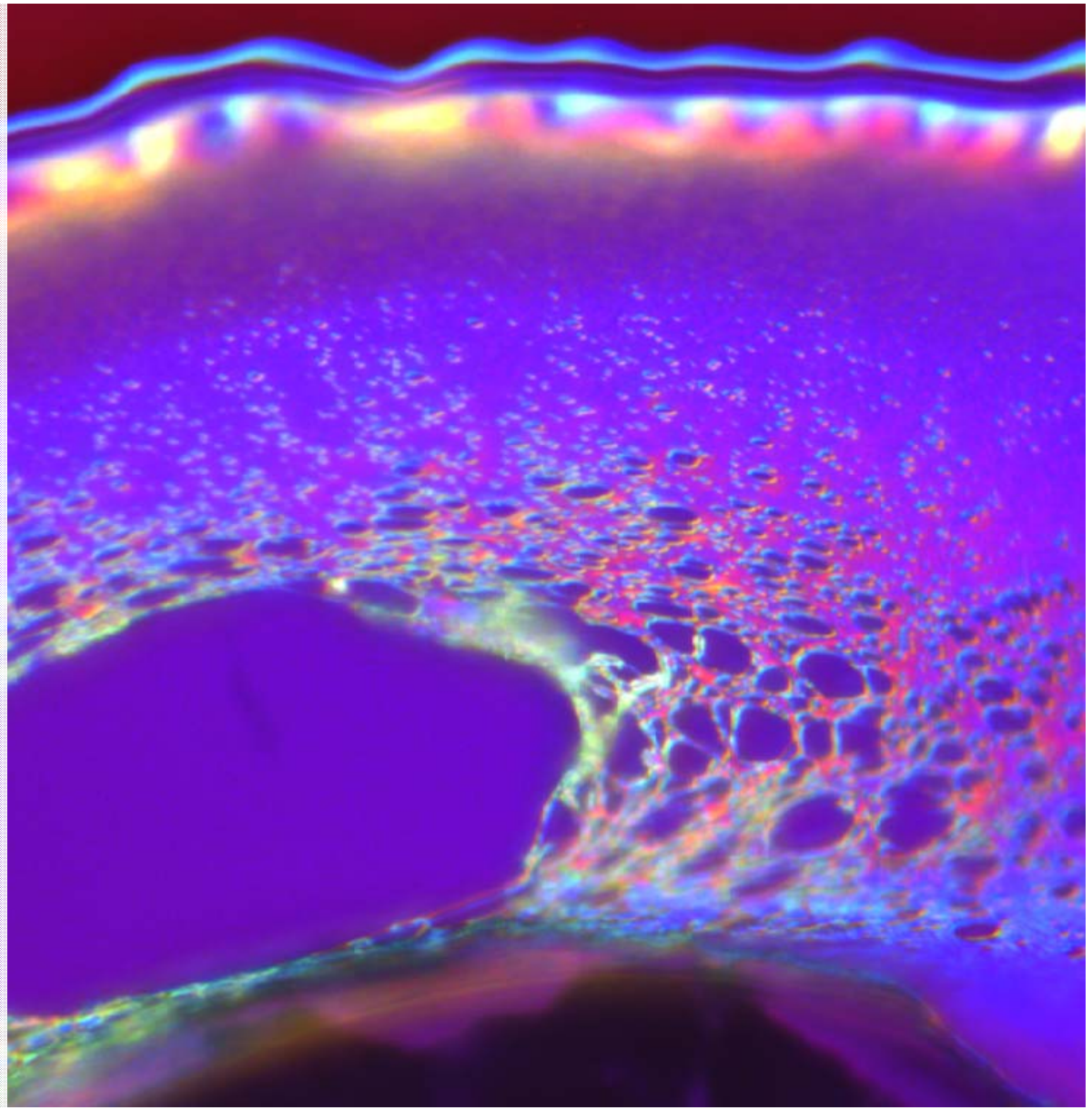
Activities at the RhySearch Optical Coating Lab



