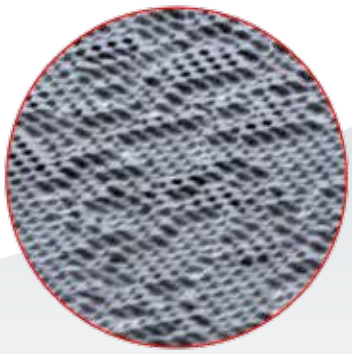
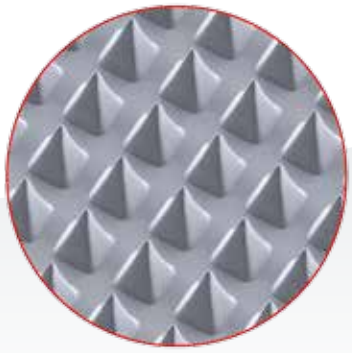
HEIDELBERG INSTRUMENTS

DWL 66+

The Ultimate Lithography Research Tool





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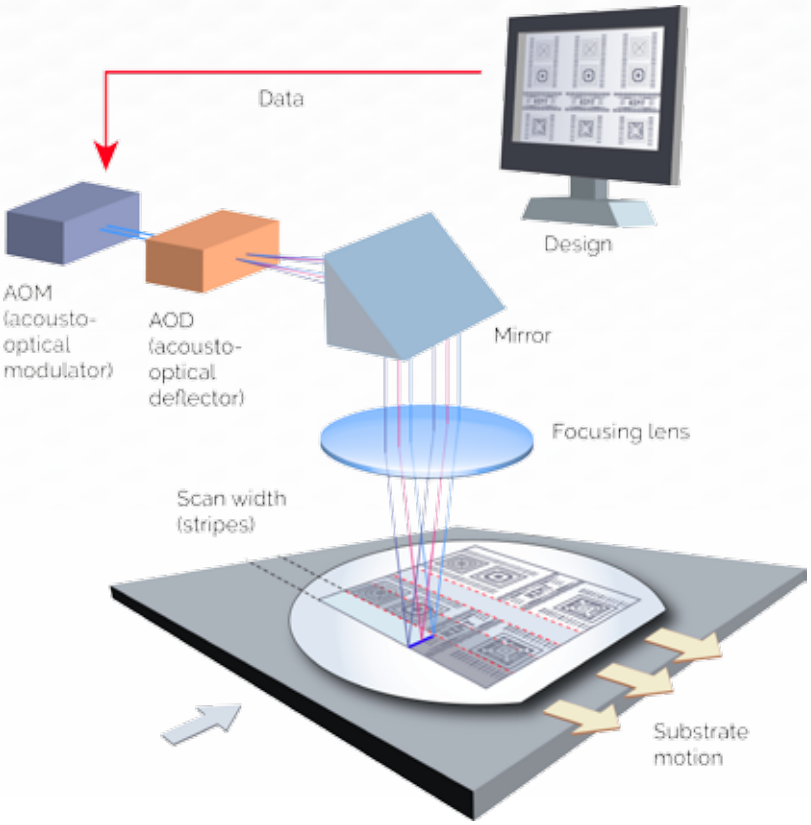
HEIDELBERG INSTRUMENTS

DWL 66⁺
THE ULTIMATE PHOTOLITHOGRAPHY TOOL FOR RESEARCH & DEVELOPMENT

The DWL 66⁺ laser lithography system is a highly versatile, high-resolution pattern generator for low-volume mask making and direct writing. Its customer base includes over 250 leading universities, research facilities, and companies worldwide.



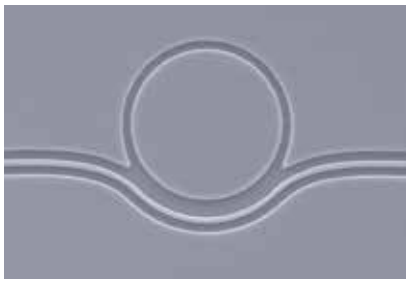
The system features powerful standard options such as the High-Resolution Mode, backside alignment (BSA), and the optical autofocus. In addition to high-resolution 2D patterns, the system also supports the creation of complex 3D structures in thick photoresist with the help of the grayscale exposure 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 300 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.

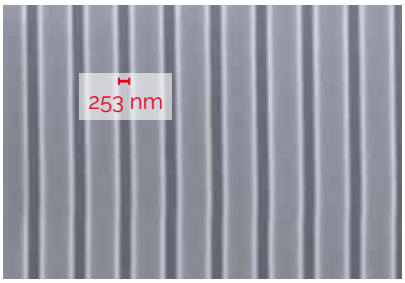
THE HIGH-RESOLUTION MODE

This is one of the six write modes that are available for the DWL 66⁺. The optimized optics and electronics setup of the High-Resolution Write Mode provide ultimate stability and resolution and enable exposures of structures with a minimum feature size of 300 nm.

[1] The Nanolithography Toolbox. K.C. Balram et al., J. Res. Natl. Inst. Stand. 121, pp. 464-475 (2016). http://dx.doi.org/10.6028/jres.121.024



A channel waveguide coupled to a ring resonator. The waveguide is approximately 320 nm wide, the resonator diameter is 3 µm. The exposure laser wavelength was 405 nm. Design created with [1].

