

Low-coherence Interferometry Solution for Precision Testing of
Center Thickness and Lens Material Identification



Our product groups

**Testing of optical
components**

MPO



**Assembly and testing of
lens systems**

MPO



**Testing of image
quality**

Image Quality



**Assembly and testing
of camera modules**

Automation



**Customer device
development**

Engineering



Non-contact measurement of center thickness



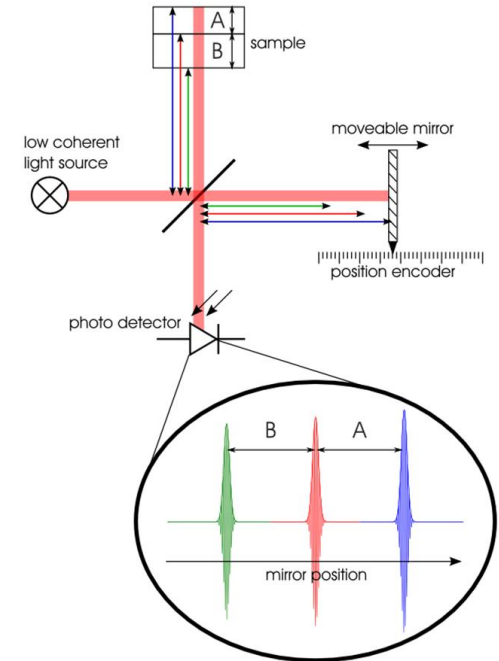
- Short coherent interferometric technique that measures the optical path length between optical surfaces
- Lens thickness of glasses can be calculated using the refractive index

$$\text{OPL} = d \cdot n_g$$

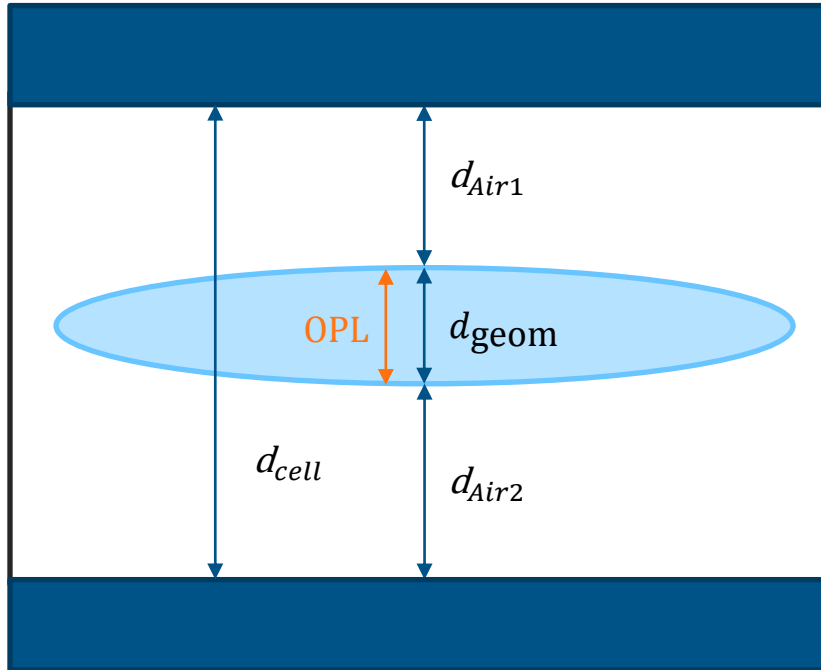
with **group** refractive index n_g

$$n_g(\lambda) = n(\lambda) - \lambda \frac{dn(\lambda)}{d\lambda}$$

- Knowledge about material properties essential for this technique



Non-contact CT measurement of unknown glasses



1. Measurement of the distance between the glass plates d_{cell}
2. Measurement of distances:
 - a. Top glass plate to top lens surface d_{Air1}
 - b. Bottom lens surface to bottom glass plate d_{Air2}
 - c. Lens surface 1 to lens surface 2 "OPL"