Dr. Roelene Botha

OCLA Workshop

Thursday, 9th June 2016

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Das Forschungs- und Innovationszentrum Rheintal

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RhySearch: The Rheintal Research and Innovation Centre

- Precision Manufacturing
- Packaging Technology
- **Coating Technology**

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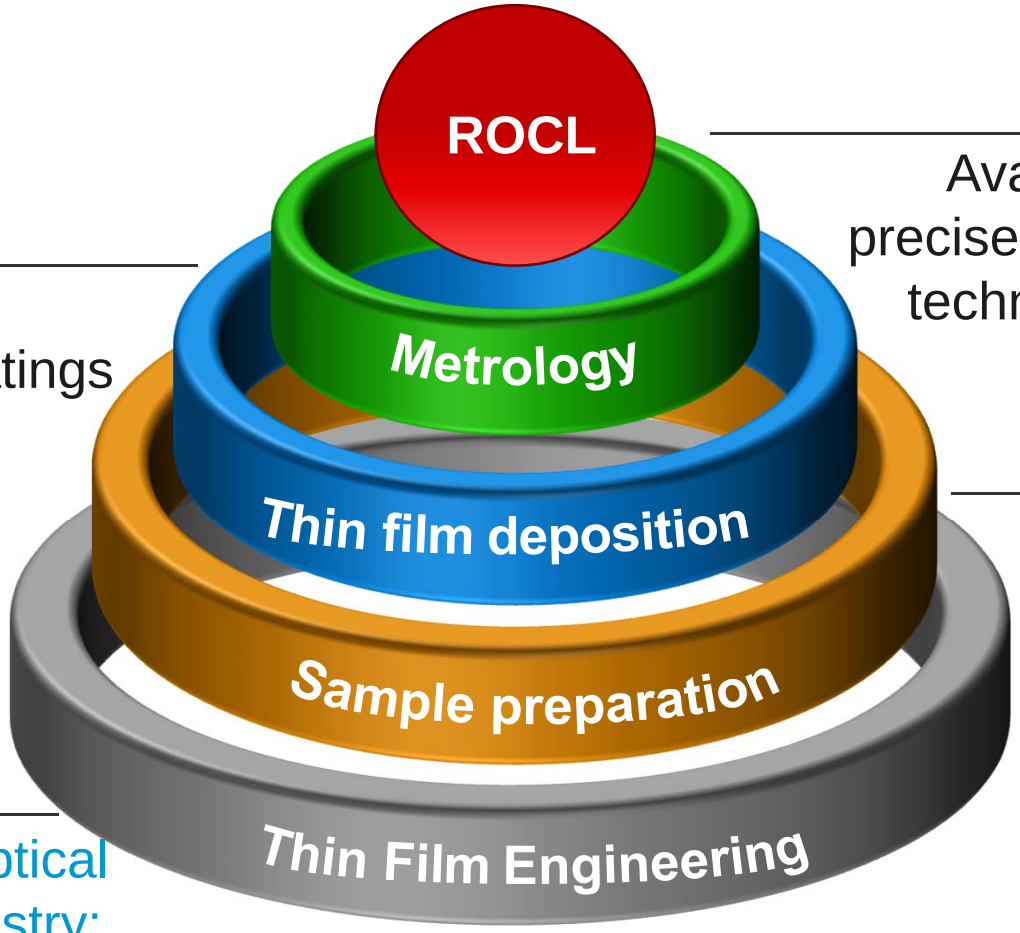
RhySearch Optical Coating Laboratory



Goal

Processes for:
low-loss optical coatings
High LIDT optical components

Goal

Availability of highly precise characterization techniques for optical components

Goal

Optimized surface preparation processes

Goal

Support regional optical manufacturing industry:

- R&D activities & consulting
- Training next generation talent

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RhySearch Optical Coating Laboratory: Analysis

- **Laser Damage Testing**
  - Available since Q3/2015
  - Laser-induced Damage Threshold according to ISO 21254
  - Long-term stability testing of laser component
- **Cavity Ring-Down Measurements**
  - Available from Q4/2016
- **Total Scattering**
  - Planned for Q1/2017

