

Quantum X product line

Redefining microfabrication.



Excellent performance in microfabrication

The industry-proven Quantum X series offers the fastest and most accurate high-precision additive manufacturing in class for designs from 2D to 3D.

The Quantum X series opens a new chapter in micro-fabrication by setting new standards in microfabrication performance, print quality and process-focused operability. Two-Photon Polymerization (2PP) is the key-enabling technology for high-resolution 3D printing on the nano-, micro-, meso- and macroscale, combining the highest precision with tremendous speed. With the inherent design freedom of the additive manufacturing approach, 2PP's precision enables groundbreaking technologies in a wide range of research and industrial fields, such as life sciences, microoptics, fiber optics, photonic integrated circuits, microfluidics, materials engineering, micro-mechanics and microelectromechanical systems (MEMS).

3D printing by 2GL[®] is a fundamentally new 3D Micro-fabrication technology that combines 2PP with a unique voxel size tuning process and requires significantly fewer print layers. This makes 2GL the fastest 2PP-based 3D printing technology with superior print quality at unrivaled print speed. 3D printing by 2GL is an essential addition to Nanoscribe's Aligned 2-Photon Lithography technology for printing freeform microoptics directly onto fiber tips and photonic chips with automatic nanoprecision alignment. The world's most accurate 3D bioprinter, the Quantum X bio, offers a bioprinting chamber and a wide range of biomaterials for various biological and biomedical applications.

Key features

- ▶ 3D and 2.5D printing with highest precision
- ▶ Industry-proven platform for wafer-level batch processing
- ▶ Modular platform ideal for multi-user facilities and multiple applications
- ▶ Additive manufacturing with enormous design freedom
- ▶ Nanoprecision aligned printing on fibers and chips
- ▶ Complete solutions including printing materials and process parameters
- ▶ Open system for custom-made and third-party materials, e.g. bioresins and biomaterials
- ▶ Automated processes, such as calibration, job execution and monitoring

Benchmark scores

Surface roughness R_a	down to ≤ 5 nm
Feature size control ¹	down to ≤ 100 nm
Shape accuracy	down to ≤ 200 nm
Print field diameter	25 mm divided by lens magnification
Maximum scan speed ²	6.25 m/s divided by lens magnification

Given values may vary depending on the photoresin and structure geometry
¹ 100 nm feature size control in x/y direction
² e.g. for 10x magnification: 625 mm/s

Choose your Quantum X system

"Best-in-class 3D printer with nanoprecision alignment system"



Quantum X align

- ▶ Aligned 2-Photon Lithography (A2PL[®]) at predefined positions
- ▶ 3D printing by 2GL[®] for superior quality at unrivaled speed
- ▶ Printing on optical fibers
- ▶ Printing on photonic chips

"The world's most accurate 3D bioprinter"



Quantum X bio

- ▶ 3D bioprinting in research and industry labs
- ▶ Wide range of biomaterials and substrates
- ▶ Live cell printing
- ▶ Printing into microfluidic chips

"Fastest and most accurate 3D printer in class"



Quantum X shape

- ▶ 2.5D and 3D printing
- ▶ Rapid prototyping
- ▶ Wafer-scale batch processing
- ▶ Wide range of scales – nano, micro, meso, and macro

"World's first Two-Photon Grayscale Lithography (2GL[®]) system"



Quantum X

- ▶ Two-Photon Grayscale Lithography (2GL[®])
- ▶ 2.5D rapid prototyping
- ▶ Industrial mastering
- ▶ Wafer-scale 2.5D fabrication in the microoptical industry

"We are confident in Nanoscribe's new, aligned 3D printing technology for producing lensed fiber arrays and lensed chips with virtually limitless optical designs."

Joost van Kerkhof, Chief Operations Officer of PHIX Photonics Assembly



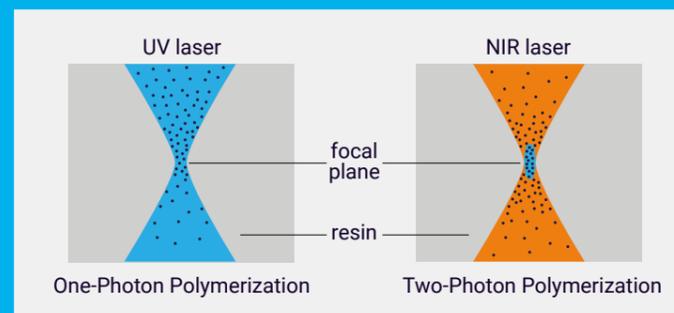
Advancing microfabrication with key technologies

Pushing the limits of high-precision 3D printing by Two-Photon Polymerization (2PP) and Two-Photon Grayscale Lithography (2GL®).

