Raith Laser Systems

Maskless Laser Beam Lithography

Exclusive worldwide distributer for all holographic systems:

Contact Rob Munday - Spatial Imaging Ltd.
Website: www.spatial-imaging.com
Email: sales@spatial-imaging.com
Telephone: +44 (0) 7913 823 506

SOLUTIONS FOR NANOFABRICATION

RAITH
NANOFABRICATION

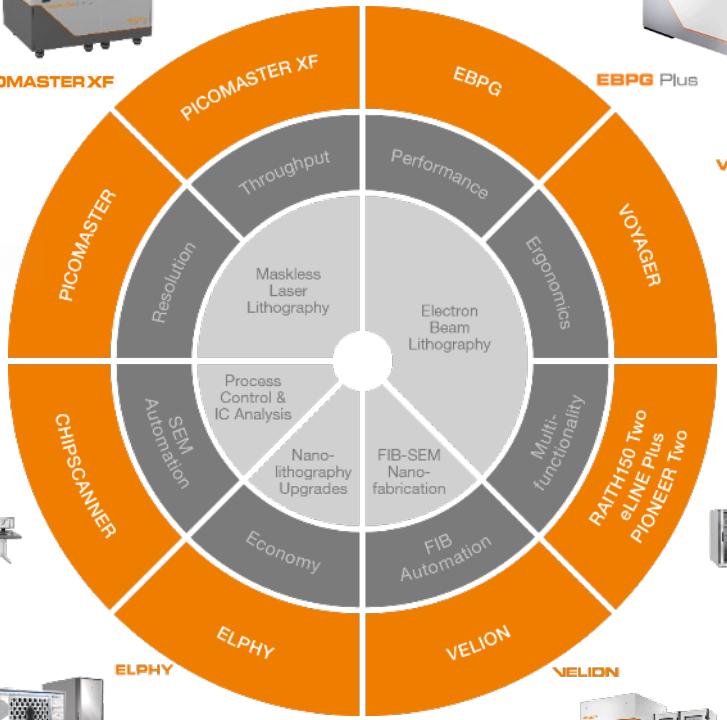
Raith Product Range

PICOMASTER XF

EBPG Plus

PICOMASTER

VOYAGER



CHIPSCANNER

PIONEER Two

eLINE Plus

RAITH150 Two

ELPHY

VELION

Raith Laser Systems Portfolio

RAITH NANOFABRICATION

Multi beam: maximum throughput

Write speed: **280 mm2/min** @ 0.6 µm resolution
@ 256 grayscale levels **real-time**

PICOMASTER XF

Single beam: ultimate resolution

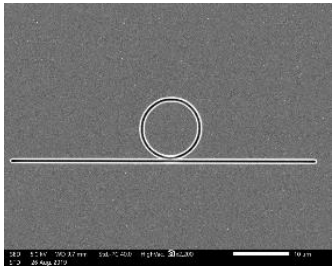
300 nm resolution guaranteed,
210 nm resolution demonstrated

PICOMASTER

Key Markets LBL - Applications

R&D Applications

- **Semiconductors research**
- **Electronics**
- **Photonic devices**
- **Mask making**
- **3D Lithography**
- **Diffractive Optics**
- **Microfluidics**
- **MEMS**
- **LED**
- **Flat panels***
- **AR/VR devices***



Holography Applications

- **Brand, Security & Anti-Counterfeiting**

Bank Notes,
Warranty Seals,
ID badges
Tickets,
Stamps,
Certificates,
Documents
Product authentication

- **Premium packaging**

Catch the consumer's eye with optical packaging. Holography and lens effects make packaging stand out.

*big substrate sizes (> 1 meter) are supported on demand

Security Hologram Sample

Diffractive holographic features

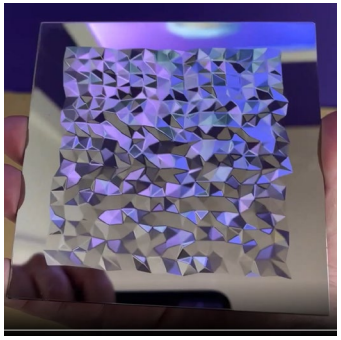
Reflective achromatic features, Fresnel lenses and images

Fresnel Lens and Fresnel ‘bass relief‘ Samples

RAITH
NANOFABRICATION

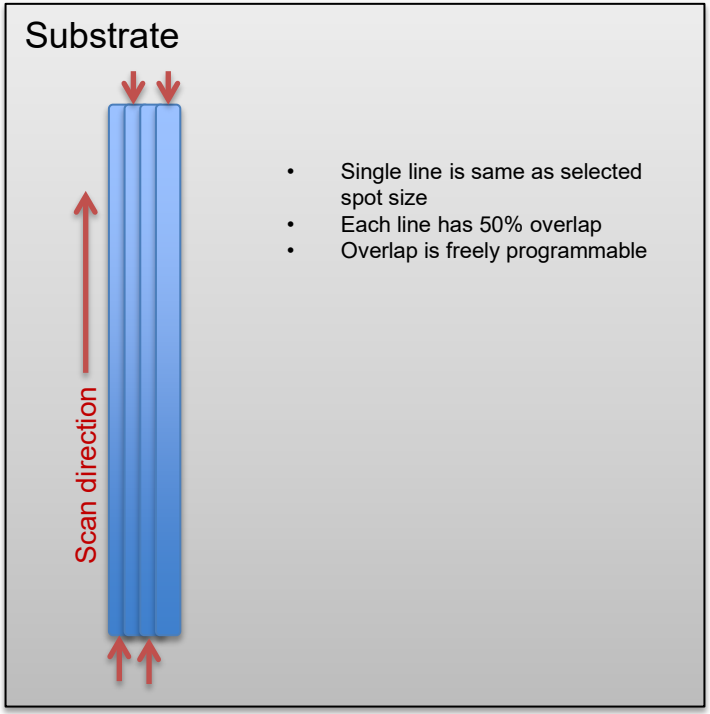




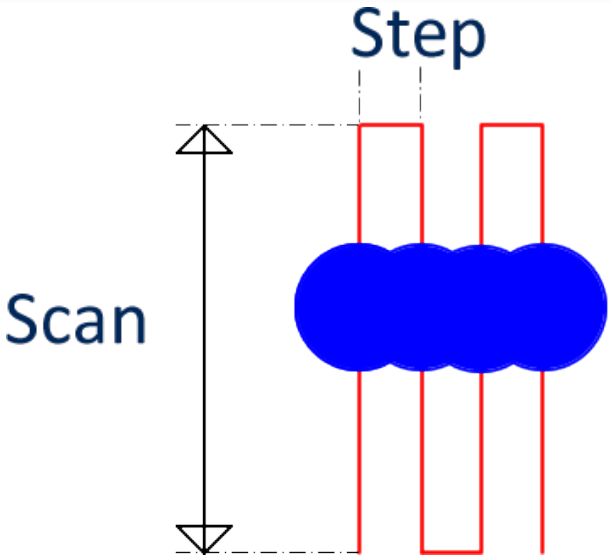



PICOMASTER – Seamless Exposure Blending

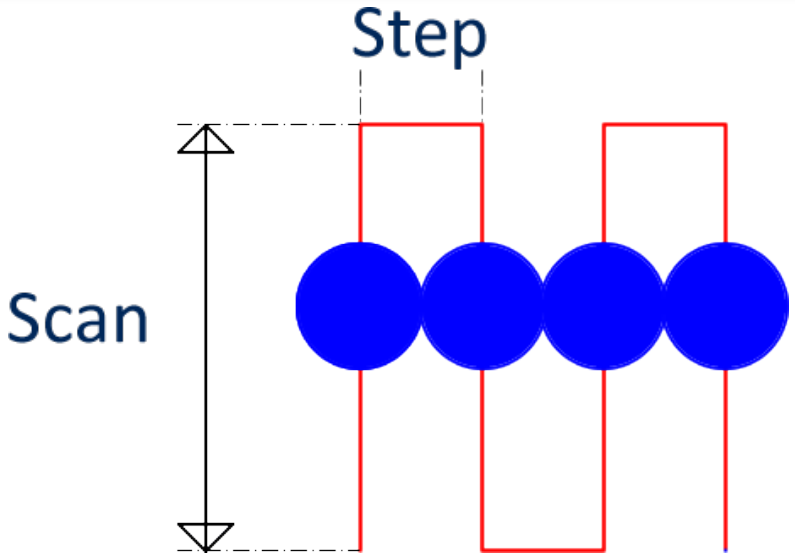
- Max speed: 1.5mm2/min
  higher is possible at lower resolution
- 405nm laser source
- Single highly focus spot
- 300nm resolution
  (0.6,0.9,1.6 and more available)
- Stitching error free



