SENSOFAR

S neox

3D Optical Profiler

FUNCTIONAL PRINTING CENTER

PII-FIRI Seminar 12.1.2026

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Lab. of Molecular Science & Engineering

Four imaging techniques in one device

CONFOCAL

- Best lateral resolution: 140 nm
- Slopes up to 70° for smooth surfaces and 86° for rough surfaces
- Continuous confocal: Speed comparable to AIFV
- High Repeatability, down to 1 nm system noise
- Thickness measurements from 1.5 µm to several mm

INTERFEROMETRY

- Large FOVs with nanometer system noise no matter the objective
- PSI: 0.01 nm system noise
- Thickness measurements from 1.5 µm to 100 µm

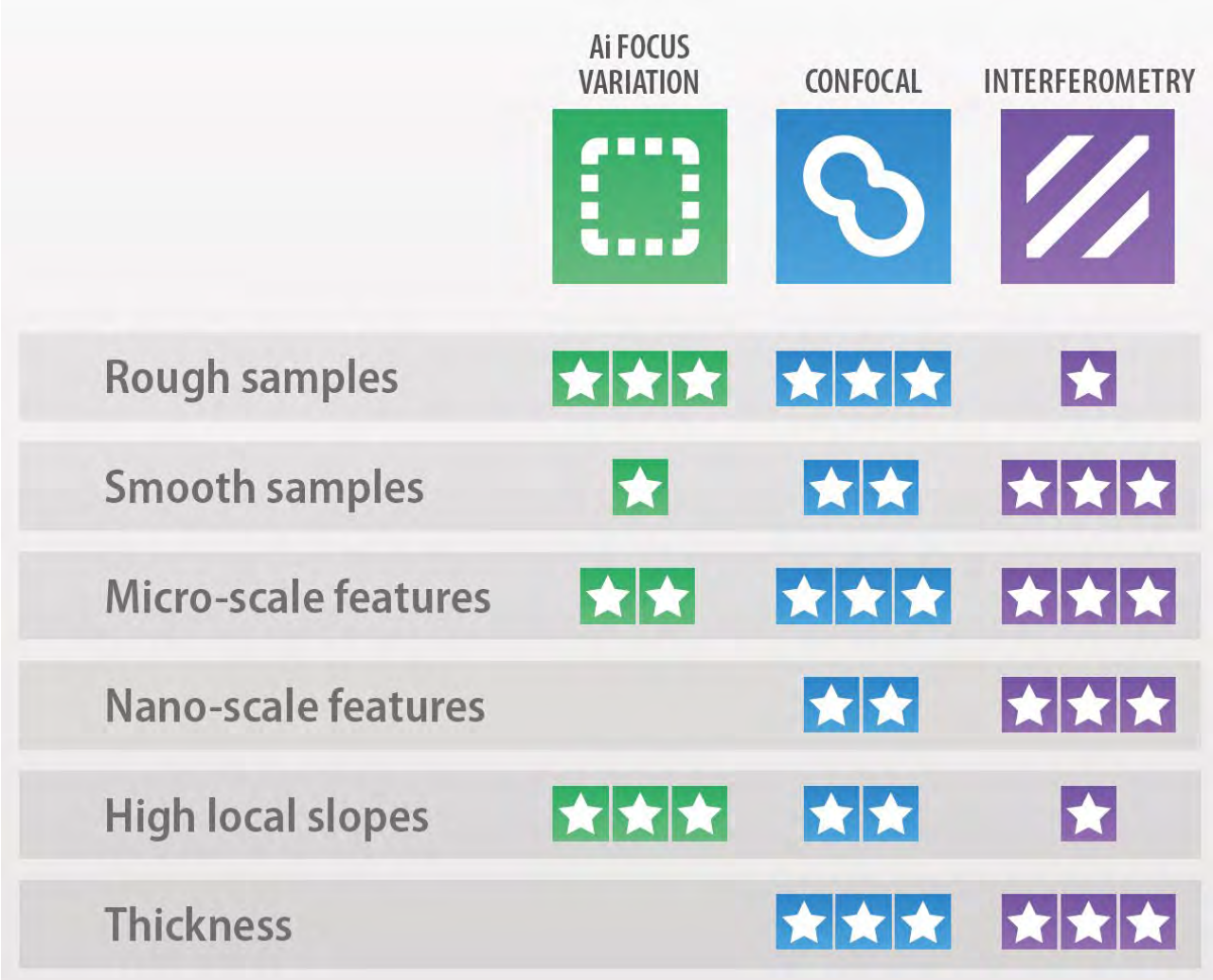
ACTIVE ILLUMINATION FOCUS VARIATION

- Measures slopes up to 86° on scattering surfaces
- Active Illumination allows measurements on smooth surfaces
- Fastest acquisition, 200 planes in 3 s
- Multiple light sources

SPECTROSCOPIC REFLECTOMETRY

- Transparent thin films from 50 nm to 1.5 µm
- Acquisition in less than 5 s
- One objective can cover all the range
- Different spot sizes (3.5 µm to 40 µm)