Two-Photon Polymerization (2PP)

A key enabling technology for high-precision 3D printing

The basic physical prerequisite of Two-Photon Polymerization (2PP) is two-photon absorption, which theoretically states that an atom or molecule absorbs two photons simultaneously. In 2PP-based 3D printing, the medium is usually a liquid and photosensitive resin that can be cured by UV light. 2PP uses low-energy light, such as near-infrared (NIR), which causes the printing material to solidify only when the photoresin molecules simultaneously absorb the energy of two photons. This mechanism is only likely in the focal volume of pulsed light, as it requires high intensity within a volume of the photosensitive material.



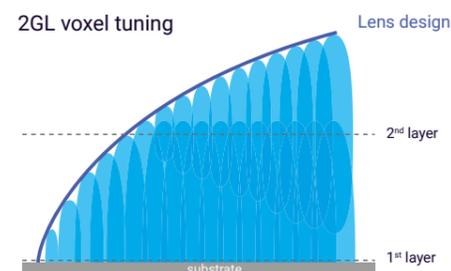
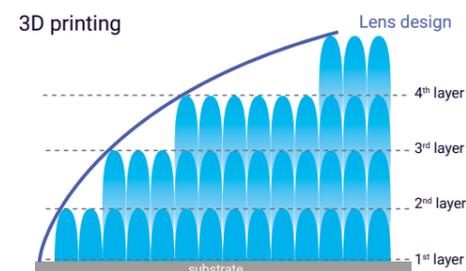
Two-Photon Grayscale Lithography (2GL®)

The power of 2GL voxel tuning redefines the microfabrication of 2.5D topography structures.

Two-Photon Grayscale Lithography combines the extraordinary performance of grayscale lithography with the precision and flexibility of 2PP. With 2GL, multi-layer topographies are printed by scanning only one layer, dramatically reducing print times. 2GL is a maskless grayscale technology that uses power-modulated laser light to shape the height profile of micro- and nanostructures through dynamic voxel tuning. It enables rapid prototyping and small series

production of 2.5D freeform microoptics, microlens arrays and multi-level diffractive optical elements.

To achieve larger structure heights with 2GL, e.g., several hundred of microns, the laser exposes the resin in multiple adjacent layers. Each layer is exposed with voxel size modulation to create smooth microstructure contours.



3D printing by 2GL®

The fastest 2PP-based 3D Microfabrication technology enables print results with superior quality at unrivaled speed.

We have introduced a fundamentally new and patented 3D Microfabrication technology: 3D printing by 2GL®. The Two-Photon Grayscale Lithography technology for additive manufacturing of optical-grade 2.5D microstructures has become the platform of choice for industrial manufacturing and mastering of microoptics. Now, Nanoscribe takes the voxel tuning technology to the third dimension.

The process of 3D printing by 2GL relies on dynamic modulation of laser power in real time while scanning at the highest possible speed. This results in a precise size adjustment of the polymerizing voxel to perfectly match the contours of any 3D shape. 3D printing by 2GL is now a new feature of the Quantum X align.

"My first print job worked flawlessly and the structure is stunningly good, if not to say sensational. I have never seen anything like this before."

Prof. Dr. Harald Giessen, University of Stuttgart

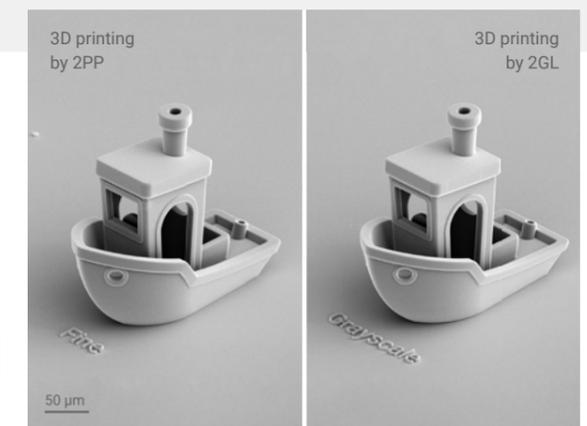
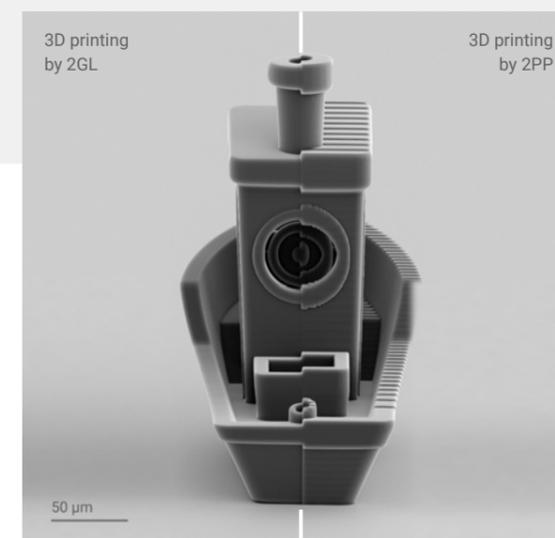