PICOMASTER – Seamless Exposure Blending

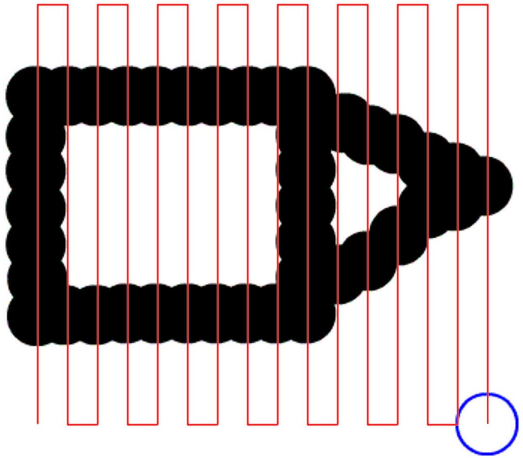


50% Step

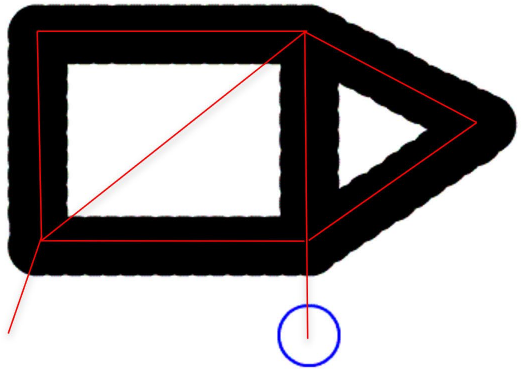


100 % Step

PICOMASTER - Raster and Vector Writing Modes

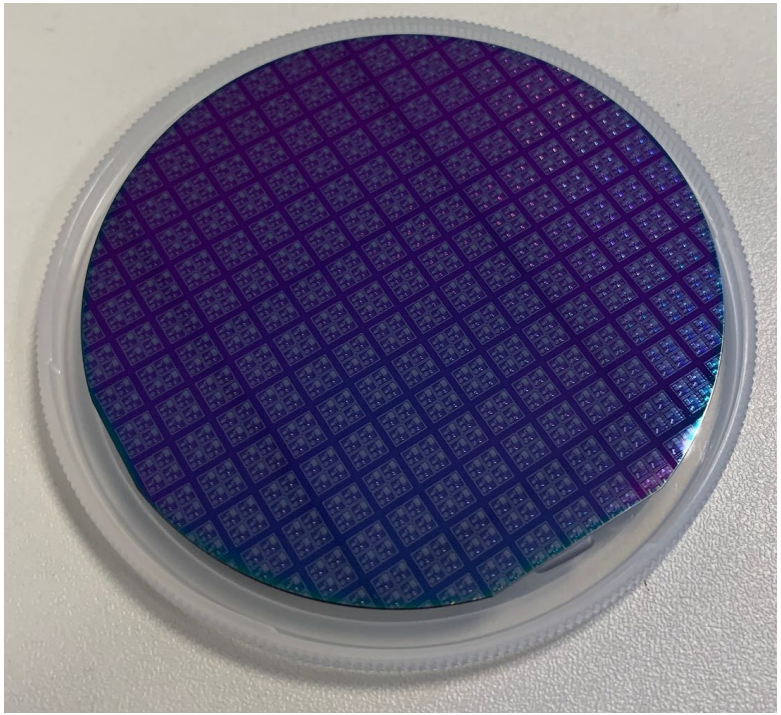


- Standard method for all existing equipment.
- Like a dot matrix printer, one row at the time.

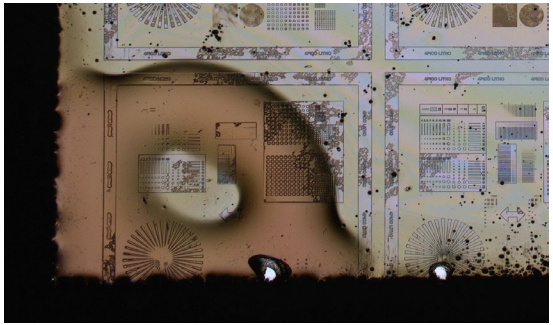


- Writing strategy where the laser writes the lines as designed. Like a laser cutting machine or plotter.

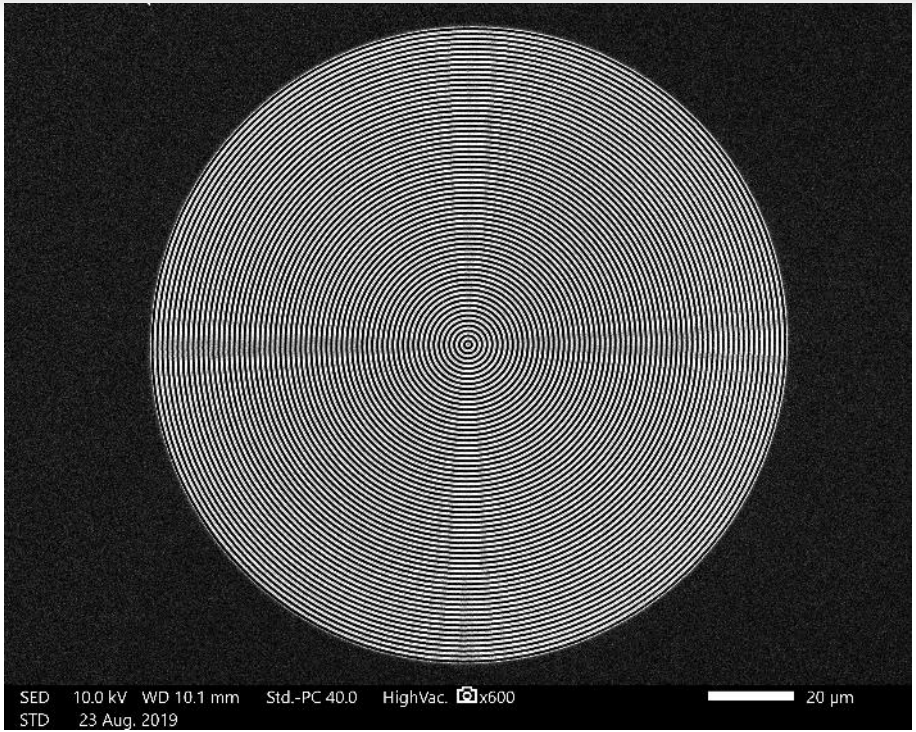
PICOMASTER - Super Accurate Hybrid Autofocus

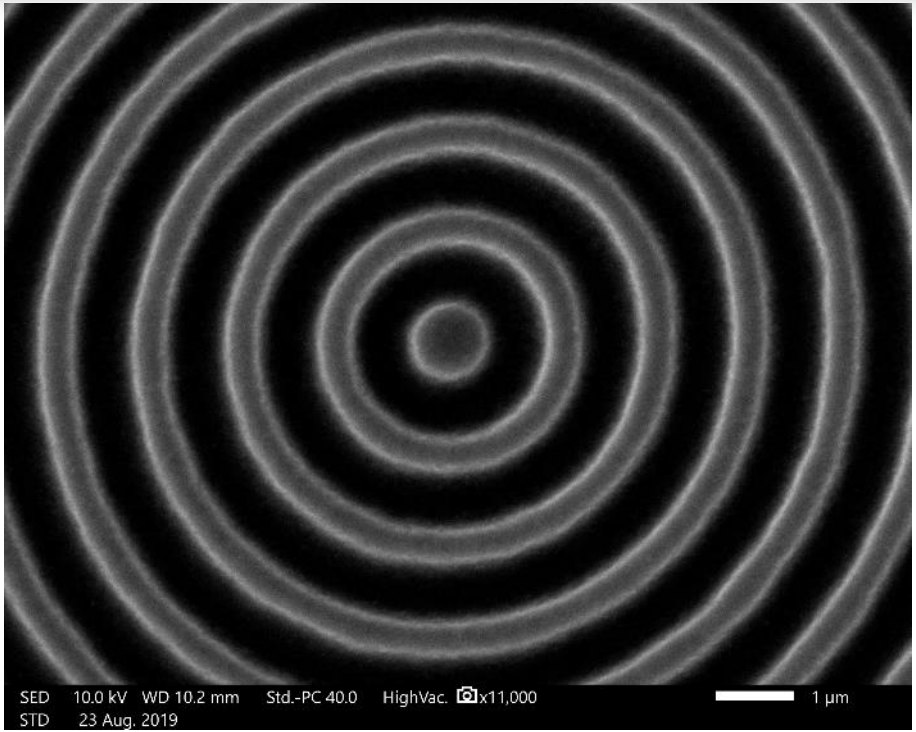


- A laser to measure distance between objective lens and substrate surface
- High autofocus range (600 µm) enables very precise surface tracking
- A second sensor maintains the correct focus distance even when the surface is not reflective or absent
- Edge to edge exposure even on small samples
- Maintains focus over trenches, on non-reflecting or absent surfaces
- Large particles, scratches and emulsion defects are ignored

