

Ultraprecision machining and optical coatings for high-end applications

Contact details:

Dr. Thomas Liebrich

+41 81 755 49 62

thomas.liebrich@rhysearch.ch

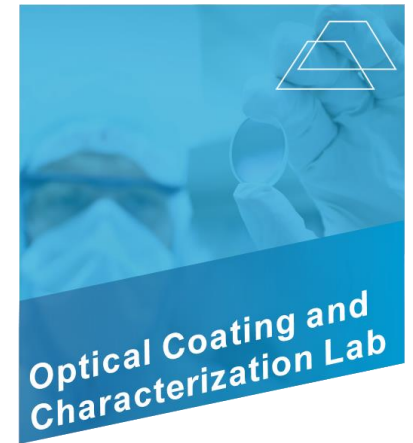
www.rhysearch.ch

Who we are and what we do

- Public-funded research institute in the Alpine Rhine Valley
 - Supporting bodies: Canton of St. Gallen and Principality of Liechtenstein
 - 25 employees (May 2023)
 - Eligible for Innosuisse funding
- Applied R&D with unique infrastructure and knowhow
 - Optical Coatings and Characterization
 - Ultra-Precision Manufacturing

RhySearch: Innovation projects

Basic Research => Applied R&D => Scaling => Market success



Knowledge and technology transfer at RhySearch

Innovation projects

In the year 2022, 11 Innosuisse projects, 7 innovation cheques and 8 projects financed by private foundations were carried out.

Professionals

International team from 10 countries. 2 dissertations completed in 2022.

Publications

In 2022, 6 publications and 2 posters were published about the research in RhySearch.



Events and workshops

In 2022, the RhySearch team gave 14 presentations at its own events and external conferences.

IPI Search

As a partner of the Swiss Federal Institute of Intellectual Property, RhySearch offers assistance with guided patent searches.

Partnerships with other research groups

The research projects are carried out in close cooperation with research partners from Switzerland, Liechtenstein and Vorarlberg.

Our project partners from the industry (selection)



Our cooperation and research partners



Zürcher Hochschule
für Angewandte Wissenschaften



Optical Coating and Characterization Lab

- Innovative solutions along the optical production chain
 - Substrate preparation and cleaning
 - Coating: Development of dielectric materials with novel optical properties
 - Research on the industrialization of new coating technologies for the optical industry
 - Quality control using high-precision characterization methods

RhySearch is the Swiss and Liechtenstein competence centre for optical coatings and characterization

- Expert know-how and cutting-edge infrastructure
- Wide range of measurement, substrate treatment and coating services
- Member of EPIC, Swissphotonics and Swissmem Photonics Group



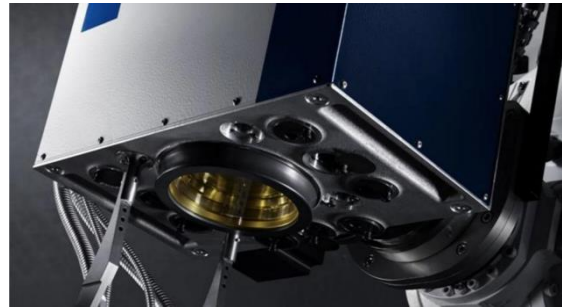
Optical Coating and Characterization: a key technology

Application examples:

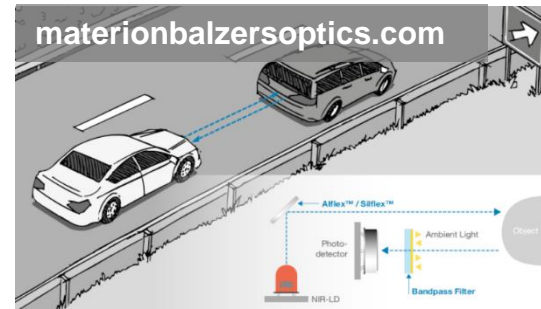
High concentration of manufacturers and users of optical thin films, components and coating equipment



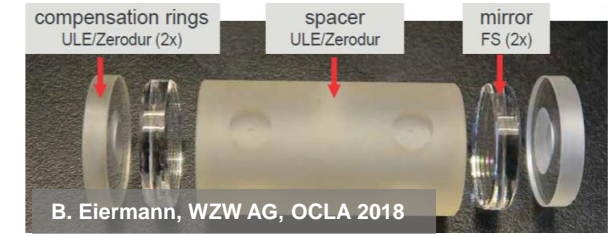
Coatings for biometric sensors produced with Evatec equipment