- Calculation of the lens thickness without material information:

$$d_{geom} = d_{cell} - d_{Air1} - d_{Air2}$$

- The group refractive index:

$$n_{group} = \frac{OPL}{d_{geom}}$$

- Inverse search of n_{group} to narrow down the material

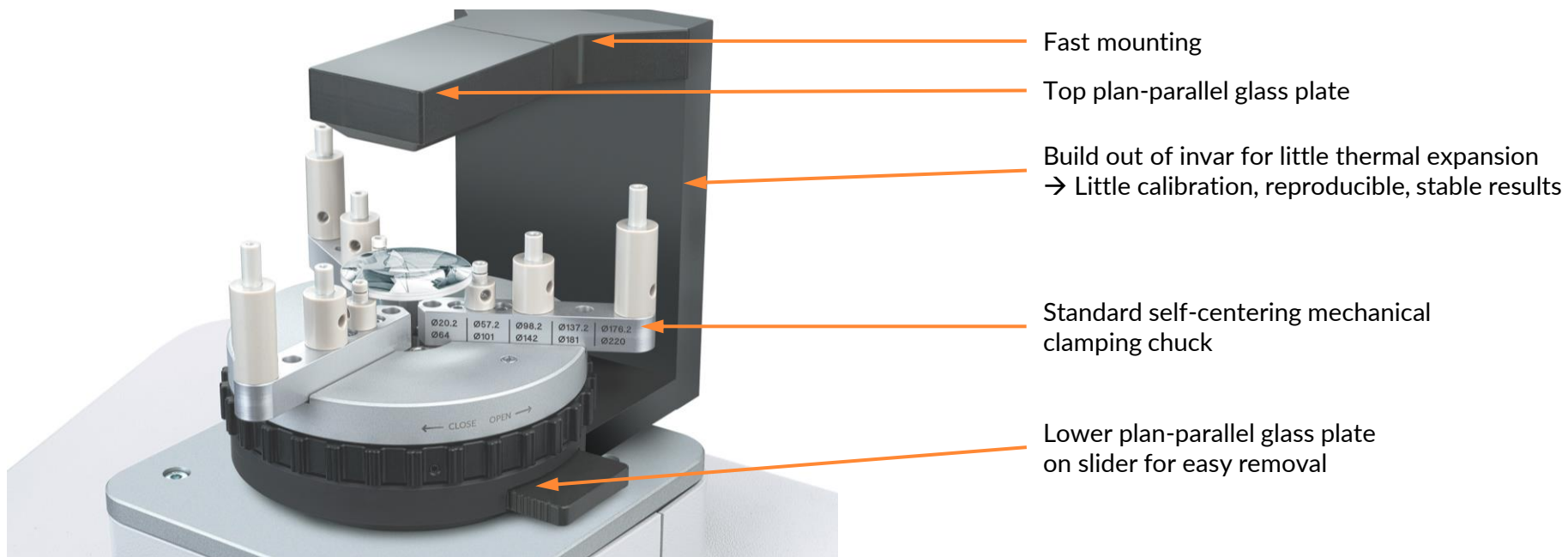
NEW: LensGage

The LensGage is used for:

- Determination of the lens thickness without knowledge of the material
 - Determination of the group refractive index
 - Usage for later OptiSurf® measurements when the objective lens is mounted
 - Quality inspection to secure a consistent group refractive index throughout batches
 - Determination of glass material
- Accessory for OptiSurf® and OptiSurf® LTM

