LITHO MASKLESS

Powering the Future of Semiconductor Research

Mask-Free Precision Patterning, just with a Microscope

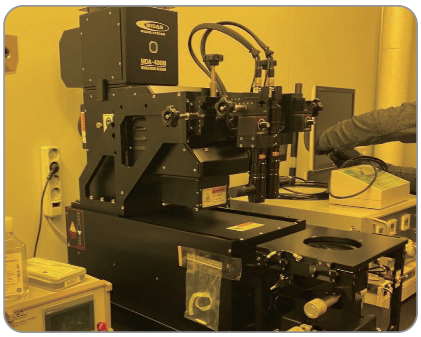
PLANCK LAB

Beyond Micro Scale Fabrication

Simplifying Semiconductor Research

Overcoming the Limitations of Conventional Mask Aligners

Traditional mask aligners have long
imposed barriers on semiconductor research



- Bulky and expensive equipment
- Complex and rigid operating procedures
- Requirement for cleanroom infrastructure
- Days of lead time for mask fabrication
- High cost per mask - often hundreds to thousands of dollars

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LITHO MASKLESS

Redefining Lithography, Without the Mask

LITHO MASKLESS is a compact tabletop lithography system

that Untilizes a UV LED-based DLP engine for mask-free patterning. Designed for simplicity and precision, it brings microfabrication out of the cleanroom and any research or education space.

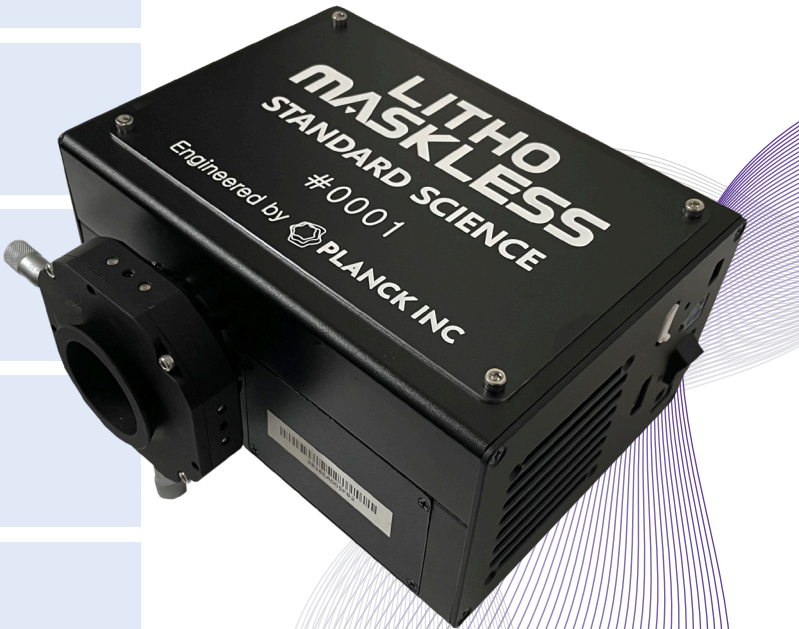
Microscope-Mountable Module
Works with conventional brand microscopes,
no additional footprint required

Instant Pattern Projection via Planck Software
Upload an image and expose in seconds

Cleanroom-Free Operation
Use directly inside a clean bench

Fully Maskless Workflow
Eliminate photomask fabrication time and cost

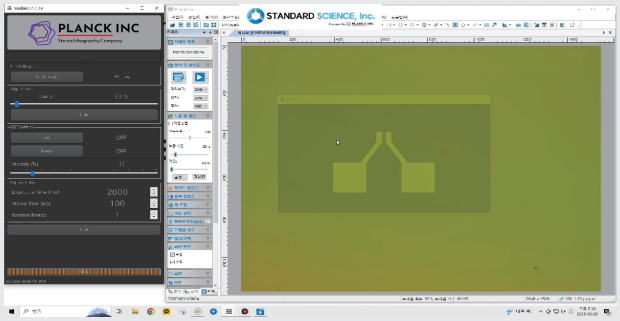
Custom Image Patterning
Supports PNG, JPG and grayscale
patterns for flexible experiment design



