

REFRACTIVE INDEX MEASUREMENT SYSTEM



RI has been designed as a complete solution to forensic analysis of small glass splinters by the immersion method. The system was developed in tight cooperation with forensic specialists on glass analysis to provide precision, reproducibility, and high comfort of work with both hardware and software.

HIGHLIGHTS

- Sufficient objective working distance for easy replacement of slides
- Reproducibility of repeated measurements standard RI deviation under 0.00002
- Up to 20 resizable measurement probes
- Video recording of the measurement progress
- Remote passive connection to database for networked systems
- Software integrating hardware and measurement control with a complete set of image processing, analysis and measurement tools in a dedicated application layout
- User-friendly template-based reporting

SYSTEM PARTS

- High quality Nikon microscope with phase contrast optics
- Nikon long working distance phase contrast objective 10x
- Mettler hot stage with LIM RI controller
- Environmental conditions monitoring via meteo station
- 64-bit high performance PC with Windows 10
- 29" LCD monitor
- 2.3 MP monochrome camera connected to microscope (C-Mount adapter)

OPTIONS

- Microscope tilting head for easier work
- Camera relay lens 0.7x for larger field of view
- Nikon Stereomicroscope with side light for sample preparation
- Set of calibration glasses, interference filters (with manual filter changer), and silicone oil



METHOD DESCRIPTION

Small glass splinters are immersed in silicone oil and put inside the hot stage and under the microscope. Phase contrast optics guarantees high image contrast, live camera image enables fast image focusing. Then, the Becke line disappearance temperature is detected automatically and a video file of the heating and cooling phase of the measurement in the temperature interval is recorded. Up to 20 probes with changeable size and rotation can be placed to the image to define measurement



Measurement results window



Screenshot of the measurement (measurement probes)

positions. RI software uses a precise algorithm for refractive index determination to calculate resulting refractive index statistics based on probe positions. Refractive index can be re-measured using the recorded data without the necessity of repeating the heating and cooling phases. The results are saved to a structured database along with measurement details and environmental conditions. A chart for visual comparison of the case-related data is created.



Comparison of several measurements

SYSTEM STABILITY

Precision of measurements is ensured by calibration via glass standards. Long-term stability can be checked by periodic measurement of a glass standard (e.g. K5). The stability is then visualized in a stability graph plot.