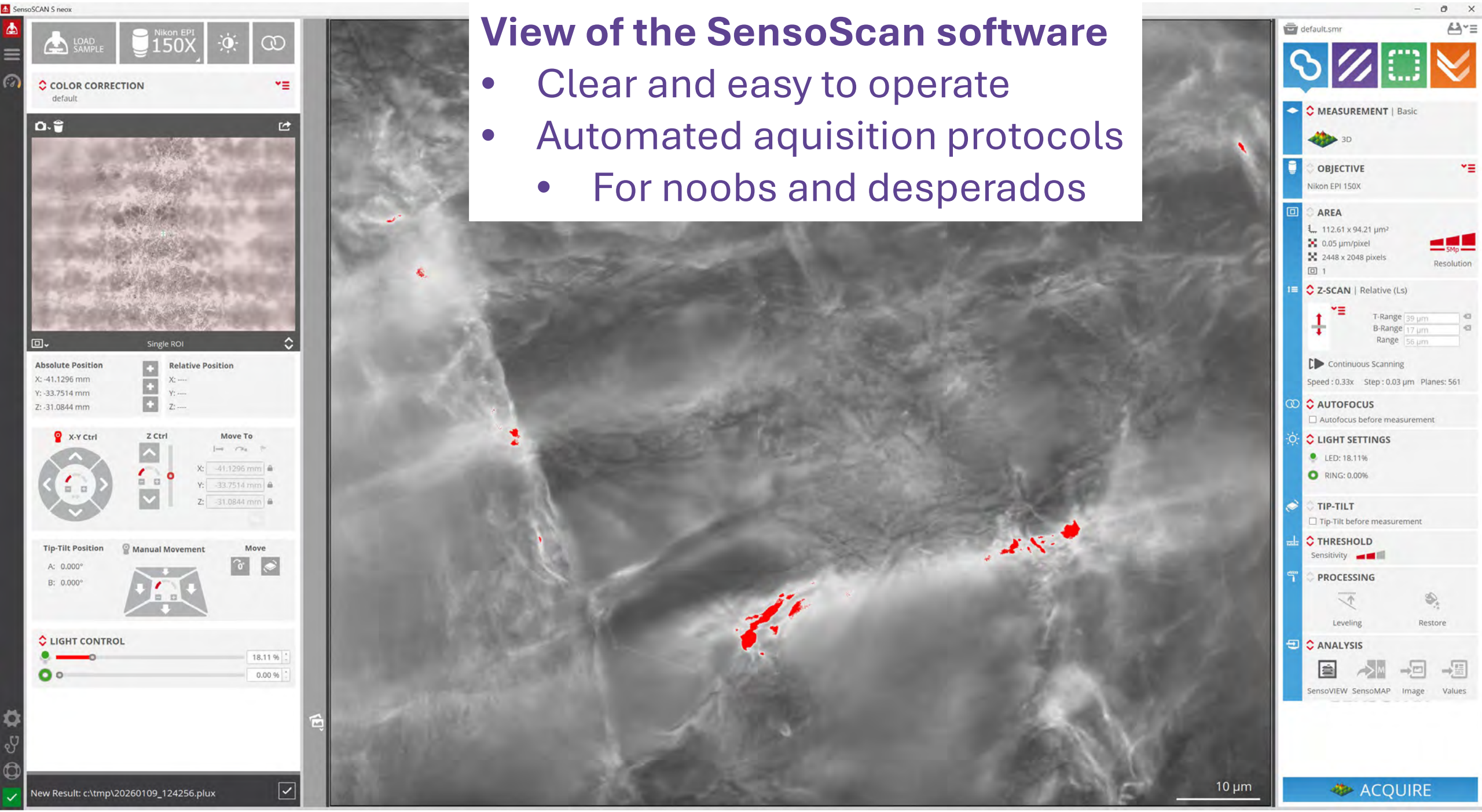
Features

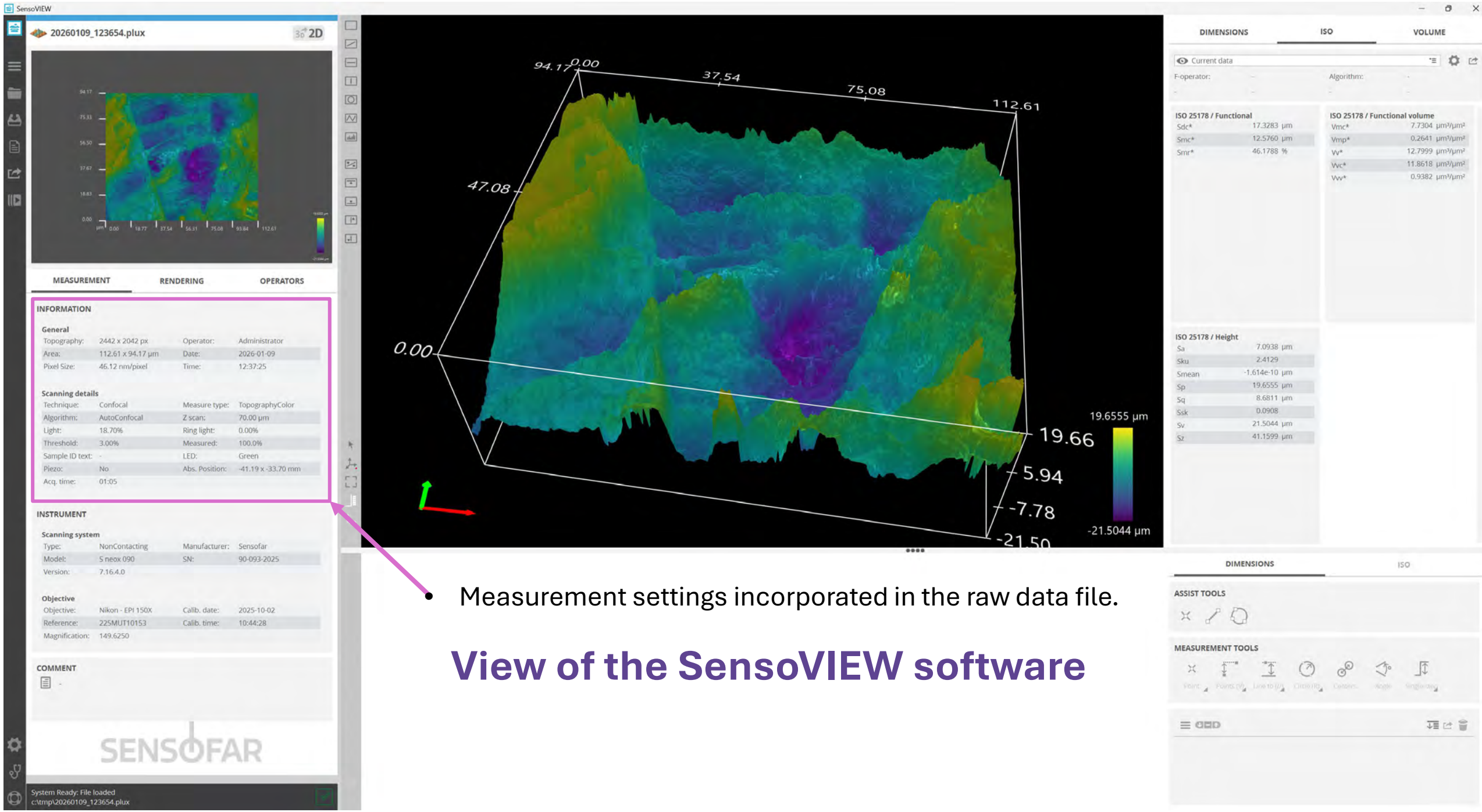


- Available objectives:
  - **Confocal / AIFV:**
    - 5x NA 0.15 WD 23.5 mm
    - 20x NA 0.45 WD 4.5 mm
    - 50x NA 0.8 WD 1.0 mm
    - 150x NA 0.95 WD 0.2 mm
  - **Interferometry:**
    - 10x NA 0.3 WD 7.4 mm
    - 20x NA 0.4 WD 4.7 mm
    - 50x NA 0.55 WD 3.4 mm
- Camera: 5 Mpx - 2448x2048 pixels (60 fps)
- Field of View from 0.018 to 6.7 mm
- Piezoelectric scanner with capacitive sensor: 200 µm range; 1.25 nm resolution
- Sample weight up to 8 kg
- Ring illumination