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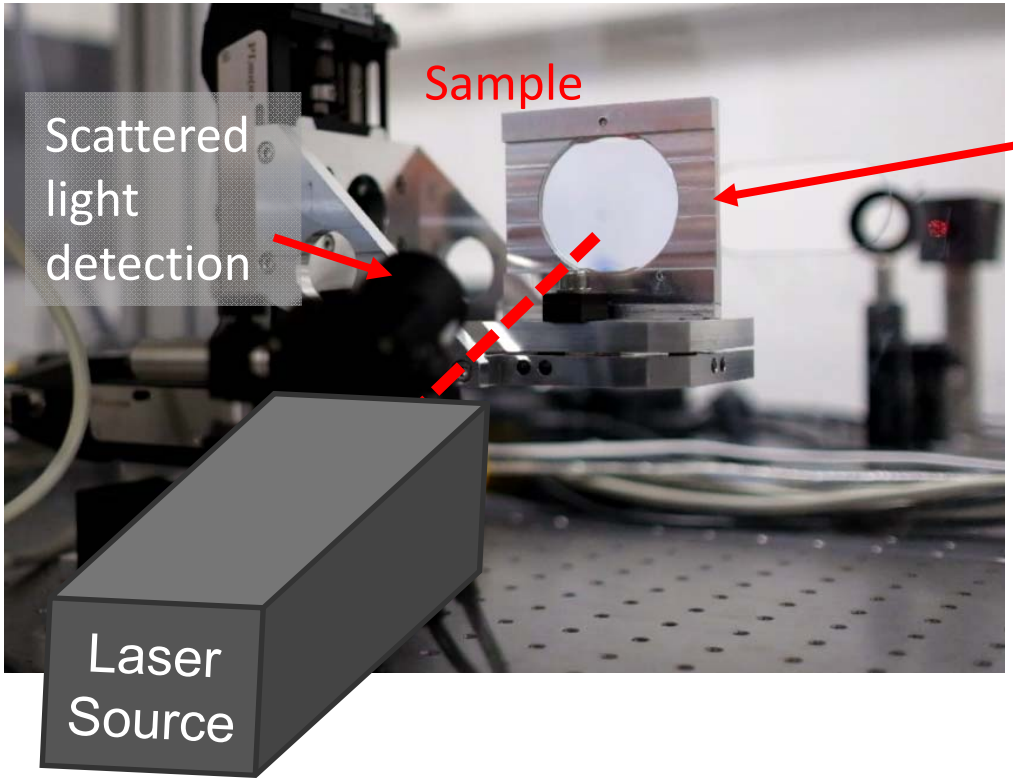
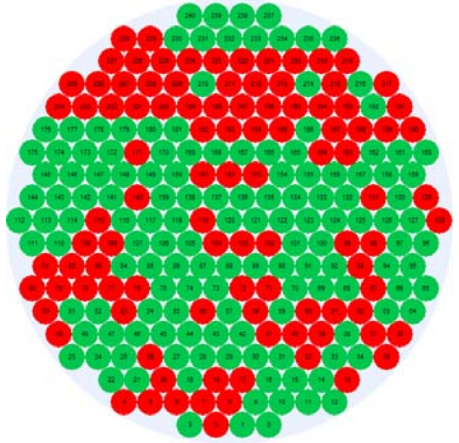
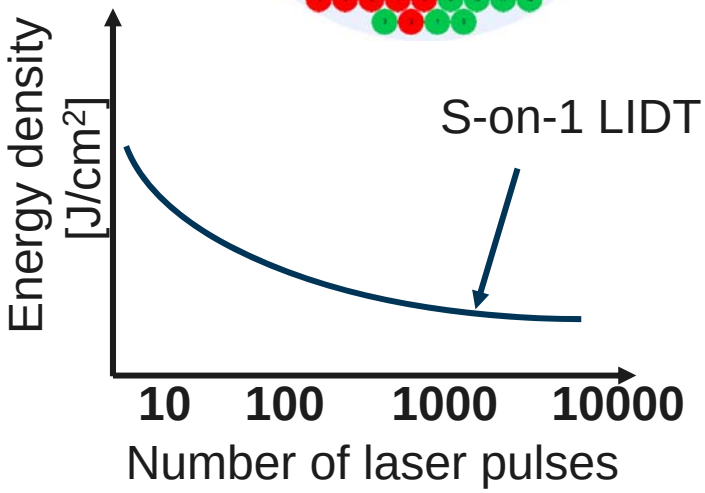
RhySearch Optical Coating Laboratory: Analysis