Processing optics for lasers from TRUMPF



Coatings for driver assistance systems from Materion Balzers Optics



Ultra stable lasers for gravitational wave detection from WZWOptic



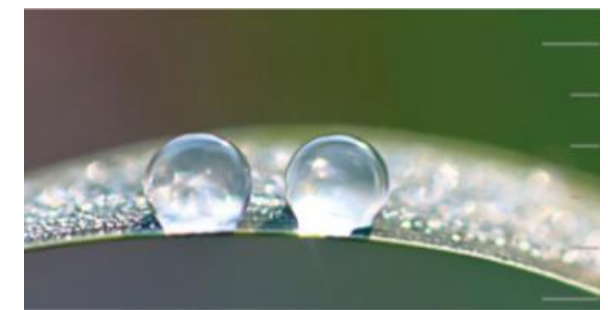
Optics for endoscopy from FISBA



Coated lenses for imaging and cameras from SwissOptic



Coatings for telescopes from SCHOTT

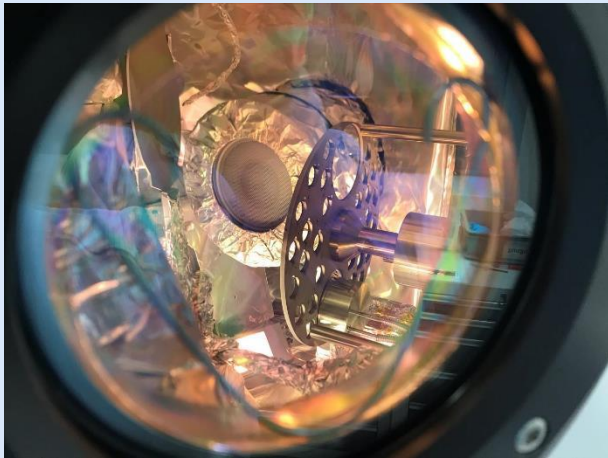
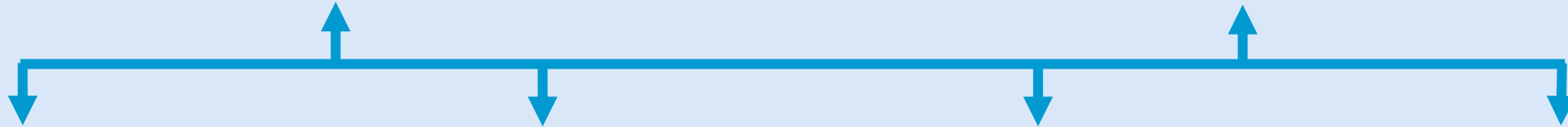