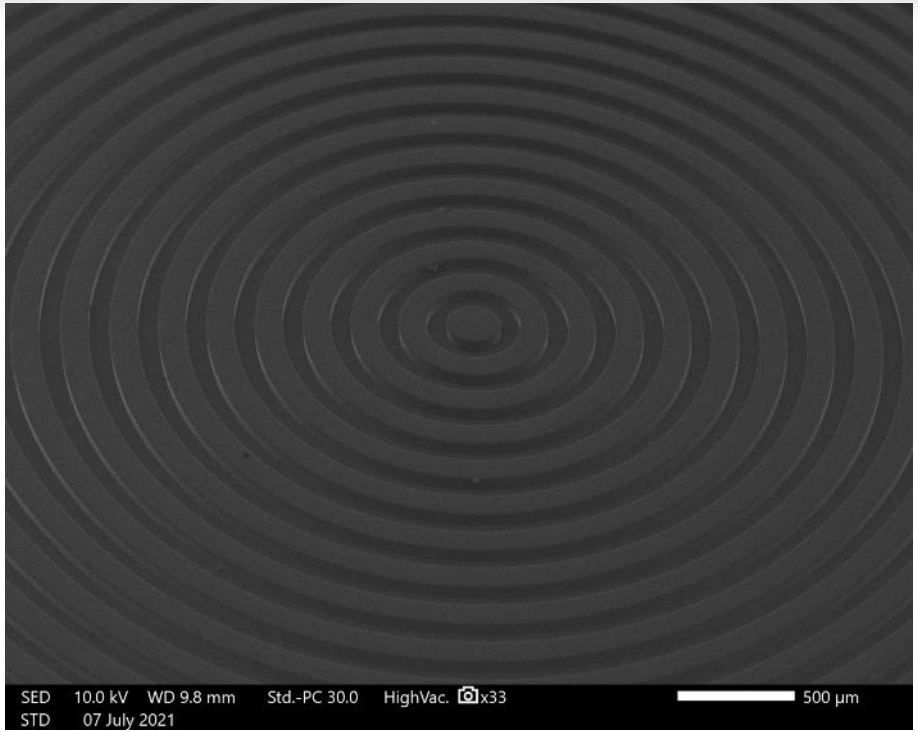


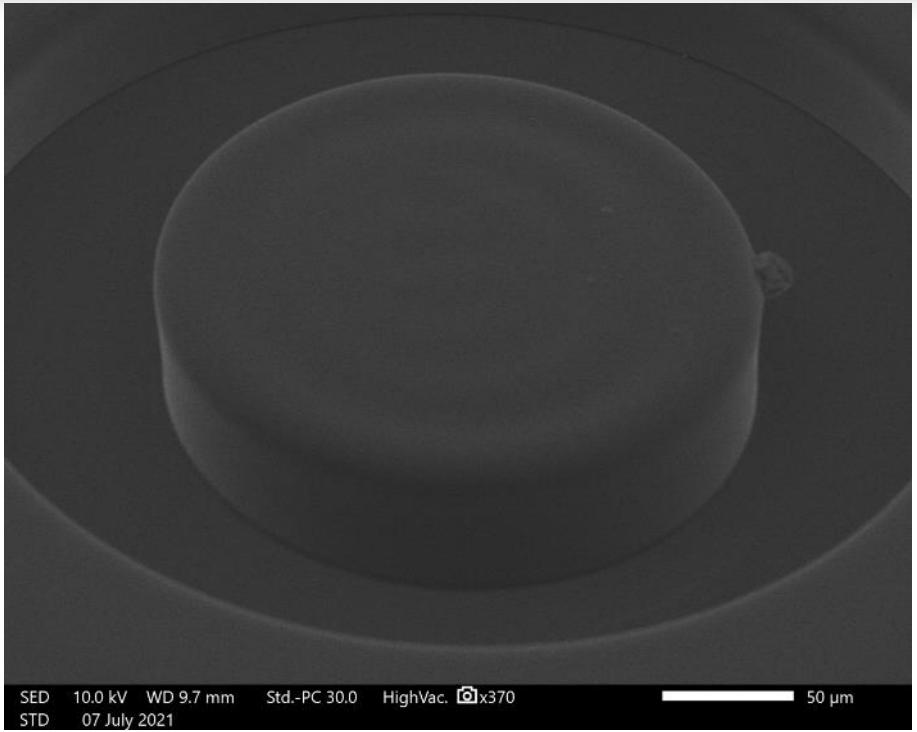
PICOMASTER - Zone Plate



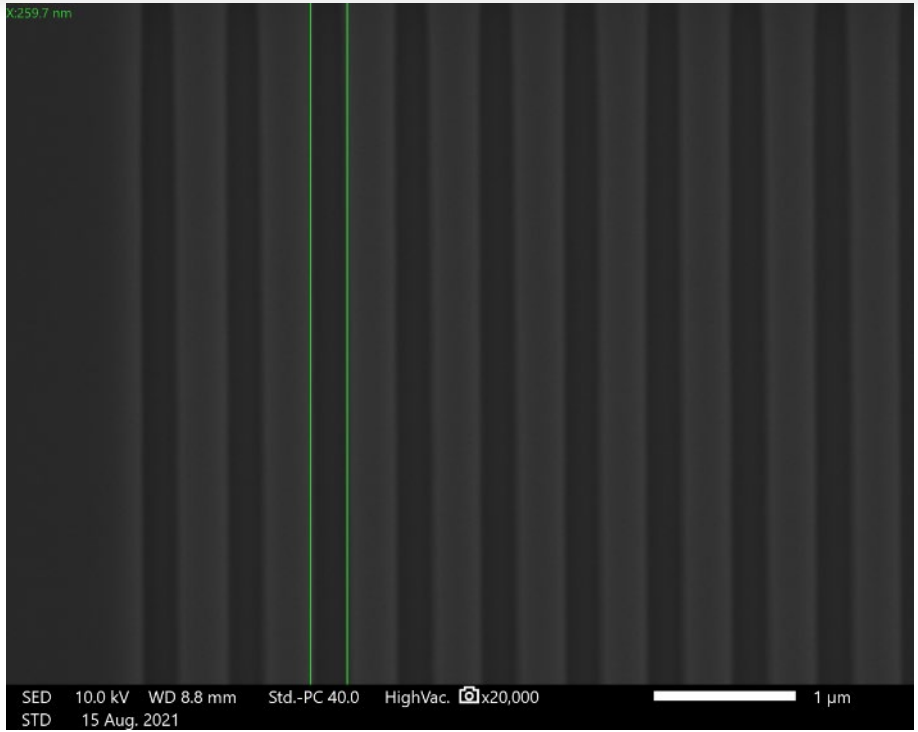


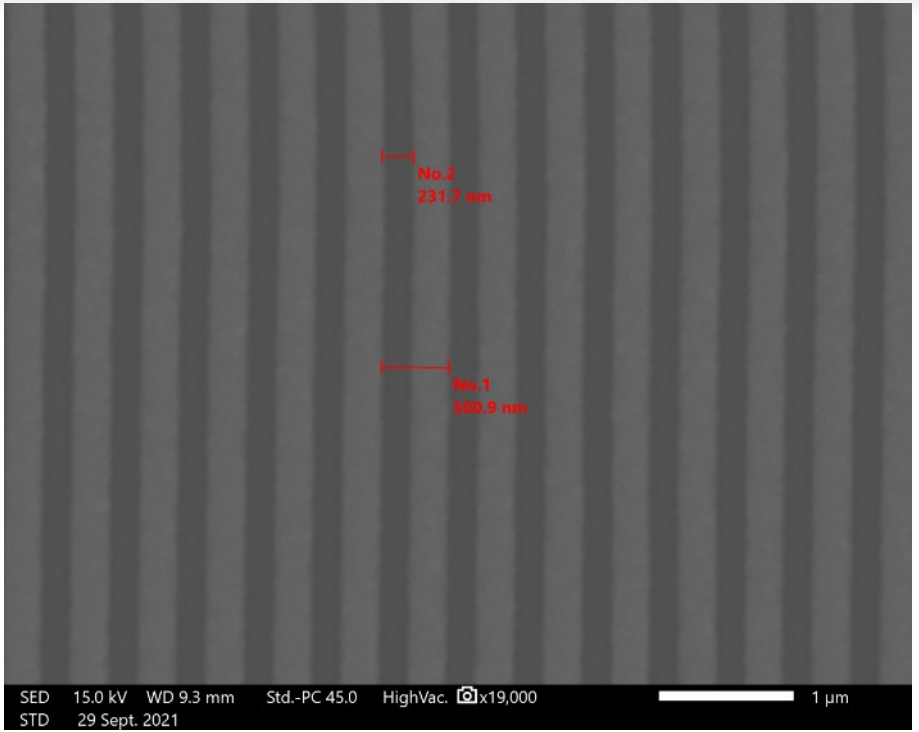
PICOMASTER - Thick Resist (SU-8 60µm)



