



Production solutions for high-performance optics – from sample to high volume



June 2023

Who we are

- Since 2001 pioneers in Nanoimprint lithography
- We combine several technologies developed at well-known Research Lab (Natlab) in Eindhoven
 - Method to create nanostructures
 - Inorganic (sol-gel) materials
 - >100 years of know-how in high-volume manufacturing equipment
 - Machine vision expertise

 Equipment, material and processes for production of high precision optics

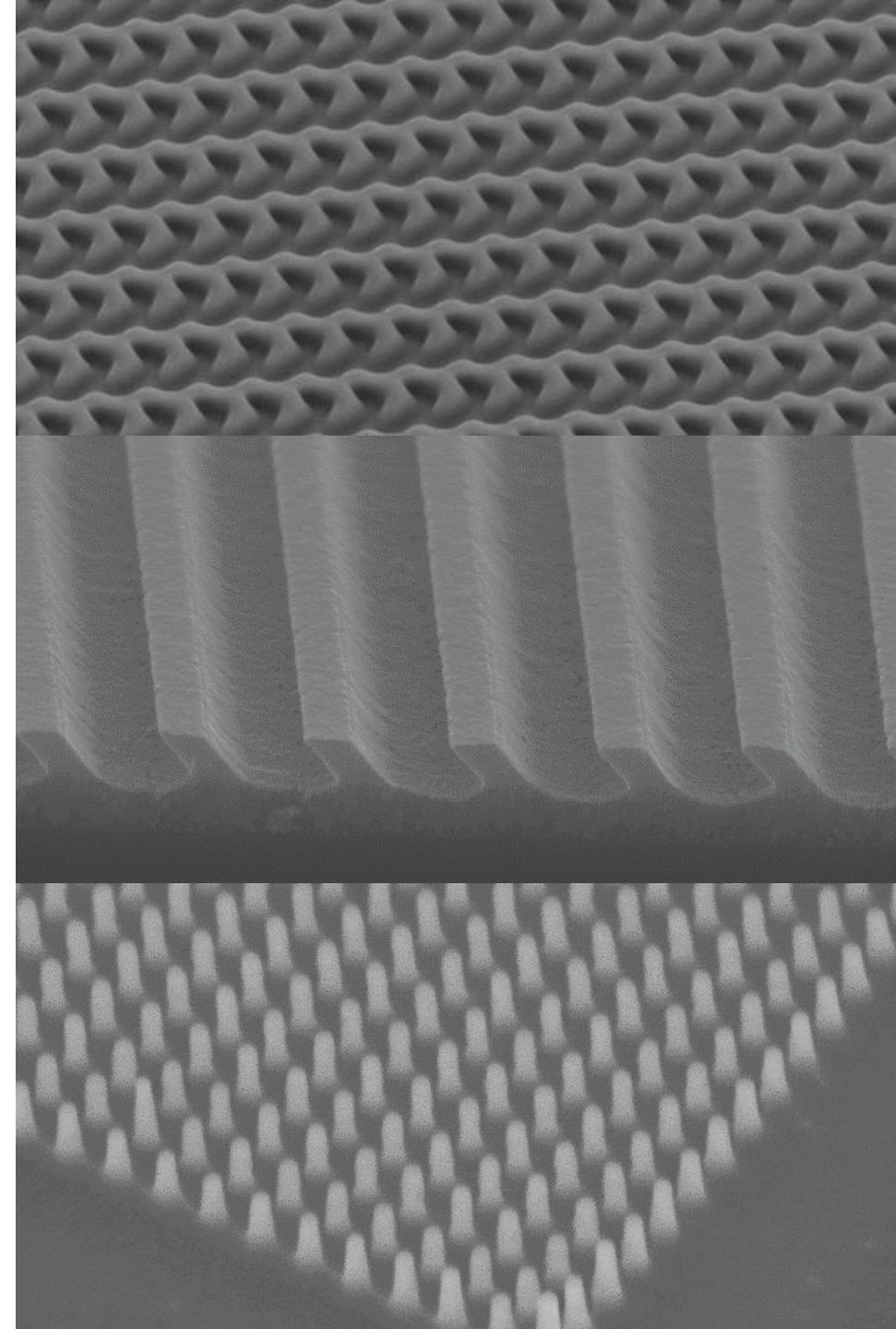
- High-volume production solutions delivered for lasers, wiregrid polarizers, metalenses and AR waveguides
- Spin-out of Philips supported by a strong consortium of European funding partners



