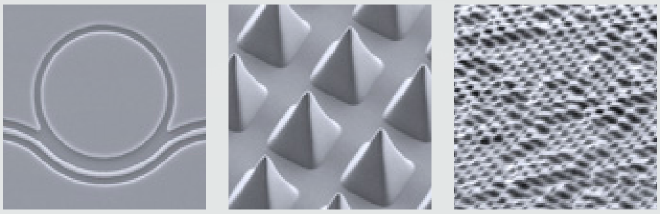
HEIDELBERG
INSTRUMENTS

DWL 66$^+$

THE ULTIMATE LITHOGRAPHY RESEARCH TOOL



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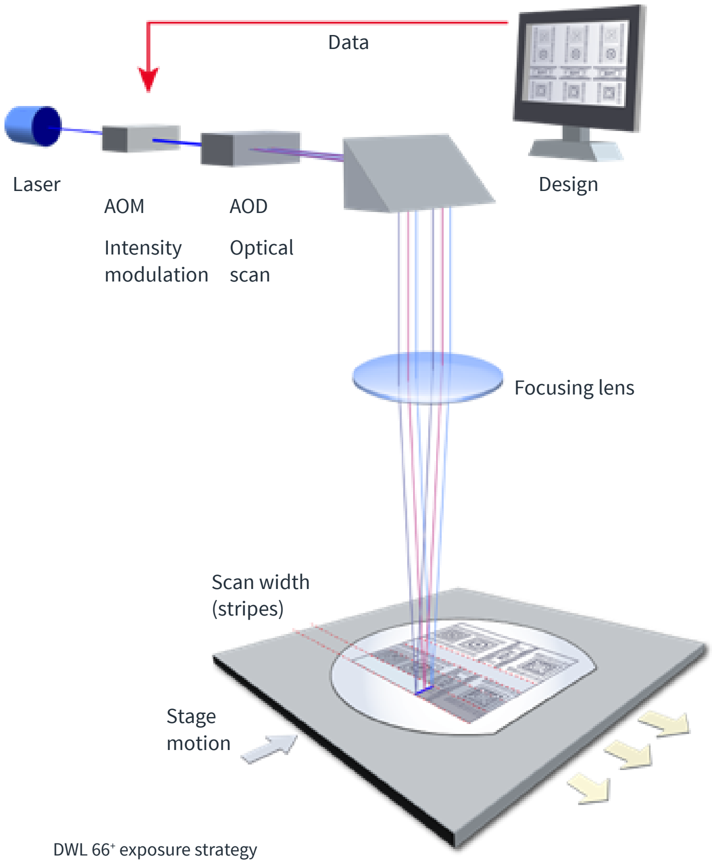
DWL 66$^+$

THE ULTIMATE PHOTOLITHOGRAPHY TOOL FOR RESEARCH & DEVELOPMENT

The DWL 66$^+$ laser lithography system is a highly versatile, high-resolution pattern generator for direct writing and low-volume mask making. Its customer base includes over 400 leading universities, research facilities, and companies worldwide.

The system features powerful standard options such as the High-Resolution Mode, backside alignment (BSA), and the optical autofocus. In addition to high-resolution 2D patterns, the system also supports the creation of complex 2.5D structures in thick photoresist with the help of the gray-scale exposure mode. The DWL 66$^+$ can be equipped with either a 405 nm laser for work with all broadband resists, or with a 375 nm UV laser that in addition allows the use of SU-8 and other i-line-resists. Advanced professional options like the High-Accuracy Coordinate System and an automatic loader are also available.

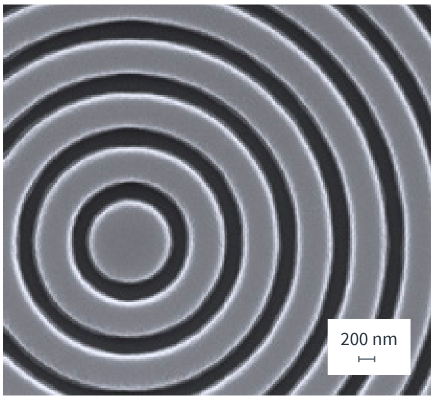
With a minimum structure size of 200 nm, the DWL 66$^+$ provides the ultimate in high resolution, outperforming the most powerful optical lithography systems in the Research & Development market segment. The system's main application areas can be found in optical sciences, material research, micro-engineering and micro-electronics.



