

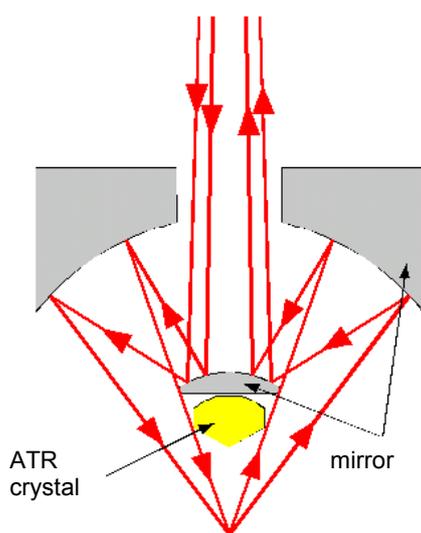
Operating instructions and adjustment procedure of the ATR-objective 20x

1. Packing list

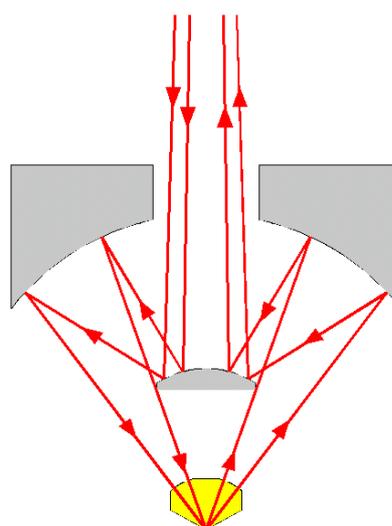
- 1.1 20x ATR-objective
- 1.2 Adjustment hex wrench
- 1.3 Transparent polymer ring for positioning the ATR-crystal in focus for the reference measurement

2. Specifications of the ATR-objective:

- 2.1.1 20x mirror objective
- 2.1.2 Working distance: 6mm
- 2.1.3 Numerical aperture: 0.6
- 2.1.4 ATR-crystal-material: Germanium
- 2.1.5 Pressure: 5 pressure modes: 0.5N-8 Newton
- 2.1.6 In Focus LED
- 2.1.7 Size of the tip of the Germanium-crystal (ca. $\varnothing 100\mu\text{m}$)
- 2.1.8 Beampath: see below



Visual mode
(crystal in upper position)



Measurement mode
(crystal pulled down)

3. Operating instructions:

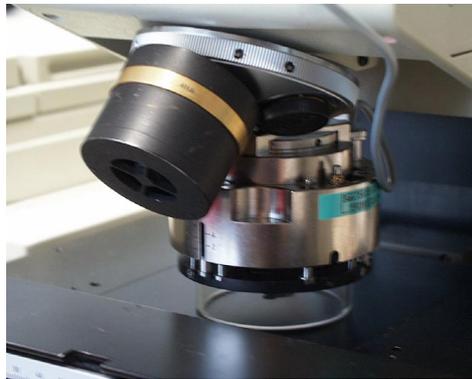
3.1 Surveying the sample defining the measurement spot

- 3.1.1. To be able to view sample the crystal has to be in the visual mode. This means that the crystal holder has to be lifted into the upper position.
- 3.1.2. Define the aperture size if the measurement spot is smaller than $\varnothing 100\mu\text{m}$.

3.2 Reference measurement

For the reference measurement a single beam spectra of the crystal (without touching the sample) For this measurement the ATR crystal has to be in measurement position. For

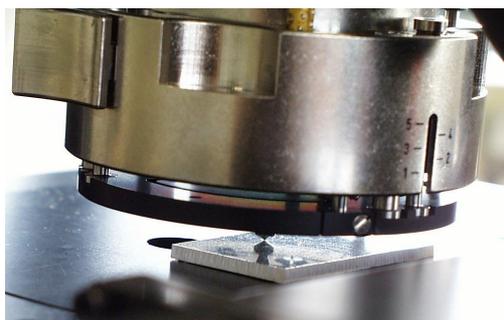
- 3.2.1. To perform the reference measurement first lower the sample stage.
- 3.2.2. Then pull down carefully the crystal holder whereas the crystal should not touch the stage.
- 3.2.3. Now the crystal is a little bit beneath the focus position. To lift it into the focus position you can use the polymer ring (part of delivery). You can also use any other object which is high enough to prevent the crystal hitting the stage.



- 3.2.4. Lift the stage until the LED light is switching to green and you are hearing a beep. With the fine adjustment wheel turn a little bit backwards until the LED is switching to red again and then forward again until it is changing to green. The green light appears briefly when the crystal reaches the focus. The LED switch is working under a hysteresis and therefore the stage always has to be moved from the bottom to the top.