EASY TO RESEARCH

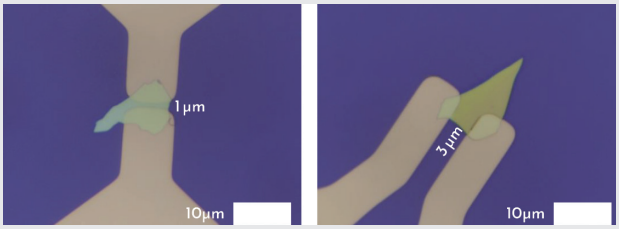
Easy to Use

PLANCK LAB's proprietary software enables maskless lithography in just a **few clicks**, No prior expertise required. Designed as a **modular add-on**, it seamlessly mounts onto microscopes, bringing advanced lithography to your existing lab setup.



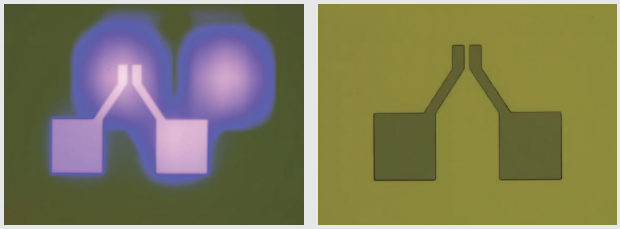
Easy Pattern Customization

Adjust pattern sizes and resolutions freely to suit diverse experimental needs. PLANCK LAB gives you the flexibility to design as precisely - or as creatively - as your research demands.



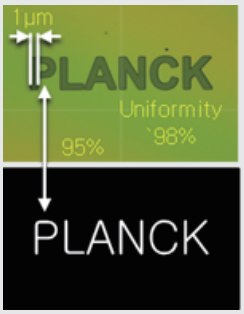
Easy High Resolution

Equipped with a high-power UV light source and a precision DMD chip, it achieves **sub-micron resolution (<1μm)**, ensuring fast and accurate patterning for advanced research.



Easy Alignment

Real-time camera integration and an intuitive UI simplify the alignment process. Even first-time users can quickly and confidently align samples with high accuracy.



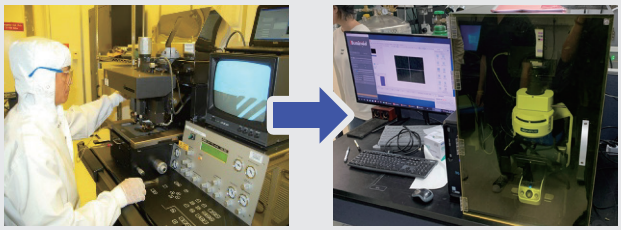
Uniformity : 98%

Resolution Limit : 1μm

Pattern Similarity : 95%

Easy Light Uniformity

AI-powered light uniformity correction ensures consistent pattern quality across the substrate - optimized for repeatability, reliability, and research-grade results.

