Message ID: **150** Entry time: **Fri Oct 21 12:53:49 2022**

Experiment Date:	2022 10 17
Duration (Days):	5
User:	Stjepko Fazinic, Iva Bozicevic Mihalic, Anja Miokovic
Accelerator:	Tandetron
Beam Line:	Old uProbe
Project:	Hi-REXS (HRZZ projekt)
Experiment Title:	HR PIXE Repeat of specific Mg compounds and preliminary measurement of Na
Beam:	3MeV He, 2MeV H
Method:	HR PIXE

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

GreatControl: Correct bias OFF, Max sensitivity, 500 kHz readout, T_{ccd}= -70 ºC, T_{back}= 23 ºC, Chiller at 18 ºC

17.10.2022.

Beam: 3 MeV He^{++}

Focus: Me 19.4, Ox 42.3

Diffraction crystal: ADP at 6cm

Current on metal before measurement ~ 3 nA

Samples: Mg (position 2), $MgSO_4$ (position 3), $MgBr_2$ (position 4)

FILE	t_{exp}/s	N_{frames}	SAMPLE	COMMENTS
2210063	20	1	Mg	finding and positioning Ka_{12} line
2210064	20	1	$MgSO_4$	- || -
2210065	10	10	DARK	
2210066	30	1	$MgSO_4$	I ~ 1.5 nA
2210067	10	109	$MgSO_4$	measurement stopped because last peak is cut from the spectrum
2210068	20	1	$MgSO_4$	crystal moved towards higher energies (towards the sample)
2210069	10	600	$MgSO_4$	good position; file 2210069_0 broken! (accidentally overwritten)
2210070	10	300	$MgSO_4$	same position, I ~ 1.2 nA
2210071	10	300	$MgSO_4$	same position

From map of pixels we see spot without events at the bottom left part of Ka_{12} line. -> Bottom region of map should be excluded from analysis.

Before measurement we had planned to measure $MgSO_4$ and $MgBr_2$ but we checked again resulting spectra from measurements in April and concluded that we are sastisfied with $MgBr_2$ so we only repeated measurement of $MgSO_4$.

18.10.2022.

Beam: 2 MeV H^+

Focus: Me 15.6, Ox 34.1

Diffraction crystal: Beryl (1010) at 11.2 cm

Current on metal before measurement ~ 4 nA

Samples: Mg_2Si+Ge (1), Mg+Ge (2), MgB_2+Ge (3), Mg (4) -> changed to Mg_2Si -> chaged back to Mg

After unsuccesful measurement of Mg+Ge we change Mg chunk for Mg_2Si. We fear that even if we find MgKa line it will be shifted from lines of other samples because Mg chunk is not in the same plane as other samples (which are in the form of tablets, as is Mg_2Si). -> This replacement was unnecessary. Later we put back Mg chunk.

FILE	t_{exp}/s	N_{frames}	SAMPLE	COMMENTS

2210072	10	1	Mg+Ge	we are not able to find any lines
2210073	5	1	Mg_2Si	- || -, I ~ 4.5 nA
2210074	20	1	Mg_2Si	- || -, we open the chamber and lift the holder of crystal
2210075	20	1	Mg_2Si	still not recognizing any lines (moving crystal in steps of 1 mm around expected position did not help); we change Mg_2Si back for Mg chunk
2210076	20	1	Mg	still not recognizing any lines, I ~ 2.6 nA; maybe edge of targets holder is making a shadow? we will change positions of targets 3 and 4
2210077	5	1	Mg	I ~ 4.5 nA, Mg chunk at position 3, still no lines -> position of target is not a problem

From Mauri's code GUI Crystal: Width of window in which MgKa line should be visible is cca 4.5 mm.

19.10.2022.

Beam: 2 MeV H^+

Focus: Me 15.6, Ox 34.1

Diffraction crystal: ADP at 6 cm

Current on metal before measurement ~ 6 nA

Samples: Mg_2Si+Ge (1), Mg+Ge (2), Mg (3), MgB_2+Ge (4) -> changed to NaCl

We want to find MgKa12 line with ADP (that worked on Monday) to check if CCD stopped working since Monday. -> It has not!

FILE	t_{exp}/s	N_{frames}	SAMPLE	COMMENTS
2210078	5	1	Mg	MgKa12 line is visible but a lot of noise is present, we close collimator slits to reduce the current to ~ 2 nA
2210079	20	1	Mg+Ge	not recognizing any lines
2210080	10	1	Mg	checking what happens when we move crystal closer to the target (to higher energies) and line moves to the left
2210081	10	1	Mg	at one point we lose MgKa line from the image -> left part of image is inaccessible
2210082	10	1	Mg+Ge	still not recognizing any lines even if we try to check only right part of the image

The problem is in the geometry of setup - we do not see lines when crystal is too close to the target.

