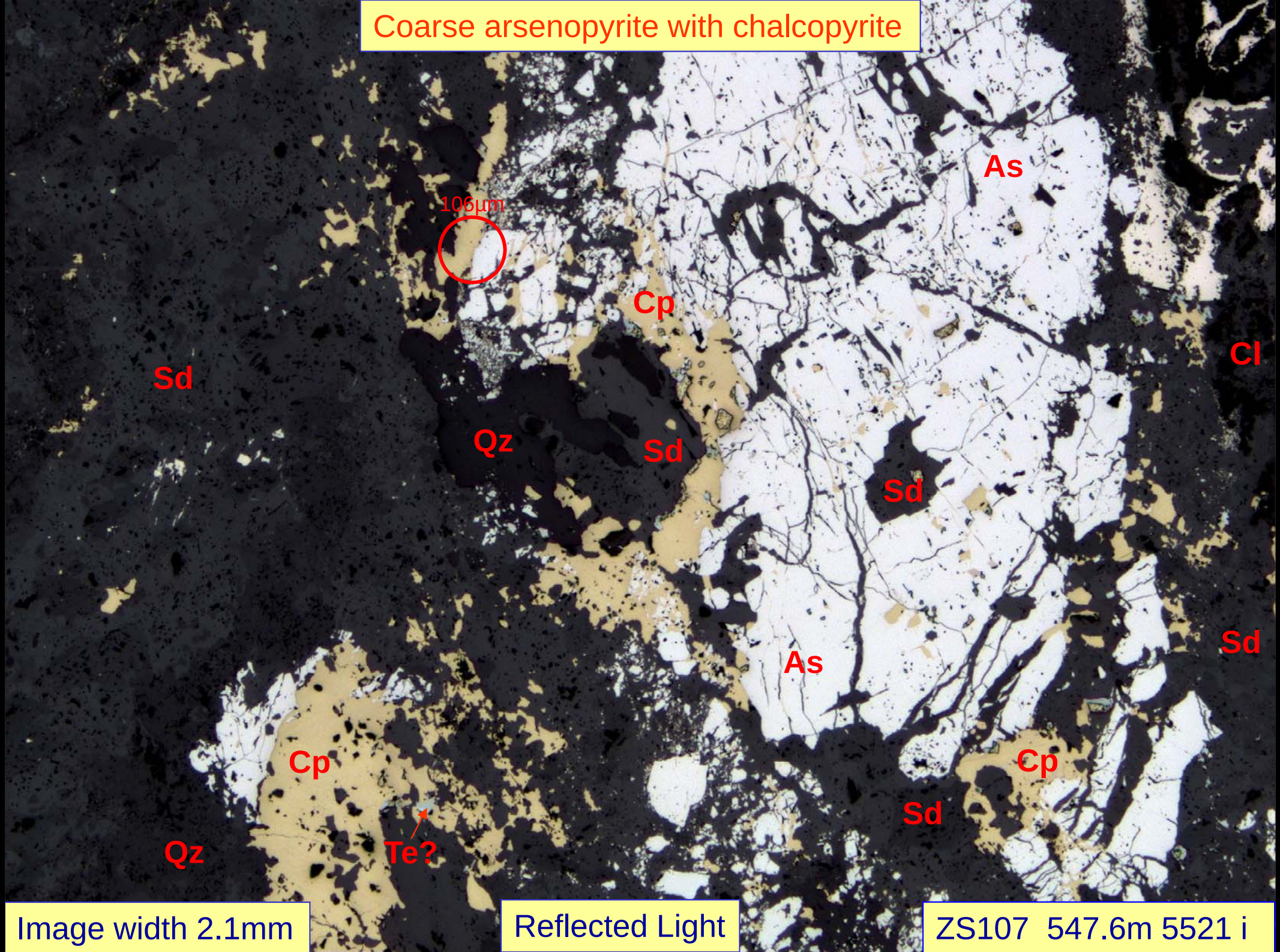

Complex low-temperature pyrite veinlet network
Vd
image e
Py/Cl
Py
Vd
Sd
Fl
Image width 2.1mm
Reflected Light
ZS107 547.6m 5521 d

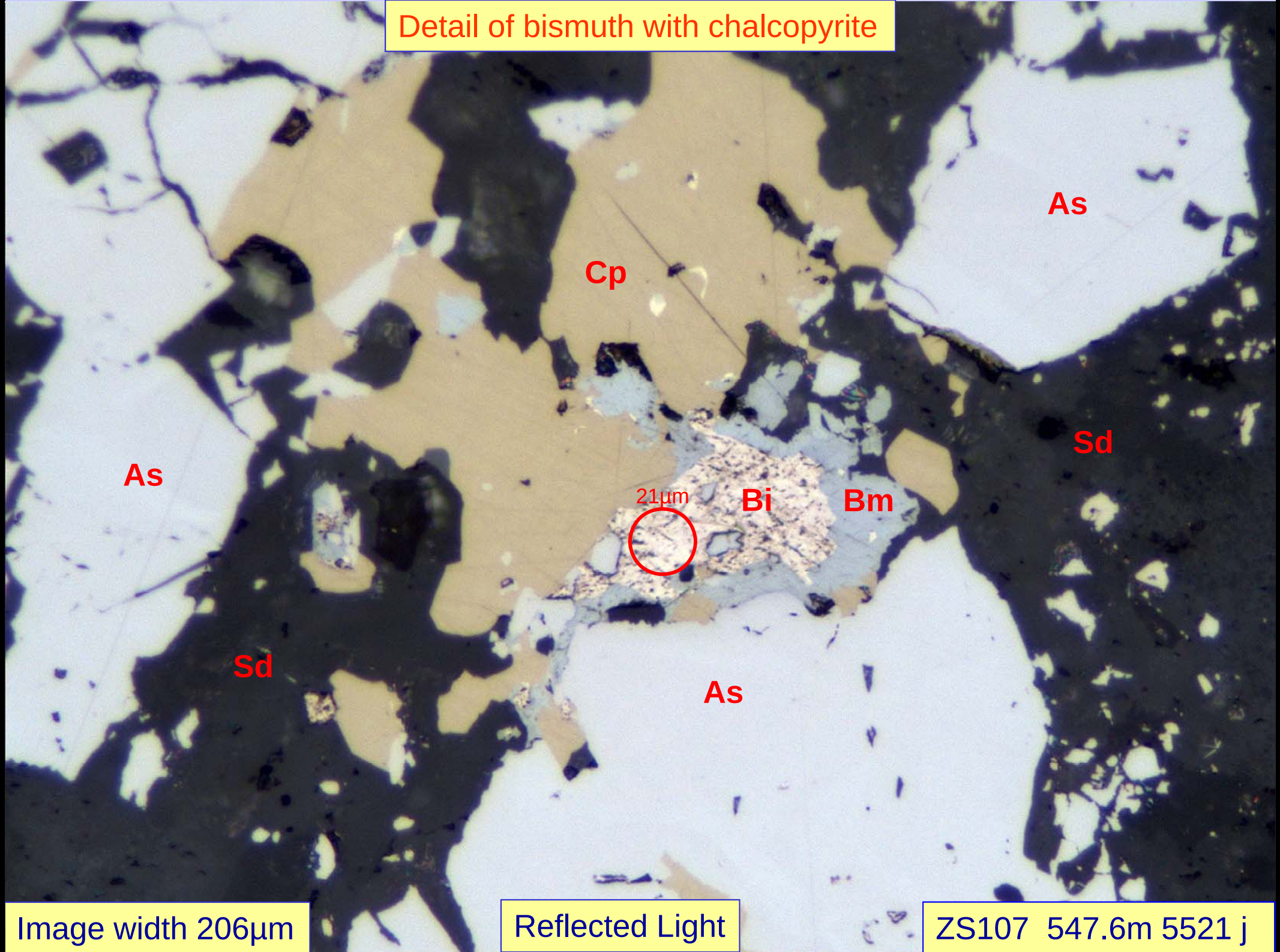

Extreme detail from previous image
21µm
Cl
Py
Image width 206µm
Reflected Light
ZS107 547.6m 5521 e

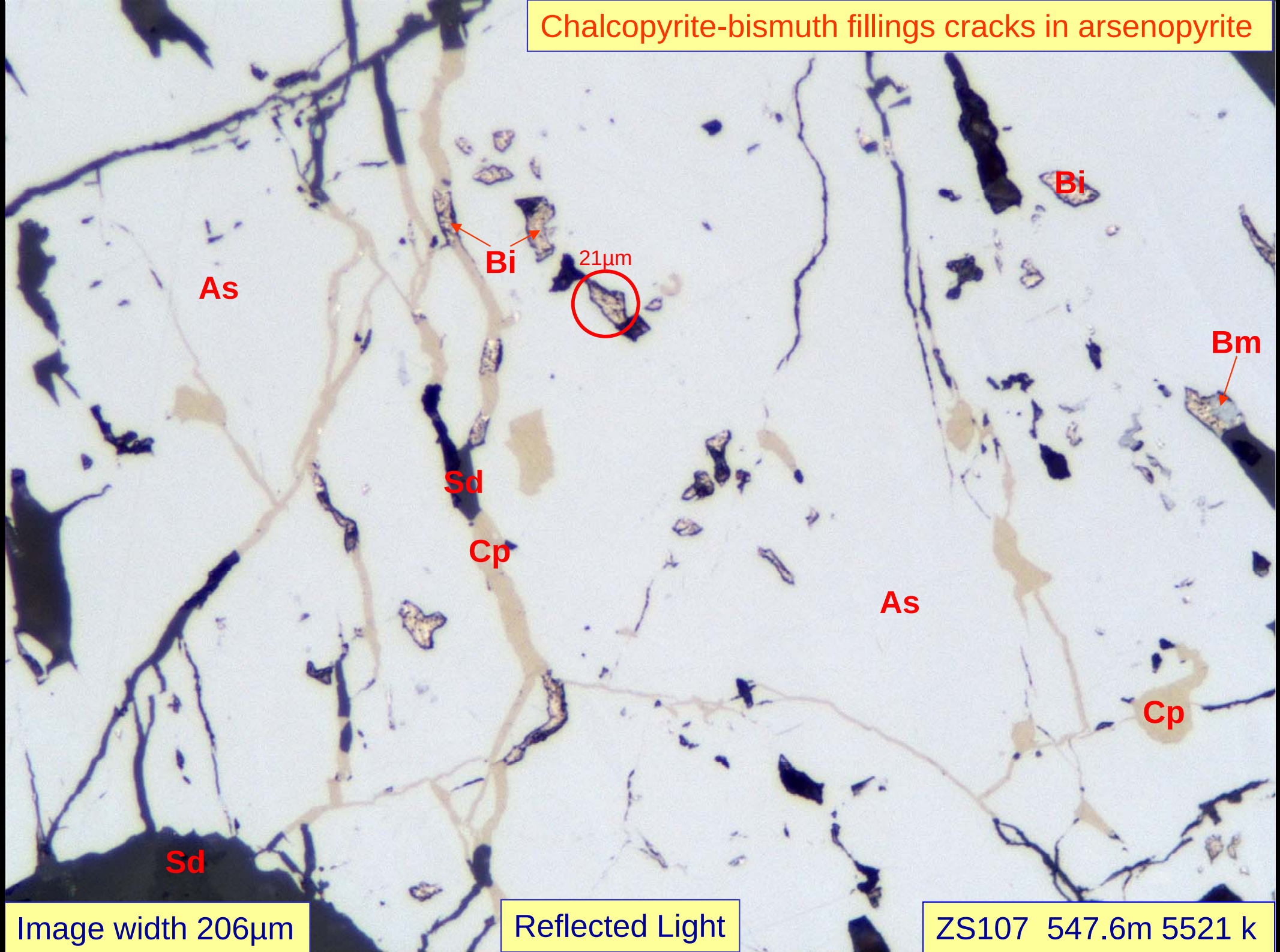

Pyrite-siderite healing fractured fluorite
Sd
106µm
Py
Py
Py
image g
Fl
Image width 2.1mm
Reflected Light
ZS107 547.6m 5521 f

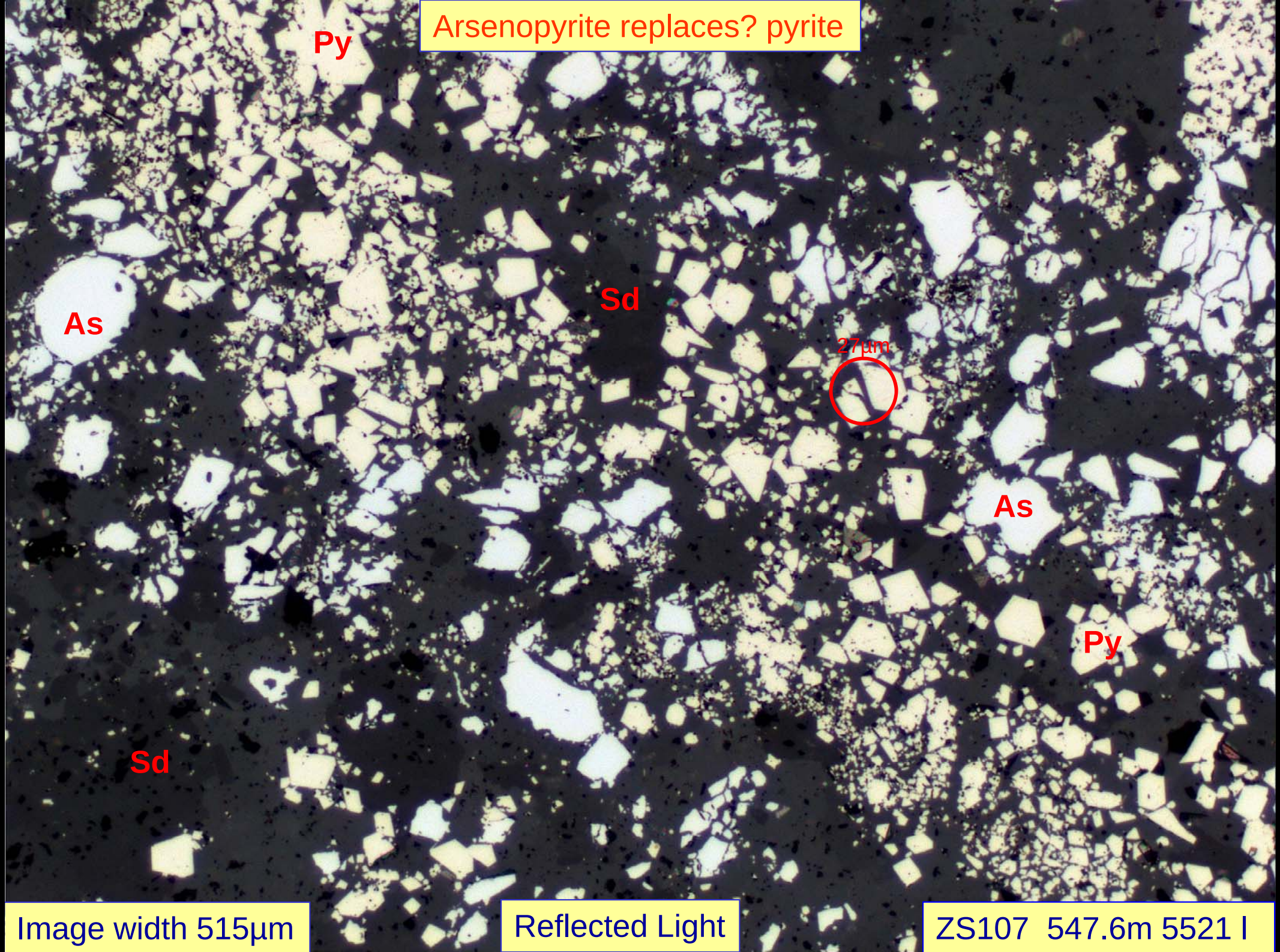

Detail from previous image
Sd
Py
Py
27µm
Fl
Sd
Sd
Fl
Image width 515µm
Reflected Light
ZS107 547.6m 5521 g

