



Nanoscribe Quantum X is the world's first Two-Photon Grayscale Lithography system for maskless microfabrication of refractive and diffractive microoptics

[Contact us for more info](#)

Experience the new Quantum X

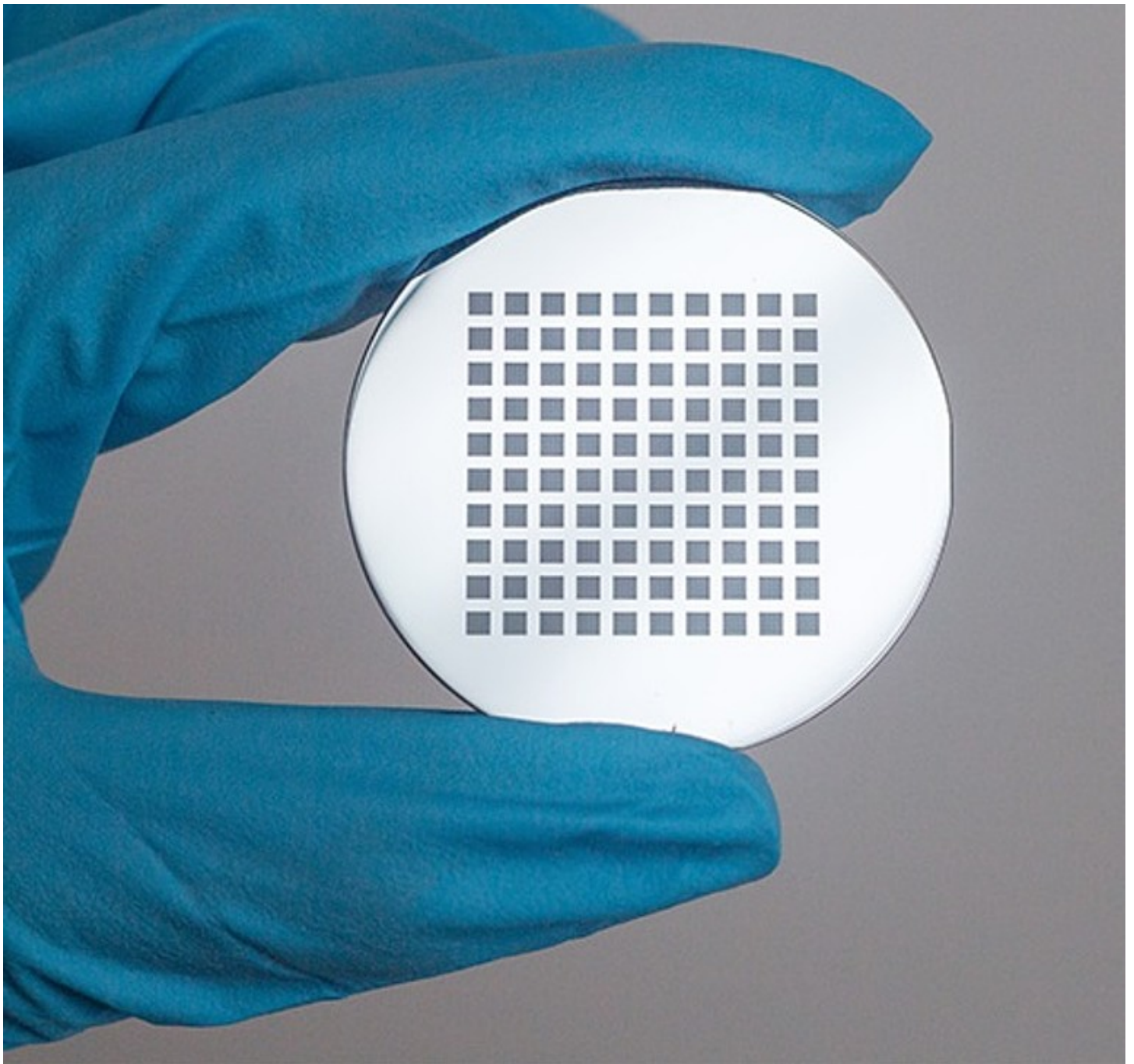
The brand-new Nanoscribe Quantum X system is designed for the microfabrication of prototypes and masters in industrial production processes. This maskless lithography system redefines the fabrication of free-form microoptics, microlens arrays and multi-level diffractive optical elements.

