Activities at the RhySearch Optical Coating Lab

Dr. Roelene Botha
OCLA Workshop
Thursday, 9th June 2016
RhySearch: The Rheintal Research and Innovation Centre

- Precision Manufacturing
- Packaging Technology
- Coating Technology
RhySearch Optical Coating Laboratory

**Goal**
Support regional optical manufacturing industry:
- R&D activities & consulting
- Training next generation talent

**Goal**
Availability of highly precise characterization techniques for optical components

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

**Goal**
Optimized surface preparation processes
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
RhySearch Optical Coating Laboratory: Analysis

Laser Damage Testing

Work conducted as part of the CTI Project:
LIDT and Degradation Inspection Technique for Industrial Applications
RhySearch Optical Coating Laboratory: Analysis

*Laser Damage Testing*

1030nm (fs)

1064nm (ns)

Sample

1064nm

1030nm

532nm

355nm
RhySearch Optical Coating Laboratory: Analysis

*Long-term stability testing of laser component*

Example: Optical degradation in air at $T = 108\pm8^\circ C$:

*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
  \[ \text{Total Loss} = \text{Reflection losses} + \text{Absorption losses} + \text{Scatter losses} \]

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
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

www.leibniz-ipht.de

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
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
  - …
RhySearch Optical Coating Laboratory: Next Steps
RhySearch Optical Coating Laboratory: Our Team

Dr. Richard Quaderer  
CEO

Dr. Thomas Gischkat  
Technical Project Manager  
Optical Coating

Bärbel Selm  
Project Manager  
Innovation

Valerie Oesch  
Executive Assistant

Dr. Roelene Botha  
Technical Project Manager  
Optical Coating

Igor Stevanovic  
Doctoral Student  
Starting July 2016
We are looking for a...

**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**
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RhySearch Optical Coating Laboratory: Lab Visit

Room 1911 (Basement, below foyer)