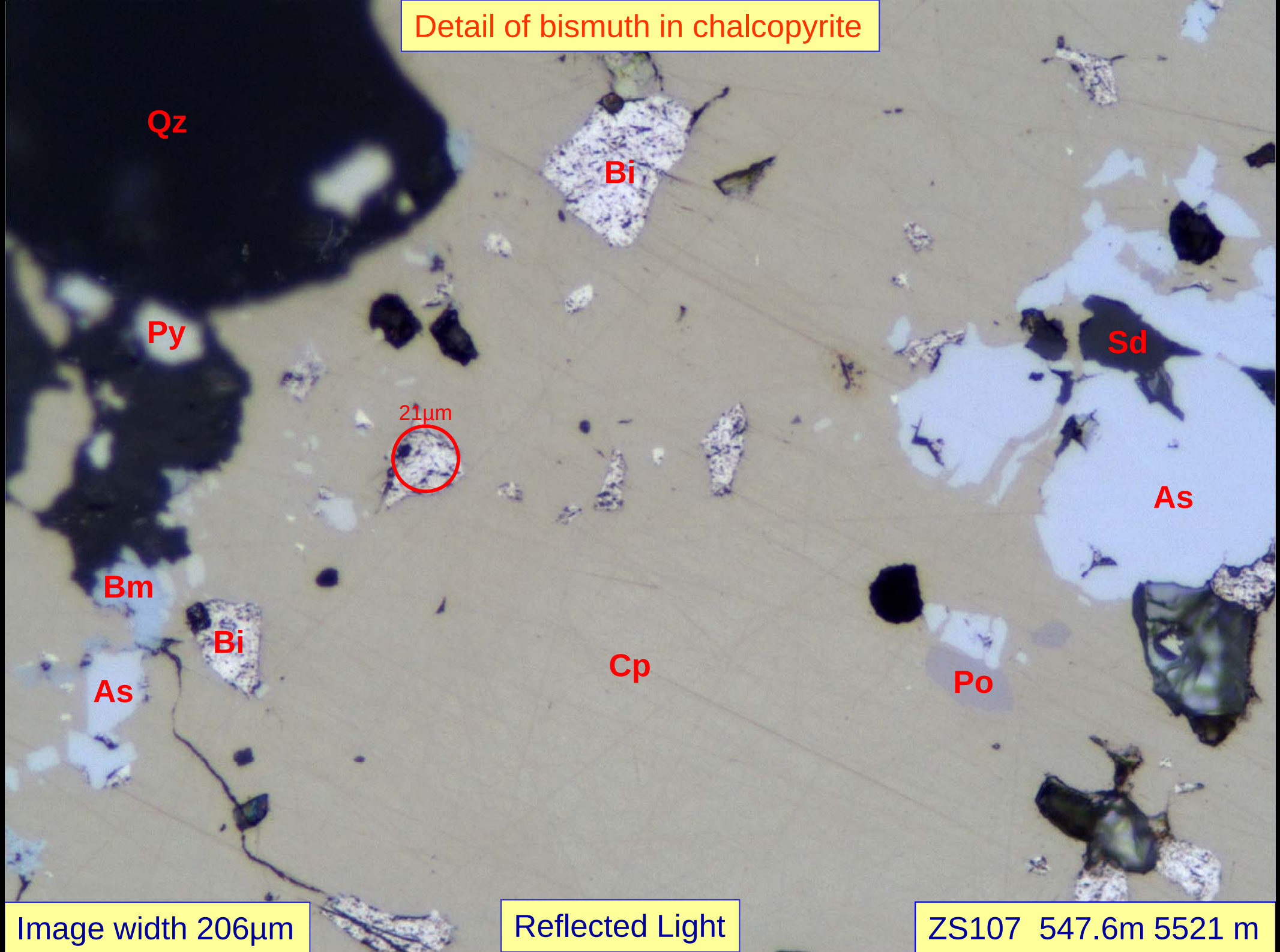

Altered muscovite
106µm
Py
Mu/Ka
Py
Image width 2.1mm
Reflected Light
ZS107 547.6m 5521 h

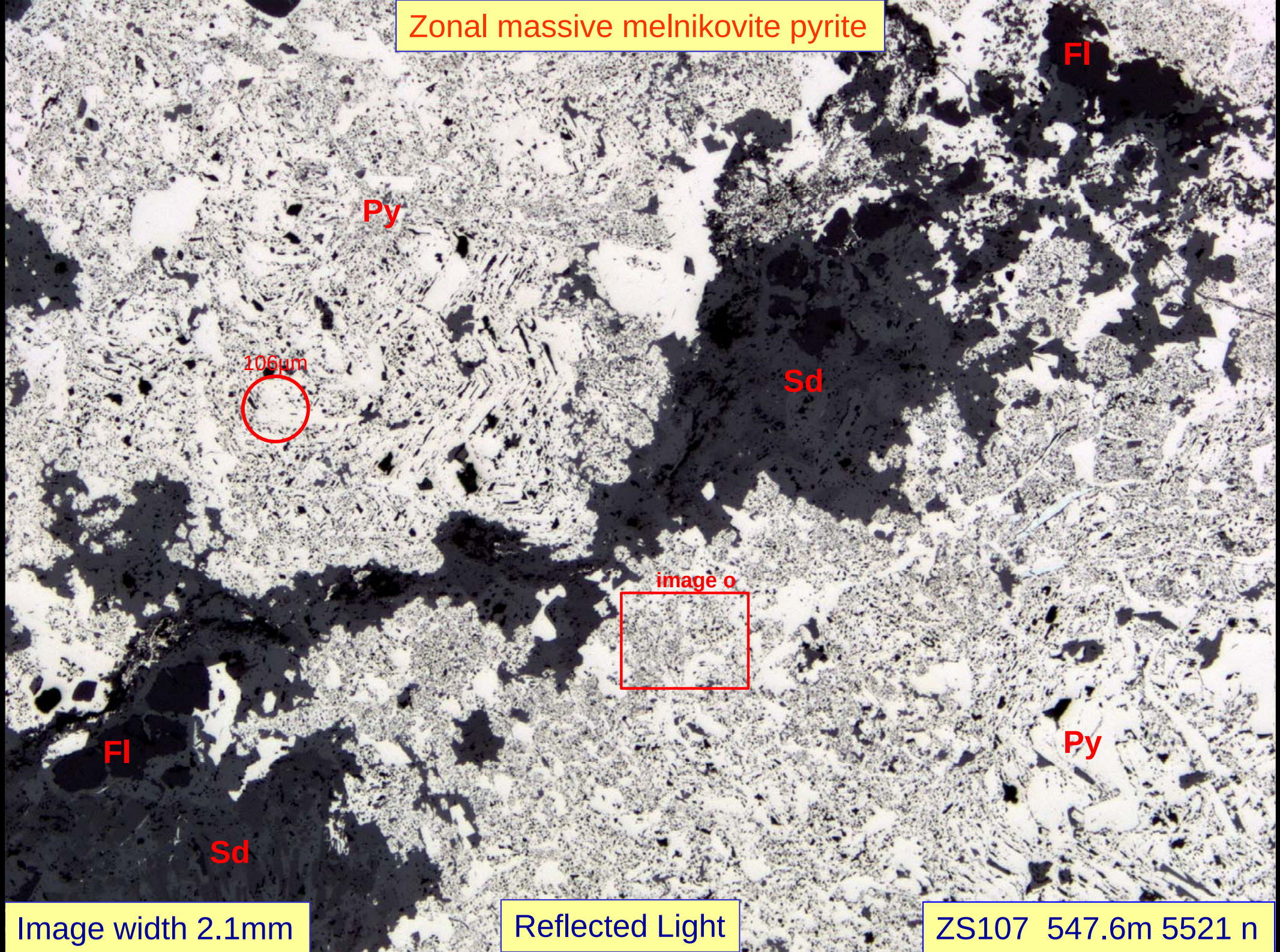

Coarse arsenopyrite with chalcopyrite
106µm
As
Cp
Cl
Sd
Qz
Sd
Sd
Sd
As
Cp
Cp
Sd
Qz
Te?
Image width 2.1mm
Reflected Light
ZS107 547.6m 5521 i

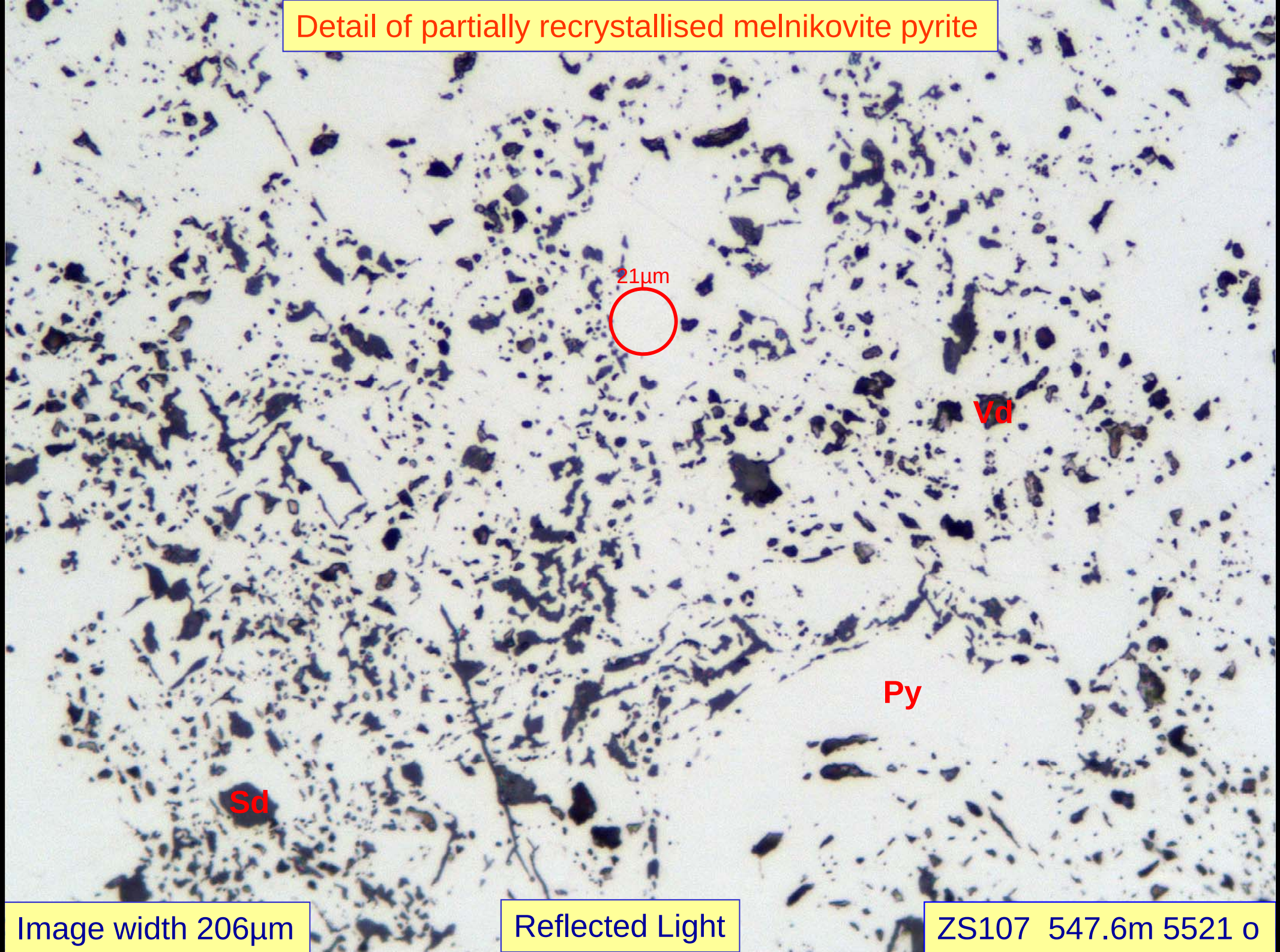

Detail of bismuth with chalcopyrite
As
Cp
Sd
As
21µm
Bi
Bm
Sd
As
Image width 206µm
Reflected Light
ZS107 547.6m 5521 j


Chalcopyrite-bismuth fillings cracks in arsenopyrite
Bi
21µm
As
Bi
Bm
Sd
Cp
As
Cp
Sd
Image width 206µm
Reflected Light
ZS107 547.6m 5521 k


Arsenopyrite replaces? pyrite
Py
As
Sd
27µm
As
Py
Sd
Image width 515µm
Reflected Light
ZS107 547.6m 5521 l


Detail of bismuth in chalcopyrite
Qz
Bi
Py
Sd
21µm
As
Bm
Bi
Cp
Po
As
Image width 206µm
Reflected Light
ZS107 547.6m 5521 m


Zonal massive melnikovite pyrite
Fl
Py
106µm
Sd
image o
Fl
Py
Sd
Image width 2.1mm
Reflected Light
ZS107 547.6m 5521 n


Detail of partially recrystallised melnikovite pyrite
21µm
Vd
Py
Sd
Image width 206µm
Reflected Light
ZS107 547.6m 5521 o

PARTICLE MINERALOGY REPORT

Severn 5521

ZS107 547.6m

GJMcA 2.2.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
43.6	0.0	0.0	0.0	0.9	0.1	0.0	55.0	**300**
61	5	4	0	77	7	0	63	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.97	0.04	29.8	0.64	33.4	0.05	
Actual		**0.04**		**0.03**	**22.7**	**0.04**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	30	0	0	0	0	0	47	
Binary	69	100	62	0	51	100	52	
Ternary	1	0	37	0	49	0	1	
Quat.y+	0	0	0	0	0	0	0	
Grains	71.7	0.3	0.7	0.0	1.7	1.3	86.7	1.62

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	0	0	0	100
Po	0		0	0	0	0	100
Cs	0	0		0	0	0	100
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	0	0	0	0	0		100
Ga	94	1	1	0	2	1	

