

HEIDELBERG
INSTRUMENTS



DWL 2000
Direct Write Lithography Systems



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The DWL 2000 and DWL 4000 laser lithography systems are fast, flexible high-resolution pattern generators for mask making and direct writing. With a write area of up to 400 x 400 mm² these systems are the perfect solution for fast patterning of masks and wafers in MEMS, BioMEMS, Micro Optics, ASICs, Micro Fluidics, Sensors, CGHs, and all other applications that require microstructures.

In addition to high-resolution 2D patterns systems provide a special exposure mode, known as Gray Scale lithography, to create complex 3D structures in thick photoresist. In contrary to other technologies this method enables high throughput formation of 3D microstructures over large areas. Special software tools for optimization and evaluation of Gray Scale exposures have been developed to reduce the cycle time for new products. To ensure lowest surface roughness and shape conformity the systems support up to 4096 gray levels, an unmatched capability in the current market. Most common applications include fabrication of wafer level optics used for telecommunication or illumination market segments where our systems are being used by some of the largest multinational corporations. Other new applications include display manufacturing as well as device fabrication in the areas of biology and life sciences.

The DWL 2000 and DWL 4000 are able to utilize different lasers, making it possible to expose nearly all photoresists including negative tone resists like SU-8. A fixed optical setup, a reliable real-time auto focus system and a high precision air-bearing stage system guarantee the quality and position accuracy of the exposed structures. A high-resolution interferometer monitors the position of the stage at all times. To ensure maximum stability, an advanced climate control provides constant temperature

Key Features and Options

- Substrates up to 9" X 9"
- Structures down to 0.5 μm
- Address grid down to 5 nm
- Multiple write modes
- Advanced 3D exposure mode
- Camera system for alignment
- Back to front side alignment
- State of the art Climate Control platform
- Optical and Air-Gauge auto focus system
- Automatic substrate loading system
- Multiple data input formats

stability during operation. Additional software is used to compensate for any remaining variation in the mechanical structures or the environmental parameters.

The operator of the system can choose between four available write modes, making it possible to optimize the performance of the system for different applications. To further increase the efficiency a loading system can be installed, which loads the substrates automatically from a cassette. According to the setup done by the operator, each substrate can be exposed with an individual design.

The DWL 2000 and DWL 4000 include two CCD cameras used for metrology and alignment purposes. This enables the systems to perform overlay exposures with high accuracy. Arbitrary structures on the substrate can be used for the alignment. The optional backside alignment system uses two additional cameras to align front side exposures to structures on the backside of the substrate.

Specifications

Write Mode	I	II	III	IV
Address Grid [nm]	5	10	12.5	25
Minimum Structure Size [μm]	0.5	0.7	0.8	1.3
Max. Exposure Speed [mm ² /minute]	30	115	180	370
Edge Roughness [3σ/nm]	40	50	60	80
CD Uniformity [3σ/nm]	60	80	90	120
Overlay Accuracy [3σ/nm]	160	200	225	350

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