Best quality with unmatched precision

Quality and speed! 3D printing by 2GL takes Nanoscribe's grayscale technology to the third dimension, making no compromises. Print results of the same structure printed with conventional 2PP-based 3D printing and 3D printing by 2GL offer an eye-opening revelation: In the example below, the 3D printed Benchy boat is split into two parts, both printed at exactly the same slicing distance, resulting in identical print time. However, using 2GL on the left part of the Benchy boat reveals no slicing steps and the real shape of the design. The 2GL printed part is free from any voxel-related distortion as seen on the right part, which was printed with conventional 2PP-based 3D printing.

Up to 60 times higher throughput

3D printing by 2GL enables flawless, optical-grade surfaces and the finest submicron features, with no slicing steps or shape distortion. For these results, its dynamic voxel tuning requires significantly fewer print layers, resulting in a faster print speed, that is unmatched by any 2PP-based 3D printer on the market. This makes it the fastest microscale additive manufacturing technology with 10 to 60 times the throughput of any current 2-photon lithography system while meeting demanding print quality requirements. For example, a Benchy boat is 3D printed by 2GL and with a powerful 2PP system. The slicing distance of the 2PP printed boat is set to 0.1 µm ("Fine"). The same object is 3D printed by 2GL ("Grayscale") with the same highest quality at a much coarser slicing of 1 µm, resulting in a print time reduced by a factor of 10.



Straightforward workflow for successful print results

How to get from your 3D design to the best possible 3D-printed structure?
With our software solutions, you will easily make your print a success.

Quantum X software

The Quantum X platform offers several software products covering your entire workflow and that are perfectly suited for multi-user environments.

Print job preparation software

Import your design file and let the software guide you through the steps of print job creation and upload onto your Quantum X.

Choose the right tool for the job:

- ▶ DeScribeX for 3D printing
- ▶ GrayScribeX for 2.5D grayscale printing
- ▶ nanoPrintX for aligned 3D printing

Print job execution software

The intuitive touchscreen menu of Quantum X easily guides you to successful printing. Also benefit from essential data such as hardware information, system status and print progress. Furthermore, a live view of the printing via three cameras gives you a visual control at any time.

Remote control software

Start and monitor your print job from the office with nanoConnectX remote access software. This makes Quantum X systems ideal for production environments and multi-user scenarios.

Print job preparation software

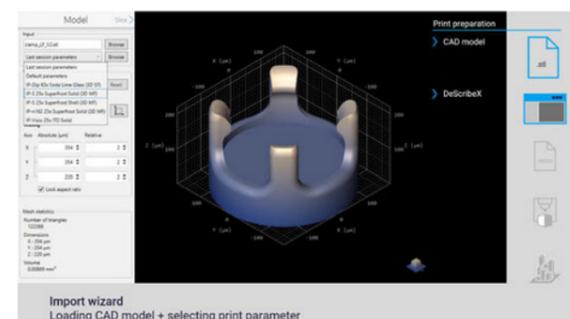
DeScribeX – field-proven software for 3D Microfabrication

DeScribeX is a print job preparation software for creating individual 3D print jobs. The integrated import wizard can load STL files as a widely used 3D CAD format. Pre-installed software print parameter presets are perfect starting points that guide you to a successful print in just a few steps.

What you see is what you print! The 3D preview and printing simulation of DeScribeX displays parameters such as print time, scan speed or laser power and simulates the whole printing process in detail. With the export function print jobs are easily transferred to the Quantum X system remotely.

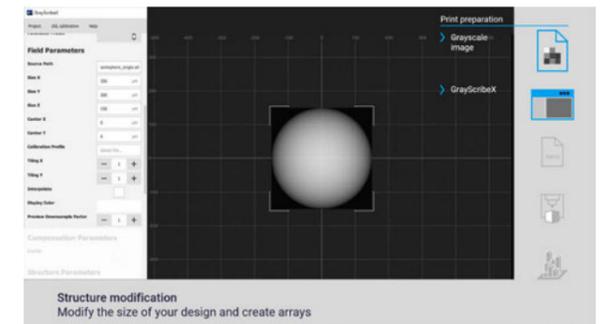
DeScribeX is straightforward to use and packed with useful features such as an adaptive slicing mode for a surface refinement and improved shape accuracy,

or the parameter sweep function that helps you find perfectly matching print parameters for new materials and applications. And for real 3D printing experts the Integrated Development Environment (IDE) allows to generate and modify print files (GWL) for customized and sophisticated printing tasks.



