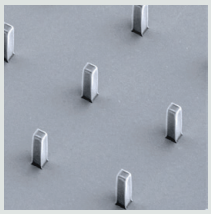
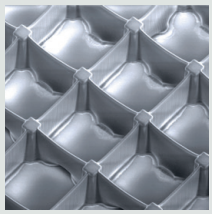
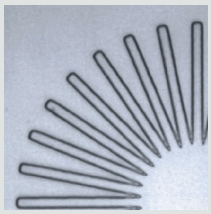
HEIDELBERG INSTRUMENTS

µMLA

THE TABLETOP MASKLESS ALIGNER







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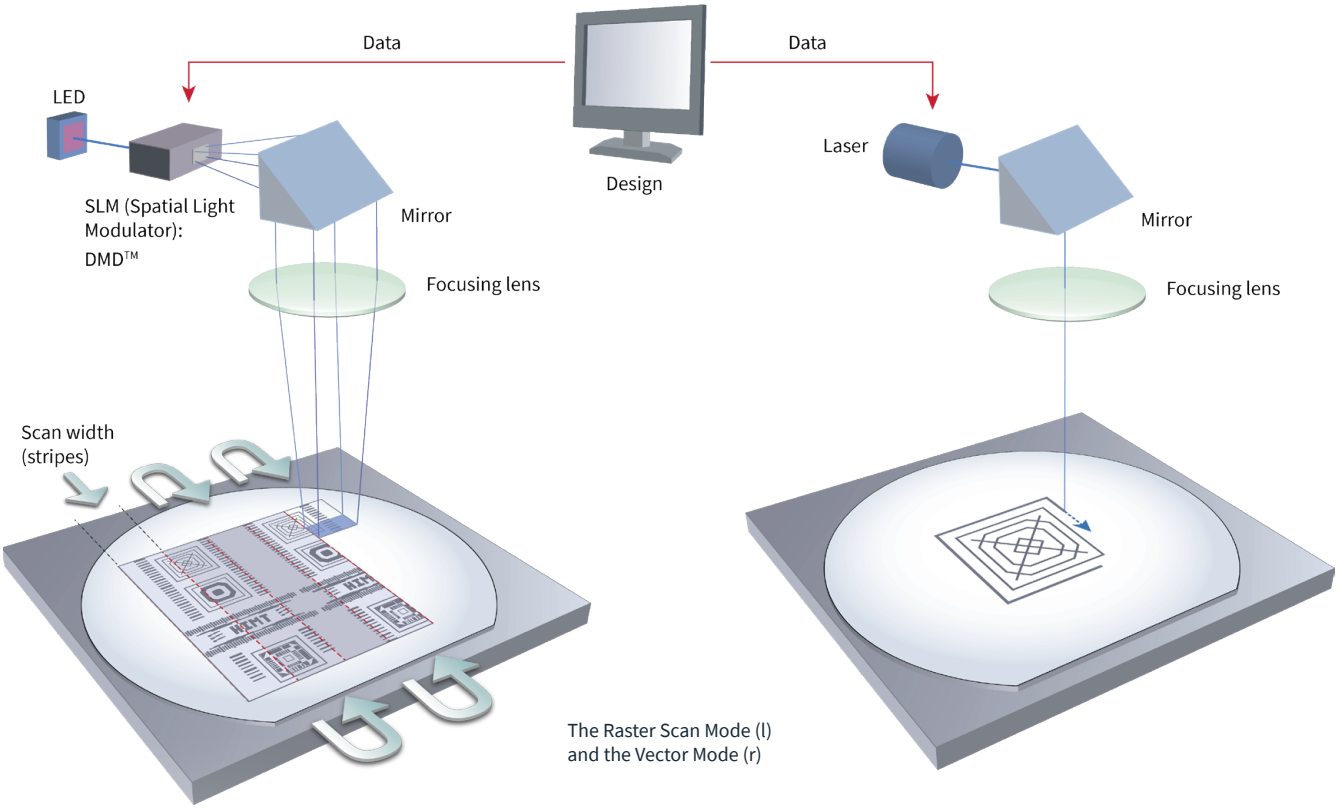
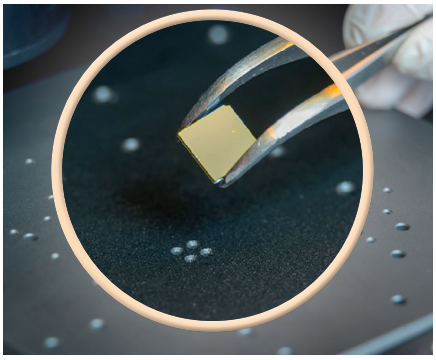
µMLA

THE TABLETOP MASKLESS ALIGNER

The revolutionary, state-of-the-art maskless laser lithography technology has become firmly established ever since our Maskless Aligner (MLA) family was first introduced in 2015. The µMLA represents the state-of-the-art, highly customizable table-top Maskless Aligner. The set-up can be configured precisely to your needs, with Raster Scan Mode, Vector Scan Mode and variable resolution.