SCIL Nanoimprint solutions

Nanoimprint production solutions for wafer-level optics

- Wafers up to **300mm**
- Feature sizes down to **10 nanometers**
- Positioning accuracy below **1 micrometer**
- Stamp life-time > **500 imprints**
- Patent families **30**
- Large range of **fully inorganic** imprint materials with excellent optical properties
- Works with industry available UV-curable organic imprint materials
- On any material, from glass to sapphire to silicon



Large variety of applications in growth markets

Mobile devices

- Camera lenses (metalenses)
- Sapphire camera covers
- MicroLED displays
- Face recognition sensors

Smart Glasses

- AR Waveguides
- MicroLED projectors
- 3D sensors

Automotive

- 3D sensors
- Front-lights
- Light carpets
- Head-up displays

Medical

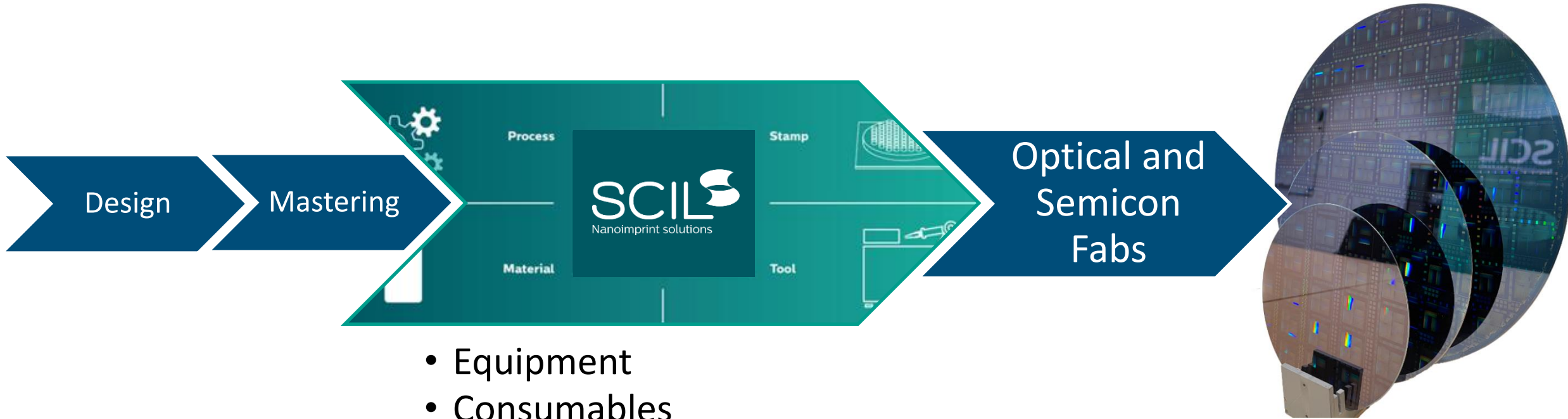
- Biosensors
- Medical imaging

Other

- Lasers
- LED
- Solar
- Quantum computing
- Integrated photonics

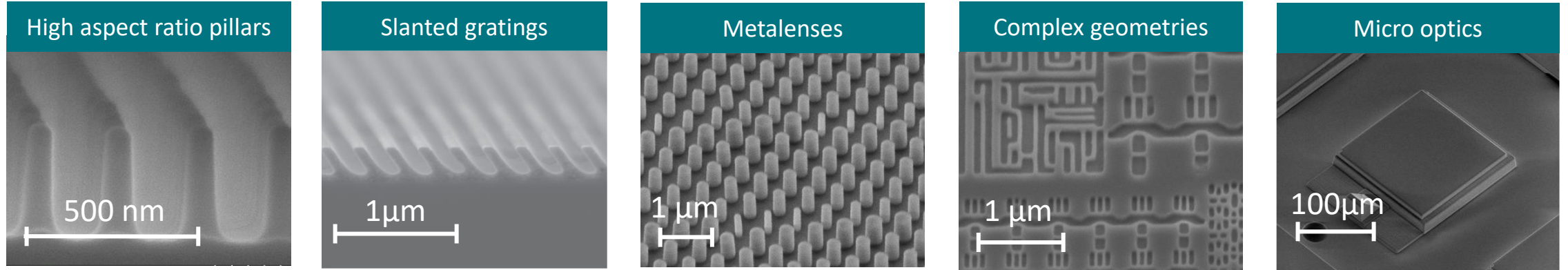


High-volume production solutions for wafer patterning



- Equipment
- Consumables
- Services
 - Process development
 - Sample and pilot production
 - Maintenance and support