The world's first Two-Photon Grayscale Lithography (2GL ®) system combines the extraordinary performance of grayscale lithography with the precision and flexibility of Nanoscribe's pioneering Two-Photon Polymerization technology.

Quantum X offers high speed, full design freedom and the precision needed for additive fabrication of complex structures requiring high shape accuracy and ultra-smooth surfaces. Fast and accurate additive manufacturing processes drastically shorten design iteration cycles and enable cost-effective microfabrication.

These unique features of Nanoscribe Quantum X have been honored with the Innovation Award at LASER World of Photonics 2019 (</en/news-insights/news/innovation-award-for-quantum-x>).

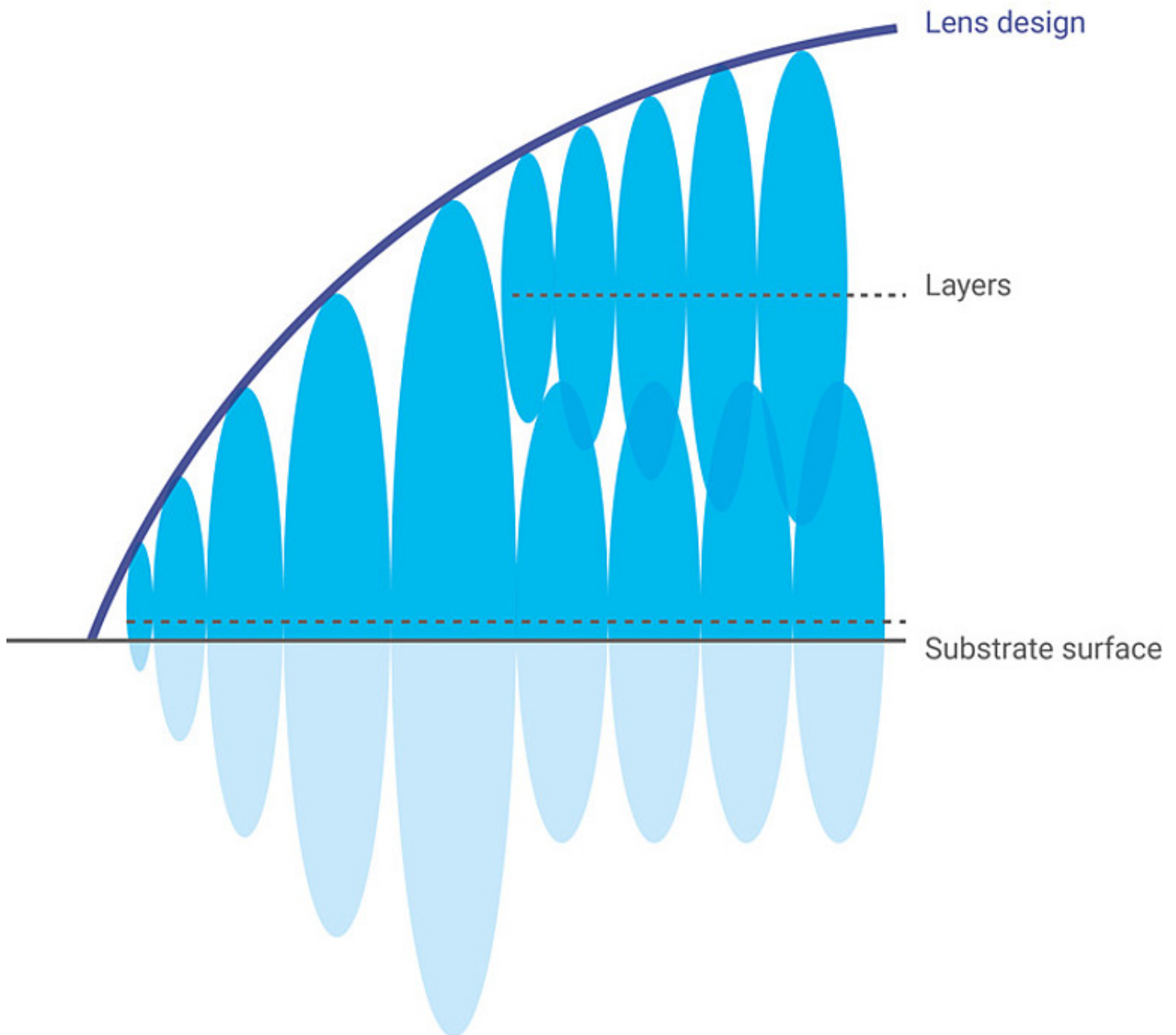
Two-Photon Grayscale Lithography



This breakthrough technology combines additive microfabrication with ultra-fast voxel size tuning: Two-Photon Grayscale Lithography (2GL) paves the way for ultra-fast, accurate and free-form microfabrication without compromising speed or accuracy.

Quantum X controls the voxel size along one scanning plane using synchronized laser power modulation at high speeds. In this manner, complex shapes are produced and variable feature heights are achievable within one scan field. Discrete and accurate steps as well as essentially continuous topographies can be printed on up to six-inch wafer substrates without the need for additional lithography steps or mask fabrication.

The Quantum X wizard guides you through the print job creation. The integrated software accepts grayscale images of up to 32-bit resolution for direct fabrication with 2GL technology. Diffractive and refractive microoptics in 2D and 2.5D materialize with smooth surfaces and high shape accuracy.



Facts and figures on Quantum X

Printing technology	Two-Photon Grayscale Lithography (2GL)
Minimum XY feature size	160 nm typical; 200 nm specified*
Finest XY resolution	400 nm typical; 500 nm specified*
Finest vertical steps	10 nm, quasi-continuous topographies possible
Minimum surface roughness R_a	≤ 10 nm*
Area printing speed	3 mm ² /h typical for diffractive optical elements

**Values may vary depending on the objective and photoresin in use.*

Dr. Michael Thiel, Chief Science Officer of Nanoscribe (CSO) & Co-Founder