3.3 Sample measurement

- 3.3.1. Lift the crystal holder of the ATR objective and lower the x,y-stage.
- 3.3.2. Put your sample onto your stage.
- 3.3.3. Pull down the crystal carefully. The stage has to be low enough that the sample is not touching the crystal.
- 3.3.4. Lift the stage cautiously until the sample on the stage touching the tip of the ATR-crystal.



- 3.3.5 Lift the stage further until the crystal getting into the focus-position and the green light appears. (details see reference measurement)
- 3.3.6 Start the measurement.

4.0 Remarks

- 4.1 Reference and sample must always be measured under the same conditions e.g. same aperture size...
- 4.2 It is recommended to check the signal in align mode before you starting the reference measurement. By observing the signal in real time one can see how much light the sample is absorbing or if the crystal may have been damaged (then the ATR signal is smaller) In case the signal is less than half of the signal which was recorded when the ATR-objective had been installed initially it is advisable to record a 100%-line and to check the signal-to-noise.
- 4.3 For all ATR-measurements it is helpful to use the OPUS-function “display single scans before measurement”.

5.0 Adjustment of the ATR-objective

The adjustment of the ATR-Objective consists of two steps:

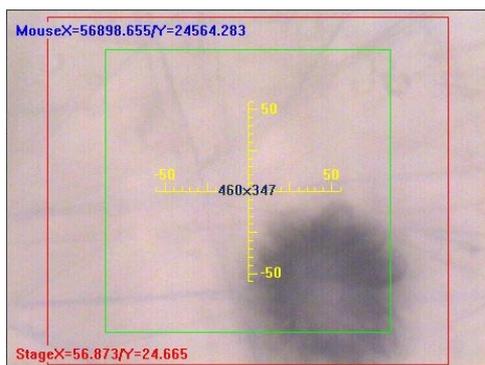
- *Adjustment of the Germanium crystal into the center of the objective*
- *Adjustment the height of the Germanium crystal*

5.1 Adjustment of the ATR crystal to the center

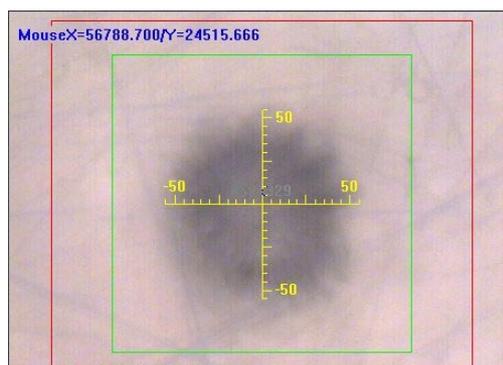
For optimum performance of the objective, the crystal should be centered.

Put two stripes of self adhesive tape on top of each other onto a gold mirror. Lower the crystal onto the tape. The tip of the crystal should give an impression in the center of the crosshair. If the crystal is not centered, use the special hex wrench adjustment tool that is delivered with the ATR-objective. First loosen the three screws at the bottom side of the crystal holder a little bit. To do this lower the stage and rotate the nosepiece with the ATR-objective to the front in order to be able to access to the bottom of the plate with the ATR crystal. **Pay attention not to damage the crystal when turning the nosepiece!!!!**) There are two holes on the outside of the lower plate in which the crystal is fixed. Use the hex wrench inside the corresponding socket screws inside the two holes to move the crystal in x and y direction within the plate.

Repeat the test with the impression of the self adhesive tape until the impression is in the center of the crosshair.



bad



good

Now fix the three screws on the bottom of the plate again. **Pay attention not to damage the crystal when turning the nosepiece!!!!**

5.2 Adjustment of the height of the ATR crystal connected to the FOCUS switch

With the same hex wrench of the microscope you can optimize the height of the crystal in ATR-measurement mode. First lower the stage. With OPUS select align mode, then pull down the plate with the crystal into the first pressure mode. **Pay attention that the crystal does not hit the table!** Now the crystal should be below the focus of the 20x objective. Put the plastic ring (part of delivery) onto the sample stage beneath the ATR-objective and press the crystal into the focus position by moving the stage upwards until the red light is switching to green and you can hear a beep. Check that you have maximum signal in align mode at the same time the red light of the FOCUS-switch on the front panel changes to green. If this is not the case you have to adjust the height of the plate with the crystal. To adjust it use the special hex wrench. At the top of the ATR-objective just beside the exit of the cable for the FOCUS-switch there is the adjustment screw. Just turn the wrench very little and check the signal repeating the procedure as above.



You have to have maximum signal to make the light change to green.

Now everything should be adjusted well and you can start the measurements as described above.