TOTAL ASSOCIATION MATRIX

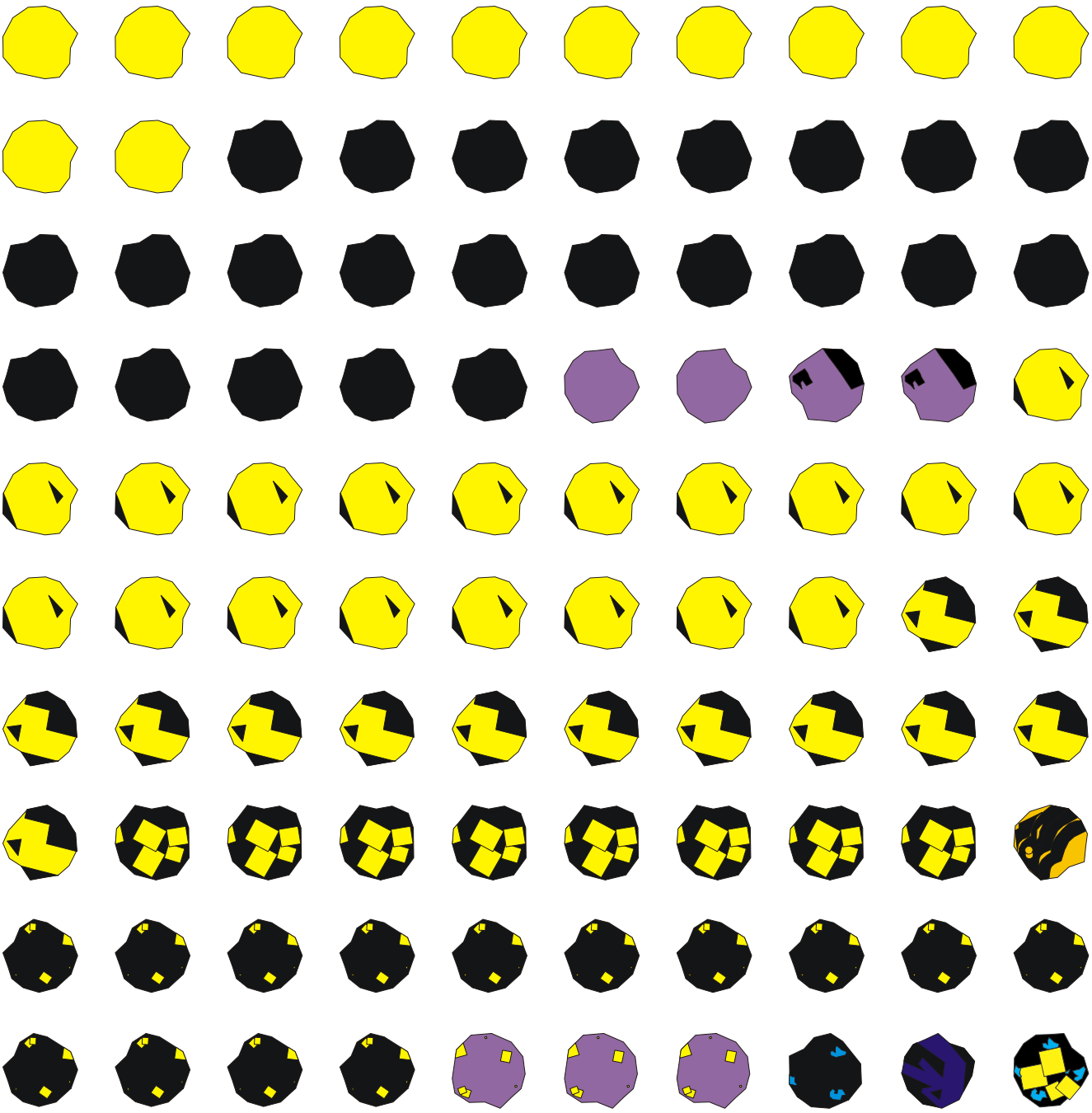
		Py	Po	Cs	St	Cp	As	Ga
	Py		0	1	0	1	0	70
	Po	0		0	0	0	0	100
of	**Cs**	37	0		0	0	0	100
all	**St**	0	0	0		0	0	0
	Cp	49	0	0	0		0	100
	As	0	0	0	0	0		100
	Ga	50	1	1	0	2	1	

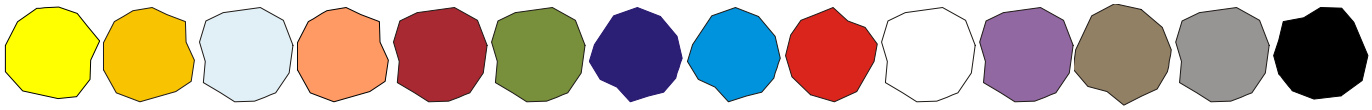
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	30		0	0	0	0	0	69	1	0
Po	0	0		0	0	0	0	100	0	0
Cs	0	0	0		0	0	0	62	37	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	51	49	0
As	0	0	0	0	0	0		100	0	0
Ga	47	49	1	1	0	1	1		1	0

Stellar Resources - Severn Drillhole Mineragraphy

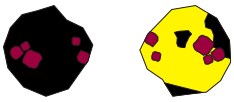
Severn 5521 **53µm mask** **January 2012**

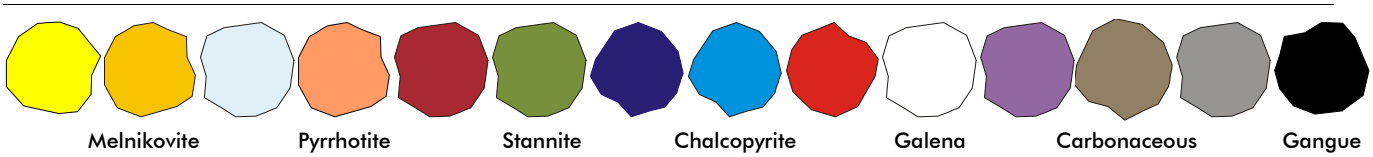




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5521 Sn Scan **53µm mask** **January 2012**





Core Scan

QXRD: 23% pyrite, 23% chlorite, 17% siderite, 15% quartz, 5% kaolinite, 4% pyrrhotite

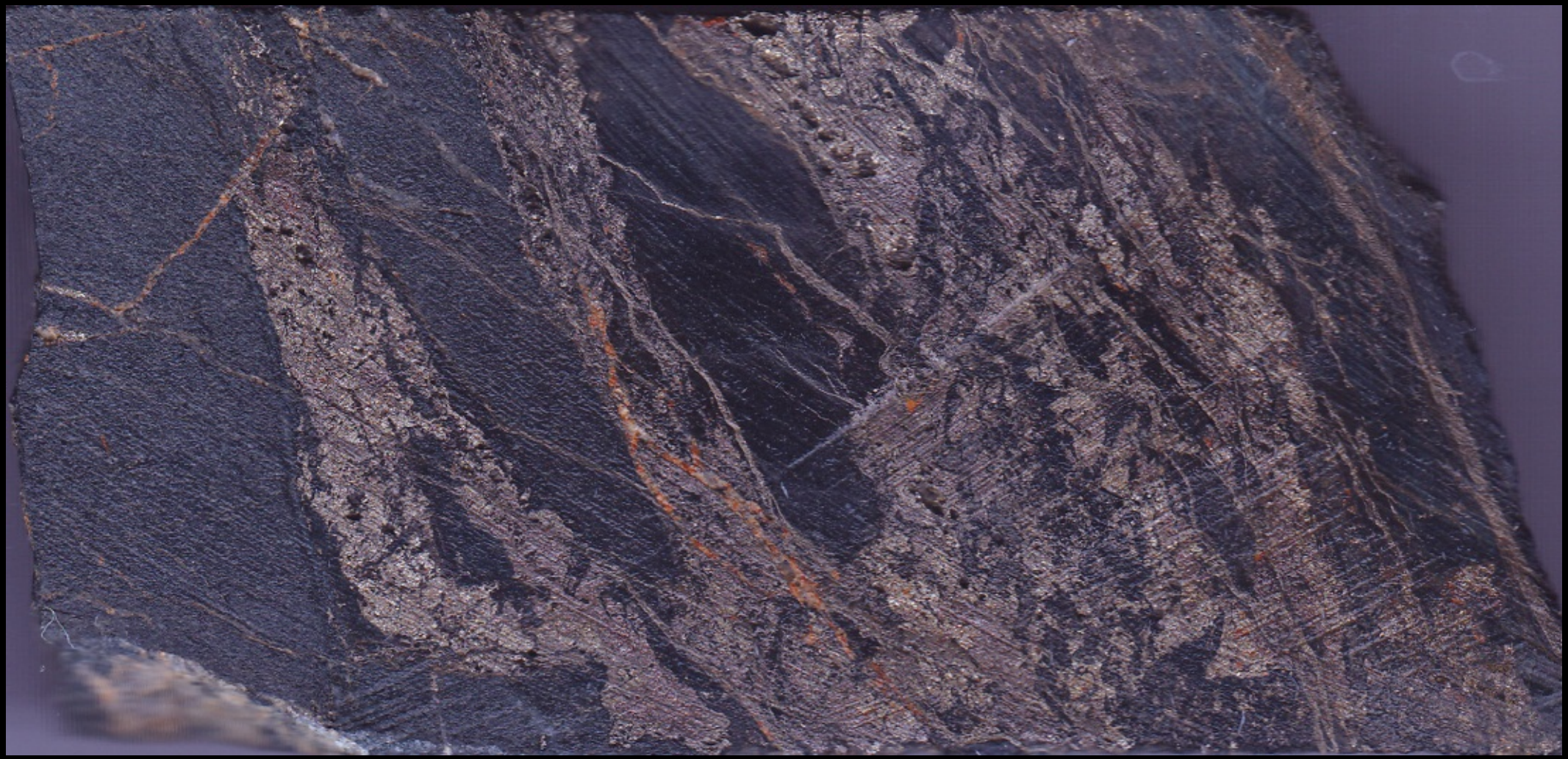
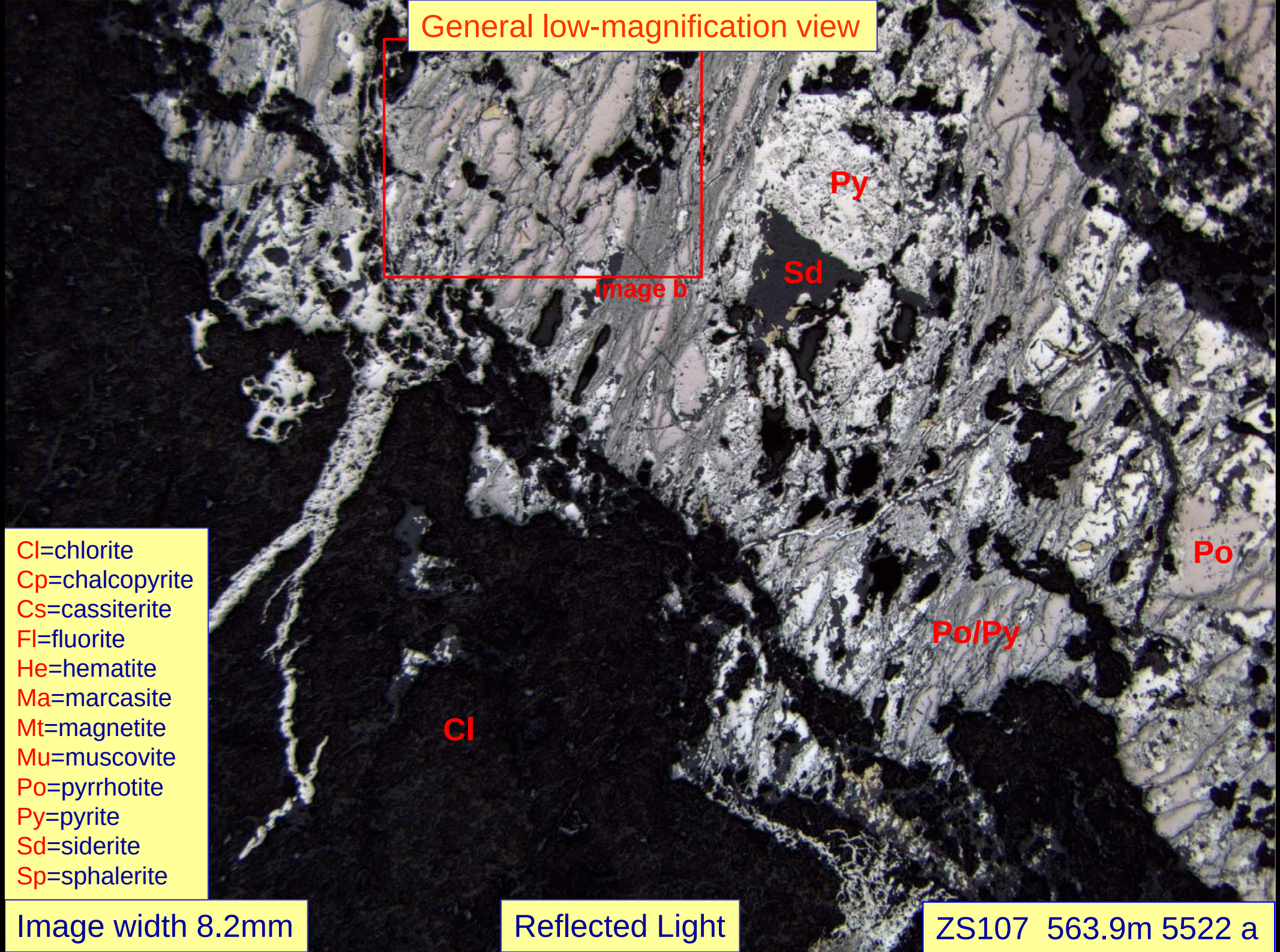