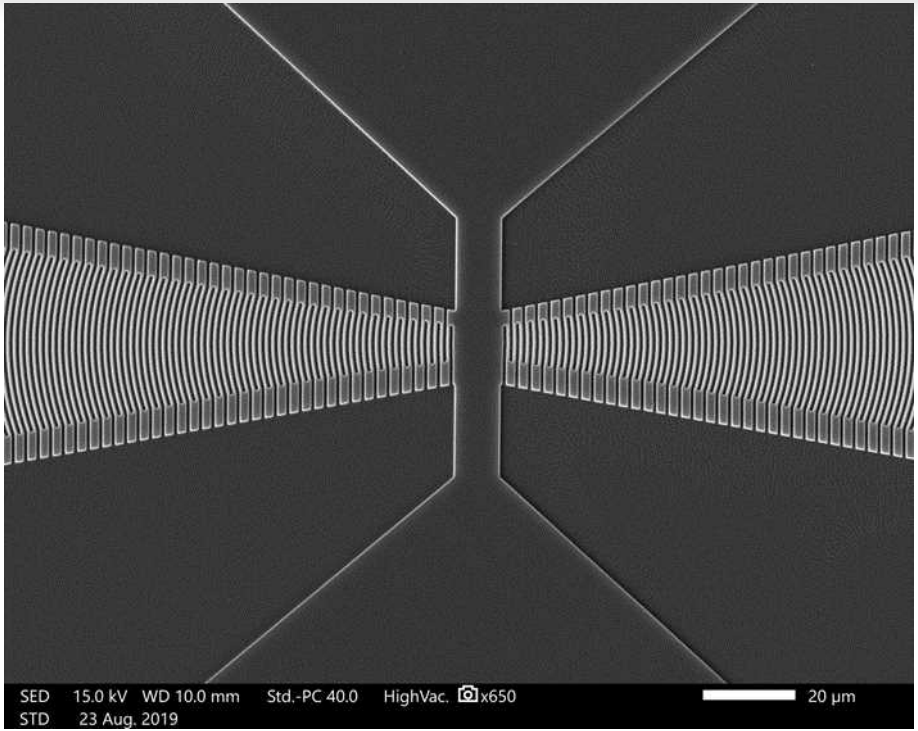


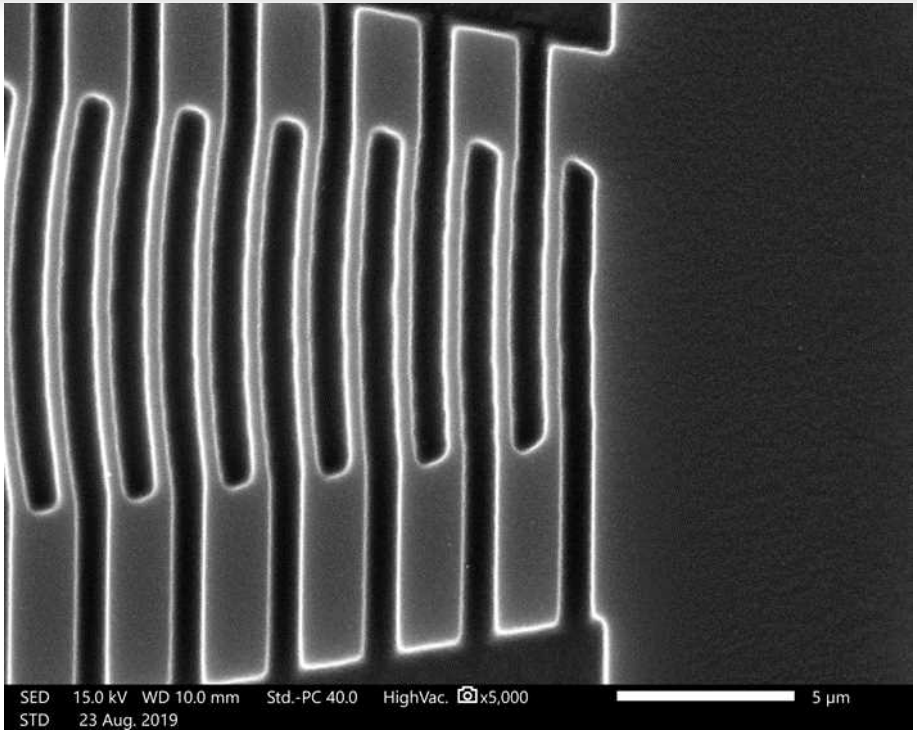
PICOMASTER - Gratings



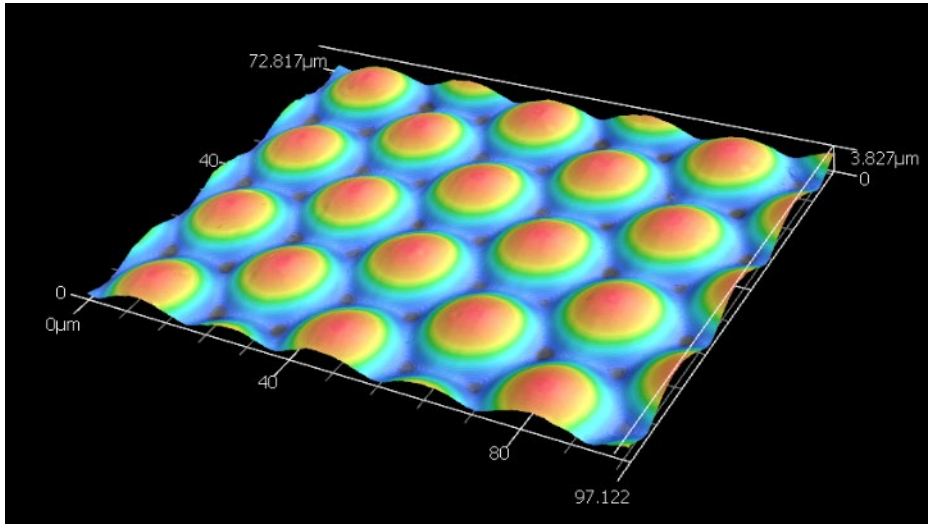


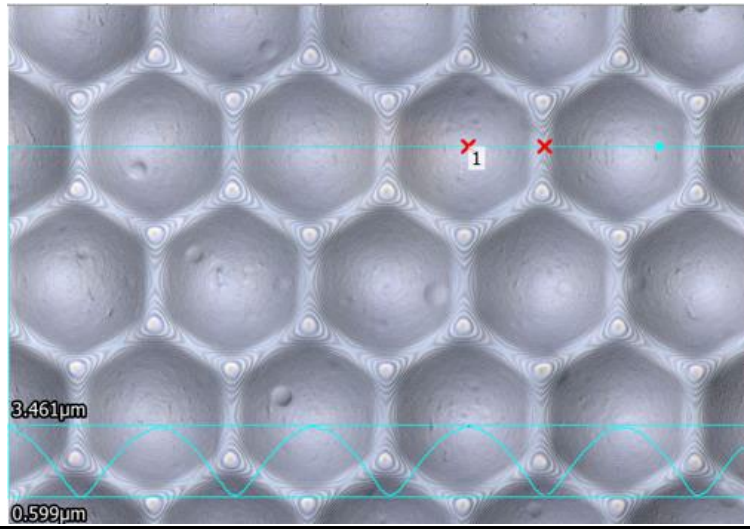
PICOMASTER - RF Devices



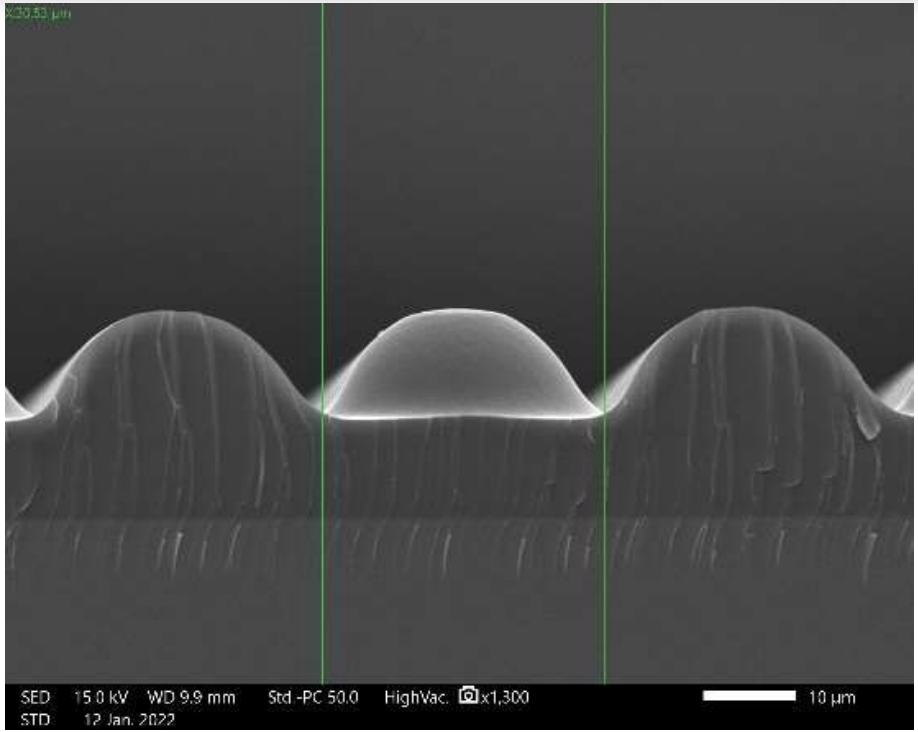


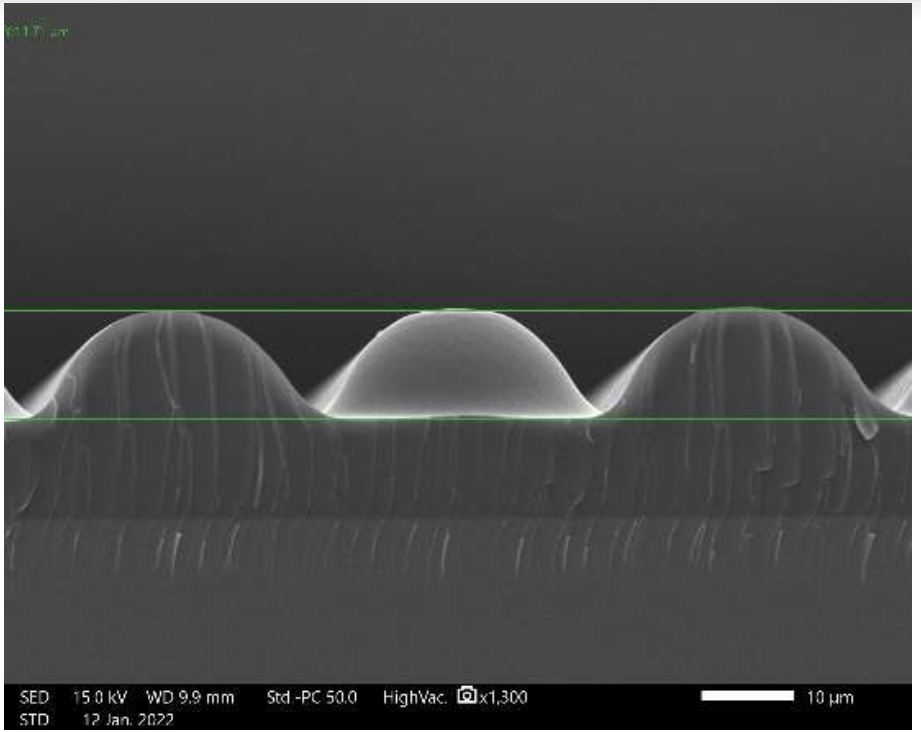
PICOMASTER - Grayscale Elements – Microlens arrays



