

Tamar Gold Ltd

Potoroo Prospect

Drill Chip Mineralogy

SEPTEMBER 2014

MODA
microscopy

McArthur Ore Deposit Assessments Pty Ltd

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TAMAR GOLD

Potoroo Prospect **Drill Chip Mineralogy** **September 2014**

Method

Drillcore chip samples (DH PTR-5) from the Tamar Gold Potoroo Prospect were submitted by consultant geologist Ken Morrison for mineralogical assessment. The chips were separated into two samples based on colour [Potoroo 1 (cream), Potoroo 2 (white)] and 5-6 chips per sample were mounted as a polished thin section by Australian Petrographics (Queanbeyan, NSW). The residue from each sample was submitted to McKnight Mineralogy (Ballarat) for Quantitative X-Ray Diffraction (QXRD) analysis.

A combination of quantitative and qualitative microscopy was undertaken by MODA.

To quantify the mineralogy, each polished section was scanned using an arbitrary 132µm circular mask on a 1.7mm square grid pattern (approximately 315 circles). A visual estimate was made of the area% of each mineral present within each masked area. This provided an overall composition and mineral associations.

Each polished section was then examined qualitatively and ~15 photomicrographs captured to illustrate the textures, concentrating on the sulphides. All images were annotated using PowerPoint.

Results

Composition - QXRD

McKnight Mineralogy reported the following “semi-quantitative” composition (wt%):

MINERAL	Potoroo 1	Potoroo 2
Quartz	33.2	38.1
Albite	11.0	22.5
Labradorite	27.2	4.8
Muscovite	10.0	18.1
Chlorite	9.1	11.9
Pyrite	5.3	2.9
Microcline	1.6	1.1
Apatite	1.1	tr
Biotite	0.9	tr
Siderite	0.5	0.5
Ankerite	tr	tr
Arsenopyrite	tr	tr
Calcite	tr	tr
Epidote	tr	tr
Marcasite	tr	tr
Pyrrhotite	tr	tr

Composition – Optical Microscopy

The optical microscopy failed to differentiate the various *feldspars*, but some of the *chlorite* was observed as being degraded to isotropic *clay*. This *clay* was not reported by QXRD. The gridded optical logging gave the following results (wt%):

MINERAL	Potoroo 1	Potoroo 2
Quartz	18.2	24.6
Feldspar	45.3	7.5
Muscovite	10.5	45.6
Biotite	8.7	2.0
Chlorite	6.9	10.2
Clay	5.6	7.0
Carbonate	0.7	0
Rutile	tr	0.2
Pyrite	4.0	2.3
Chalcopyrite	0.1	0
Arsenopyrite	0	0.5
Marcasite	Tr	0
Pyrrhotite	Tr	Tr
Sphalerite	0	0

Despite a detailed search, no electrum was observed.

Textural Features

Both samples consist of an altered quartz-feldspar-biotite granitoid that is texturally homogenous in all the chips examined. *Quartz* and *feldspar* grains are generally 500µm-1.5mm across with *biotite* 200-600µm. The cream-coloured chips of Potoroo 1 were found to be coated by a thin layer of *ferruginous clay* containing ultrafine-angular *pyrite* fragments – presumably mud from drilling residues.

In both samples:

- *Plagioclase feldspars* are seen to be variably altered to fine *sericitic muscovite* and minor isotropic *clay*. Some of the less altered *feldspar* grains exhibit well-defined zonal alteration.
- *Biotite* is altered initially to a very pale green *chlorite* and thence to an unidentifiable isotropic *clay*. The *chlorite* often contains delicate networks of interlocking *rutile* needles. The typical textural habit of *biotite* is preserved through the alteration.

Potoroo #2 is substantially more altered than Potoroo #1, but contains less sulphide.

The bulk of the *pyrite* present occurs as late, vuggy crustiform infillings. Porous, amorphous *melnikovite pyrite* is present, which is variably recrystallised to crystalline *pyrite* and minor *marcasite*. *Melnikovite pyrite* is a common carrier of sub-

microscopic gold and the Potoroo *pyrite* could be microanalysed by laser ablation ICP-MS for confirmation.

In one chip of Potoroo #2, fine *arsenopyrite* crystals were observed, together with larger euhedral *pyrite*. Small *pyrrhotite* blebs were seen within the *arsenopyrite* crystals.

Although minor, *chalcopyrite* was often seen associated with crystalline *pyrite* aggregates, or as isolated small grains in gangue.

There was a complete lack of any Bi or Ag minerals.

Recommended Further Work

The small sample size raises representivity concerns. Before any microanalysis is undertaken to establish the Au grade of the various textural forms of *pyrite*, it is recommended that a sulphide concentrate be prepared from a composite of the complete interval. This can be achieved by superpanner, flotation or heavy liquid. After assessing the assay results of the sulphide concentration, further microscopy and microanalysis may be justified.

G.J.McArthur PhD FAusIMM MMICA MSEG
Principal Mineralogist
9.9.14

Polished Block – Mounted Chips

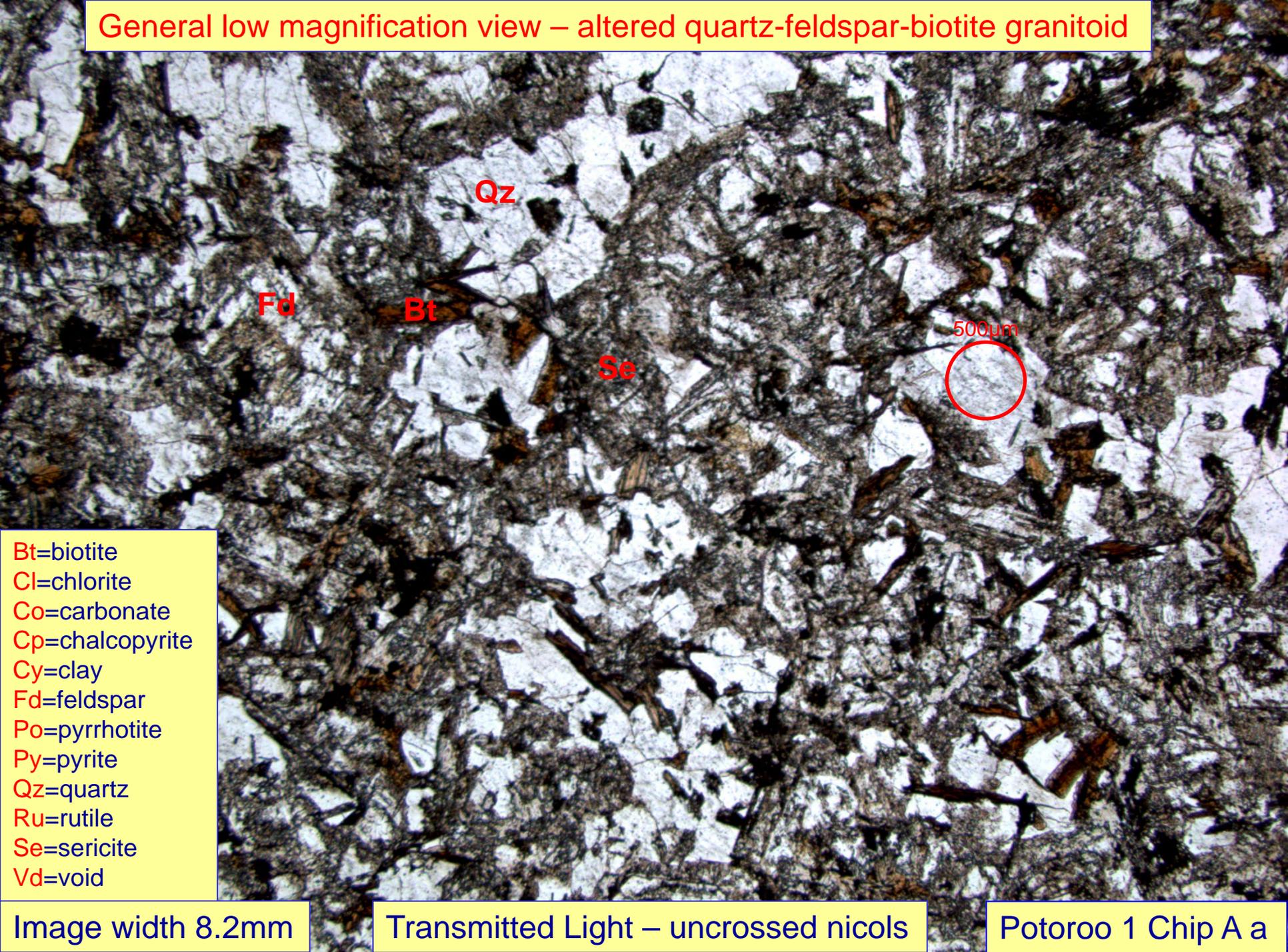


Image width 52mm (4X)

Optical scan (wet)

Potoroo 1 Block

General low magnification view – altered quartz-feldspar-biotite granitoid



Fd

Qz

Bt

Se

500µm

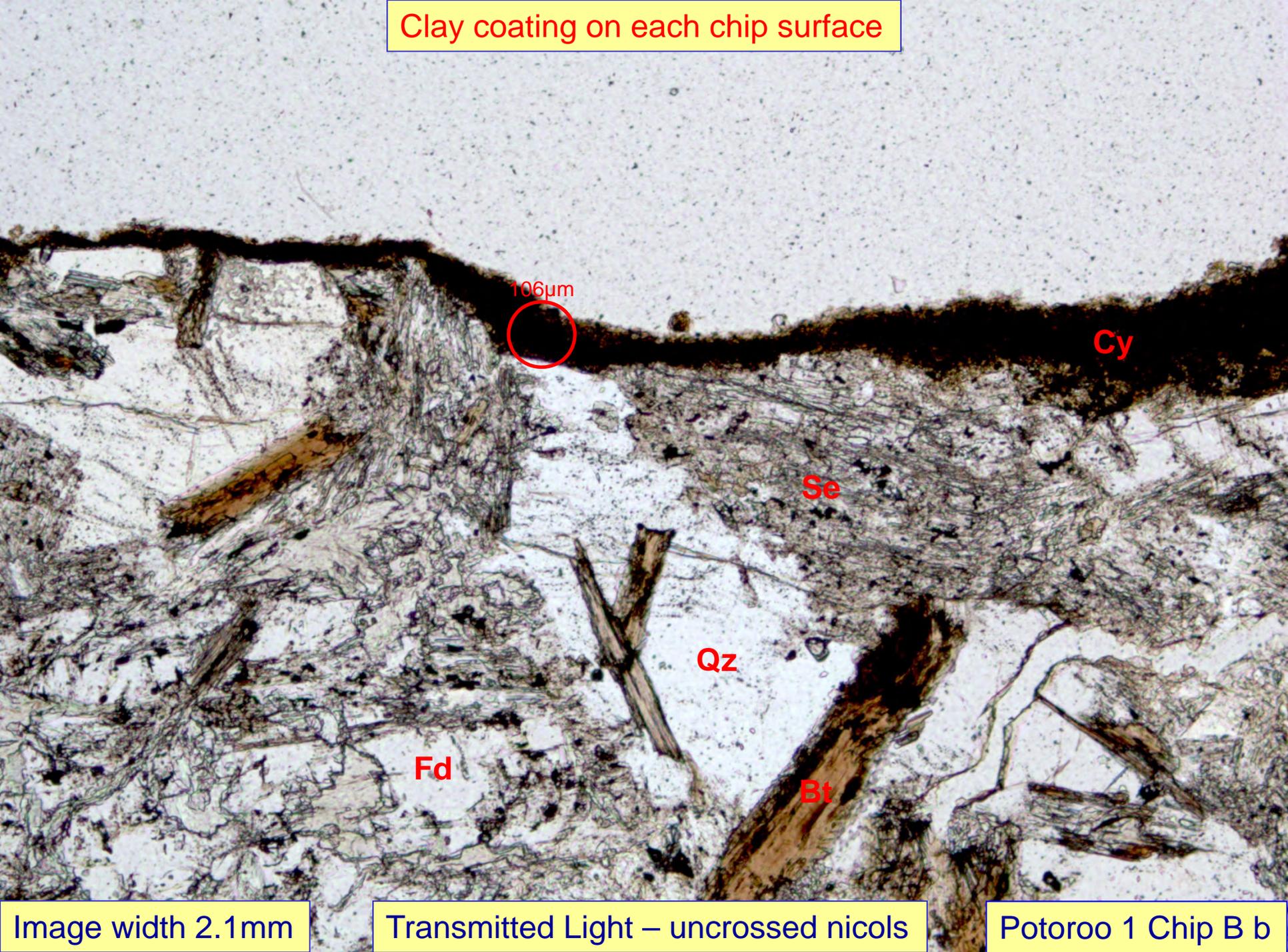
- Bt=biotite
- Cl=chlorite
- Co=carbonate
- Cp=chalcopyrite
- Cy=clay
- Fd=feldspar
- Po=pyrrhotite
- Py=pyrite
- Qz=quartz
- Ru=rutile
- Se=sericite
- Vd=void