Image width ~100mm

ZS107 563.9m 5522

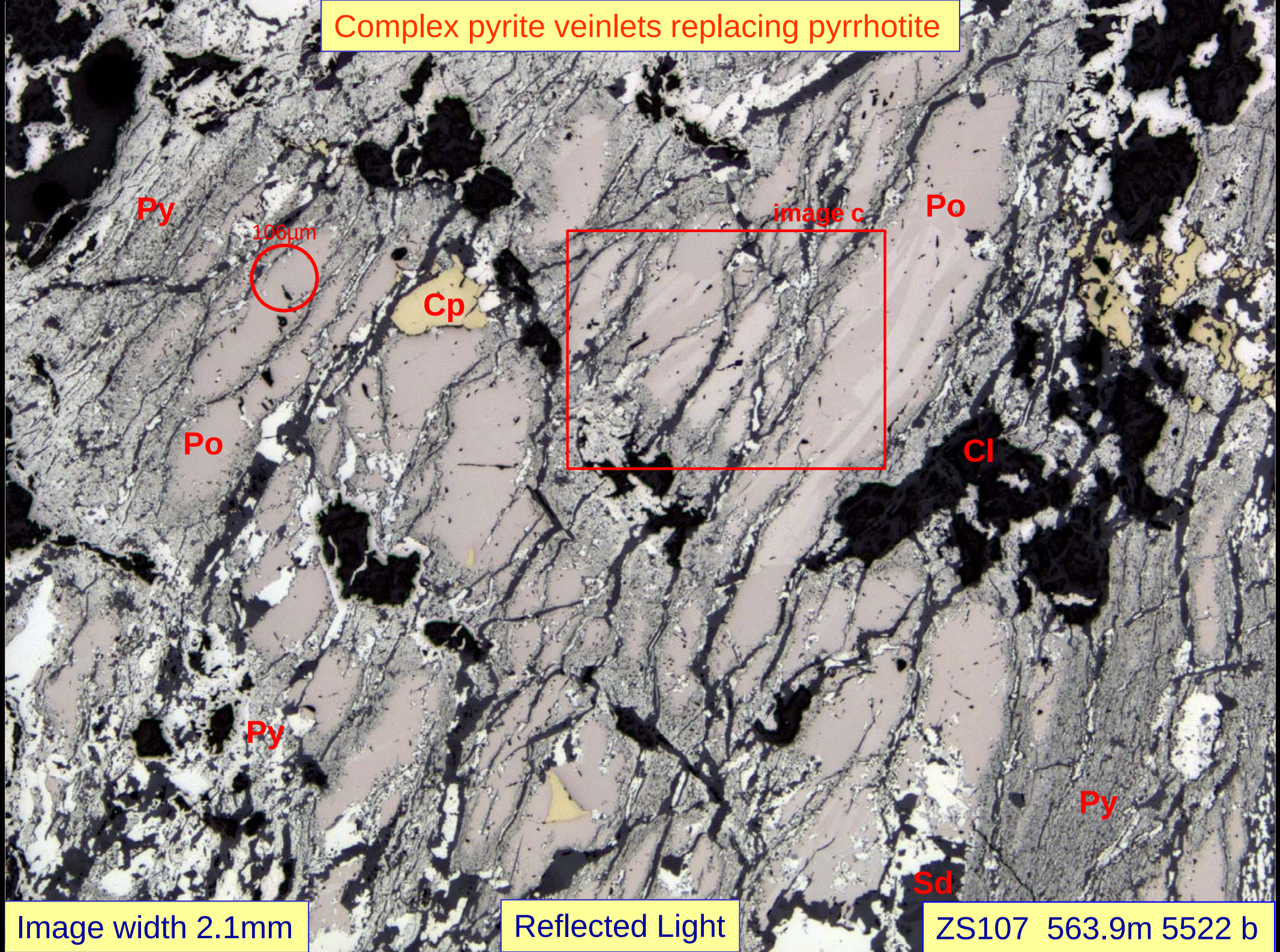


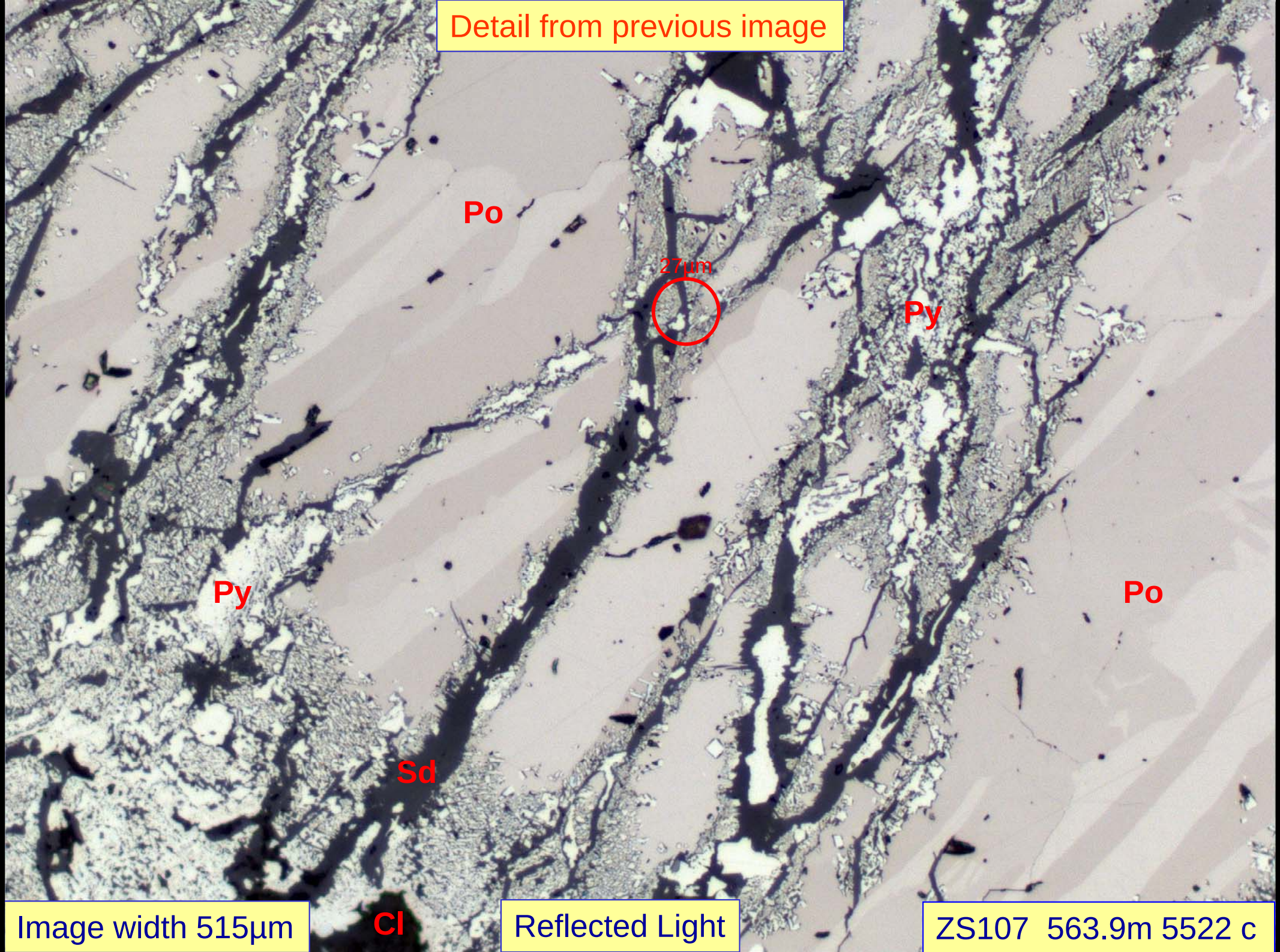
Cl=chlorite
Cp=chalcopyrite
Cs=cassiterite
Fl=fluorite
He=hematite
Ma=marcasite
Mt=magnetite
Mu=muscovite
Po=pyrrhotite
Py=pyrite
Sd=siderite
Sp=sphalerite

Image width 8.2mm

Reflected Light

ZS107 563.9m 5522 a


Complex pyrite veinlets replacing pyrrhotite
Py
106µm
Cp
image c
Po
Po
Cl
Py
Py
Sd
Image width 2.1mm
Reflected Light
ZS107 563.9m 5522 b


Detail from previous image
Po
27µm
Py
Py
Po
Sd
Cl
Image width 515µm
Reflected Light
ZS107 563.9m 5522 c

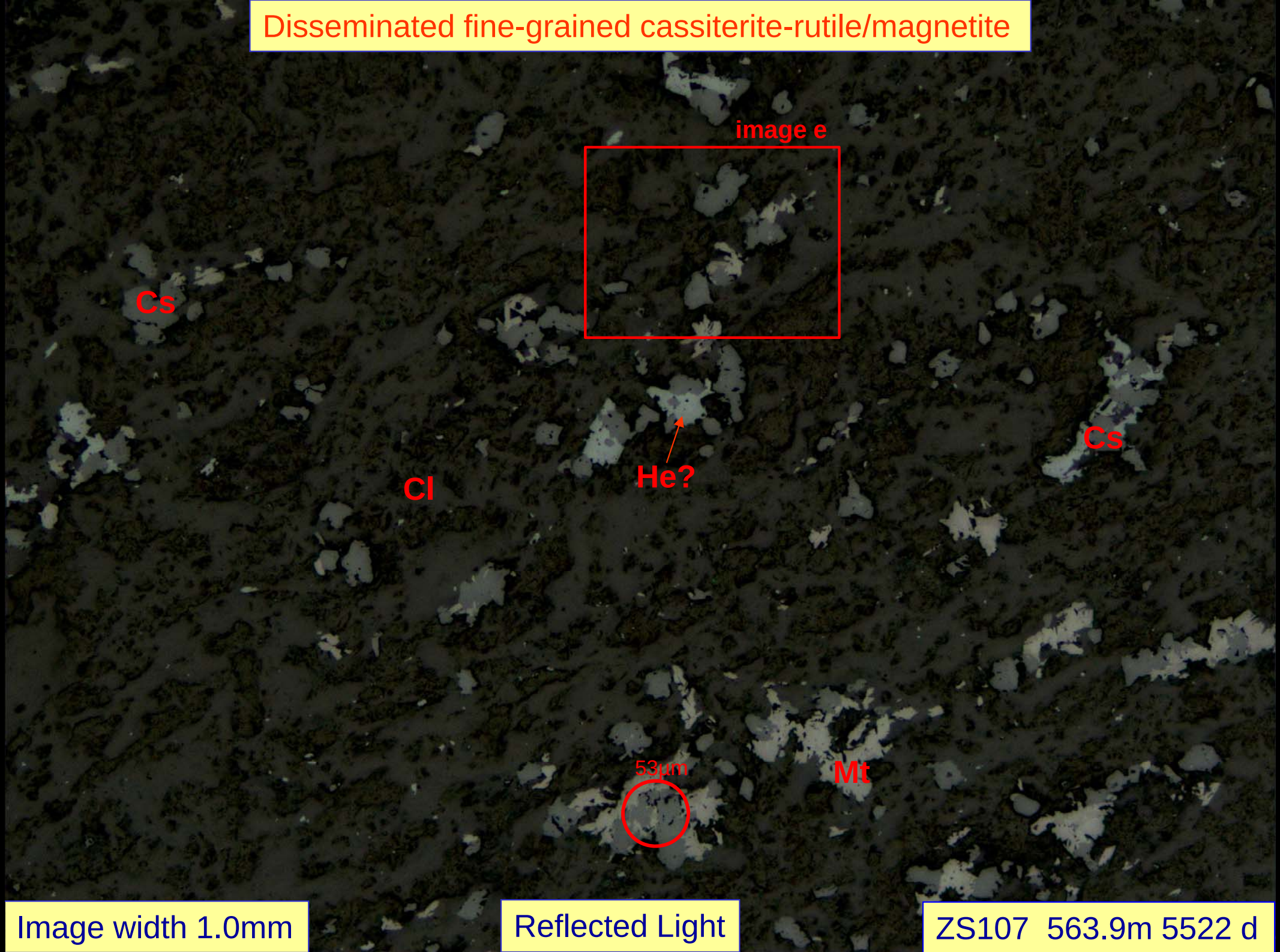
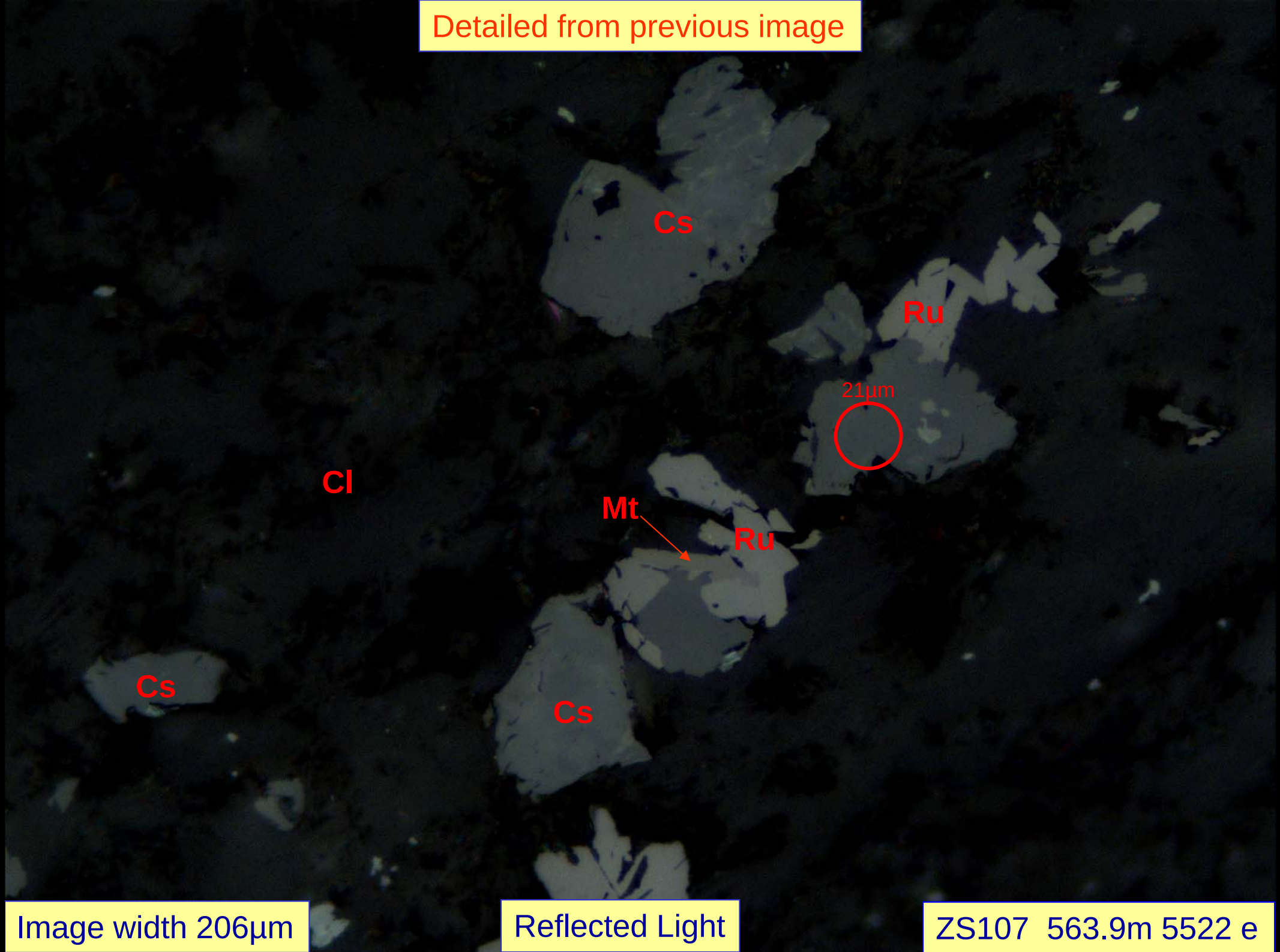
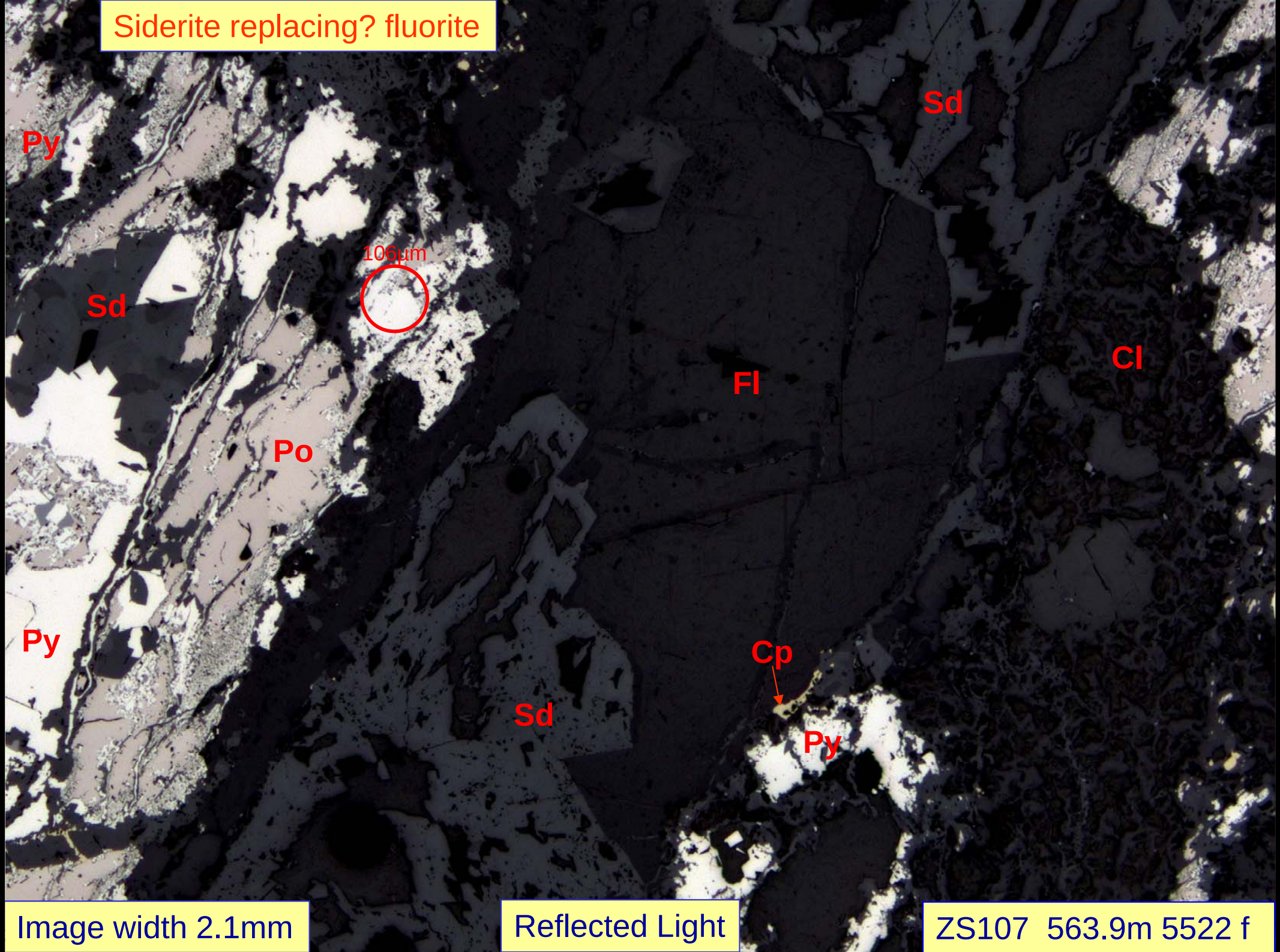