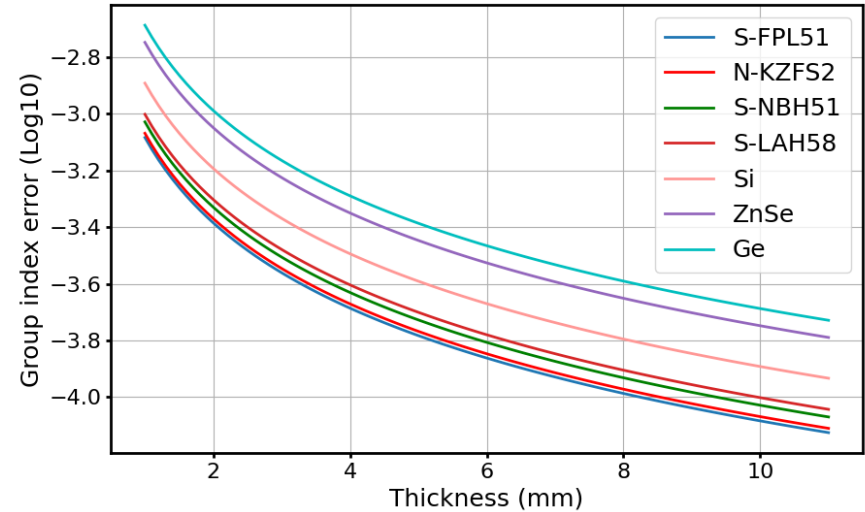


Set up



Non-contact CT measurement of unknown glasses

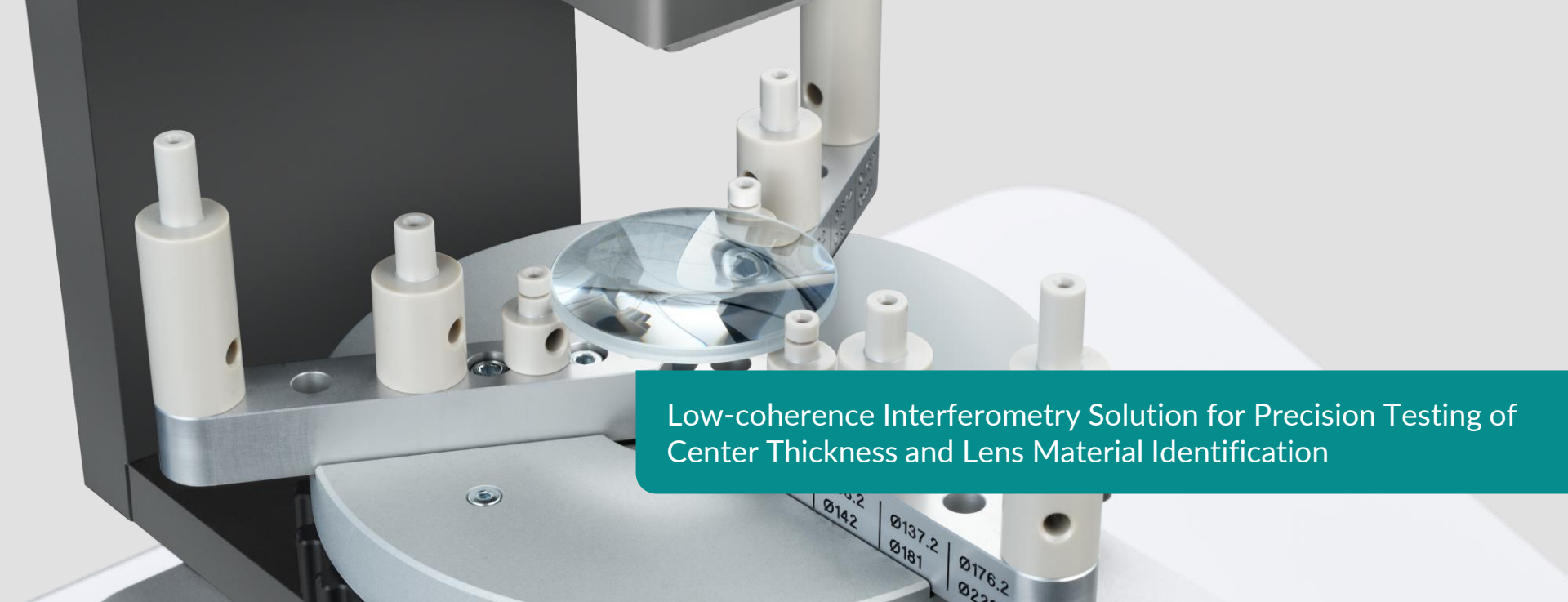
Material	Thickness [mm]	Group refractive index		Deviation
		Nominal	Measured	
S-LAH58	7.9265	1.878438	1.878415	0.00002
F_silica	5.0430	1.461648	1.461705	0.00006
N-KZFS2	10.9143	1.561912	1.562031	0.00012
S-FPL51	5.6865	1.497283	1.497406	0.00012
S-NBH51	1.0681	1.745795	1.746083	0.00029
S-LAH58	3.8951	1.878418	1.878833	0.00041



Technical data: OptiSurf® LensGage

	OptiSurf® „LensGage” Module
Max. Sample diameter	200 mm
Accuracy	$n_g: \sim 10^{-4}$ for $d_{geom} > 6$ mm $d_{geom}: 1.5 \mu\text{m}$
Measurement wavelength	1310 nm; spectral band width of 85 nm
Thickness range for LensGage module	Up to 55 mm optical thickness (larger on request)

This new approach is a very powerful tool to precisely test the center thickness of (unknown) lenses, to monitor refractive properties, and to identify the glass material of lenses



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