The Raster Scan Mode (l) and the Vector Mode (r)

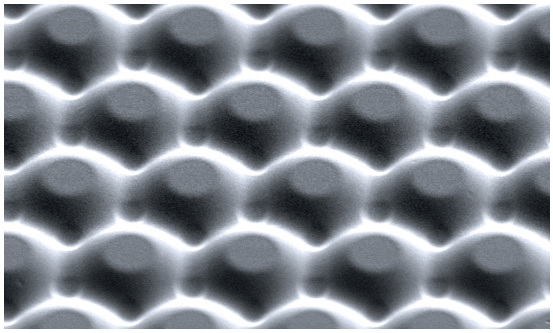


Small sample handling

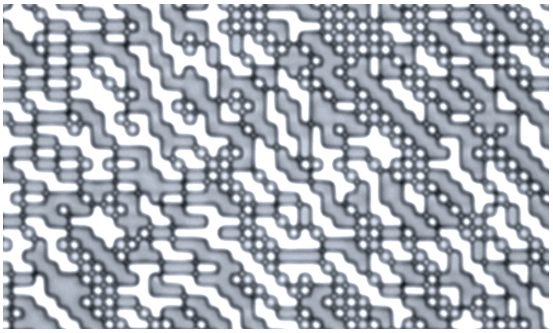
In many applications, the traditional photomask has become a thing of the past. Maskless lithography means that your design file is exposed directly onto the resist-coated wafer via a 2-dimensional Spatial Light Modulator (SLM). The µMLA is the highly successful table-top system within our MLA family. It is „little brother“ to our Advanced Maskless Aligner MLA 150 – an indispensable workhorse in many multi-user facilities, nanofabrication labs, and national institutes – and our industrial Maskless Aligner, the MLA 300. The entry-level system µMLA offers new features such as variable resolution. We created a table-top system that is flexible and highly customizable. And of course small sample handling is straightforward.

Applications include Research & Development in areas such as MEMS, micro-fluidics, micro-optics and all other fields where an affordable, compact, and powerful pattern generator for microstructures is required.

APPLICATIONS

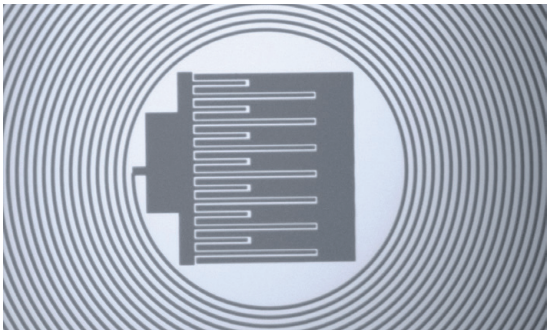


The µMLA offers a standard Grayscale mode, which allows the creation of micro-lenses. Resist: 15 µm thick AZ4562. Pitch 30 µm, radius of curvature 16 µm (l).

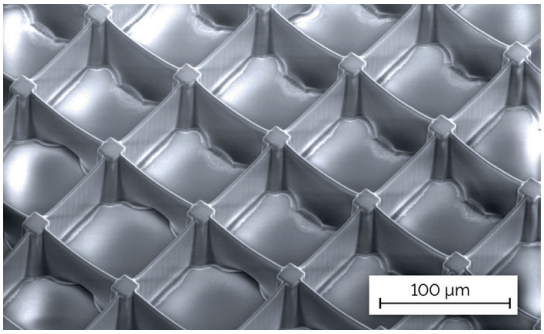


Micro-Optics: Binary diffractive optical element (DOE). The design is made up of 1 µm² squares (r).

APPLICATIONS



Microfluidics (l).



Cage structures made of circa 50 µm thick SU-8. The structures are used in biological applications to trap and grow cells (r).

Courtesy of the University of Hamburg

CUSTOMIZE YOUR µMLA

Two Exposure Modes

The standard µMLA uses the Raster Scan Exposure Mode for exposures, which is fast and provides excellent image quality and fidelity, while the write time is independent of structure size or pattern density. The optional Vector Scan Mode can generate curved lines (e.g. waveguides) with minimal edge roughness. While Vector Mode creates similar image quality as the Raster Scan exposure mode, it cannot achieve the same write speed, especially for patterns with high fill factor.

A Choice of Wavelengths

You can use up to three different wavelengths (LED and/or laser diodes) on one system.

Variable Resolution

The variable resolution function allows you to choose up to three (raster mode) or five (vector mode) different resolutions for a particular write mode.