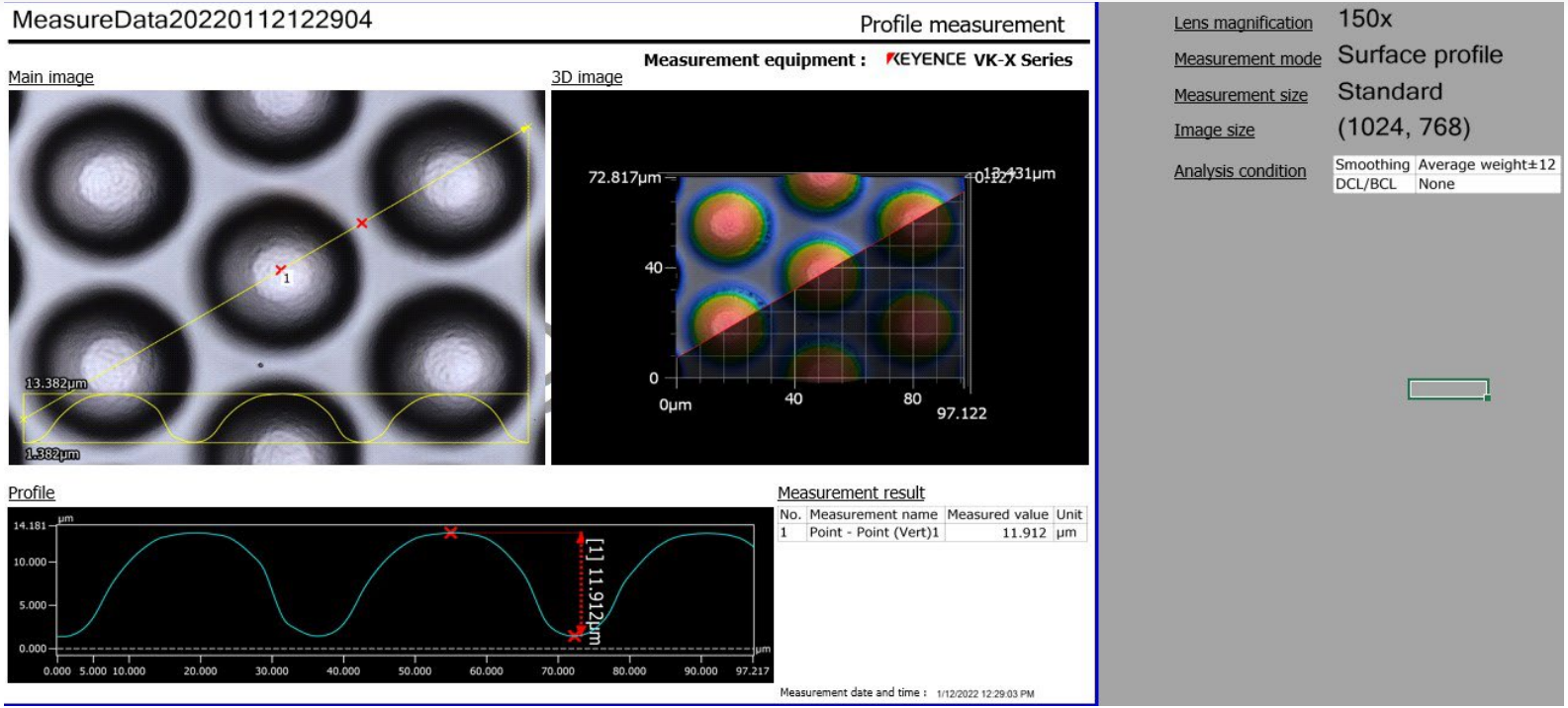


PICOMASTER - Grayscale Elements – Microlens arrays

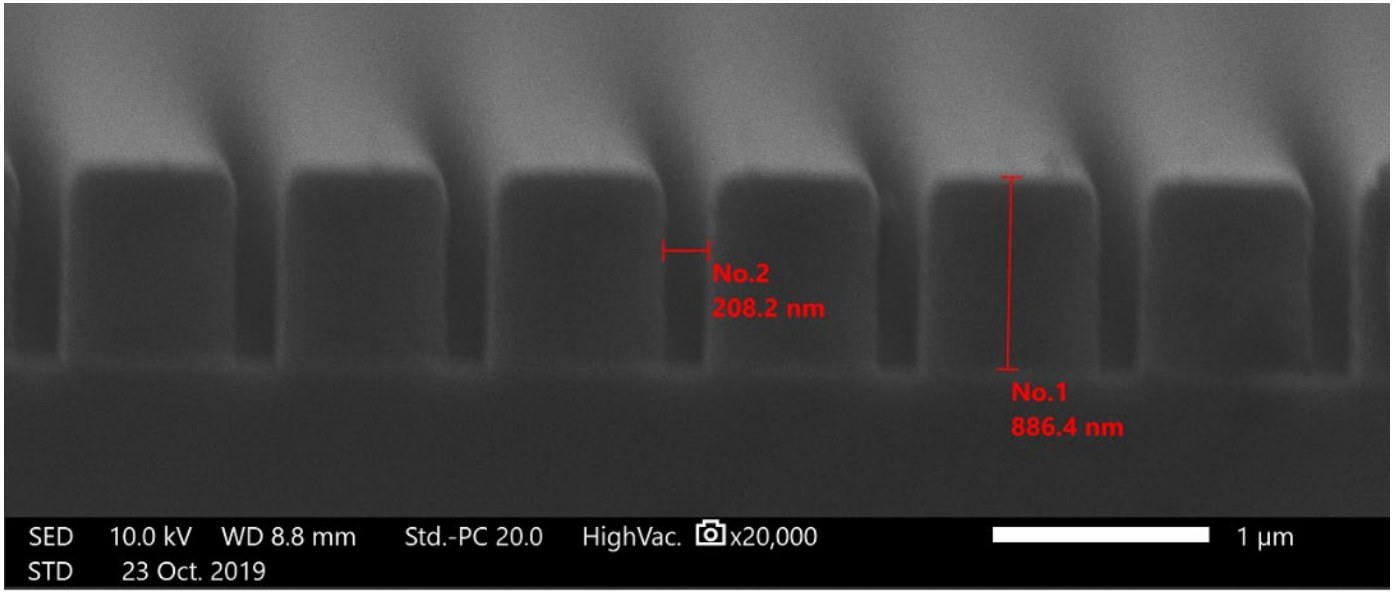




PICOMASTER - Grayscale Elements – Microlens arrays



PICOMASTER - High Aspect Ratio Gratings



The positive high contrast resist MiR 701 enables the PicoMaster to create features well **below the specified resolution** of 300nm. In the sample the lines where exposed with optimized step resolution, to match the address grid of 200nm.

Process specifications	
Priming:	2000 RPM
Spin Coating:	4000 RPM
Soft bake:	90 Sec @ 90 °C
Expose:	λ = 405nm Dose: 60 mJ/cm²
Post bake:	none
Developing:	60 sec single puddle

Materials specifications	
Primer:	Silane
Photo resist:	AZ MiR 701 14CP
Developer:	AZ 326 MIF
Substrate:	Soda-lime glass

PicoMaster specifications	
System:	PicoMaster 100
Scan speed:	200 mm/Sec
Step size:	200nm
Spot size:	0.3µm

PicoMaster XF - High-speed Large Format Systems

RAITH NANOFABRICATION

Multi beam: maximum throughput

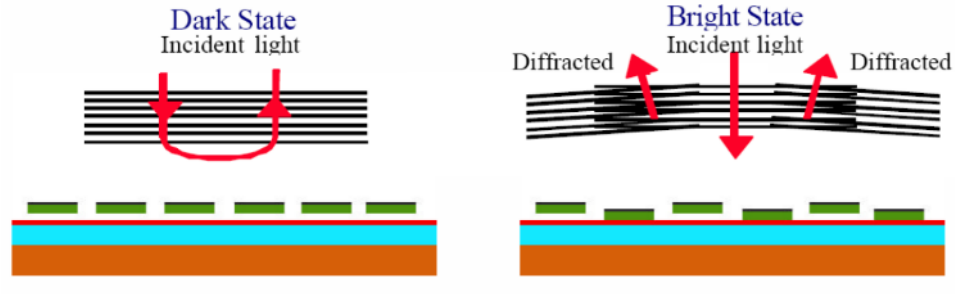
On request
Customized solutions

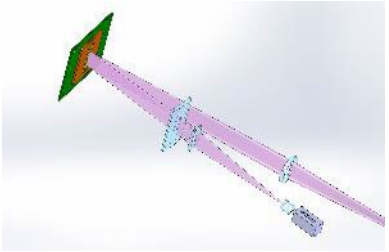
Write speed: **280 mm2/min** @ 0.6 nm resolution
@ 256 grayscale levels **real-time**

