



IQS
NANO

ULTRA-FAST NANO 3D PRINTING

Exceptional resolution powered
by Two-Photon Polymerization

IQ NANO 3D

Key Technologies

Two-Photon Polymerization

Two-Photon Polymerization (2PP) is the core technology of IQnano3D. It is based on nonlinear absorption of two photons within a focused laser spot, which triggers polymerization only at the focal volume. This enables true 3D structuring in photosensitive resins with nanoscale resolution, submicron voxels, and sharp feature definition.

Technology Based on a Green Laser

IQnano3D is powered by a green femtosecond laser at 520 nm ± 5 nm. Compared to red lasers, the green wavelength provides more than 30% higher precision. This makes the system highly attractive for applications that demand maximum accuracy and fine detail. It also enables the use of photoresins with low autofluorescence, which is particularly valuable in biological research and cell-based applications.

NanoSweep™ Beam Steering

NanoSweep™ is our patented beam steering technology that combines fast, inertia-free Acousto-Optic Deflector (AOD) technology with high-precision stage motion. The laser beam is deflected at the speed of sound, enabling rapid, brush-like sweeping across each layer with dynamically adjustable stroke width. This approach achieves extreme writing speeds while maintaining nanoscale accuracy. Randomized seam positioning further improves structural integrity, surpassing conventional raster strategies.

Key Benefits:

- ✔ True 3D structuring with nanoscale resolution
- ✔ Over 30% higher precision with 515 nm green laser
- ✔ Broad compatibility with standard and transparent materials
- ✔ Ultra-fast, inertia-free beam steering with NanoSweep Seamless
- ✔ Stitching and stable geometry across large areas
- ✔ High-throughput microfabrication with maintained voxel accuracy

IQnano3D COMPLEX SOLUTION

3.3+

Ultra-fast speed – up to 3.3 million voxels/s

<150

High resolution down to 150 nm

>1:10

Extreme aspect ratio up to 1:10



Custom print modes – for efficient production



Material flexibility – incl. biocompatible resins



Intuitive workflow – easy and user-friendly

PRINTING MATERIALS

We offer a portfolio of **nine** proprietary **ResIQ™** photoresins, developed for top performance in Two-Photon Polymerization. They cover applications ranging from cost-effective prototyping and durable functional parts to biocompatible scaffolds, high-purity optics, and fluorescently labeled structures.



Basic One

- ✔ Cost-effective prototyping, high resolution at micron scale.

Hybrid One

- ✔ Inorganic-organic matrix, high mechanical strength & chemical resistance.

Bio One

- ✔ biocompatible, low autofluorescence, stable up to 200 °C.

BioFlex

- ✔ flexible, supports direct cell adhesion & growth, noncytotoxic.

OptoBase

- ✔ Affordable optical resin, transparent (400–1600 nm).

OptoPure

- ✔ High performance resin for optical application (high transparency in UVA to IR region).

LumiBlue

- ✔ Fluorescent resin for structure labeling and microscopic inspection.

PETA

- ✔ Highly reactive acrylate resin enabling rapid crosslinking, high resolution, and efficient 2PP processing.

PETA+

- ✔ Improved stability for longterm high-resolution printing, PDMS compatible.

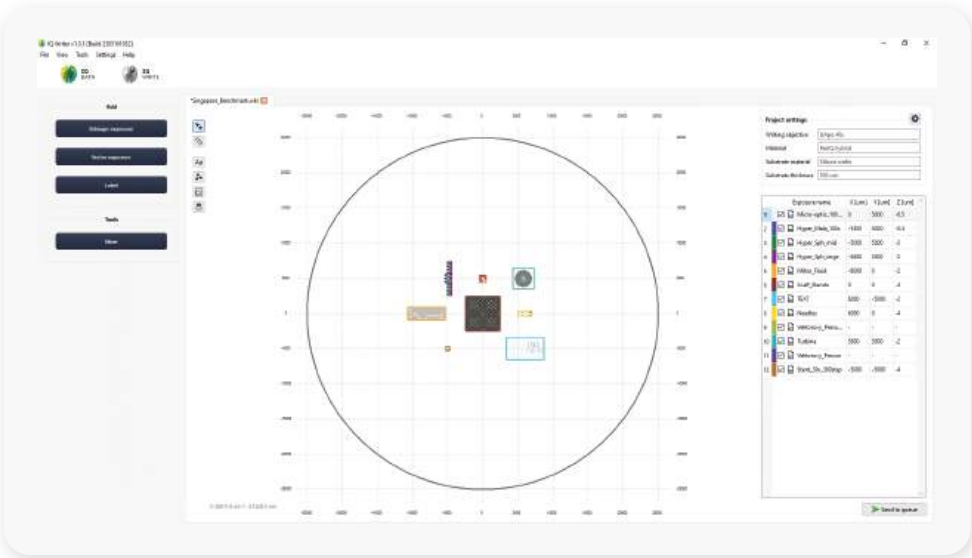
For a detailed overview of all materials, see the brochure **ResIQ Photoresins 2025**.