View of the SensoScan software

- Clear and easy to operate
- Automated aquisition protocols
  - For noobs and desperados



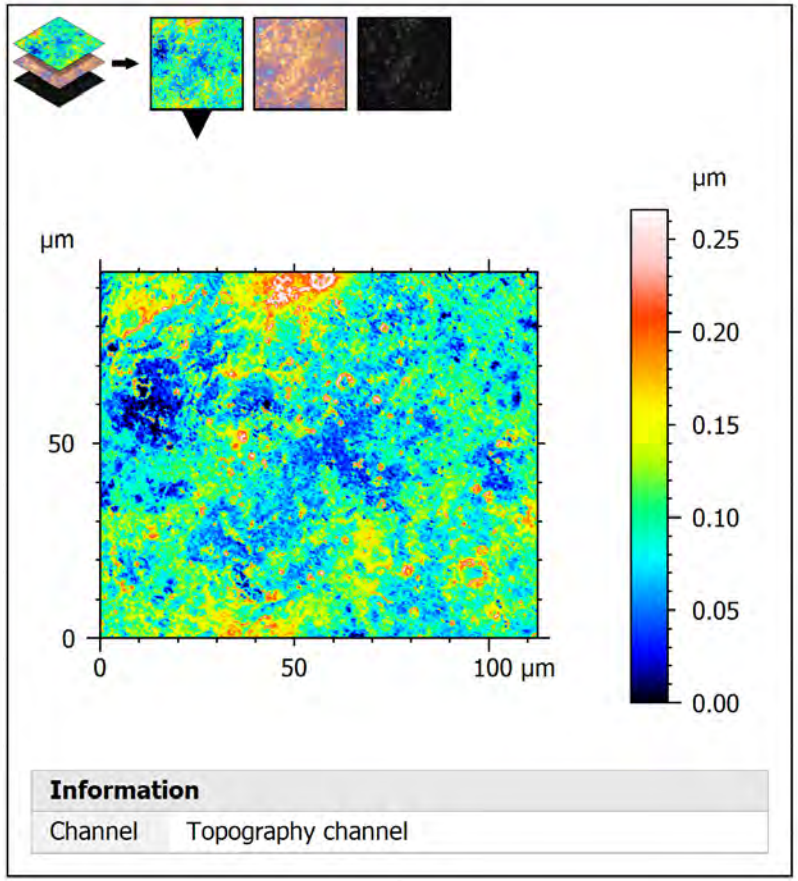


- Measurement settings incorporated in the raw data file.

