

November 9, 2021

Sample alignment for reflectivity, GISAXS, RSMs, ..., using Pilatus detector

1. Set  $\theta$  motor to zero (sample horizontal) by typing: "umv th 0"
2. Mount new sample
3. Rename Pilatus image file by typing: "pmask MYSAMPLENAME"
4. We will look at IOC3 counts (ion chamber #3)
5. Make sure that the detector arm is away from 0 degree, it should be at 40 degree or more. For example, type "umv tth 40"
6. Remove filters, for example type: "pfilter 0"
7. We will now align the sample, the goal is to have it at the beam height and with its surface parallel to the beam.
8. We will scan the sample height by typing: "lup z -1 1 40 1"
9. Look at the scan in the program PyMCA with x axis "z" and y axis "IOC3"
10. Find the inflection point where the sample cuts half the beam. Find the value XX of z (sample height) at this point. We will move z to this value XX by typing: umv z XX
11. We will rock the sample to make it parallel to the beam by typing: lup th -1 1 40 1
12. Look in PyMCA with x axis "th" and y axis "IOC3"
13. The curve should look as a triangle. Find the  $\theta$  value XX for the tip of the triangle. Move  $\theta$  to that position XX by typing: umv th XX. We will tell the program that this value is zero by typing: set th 0
14. We will repeat the sample height scan and rocking scans, steps from 5 to 10, until there are no more variations.
15. Take a snapshot by typing ct in SPEC and looking at the image in the BXDS calculator
16. We will move tth and  $\theta$  to 0.5 and 0.25 by typing: uan 0.5 0.25
17. We will take an image by typing ct and looking the image in the BXDS Calculator
18. Find a feature in the detector image, find the x pixel value for this pixel, for example 261. We need to take this feature to the center of the detector, this is, pixel 243. We will find the distance in pixels from the center to the feature position.  $261 - 243$ . This difference, divided by the pixel per degree calibration, is the amount in degree that we need to move tth to have this feature centered in the detector. Move tth by this amount, take another image by typing ct, confirm that the feature is at the center of the detector, this is, at pixel 243. Find the position of tth by typing wa in SPEC. We will make  $\theta$  half of the tth value XX by typing set th XX. We are now in the specular condition and ready to measure.