GrayScribeX – straightforward 2GL workflow

GrayScribeX is a specially developed software for creating individual 2D and 2.5D print jobs for Quantum X systems. You can import standard 16 bit grayscale images or CAD models that are automatically converted into grayscale images. A smart software routine translates the gray values from the imported design into the heights of the print object and precisely sets the calibrated print parameters. With GrayScribeX objects can be easily added, removed or duplicated to the print file, thus allowing to create print jobs of different structures in one file. Depending on your application you can rescale or create arrays of the print job's objects and print your design with field-proven print parameter presets.



Set the scene with nanoPrintX

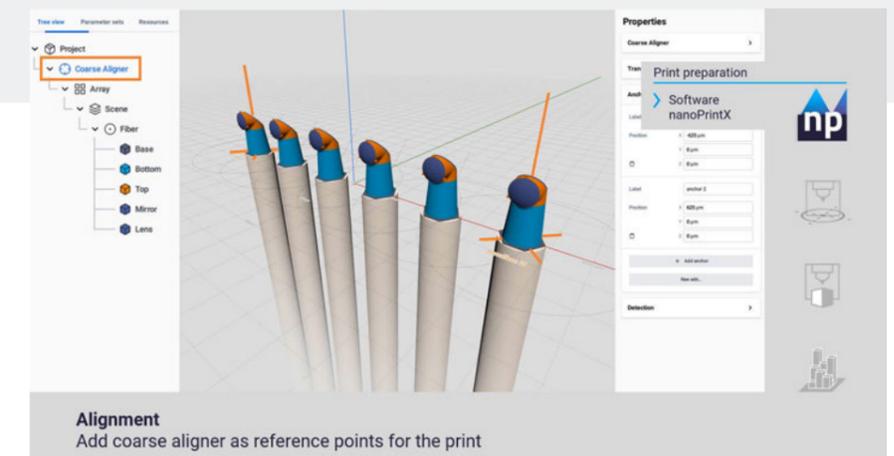
Compose and align your prints smarter

nanoPrintX is much more than a 3D printer slicer software. It is a game-changing tool to create sophisticated print projects for aligned 3D printing. The underlying scene graph concept, a tree-like data structure that provides a hierarchical organization of all print-relevant objects and operations, enables an agile definition of what, where, in which spatial orientation and how to print.

The intuitive software architecture, combined with a central rendering canvas, provides instant visual feedback on the position and spatial alignment of all elements relative to each other and to predefined positions or substrates.

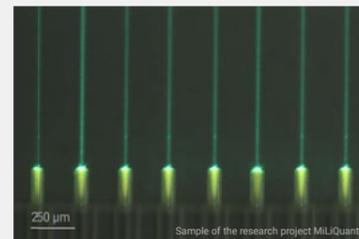
Each node of the nanoPrintX scene graph is a print-relevant object or operation and includes a set of adjustable properties. You can import several design files and organize them into group or array nodes, or merge multiple files into one print object.

To make the most out of the Aligned 2-Photon Lithography (A2PL) technology, you can define individual alignment markers as well as substrate features such as chip edges and fiber facets. Using Quantum X align's confocal unit or fiber illumination unit, these specific substrate markers can be identified and matched to the digital model defined with nanoPrintX.





"Best-in-class 3D printer with nanoprecision alignment system"



Quantum X align

Aligned 2-Photon Lithography (A2PL®) drives innovation in photonics packaging

Align, print, done

Packaging of integrated photonics requires tedious placement and active alignment of small optical elements. Quantum X align with A2PL® and the nanoPrintX software simplify this process: Optical interfaces on photonic chips or fiber cores are automatically detected and matched with the digital model designed with nanoPrintX. Thus, user-defined structures, such as freeform optics or diffractive elements, are printed directly in place, even on tilted or angled structures. These microoptical interconnects relax alignment tolerances and eliminate the need for often costly active alignment. The new 3D printing by 2GL® enables the printing of microoptics with superior quality at unrivaled speed.

Align to optical fibers and photonic chips

Automatic 3D fiber core detection and automatic tilt correction ensure precise alignment and minimal coupling losses when printing on single cleaved fibers or v-groove fiber arrays. Printing on photonic chips is also possible using a confocal imaging module for 3D mapping of topographies and fully automatic alignment to markers or waveguides.

Align to your ideas

The 3D alignment systems with nanoscale precision and tilt compensation, combined with a powerful and user-friendly workflow, open up new applications beyond microoptics, such as microfluidics, complex sensor systems and MEMS: Quantum X align is the perfect tool for high-precision 3D Microfabrication automatically positioned with the highest precision on complex 3D substrates.