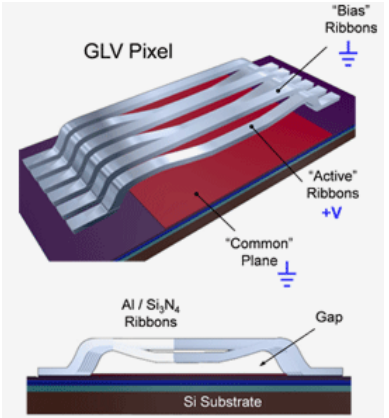
PICOMASTER XF PICOMASTER XF200 TO PICOMASTER XF1400

PICOMASTER XF - Exposure Technology

- 1D Spatial Light Modulator
- Intensity control by diffraction
- 2048 Ribbon pairs in parallel
- 256 intensity levels in real time
- Hybrid Autofocus



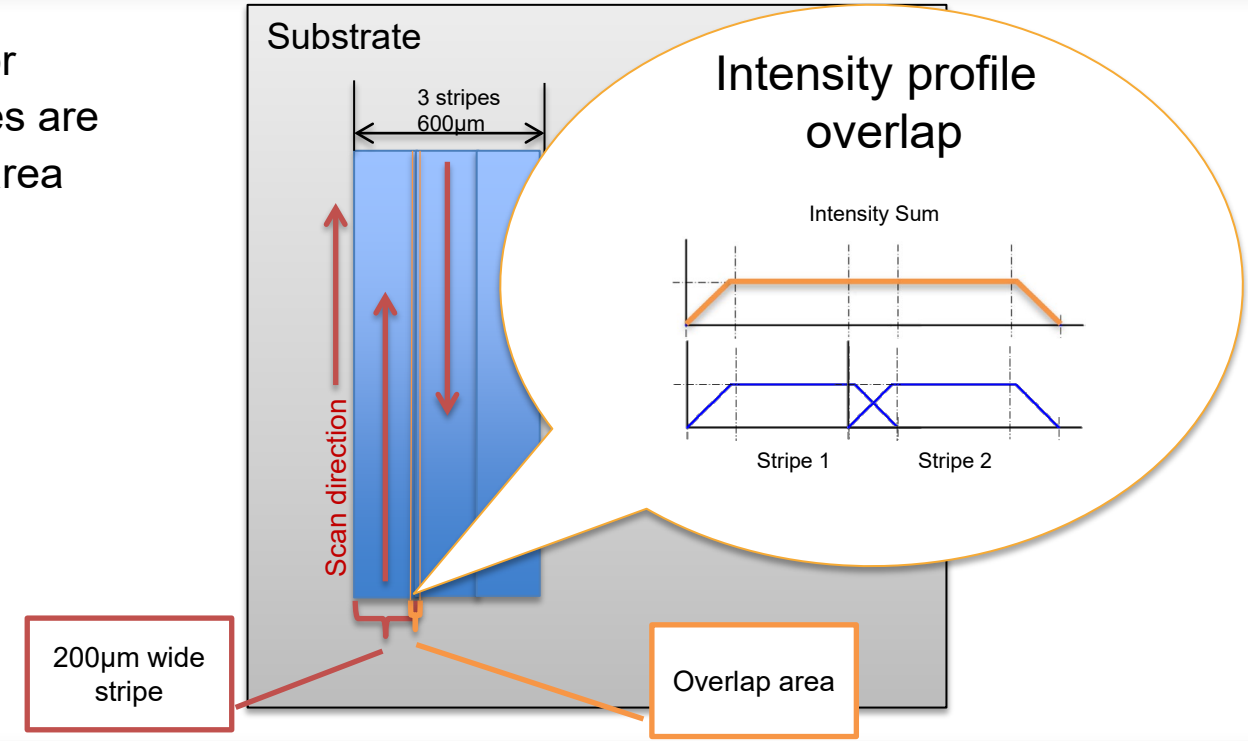




PICOMASTER XF - Non-overlap Strategy

To meet < 60 nm stitching error requirement neighboring stripes are exposed with certain overlap area

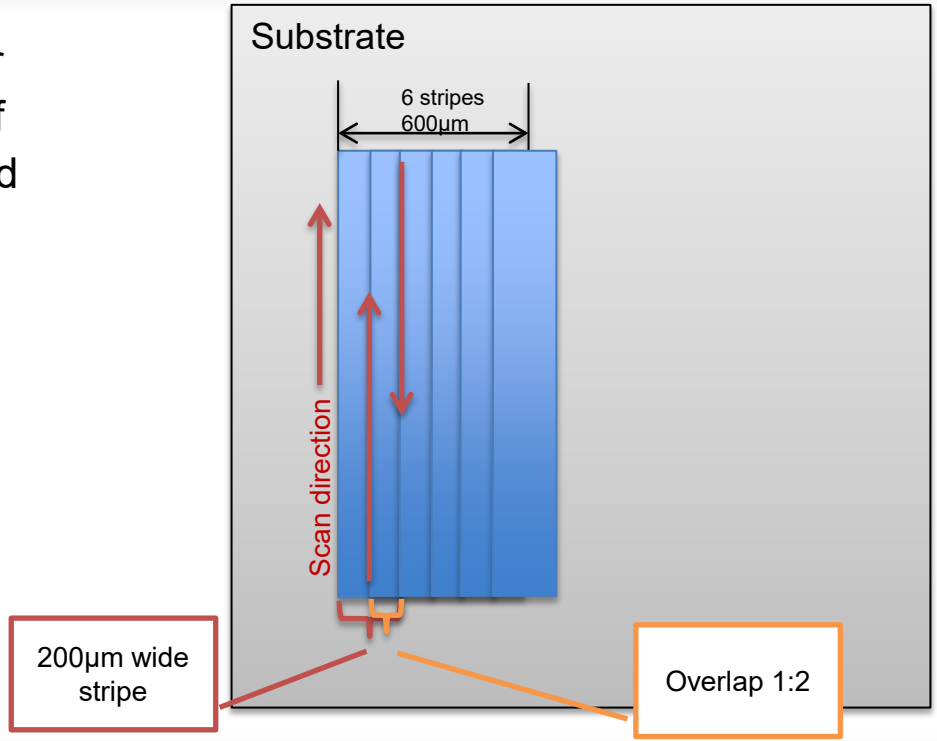
- 1D Spatial Light Modulator
- 600nm resolution
- 200µm stripe width
- 1:1, Minimum overlap



