

Message ID: 168 Entry time: 2/21/2023 4:08:01 PM

Experiment Date:	2023 02 20
Duration (Days):	5
User:	Stjepko Fazinic, Iva Bozicevic Mihalic, Anja Miokovic
Accelerator:	Tandetron
Beam Line:	Old uProbe
Project:	Hi-REXS (HRZZ projekt)
Experiment Title:	Analysis of paint layer using combination of HR-PIXE and PIXE, S+Pb+Hg, Ti+Ba
Beam:	2MeV H
Method:	HR PIXE, PIXE

Beam deflection was connected to the horizontal deflector with -700 V.

GreatControl: X Binning = OFF, Y Binning = OFF, Readout Speed = 500 kHz, Gain = Max Sensitivity, Correct Bias = UNCHECKED, $T_{ccd} = -70$ °C, $T_{back} = 23$ °C, Chiller at 18 °C

SDD put with the longest screws. -> The distance between two plates is 89 mm.

20.2.2023.

Chamber positioned similar as it was in June.

Beam: 2 MeV H⁺

Focus: Me 17.6A, Ox 34.9A

Scanning: x=10.0, y=9.55

Diffraction crystal: PET(002) at 11.7 cm

Current on metal before measurement ~ 1.5 nA

Sample 27608 on holder together with Cu mesh 400 and quartz.

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	COMMENT
2302065	SDD	Cu mesh 400	/	/	SS=5x0.1
2302066	SDD	Sample 27608	/	/	SS=1.1x1
2302581	SDD+CCD	Sample 27608 -ROI	60	1	ROI with max S+Pb counts, we do not see the lines
Chamber moved a bit so that it fits better to the marks on the floor.					
2302582	SDD	Sample 27608	/	/	new map after moving
2302583	SDD+CCD	Sample 27608 -ROI	60	1	ROI with max S+Pb counts, still no lines

Chunk of pure S and Pb are added to the holder.

Crystal is changed to Si(111) -> we will see only SKa, but crystal will be further away from the sample so we expect that setup to be less sensitive on the position of the chamber (if that is a problem).

Initial position of Si(111) at 8.9 cm -> calculated with Mauri's code.

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	COMMENT
2302584	CCD	S	10	1	Ska line is visible with crystal positioned at 7.9 cm - it is on the right side of the frame
We moved crystal closer to check if the whole frame is available. Lower than ch~200 we can not see the line. Chamber is moved so that beam spot is closer to the crystal. Now with Si at 8.9 cm SKa line is at the center of frame as expected. Old marks are erased from the floor.					
NEW BLACK MARKS FOR GOOD POSITION OF THE CHAMBER ARE DRAWN ON THE FLOOR!					
2302585	CCD	S	5	1	Si at 9.3 cm, SKa line is visible at the leftmost part of the frame -> whole frame is available
PET(002) put back in the chamber. Blue dot facing the input door marked on it.					
2302586	CCD	S	5	1	PET at 11.5 cm, SKa line is visible at ch~600 but part of frame left from it is unavailable
PET(002) pulled out of crystal holder for 4 mm (same thing we did in November with Beryl).					
2302587	CCD	S	5	1	PET at 11.7cm, SKa line is visible even at ch~100 -> we are satisfied

21.2.2023.

Beam: 2 MeV H⁺

Focus: Me 17.6A, Ox 34.9A

Scanning: x=10.0, y=9.55

Diffraction crystal: PET(002) at 11.7 cm, peeking out of the holder for 4 mm, blue dot facing the input door

Current on metal before measurement ~ 1.5 nA

Sample 27608 on holder together with Cu mesh 400, Pb chunk, S chunk, quartz and paper.

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	ROI DEFINITION	COMMENT
2302588	SDD	Sample 27608	/	/	/	SS=0.7x1, SDD rate~3 kHz
2302589	SDD	- -	/	/	/	SS=0.7x1, SDD rate~2 kHz
2302590	SDD+CCD	Sample 27608 - ROI	20	1	3x3 px ² , start px=(40,60)	part of map with max S+Pb counts
2302591	CCD	DARK	10	1	/	
2302592	SDD+CCD	Sample 27608 - ROI	10	200	same ROI as previous	
2302593	- -	- -	10	200	- -	
2302594	- -	- -	10	200	- -	current needed to be increased, SDD rate~1 kHz
2302595	- -	- -	10	200	- -	SDD rate~1 kHz
2302596	SDD	Sample 27608	/	/	/	SS=0.7x1, SDD rate~700-800 Hz

Crystal changed to Ge(220) so that we can inspect regions with Ti+Ba.