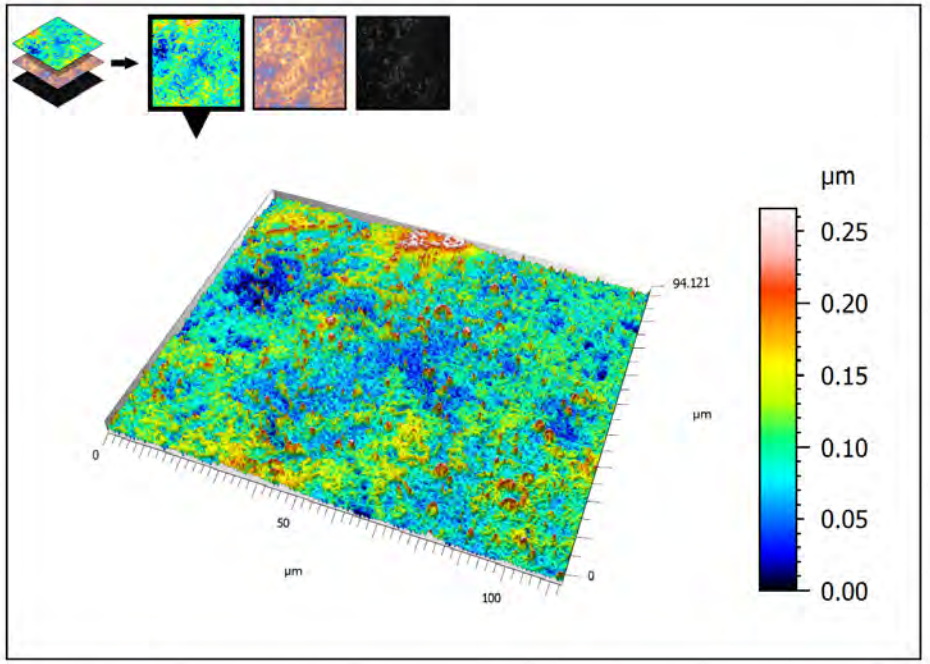
View of the SensoVIEW software

View of the SensoMAP software

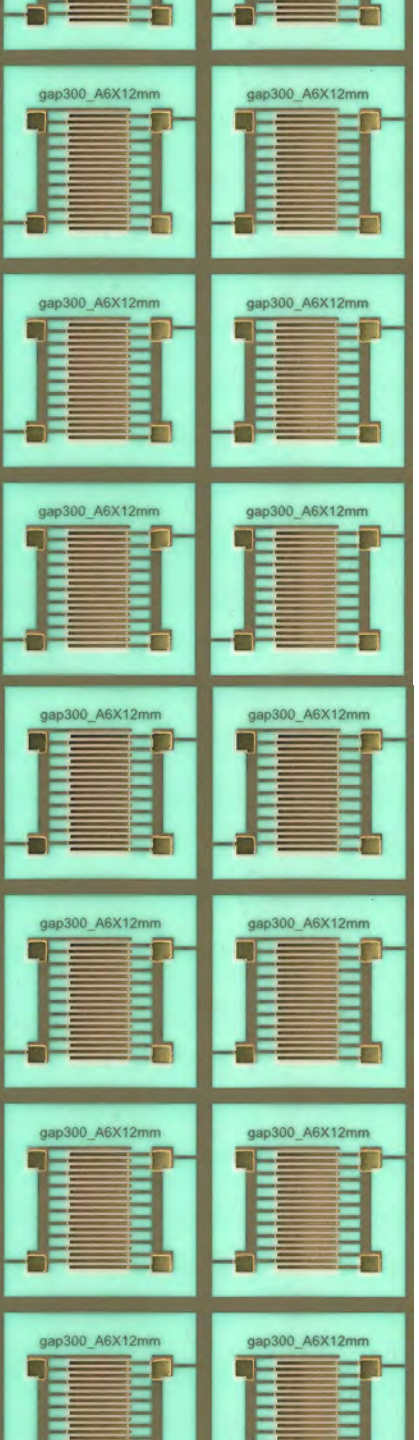
↓Traceability



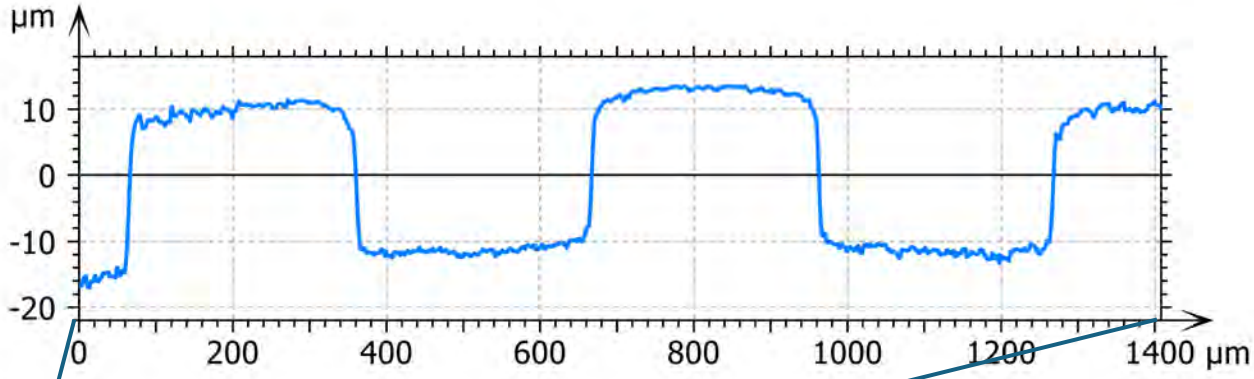
Information	
Channel	Topography channel

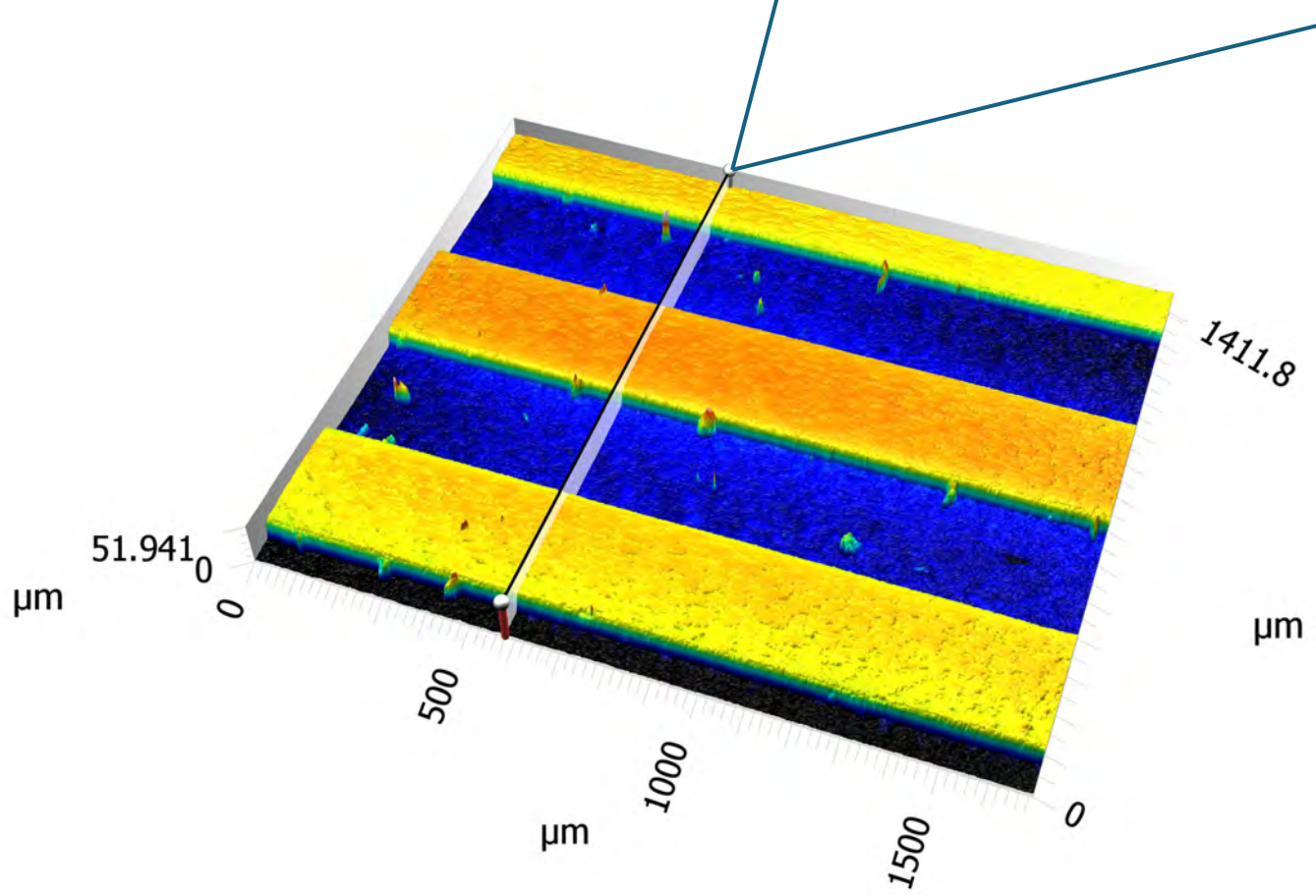


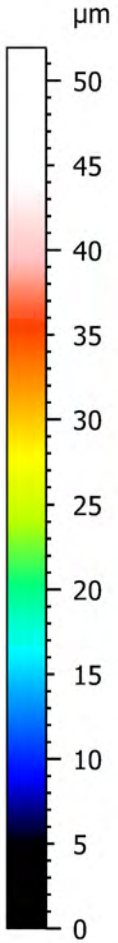
ISO 25178-2 - Primary surface			[32]
S-filter (λs): None			
F-operation: None			
Height parameters			
Sq	0.040134	µm	
Ssk	0.74141		
Sku	4.3515		
Sp	0.16932	µm	
Sv	0.096645	µm	
Sz	0.26596	µm	
Sa	0.030731	µm	