Image width 8.2mm

Transmitted Light – uncrossed nicols

Potoroo 1 Chip A a

Clay coating on each chip surface



Cy

106µm

Se

Qz

Fd

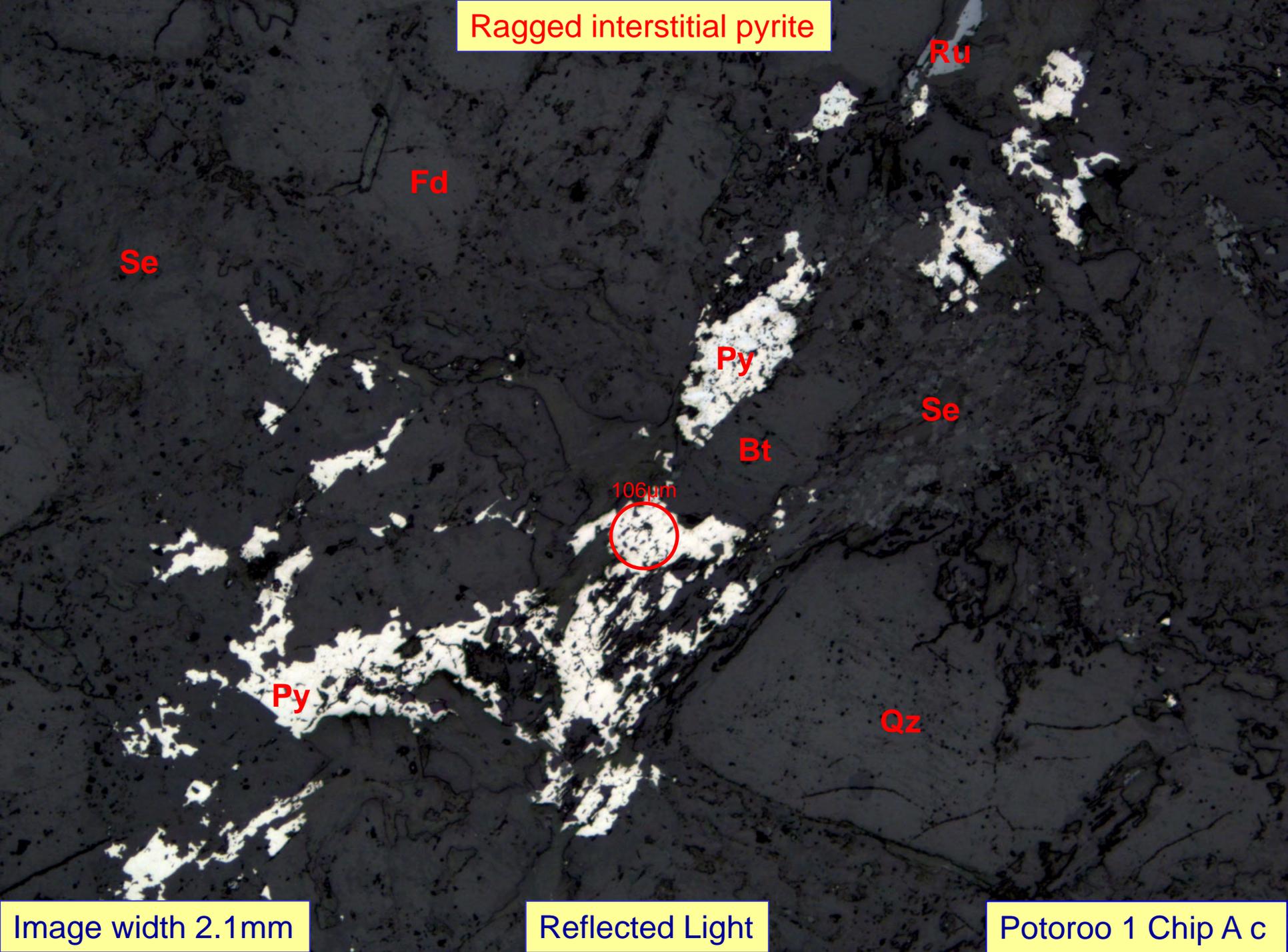
Bt

Image width 2.1mm

Transmitted Light – uncrossed nicols

Potoroo 1 Chip B b

Ragged interstitial pyrite



Se

Fd

Ru

Py

Se

Bt

106µm

Py

Qz

Image width 2.1mm

Reflected Light

Potoroo 1 Chip A c

Crustiform pyrite coating void walls

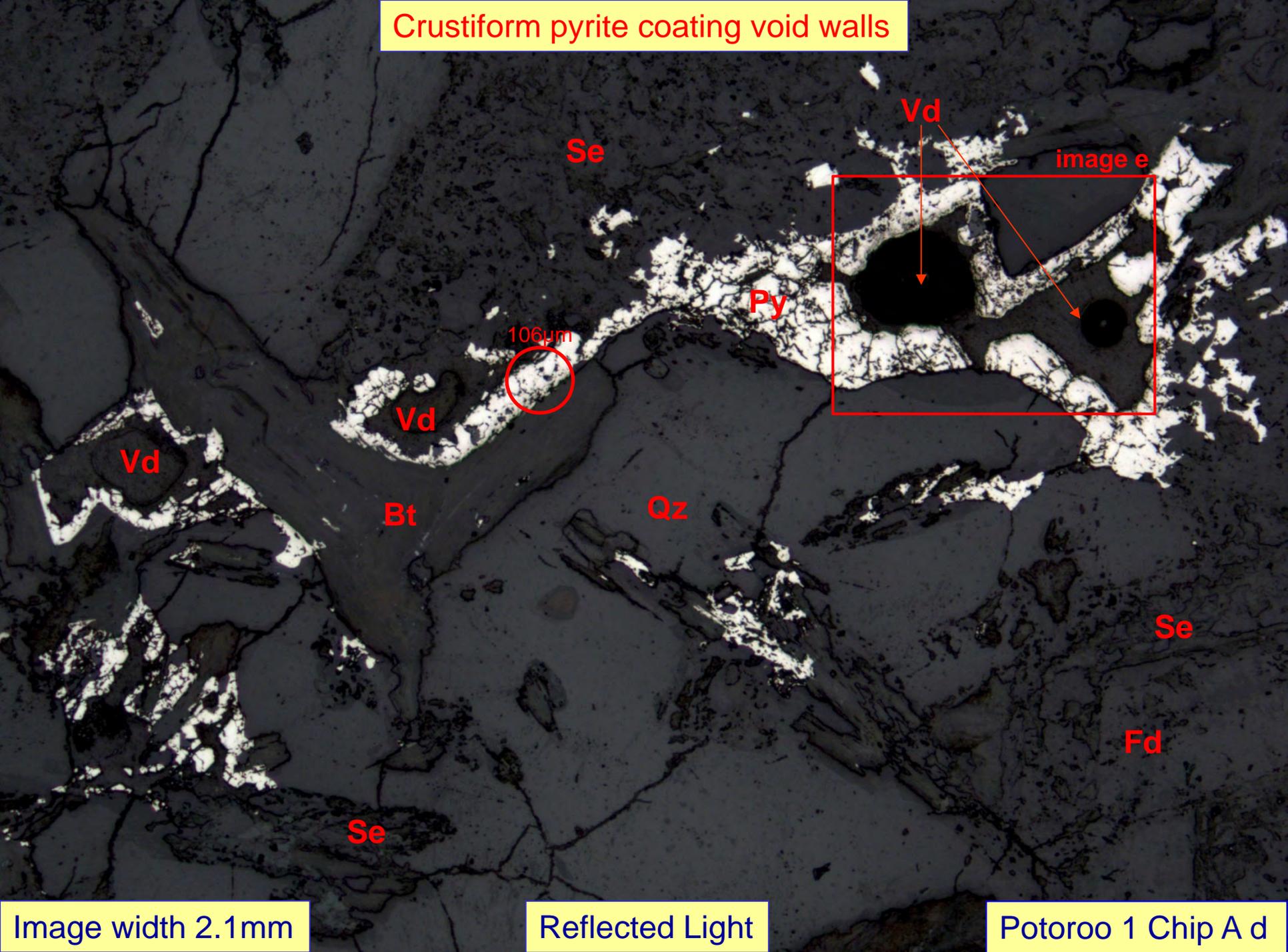
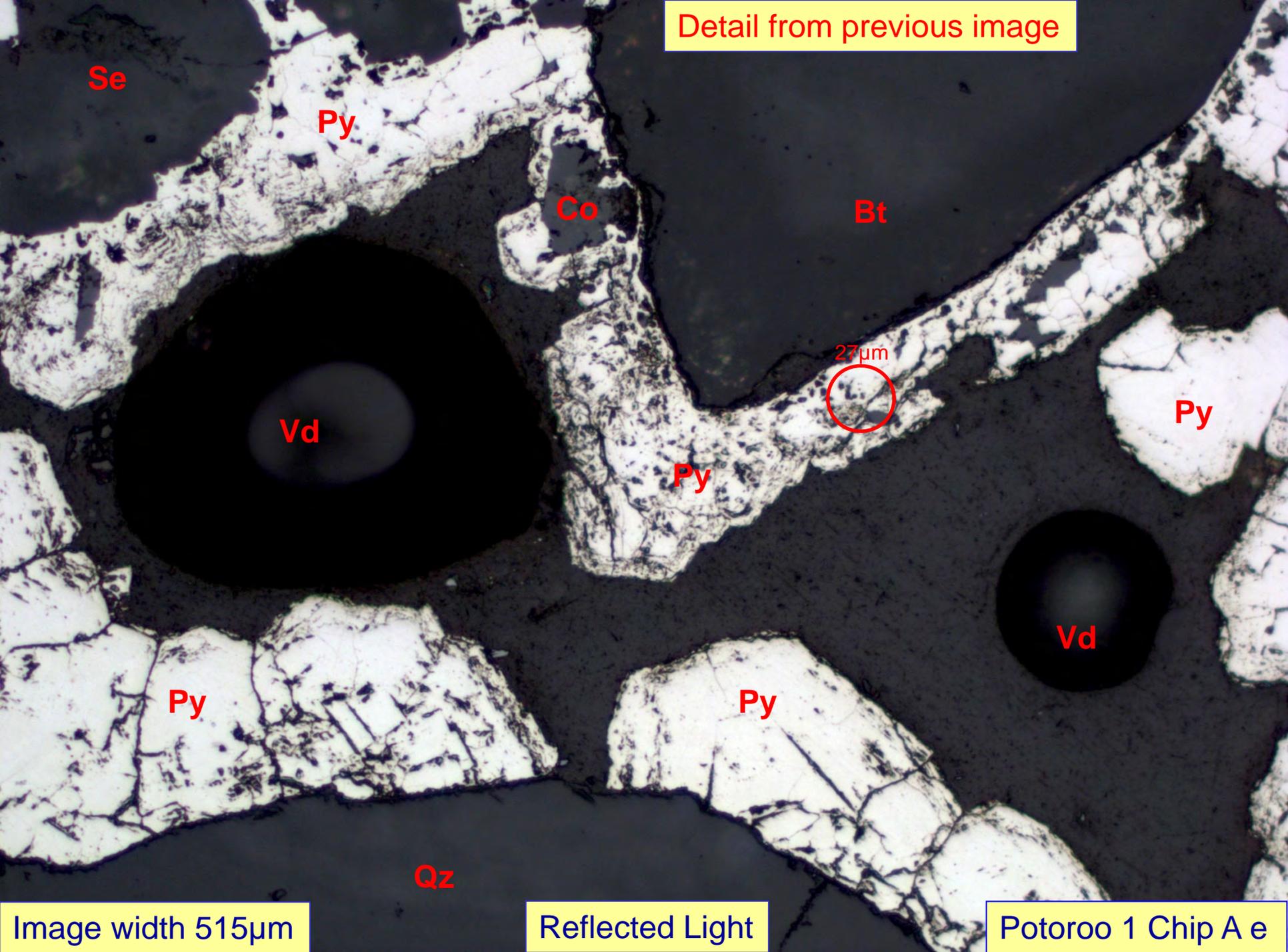


Image width 2.1mm

Reflected Light

Potoroo 1 Chip A d

Detail from previous image



Se

Py

Co

Bt

Vd

27µm

Py

Py

Vd

Py

Py

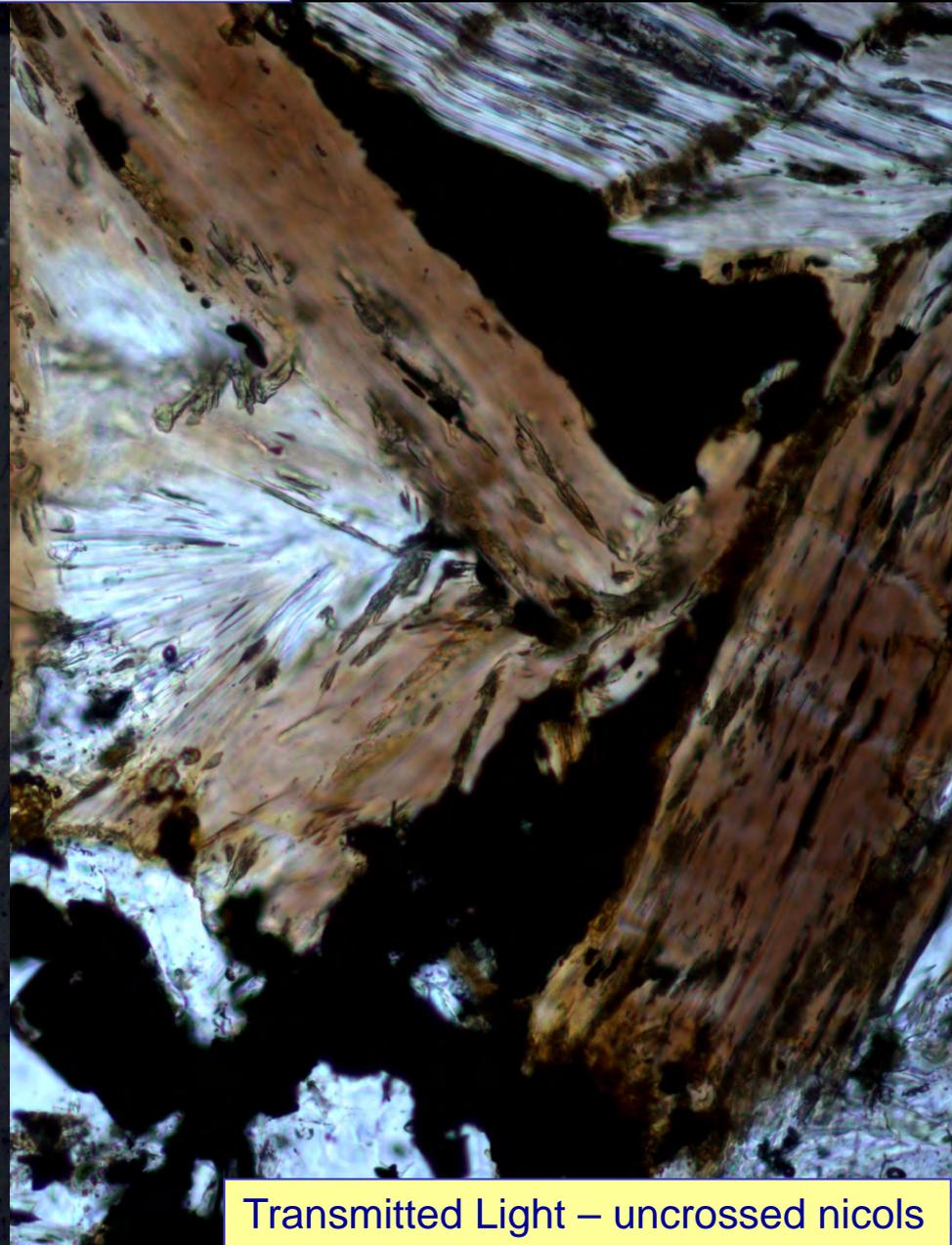
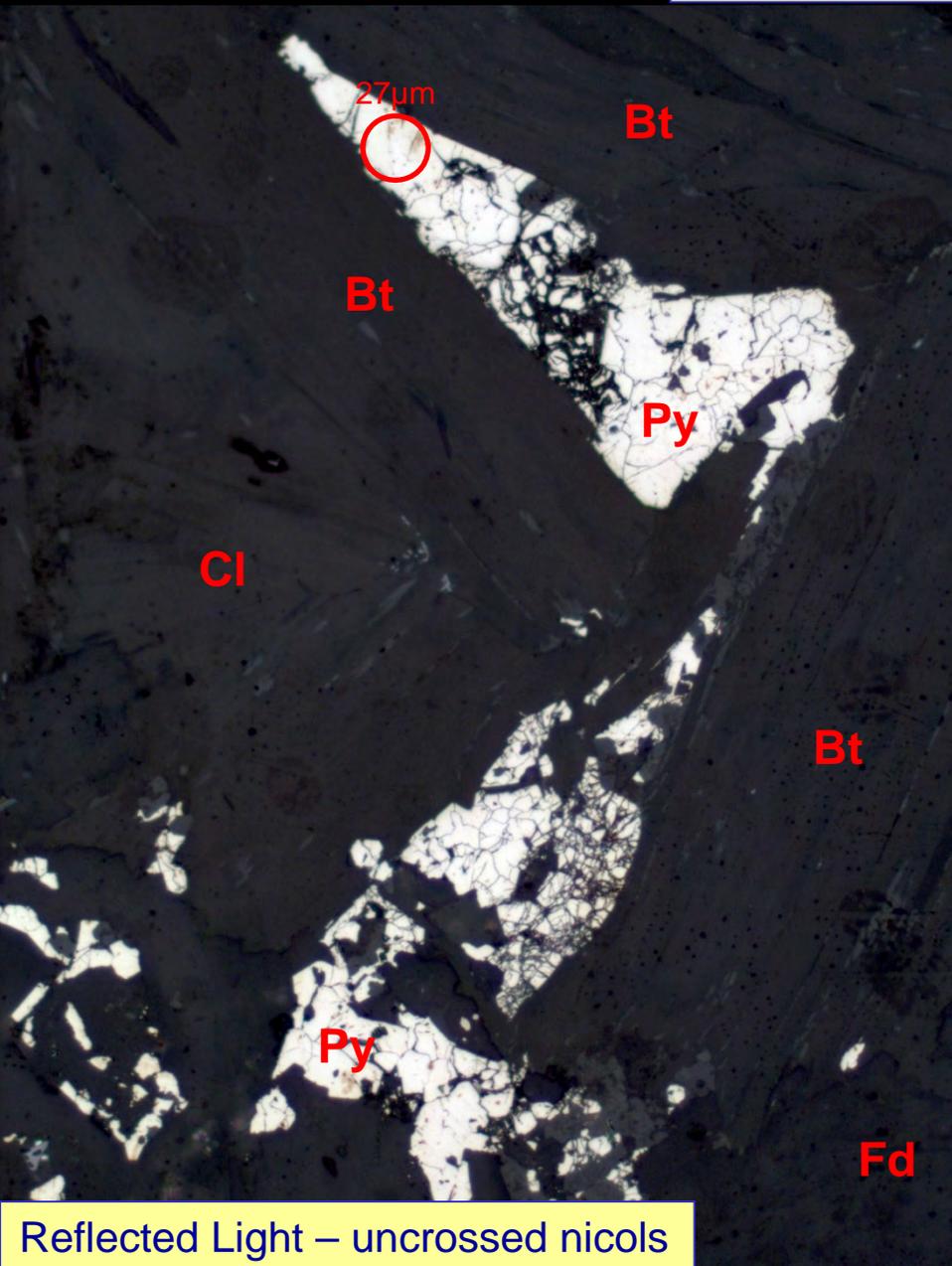
Qz