Diffraction crystal: Ge(220) at 11.3 cm, peeking out of the holder for 4 mm, blue dot facing the input door

Pb chunk changed for Ti foil.

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	COMMENT
Scanning is turned off while we measure Ti foil. We measure just one point.					
2302597	SDD	Ti	/	/	SDD rate~1,2-1.3 kHz
2302598	CCD	- -	30	1	TiKa line visible at ch~160 and TiKb at ch~910
2302599	CCD	- -	3	1	
2302600	CCD	- -	3	1	I fell ~0.5nA (it was not possible to increase it)
2302601	CCD	DARK	3	10	
2302602	CCD	Ti	3	300	I~0.5 nA
Scanning is turned back on.					
2302603	SDD	Sample 27608	/	/	SS=0.7x1
2302604	CCD+SDD	Sample 27608 - ROI 1	60	1	green line of sample, in Vista we see only BaLa; I~0.5 nA, SDD rate~1 kHz
2302605	CCD	- -	10	50	- -
2302606	CCD+SDD	Sample 27608 - ROI 2	10	50	somewhere around blue line of sample, from Matlab analysis we see 3 lines: BaLa+TiKa+BaLb1

22.2.2023.

Beam: 2 MeV H⁺

Focus: Me 18.0A, Ox 35.0A

Scanning: x=10.0, y=9.55

Diffraction crystal: Ge(220) at 11.3 cm, peeking out of the holder for 4 mm, blue dot facing the input door

Current on metal before measurement ~ 1.5 nA (collimator slits closed a bit)

Sample 27608 on holder together with Cu mesh 400, Ti foil, S chunk, quartz and paper.

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	ROI DEFINITION	COMMENT
2302607	SDD	Sample 27608	/	/	/	SS=0.7x1, SDD rate~2 kHz
2302608	SDD	Sample 27608 - ROI 1	/	/	3x3 px ² , start px=(75,101)	blue line of the sample (?), recognizing both Ti and Ba from spectrum
2302609	CCD	DARK	10	10		
2302610	CCD+SDD	Sample 27608 - ROI 1	10	300	- -	
2302611	CCD	- -	10	300	- -	SDD rate~1300 Hz
Spector file 2302610 contains both 2302610 and 2302611 measurements.						
2302612	CCD+SDD	- -	10	100	- -	CCD stopped at frame 55 because current fell; Spector stopped with delay (and in the meantime deflector was put to 5 V)
2302613	SDD	Sample 27608	/	/	/	SS=0.7x1
2302614	CCD+SDD	Sample 27608 - ROI 2	30	1	3x3 px ² , start px=(75,46)	green line of the sample; region of map where we see counts for BaLb peak, but less counts for TiKa+BaLa overlapping peak -> mainly Ba in this region
2302615	CCD+SDD	- -	10	300	- -	SDD rate~1.5 kHz
We moved to Ti foil after and Spector was not stopped. (Replay cut the last minute.)						
2302616	CCD	Ti	10	1	/	
2302617	CCD	DARK	1	10	/	
2302618	CCD	Ti	1	600	/	collimator slits closed so that I~1 pA, because for Ti foil we got too many events for 1.5 nA
2302619	CCD	Ti	1	600	/	good frames: from 0 to 284, from 331 to 416
2302620	CCD	Ti	1	300	/	
We wanted to try to get more statistics of TiKb. Current was increased by opening collimator slits.						
2302621	CCD	DARK	6	10	/	I~1.5 nA
2302622	CCD	Ti	6	450	/	- -, from Matlab analysis we see that we did not improve statistics for TiKb -> we finish with measurements

23.2.2023.

PROBLEM AT THE BEGINNING:

We got the beam and focused it with setup from the day before.

After putting new samples on sample holder and changing the crystal we could not get the beam anymore. Crystal (PET) was pulled out for 4 mm as it was on Monday and Tuesday.

We decided to push crystal in the holder for 1 mm and check if it was blocking the beam.

The beam got in. We also saw on quartz that beam spot shifted towards the crystal.

Shift of beam was also confirmed when checking position of SKA line. -> It has shifted to the right side on the frame.

Good thing is that whole frame was still available.

We don't know how to explain this sudden shift of the beam.

Beam: 2 MeV H⁺

Focus: Me 17.8A, Ox 35.0A

Scanning: x=10.0, y=9.55

Diffraction crystal: PET(002) at 11.7 cm, peeking out of the holder for 3 mm, blue dot facing the input door

Current on metal before measurement ~ 2.6 nA

Sample 23521 (new one!) on holder together with Cu mesh 400, HgS chunk (a bit out of plane with respect to the other samples, but we could not fix it better because it would fall apart), Pb chunk, S chunk, quartz and paper.