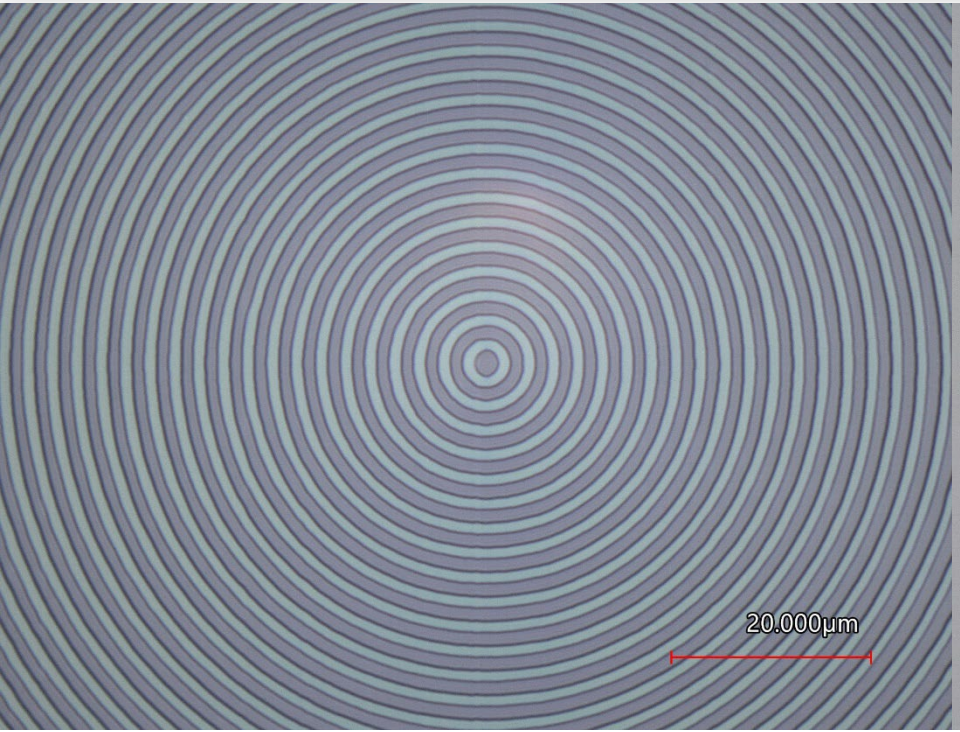
PICOMASTER XF - Overlap Strategy

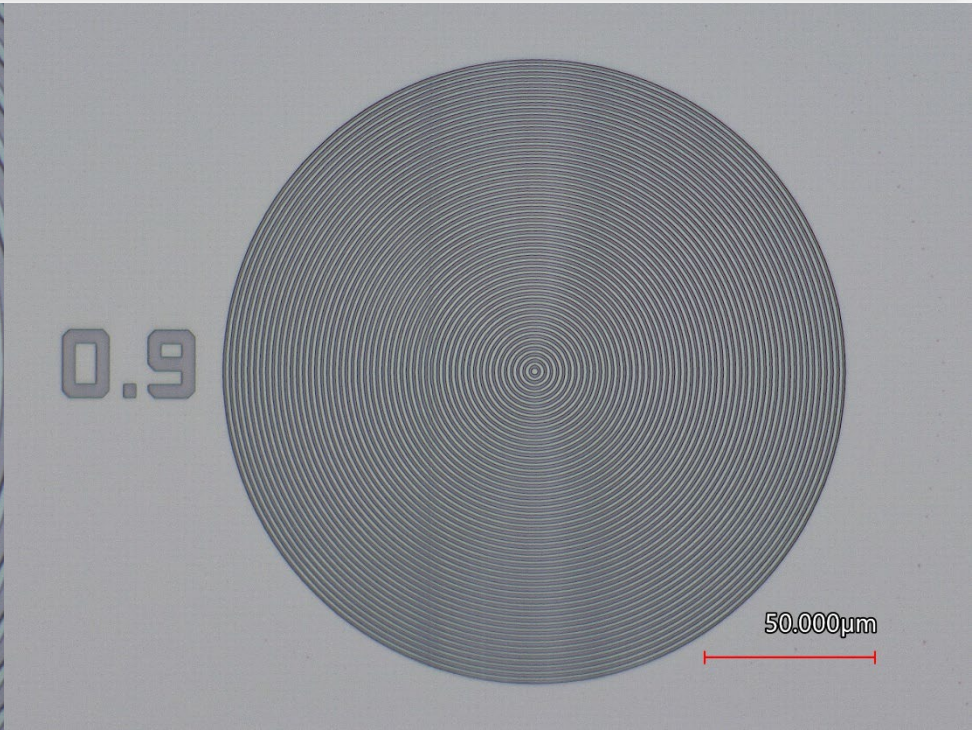
To meet < 60 nm stitching error requirement overlap strategy of exposure could be implemented

- Half the maximum speed
- 1D Spatial Light Modulator
- 600nm resolution
- 200µm stripe width
- 1:2, 50% overlap