Laser Damage Testing







Work conducted as part of the CTI Project:
LIDT and Degradation Inspection Technique for Industrial Applications

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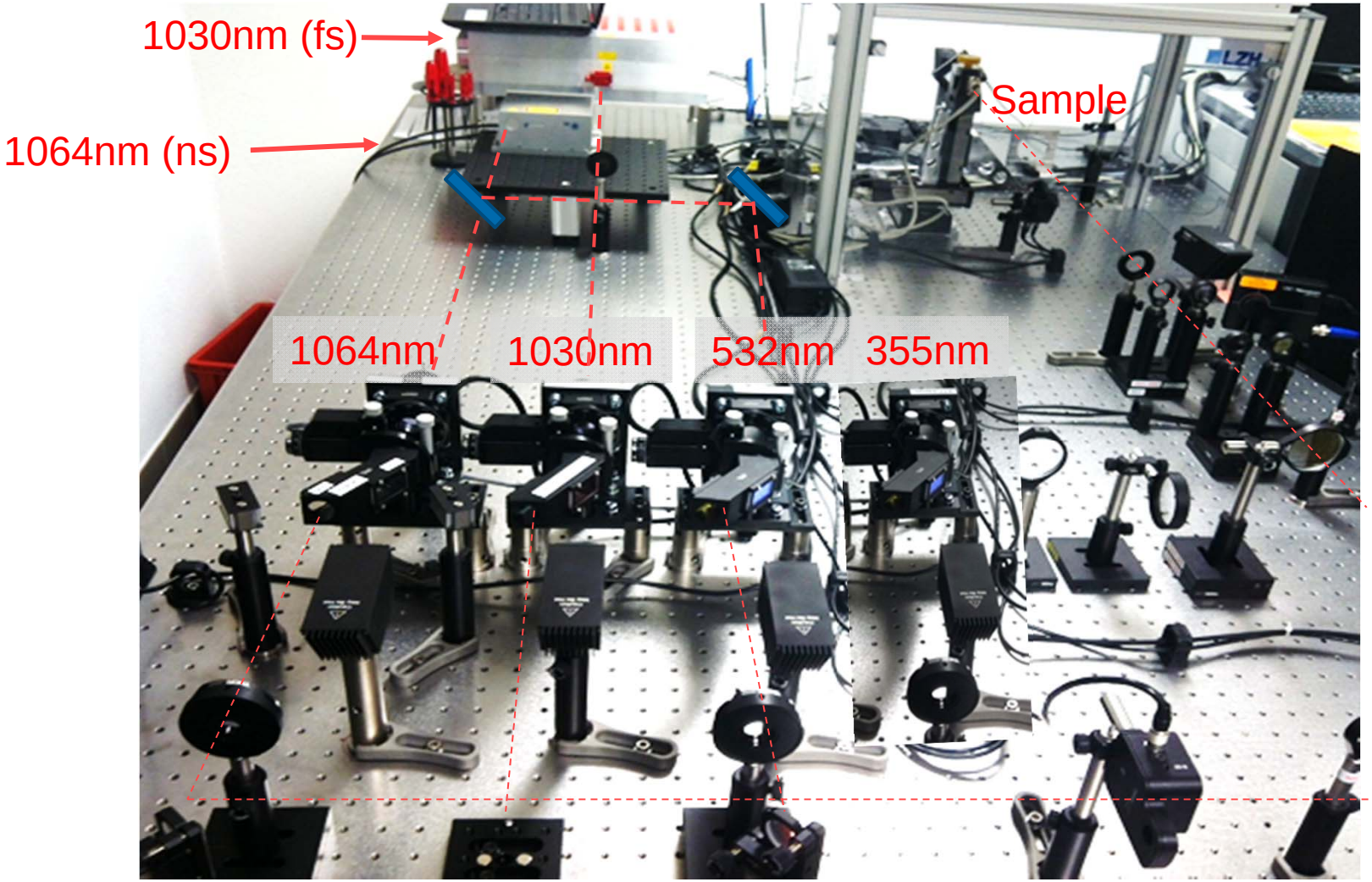
RhySearch Optical Coating Laboratory: Analysis

