**Bruker**

**General notes:**

* Bruker support email: [mburleson@wcu.edu](mailto:mburleson@wcu.edu)
* Bruker support password: Catamounts1
* Chamber pulls out horizontally from front of instrument
* There are windowless detectors - An EDS detector that does not use a window material for preventing contaminants onto its detector element. Flatquad is windowless but Xflash is not.
* Lower voltages are used for lighter elements to prevent charging – would cause a continuous drift
* Save to D drive!!
* Working distances can be found within the documentation of each detector:
  + Flatquad is 10
  + XFlash is 8.5
* The larger the crystal of the detector means larger X-ray counts
* All windows must have the same credentials
* Red light on the box to the right means the FlatQUAD is warm

Graphical user interface

Description automatically generated

* The SCU box must remain on

A picture containing text, electronics, computer

Description automatically generated

* The computer should be shutdown (not restarted) once a week. Bruker computer is second from the right
* Software is Esprite 2.5. Username and password are “edx”
* The FlatQuad has a switch on top that should ALWAYS be checked prior to use. The default is 20. The others depend on sample and the accelerating voltage.

**Detectors:**

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Description automatically generated

* If using a lower accelerating voltage, **change the voltage in Thermo’s software first**, then change the switch on top of the flat quad. Be sure this is returned to 20 when finished.
* Bruker software goes left to right at the top panes
* Scan is where to setup window for processing on Bruker end
* Frame scan is 16 by default. Resolution is set to 1000 with everything else kept at 16
  + Resolution can be adjusted to 10x75 but results in a very pixelated image. Therefore, 1000 is the default
* Channel 1 is BSE
* Throughput is dependent on beam current, and default is 30
* When looking at detector throughput, maximum energy (energy range) (keV) is the x-axis, which is twenty by default.
* Always leave mode as normal operation
* Cooling should always be at thermostat. Readback will go from on to ok when ready. When the software is closed, the detector will start warming back up
* Shutdown CCD when not in use on Thermo side!
* Always load Thermo’s software first, then Bruker’s, and check for communication. If there is no communication, check system settings on Bruker end. Password and username are “Supervisor” for Thermo.
* Windows password is “supervisor” for Bruker
* Under acquire the automatic setting will be 50k counts but won’t allow proper post-analysis. So, leave it as precise and after acquisition for quant.
  + The other options are fast and exhaustive. Fast is not enough to fully post process.
  + Automatic quantification is standardless quantification. It’s recommended to use after acquisition.
  + Under multiple detectors, we have to use **single spectrum (always).**
  + Cycling is used when you want to do something to your sample, such as freezing, to see what changes. It’s not commonly used.
  + After measurement we want all options selected.
* Put indicator on center of peak then finder
* Objects will be where we can include image – leave at single for image
  + First want to preview to capture image from microscope
  + Under capture, leave it as single for capture parameters
  + Using measurement points, you can choose different shapes and points.
  + Select as many as you’d like, but make sure to use the select all option to have each point selected measured. Each data point will be labeled as “Spectrum…”
* Line profile should always include an updated image with preview and then capture function
* Mapping – Acquire – map area = full. You can change to manual for a single map
  + To set this up, go to acquire, map area, and select full (repeated for clarity)
  + Preview to get a snapshot first!
  + Then capture, leave at single
  + Map time should be set to manual – now we’re collecting a map and we don’t know how long with our counts how long it will take. You can’t add until the end after to repeat
  + Acquire single maps only
  + Click Acquire
  + You can choose which elements are included by using the periodic table to the top right in the software
* All other detectors should be parked before moving the FlatQuad in – FQ is good to remove shadowing effects seen in the regular EDS
* Flatquad use must have XFlash parked first
* You click the FQ to initialize it
* Change from standby to normal operation under vacuum only
  + Be sure to set thermostat operation on FQ
  + Cool it before moving the detector elements in
* Automatic calibration of Cu – select copper then all under settings
* When calibrating, we look for the 0 and K lines of Cu.
* You want to operate at least 1.5x the voltages for the lines you are assessing. For example, Cu’s K-line is ~8 so you’d need 12 (20) accelerating voltage minimum
* To test for resolution, we use Mn
* To test the lower resolution:
  + Click current to fetch the settings from the detector (reads what the software is set for). We want 30k CPS and 20 kEV
  + Click test for Mn Kα FWHM
  + The peak should be ~129