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	COMMENT
2302623	CCD	S	10	1	I~1.7 nA, checking if the leftmost part of the frame is available -> it is
2302624	CCD	S	10	1	
2302625	CCD	HgS	60	1	
2302626	CCD	DARK	10	10	
2302627	CCD+SDD	HgS	10	300	I~1.5 nA, SDD rate~4 kHz; after finishing measurement we forgot to stop Spector

I~2nA on metal.

We are trying to get better focus. Sample 23521 is smaller than the previous one and we need good resolution to recognize its details.

Focus changed: Me 16.9A, Ox 34.9A

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	ROI DEFINITION	COMMENT
2302628	SDD	23521	/	/	/	SS=0.7x1; bad resolution, we played with Andro's and collimator slits a bit
2302629	SDD	Cu mesh 400	/	/	/	SS=5x0.1; we are not satisfied, playing slits again
2302630	SDD	- -	/	/	/	SS=5x0.1; we do not think we can make it better today, we chose to work with this resolution

I~1 nA on metal. (Current is reduced but it got us better focus.)

2302631	SDD	Sample 23521	/	/	/	SS=5x0.1
2302632	CCD+SDD	Sample 23521 - ROI 1	60	1	5x6 px ² , start px=(105,46), chosen by hand	red towards black part of sample (on the separate part of sample), expecting HgS

We saw something weird with peak on ~4 keV in Spector spectrum. Shaping time of amplifier is changed from 8 us to 12 us. -> Problem solved.

2302633	CCD+SDD	- -	300	10	- -	I~0.3-0.4 nA
2302634	CCD+SDD	- -	300	10	- -	- -

We first increased current with magnets ~ 0.6 nA. Then we opened collimator slits a bit to increase it more.

I~ 1.2 nA on sample

2302635	CCD+SDD	- -	150	10	- -	SDD rate~2 kHz
2302636	SDD	Sample 23521 - ROI 2	/	/	part of map with some S+Pb no Hg counts, big ROI chosen by hand	black part of sample; in spectrum: visible both low Pb and low Hg peaks, also Ca peak is very intense
2302637	SDD	Sample 23521 - ROI 3	/	/	part of map with high Pb and low Hg counts, big ROI chosen by hand	part of sample where yellow line penetrates into orange line; in spectrum: high Pb and lower Hg peaks
2302638	SDD	Sample 23521 - ROI 4	/	/	part of map with some S+Pb counts and no Hg counts, big ROI chosen by hand	yellow line above orange one; spectrum similar as previous but with less difference in intensity of Pb and Hg peaks, also Ca peak is higher

24.2.2023.

Beam: 2 MeV H⁺

Focus: Me 17.8A, Ox 34.9A

Scanning: x=10.0, y=9.55

Diffraction crystal: PET(002) at 11.7 cm, peeking out of the holder for 3 mm, blue dot facing the input door

Current on metal before measurement ~ 1.2 nA

Sample 23521 on holder together with Cu mesh 400, HgS chunk (a bit out of plane with respect to the other samples), Pb chunk, S chunk, quartz and paper.

Before measurement we played with Andro's and collimator slits to get better focus.

SOLUTION FOR BEST FOCUS: Collimator slits opened but Andro's slits closed.

FILE	DETECTOR	SAMPLE	t _{exp} /s	N _{frames}	ROI DEFINITION	COMMENT
2302639	SDD	Cu mesh 400	/	/	/	SS=5x0.1; better than yesterday but we want to improve vertical resolution more -> playing with slits some more
2302640	SDD	- -	/	/	/	SS=5x0.1, we are satisfied
I~1.1 nA on metal						
2302641	SDD	Sample 23521	/	/	/	SS=5x0.1, I~1 nA, SDD rate~2 kHz (when on paint); collecting map on the same position as yesterday

2302642	CCD+SDD	Sample 23521-ROI 1	60	1	4x6 px ² , start px=(60,76), chosen by hand	part of sample where yellow color penetrates the orange line
2302643	- -	DARK	10	10	- -	
2302644	- -	Sample 23521-ROI 1	10	300	- -	I~1.1 nA, current fell twice during the measurement so it was increased from accelerator control
2302645	- -	Sample 23521-ROI 2	10	300	4x4 px ² , start px=(52,55), chosen by hand	black part of the sample, from Spector maps we concluded that it corresponds to S and Cl
2302646	- -	- -	10	150	- -	