Electrode characterisation

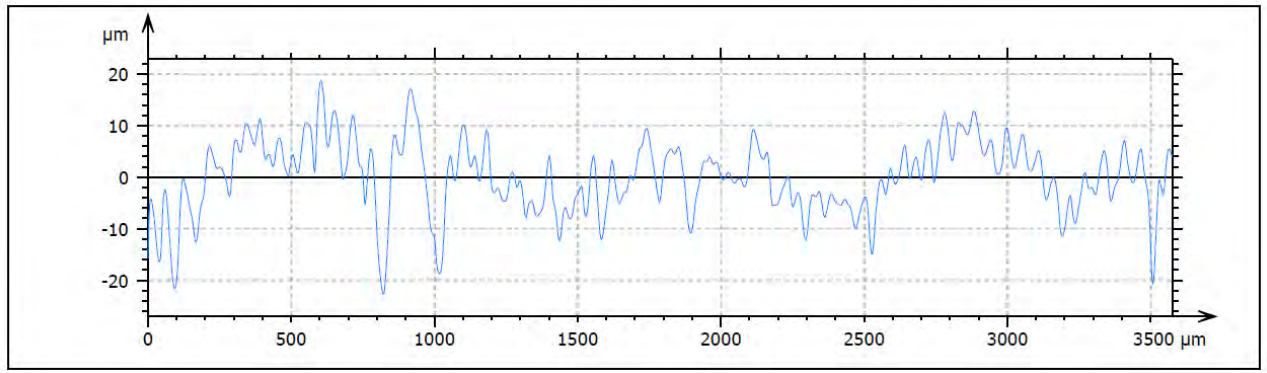


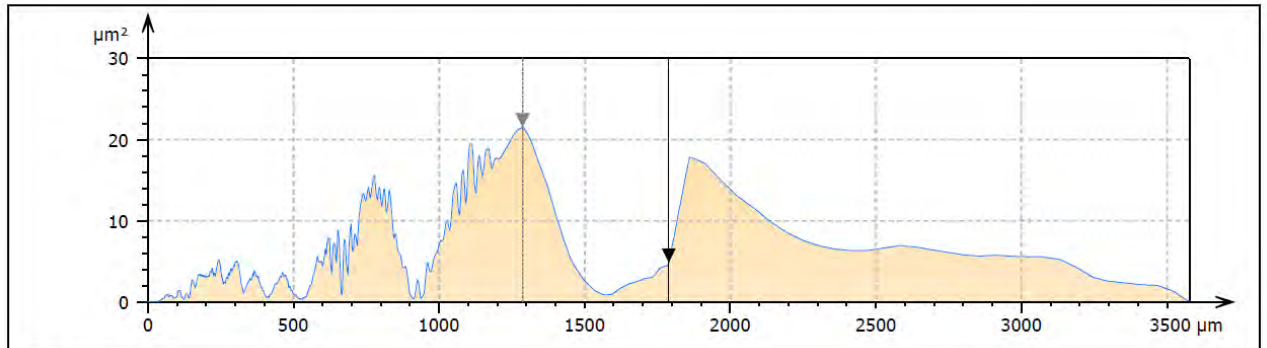




with PhD Viktor Finnäs (Marine biology)

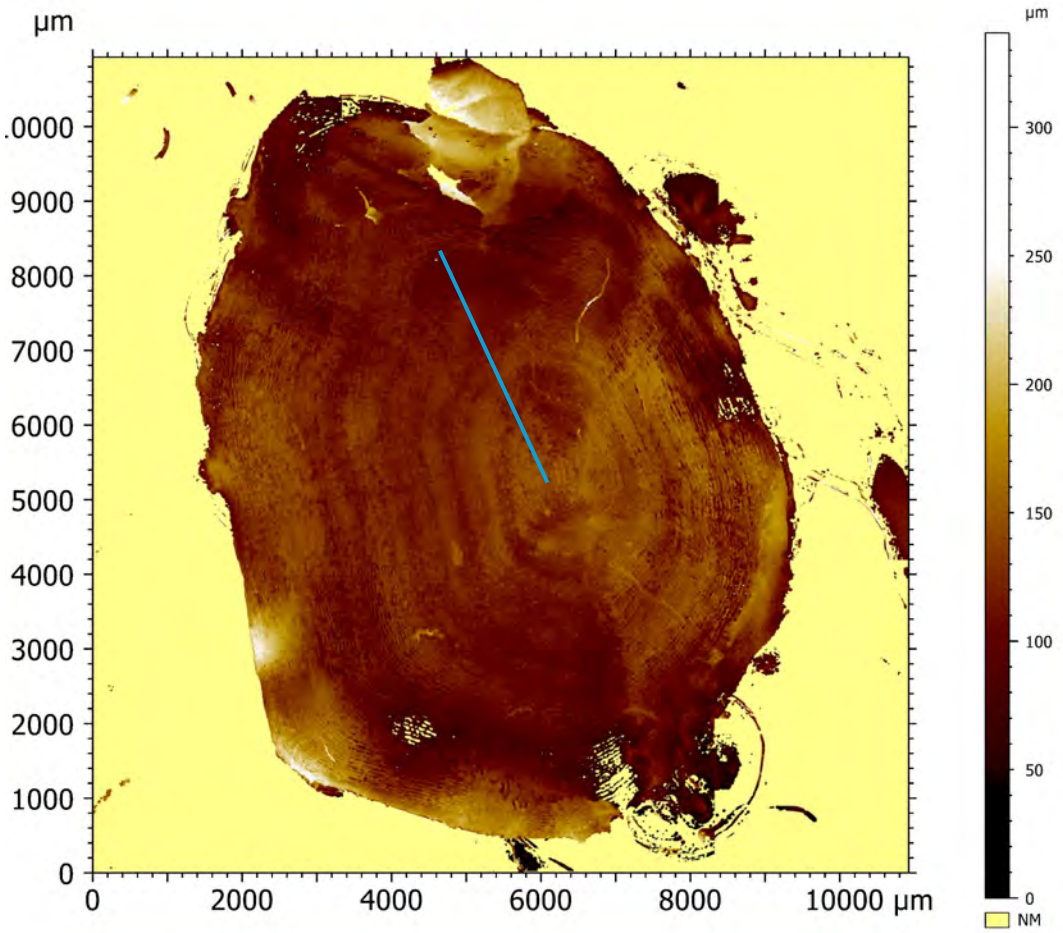
Fish scales





Information	
Number of iterations	32
Smoothing	11
Window function	None

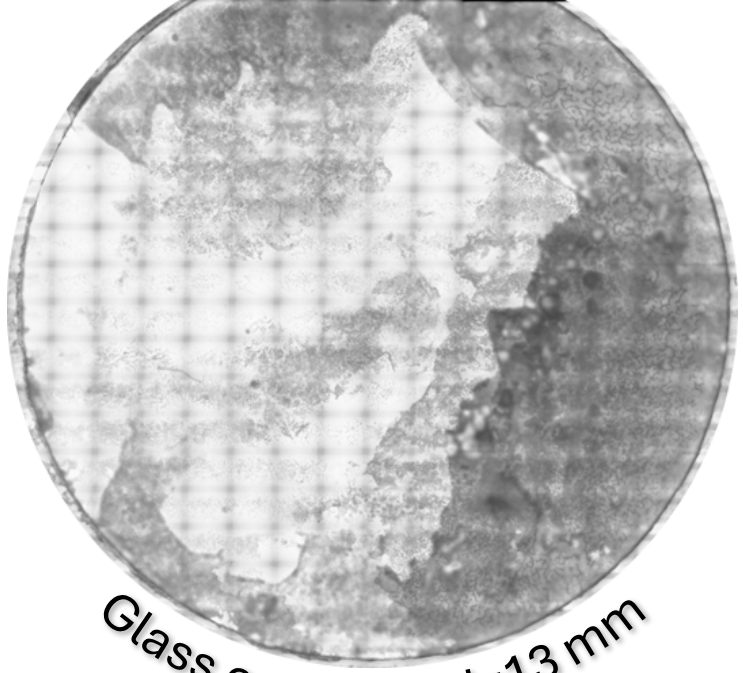
Parameters	Value	Unit
Wavelength	1788.9	µm
Magnitude	2.2093	µm
Dominant wavelength	1286.6	µm
Maximum magnitude	4.6402	µm