Beer's law imposes strong limitations on today's maskless lithography devices. Quantum X features Two-Photon Grayscale Lithography, which overcomes these limitations and offers unprecedented design freedom. Our customers are working at the cutting edge of microfabrication.

Highly efficient microfabrication



Maskless lithography is now flexible and straightforward for the user. A powerful lithography process, tailor-made materials and a state-of-the-art software architecture make Quantum X a highly efficient microfabrication tool. Nanoscribe's maskless lithography allows a variety of substrates and does not require spin-coating, pre- or postbaking, or costly mask fabrication when using Nanoscribe photoresins.

Quantum X software performs fully automatic calibration, controls and monitors print jobs in real time. The control system synchronizes accurately laser power modulation and exposure positioning within some nanoseconds, enabling full voxel size control in one scan field. Graphical or remote user interfaces, including a touchscreen located on the printer, support advanced user-machine interactions. Users can check on the job status, adjust process controls and visualize printing in real time.

Optimized photoresin materials

Nanoscribe Quantum X uses photoresin materials tailored to the requirements of Two-Photon Polymerization (2PP). The system's dispenser contains the resin material in use and deposits automatically the necessary dose on the substrate during the fabrication. Nanoscribe printing

materials are optimized for the fast processes of Two-Photon Grayscale Lithography (2GL) and work excellently with Quantum X. They feature the following properties:

- ▶ Fast 2GL for 2.5D microfabrication
- ▶ Straightforward handling and easy processing
- ▶ No spin-coating, pre- or postbaking required
- ▶ Optical-quality surfaces and excellent shape accuracy
- ▶ High aspect ratios and high structures, approaching the limits of the physically possible

[Read more about materials](#)

Quantum X Redefining microfabrication.

Be the next user!

We would be pleased to make you a customized offer.
For this, clarify the detailed issues with our sales experts.

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