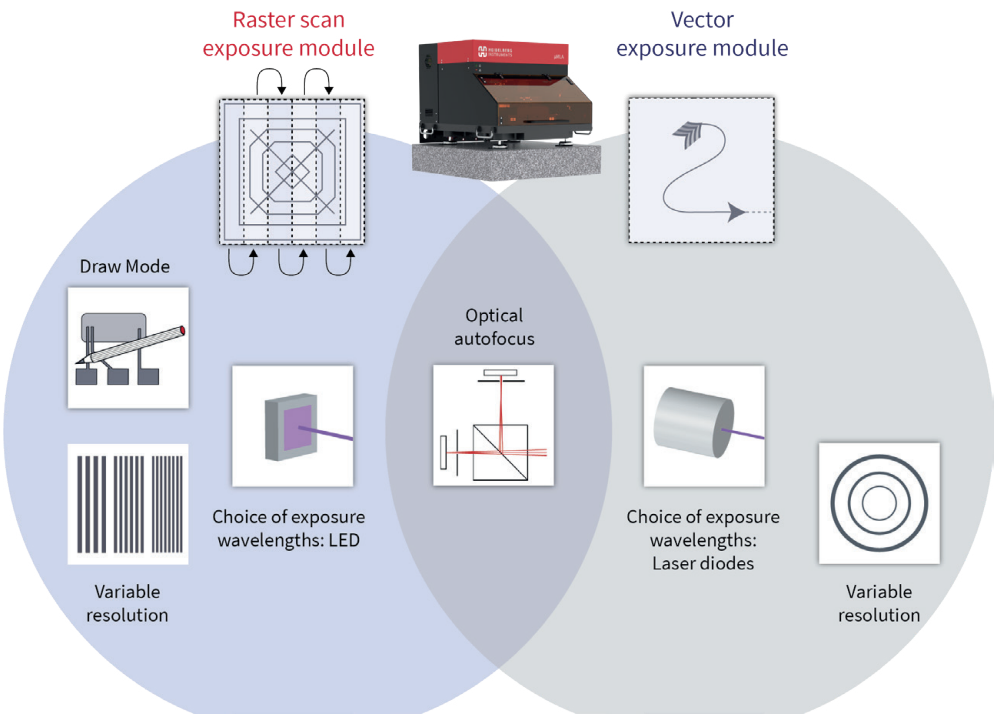
Simply select the resolution of choice in the software menu and optimize the parameters for your application.

The Surface at a Glance

The overview camera with a field of view of 13 mm x 10 mm provides an easy way to locate alignment marks or other features of interest on your substrate.

Small Sample Handling

Small sample handling is straightforward with the µMLA: The optical autofocus option allows accurate exposure right up to the edges of a sample.



Options offered by the Raster Scan Exposure Mode (blue circle) and by the Vector Exposure Mode (gray circle)

Overlap: Options available for both modes

µMLA

SYSTEM SPECIFICATIONS

	Write Mode I*	Write Mode II*	Write Mode III*
Writing performance (Raster Scan Exposure Module)			
Minimum feature size [µm]	0.6	1	3
Minimum lines and spaces [µm]	0.8	1.5	3
Address grid [nm]	20	50	100
Edge Roughness [3σ, nm]	100	150	200
CD uniformity [3σ, nm]	200	300	400
2nd layer alignment over 5x5mm² [nm]	500	500	1000
2nd layer alignment over 50x50mm² [nm]	1000	1000	2000
Write speed	**with 390 nm LED / 365 nm LED**		**with 390 nm LED**
Write speed	10mm²/min at 0.6µm	40mm²/min at 1µm	100mm²/min at 3µm
Optional write speeds at different minimum structure sizes with "Variable Resolution for Raster Scan Exposure Module"	18 mm²/min at 1 µm 25 mm²/min at 2 µm	60 mm²/min at 2 µm 90 mm²/min at 4 µm	160 mm²/min at 4µm 240 mm²/min at 6 µm
Writing performance (Vector Mode Exposure Module)			
Minimum feature Size [µm]	0.6	1	3
Address grid [nm]	20	20	20
2nd layer alignment over 5 x 5 mm² [nm]	500	500	1000
2nd layer alignment over 50 x 50 mm² [nm]	1000	1000	2000
Maximum linear write speed in Vector Mode	200 mm/s	200 mm/s	200 mm/s
Available spot sizes in Vector Mode [µm]	0.6 / 1 / 2 / 5 / 10	1 / 2 / 5 / 10 / 25	3 / 5 / 10 / 25 / 50
System specifications			
Maximum substrate size	6" x 6"		
Minimum substrate size	5 mm x 5 mm		
Substrate thickness	0.1 to 12 mm		
Maximum write area	150 mm x 150 mm		
Light source	Raster scan exposure module LED; 390 nm or 365 nm	Vector exposure module Laser; 405 nm and/or 375 nm	
System dimensions (lithography unit)			
Main system housing	Width 640 mm (25")	Depth 840 mm (33")	Height 530 mm (21") Weight 130 kg (285 lbs)
Installation requirements			
Electrical	230VAC/2.5A or 120VAC/4A or 100VAC/5A		
Compressed air	6 - 10 bar		
Cleanroom	ISO 5 recommended		
Temperature stability	±1°C		

*Only one write mode can be installed on the system

Please note: Specifications and throughput depend on individual process conditions and equipment configuration. Design and specifications are subject to change without prior notice.

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