↑ **Stitching of multiple images**

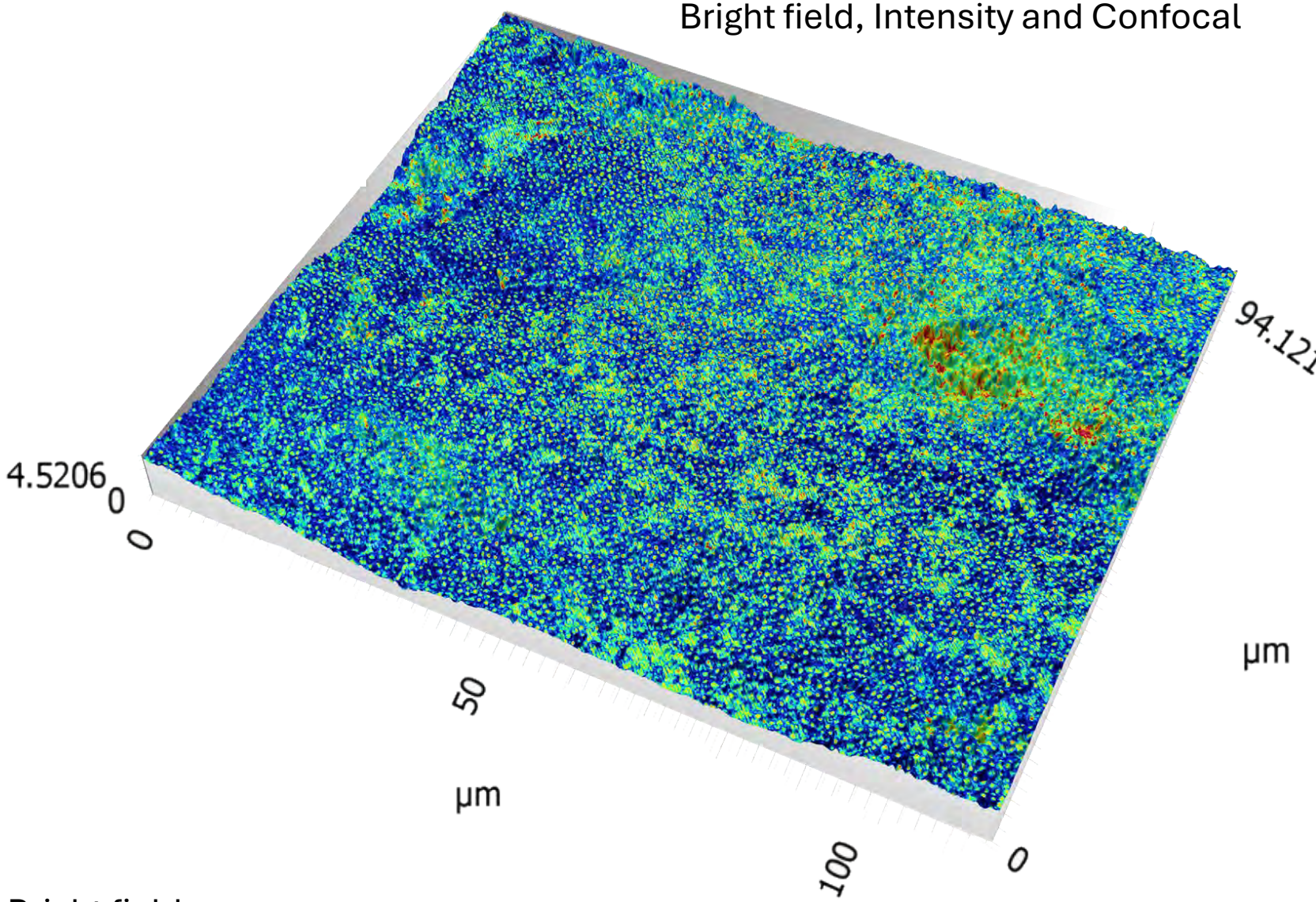
with PhD cand. Leila Rostami (PSL)