Easy-to-clean coatings for the watch industry from Blösch

Coating



Process monitoring and analytics



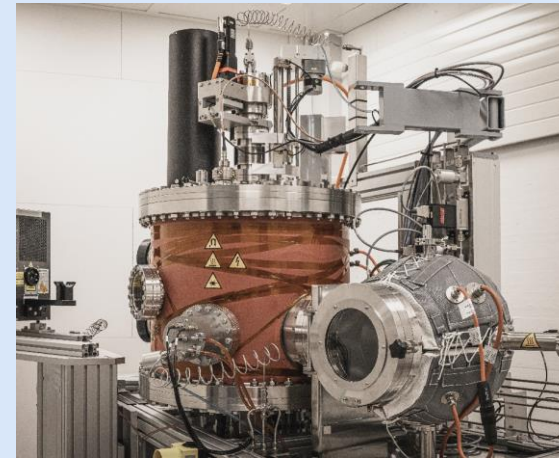
DIBS – Dual Ion Beam Sputtering

Fabrication of precise optical
thin-film interference coatings



ALD – Atomic Layer Deposition

Key technology for coating
free-form and highly curved
geometries



Forza Flexible Research System

Pioneering coating system
with pulsed laser deposition
and ion beam sputtering

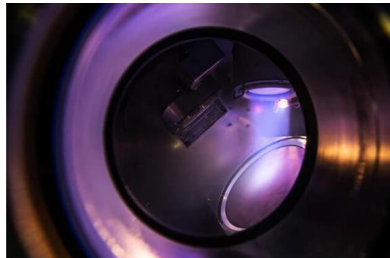
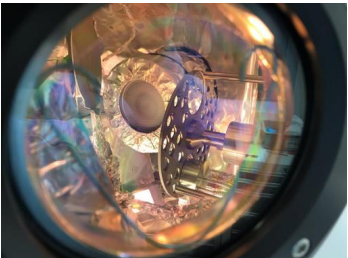
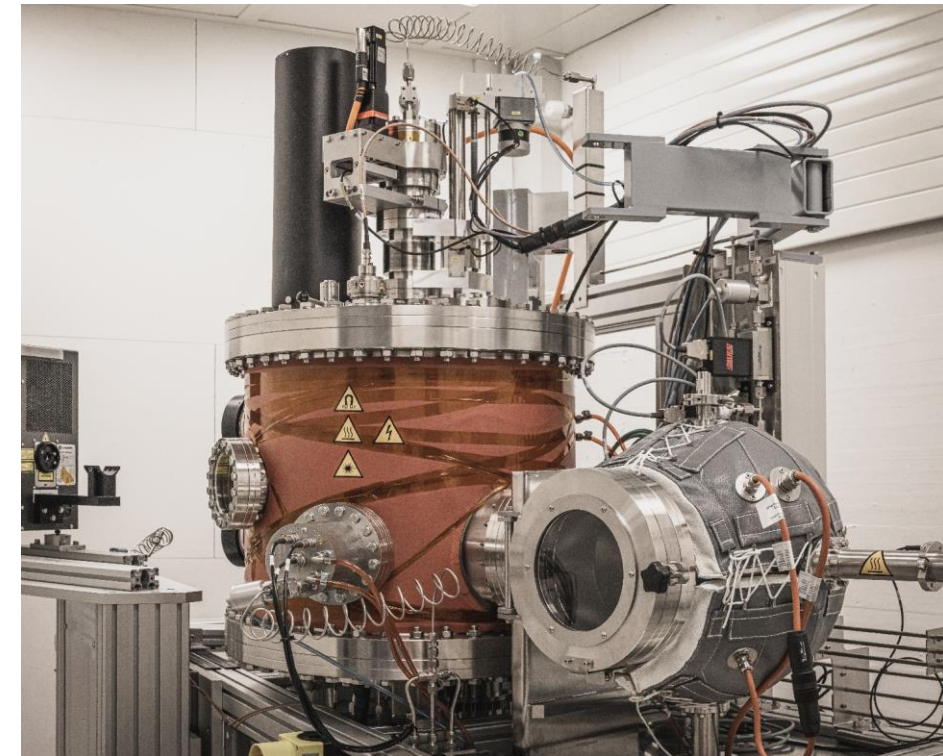
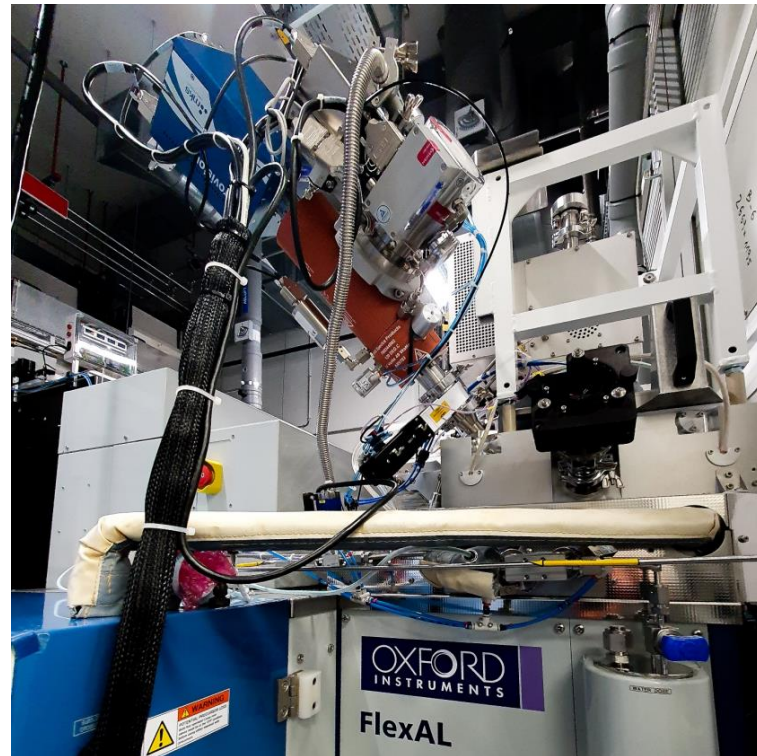