Image width 515µm

Reflected Light

Potoroo 1 Chip A e

Pyrite interstitial to biotite



Reflected Light – uncrossed nicols

Transmitted Light – uncrossed nicols

Image width 2 x 386µm

Potoroo 1 Chip A f/g

Ragged, crustiform pyrite

Se

Bt

Fd

Bt

58um



Ru

Py

Co

Co

Se

Py

Bt

Py

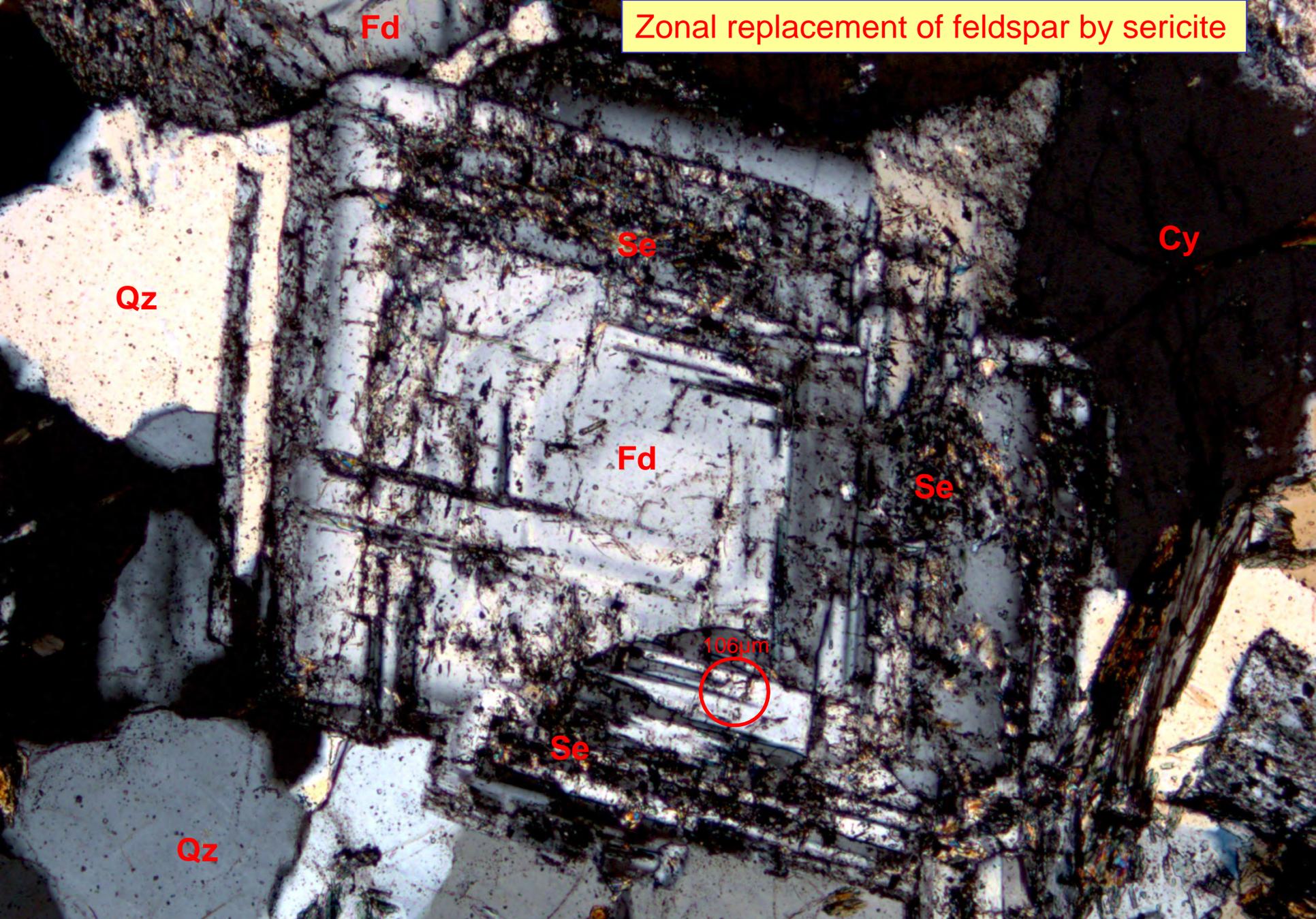
Fd

Image width 1.0mm

Reflected Light

Potoroo 1 Chip B h

Zonal replacement of feldspar by sericite



Fd

Se

Cy

Qz

Fd

Se

106µm

Se

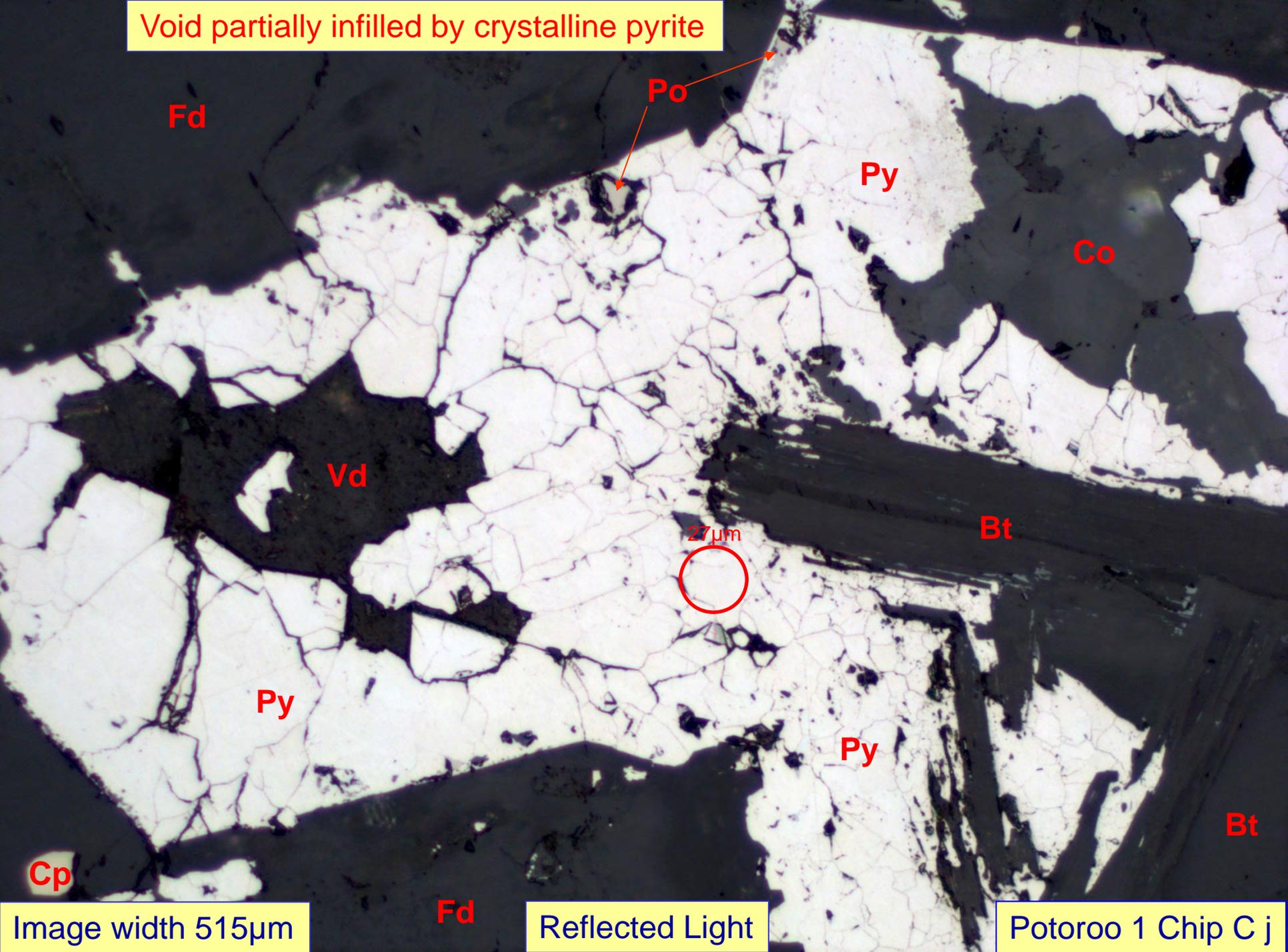
Qz

Image width 2.1mm

Transmitted Light – crossed nicols

Potoroo 1 Chip C i

Void partially infilled by crystalline pyrite



Fd

Po

Py

Co

Vd

27µm

Bt

Py

Py

Bt

Cp

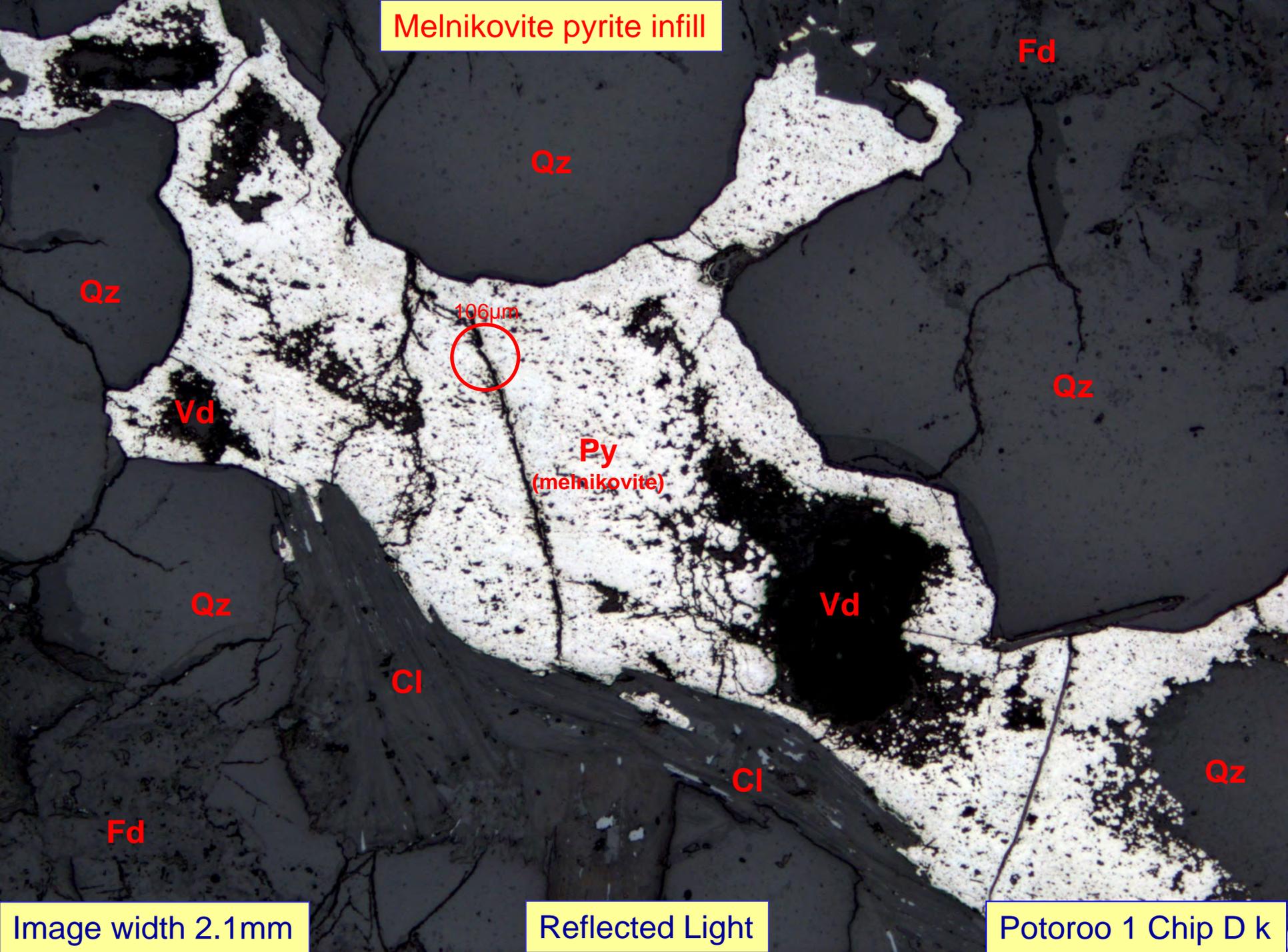
Fd

Image width 515µm

Reflected Light

Potoroo 1 Chip C j

Melnikovite pyrite infill



Fd

Qz

Qz

106µm

Vd

Py
(melnikovite)

Qz

Qz

Vd

Cl

Cl

Qz

Fd

Image width 2.1mm

Reflected Light

Potoroo 1 Chip D k

Fragmented crustiform melnikovite pyrite with carbonate (siderite?)

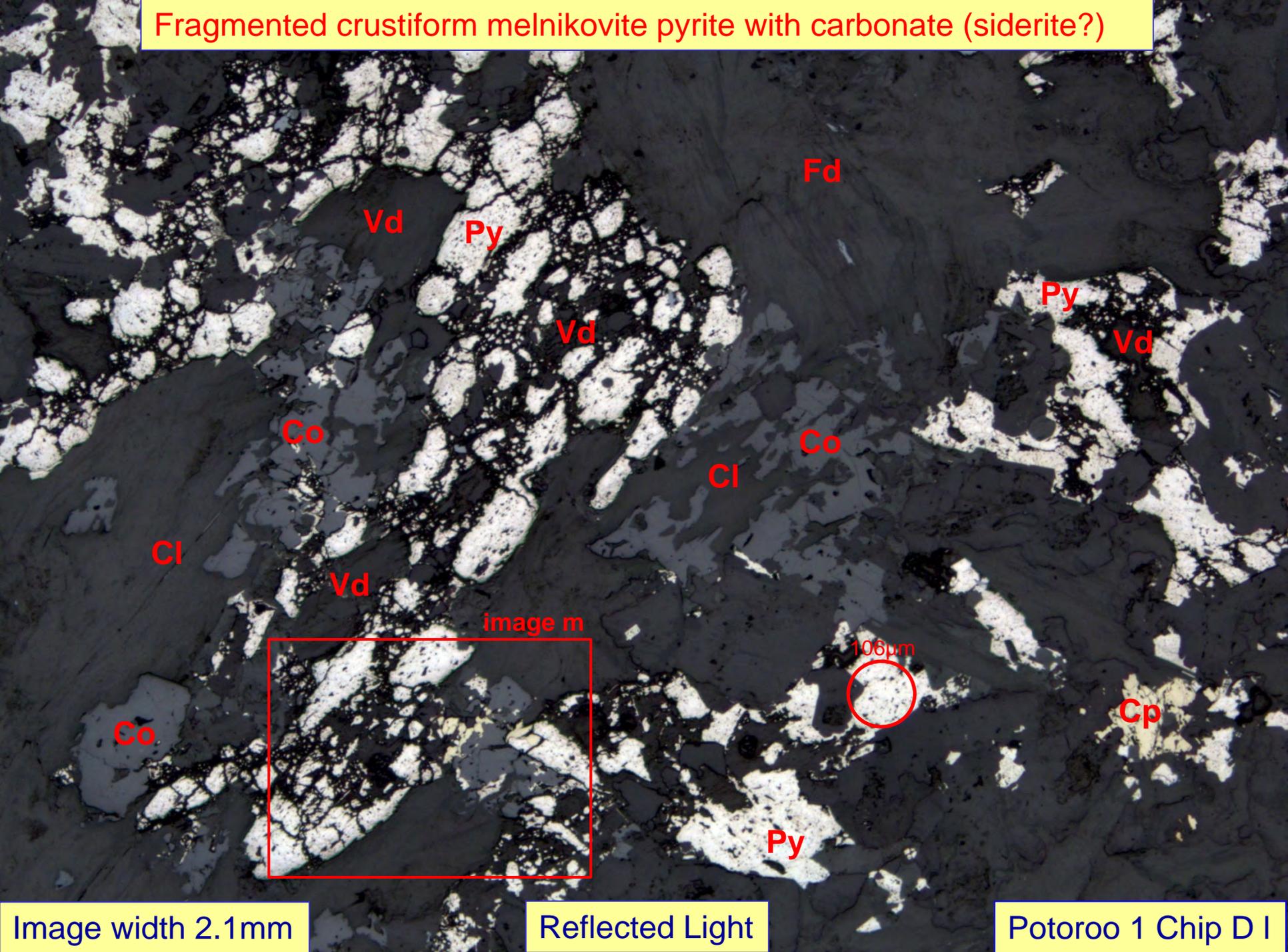
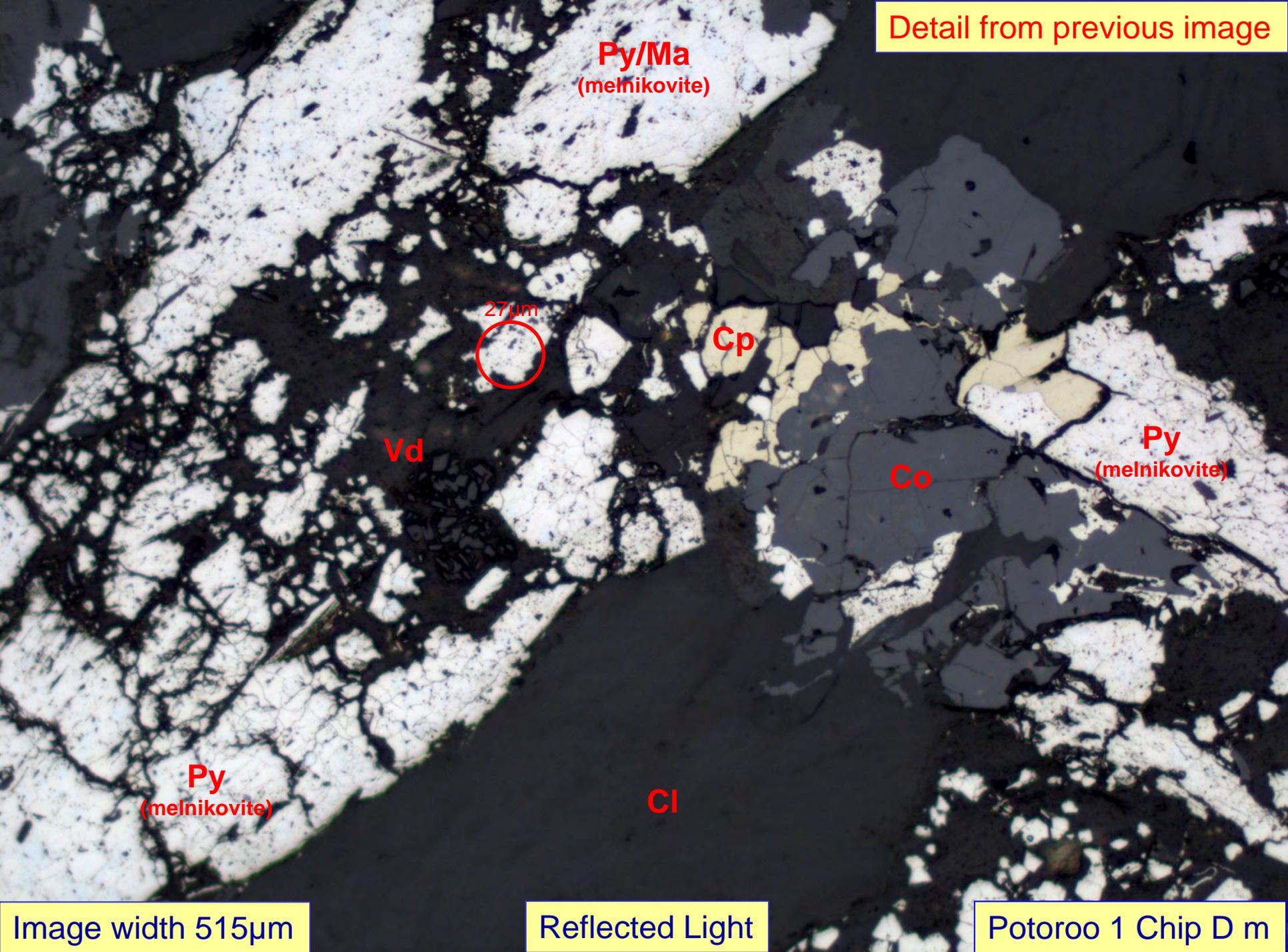


Image width 2.1mm

Reflected Light

Potoroo 1 Chip D I

Detail from previous image



Py/Ma
(melnikovite)

27µm

Cp

Vd

Co

Py
(melnikovite)

Py
(melnikovite)

