Title:

NanoScribe – Quantum X Shape at NEST joint lab with Scuola Normale Superiore of Pisa

Sub-title:

Micro scale 3D printing system based on two photon polymerization

General description:

Nanoscribe QuantumX Shape is 3D printer based on two-photon polymerization, using a femtosecond pulsed laser with a wavelength in the range 700-800 nm. It enables high-resolution (sub-micron) 3D printing without limitations to the geometry and can use a variety of printing materials with different chemical-physical properties, including functional materials.

Features:

1. Ability to print components of complex 3D shape without restrictions
2. User-friendly software and graphical interface (DeScribeX, NanoPrintX, NanoConnectX) to import and manage CAD files and printing processes.
3. Printing area of 50x50 mm^2 and printing height of 20 mm;
4. Horizontal feature size as low as 2 µm and vertical feature size of 40 µm at high speeds (max 1250 mm/ s)
5. Horizontal feature size as low as 0.2 µm and vertical feature size of 0.5 µm at slow speeds (max 100mm/ s)
6. Mechanical and/or piezo-assisted stage for sample handling, comprising any alignment and compensation systems for handling errors and vibrations.
7. Automatic stitching of 3D printed parts.
8. 3D printing by patented Two-Photon Grayscale Technology, for optical grade devices (surface roughness <10nm).
9. Wide range of light curable materials: biomaterials certified ISO10993-5, Nanoscribe materials and non-proprietary commercial materials (e.g., SU-8).
10. Objectives and accessories/parameters for printing at 5x, 10x, 25x, 63x magnification.

Control over temperature, humidity, (HEPA-filtered and CO_2 connection) to print cellular constructs and guarantee their survival.

Applications:

- Bio- devices:
  - High-precision-3d-printing-enables-worlds-tiniest-endoscope https://www.nanoscribe.com/en/news-insights/news/high-precision-3d-printing-enables-worlds-tiniest-endoscope (Image in folder)
- Micro-optics:
  - Complex aspherical singlet and doublet microoptics by grayscale 3D printing - https://opg.optica.org/oe/fulltext.cfm?uri=oe-31-3-4179&id=525410
- Micromechanics
  - Additive Manufacturing of Ductile, Ultrastrong Polymer-Derived Nanoceramics (architectures with feature sizes down to 200 nm and monolithic pillars with diameters up to 20 μm) - https://www.sciencedirect.com/science/article/pii/S2590238519302243?via%3Dihub
- Microfluidics components
  - Actuator to realize a microfluidic device for sample collection - https://onlinelibrary.wiley.com/doi/10.1002/admt.202000323