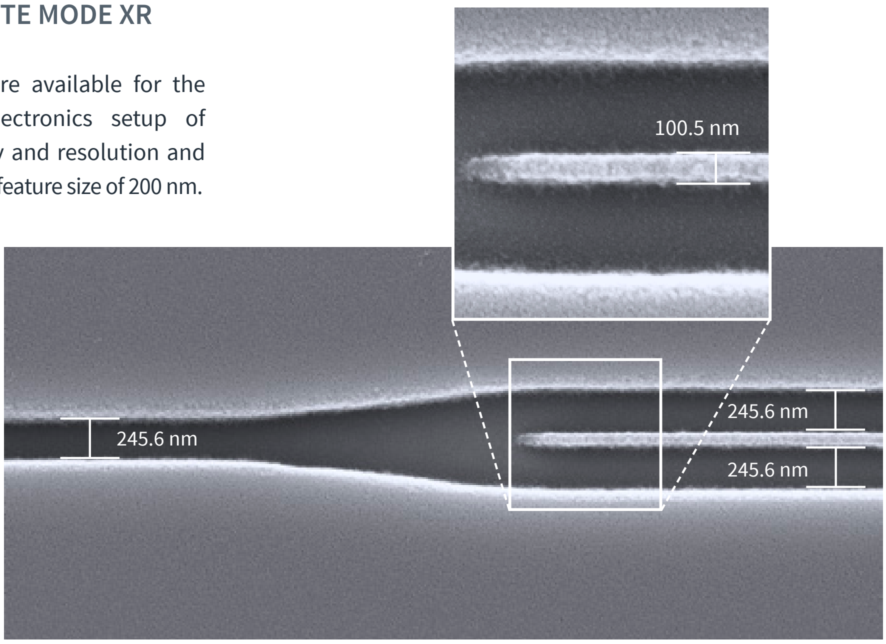
DWL 66$^+$ exposure strategy

PUSHING THE LIMITS WITH THE WRITE MODE XR

This is one of the six write modes that are available for the DWL 66$^+$. The optimized optics and electronics setup of the Write Mode XR provide ultimate stability and resolution and enable exposures of structures with a minimum feature size of 200 nm.



Concentric rings with a linewidth of about 200 nm

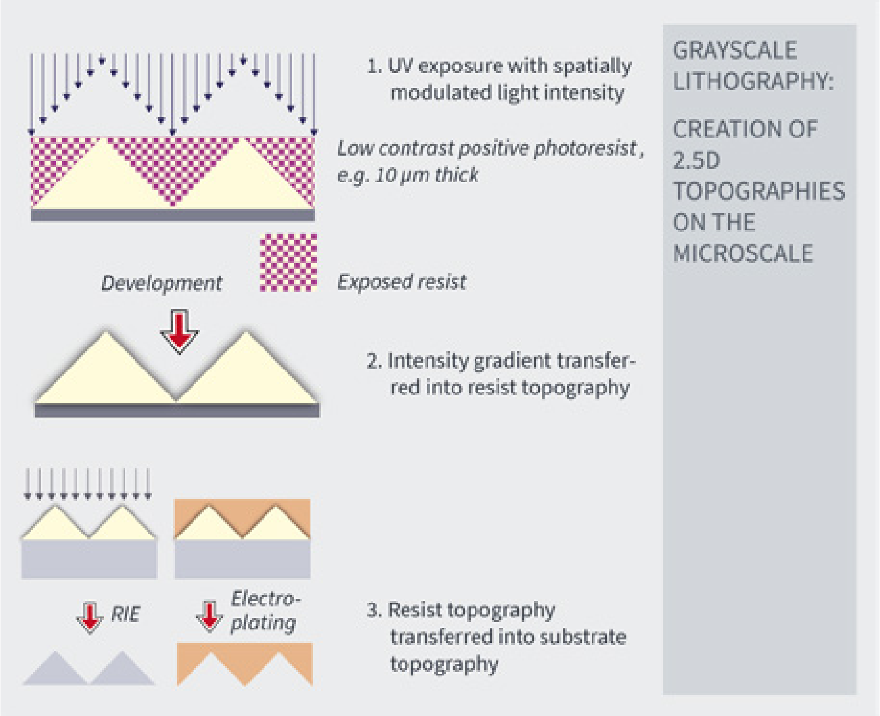


Even 100 nm gaps between exposed features are achievable with optimized process parameters.

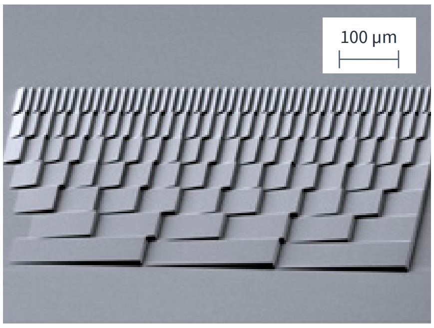
A CHOICE OF GRAYSCALE CAPABILITIES

Grayscale lithography uses a low-contrast positive photoresist. The exposure intensity gradient transfers directly into exposure depth. The result after processing is a 2.5D topography on the microscale.

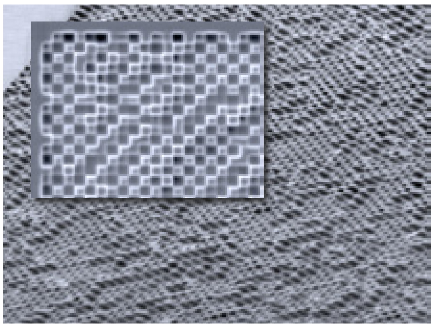
The advanced and professional grayscale mode present powerful tools for the creation of complex topographies - for example for micro-optical components or MEMS.