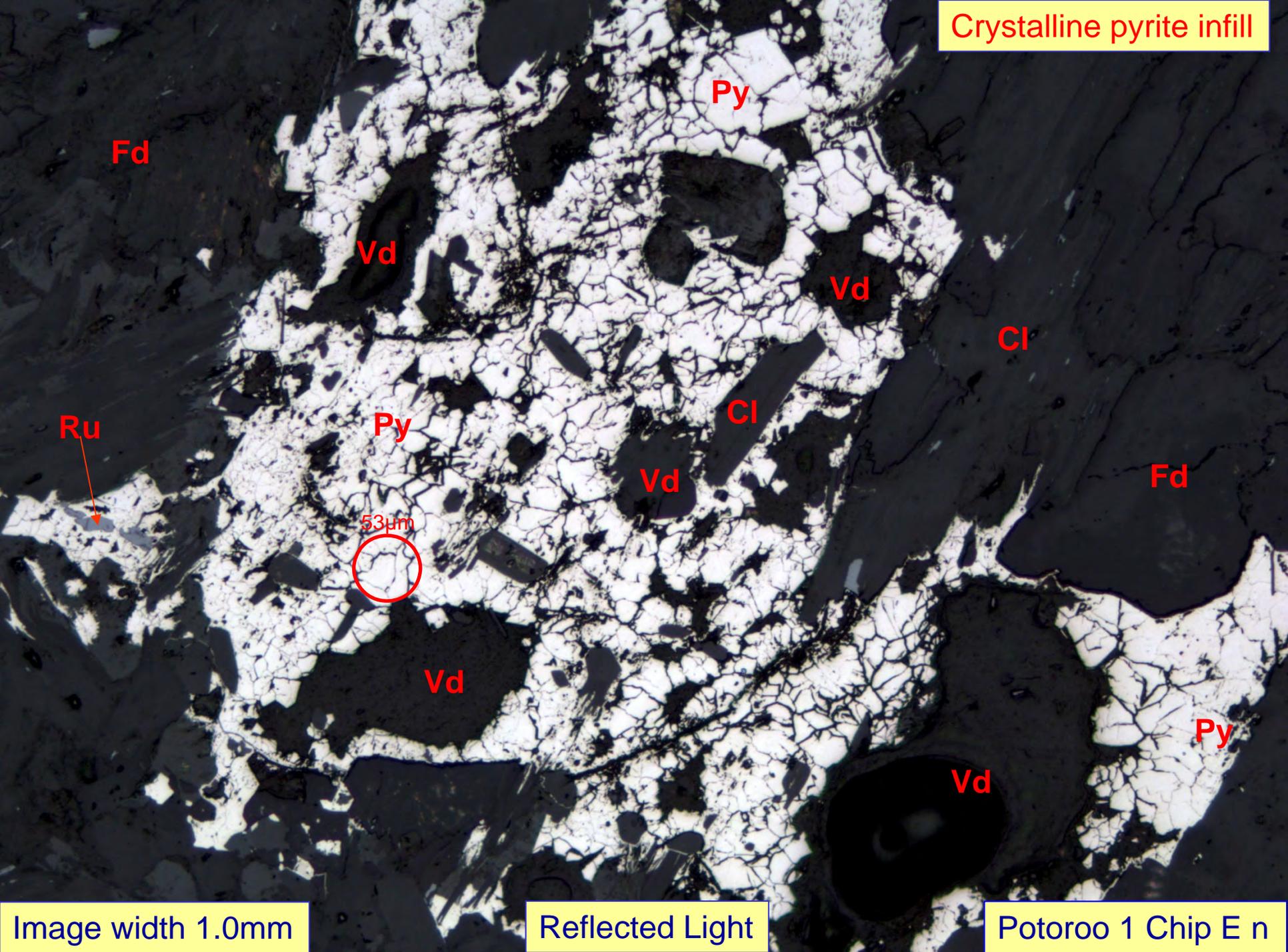
Cl

Image width 515µm

Reflected Light

Potoroo 1 Chip D m

Crystalline pyrite infill



Fd

Py

Vd

Vd

Cl

Ru

Py

Cl

Vd

Fd

53µm

Vd

Py

Vd

Image width 1.0mm

Reflected Light

Potoroo 1 Chip E n

Ragged melnikovite pyrite with rutile

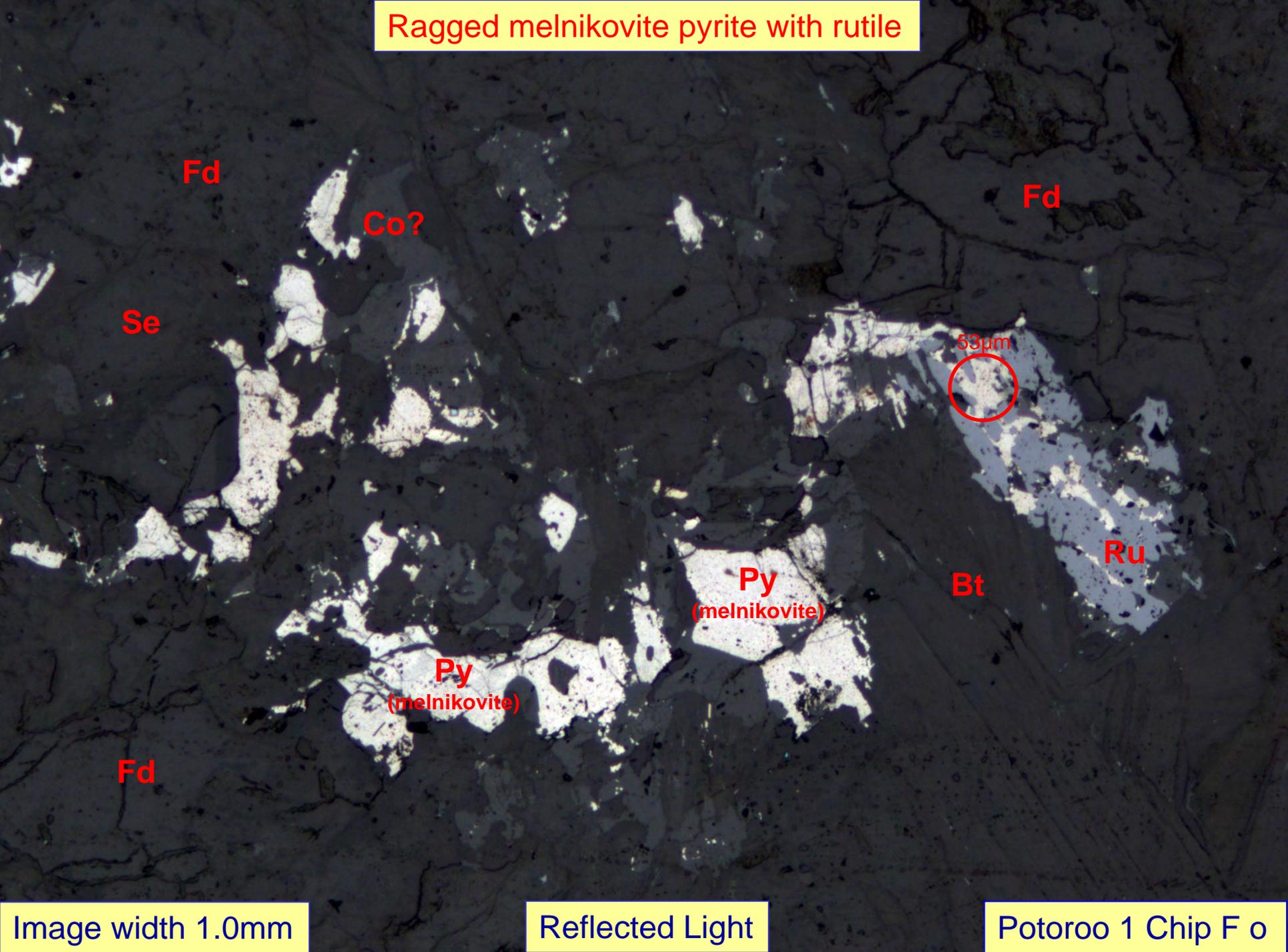


Image width 1.0mm

Reflected Light

Potoroo 1 Chip F o

Interstitial melnikovite pyrite

Cp

Fd

Se

image q

Vd

Py
(melnikovite)

53µm

Fd

Ru

Co?

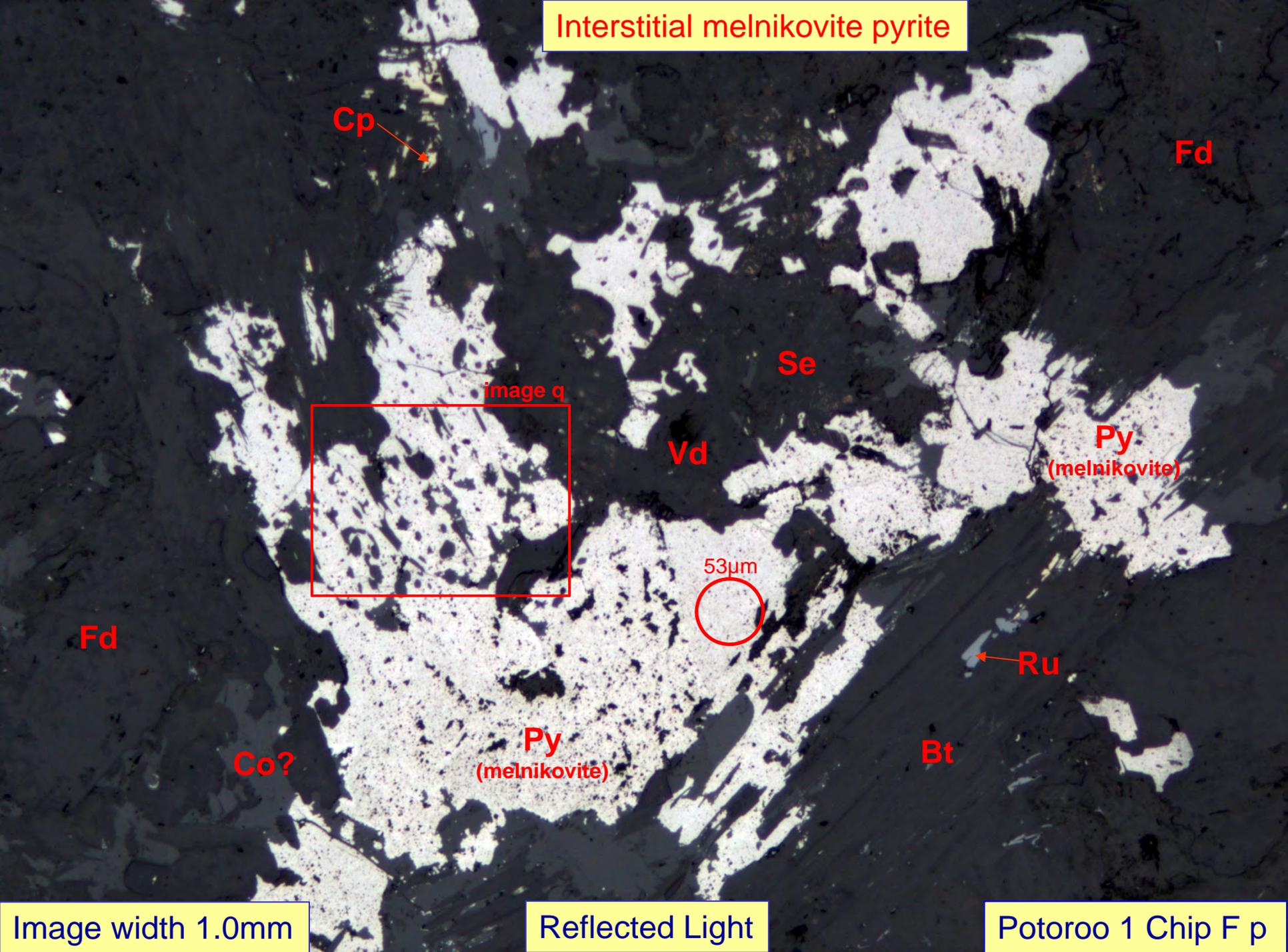
Py
(melnikovite)

Bt

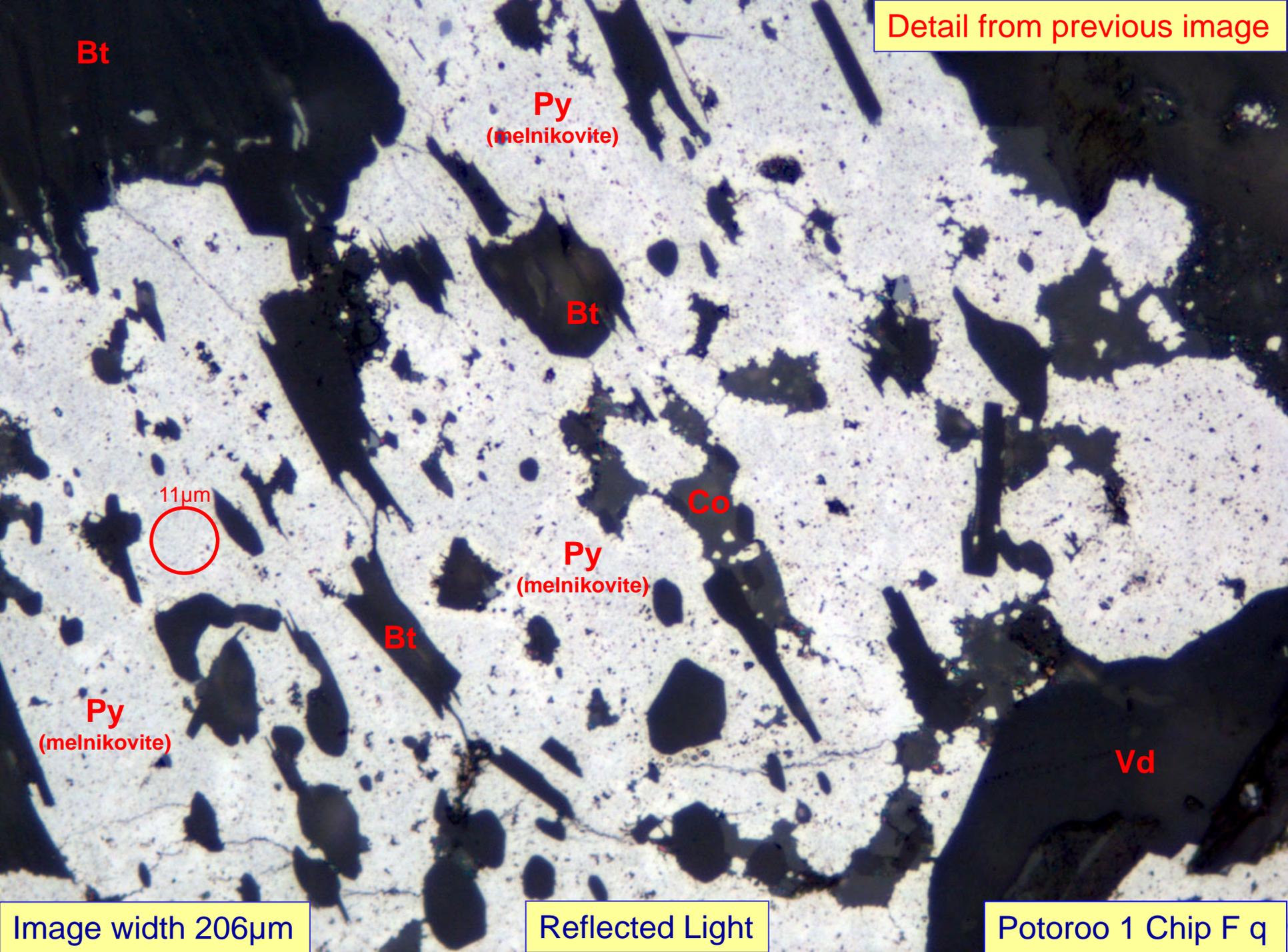
Image width 1.0mm

Reflected Light

Potoroo 1 Chip F p



Detail from previous image



Bt

Py
(melnikovite)

Bt

11µm

Co

Py
(melnikovite)

Bt

Py
(melnikovite)

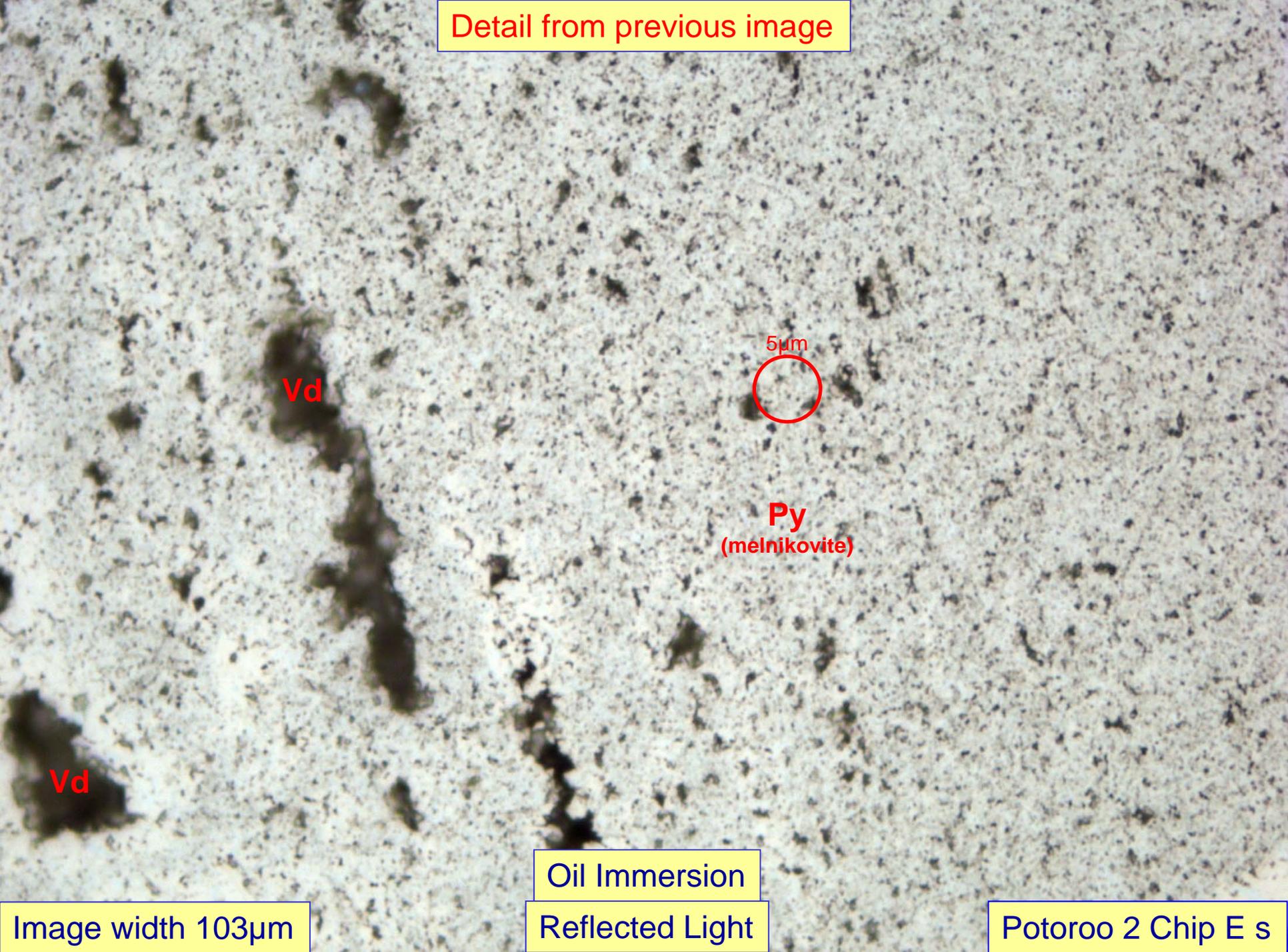
Vd

Image width 206µm

Reflected Light

Potoroo 1 Chip F q

Detail from previous image



Vd

5µm

Py
(melnikovite)

