RML-100 series
Digital Maskless Aligner

Reyin

FEATURES

- Maskless lithography system based on digital micromirrors and precision motion stage.
- Generates lithography patterns directly from digital graphics. Supports reading GDSII and BMP files.
- Coaxial microscopy system enables real-time observation and alignment.
- Fully automated focusing and mask alignment.
- Resolution options of 500nm and 1μm.
- Gray-scale exposure (256 levels in scanning mode, 4096 levels in static exposure mode).
- Compact structure suitable for a wide range of applications

APPLICATION

- Microfluidic chips, biochips, photonic chips, MEMS devices, power devices, and more.
- Advanced packaging
- Diffractive optical devices and 2.5D micro-optical elements.
- Education and scientific research.

SPECIFICATIONS

	RML-110	RML-120
Wavelength*	365nm/405nm	
Numerical Aperture	0.28	0.40
Max. frame*	100mm x 100mm / 200mm x 200mm	
Resolution	1.0 um	500 nm
Grayscale lithography	64 levels	256 levels
Max exposure	2000mJ/cm^2	8000mJ/cm^2
Alignment accuracy	<500nm	<250nm
Field Curvature	< 1 um	< 1 um
Max speed	20mm^2/sec	5mm^2/sec
Input file	BMP, GDSII, SVG	
Z working range	0~15mm	0~15mm
Auto focusing range	±1mm	±0.5mm
Z level accuracy	<1 um	<1 um
Environment	20~25℃	
Dimension	950 x 780 x 1900mm	

*Customizable maximum wafer size and wavelength.

SAMPLES
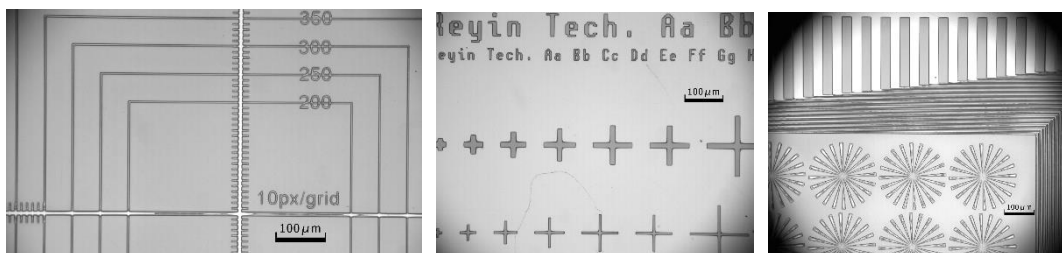
Introduction to Reyin Maskless Aligner

Introduction

The RML-100 maskless aligner is lithography workstation used to project digital design patterns onto the wafer surface. It achieves large-area continuous lithography through high-precision motion stages and fast scrolling pattern generator.

Principle

The system combines high-precision motion control with digital projection technology. The optical principle is similar to that of a scanner: the digital micromirror device (DMD) reflects ultraviolet light to wafer. The pattern is synchronized with the wafer's motion.
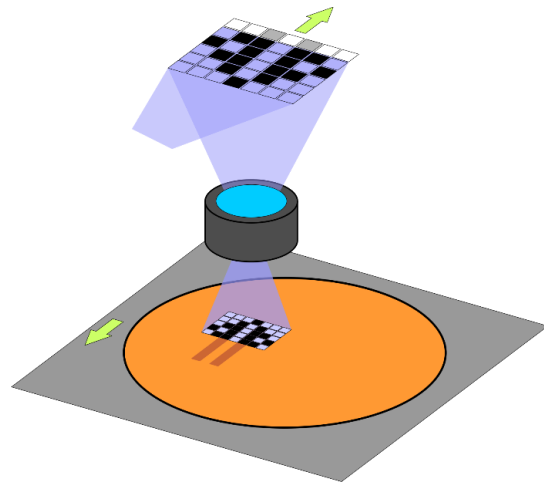
Differences from Laser Direct Writing Systems

Most laser direct writing systems use a single-point light source and work with point and line elements as the basic units for lithography. The Reyin maskless lithography system, on the other hand, operates with two million controllable light spots simultaneously, working with area as the unit. This enables it to overcome the efficiency challenges posed by complex patterns and achieve lithography speeds of up to 20 mm²/s, completing lithography on a 4-inch silicon wafer within 8 minutes.

Image

The optical-mechanical system is finely calibrated to achieve seamless patterns. The resulting working area of the system is fully gridized into pixels, with pixel sizes ranging from 2µm to 500nm (depending on the lenses configuration). The wafer corresponds to approximately billions of usable pixels. The software can process up to 2.5 billion pixels in a single run and

supports BMP files directly or automatic gridization of GDS files.
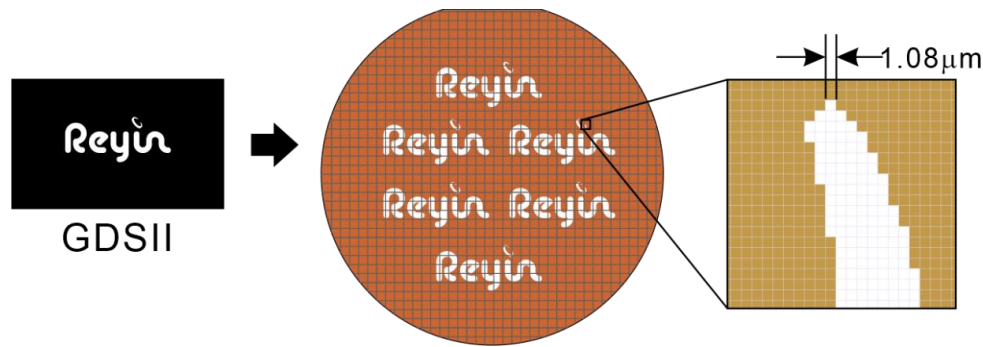
Motion stages

RML-100 is equipped with self-developed motion stages. It achieves industry-leading performance and accuracy. Through laser interferometer calibration, the standard models (IXY100, IXY200) achieve a positioning repeatability of 0.5μm with 100nm resolution, and 1μm straightness and flatness.

Automation

The equipment features a machine vision system that is coaxial with the processing optical path. It can perform fully automatic marker alignment and verify the lithography results. The focus measurement device can automatically analyze the thickness and surface roughness of the wafer and adjust the focal length accordingly.

The software interface operates in a task-oriented mode, allowing efficient management of process data throughout the entire workflow, facilitating the completion of multiple lithography tasks.

Other features

The digital micromirror control circuit can modulate individual light spots at kHz speeds. In scanning lithography mode, it can achieve exposure with 256 levels of gray scale.

The software adopts an open architecture, allowing modular integration of various trajectory planning and image recognition algorithms. This enables the reconstruction of hardware workflows to accommodate various special processes, such as deep etching for thick resist, fine-grained microlens fabrication, chip repair, and 3D surface processing, among others.

Reyin Instruments provides hardware products and system solutions, including customizable light source wavelengths, lenses, and motion platforms, to cater to different industries and applications.