From nano-to micro structures

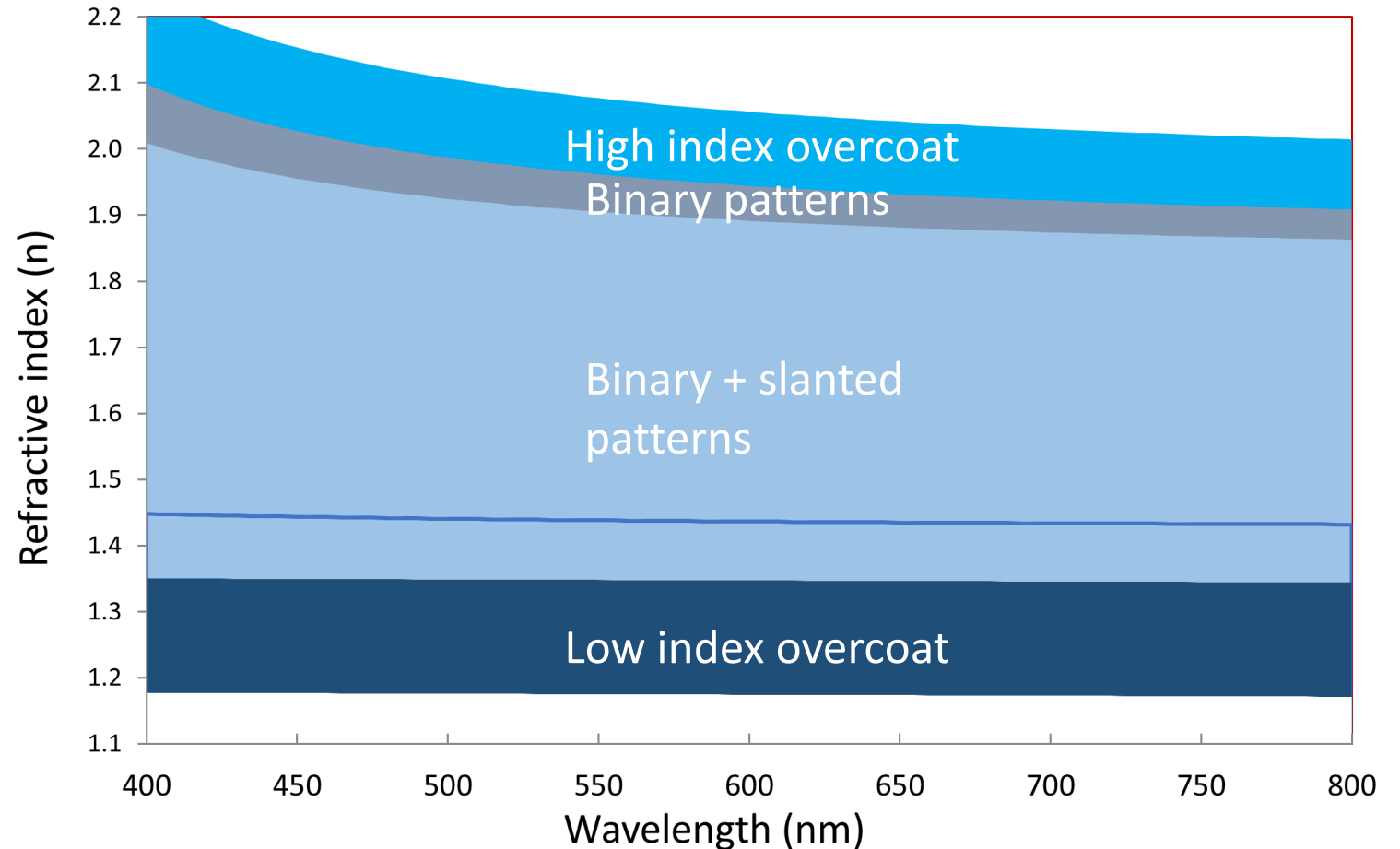


From R&D to volume production



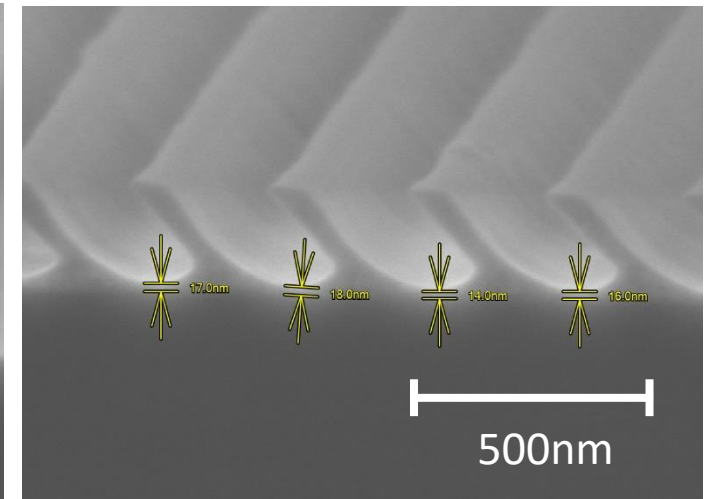
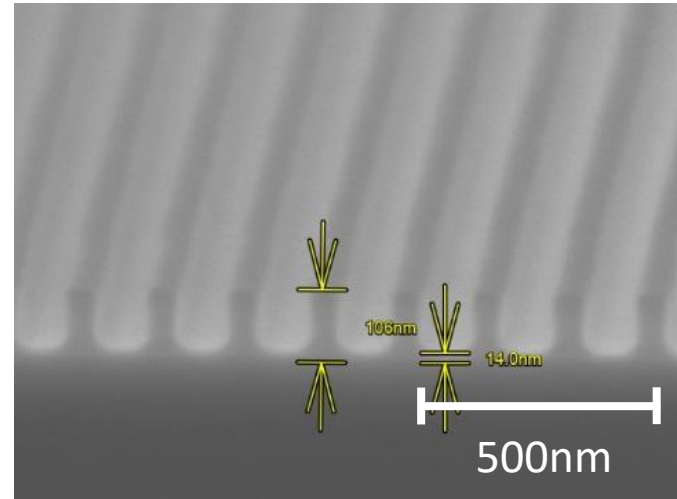
Imprint materials - full range in refractive index

- Directly patterning optical materials
- All resist types are fully inorganic
 - Index range $n=1.17$ to **2.2**
 - **Increased slant index to $n=1.93$**
 - Non-absorbing down to $\lambda \sim 360\text{nm}$
 - Temperature stable $>400^\circ\text{C}$
 - Non-yellowing
- Low shrinkage: 5-8%
- Applications:
 - Augmented Reality
 - Meta-surfaces
 - Etch masks
- Key figure or merit:
nm-reproducible features