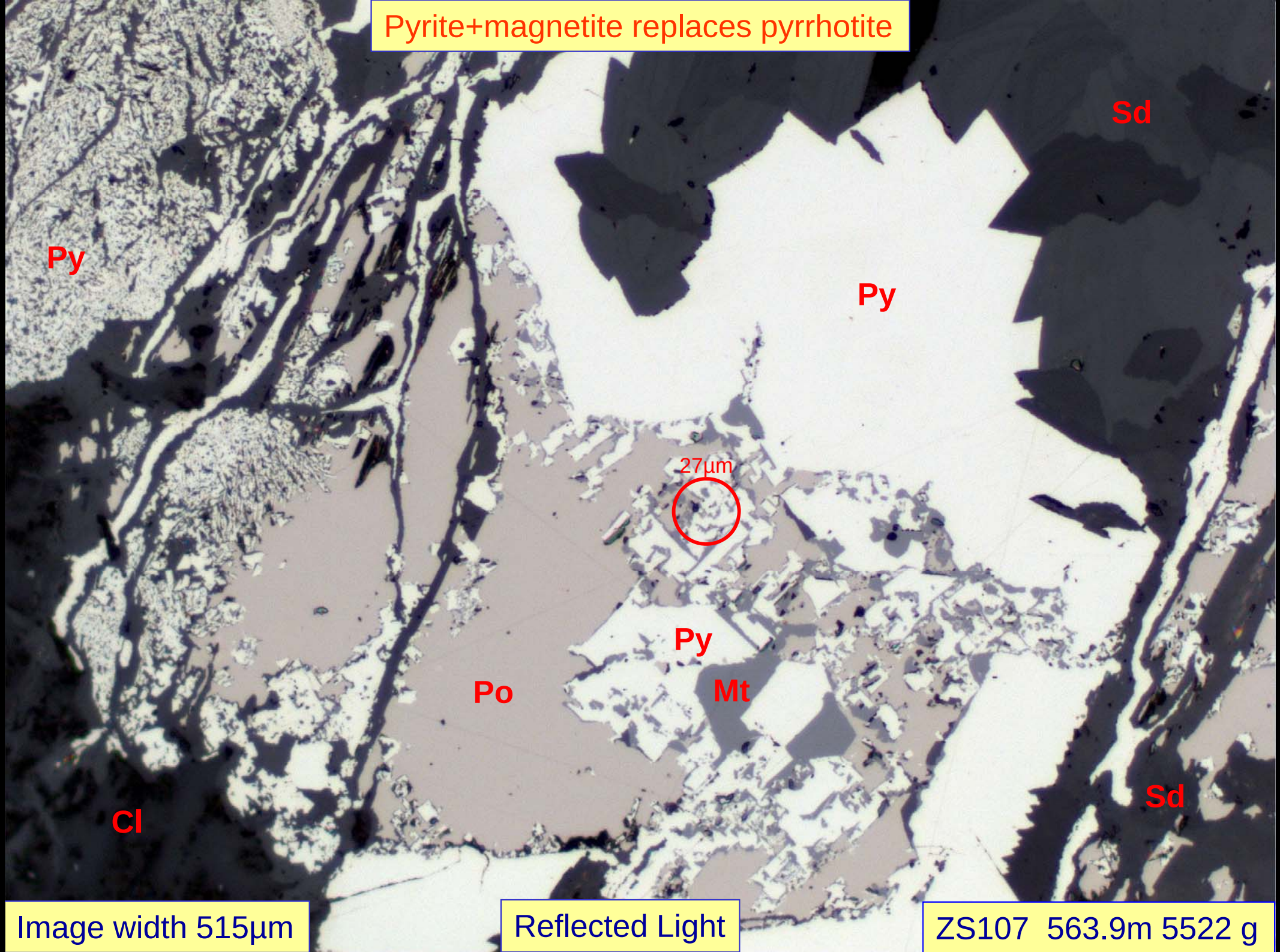
Image width 1.0mm

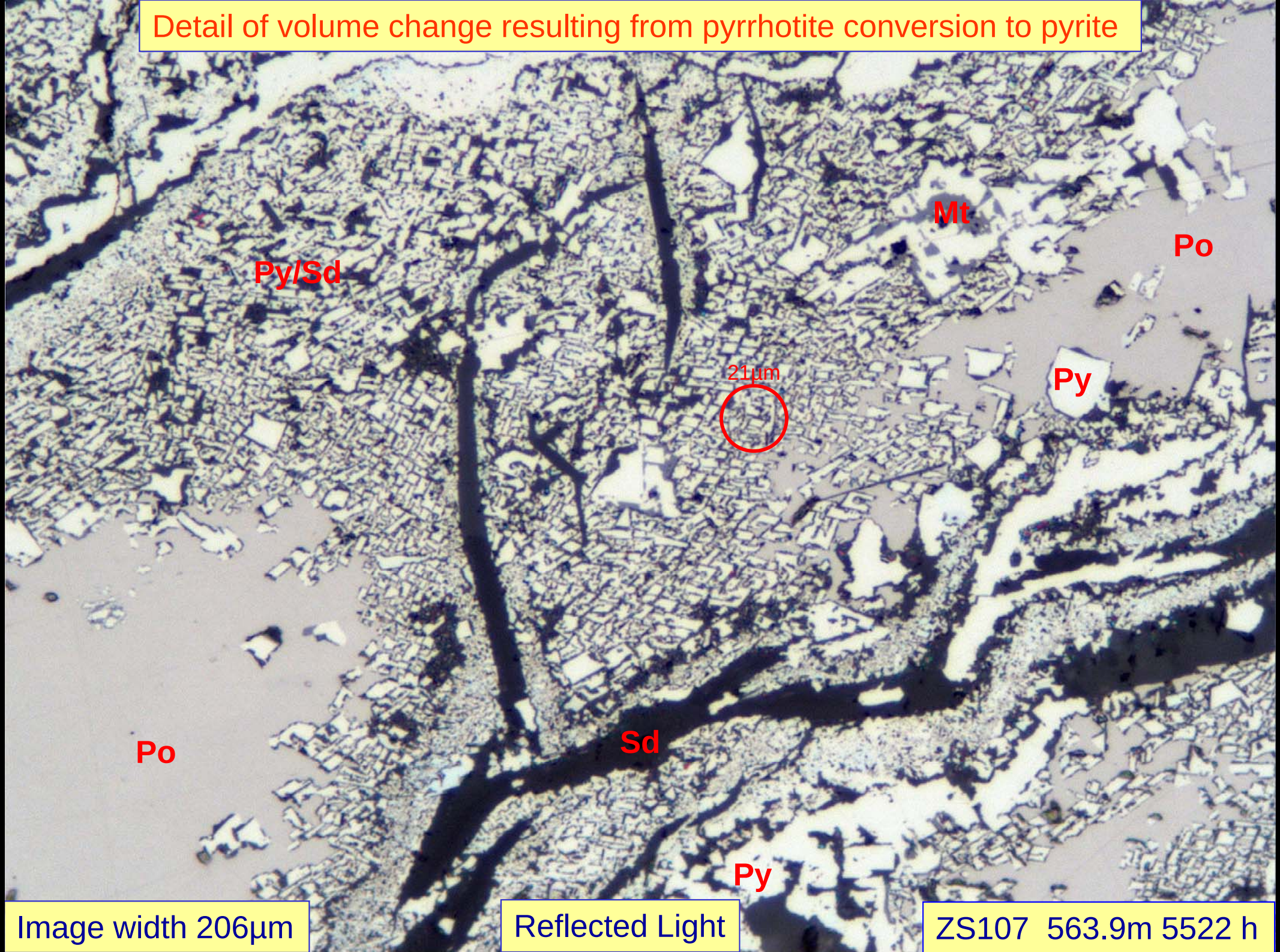
Reflected Light

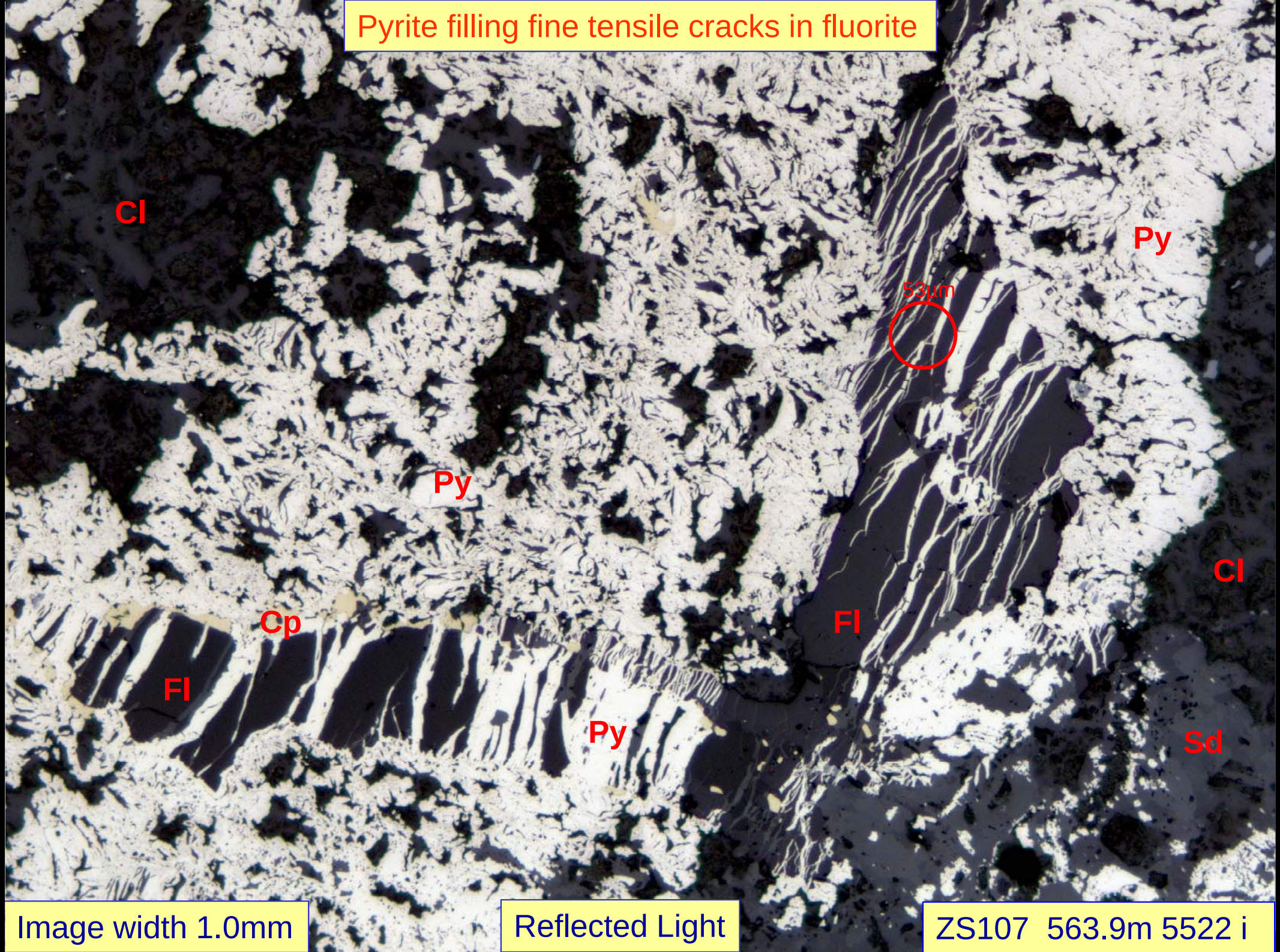
ZS107 563.9m 5522 d

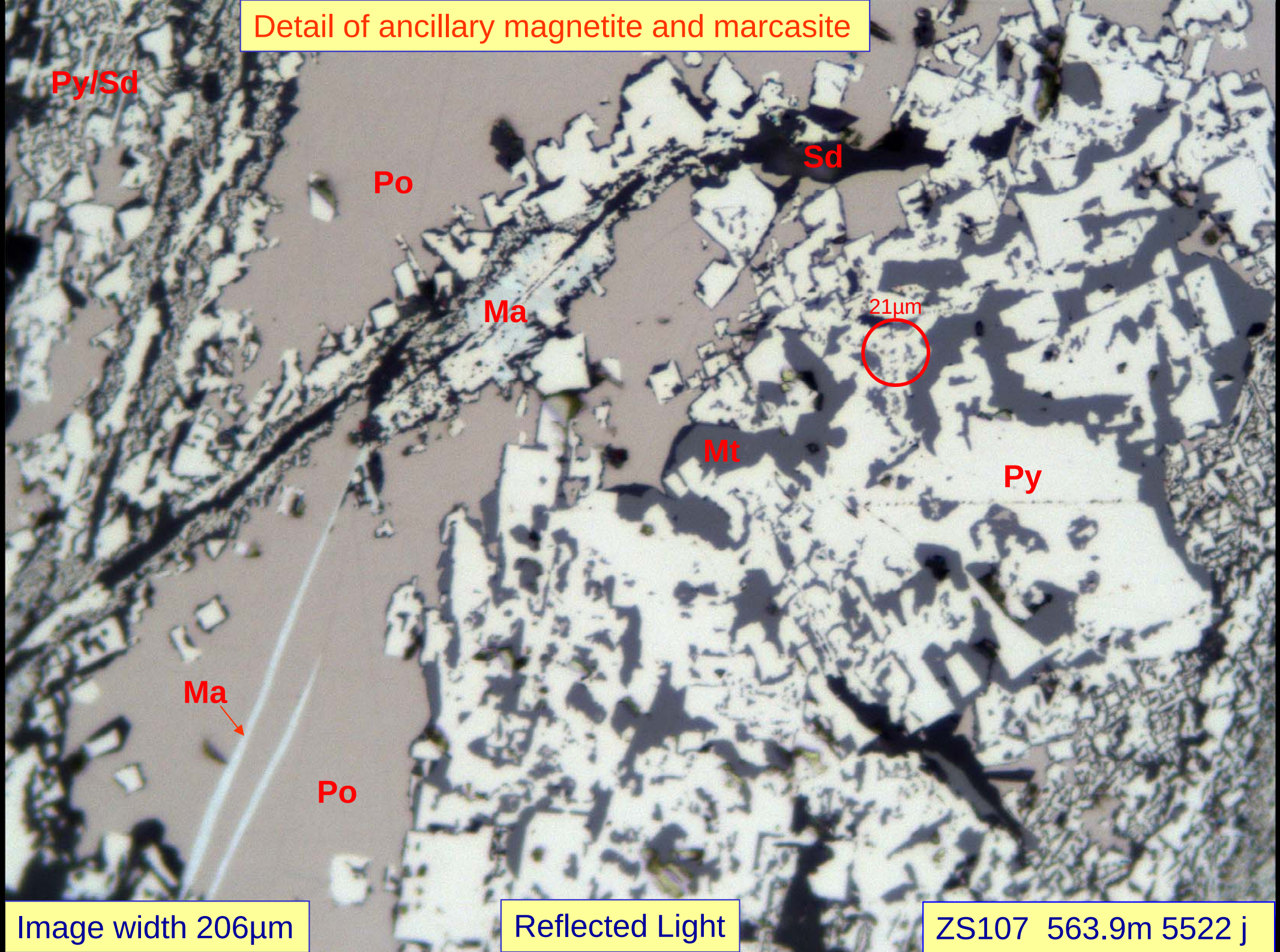

Detailed from previous image
Cs
Ru
21µm
Cl
Mt
Ru
Cs
Cs
Image width 206µm
Reflected Light
ZS107 563.9m 5522 e