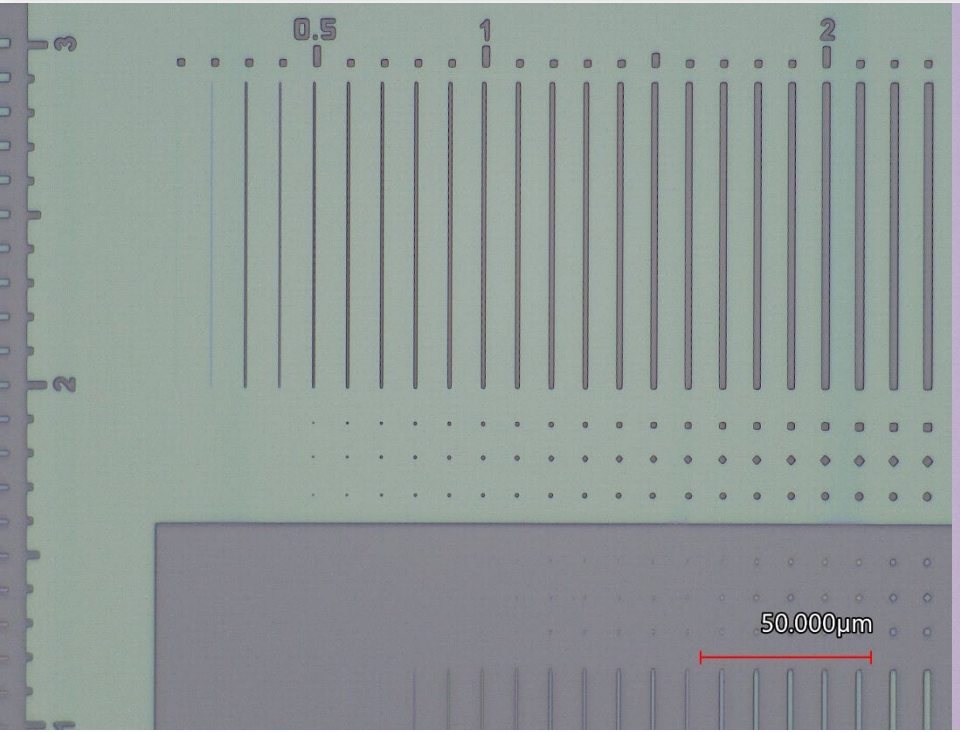


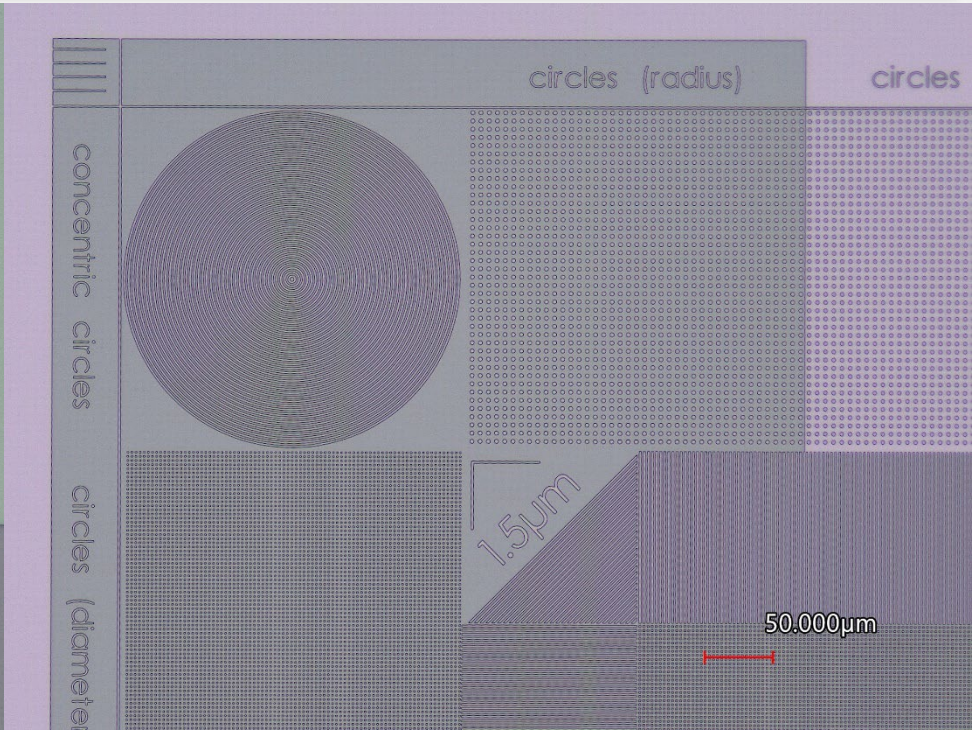
PICOMASTER XF - Zone Plate



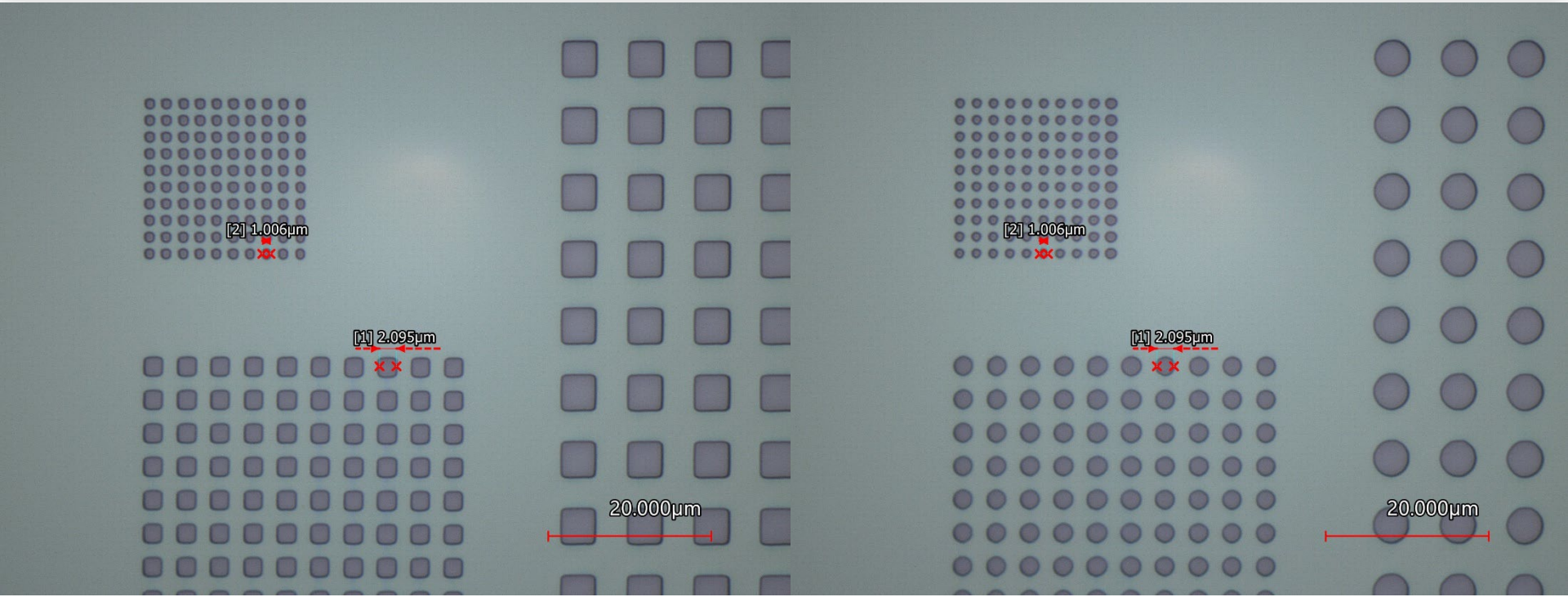


PICOMASTER XF - Grids

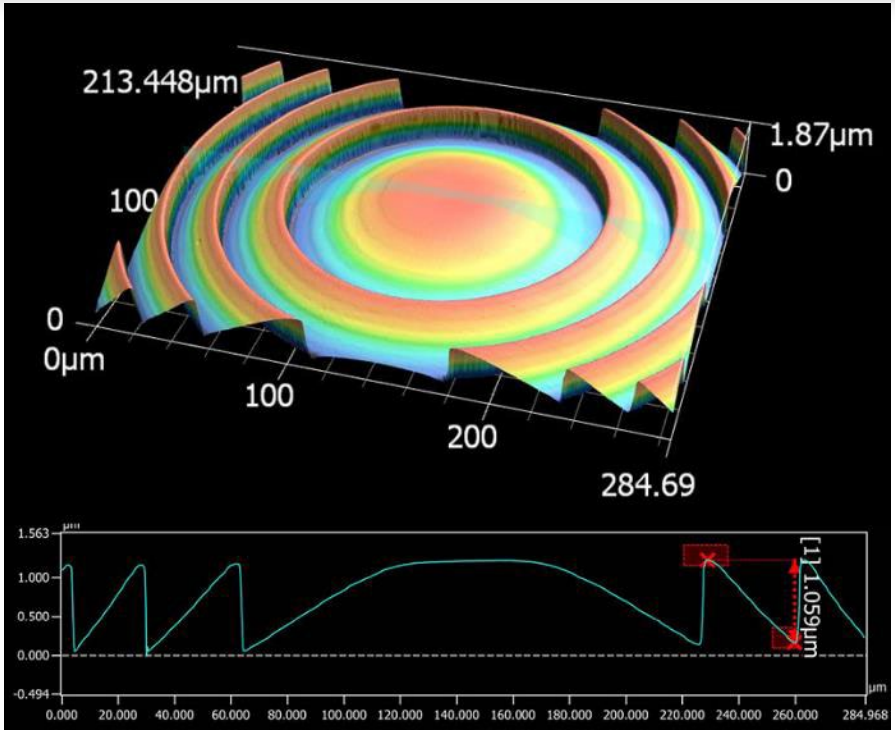


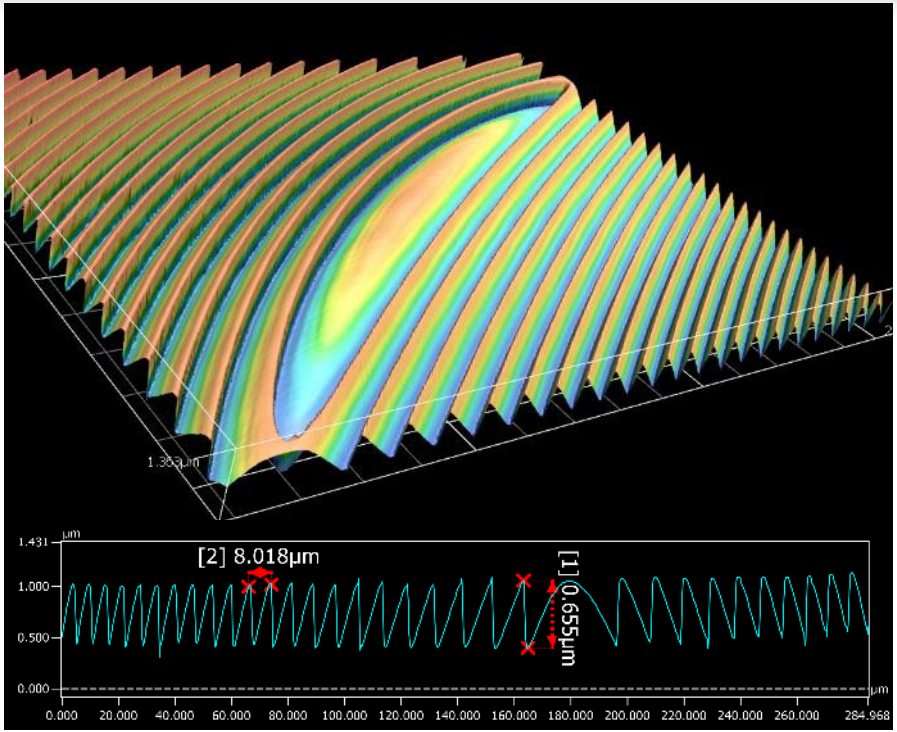


PICOMASTER XF - Shapes

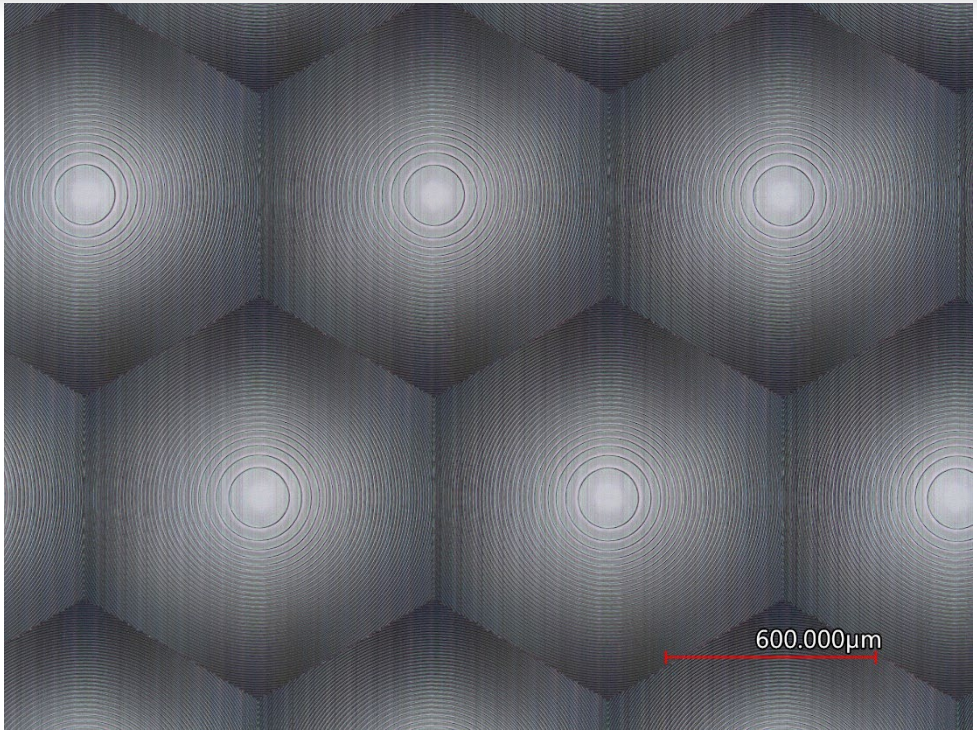


PICOMASTER XF - Fresnel Lenses



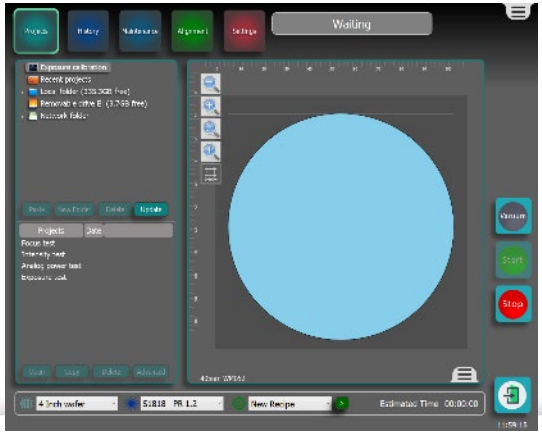


PICOMASTER XF - Fresnel lens array



PicoMaster and PicoMaster XF - Software

Screenshot of the visual PicoHLD.



Screenshot of the visual Machine Controller software.

- **PicoMaster Machine Controller and PicoHLD – hologram and lens designer**

The Picomaster comes with two Windows based applications: PicoMaster Machine Controller and PicoHLD. PicoHLD allows the user to select all hologram, Fresnel lens and other optical features and combine and compose images while PicoMaster Machine Controller processes these jobs and control the machine, allows the operator to queue jobs, monitor progress and gives a high level of manual control features.

- **Features of PicoMaster Machine Controller:**

- Direct supported file formats: GDSII, BMP, TIFF
- DXF to GDSII convertor included
- Windows 10 operating system
- Real time processing of images. No need for offline pre- processing
- Designer application included.
- User login (multiple levels)
- Recipe based process selection

- **User Algorithms**

PicoMaster software supports user libraries. These libraries can be written in C# or VB.net. With these user libraries the user can create his own algorithm to calculate the laser intensity at each grid point.

PicoSC/PicoSD – Photoresist Plate Coating and Developing

Configurations:

- 150/200/250 size
- Standalone / Combined SDC
- Manual / Automated

Coating & Baking

Developing

RAITH

NANOFABRICATION

Your challenge is our mission.

SPATIALIMAGING

Exclusive worldwide distributer for all holographic systems:

Contact Rob Munday - Spatial Imaging Ltd.

Website: www.spatial-imaging.com

Email: sales@spatial-imaging.com

Telephone: +44 (0) 7913 823 506