# XPS2 Sample Heating Operating Procedure

Using the stage connections of the Nexsa G2 system, the NX heater module uses MEMS chip technology to provide rapid heating of samples in the analysis chamber. The NX-Heater provides sample temperature control from 25C to 800C.

## Help Resources

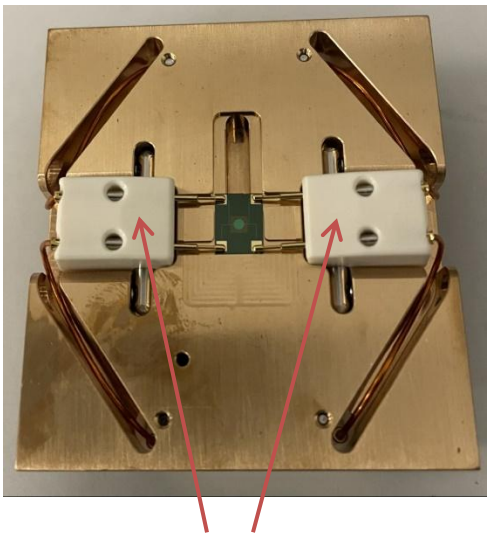
XPS knowledge viewer – XPS Experimentation (Page 4) – Optional Modules – NX Heater Module

Nexsa G2 User Manual (Page 136) provided by Thermo Scientific is located in the Manuals folder on the desktop

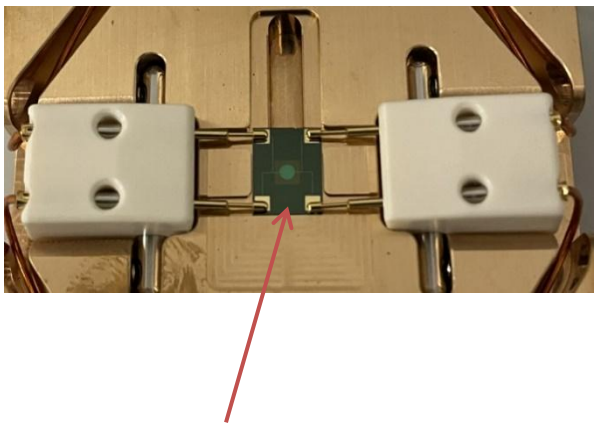
## Sample Loading

*It is helpful to use the stereo microscope in the Sample Prep lab for sample loading*

1. Load the MEMS chip onto the NX heater block (if not already present). *See video in XPS knowledge viewer and page 138 in Nexsa G2 user manual*
   ***Warning: The center of the MEMS chip is a membrane and is fragile***
   a. Depress the two spring-loaded contact pins and hold open
   b. Slide the MEMS heater chip into the recess between the two sets of depressed pins. See photo below for correct orientation.
   c. Make sure that the pins are on the contact pads of the chip, and that the chip is secured.

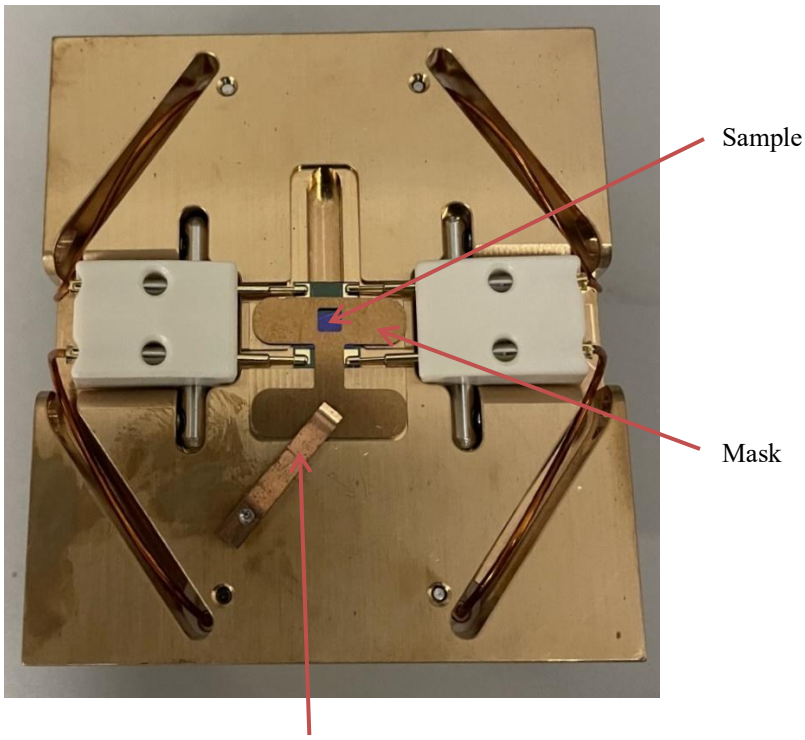


Spring loaded contact pins

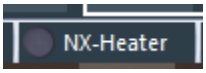


MEMS heater chip

2. Load the sample on top of the MEMS chip. The sample needs to be sized so that it fits over the MEMS chip but doesn't contact the contact pins.
3. Select the desired analytical view using one of the two provided mask sizes and place the mask over the top of the sample and the MEMS chip.
4. Replace the spring clip arm over the edge of the mask to hold the mask in place.