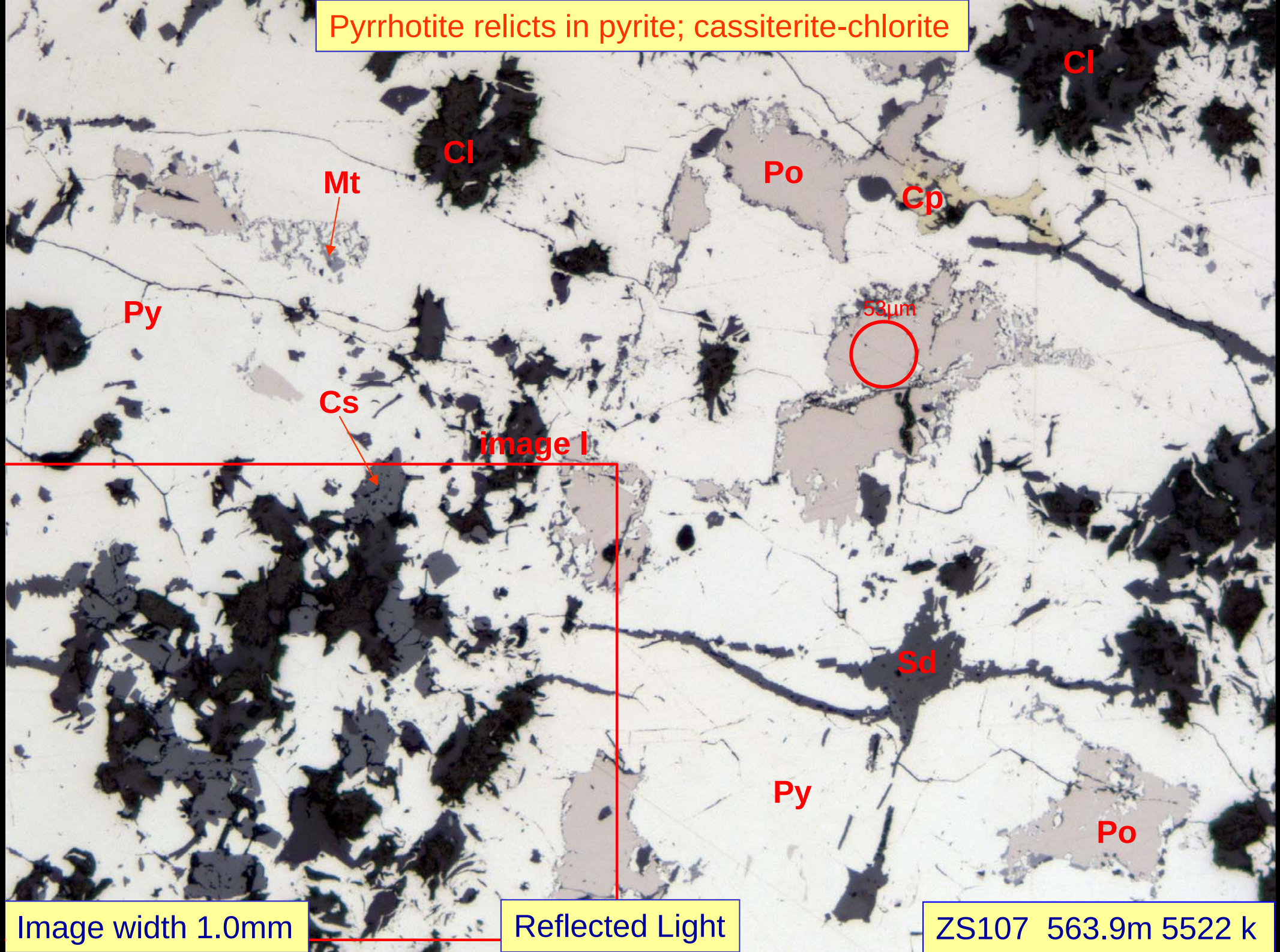

Siderite replacing? fluorite
Py
Sd
106µm
Sd
Cl
Fl
Po
Py
Cp
Sd
Py
Image width 2.1mm
Reflected Light
ZS107 563.9m 5522 f

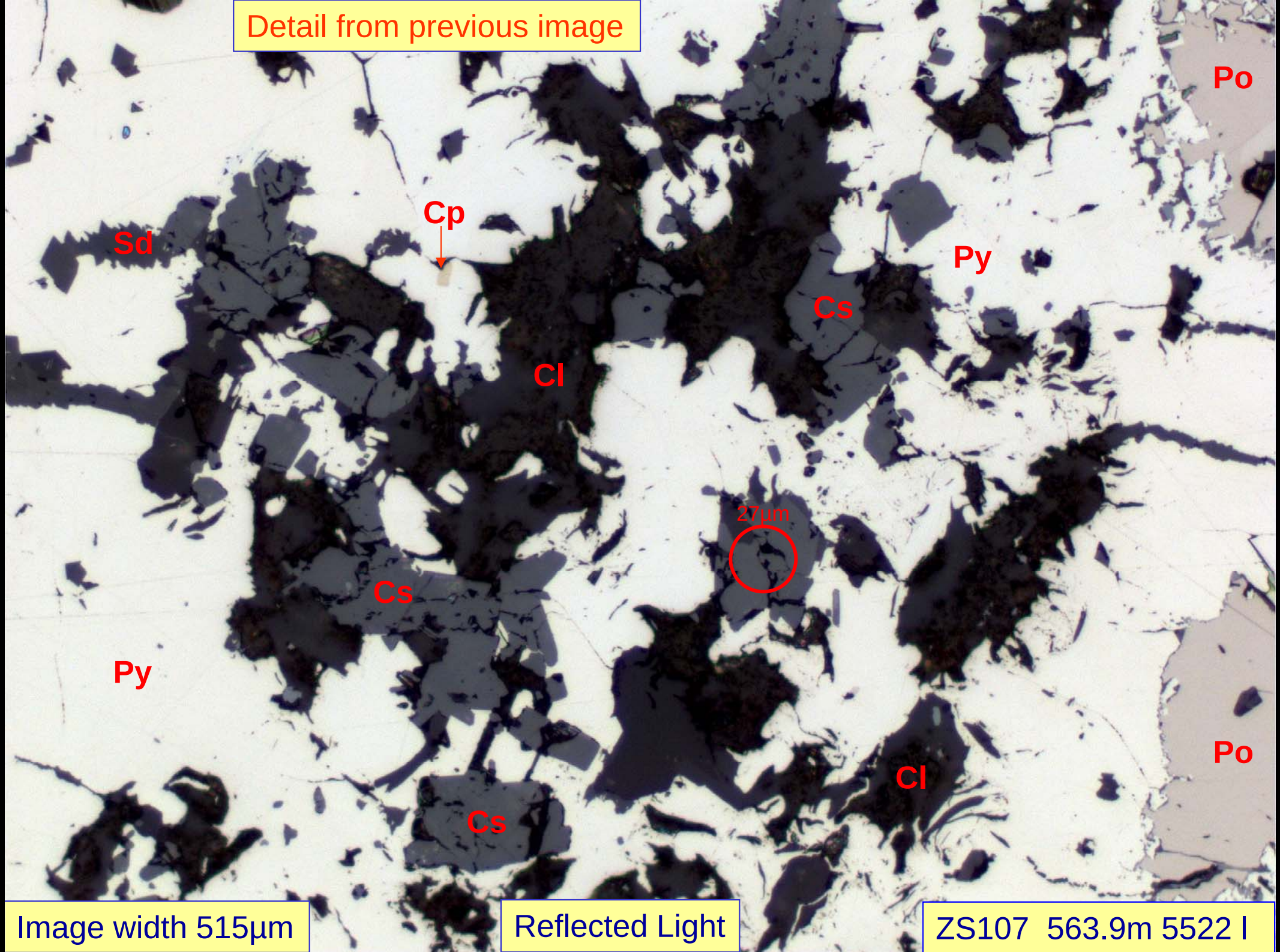

Pyrite+magnetite replaces pyrrhotite
Sd
Py
Py
27µm
Py
Po
Mt
Sd
Cl
Image width 515µm
Reflected Light
ZS107 563.9m 5522 g

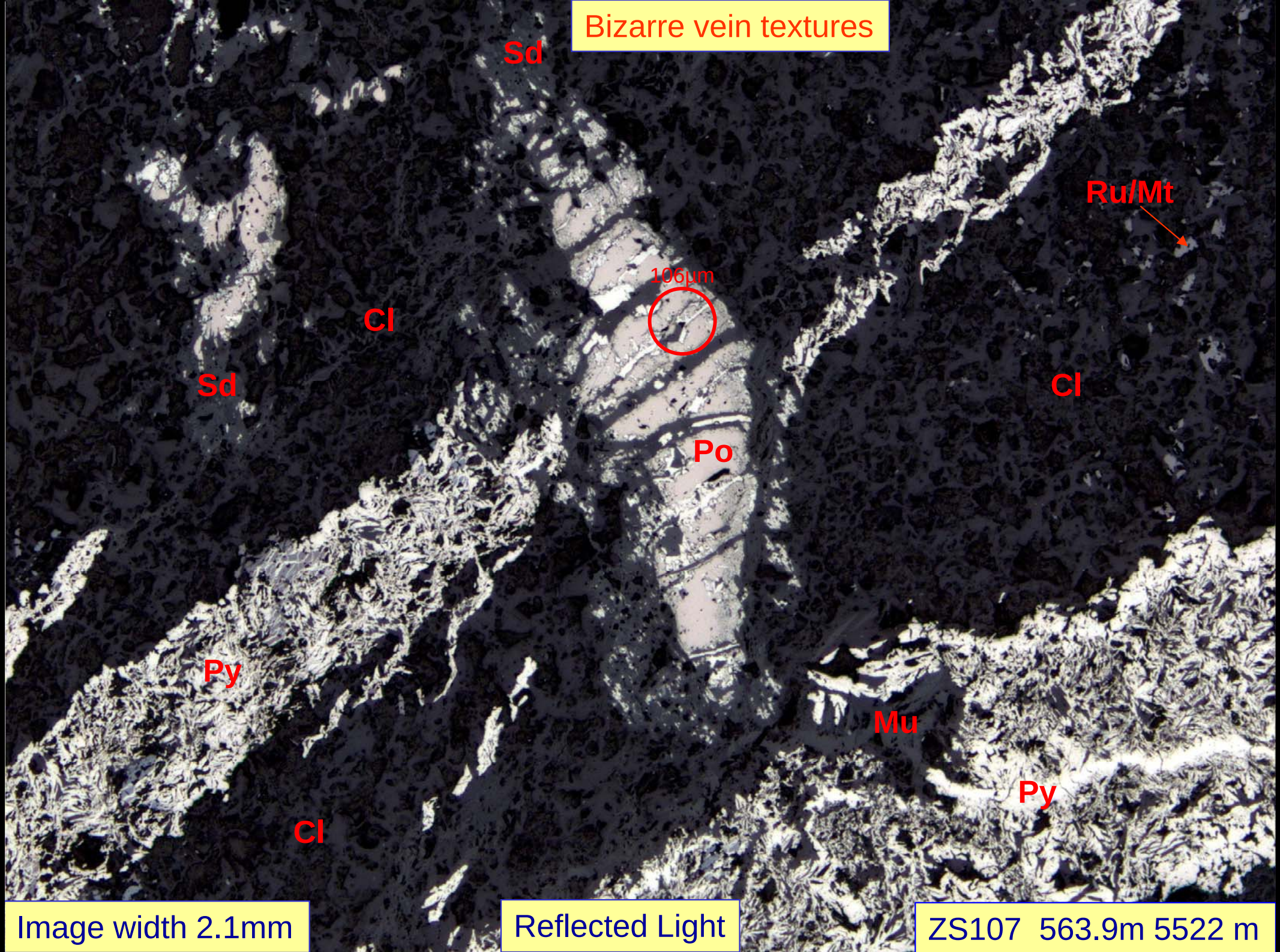

Detail of volume change resulting from pyrrhotite conversion to pyrite
Mt
Po
Py/Sd
21µm
Py
Po
Sd
Py
Image width 206µm
Reflected Light
ZS107 563.9m 5522 h

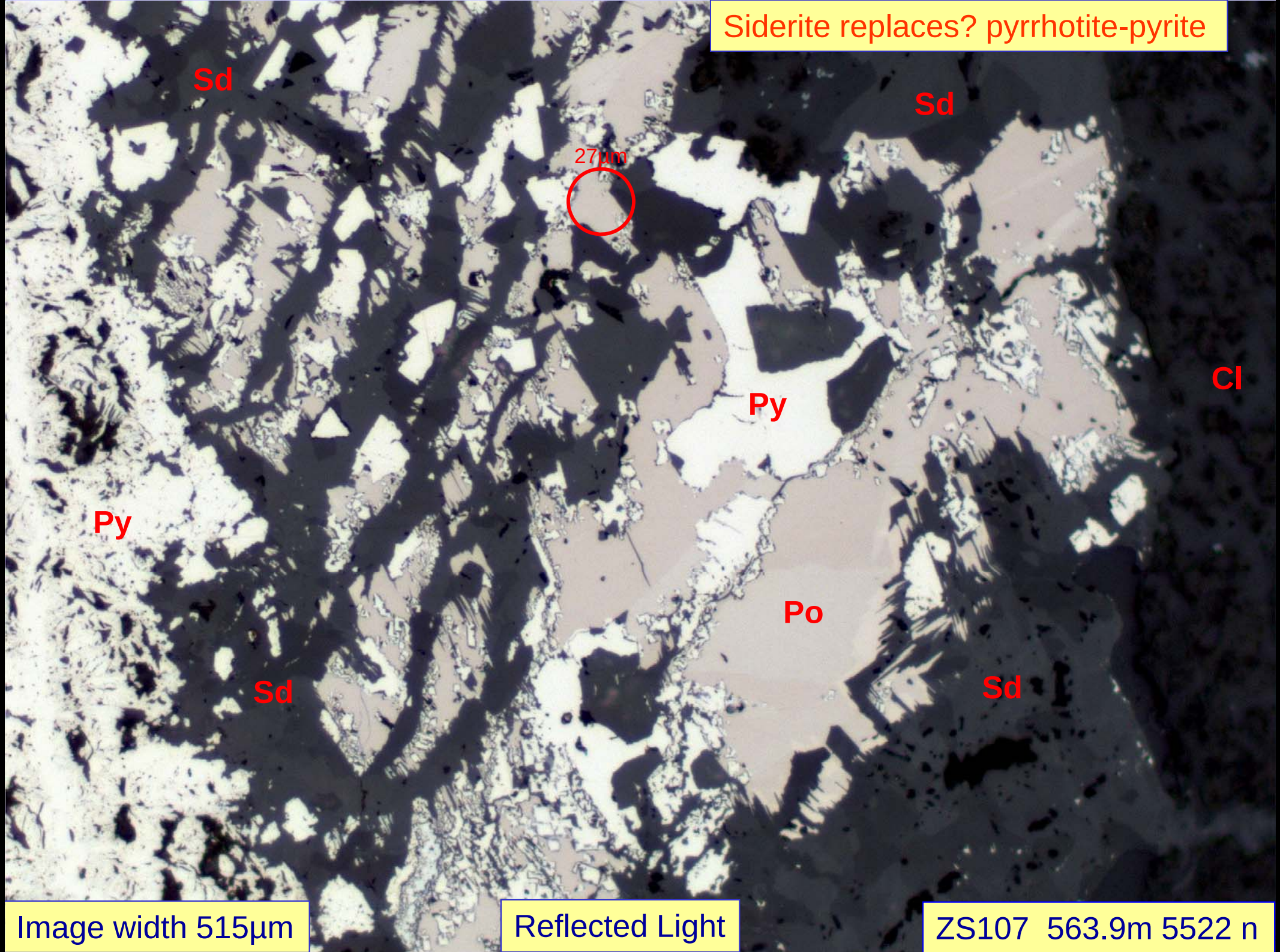

Pyrite filling fine tensile cracks in fluorite
Cl
Py
53µm
Py
Cl
Cp
Fl
Fl
Py
Sd
Image width 1.0mm
Reflected Light
ZS107 563.9m 5522 i