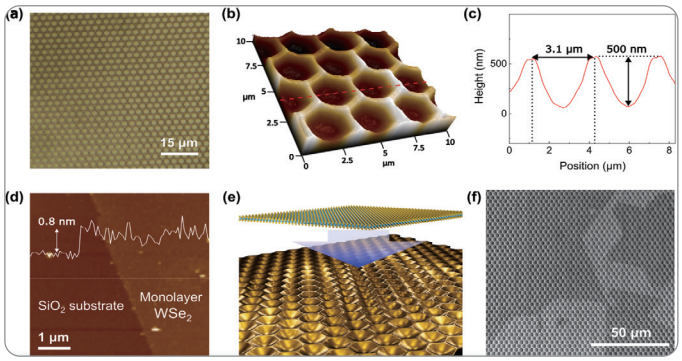


Easy to Set Up, Cleanroom-Free

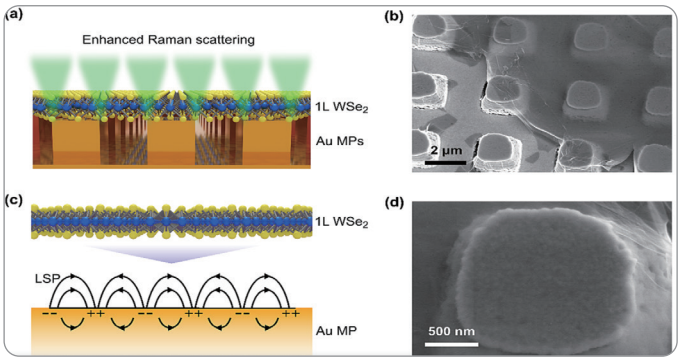
Its compact design makes advanced lithography possible in any lab environment. All you need is a compatible standard microscope and the PLANCK LAB's module Enjoy up to **95% cost savings** compared to conventional photolithography systems.

Trusted by Scholars, Cited by Journals

Studies on diverse patterns in the micrometer scale

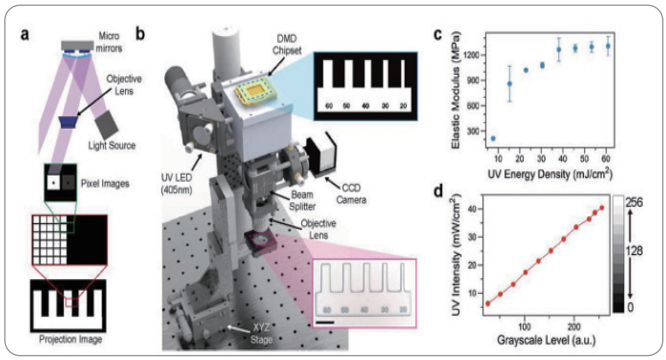


Jeong, H., Cho, G. H., Yoo, J., Lee, S. M., Salas-Montiel, R., Ko, H., ... & Jeong, M. S. (2024). Strain-sensitive optical properties of monolayer tungsten diselenide. Applied Surface Science, 653, 159382.



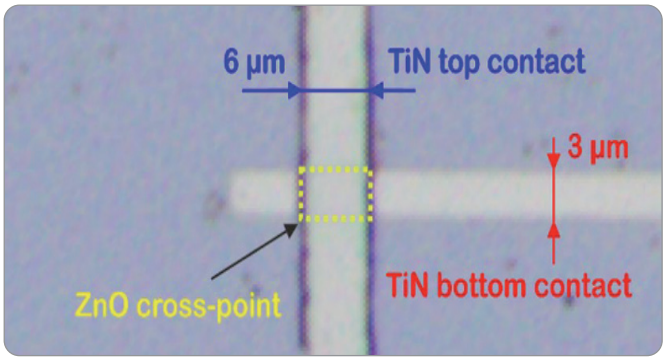
Jeong, H., Suh, H. C., Cho, G. H., Salas-Montiel, R., Ko, H., Kim, K. K., & Jeong, M. S. (2024). Platform for surface-enhanced Raman scattering in layered quantum materials. Applied Surface Science, 646, 158823.

Hydrogel MEMS Resonators



Yoon, Y., Chae, I., Thundat, T., & Lee, J. (2019). Hydrogel Microelectromechanical System (MEMS) Resonators: Beyond Cost-Effective Sensing Platform. Advanced Materials Technologies, 4(3), 1800597.

Neuromorphic research via electrode pattering



Tominov, R., Vakulov, Z., Kazantsev, V., Prakash, C., Rodriguez, D., & Smirnov, V. (2024, September). Synaptic plasticity in the nanocrystalline ZnO cross-point for neuromorphic systems of AI. In 2024 8th Scientific School Dynamics of Complex Networks and their Applications (DCNA) (pp. 235-238). IEEE.