Software & Tools for data preparation and print process

IQData for data preparation:

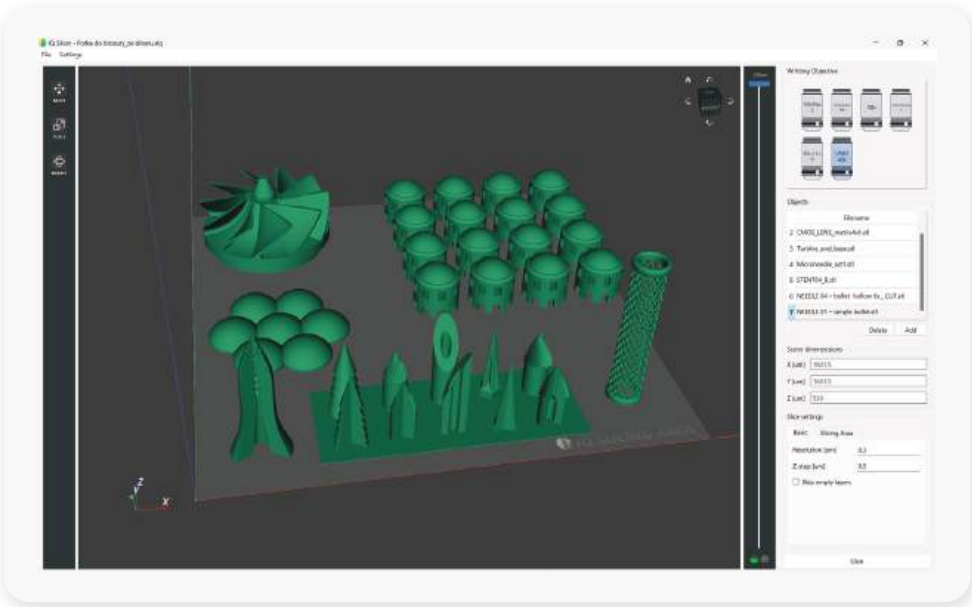
- ✓ Slicer for CAD model processing
- ✓ Project builder (subjobs)
- ✓ C++ and Python scripting support

IQData (Data preparation) - Includes slicer for CAD model processing, project builder for subjob management, C++ and Python scripting support, user and advanced modes. Supports IQS nano's proprietary ResIQ resin series.



- ✓ Print layout interface for managing sub-jobs
- ✓ Visualization of print project sub-jobs
- ✓ Advanced settings for print job parameters
- ✓ Custom script editor
- ✓ Vector-based job builder
- ✓ Tool for generating labels
- ✓ Resin, substrate setting and print parameters

Slicer for CAD model processing:



- ✓ Input STL files
- ✓ Basic 3D model function (rotation, resize...)
- ✓ Pre-setting parameters for slicing
- ✓ Subfield segmentation tool (for larger objects)

IQWrite – Printer Control

IQWrite runs exclusively on the printer's control PC. It manages complete device setup, including autofocus on the wafer, nanometer-precision stage movements, and Z-axis adjustments.

Users can monitor the process via live camera feed or direct objective view. Objective lenses can be easily swapped, with automatic calibration triggered by a single click, ensuring seamless and accurate printing.

DESCRIPTION

Performance

Print technology:	Two-photon polymerization (2PP)
Print area:	up to 50 x 50 mm ²
Print height (max.):	up to 20 mm (Air immersion lens)
Minimal feature size (lateral; vertical):	> 110 nm; > 250 nm

Fabrication modes:

NanoSweep mode: Synchronized writing with stage movement and AOD scanner (stitching free in stage scan direction)
Scanner mode: AOD raster scanning synchronized with Z-axis stage (writing fields stitching)
Vector mode: Advanced Vector AOD scanner patterning synchronized with Z-axis stage, controlled by customer written script
Max. sample size: 150 mm x 150 mm; 6"

Max. sample thickness:

Up to 20 mm for standard flat substrates (wafers);
Up to 50 mm with special holders for non-standard samples.
Autofocus: Optical detection of surfaces interfaces
Optical inspection system: Includes a coaxial camera for precise navigation on the substrate, complemented by a chamber camera for monitoring the printer setup and printing process

Print substrates:

Standard: Reflective and non-reflective (e.g. glass, silicon, quartz, sapphire, microscope glass slides, metal)
Nonstandard: Print on device and components (fiber connector, optoelectronic, photonic, on chip, microfluidic chip, etc.)
Print materials: IQS nano proprietary ResIQ resin; customer-specific resins; photoresist

Laser and Scanner:

Max. average power (2H): >500 mW
Wavelength (2H): 520 nm ± 5 nm
Laser scanner type: AOD-based (Acousto-Optic Deflector) technology enables high-speed, non-mechanical deflection of the laser beam, providing precise and rapid scanning without moving parts
Laser scanner resolution: >5nm (for 60x Lens)
Laser scanner speed: Up to 3.3 million voxels per second

Objectives

	Standard			Optional		
Lens magnification	60x	20x	10x	100x	30x	5x
Numerical aperture	1.42	0.7	0.25	1.45	1.05	0.25
Working distance	0.15 mm	0.35 mm	21 mm	0.13 mm	0.8 mm	12.5 mm
Resin immersion	Yes	Yes	No (Air)	Yes	Yes	No (Air)
Writing field (addressable field)	35x35µm ²	110x110µm ²	220x220µm ²	20x20µm ²	70x70µm ²	430x430µm ²



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