Vd

Oil Immersion

Reflected Light

Image width 103µm

Potoroo 2 Chip E s

Polished Block – Mounted Chips

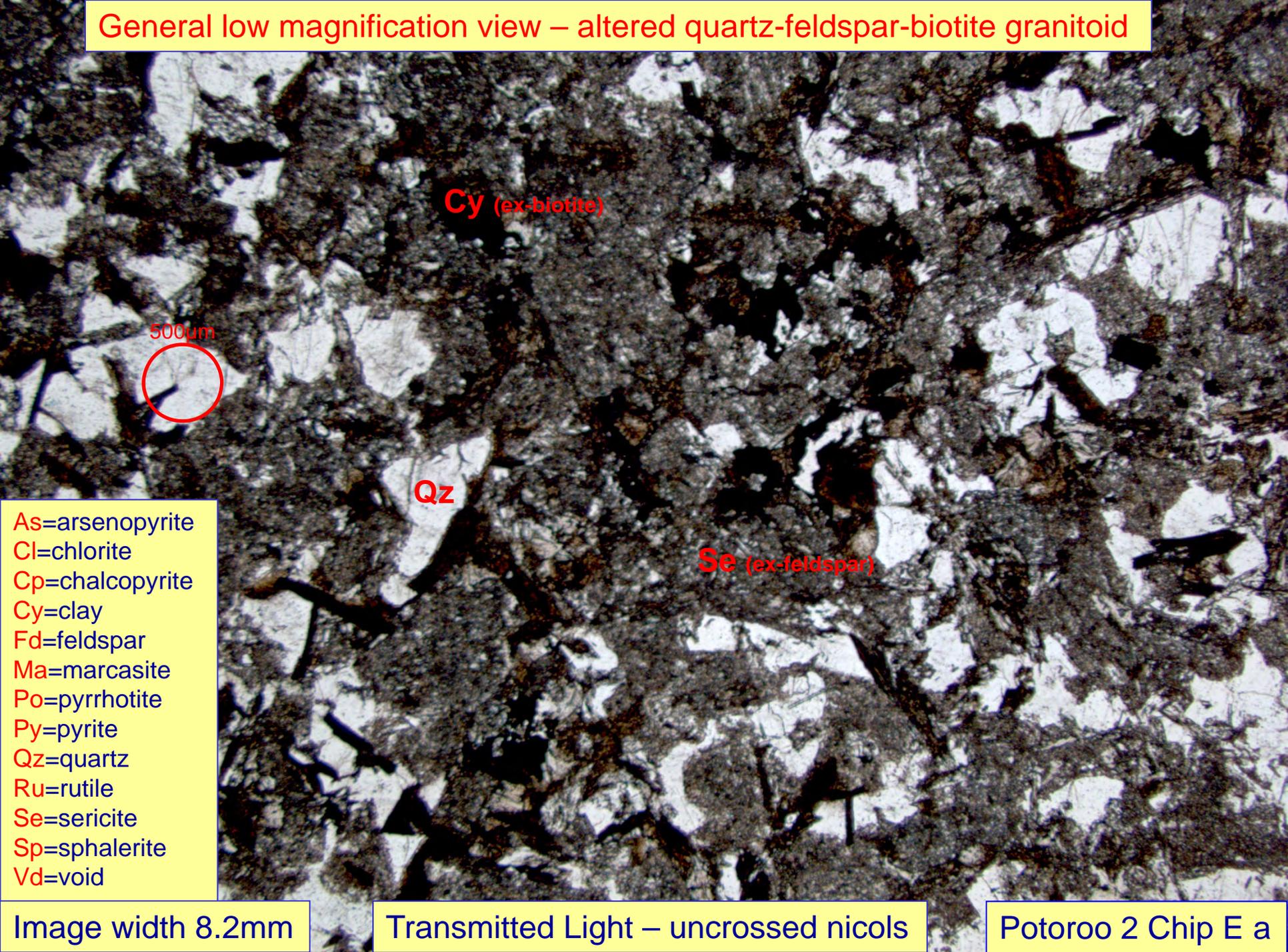


Image width 51mm (4X)

Optical scan (wet)

Potoroo 2 Block

General low magnification view – altered quartz-feldspar-biotite granitoid



500µm

Cy (ex-biotite)

Qz

Se (ex-feldspar)

As=arsenopyrite
Cl=chlorite
Cp=chalcopyrite
Cy=clay
Fd=feldspar
Ma=marcasite
Po=pyrrhotite
Py=pyrite
Qz=quartz
Ru=rutile
Se=sericite
Sp=sphalerite
Vd=void

Image width 8.2mm

Transmitted Light – uncrossed nicols

Potoroo 2 Chip E a

Ragged, interstitial melnikovite pyrite

Qz

106µm

Py

Se

Py

Cp

Py

image c

Cy

Py

Se

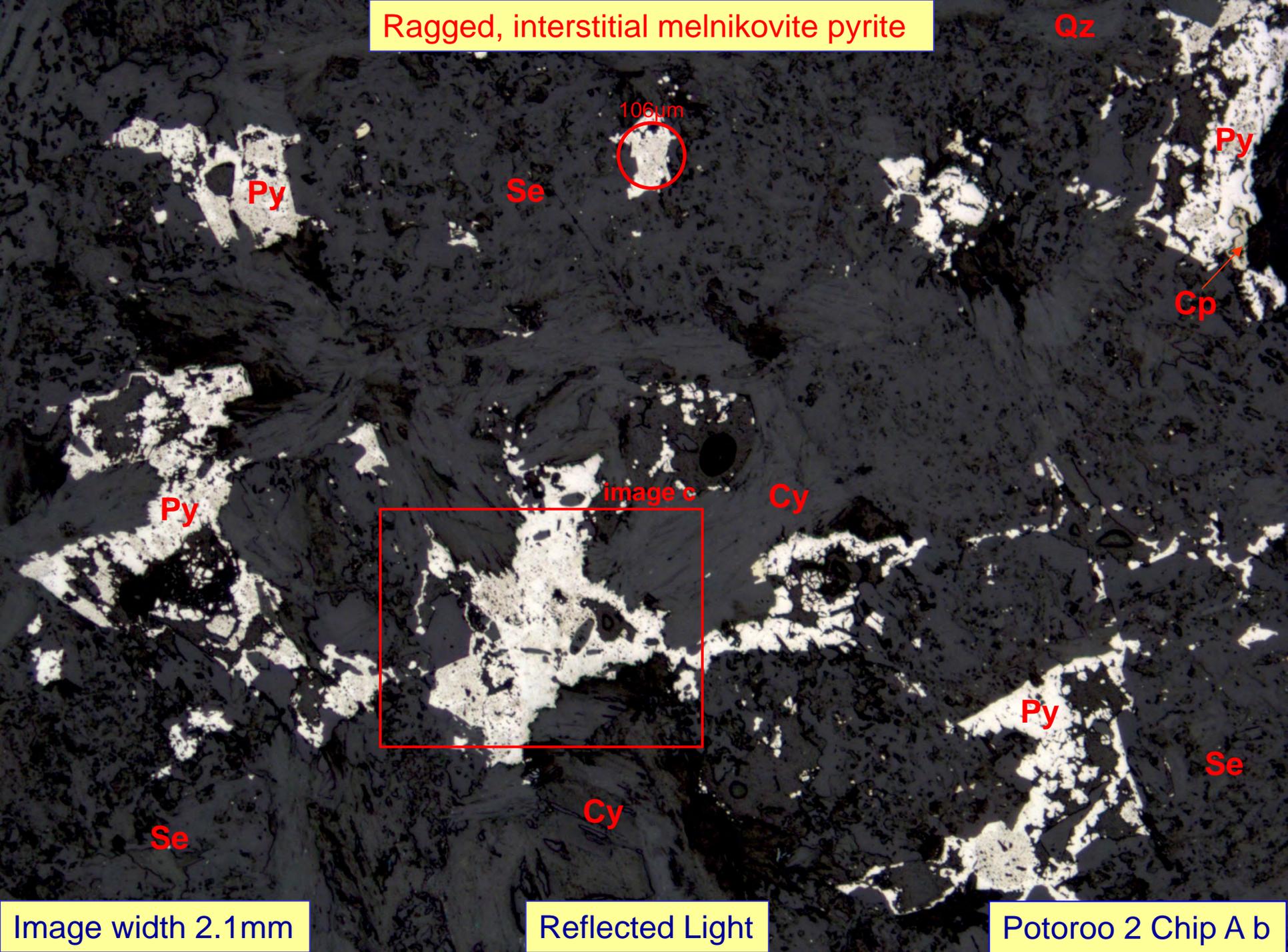
Se

Cy

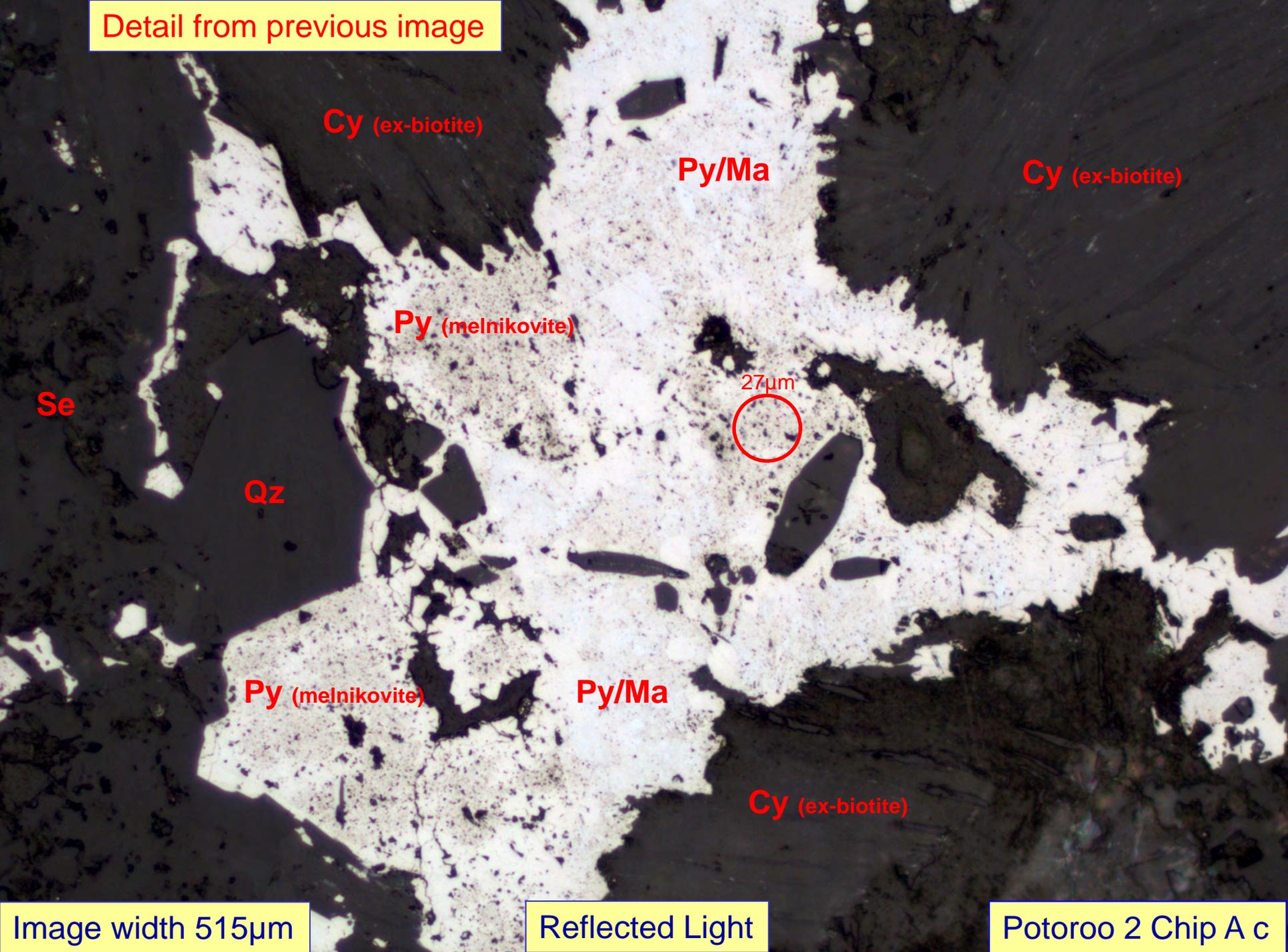
Image width 2.1mm

Reflected Light

Potoroo 2 Chip A b



Detail from previous image



Cy (ex-biotite)

Py/Ma

Cy (ex-biotite)

Py (melnikovite)

27µm

Se

Qz

Py (melnikovite)

Py/Ma

Cy (ex-biotite)