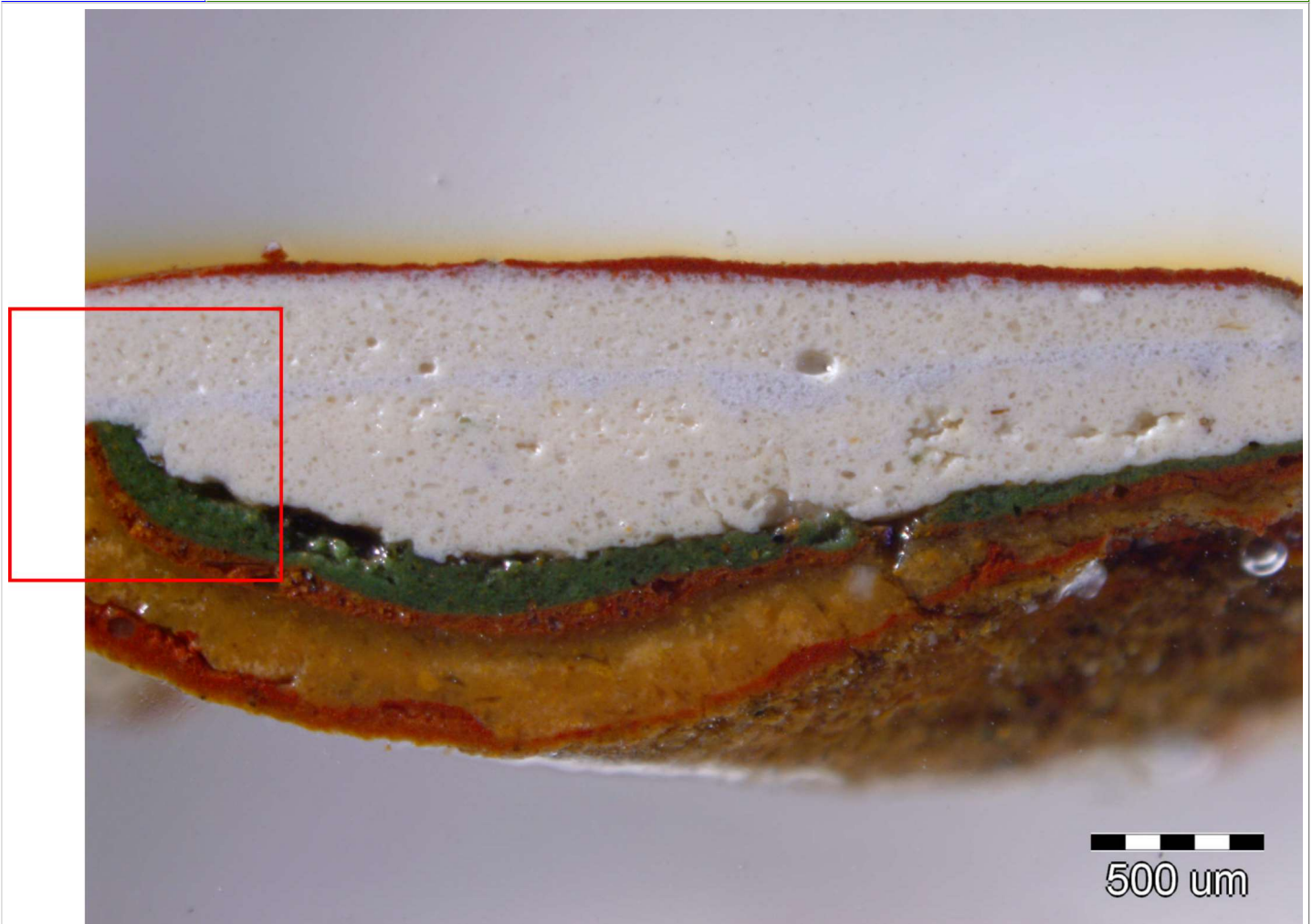
Crystal changed to Si(111) because we want to inspect Cl HR spectrum.

Si(111) at 10.4 cm, peeking out of the holder for 3 mm, blue dot facing the input door.