Process monitoring and analytics

Broadly diversified measuring
equipment for standard &
precise, low-loss coatings.
Unique in Switzerland

Optical Coating and Characterization Lab: selected research projects

- Fabrication of precise thin-film interference coatings on “Dual Ion Beam Sputtering”
- Development of “Atomic Layer Deposition” for highly conformal thin film coatings and free-form geometries
- Development of a flexible R&D coating system for various applications, e.g. ion beam sputtering (IBS), pulsed laser deposition (PLD), laser treatment
=> optimized for direct growth of 2D materials on various substrates



Ultra-Precision Manufacturing Lab

- Applied research and development for manufacturing technologies
 - Machining processes and parameters, materials, tools or coatings
 - Automation and digitalization of machining processes

RhySearch is the first research center for ultra and high-precision manufacturing in Switzerland

- Selection of some applications
 - Optical industry: aspherical lenses or metal mirrors
 - Mould and tool-making: tools for hot pressing lenses
 - Research: Components for particle accelerators
 - Semiconductor industry: mirror surfaces for EUV lithography
 - Watch and jewelry industry: production of circuit boards



Ultra-Precision Manufacturing: a key technology

An above-average number of companies produce assemblies and systems with high-precision components:



Laser scanners or cameras from Leica Geosystems or SwissOptic



Vacuum valves from VAT for the semiconductor industry



EUV lithography for the next chip generation (VDL-ETG)



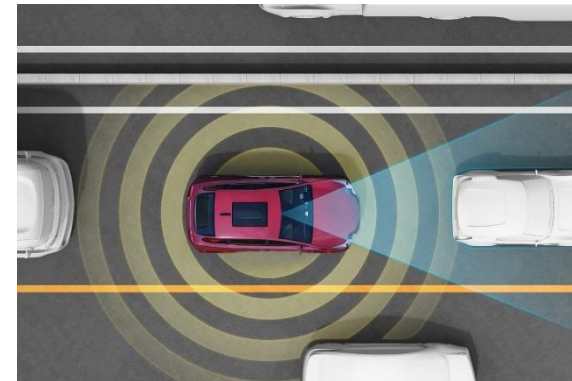
Miniaturized camera by Feinwerkoptik Zünd



Microtechnology, e.g. for unmanned aerial vehicles or laboratory automation from maxon motor



Temperature sensors in space from IST



LIDAR sensors for autonomous driving from AMS



Watch and jewelry industry

Part dimensions in the range from mm to m and shape deviations in the range from nm to μm

Process control system



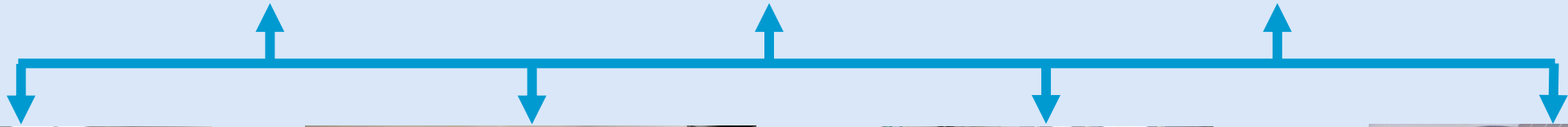
Process monitoring



Performance analysis



*Air-conditioned
laboratory*



5-axis machining centre
Kern-Microtechnik «Micro HD»
(Part accuracy <math><2\ \mu\text{m}</math>)