Image width 515µm

Reflected Light

Potoroo 2 Chip A c

Interstitial pyrite and minor chalcopyrite

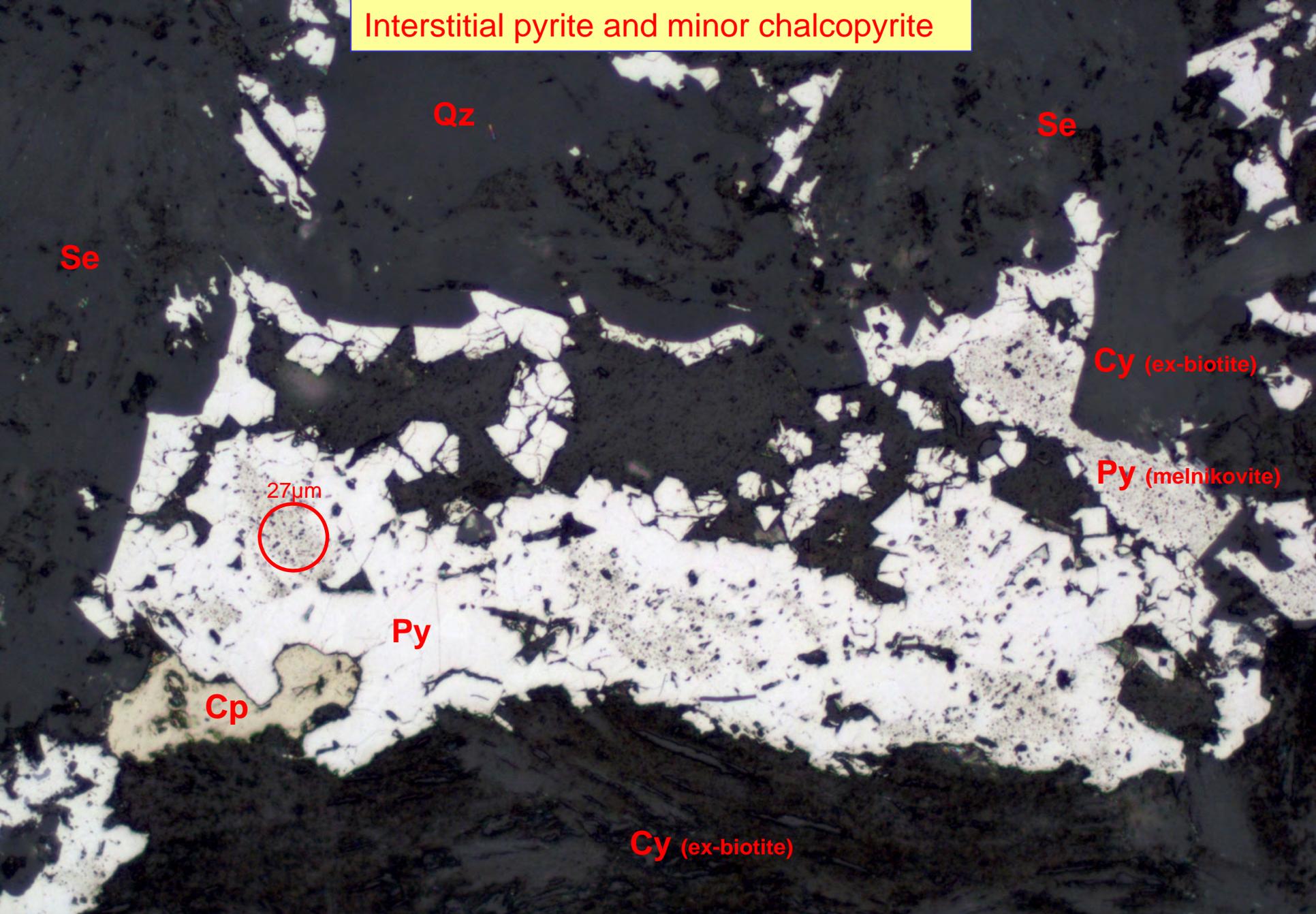


Image width 515µm

Reflected Light

Potoroo 2 Chip A d

Interstitial melnikovite pyrite

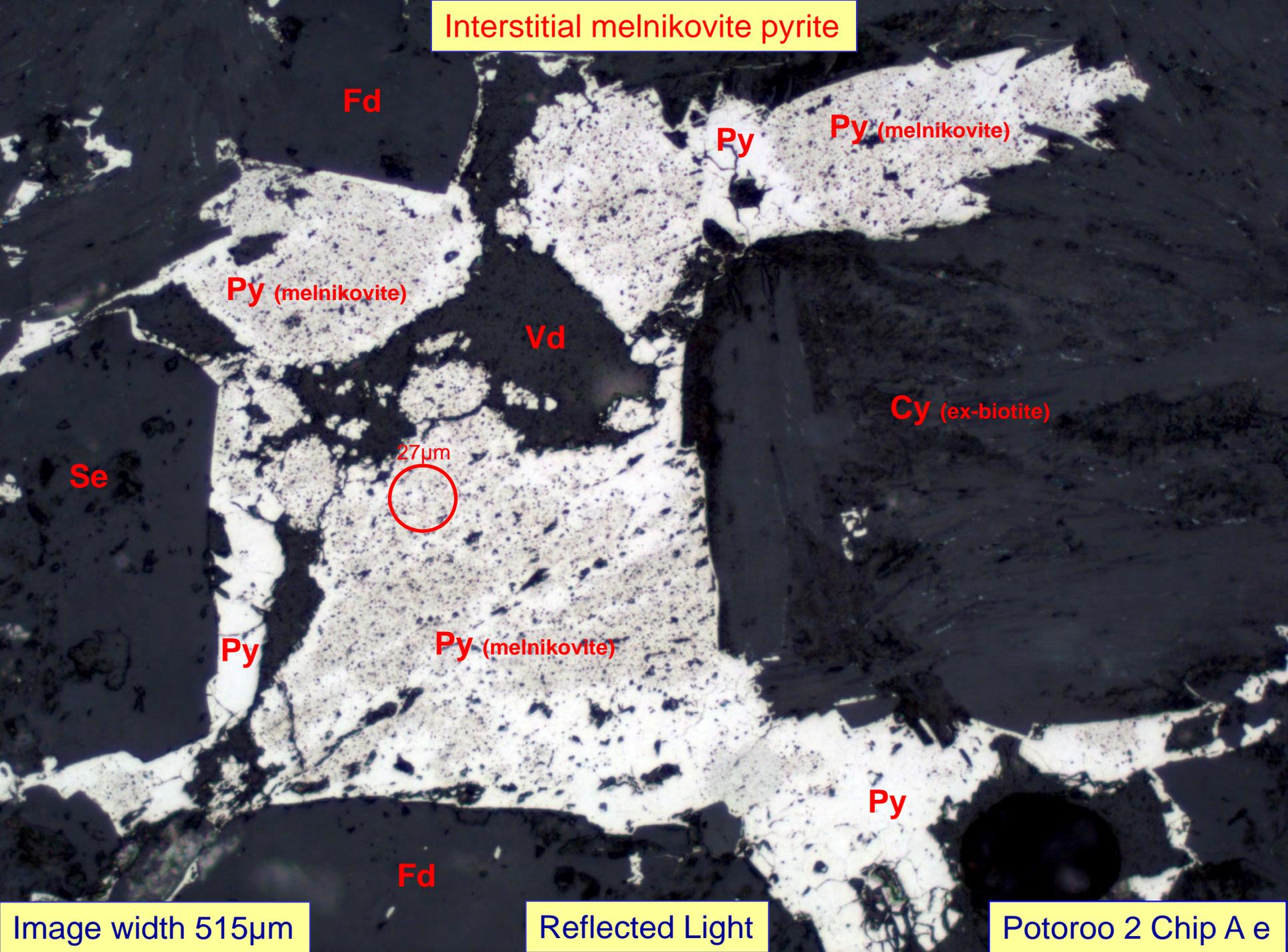
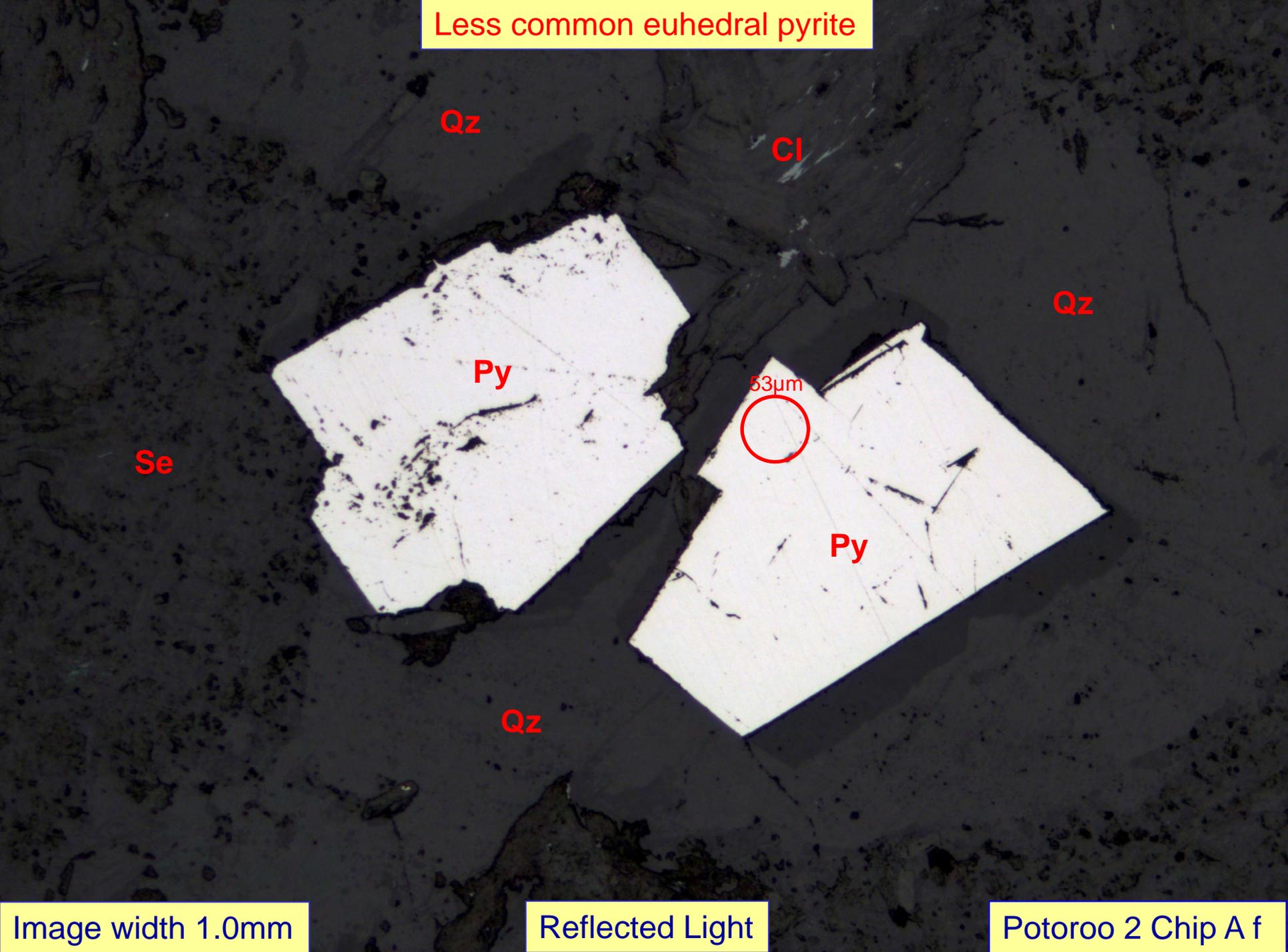


Image width 515µm

Reflected Light

Potoroo 2 Chip A e

Less common euhedral pyrite



Qz

Cl

Qz

Py

Se

53µm

Py

Qz

Image width 1.0mm

Reflected Light

Potoroo 2 Chip A f

Varied interstitial pyrite

Se

Cy

Py

Cy (ex-biotite)

Py (melnikovite)

Vd

27µm

Qz

Fd

Vd

Py

Py (melnikovite)

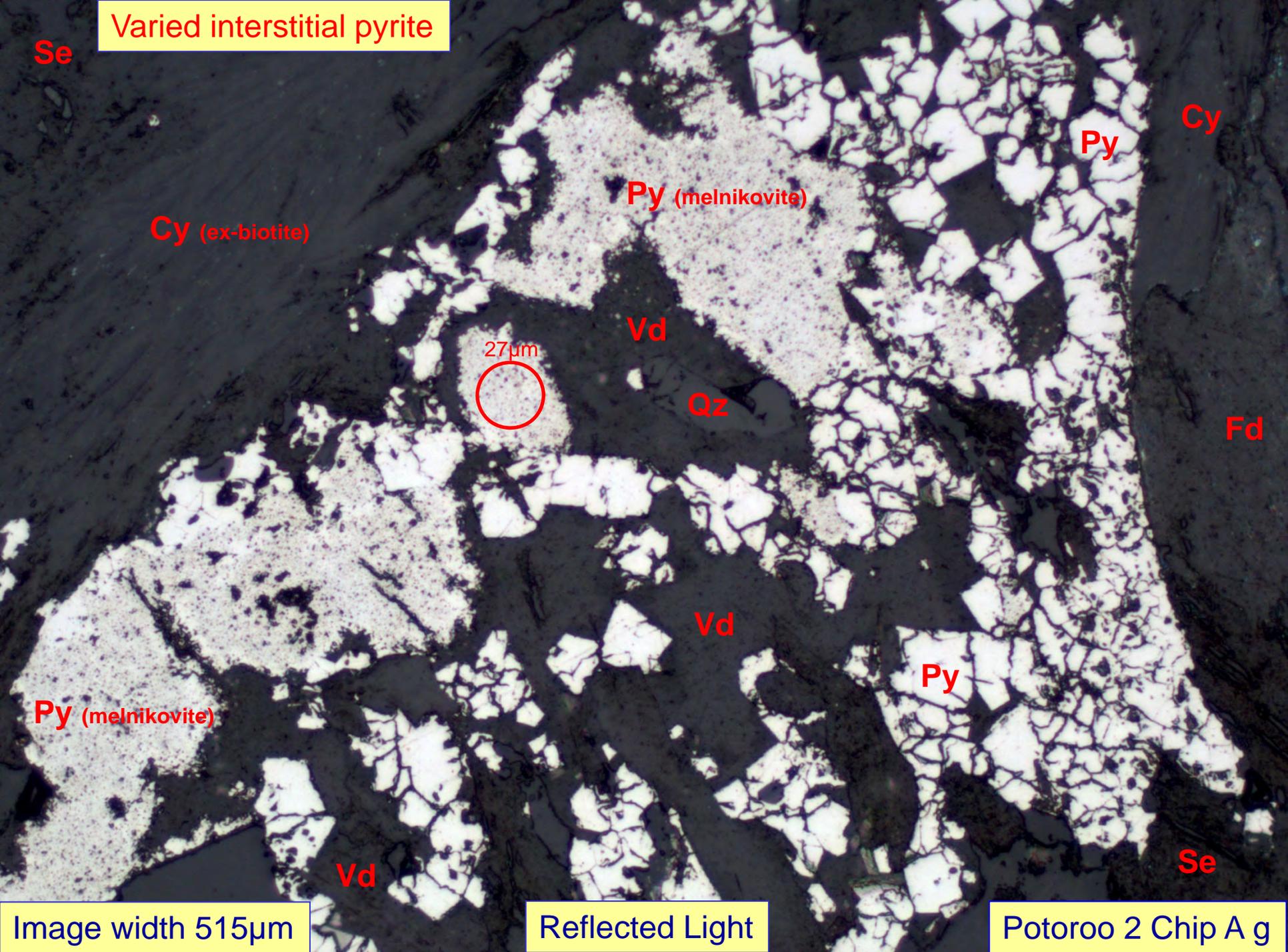
Se

Vd

Image width 515µm

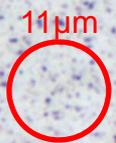
Reflected Light

Potoroo 2 Chip A g



Detail of porous melnikovite pyrite
(probable Au carrier)

Vd



Py (melnikovite)