Discover Quantum X align

Send us an e-mail
sales@nanoscribe.com

Key features

- ▶ High-performance 3D printing on fibers and chips with A2PL® technology
- ▶ 3D printing by 2GL® with superior quality at unrivaled speed
- ▶ Automatic alignment system with nanoprecision in all spatial directions
- ▶ Fiber illumination unit for fiber core detection
- ▶ Confocal module for 3D topography detection
- ▶ Define structure placement relative to fiducials on chips and other substrates using nanoPrintX

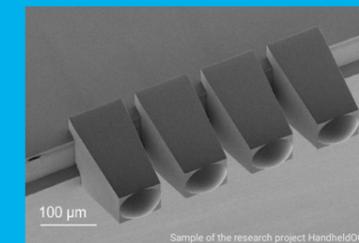
Designed for

- 3D Microfabrication of precisely aligned freeform microoptics
 - ▶ Lensed fiber arrays for optical interconnects
 - ▶ Imaging and beam shaping optics on single fibers or fiber arrays
 - ▶ Optical interconnects on integrated photonic chips
- Pioneers and innovators in research and industry active in
 - ▶ Integrated photonics and photonics packaging
 - ▶ Optical sensing and medical instrumentation
 - ▶ Quantum technology

Technical specifications

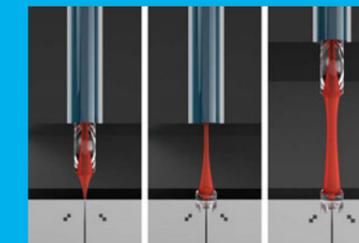
Printing technology	3D printing based on Two-Photon Polymerization (2PP) Aligned 2-Photon Lithography (A2PL®) 3D printing by 2GL®
3D alignment precision	down to 100 nm (xy) / 500 nm (z)
Substrates	Single fibers and Fiber arrays (v-groove) Photonic chips (unmounted/TO can) Wafers from 1" to 8" (25.4 mm to 200 mm)

Connect to the photonic world



Quantum X align is equipped with Aligned 2-Photon Lithography (A2PL®) technology. This enhances Nanoscribe's field-proven 3D Microfabrication system based on Two-Photon Polymerization (2PP) by adding high-precision alignment capabilities for highly accurate placement of printed structures. With A2PL freeform microoptics can be printed precisely aligned to the optical axes of fibers or photonic chips with submicron accuracy. Produce efficient optical interconnects for photonic integration and photonics packaging or miniaturized imaging optics, e.g. for minimally invasive endoscopy.

3D printing of FSMOC



Free Space Microoptical Coupling (FSMOC) offers a highly robust and efficient light coupling solution for photonics packaging and integration. Freeform microoptics fabricated directly on the optical interface of chips or fibers, taking tilt into account, enable tailored beam shaping and highly precise mode field adjustments. This leads to relaxed alignment tolerances between optical elements and eliminates the need for active alignment. FSMOC is flexible in use and can be easily tailored to meet application-specific requirements.

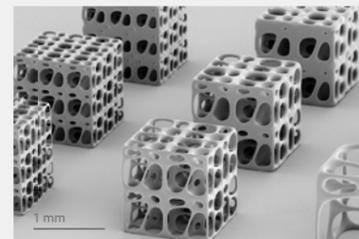
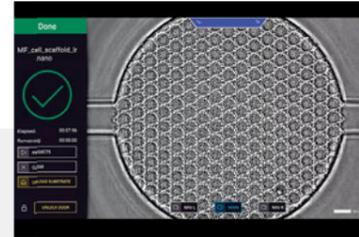
Straightforward workflow



The on-fiber printing workflow guarantees straightforward and flawless 3D Microfabrication, perfectly aligned on the optical interface of the fiber. V-grooved fiber arrays and single fibers can be processed and secured in a special tailored substrate holder. For the detection of the fiber core a proprietary fiber illumination module guides you to define and align your print field. Just tap and print. In combination with smart software routines your print object is placed with submicron precision on the optical interface of the fiber. The automatic tilt correction ensures that printed microoptics are perfectly aligned and match your optical simulations.



"The world's most accurate 3D bioprinter"



Quantum X bio

High-performance 3D bioprinter for biofabrication and live cell printing

Advanced biomedical applications

Print virtually any 3D design with unmatched precision and speed, and benefit from a wide range of biomaterials, and bioresins available from Nanoscribe and our partners Advanced BioMatrix, CELLINK and BIO INX. Even organic and complex 3D structures can be precisely printed into microfluidic channels with just a touch screen tap. This makes Quantum X bio the optimal tool for creating physiologically relevant microenvironments for tissue engineering, custom cell scaffolds, and other innovative applications where precision, speed, biocompatible materials, and sterility matter.

Bioprinting at the microscale and beyond

Quantum X bio puts you at the forefront of exploring the full range of biological and biomedical applications. Take advantage of the bioprinting chamber, which creates a sterile environment with temperature and humidity control, a HEPA-filtered airflow and optional connection for pre-mixed air/CO₂, ready to work with aqueous biomaterials and cells.