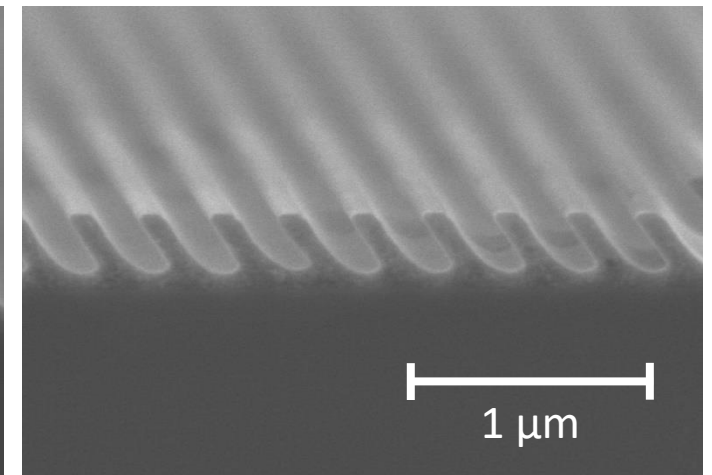
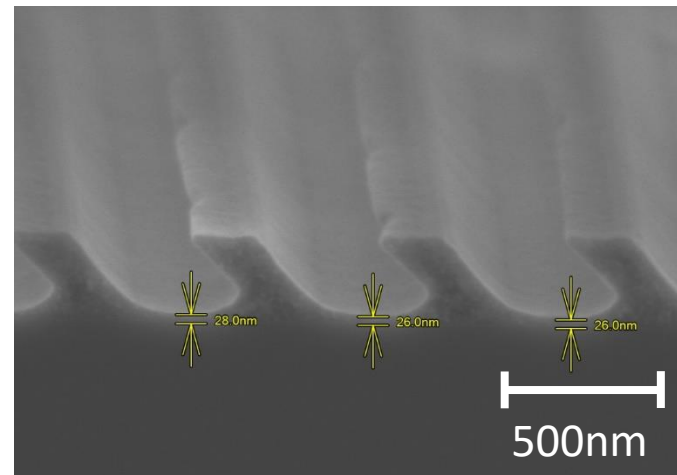


Binary and slanted gratings in high index inorganic material

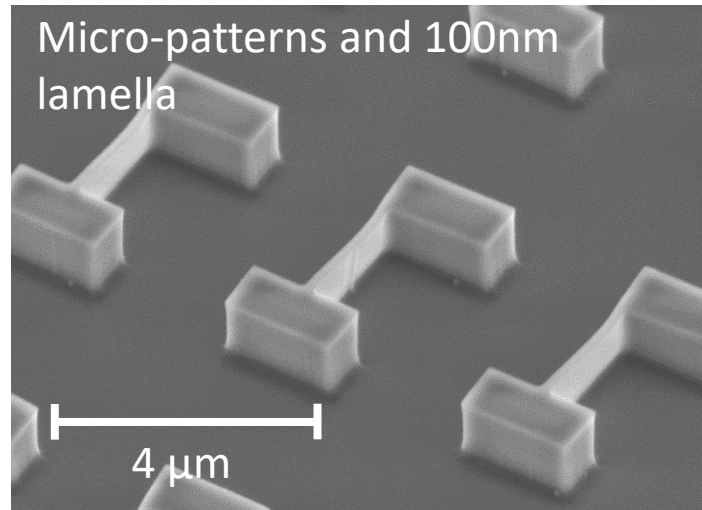
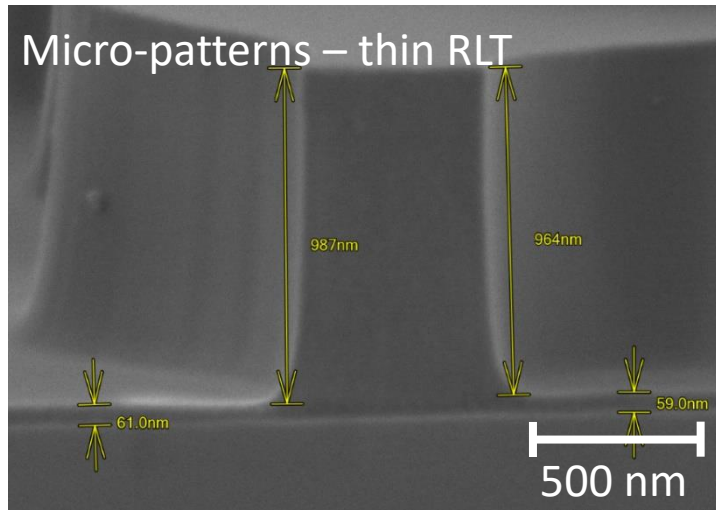
- $n=1.75$
- RLT below 20nm
- Slant gratings in all directions possible in the same imprint
- Very low to no haze