Laser Damage Testing



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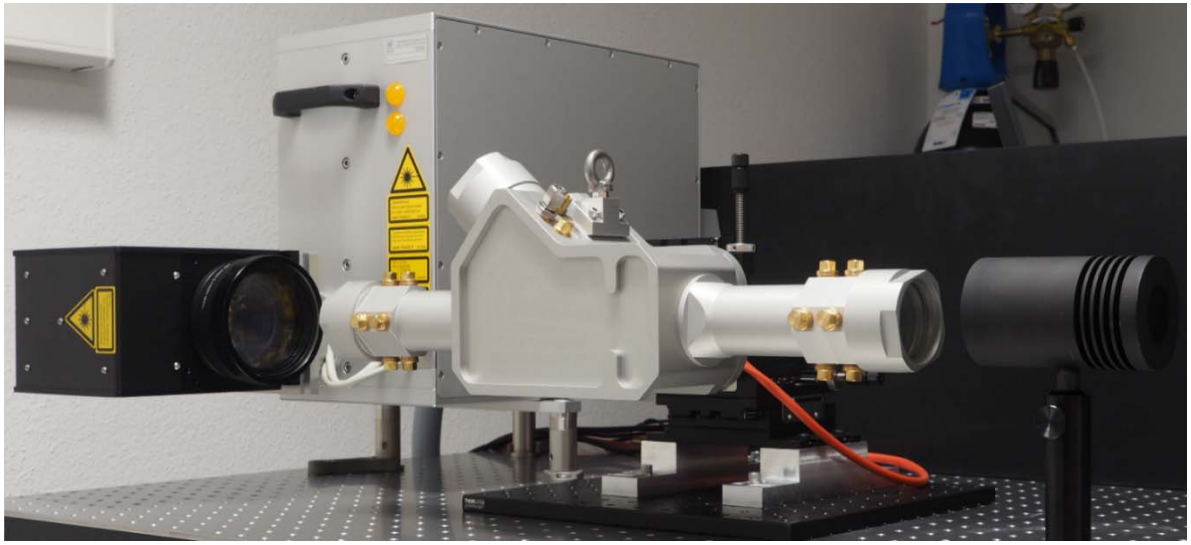
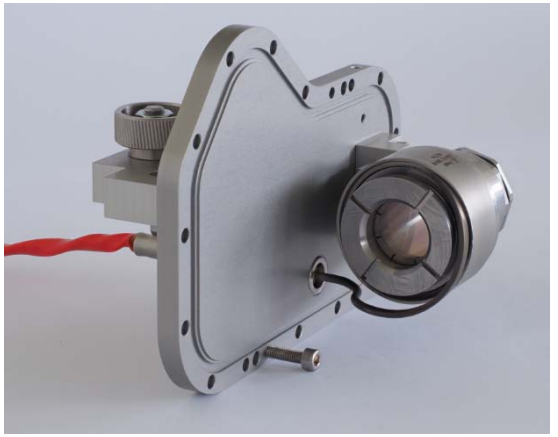
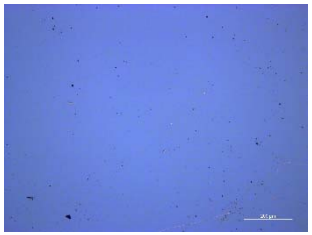
RhySearch Optical Coating Laboratory: Analysis