On position (4) MgB_2 is changed for NaCl.

Diffraction crystal changed: Beryl at 10.2 cm -> we want to try to find Na because Beryl position for it is further from the target than for Mg.

Beryl is not centered well on its holder. We have marked holder of Beryl crystal with blue dot that should be looking at direction of person who is putting crystal in the chamber (dot looking towards NW).

FILE	t_{exp}/s	Nframes	SAMPLE	COMMENTS
2210083	10	1	NaCl	Beryl at 10.2, not recognizing any lines

Diffraction crystal changed: ADP -> checking if we can see Al, we know we could before. If AlKa is inaccessible we definetely need to change the geometry.

From Mauri's code GUI Crystal: Crystal positions for AlKa and MgKa lines are shifted for cca 3.7 cm.

After not finding AlKa line, we moved the pedestal of the chamber to fit marks on the floor (it did not fit them very well) and we fix the screws of the crystal holder so that they are at the frontmost position of the slots. (We believe these are the only things different from measurements in June)

FILE	t_{exp}/s	Nframes	SAMPLE	COMMENTS
2210084	5	1	Mg	ADP at 4.5 cm, Ka line moved to the right edge of the image
2210085	5	1	Al (holder)	ADP at 8.2 cm, not recognizing any lines; moving chamber, and fixing the position of the crystal
2210086	5	1	Mg	ADP at 5.6 cm; we can see line at a position of image a bit more left then before, but there is still unaccessible region to the left of the image
2210087	5	1	Mg	ADP at 5.6 cm, we moved filter above the CCD to check if it makes shadow -> it does not -> problem is definetely geometry

We rotated crystal a bit. -> We could acces whole image for Mg.
Then we moved chamber so that beam falls closer to the CCD. -> AlKa line became visible.

FILE	t_{exp}/s	Nframes	SAMPLE	COMMENTS
2210088	5	1	Mg	ADP at 4.5 cm, MgKa line is visible fully to the right of the image, I ~ 2 nA
2210089	5	1	Mg	moving MgKa line fully to the left, there is no cutting of the line anymore
2210090	5	1	Al (holder)	ADP at 8.2 cm, still not recognizing any lines

2210091	5	1	Mg	ADP at 5.6, chamber moved so that beam falls closer to the CCD, position of line shifted to the right; when ADP at 6.6 MgKa line fully to the left of the image
2210092	5	1	Al	ADP at 10.2 cm, AlKa visible fully to the left of the image

At the end of the day we can find with ADP crystal what was possible in previous measurements (Al and Mg).

20.10.2022.

Filter above the CCD is put back.

Beam: 2 MeV H^+

Focus: Me 16.7, Ox 34.8

Diffraction crystal: Beryl

Current on metal before measurement ~ 1.8 nA

Samples: Mg_2Si+Ge (1), Mg+Ge (2), Mg (3), NaCl (4)

FILE	t_{exp}/s	Nframes	SAMPLE	COMMENTS
2210093	10	1	NaCl	Beryl at 9.8 cm, not recognizing any lines while we move crystal around initial position
2210094	20	1	Mg	Beryl at 11.1 cm, line is visible fully to the right of the image
2210095	20	1	Mg	crystal moved a bit to higher energy (~ at 11.2 cm) -> line is cut -> we still can not access left part of the image
2210096	20	1	Mg	chamber moved so that beam falls closer to the CCD, line shifted to the right for the same position of the crystal -> for Beryl at 11.15 cm line is now fully to the right; bigger area of image is accessible, but still not whole image
2210097	10	1	Mg	chamber moved again in the same direction, now we can acces cca 2/3 of an image
2210098	10	1	Mg	chamber moved again in the same direction, finally we can access the full image; for Beryl at 12.0 cm line is fully to the left of the image, at that position bottom part of the line is cut a bit
2210099	7	10	DARK	
2210100	7	300	Mg	I ~ 1.75 nA, checking the resolution of Mg spectrum -> it looks good
2210101	10	1	Mg_2Si+Ge	- || -, not recognizing low intensity MgKa line within a lot of Ge background
2210102	10	1	Mg	MgKa line moved to the right part of the image so we know where to expect line while measuring Mg_2Si+Ge
2210103	6	1	Mg_2Si+Ge	Beryl at 11.6 cm, MgKa line found
2210104	6	10	DARK	
2210105	6	220	Mg_2Si+Ge	I ~ 2.2 nA, spectrum analysed -> MgKa12 peak has two spikes -> to fix it we move crystal a bit closer to the target and we move beam to slightly different position on atarget
2210106	6	450	Mg_2Si+Ge	I ~ 2.2 nA, new position, we are satisfied with the spectrum
2210107	6	450	Mg_2Si+Ge	-|| -, same position as previous one

While moving chamber we were observing beam on quartz.