Bioprinting library and data-driven workflow

With Quantum X bio, you benefit from Nanoscribe's easy-to-use software with intuitive touchscreen controls, enhanced by our Bioprinting Model Library of verified models. Logging of temperature and humidity data during printing ensures cell-friendly conditions in the bioprinting chamber. Load, start and monitor your print from the device's touchscreen – or remotely from your PC with nanoConnectX.



Discover Quantum X bio

Send us an e-mail
sales@nanoscribe.com

Key features

- ▶ 3D bioprinter based on Two-Photon Polymerization
- ▶ Bioprinting chamber with temperature and humidity control, and HEPA-filtered airflow with optional connection for pre-mixed air/CO₂
- ▶ Printing on cell culture dishes, microscope slides, glass and silicon wafers, and microfluidic chips
- ▶ Feature sizes down to 1 μm and below
- ▶ Ready for live cell printing with custom bioresins

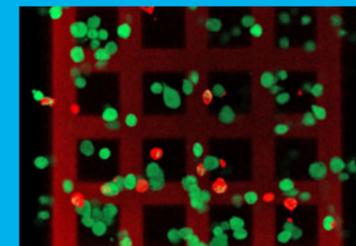
Designed for

- ▶ Cell scaffolds and skin/tissue models
- ▶ Living/4D materials
- ▶ Microfluidics and microneedle arrays
- ▶ Drug delivery vectors and micro/soft robotics
- ▶ Vascular models
- ▶ Topology for cell mechanics and migration
- ▶ Biosensors
- ▶ Materials engineering

Technical specifications

Printing technology	3D printing based on Two-Photon Polymerization (2PP) Two-Photon Grayscale Lithography (2GL®) with voxel tuning capability
Photoresins	Open system for custom materials Hydrogels/bioresins from Advanced BioMatrix, Cellink and BIO INX Nanoscribe IP/IPX Photoresins (polymers) Nanoscribe acrylate, PDMS and glass photoresins (biocompatible, ISO 10993-5)
Substrates	Microscope slides (3 x 1" / 76 x 26 mm ²) Cell culture imaging dishes (35 mm or 50 mm) Wafers from 1" to 8" (25.4 mm to 200 mm)

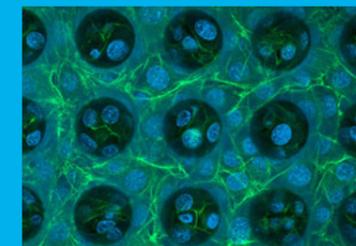
Live cell printing



Be ready for live cell printing! Quantum X bio provides all the features you need for printing with bioresins containing living cells and keeping them alive. This allows you to explore exciting new applications like 3D tissue models, smart or living materials.

- ▶ Sterile, temperature- and humidity-controlled environment
- ▶ HEPA-filtered airflow
- ▶ Use custom bioresins based on hydrogels
- ▶ Cell-friendly wavelength (780 nm)
- ▶ Live-cell printing with viability > 90 % possible

Unmatched precision



With Quantum X bio, you can adjust print resolution and control finest details down to 100 nanometer precision. Thanks to the bioprinter's unmatched precision in combination with tremendous speed, it is the optimal tool for the fabrication of advanced microenvironments for tissue engineering, custom scaffolds for cell studies, and many other innovative biological applications. The fluorescence microscope image shows cell culturing in 3D-printed microwell arrays. The fluorescent NIH 3T3 cells are attached to the biocompatible scaffold made of IP-S whereby they proliferate.

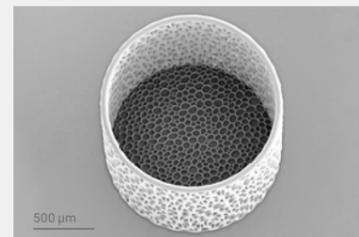
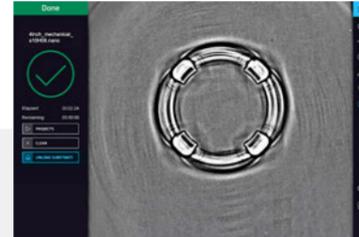
Advanced bioprinting



The bioprinting chamber is a game changer, providing temperature and humidity control and a sterile environment by HEPA-filtered airflow with an optional connection for pre-mixed air/CO₂. Get ideal conditions for cell experiments, work with aqueous biomaterials, and adjust the viscosity or gelation of print materials. The chamber can be removed for cleaning or replaced with other compatible substrate holders. The virtual navigation camera provides a 3D digital view of the substrate in the chamber and the objective lens in use during printing, as well as automatic collision prevention when using special substrates.



"Fastest and most accurate 3D printer in class"



Quantum X shape

New generation high-performance 3D printer for best-in-class innovators

Reshaping precision.

