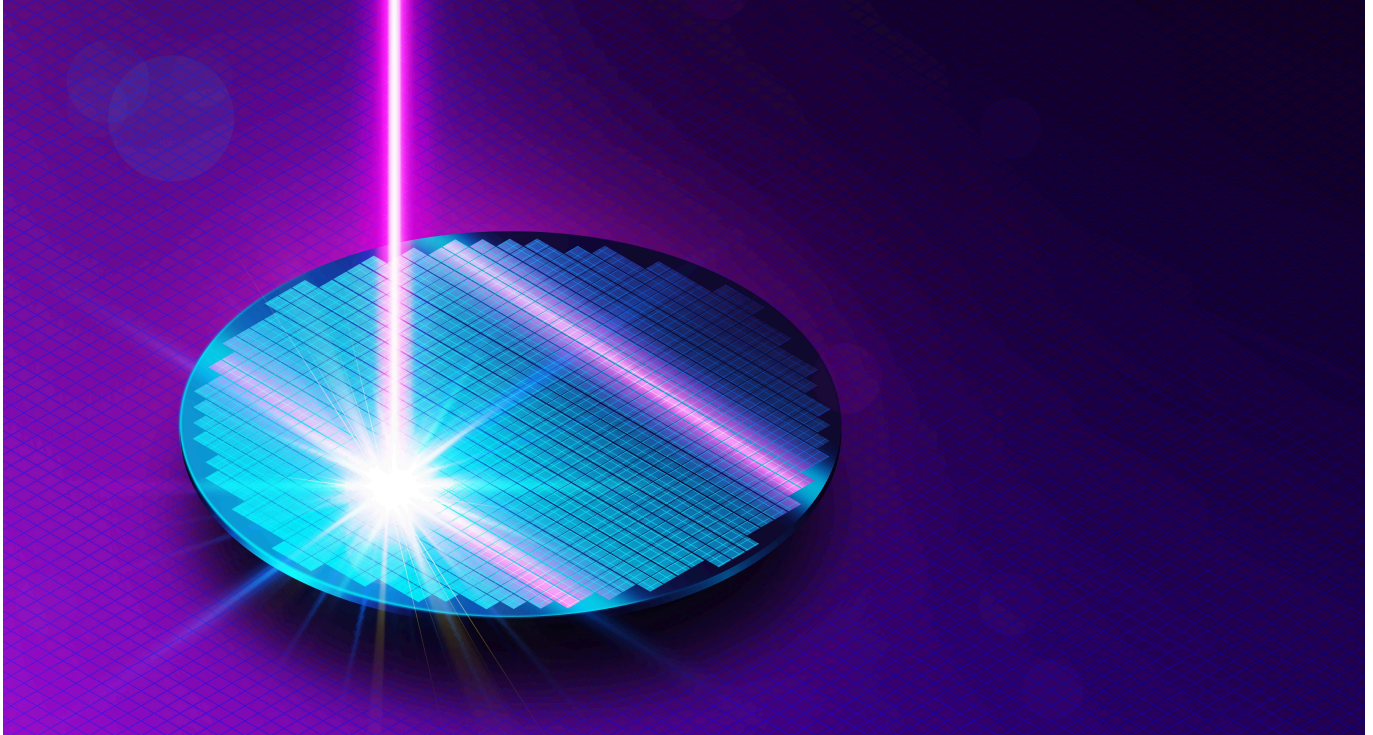


**TECH OFFER**

## Desk-Top Direct Write Maskless Nano/Micro Lithography System



### KEY INFORMATION

**TECHNOLOGY CATEGORY:**

**Electronics** - Lasers, Optics & Photonics

**Materials** - Semiconductors

**Healthcare** - Medical Devices

**TECHNOLOGY READINESS LEVEL (TRL):** **TRL7**

**COUNTRY:** **SINGAPORE**

**ID NUMBER:** **TO174889**

### OVERVIEW

Maskless laser lithography (MLL) is a microfabrication technique used to create complex patterns on a substrate with high precision and resolution. A Singapore-based research team has developed a compact and cost-effective MLL system by seamlessly integrating hardware and software components. By seamlessly integrating with computer-aided design software, operators can easily input arbitrary patterns for exposure. The small system footprint makes it ideal for research labs and offers widespread applicability across various fields, including microfluidics, electronics, and nano/micro mechanical systems. The system's cost-effectiveness extends its benefits beyond university research labs, presenting opportunities for semiconductor and medical companies to leverage its capabilities.

This technology is available for IP licensing or further co-development in view of scale-up manufacture and commercialisation.

## TECHNOLOGY FEATURES & SPECIFICATIONS

- Max exposable area 150mm x 150mm
- Max substrate size 150mm x 150mm
- Resolution 0.8 microns
- Precise cartesian movement, laser focus and pattern alignment using camera vision
- Galvo mirror-based laser steering
- Feedback-enabled actuators, optical elements, and electronic control systems
- Proprietary software efficiently processes computer-aided drawings of nano/microstructures
- Smart focusing mechanism, image recognition (pattern stitching)

## POTENTIAL APPLICATIONS

This technology offers a versatile nano/micro lithography tool for research labs creating sub-micron sized features and to facilitate rapid prototyping of circuits and devices. The cost-effective desk-top configuration provides researchers and industry practitioners access to lithography techniques without the need for complex infrastructure and facilities.

Applications extend to the design and fabrication of micro-electro-mechanical systems (MEMs), biomedical devices and microelectronics, such as in the following sectors:

- Medical (including microfluidics)
- Semiconductor
- Microelectronics
- Biotechnology and life sciences
- Advanced materials research

## MARKET TRENDS & OPPORTUNITIES

The global Maskless Lithography System market size is estimated to be worth US\$ 336.06 million in 2022 and forecasted to increase to US\$ 501.43 million by 2028 with a CAGR of 6.90%.The lithography market is also projected to experience sustained growth in the coming decades due to the increasing demand for 5G, AIoT, IoT, and semiconductor circuit performance and energy consumption optimization.

## UNIQUE VALUE PROPOSITION

Similar laser lithography systems use complex, expensive, and sensitive components such as employing the use of a fast-moving optical head while this technology directly steers the laser beam to expose the patterns.

Arbitrary pattern lithography systems such as electron beams lithography (EBL) typically require large vacuum chambers, pumps, chillers, and precise electronics for steering electron beams. Fast UV mask aligners require masks that fixed chrome patterns on quartz or glass plates.

Compared to current state-of-the-art systems, this technology offers competitive performance at reduced cost, complexity and with a substantially smaller footprint.