Long-term stability testing of laser component

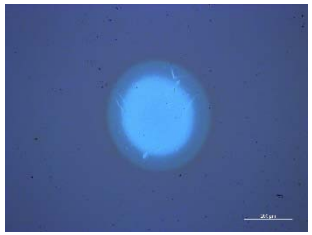




Example: Optical degradation in air at T = 108±8°C :



t=10 min



t=160 min

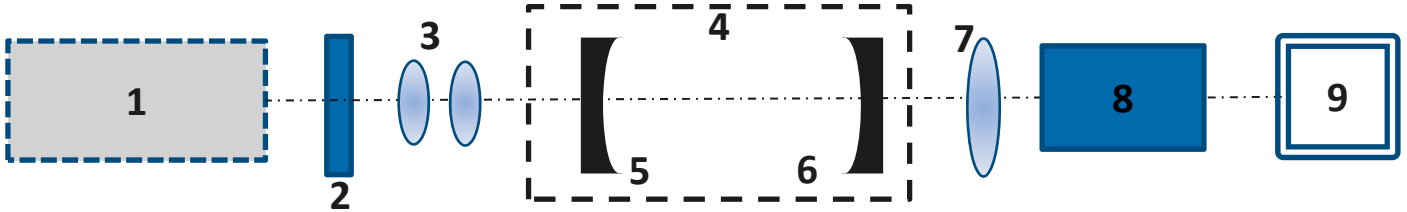
Work conducted as part of the CTI Project:
LIDT and Degradation Inspection Technique for Industrial Applications

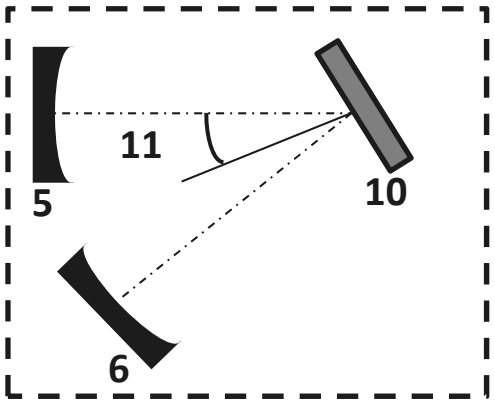
RhySearch Optical Coating Laboratory: Analysis

Cavity Ring-Down loss measurement system

- Measurement of total losses of an optical component

  Total Loss = Reflection losses + Absorption losses + Scatter losses





1 Laser
2 Polarizer
3 Mode-matching Optics (beam shaping lenses)
4 Initial cavity
5 Input cavity mirror (concave, highly reflective)
6 Output cavity mirror (concave, highly reflective)
7 Focusing lens
8 Photo-detector
9 Control and data-processing unit
10 Sample ((highly reflective)
11 Sample Angle of Incidence (AOI)

BS ISO 13142:2015

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RhySearch Optical Coating Laboratory: Analysis

Cavity Ring-Down loss measurement system

- Measurements at different angles of incidence: 0°, 12°, 30°, 45°
- Wavelengths: 638nm and 1064nm
- Sample size ø=1/2“and ø=1“
- Substrate thickness 4mm to 9 mm

Available from Q4/2016

RhySearch Optical Coating Laboratory: Coating Technology

Veeco Spector Dual Ion-Beam Sputter System

- Turn-Key Manufacturing for Precision Optical Thin Films
  - Ultra-low-loss laser mirrors
  - Absorption and scatter in the ppm levels
- High film purity
- Superior film thickness control
- Quest Optical Monitoring Software

Installation end 2016 in the new NTB cleanroom facilities

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RhySearch Optical Coating Laboratory: Sample Preparation

- *Critical step in component manufacturing*

- NTB Equipment:
  - Nomarski DIC-microscope
  - UV-VIS-NIR spectrophotometer
  - Ellipsometer
  - White light interferometer / Confocal profilometer
  - Atomic Force Microscope
  - MS deposition system
  - E-Beam evaporator
  - PECVD deposition system
  - …

NTB
Interstaatliche Hochschule für Technik Buchs
FHO Fachhochschule Ostschweiz

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RhySearch Optical Coating Laboratory: Next Steps