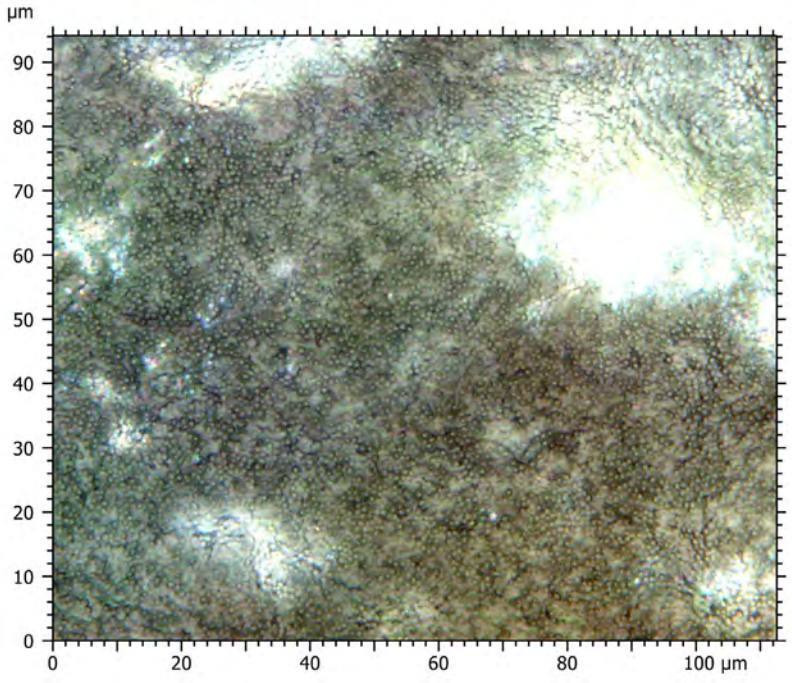
MRSA biofilms



Glass cover slip d=13 mm

↓Combined
Bright field, Intensity and Confocal

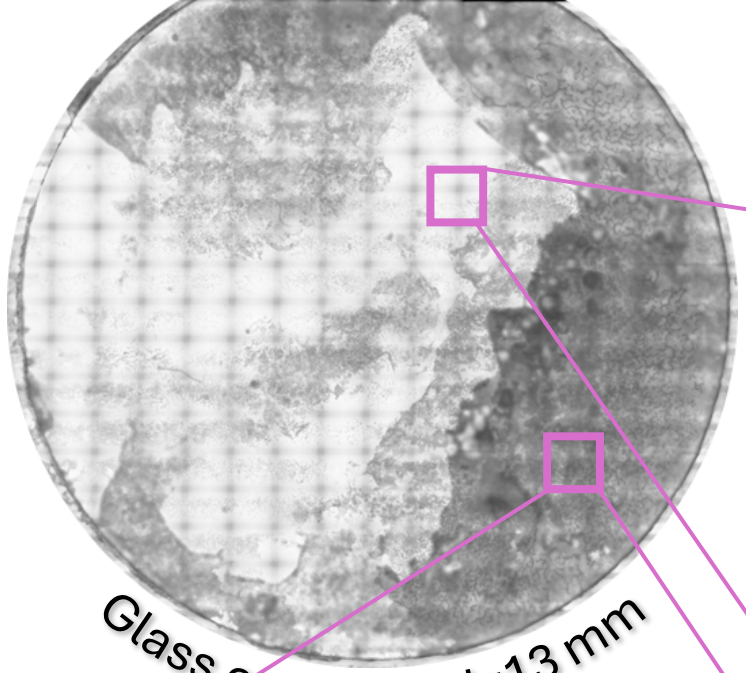


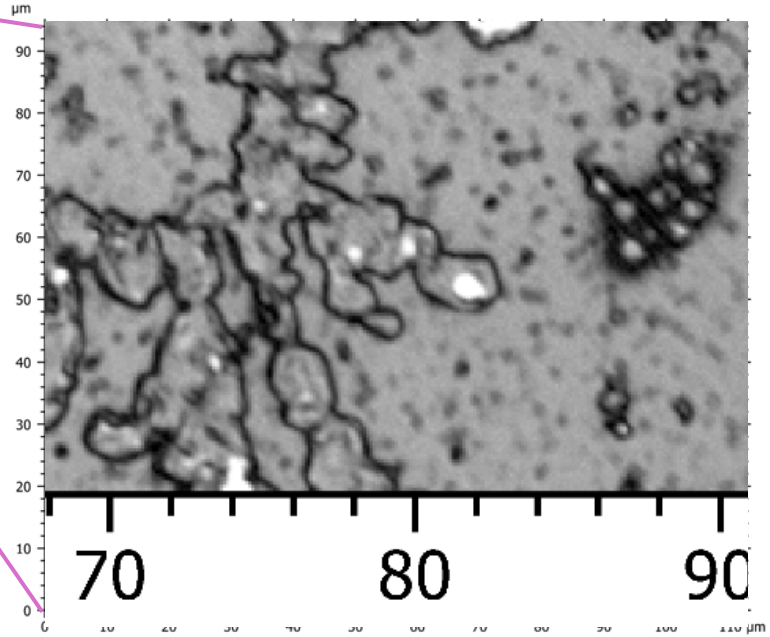


←Bright field

with PhD cand. Leila Rostami (PSL)