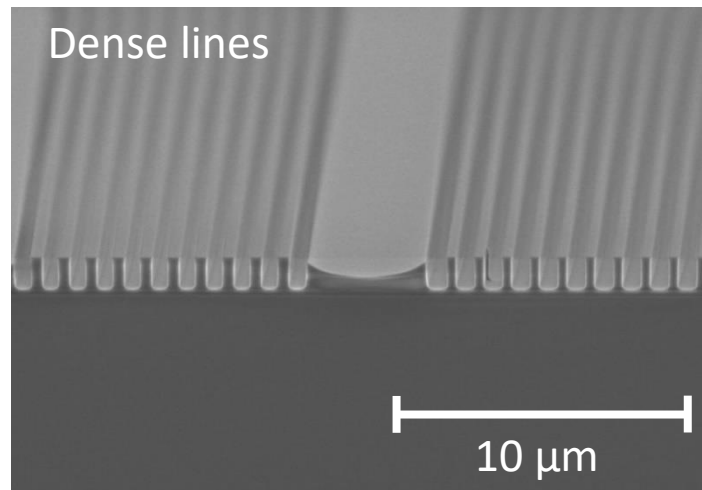
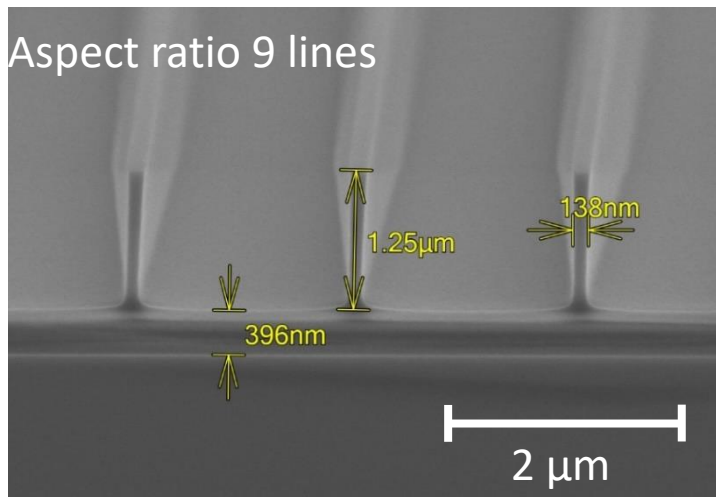
- $n=1.93$
- RLT below **30nm** demonstrated (expect to reach RLT <20nm)
- Slant gratings in all directions possible in the same imprint
- Very low to no haze



Variety of micro patterns, direct replication into NanoGlass



- High aspect ratio patterns
- Thin residual layer



How we work

- We develop the right imprint process for the requirements of our customers
- Combined with optimized equipment and consumables
- We produce samples for qualification purposes
- When ready we deliver the production equipment and transfer the SCIL imprint process to the production site of our customer

Fast development cycles and a cost efficient and reliable solution that works



SCILS 
Nanoimprint solutions