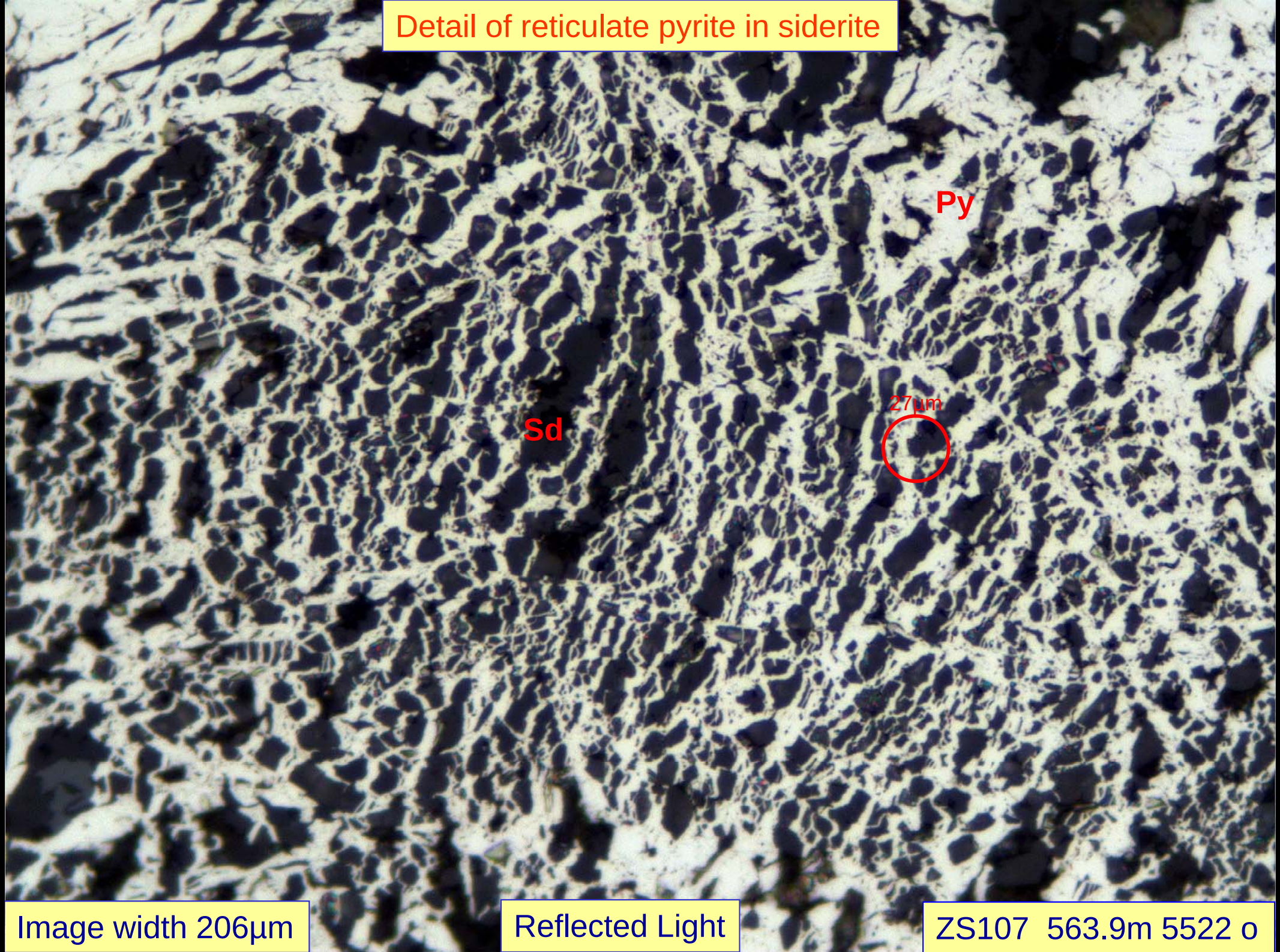

Detail of ancillary magnetite and marcasite
Py/Sd
Po
Sd
Ma
21µm
Mt
Py
Ma
Po
Image width 206µm
Reflected Light
ZS107 563.9m 5522 j

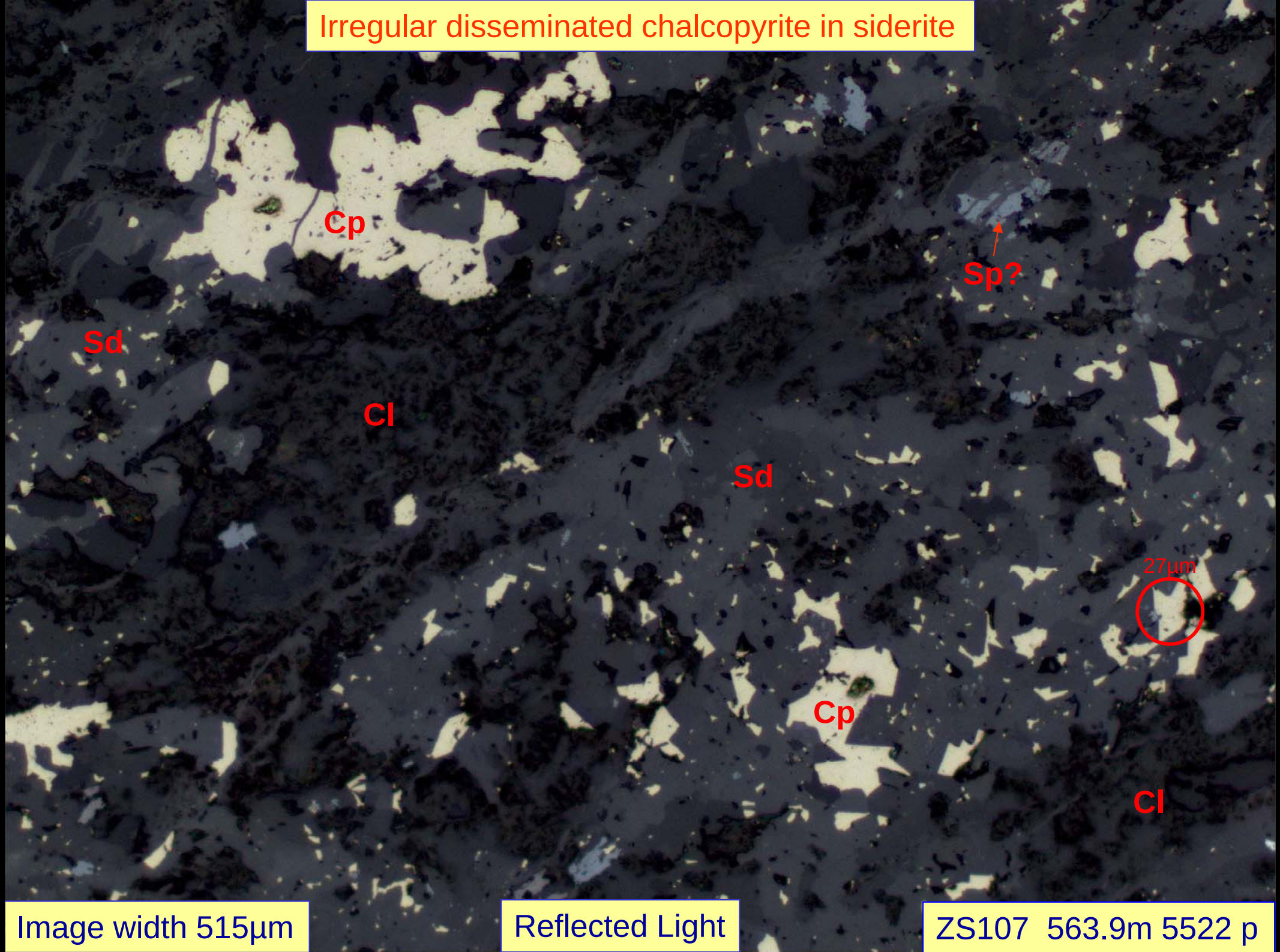

Pyrrhotite relicts in pyrite; cassiterite-chlorite
Cl
Cl
Mt
Po
Cp
Py
53µm
Cs
image I
Sd
Py
Po
Image width 1.0mm
Reflected Light
ZS107 563.9m 5522 k


Detail from previous image
Po
Cp
Sd
Py
Cs
Cl
27µm
Cs
Py
Po
Cl
Cs
Image width 515µm
Reflected Light
ZS107 563.9m 5522 l


Bizarre vein textures
Sd
Ru/Mt
106µm
Cl
Sd
Cl
Po
Py
Mu
Py
Cl
Image width 2.1mm
Reflected Light
ZS107 563.9m 5522 m


Siderite replaces? pyrrhotite-pyrite
Sd
Sd
27µm
Cl
Py
Py
Po
Sd
Sd
Image width 515µm
Reflected Light
ZS107 563.9m 5522 n


Detail of reticulate pyrite in siderite
Py
Sd
27 µm
Image width 206µm
Reflected Light
ZS107 563.9m 5522 o


Irregular disseminated chalcopyrite in siderite
Cp
Sp?
Sd
Cl
Sd
27µm
Cp
Cl
Image width 515µm
Reflected Light
ZS107 563.9m 5522 p

PARTICLE MINERALOGY REPORT

Severn 5522

ZS107 563.9m

GJMcA 2.2.12

53µm mask	100 % by weight

Average composition - all grains

Py	Po	Cs	St	As	Cp	SpGn	Ga	n
27.0	6.7	0.6	0.0	0.0	0.3	0.0	65.3	**300**
54	44	12	0	0	15	0	71	

ASSAYS

	SG	Sn	S	As	Fe	Cu	
Calc'd	3.74	0.94	22.3	0.00	30.7	0.12	
Actual		**0.70**		**0.00**	**27.4**	**0.09**	

COMPOSITE PROPORTIONS

	Py	Po	Cs	St	Cp	As	Ga	
Mono	17	45	0	0	0	0	66	
Binary	66	10	91	0	87	0	27	
Ternary	17	45	9	0	13	0	7	
Quat.y+	0	0	0	0	0	0	1	
Grains	47.7	14.3	5.3	0.0	2.0	0.0	91.7	1.61

BINARY ASSOCIATION MATRIX

	Py	Po	Cs	St	Cp	As	Ga
Py		0	0	0	0	0	100
Po	97		0	0	0	0	3
Cs	0	0		0	0	0	100
St	0	0	0		0	0	0
Cp	0	0	0	0		0	100
As	0	0	0	0	0		0
Ga	73	2	21	0	4	0	

TOTAL ASSOCIATION MATRIX

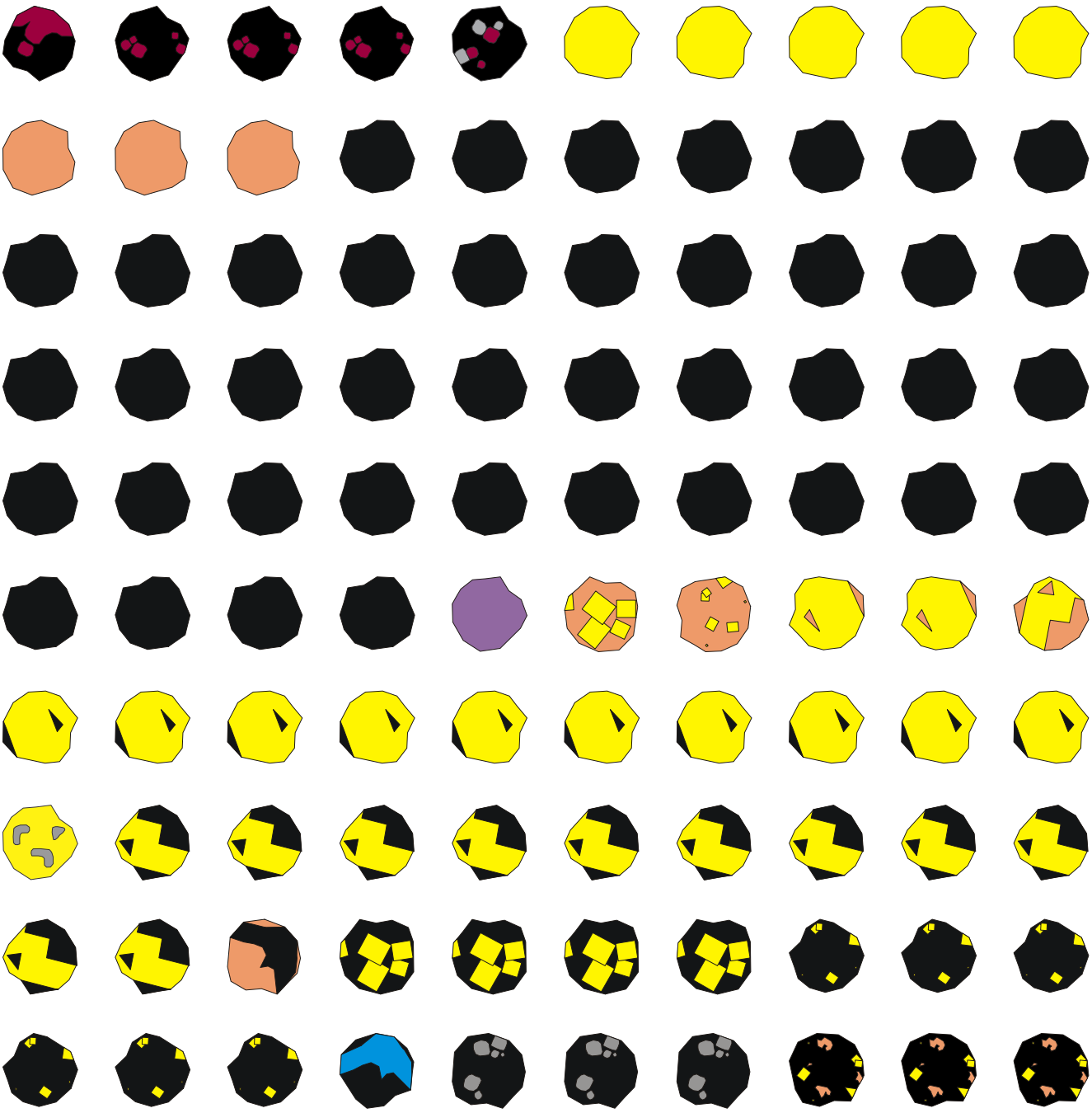
		Py	Po	Cs	St	Cp	As	Ga
	Py		15	1	0	0	0	83
	Po	55		0	0	0	0	46
of	**Cs**	7	0		0	2	0	100
all	**St**	0	0	0		0	0	0
	Cp	5	0	8	0		0	100
	As	0	0	0	0	0		0
	Ga	26	5	7	0	2	0	

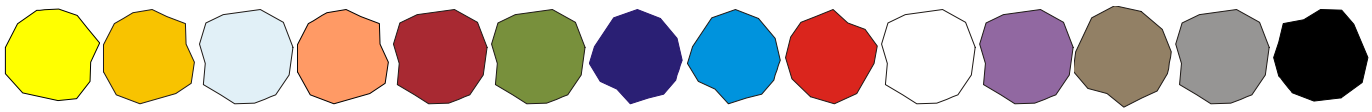
DISTRIBUTION MATRIX

	Free	Binary							Tern	Quat
		Py	Po	Cs	St	Cp	As	Ga		
Py	17		0	0	0	0	0	66	17	0
Po	45	9		0	0	0	0	0	45	0
Cs	0	0	0		0	0	0	91	9	0
St	0	0	0	0		0	0	0	0	0
Cp	0	0	0	0	0		0	87	13	0
As	0	0	0	0	0	0		0	0	0
Ga	66	20	0	6	0	1	0		7	1

