

# MicroWriter ML<sup>®</sup> 3 Baby



The MicroWriter ML<sup>®</sup> products are a range of photolithography machines designed for rapid prototyping and small volume manufacturing in R&D laboratories and clean rooms.

Conventional approaches to photolithography are usually based on exposing through a chromium-glass mask manufactured by specialist vendors. In R&D environments it is often necessary to change the mask design frequently. Direct-write lithography tools (also known as digital mask aligners or maskless aligners) overcome this problem by holding the mask in software. Rather than projecting light through a physical mask, direct-write lithography uses computer-controlled optics to project the exposure pattern directly onto the photoresist.

MicroWriter ML<sup>®</sup>3 Baby is a compact, high-performance, low-cost direct-write optical lithography machine which is designed to offer unprecedented value for money in a small laboratory footprint. Measuring only 70 cm x 60 cm at its base, it sits on a standard laboratory bench or desk and plugs into a supplied laptop computer. Its only service requirement is a standard power socket. A light-excluding enclosure with safety interlock allows it to be used equally well in an open laboratory environment or in a clean room. Easy to use Windows based software means most exposures can be set up and launched with just a few mouse clicks.

## Key features

- XY interferometer with 15 nm resolution for precise motion control
- Autofocus system using yellow light – no minimum wafer size
- High quality optical microscope camera with Olympus infinite conjugate x10 plan objective lens and yellow light illumination for alignment to lithographic markers on the wafer ( $\pm 2\mu\text{m}$   $3\sigma$  alignment accuracy). Additional x4 digital zoom can be selected in software
- Grey scale exposure mode for 3-dimensional patterning (255 grey levels)
- 20nm sample stage resolution
- Light-excluding enclosure with safety interlock
- Designed for desktop use – no optical table required
- Easy to use, Windows<sup>®</sup> based control software supplied
- Supplied with KLayout open-source mask design software ([www.klayout.de](http://www.klayout.de))
- Supplied with pre-configured 64-bit Windows 10 PC and monitor for 'plug and play' installation
- All cables supplied
- Extremely competitively priced for University and industrial R&D budgets
- Can be later upgraded for MicroWriter ML<sup>®</sup>3 Baby Plus, Mesa or Pro for higher performance
- CE-marked and compliant with EN-61010
- 90-260 VAC, 50-60Hz, 4A single phase power requirement

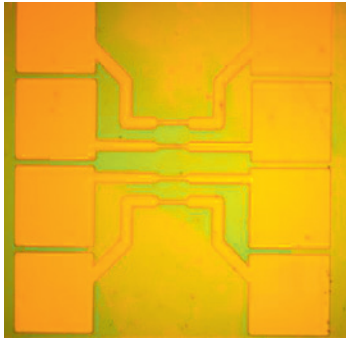
Specifications	
Writing area	149 mm x 149 mm maximum
Maximum wafer size	155 mm x 155 mm x 7 mm
Resolutions	1 $\mu\text{m}$ across full writing area
Lightsource	405 nm long-life semiconductor lightsource suitable for broadband, g- and h-line positive and negative photoresists (e.g. S1800, ECI-3000, MiR 701). Replacement 385 nm lightsource available as option, suitable for g-, h- and i-line photoresists (e.g. SU-8)
Writing speed	Up to 50 mm <sup>2</sup> /minute (1 $\mu\text{m}$ resolution) allowing a 50 mm x 50 mm area to be exposed in under 1 hour
Software	API for external interfacing and control
Addressable grid	0.2 $\mu\text{m}$ (minimum), 15 nm sample stage resolution
File formats	CIF, GDS2, BMP, TIFF, JPEG, PNG, GIF
External dimensions	700 mm (w) x 700 mm (d) x 700 mm (h), excluding laptop computer