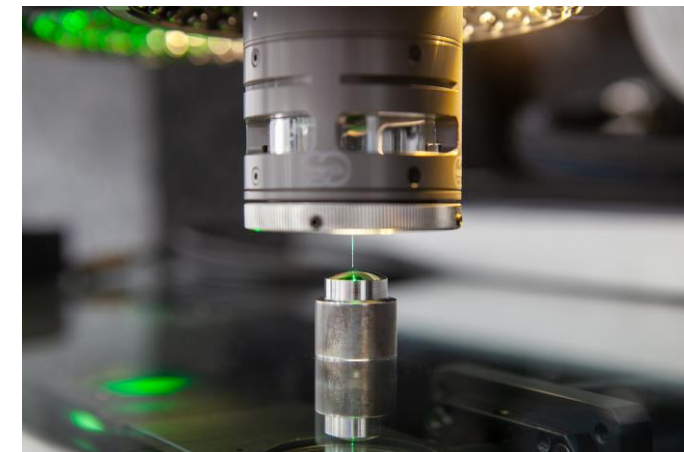
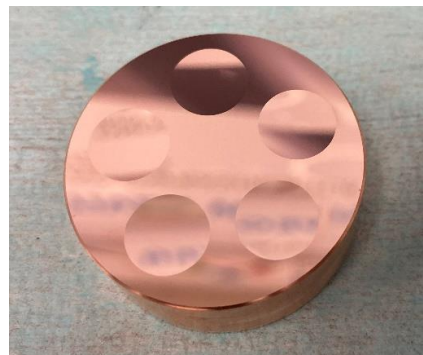
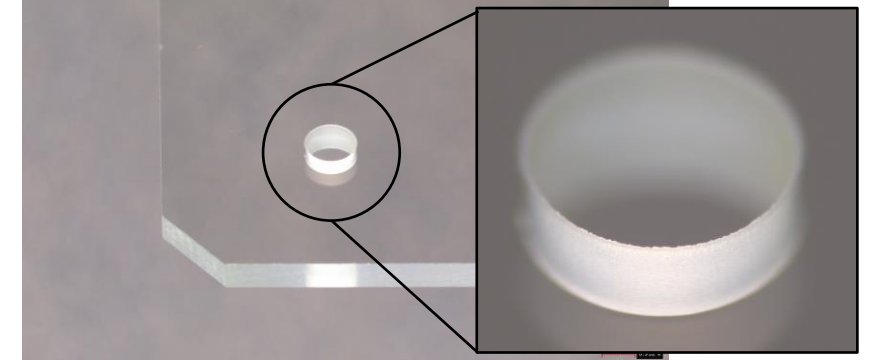
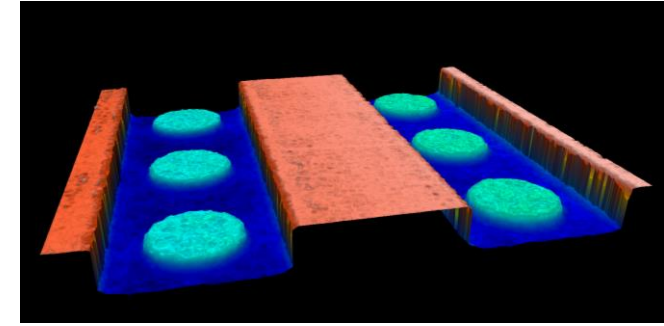
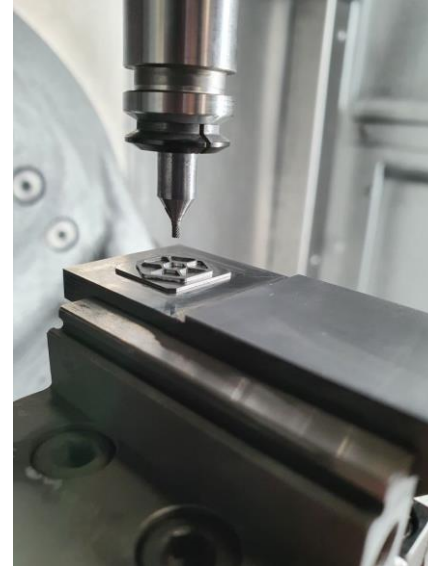
Ultra-precision turning
LT-Ultra «MTC 650 UP»
(Part accuracy <math><0.1\ \mu\text{m}</math>)