Quantum X shape offers 3D Microfabrication capabilities with unmatched precision thanks to the highest voxel modulation rate in class, and an extremely fine address grid, allowing for sub-voxel size shape control. In addition, you benefit from the 2GL high performance voxel tuning capability for 2.5D structures with stunningly smooth, accurately shaped, or micropatterned surfaces.

Reshaping output.

Quantum X shape is the ideal tool for rapid prototyping of application designs in biomedical devices, microoptics, microelectromechanical systems (MEMS), microfluidics, surface engineering and many more. Wafer handling capabilities make batch processing and small series production of 3D microparts easier than ever.

Reshaping usability.

Control your print job via the device's integrated touchscreen. Keep an eye on your printer even from the office and in multi-user configurations via nanoConnectX. And benefit from industrial standards and time-efficient wafer batch production.



Discover Quantum X shape

Send us an e-mail
sales@nanoscribe.com

Key features

- ▶ High-speed 3D Microfabrication with ultra-fast voxel modulation rate
- ▶ Four Print Sets available, from nanometer to centimeter scale
- ▶ Wide range of substrates and wafers up to 8"
- ▶ Industry-proven platform for wafer-level batch processing
- ▶ 200 typical mesoscale structures printable overnight

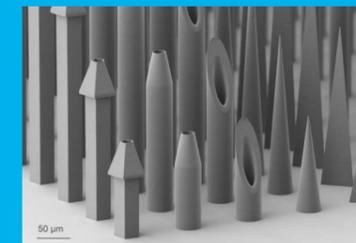
Designed for

- ▶ Rapid prototyping in research and industry
- ▶ Batch processing / small series production
- ▶ Wafer-scale fabrication
- ▶ Research labs and multi-user facilities with highest quality and output requirements
- ▶ Life sciences, materials engineering, microfluidics, micromechanics & MEMS, microoptics and integrated photonics

Technical specifications

Printing technology	Layer-by-layer 3D printing based on Two-Photon Polymerization (2PP) Two-Photon Grayscale Lithography (2GL®) with voxel tuning capability
Substrates	Microscope slides (3 x 1" / 76 x 26 mm ²) Wafers from 1" to 8" (25.4 mm to 200 mm) Glass, silicon and further transparent and opaque materials
Maximum print area	50 x 50 mm ²

Precision by 2PP



Based on Two-Photon Polymerization, Quantum X shape is the most precise system in class. Its superior precision relies on an advanced galvo mirror system combined with the highest voxel modulation rate in class.

This high modulation rate leads to an extremely fine address grid, that allows for sub-voxel power control. As a result 3D shapes with submicron precision and unprecedented accuracy can be printed.

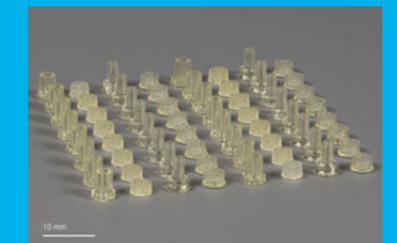
Wafer-scale batch processing



Quantum X shape is based on the industry-proven, upright Quantum X platform and can process glass substrates and silicon wafers up to 8". In combination with the proprietary photoresin dispenser, exact dosing of the printing material is guaranteed throughout the entire printing process.

As a result, up to 200 typical meso-scale structures can be printed overnight on a fully addressable print field of 50 x 50 mm².

XLFP Print Set

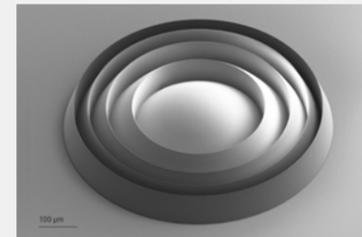
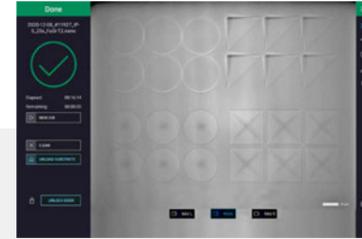


3D-printing via Two-Photon Polymerization focuses on the fabrication of objects on the microscale. With the XLFP Print Set this manufacturing range expands from nano- and microscale structures to millimeter- and centimeter-sized objects with highest precision and shape accuracy. With the new XLFP Print Set you benefit from wafer-scale batch production with print volumes up to 30 cubic centimeters in one pass.

The XLFP Print Set is ideal for various applications, such as prototyping of mechanical and microfluidic parts and structures, housings, connectors or nozzles.



"World's first Two-Photon Grayscale Lithography (2GL®) system"



Quantum X

Industrial manufacturing performance with 2.5D grayscale lithography system for prototyping and mastering

Industrial performance.

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 eight-inch wafer substrates without the need for additional lithography steps or mask fabrication.

Industrial mastering.

Quantum X is designed for rapid prototyping and mastering in industrial production and replication processes. This maskless lithography system redefines the fabrication of freeform microoptics, microlens arrays and multi-level diffractive optical elements.