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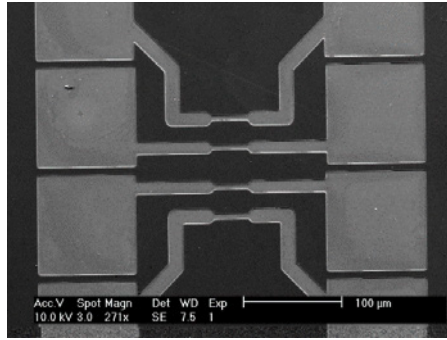
## Designed for R&D in:

- Microelectronics and semiconductors
- Spintronics
- MEMS/NEMS
- Sensors
- Microfluidics and lab-on-a-chip
- Nanotechnology
- Materials science
- Graphene and other 2-dimensional materials

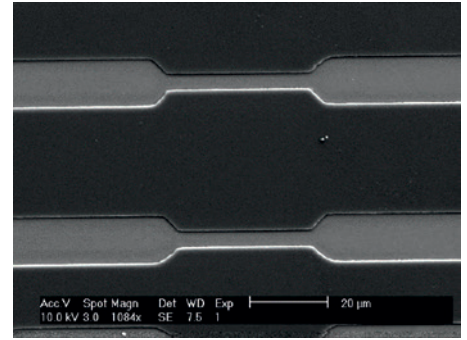
## Electrical transport measurement chip



ML 3 microscope image of exposed AZ<sup>®</sup> ECI 3007 positive photoresist developed in AZ<sup>®</sup> 326 MIF developer

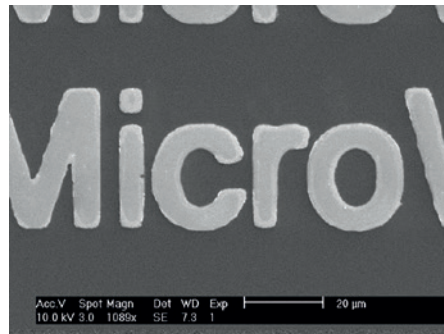
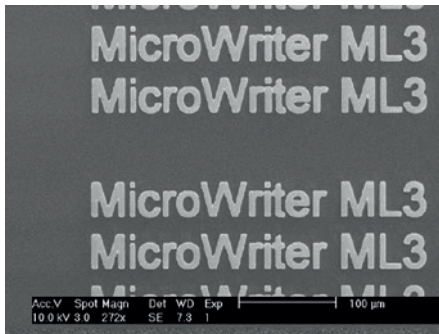


SEM images after metallisation with 20 nm of gold (centre and right)



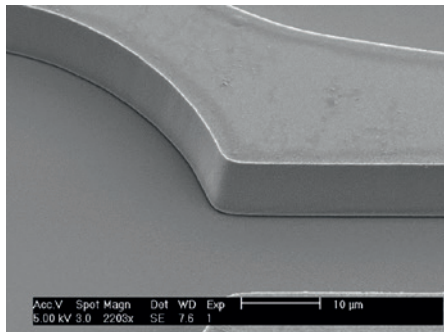
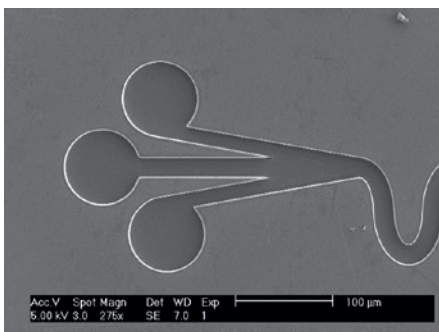
Square contact pads are 100  $\mu\text{m}$  wide; central wires are 3  $\mu\text{m}$  wide

## Micro text



SEM images after metallisation with 20 nm of gold and lift-off. Lower case letters are 27  $\mu\text{m}$  high; gap between letters 'r' and 'o' is 1.5  $\mu\text{m}$ .

## Microfluidic device



SEM images after metallisation with 20 nm of gold of AZ<sup>®</sup> 9260 12  $\mu\text{m}$  thick positive photoresist developed in AZ<sup>®</sup> 326 MIF developer.