Worldwide Academic Presence

9 Countries

13 Journals

40+ Universities & Institutes (by 2025)

HARVARD UNIVERSITY · USC University of Southern California · UTS University of Technology Sydney · Nanyang Technological University Singapore · Seoul National University · KIST

KAIST · POSTECH · Yonsei University · Korea University · Sogang University · Hanyang University · KITECH

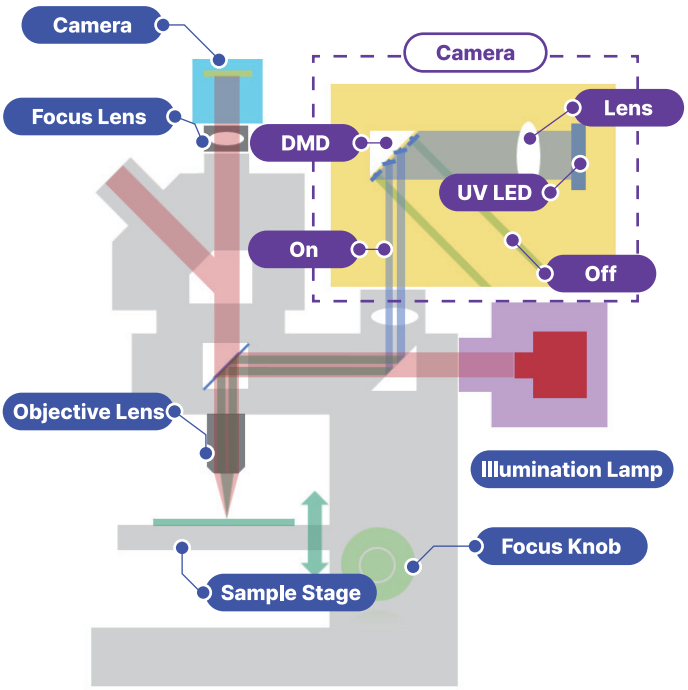
Specifications & Applications

Technical Specifications

Pattern Generator	0.65"DMD (Native 1920×1080px)
Exposure Intensity	Max 160mW/cm2 @20x
Light Source	UV LED
Wavelength	365nm / 385nm / 405nm
Camera	1/1.8" CMOS sensor
Ports Requirement	USB 2.0, HDMI, USB 3.0*
Power	110V or 220V, 60W
Image Format	PNG/BMP/JPG
Operating OS	Windows 10 or 11
Machine Size (for Olympus BX53M)	Module：165 × 120 × 80 mm Full System: 600 × 260 × 470 mm

* For CMOS Camera

System Schematics



Technical Specifications

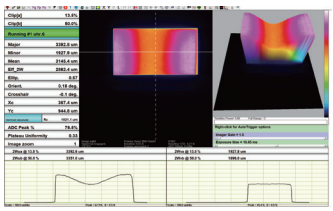
Objectives	5x (NA 0.15)	10x (NA 0.30)	20x (NA 0.45)	50x (NA 0.75)	100x (NA 0.90)
Resolution(μm/px)	1.52	0.76	**0.38**	0.15	0.08
Maximum Pattern Size (μm)	2910 × 1640	1450 × 820	**730 × 410**	290 × 160	145 × 80

* For Olympus MPlanFLN Objective Lens ** The System is optimized at 20x

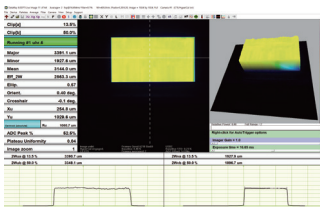
Technologies

AIUniBeam™

AIUniBeam™ is AI-based beam uniformity compensation technology using a beam profiler. The beam profiler measures the intensity of every pixel and then compensates and optimizes the local intensity using pixel control to satisfy over 98% uniformity.



No Compensation



AIUniBeam™

Easyalign™

Easyalign™ is a pattern alignment and simulation feature integrated into the LITHO Maskless system. It uses a built-in camera to overlay the simulated pattern onto the live substrate view, enabling real-time preview and precise alignment. This enhances accuracy and simplifies workflows, especially for multi-layer or structured surfaces.

Easyalign™

Beyond Mirco Scale Fabrication in Microscope

LITHO MASKLESS

"We envision a world where scientific discovery is limited not by tools or complexity, but only by imagination"

We believe **technology should quietly support those driven by curiosity**. That's why we create intuitive, microscope-based systems that remove the **barriers of space and time**, allowing exploration to happen freely - anywhere, anytime.

We dream of a future where anyone with a question worth asking can pursue it without constraints, at their own pace and in their own space. We don't just build lithography tools.

We build **enablers of discovery.**

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PLANCK LAB
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