5. Load the sample heating module onto the XPS stage (with larger bottom hole facing the analysis chamber), and after pump down, transfer into the analysis chamber.
6. Test the electrical connection of the heater
    a. Open the NX-Heater control by clicking on the NX-Heater box at the bottom of the Avantage window



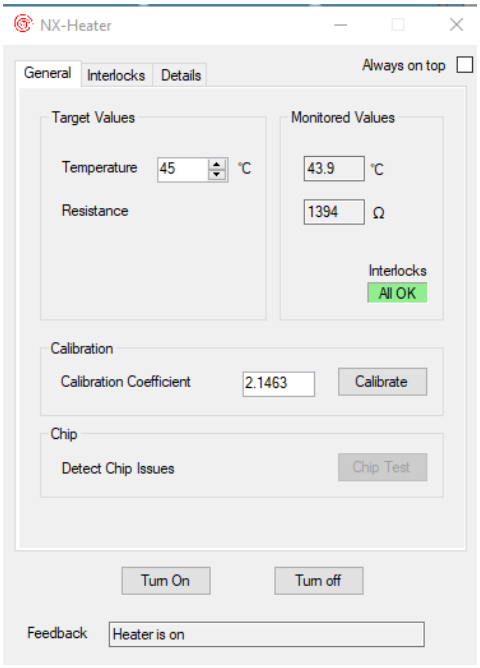

    b. Click the "Chip Test" button. A message in the Feedback window should read "No Chip Errors Detected". If a server error is displayed, restart the Avantage software and try again.

# Data Collection

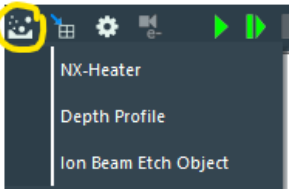
The sample temperature can either be set manually or controlled as part of an Experiment.

<u>To set the temperature manually</u>

- Open the NX-Heater control by clicking on the NX-Heater box at the bottom of the Avantage window.
- In the General tab, set the temperature value and then click "Turn On". The Feedback window should display "Heater is on" and the monitored temperature value should reach the input temperature value.
- You can then create and run an experiment, and the data will be collected with the temperature at this value.

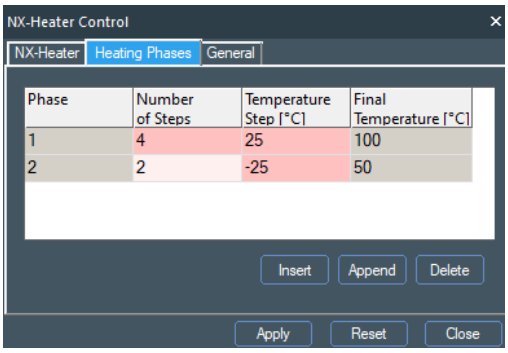



<u>To control the temperature as part of an XPS experiment</u>

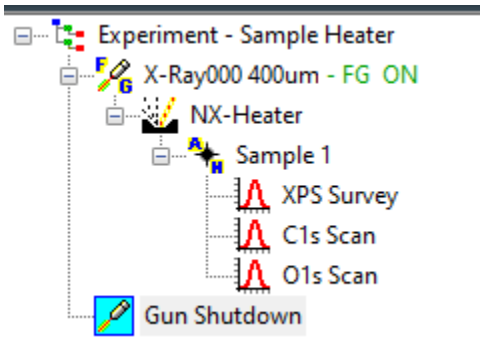



1. Go to the Experiment tab and create an Experiment and set the Main folder where the data will be stored
2. Select the X-Ray source and set the desired Spot Size
3. Select the Profile icon and click on NX-Heater from the pull down menu
4. The NX-Heater object provides the option to autonomously heat a sample in discrete steps, up to a given temperature. This function can be controlled in the Heating Phases tab of the NX-Heater properties panel, which allows the user to define the temperature and number of heating steps.

   In the example on the right, Phase 1 heats the sample up to 100C in 4 steps of 25C, while Phase 2 cools the sample back down to 50C in 2 steps of 25C.




5. Add a point location and the desired scans to the experiment. The Avantage software will repeat the scans for each temperature step.




Experiment using the Sample Heater Module

6. Run the experiment. You can open the NX-Heater control window to monitor the heater status and temperature as the experiment proceeds.