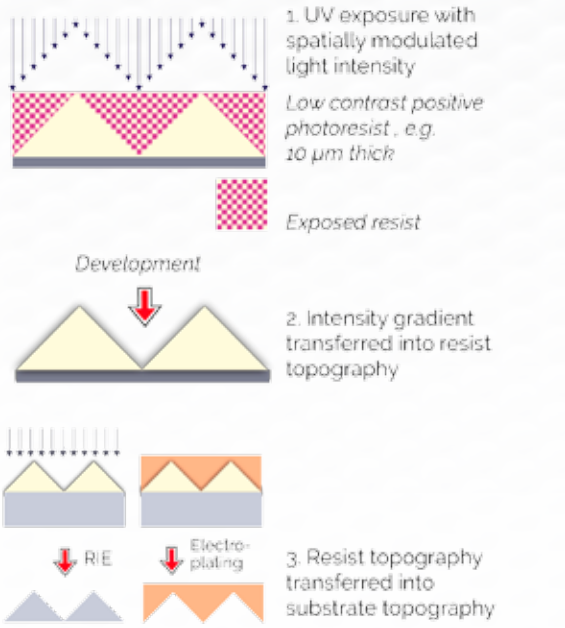


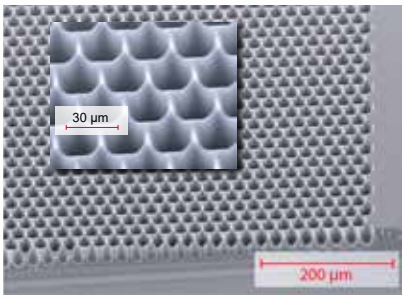
Minimum feature size: 300 nm - or even less. The image shows the result of a high-resolution test exposure with a nominal linewidth of 250 nm!

A CHOICE OF GRAYSCALE CAPABILITIES

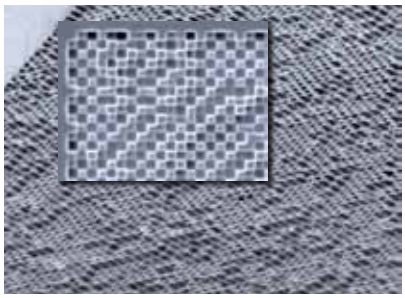
Grayscale lithography uses a low-contrast positive photo-resist. The exposure intensity gradient transfers directly into exposure depth. The result after processing is a 3D topog-raphy on the microscale.

Whether standard, advanced or professional - the grayscale mode presents a powerful tool for the creation of complex topographies - for example for micro-optical components or MEMS.

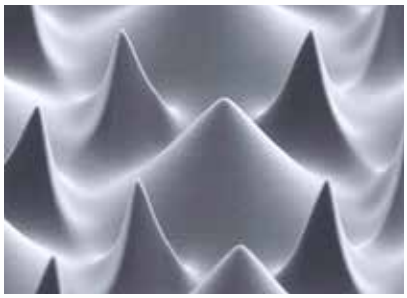




Microlens array: Width of lenses 20 µm, depth 30 µm



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



Diffuser: Resist AZ 4562, structure size < 5 µm

ADVANCED OPTIONS AND UPGRADES

- Professional Grayscale

Allows the exposure of CAD files with up to 1000 gray levels in order to create complex topographies for applications such as microoptics. Includes highly sophisticated software package.

- High-Accuracy Option

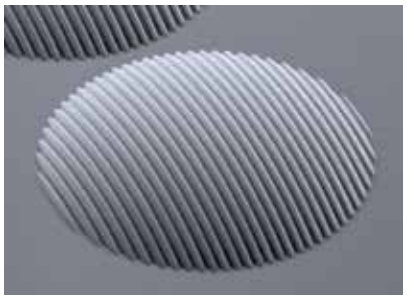
Includes various technical measures to improve the thermal stability and posi-tion accuracy of the stage's coordinate system. Provides improved specifications for 2nd layer overlay accuracy.

- Automatic Loader

Handling of masks up to 7″ and wafers up to 8″. Optional second cassette station. Pre-aligner and wafer scanner available.

- 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.



Grating on concave lens

Courtesy of Fraunhofer IOF

DWL 66+
SYSTEM SPECIFICATIONS

Write mode	HiRes	I	II	III	IV	V
Writing performance						
Minimum structure size [µm]	0.3	0.6	0.8	1	2	4
Minimum lines and spaces (half pitch, µm)	0.5	0.8	1	1.5	3	5
Address grid [nm]	5	10	25	50	100	200
Edge roughness [3σ, nm]	50	50	70	80	110	160
CD uniformity [3σ, nm]	60	70	80	130	180	250
Alignment measurement accuracy [3σ, nm]	100	100	150	250	400	800
2nd layer alignment over 100 x 100 mm² [3σ, nm]	500	500	500	500	800	1000
Max. write speed 405 nm laser [mm²/min]	3	13	40	150	600	2000
Max. write speed 375 nm laser [mm²/min]	2	10	30	110	-	-
System features						
Light source	Diode laser with 405 nm or 375 nm					
Substrate sizes	Variable: 3 x 3 mm² to 9″ x 9″ | Customizable on request					
Substrate thickness	0 to 12 mm					
Maximum exposure area	200 x 200 mm²					
Temperature controlled flow box	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 / 255 gray levels respectively					
Vector mode	Enables the writing of stitching-free lines					
Backside alignment (optional)	Allows to align 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 down to 350 nm					
Professional Grayscale Mode	1000 gray levels, professional data conversion software					
Automatic loading system	Automatic loading unit, optional additional cassette station, optional pre-aligner and wafer scanner					
System dimensions of standard version						
Height × width × depth	1950 mm × 1300 mm × 1100 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.

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HEIDELBERG INSTRUMENTS
The power of direct writing

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HIMT 09 / 2019