- First move: beam moved towards the CCD for ~ half of a width of a quartz.

- Second move: beam moved towards the CCD for ~ full width of a quartz.

- Third move: beam mowed towards the CCD for ~ 3/4 of a width of a quartz.

After final movement of chamber we could not reach position 2 of the targets holder.

We change position of samples: Mg+Ge (1), MgB_2 (3), NaCl (4)

FILE	t_{exp}/s	Nframes	SAMPLE	COMMENTS
2210108	4	1	Mg+Ge	Beryl at 11.6 cm, I ~ 2.2 nA
2210109	4	10	DARK	
2210110	4	150	Mg+Ge	- || -
2210111	4	600	Mg+Ge	- || -, new position -> crystal moved a bit to the front
2210112	4	300	Mg+Ge	- || -, same position; files 2210112_0 and 2210112_1 are accidentally overwritten
2210113	4	60	Mg+Ge	- || -
2210114	4	450	Mg+Ge	same position, current fell -> I ~ 1.5 nA

In final position of a chamber when opening its window we would hit a valve that separates main chamber and small input chamber

-> To be able to open our chamber we would tilt it a bit each time. After doing that we see on quartz that beam position moved a bit.

21.10.2022.

Beam: 2 MeV H^+

Focus: Me 16.2, Ox 34.8

Diffraction crystal: Beryl

Current on metal before measurement ~ 2.5 nA

Samples: Mg+Ge (1), MgB_2+Ge (3), NaCl (4)

FILE	t_{exp}/s	Nframes	SAMPLE	COMMENTS
2210115	4	1	MgB_2+Ge	Beryl at 11.6 cm, I ~ 2.5 nA
2210116	4	10	DARK	
2210117	4	150	MgB_2+Ge	- || -, current is not stable - varying between 1 - 2 nA
2210118	4	464	MgB_2+Ge	new position, current fell during the measurement so we stopped it
2210119	4	480	MgB_2+Ge	I ~ 1.7 nA, same position as previous
2210120	4	600	MgB_2+Ge	- || -

Before mounting new targets, we checked again if we can reach position 3 and 4. Now we can! -> probably while tilting chamber to open its door we moved it in a way to make this possible again

Samples changed: NaCl+Zn (1), Mg (2), $MgBr_2$+Ge (3), NaCl (4)
We only do preliminary measurements of NaCl+Zn, to see if we can catch what we want. Complete measurements will be done in November.

2210121	10	1	NaCl+Zn	Beryl at 10.6 cm, on point of the sample that does not shine; we recognize one low intensity line among background (similar to Mg compounds + Ge situation), but we are not sure if we see three lines (ZnLa, ZnLb and NaKa)
2210122	6	225	NaCl+Zn	I ~ 1.5 nA, spectrum analysed -> 3 peaks recognizible, but ZnLa peak is much higher than NaKa, also we want to move peaks a bit to the left of the spectrum
2210123	6	10	DARK	
2210124	6	1	NaCl+Zn	Beryl at 10.8 cm
2210125	6	115	NaCl+Zn	- || -, I ~ 1.25 nA; from spectrum we only see Zn peaks
2210126	6	115	NaCl+Zn	new position on sample -> where we barely see light, I ~ 2 nA; spectrum looks ok, maybe Zn is still a bit too high
2210127	6	115	NaCl+Zn	nes position on sample -> bright position, I ~ 1.2 nA; in spectrum we see only Na peaks;
2210128	6	1	$MgBr_2$+Ge	Beryl at 11.6 cm, I ~ 2 nA
2210129	6	10	DARK	
2210130	6	54	$MgBr_2$+Ge	- || -, from spectrum we see only Ge peaks -> moving to higher energies
2210131	4	40	$MgBr_2$+Ge	right position of a crystal; on position on sample that does not shine -> in spectrum GeLa is too high
2210132	4	40	$MgBr_2$+Ge	I ~ 2 nA, on position of sample that shines with low intensity -> we are satisfied with the spectrum and staying on this position
2210133	4	10	DARK	
2210134	4	600	$MgBr_2$+Ge	I ~ 1.8 nA, good position
2210135	4	600	$MgBr_2$+Ge	- || -

From Mauri's code GUI Crystal: Width of window in which NaKa line should be visible is cca 8 mm.