**5-axis machining centre
with ultra-short pulse laser**
GFH «GL.compact II»
(λ : 1030 / 515 / 343 nm)

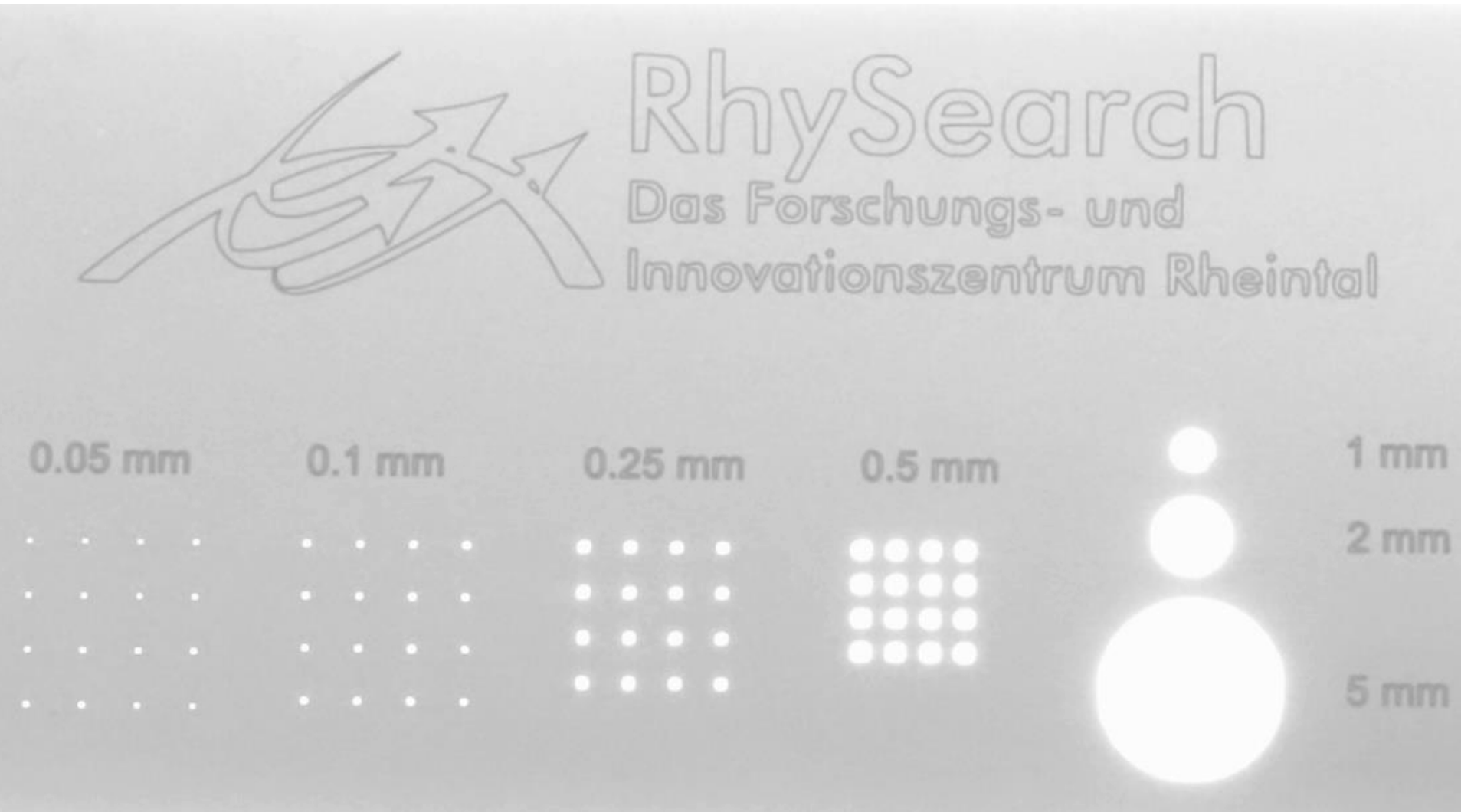
**Multisensor coordinate
measuring machine**
WERTH «VideoCheck UA»
(measurement uncertainties
<math><<0.1\ \mu\text{m}</math>)

Ultra-Precision Manufacturing Lab: selected research projects

- Ultra-precision machining of free-form geometries
- Machining of hard, brittle materials
- Laser micromachining
- Hybrid machining
- Nano-metrology



Thanks a lot for your attention



Contact:
Dr. Thomas Liebrich | +41 81 755 49 62 | thomas.liebrich@rhysearch.ch | www.rhysearch.ch