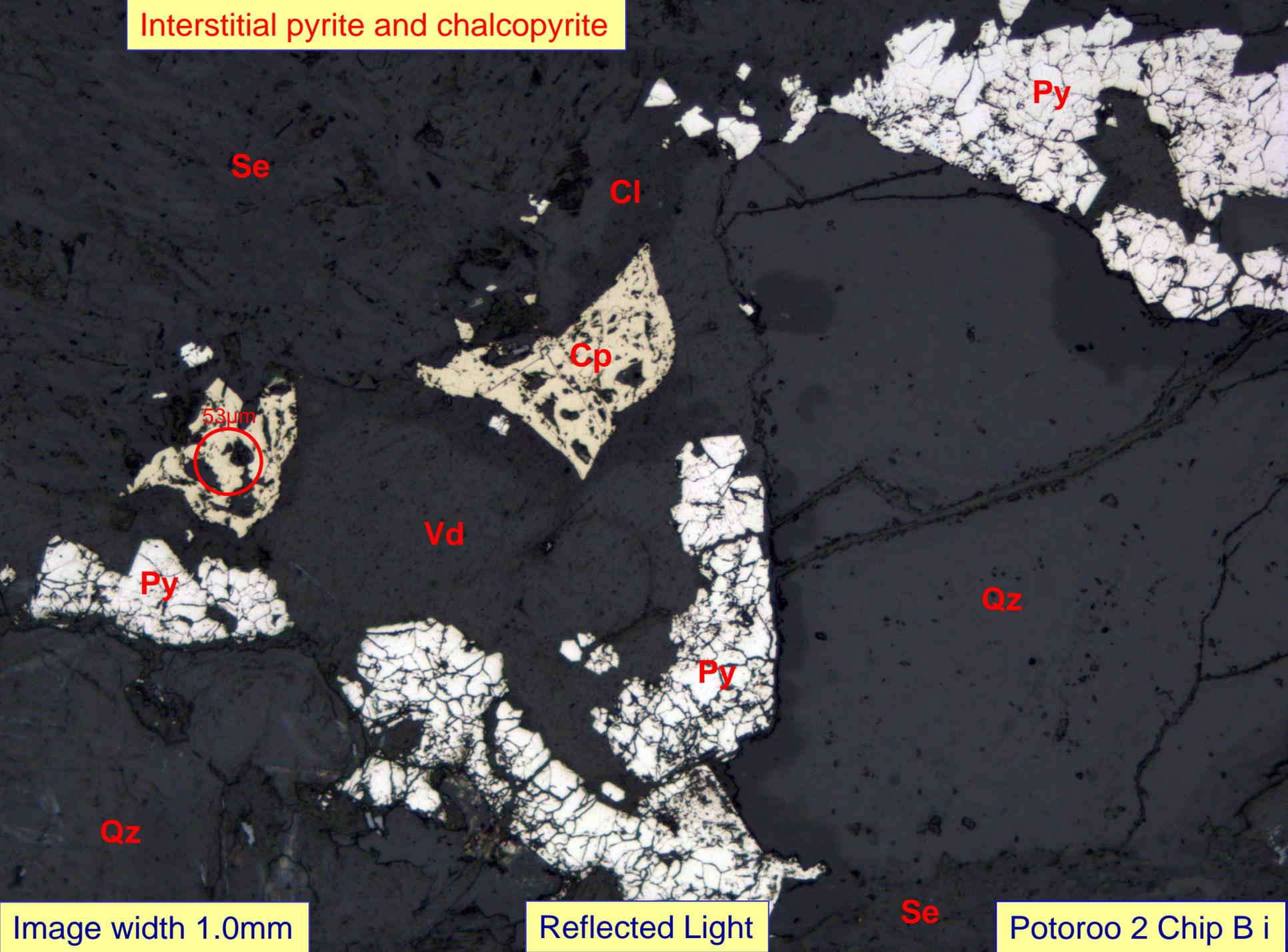
Vd

Image width 206μm

Reflected Light

Potoroo 2 Chip A h

Interstitial pyrite and chalcopyrite



Se

Cl

Py

Cp

53µm

Vd

Py

Qz

Py

Qz

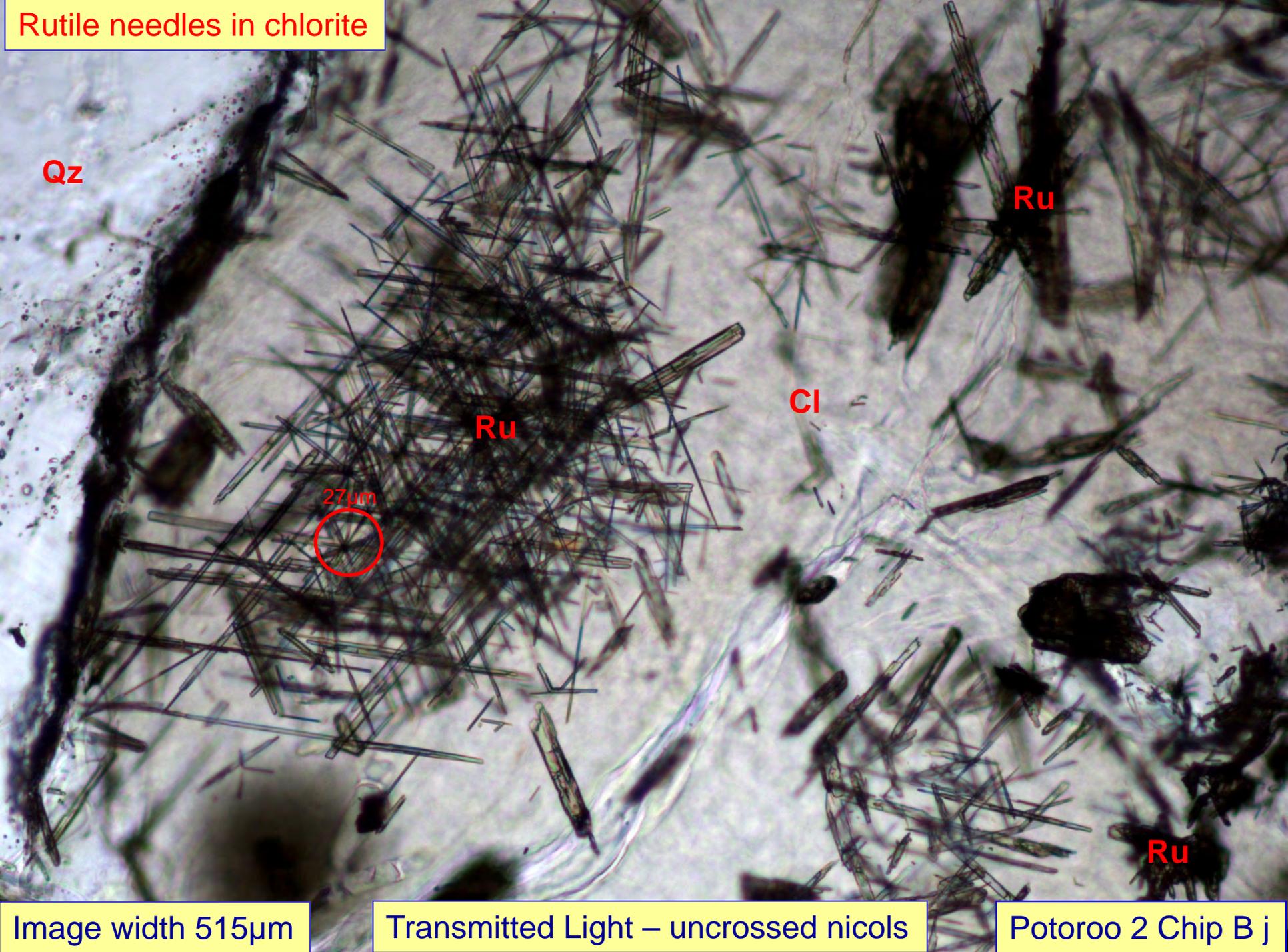
Se

Image width 1.0mm

Reflected Light

Potoroo 2 Chip B i

Rutile needles in chlorite



Qz

Ru

Ru

Cl

27µm

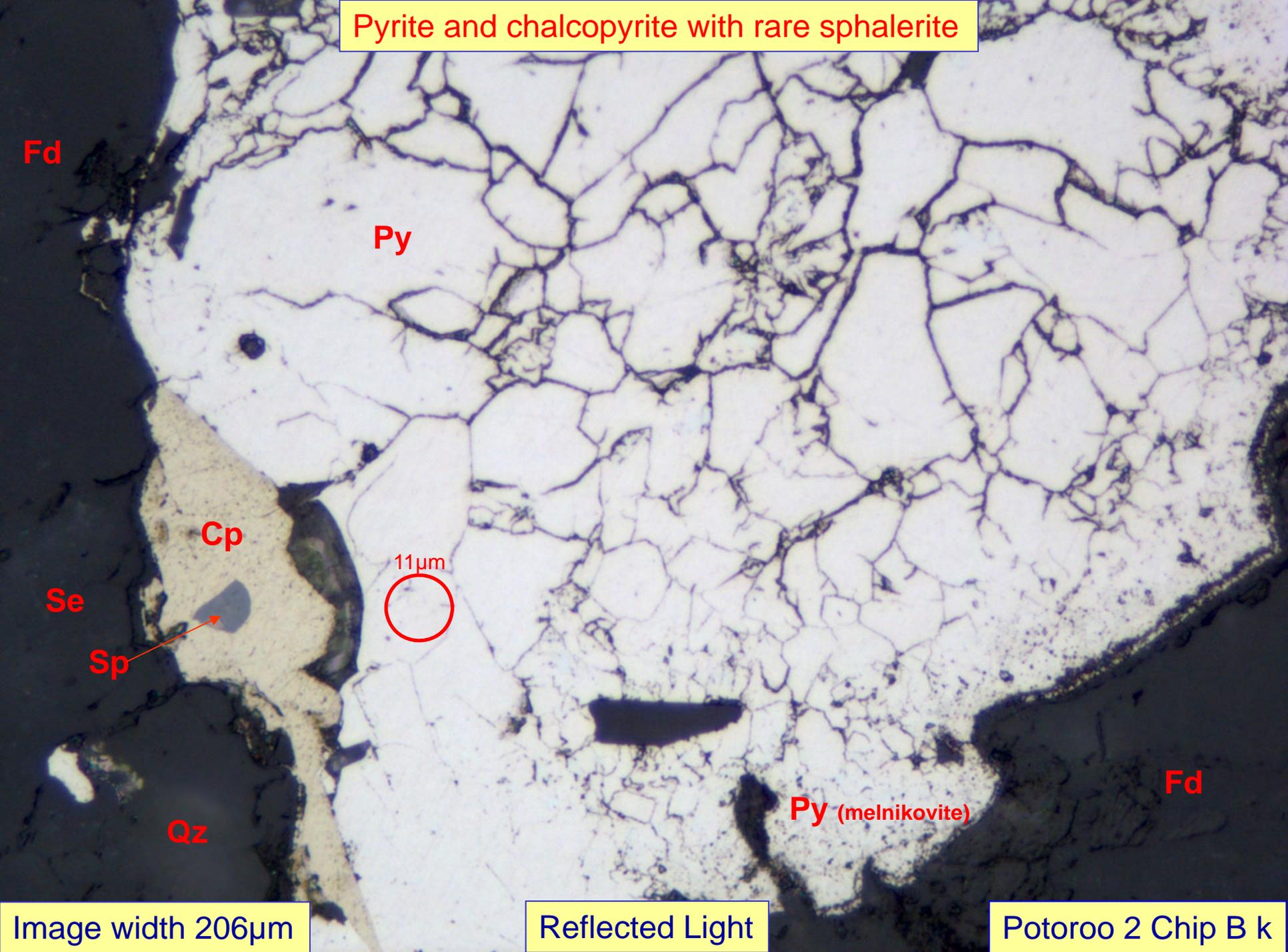
Ru

Image width 515µm

Transmitted Light – uncrossed nicols

Potoroo 2 Chip B j

Pyrite and chalcopyrite with rare sphalerite



Fd

Py

Cp

11 μ m

Se

Sp

Qz

Py (melnikovite)

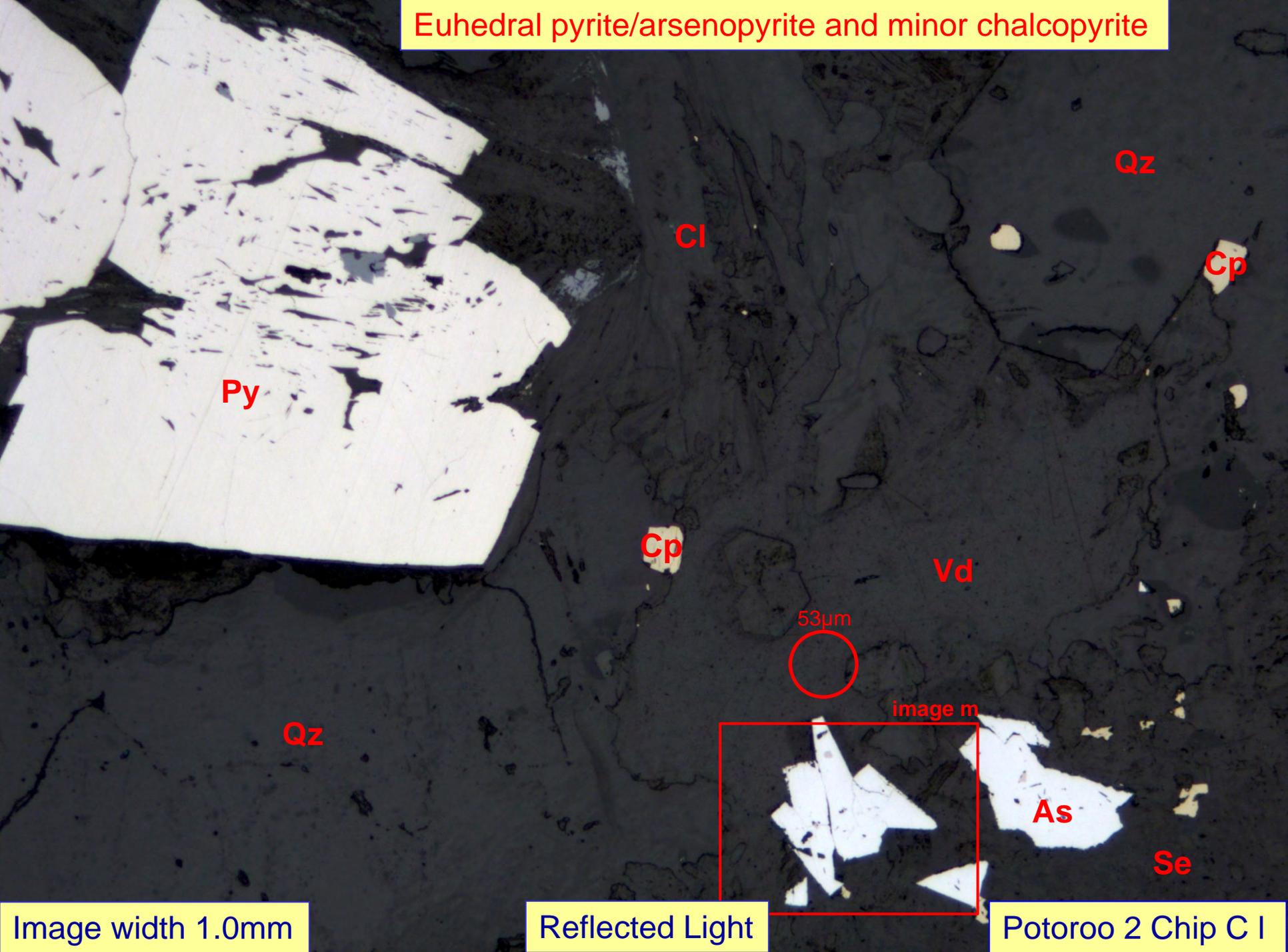
Fd

Image width 206 μ m

Reflected Light

Potoroo 2 Chip B k

Euhedral pyrite/arsenopyrite and minor chalcopyrite



Py

Qz

Cl

Cp

Cp

Vd

53µm

Qz

image m

As

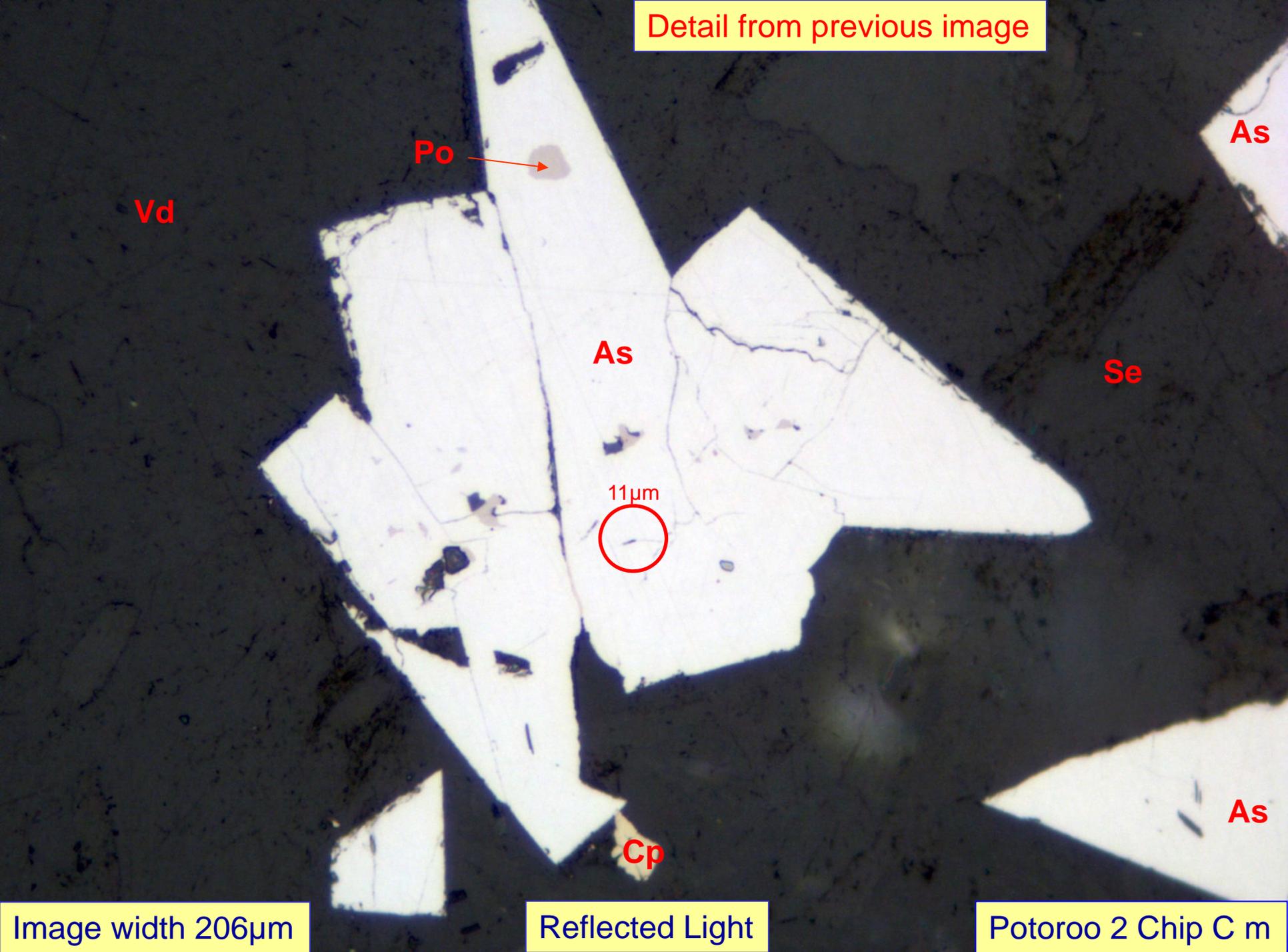
Se

Image width 1.0mm

Reflected Light

Potoroo 2 Chip C I

Detail from previous image



Vd

Po

As

Se

11µm

Cp

As

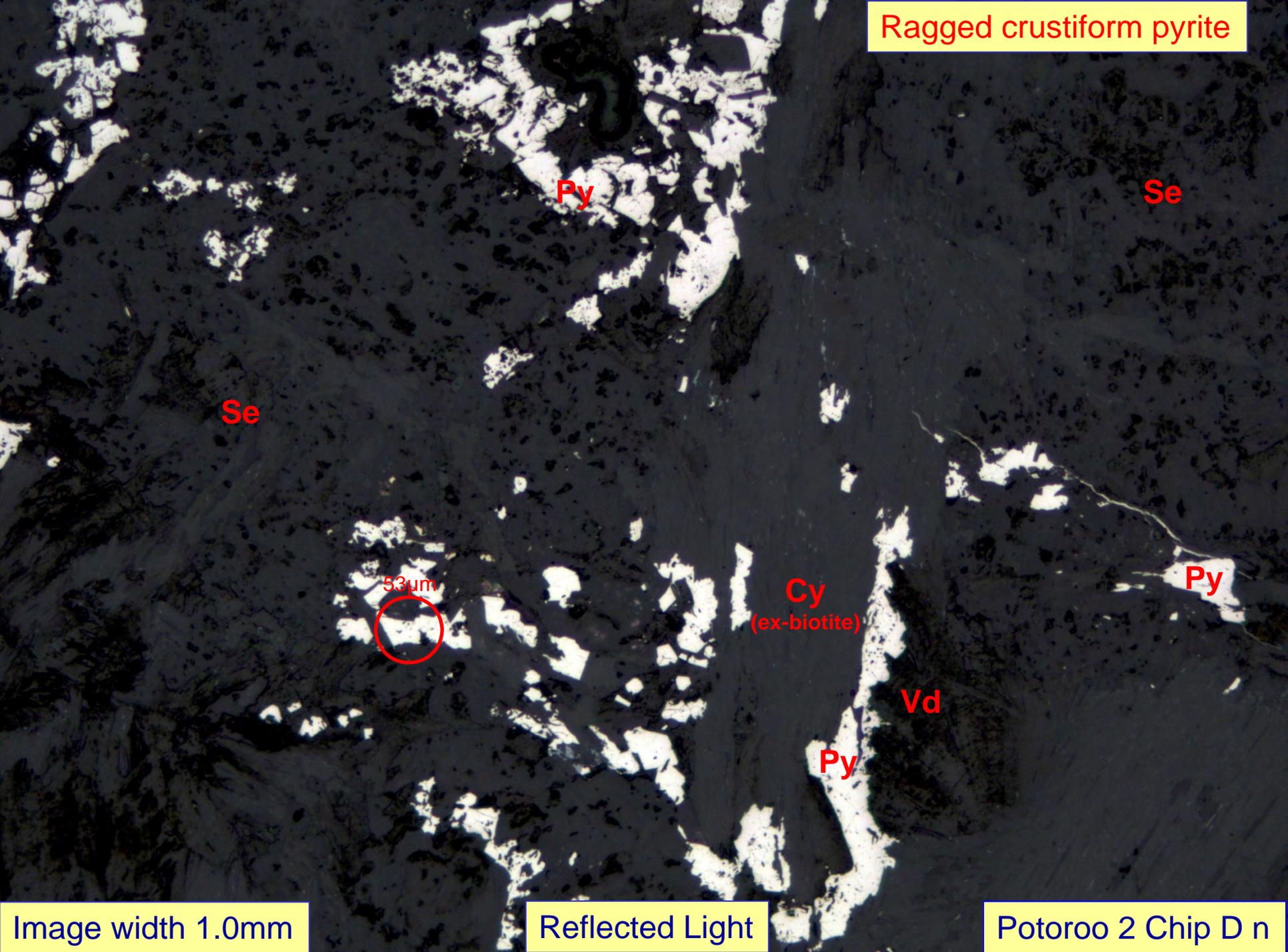
As

Image width 206µm

Reflected Light

Potoroo 2 Chip C m

Ragged crustiform pyrite



Se

Py

Se

53µm

Cy
(ex-biotite)

