



# Laboratory Refractometer—ATR-Series

## Solid sample measurement

With refractometers of ATR-series the refractive indices of solid samples can be measured. Naturally the accuracy of this method will be lower as with liquids, since a perfect contact to the measuring prism is difficult to achieve with solid state material. Since the only requirement for a successful refractive index measurement is a plane polished surface of optical quality and flatness guaranteeing for a good contact to the measuring sapphire prism.

In order to have reliable result please keep following parameter in mind:

- The sample must have a diameter of 10 mm (using ATR-ST the diameter can be more extensive)
- The thickness of the sample should not be less than 5 mm
- The measured surface must be flat and polished to optical quality. The rim and second surface should be fine ground. ( see sample glass )
- Keep the glass sample and prism surface extremely clean: even a fine dust particle will lead to a tilting of the sample surface causing different readings

Following steps will help to reach good result with solid state samples:

- Place a small drop of index matching liquid with high refractive index (delivered on demand) at the centre of the measurement prism. The diameter of the liquid should be app. 2 mm
- Press the cleaned surface of the sample against the liquid drop. Check that the full contact area is filled with the index matching liquid without air bubbles. Press the sample gently to remove possible air bubbles.
- Close the plastic flap of the sample room compartment. Wait for the temperature to be reached. Although solid samples like glass do have an temperature coefficient of around  $5 \cdot 10^{-6} / ^\circ\text{C}$  the temperature coefficient and viscosity of the index matching liquid is about 10 times higher and will change much faster with temperature.
- Also the thickness of the liquid contact layer does have an enormous influence on the reproducibility of measurements: for that reason the correct amount and temperature of index liquid are were important for measurement accuracy.
- Optical in-homogeneities along the surface of the sample will also lead to different results depending on the orientation of sample on the prism surface. In order to account for this effect rotate the sample each  $90^\circ$  and perform a measurement. The mean value of all those measurements should give acceptable results. Another possible reason for angle dependent result can be stress induced birefringence in the glass sample, which should be reduced by tempering.
- Remove the sample from the sample compartment and clean glass sample and prism surface thoroughly.
- Repeat the glass sample measurement another four times. If the instrument has been connected to a printer or a PC after completing all 5 measurements the mean value and standard deviation will be calculated automatically.