Industrial standards.

Control your print job via the device's integrated touchscreen. Keep an eye on your printer even from the office and in multi-printer and multi-user configurations via nanoConnectX. And benefit from industrial standards and time-efficient wafer batch production.



Discover Quantum X

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Key features

- ▶ High-speed 2.5D Microfabrication by Two-Photon Grayscale Lithography (2GL®)
- ▶ 2GL stitching and tilt compensation for truly seamless structures
- ▶ Ultra-smooth surfaces and excellent shape accuracy
- ▶ Sag heights up to $\geq 1,000 \mu\text{m}$ with vertical side walls and high aspect ratios
- ▶ Wide range of substrates and wafers up to 8"

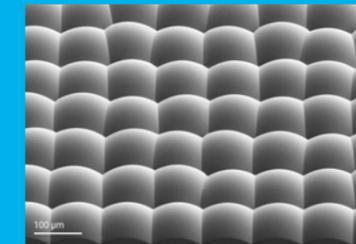
Designed for

- ▶ Refractive microoptics – individual lenses and arrays
- ▶ Diffractive microoptics – discretization up to 4,000 levels
- ▶ Small series production and wafer-scale fabrication
- ▶ Rapid prototyping
- ▶ Industrial mastering for replication processes, e.g. master templates for NIL and μIM

Technical specifications

Printing technology	Two-Photon Grayscale Lithography (2GL®) with voxel tuning capability
Substrates	Microscope slides (3 x 1" / 76 x 26 mm ²) Wafers from 1" to 8" (25.4 mm to 200 mm) Glass, silicon and further transparent and opaque materials
Maximum print area	50 x 50 mm ²

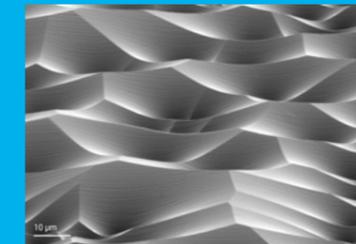
Maximum throughput with 2GL®



2GL enables outstanding ultrafast microfabrication of arbitrary shaped topographies with exceptional optical quality and drastically reduced number of layers, thus resulting in the shortest printing times.

For example, a single microlens (300 μm in diameter and 69 μm in height) can be fabricated in 36 seconds with a surface roughness below 8 nanometers (R_a) and a shape accuracy of better than 110 nanometers (S_a). Our 2GL technology is many times faster than conventional 2PP-based microfabrication, with higher quality results.

Excellent shape accuracy



Two-Photon Grayscale Lithography enables the fabrication of nanostructured topographies, such as multi-level diffractive optical elements (DOEs) with truly outstanding shape accuracy in a single printing step. The nanostructured surfaces meet the high lateral and axial submicron resolution as required, for example, in DOEs.

With additive microfabrication, multi-level DOEs can be fabricated in a single printing step, either as functional prototypes or as masters for tooling in volume production.

Industrial microfabrication



2GL enables the fabrication of master templates for subsequent replication processes, such as nanoimprint lithography (NIL) and micro injection molding (μIM). It is also ideal for rapid prototyping of designs that can be directly validated for the requirements of the microoptics industry.

The granite-based platform of the Quantum X product line is extremely rigid and can process standard wafers up to 8 inches with high yield, making it the ideal tool for producing master templates for industrial replication processes.



Why Nanoscribe

Join the Nanoscribe community! As the pioneer and market leader in high-precision additive manufacturing, we are your reliable partner for microfabrication systems, software, and solutions. Founded in 2007 as a spin-off of the Karlsruhe Institute of Technology (KIT), we are a vibrant, award-winning company and part of the BICO Group since June 2021. With our field-proven systems, straightforward 3D printing workflows and all-in-one solutions, our more than 4,000 system users are driving future-shaping applications.

In our Nanoscribe community there are innovators and thought leaders across a broad spectrum of scientific research and industries including life sciences, microoptics, photonics, materials engineering, microfluidics, micromechanics and MEMS. Their fascinating innovations have now been published in over 1,800 contributions to a wide range of peer-reviewed journals.

CUSTOMER SUPPORT AND SERVICES

With more than 15 years of experience in microfabrication technologies, our customer support team strives to provide the best support in the shortest time possible. Sales and support are provided worldwide from locations in Germany, China and the USA, as well as by a worldwide network of certified distributors. Our interdisciplinary and multilingual service team attends to your requests with comprehensive customer support:

- ▶ Commissioning, maintenance and repair
- ▶ On-site and online training sessions
- ▶ 24/7 assistance through NanoGuide, a comprehensive self-service platform
- ▶ Phone, e-mail and remote support
- ▶ Technical and application support beyond primary use cases
- ▶ Extended maintenance and guarantee contracts, upgrade and relocation services



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