Py

Vd

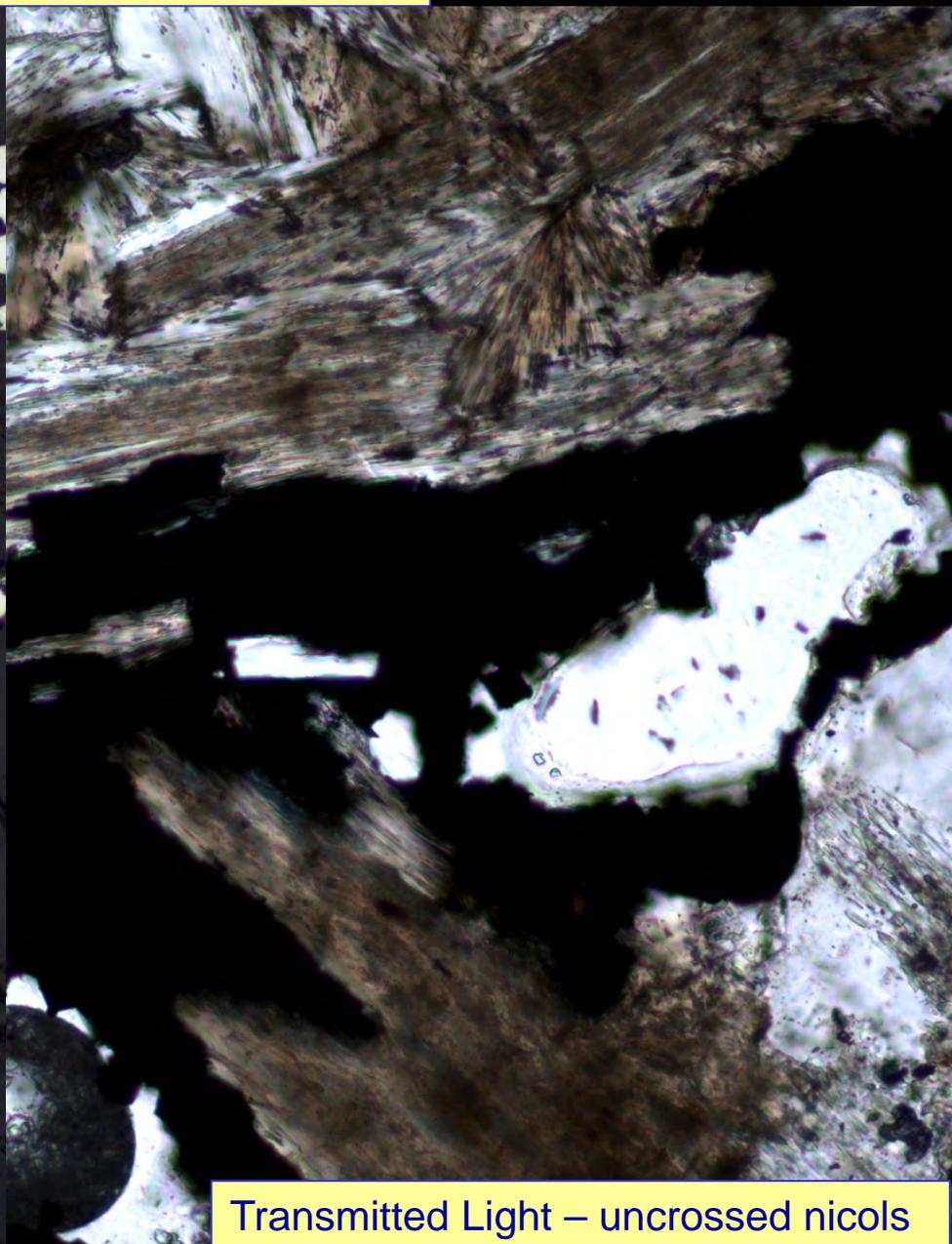
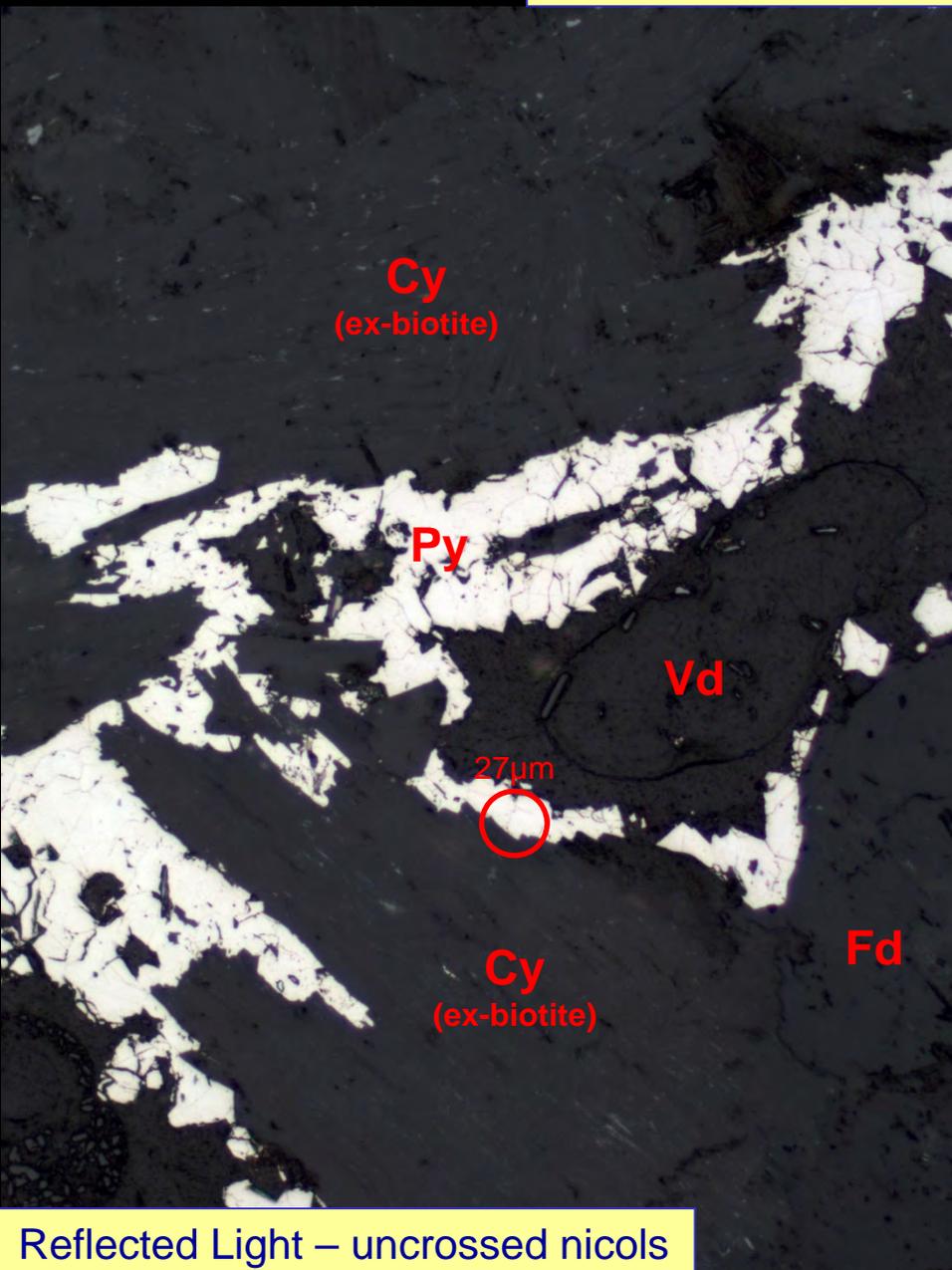
Py

Image width 1.0mm

Reflected Light

Potoroo 2 Chip D n

Pyrite interstitial to original biotite laths



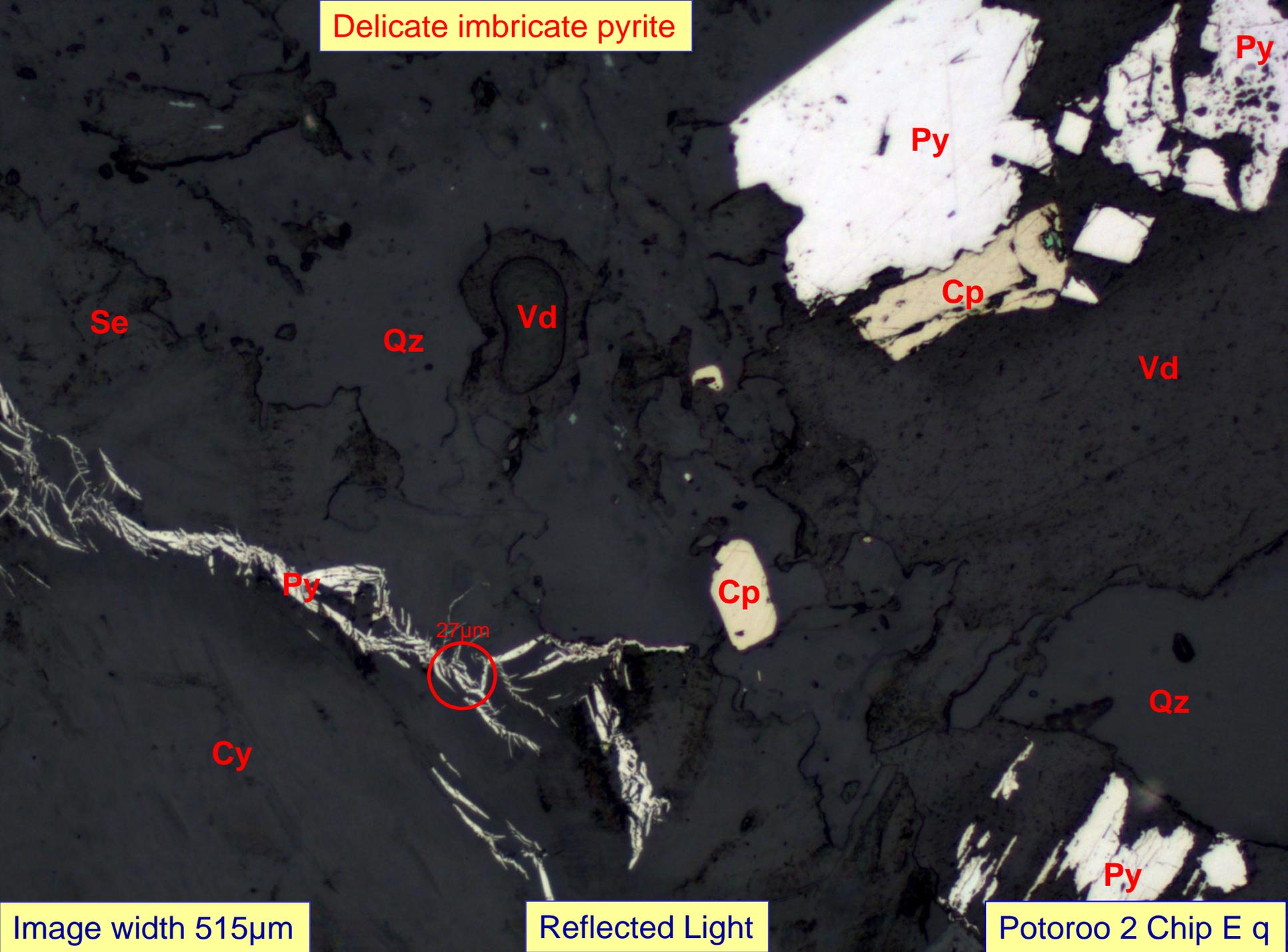
Reflected Light – uncrossed nicols

Transmitted Light – uncrossed nicols

Image width 2 x 386µm

Potoroo 2 Chip D o/p

Delicate imbricate pyrite



Se

Qz

Vd

Py

Cp

Vd

Py

Py

Cp

27µm

Qz

Cy

Py

Image width 515µm

Reflected Light

Potoroo 2 Chip E q

Detail of porous melnikovite pyrite

image s

Py
(melnikovite)

11µm

Vd

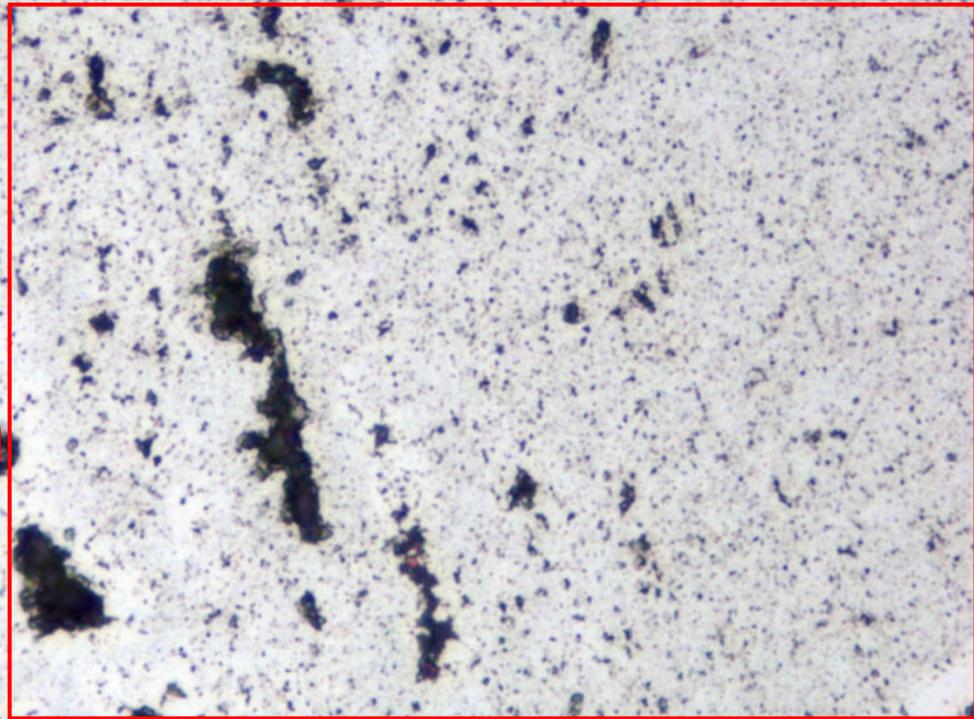


Image width 206µm

Reflected Light

Potoroo 2 Chip E r

X/Y	Qz	Fd	Bi	MuSe	Cl	Cy	Ru	Py	Ma	Po	As	Cp	Sp	TOTAL
4.19	65				32		3							100
4.20		5		95										100
4.21	65			35										100
4.22		5	20	30				45						100
4.23		10		75	15									100
4.24	15					85								100
4.25	75	10			15									100
4.26				100										100
4.27		10		90										100
4.28				100										100
4.29		15		5				80						100
4.30					45	50		5						100
5.01	80			20										100
5.02					85	15								100
5.03	25			25	50									100
5.04				85	15									100
5.05				5	30	65								100
5.06	45			20		35								100
5.07	85			15										100
5.08		15		85										100
5.09	90			10										100
5.10				100										100
5.11	5			95										100
5.12	55			45										100
5.13					100									100
5.14		25		25	49		1							100
5.15	15					85								100
5.16				100										100
5.17	100													100
5.18	90					10								100
5.19				85	15									100
5.21		15		85										100
5.22				100										100
5.23	70			30										100
5.24	15			55		30								100
5.25	85					15								100
5.26	15		85											100
5.27				100										100
5.28			40											100
6.04				100										100
6.10				100										100
6.11	100													100
6.12				100										100
6.19				45		55								100
6.20		20		60	20									100
6.21				5	95									100
6.22		20		80										100
6.23				99			1							100
6.24		20		70		10								100
6.25				90		10								100

X/Y	Qz	Fd	Bi	MuSe	Cl	Cy	Ru	Py	Ma	Po	As	Cp	Sp	TOTAL
9.05		30		70										100
9.06	80	10		10										100
9.07	5	5		10	20	60								100
9.08		25		75										100
9.09	90			10										100
9.10		20		50	30									100
9.11				80	20									100
9.12		5		95										100
9.14				85	15									100
9.15	55			45										100
9.16	100													100
9.17				64	35			1						100
9.18	45		10		45									100
9.19				100										100
9.20				10	85		5							100
9.21	100													100
9.22					100									100
9.23	60			40										100
9.25	65		35											100
9.26	100													100
9.27	10			80		10								100
9.28				25	75									100
9.29	30	10		60										100
9.30	60			25	15									100
10.01		80		20										100
10.02	65		34				1							100
10.03	20		50	30										100
10.04	20	30		50										100
10.05	100													100
10.06	30			70										100
10.07	85			15										100
10.08				25		75								100
10.09	100													100
10.10					100									100
10.11	10			90										100
10.12	10				90									100
10.13				100										100
10.14		35		65										100
10.15	100													100
10.16				20										100
10.17	20			80										100
10.18				65		35								100
10.19	100													100
10.20	5			10		85								100
10.21		20		80										100
10.22		5		40		55								100
10.23						55		45						100
10.24	95					5								100
10.25						100								100
10.26				100										100

X/Y	Qz	Fd	Bi	MuSe	Cl	Cy	Ru	Py	Ma	Po	As	Cp	Sp	TOTAL
12.29	90			10										100
13.02	65			35										100
13.03				80	20									100
13.04	40			60										100
13.05				85	15									100
13.06	95					5								100
13.07				85		15								100
13.08		30		70										100
13.09				50	50									100
13.10				60		40								100
13.11						55								100
13.12	40			60										100
13.13	55			45										100
13.14				100										100
13.15				100										100
13.16				100										100
13.17		25		75										100
13.18				100										100
13.19	5			15	80									100
13.20				100										100
13.21				10	90									100
13.22				65		35								100
13.24				50							5			100
13.25	100													100
13.26		60	10	30										100
13.27	55	35		10										100
13.28	5		45	50										100
13.29	100													100
13.30	60			40										100
14.01					10	90								100
14.02	75			25										100
14.03				35							65			100
14.11	30			70										100
14.12				15	85									100
14.13	45			55										100
14.14	40				60									100
14.15		30		70										100
14.16				90	10									100
14.17		80		17				3						100
14.18					70		30							100
14.19				100										100
14.22	50				10	40								100
14.23				70	30									100
14.24	35			65										100
14.25		70		30										100
14.26	50					50								100
14.27	100													100
14.28				40		60								100
14.29</														

Potoroo Photomicrographs Log

Photo#	Sample	Image	R/T	U/X	Obj	Minerals present	Comments
23510	Potoroo #2	A	T	U	1.25	SeQzCy	chip E
23511	Potoroo #2	B	R	U	5	SeCyPyQzCp	chip A
23512	Potoroo #2	C	R	U	20	CyPySeQzMa	enlarged view #23511
23513	Potoroo #2	D	R	U	20	CySePyQzCp	chip A
23514	Potoroo #2	E	R	U	20	CyPySeFdVd	chip A
23515	Potoroo #2	F	R	U	10	QzSeClPy	chip A
23516	Potoroo #2	G	R	U	20	CyPyVdFdSeQz	chip A, void centre, Fd bottom left
23517	Potoroo #2	H	R	U	50	PyVdQz	chip A
23518	Potoroo #2	I	R	U	10	QzSePyVdClCp	chip B
23519	Potoroo #2	J	T	U	20	ClQzRu	chip B
23520	Potoroo #2	K	R	U	50	PyFdQzSeCpSp	chip B
23521	Potoroo #2	L	R	U	10	QzVdSeClPyAsCp	chip C
23522	Potoroo #2	M	R	U	50	SeVdAsPoCp	chip C, enlarged view #23521
23523	Potoroo #2	N	R	U	10	SeCyPyVdFd	chip D
23524	Potoroo #2	O	R	U	20	CyPyVdFdSe	chip D, late Py crusts
23525	Potoroo #2	P	T	U	20	CyPyVdFdSe	chip D, same view as #23524
23526	Potoroo #2	Q	R	U	20	QzCySeVdPyCp	chip E
23527	Potoroo #2	R	R	U	50	PyVd	chip E
23528	Potoroo #2	S	R	U	100	PyVdMa	chip E, enlarged view #23527
23529	Potoroo #1	A	T	U	1.25	FdQzBtSe	chip A
23536	Potoroo #1	B	T	U	5	QzFdSeBtCy	chip B, ferruginous Cy coating (all #1 grains)
23530	Potoroo #1	C	R	U	5	FdQzSePyBt	chip A
23531	Potoroo #1	D	R	U	5	QzFdSePyBtVd	chip A, late Py crusts
23532	Potoroo #1	E	R	U	20	PyVdQzBt	chip A, enlarged view #23531
23533	Potoroo #1	F	R	U	20	BtPyFd	chip A
23534	Potoroo #1	G	T	U	20	BtPyFd	chip A, same view as #23533
23535	Potoroo #1	H	R	U	10	MuFdPyBtRuCo	chip B
23537	Potoroo #1	I	T	X	5	FdQzCySe	chip C, zonal plag alteration
23538	Potoroo #1	J	R	U	20	PyFdBtVdCpPo	chip C
23539	Potoroo #1	K	R	U	5	QzPyClFdVd	chip D
23540	Potoroo #1	L	R	U	5	ClPyVdCoFdCp	chip D
23541	Potoroo #1	M	R	U	20	PyClVdCoCo	chip D, enlarged view #23541
23542	Potoroo #1	N	R	U	10	ClPyVdFd	chip E
23543	Potoroo #1	O	R	U	10	FdSePyBtRu	chip F
23544	Potoroo #1	P	R	U	10	BtPyFdSeVd	chip F
23545	Potoroo #1	Q	R	U	50	PyBtVd	chip F, enlarged view #23545