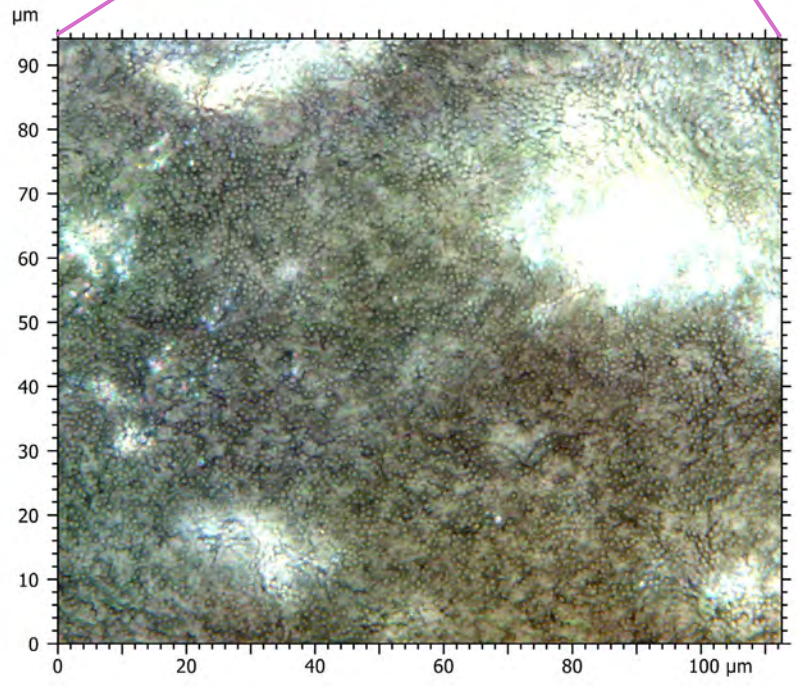
MRSA biofilms



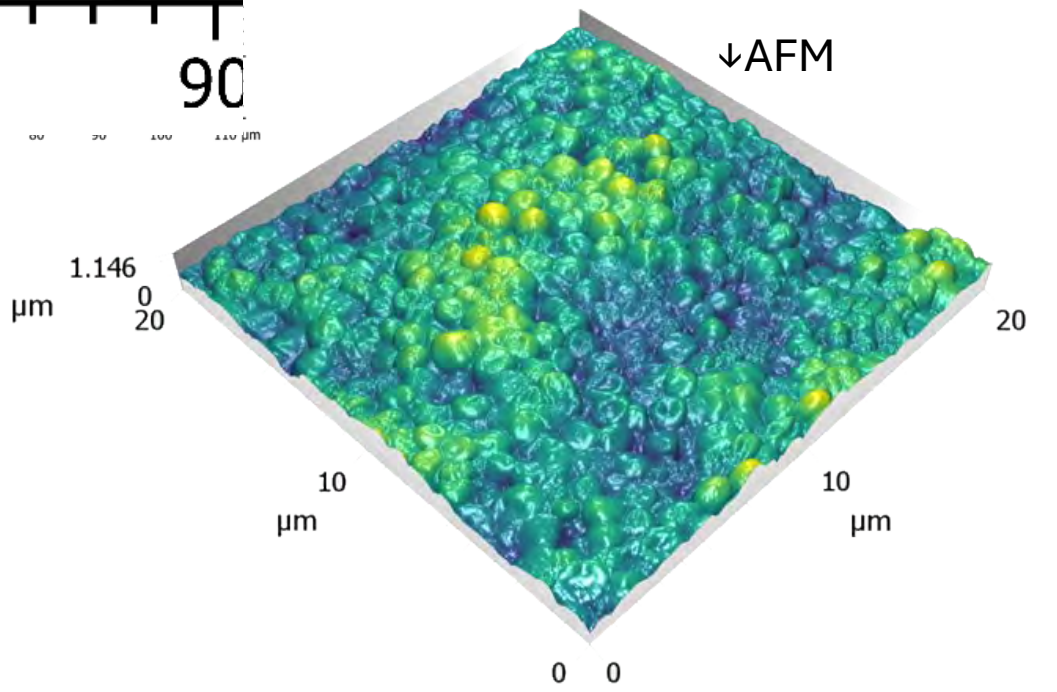


←DIC

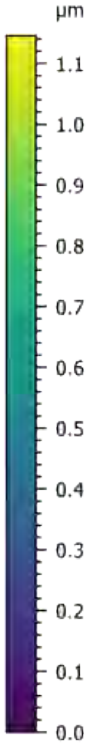
Staphylococcus aureus
d ≈ 500 – 1000 nm



←Bright field

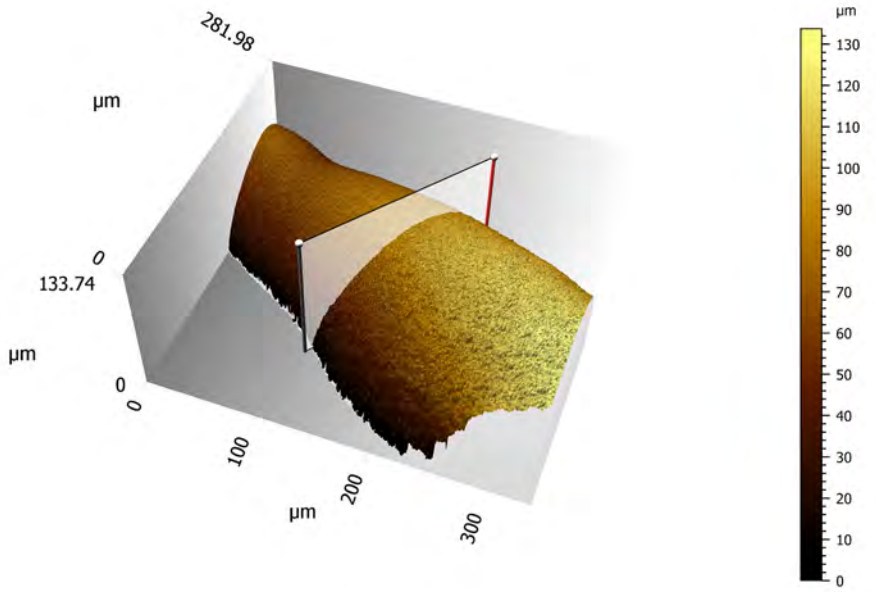


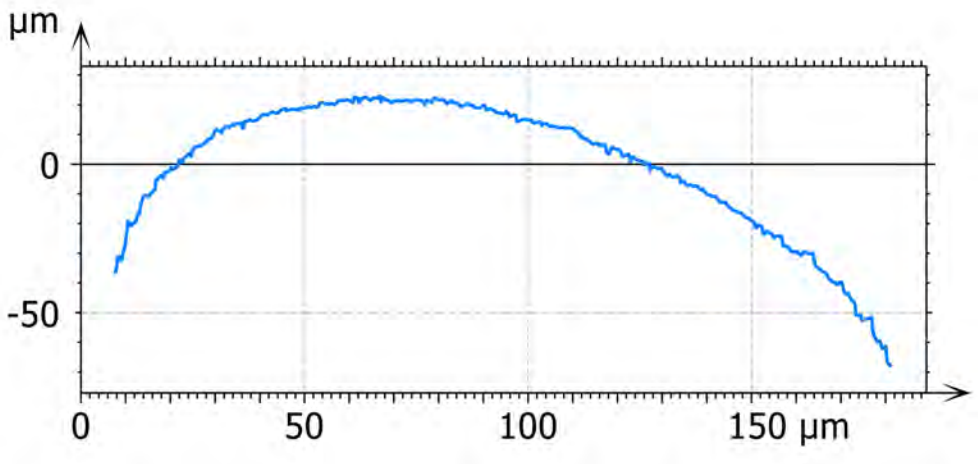
↓AFM



CaP agar tube

PhD cand. Emilia Ares (FyKe)





Summary

- Consider **profilometry** if:
  - You want to **3D image** your sample on the mid-micrometer/high-nanometer scale
    - Lateral resolution 140 nm
    - No sample processing required
  - You want to **measure** your sample's
    - **Features** (layer thicknesses, heights, widths, morphology …)
      - Particles
      - Fibres
    - **Topography & roughness** (wear, coatings, processing, …)

- The **S Neox** profilometer is **quick** and **easy to use**
- Affordable
  - 10 € / hour for ÅAU users
- Contact me for training & info:
  - emil.rosqvist@abo.fi
  - OpenIRIS

ST Instruments Sensofar S Neox 3D Optical Profiler ★

Physical Chemistry

Affiliations: AAU

Type: **Profilometer**

Location: **Aurum B323**

Thank you!

Confocal microscopy

2D images are captured stepwise at different depths while out-of-focus light is blocked.

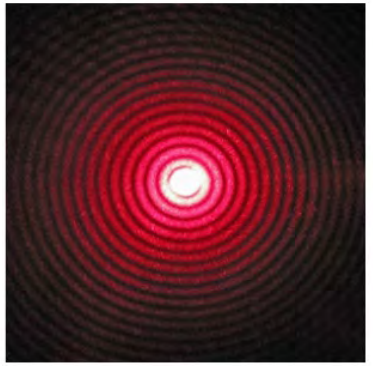
Reflectometry

- When a transparent layer is deposited on top of a surface, its reflectivity changes. The system acquires the reflectance spectrum of the sample in the visible range. This is compared with a simulated spectra calculated by the software, with layer thickness modification until the best fit is found.

Ai FV

Interferometry

- **Phase Shift Interferometry (PSI):** Acquires interference data during a controlled phase shift. Preferred technique for very smooth surfaces. Sub-ångström resolution for all NA, to allow large field of view imaging with same height resolution.
- **Coherence Scanning Interferometry (CSI):** Uses interference fringes to determine topography, transparent film structure, and optical properties, e.g.
- **Extended Phase Shifting Interferometry (ePSI):** Combines ePSI and CSI achieving 0.1 nm measurement noise.



Circular fringes