Stellar Resources - Severn Drillhole Mineragraphy

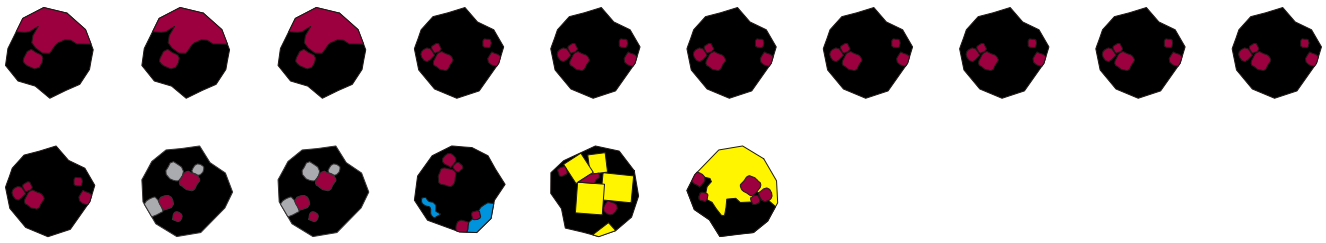
Severn 5522 **53µm mask** **January 2012**

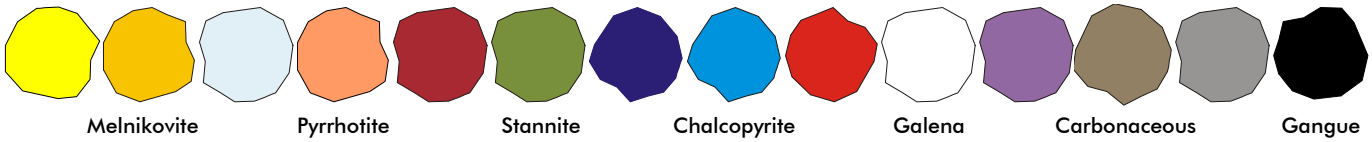




Stellar Resources - Severn Drillhole Mineragraphy

Severn 5522 Sn Scan **53µm mask** **January 2012**



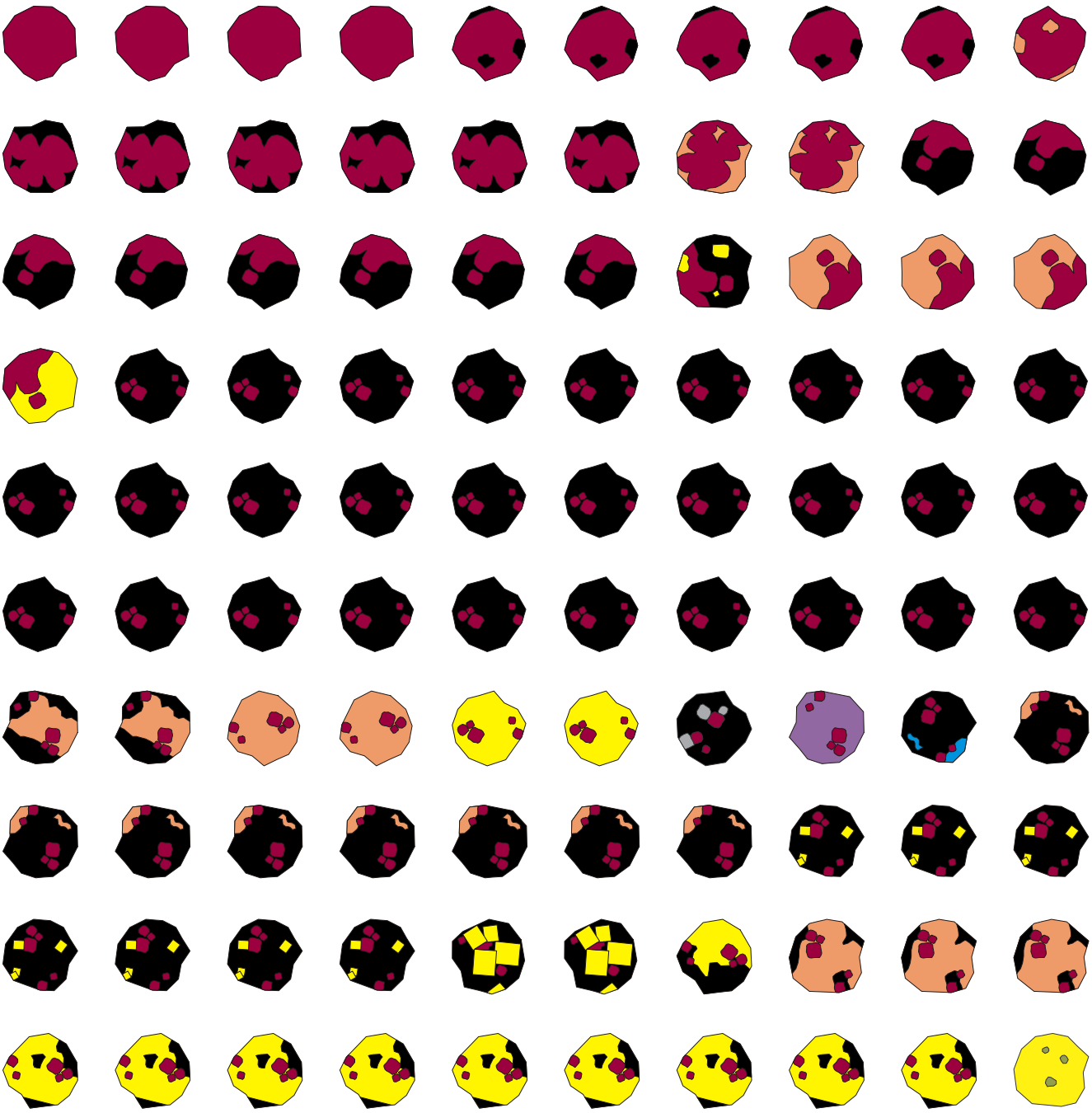


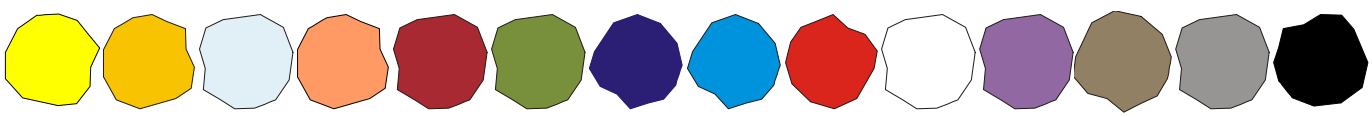
ALL SAMPLE
AVERAGES

CASSITERITE/STANNITE
CHALCOPYRITE
PYRRHOTITE
PYRITE

Stellar Resources - Severn Drillhole Mineragraphy

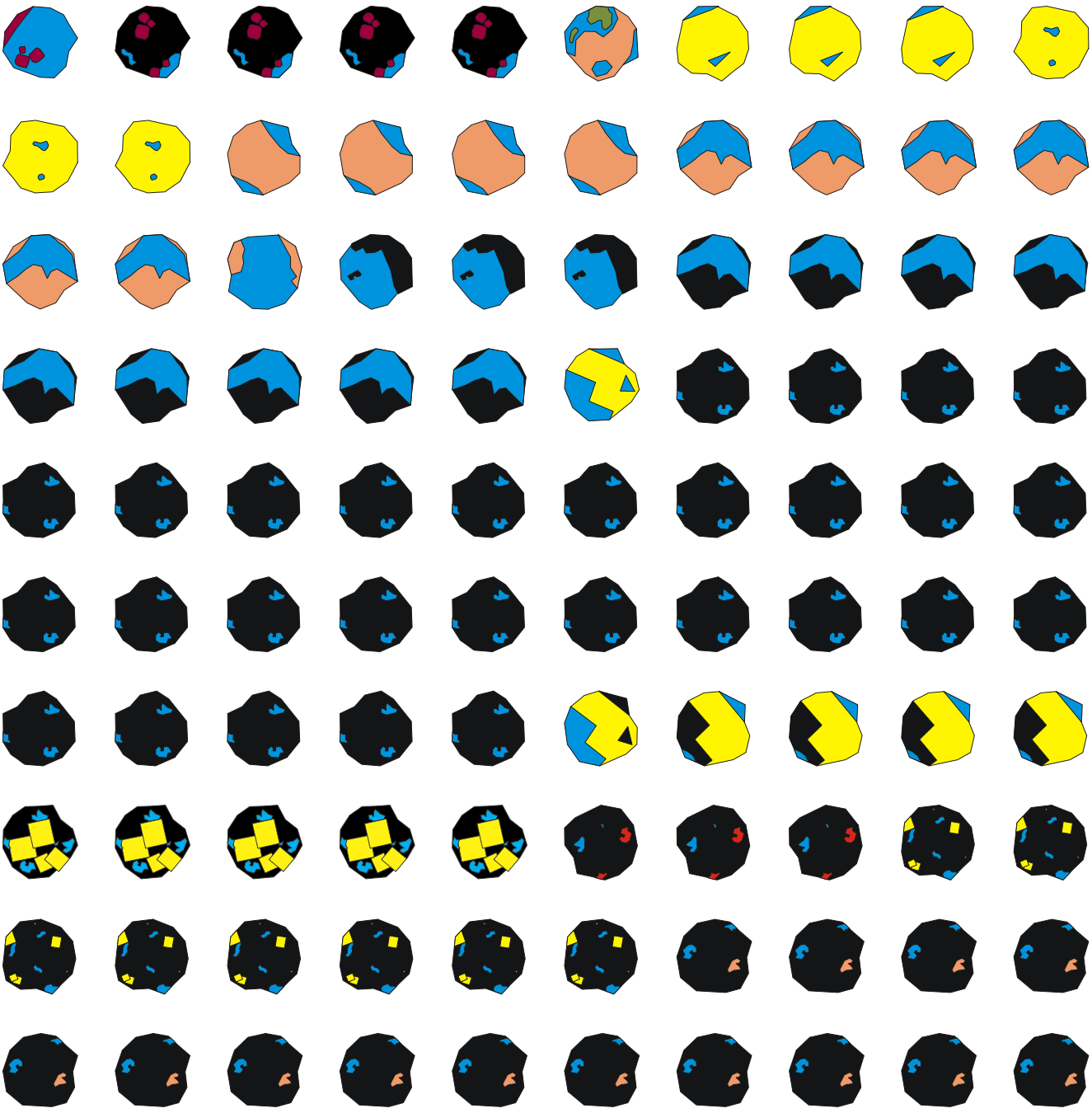
All Samples Sn Scan **53µm mask** **January 2012**

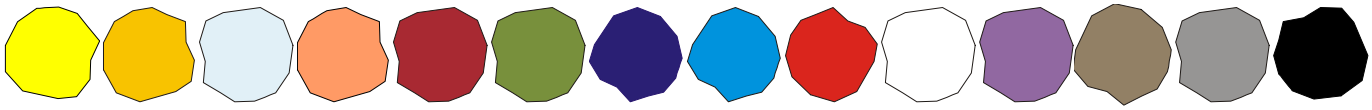




Stellar Resources - Severn Drillhole Mineragraphy

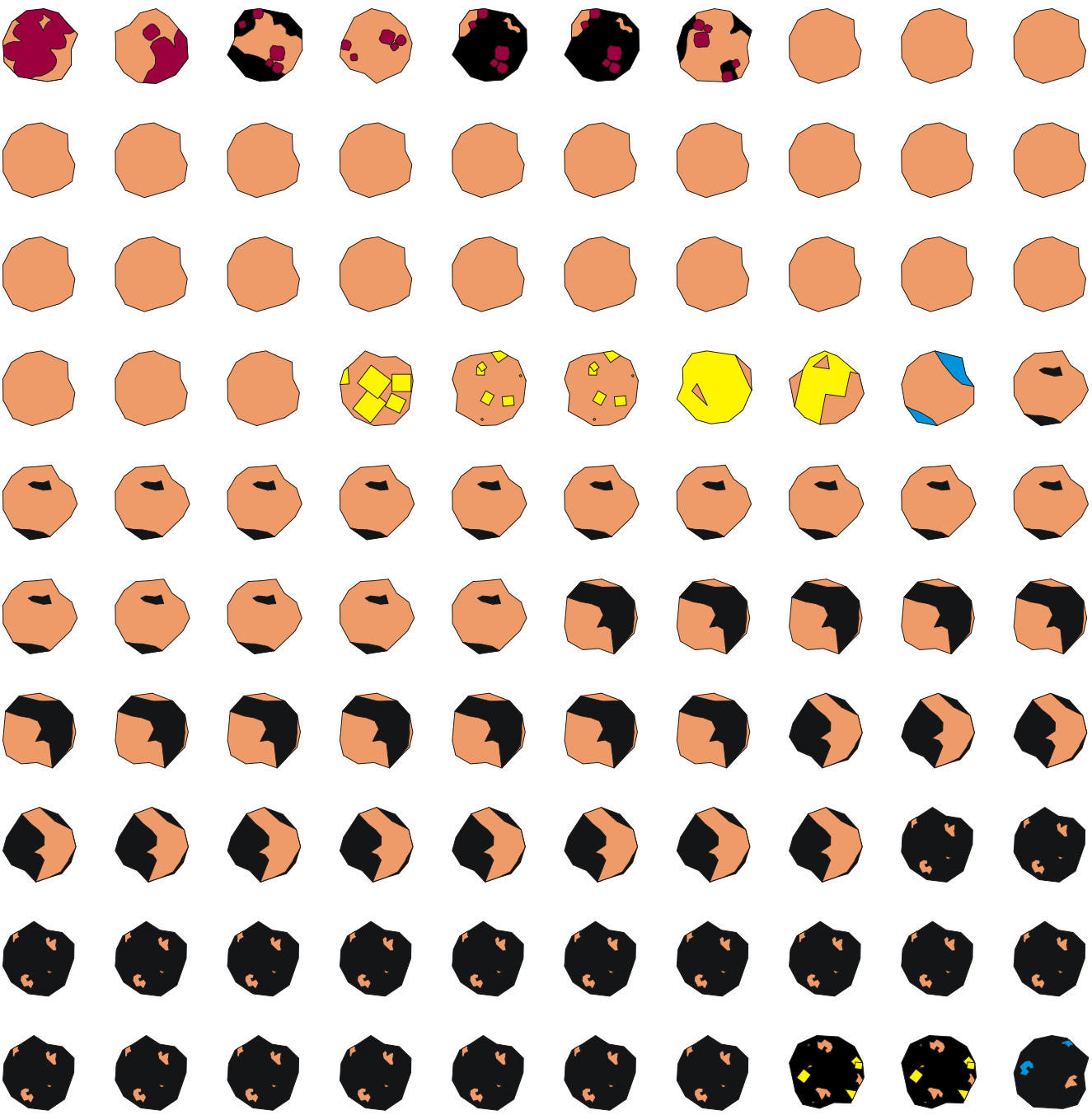
All Samples Cp Scan **53µm mask** **January 2012**

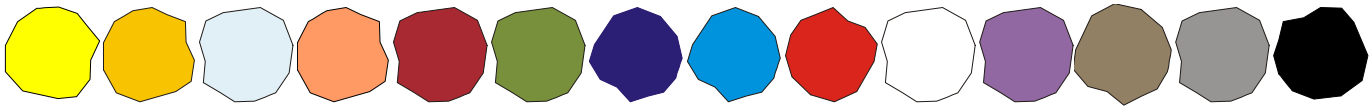




Stellar Resources - Severn Drillhole Mineragraphy

All Samples Po Scan **53µm mask** **January 2012**





Stellar Resources - Severn Drillhole Mineragraphy

All Samples Py Scan **53µm mask** **January 2012**