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RhySearch Optical Coating Laboratory: Our Team

Dr. Richard Quaderer
CEO

Bärbel Selm
Project Manager
Innovation

Dr. Thomas Gischkat
Technical Project Manager
Optical Coating

Valerie Oesch
Executive Assistant

Dr. Roelene Botha
Technical Project Manager
Optical Coating

Igor Stevanovic
Doctoral Student
Starting July 2016

We are looking for a…

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Head of the Optical Coatings lab

- We expect
  - In-depth knowledge of Optical Coatings
  - Several years of professional experience
  - Good track record in project generation

- We offer
  - Exciting opportunity in a great environment
  - Opportunity to shape the further development of the Optical Coatings lab
  - A dynamic and motivated team

- Contact info
  - richard.quaderer@rhysearch.ch

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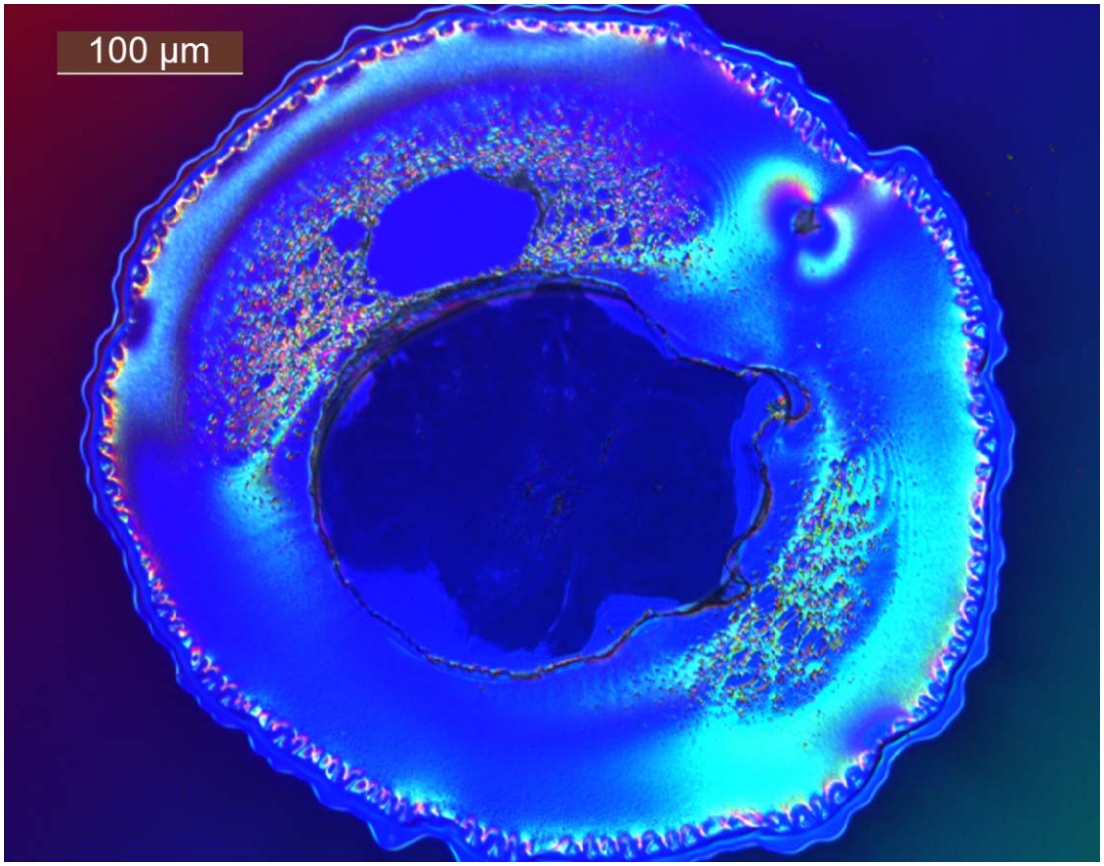
RhySearch Optical Coating Laboratory: Lab Visit



Room 1911 (Basement, below foyer)