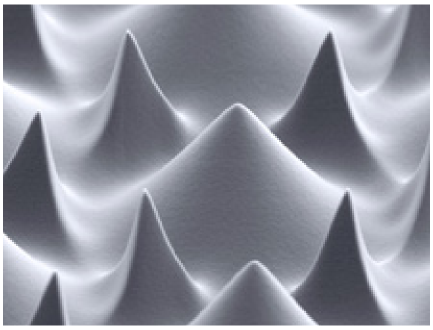
APPLICATIONS



Blazed gratings with 10 to 70 degree slope



DOE: Resist AZ 4633, resist thickness 4 µm, structure size 2 µm



Diffuser: Resist AZ 4562, structure size < 5 µm

Image courtesy of IGI

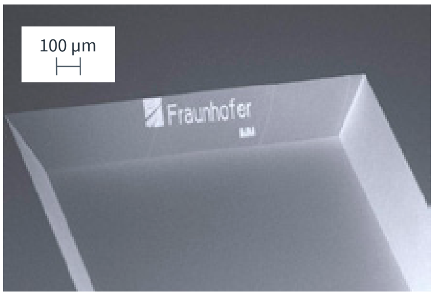
ADVANCED OPTIONS AND UPGRADES

- Professional Grayscale
  Allows the exposure of CAD files with up to 65 536 gray levels in order to create complex topographies for applications such as microoptics. Includes highly sophisticated software package.

- High-Accuracy Coordinate System
  Includes various technical measures to improve the thermal stability and position accuracy of the stage’s coordinate system. Provides improved specifications for 2nd layer overlay accuracy.

- Automatic Loader
  Handling of masks up to 7″ and wafers up to 8″ with two carrier stations, pre-aligner and wafer scanner.

- Basic Freeform (BFF)
  Exposures on non-planar substrates with features down to 3 µm. Typical applications are microstructures on top of convex or concave lenses or across sidewalls of etched grooves.



Fraunhofer logo written with Basic Freeform Mode on the sidewall of a 500 µm deep groove

Image courtesy of Fraunhofer IMM

DWL 66$^+$

SYSTEM SPECIFICATIONS

Writing performance

Write mode	XR	I	II	III	IV	V
Minimum feature size [µm]	0.2	0.6	0.8	1	2	4
Minimum lines and spaces [µm]	0.3	0.8	1	1.5	3	5
Address grid [nm]	5	10	25	50	100	200
Edge roughness [nm]	50	50	70	80	110	160
CD uniformity [nm]	60	70	80	130	250	400
2nd layer alignment over 5 mm x 5 mm [nm]	250	250	250	250	350	500
2nd layer alignment over 100 mm x 100 mm [nm]	500	500	500	500	800	1000
Backside alignment [nm]	1000					
Write speed [mm^2/min][1] with diode laser (405 nm)	3	13	40	150	600	2000
Write speed [mm^2/min][1] with UV diode laser (375 nm)	2	10	30	110	-	-
Pixel grid in x and y [nm]	50	100	250	500	1000	2000
Scan speed [mm/s]	1800	3600	4500	9000	18 000	36 000

[1] Write speed is calculated for a 200 mm x 200 mm raster mode exposure with the specified pixel grid

System features

Light source	Diode laser with 405 nm or 375 nm
Substrate sizes	Variable: 5 x 5 mm^2 to 9″ x 9″ | Customizable on request
Substrate thickness	0 to 12 mm
Maximum exposure area	200 x 200 mm^2
Environmental chamber	Temperature stability ± 0.1°, ISO 4 environment
Real-Time autofocus	Optical autofocus or air-gauge autofocus
Autofocus compensation range	80 µm
Standard or Advanced Grayscale Mode	128 or 32 768 gray levels respectively
Vector Mode	Enables the writing of stitching-free lines
Overview camera	13 x 10 mm^2 field of view facilitates alignment to marks and substrate navigation
Backside alignment (optional)	Allows the alignment of exposures to structures on the backside of the substrate

Advanced options - performance upgrades

High-accuracy coordinate system	Includes golden plate calibration and climate monitoring: 2nd layer alignment over 100 x 100 mm^2 improved to 350 nm
Professional Grayscale Mode	65 536 gray levels, professional data conversion software
Automatic loading system	Handling of masks up to 7″ and wafers up to 8″ with two carrier stations, pre-aligner and wafer scanner

System dimensions of standard version

Width × depth x height	1300 mm x 1100 mm x 1950 mm (lithography unit only)
Weight	1000 kg (lithography unit only)

Installation Requirements

Electrical	230 VAC ± 5 %, 50/60 Hz, 16 A
Compressed air	6 - 10 bar

Please note: Specifications depend on individual process conditions and may vary according to equipment configuration. Write speed depends on exposure area. Design and specifications are subject to change without prior notice.

Visit product website for
more information

To contact your local representative,
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heidelberg-instruments.com

HEIDELBERG
INSTRUMENTS
The power of direct writing

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