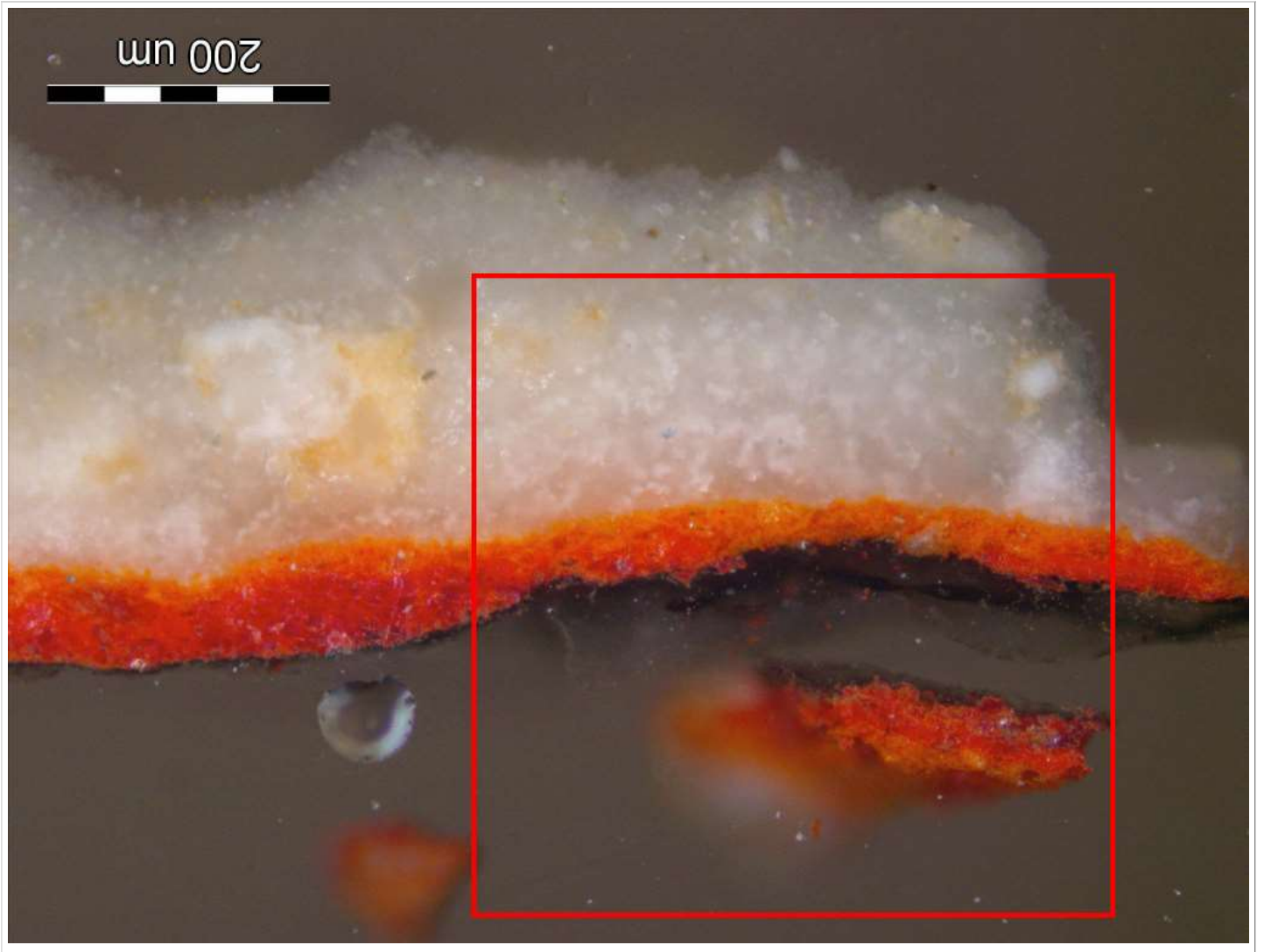
Part of NaCl pellet added to sample holder instead of Cu mesh.

2302647	CCD	NaCl	30	1	/	ClKa line visible in Vista
2302648	CCD	- -	10	1	/	Si at 10.5 cm, ClKa line in the middle of the frame
2302649	CCD	- -	60	1	/	ClKa and ClKb are both entering the frame
2302650	SDD	Sample 23521	/	/	/	SS=5x0.1, back to same position as before
2302651	CCD+SDD	Sample 23521-ROI 3	60	1	high Cl counts, 4x4 px ² , start px=(44,45), chosen by hand	black part of the sample
2302652	- -	- -	10	150	- -	
2302653	- -	- -	10	450	- -	
2302655	CCD	- -	10	300	- -	

Attachment 1: [27608_skenirano_podrucje.png](#) 2.630 MB Uploaded 2/28/2023 12:56:10 PM | [Hide](#) | [Hide all](#)



Attachment 2: [23521_skenirano_podrucje.png](#) 1.768 MB Uploaded 2/28/2023 12:58:50 PM | [Hide](#) | [Hide all](#)



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