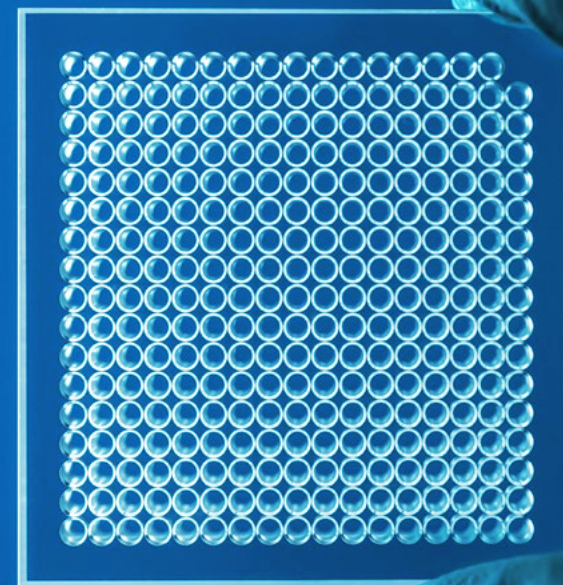




samples book





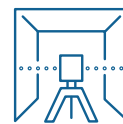
20+ years of expertise

in femtosecond laser micromachining
with high focus on glass



Full-service solution:

Prototyping
Scaling production
Laser system development



Patent family of
13 in-house and 2 licensed patents

enabling cutting-edge technologies



60+ professionals

Laser solutions for
your μ tasks

Member of



Toolas

ISO certified



We have:

In-house laser processing facilities, complemented by post-processing capabilities



Clean room ISO7

Lasers

Femtosecond
Picosecond
Nanosecond
CO₂

5 axis scanners

Scanlab Precsys 1030nm

Scanners

Galvoscanners 1030/515/343



Positioning stages

up to 380 mm travelling range

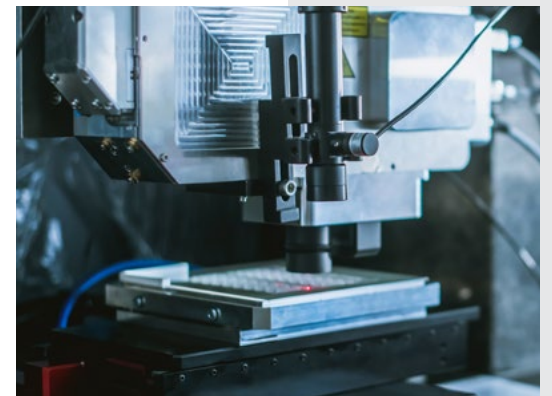
Wet etch benches

High-end metrology

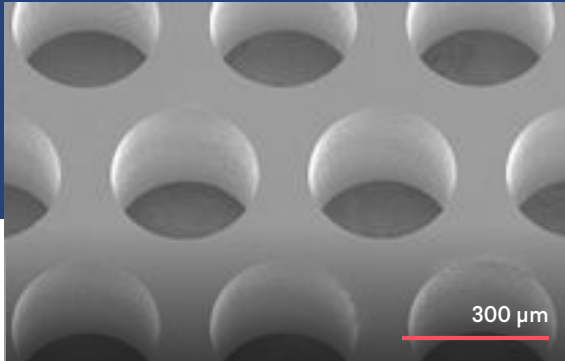
Scanning electron microscope | SEM
Sensofar Neox profilometer
Nikon Nexiv VMZ-S video
measuring system



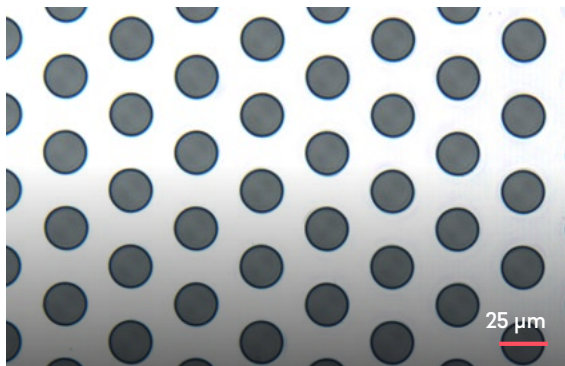
Birefringence measurement system



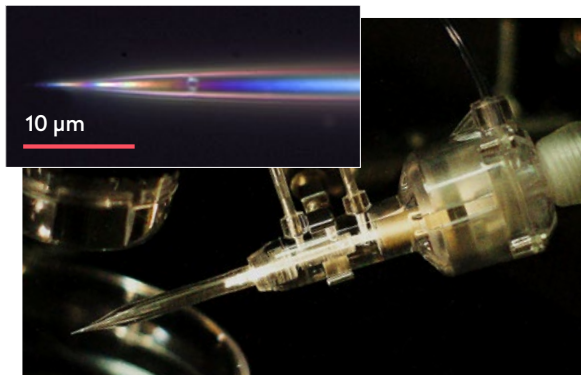
Glass & sapphire drilling



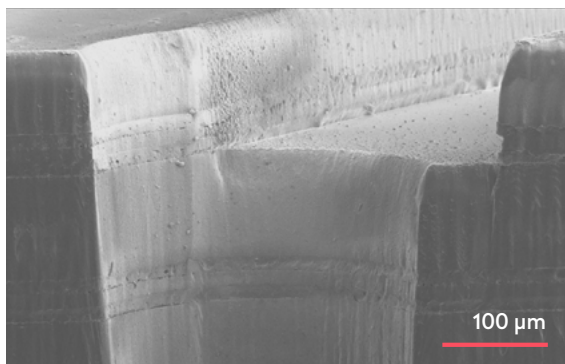
Glass drilling, no taper, microscope view



Glass wafer drilling



Glass biopsy probe drilling



Microfluidics chip channel drilling



Hole diameter

from 20 μm



Various shapes

circular, square,
irregular



Thin glass & sapphire

30 μm – 3 mm



Hole size tolerance

$\pm 1 \mu\text{m}$



Aspect ratio

To 1:100



Straight hole cross-section

No taper



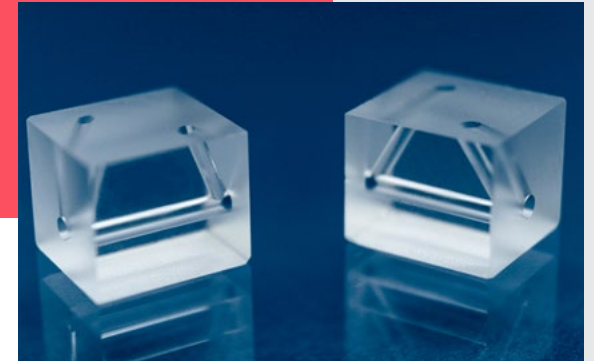
Low chipping

<10 μm



Smooth sidewalls

Ra <1 μm



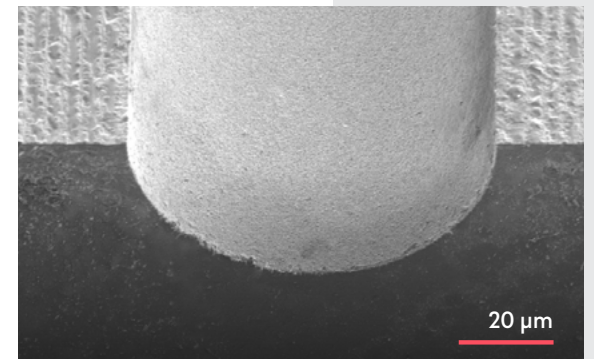
Selective laser etching of 3D glass structures



Fiber alignment arrays



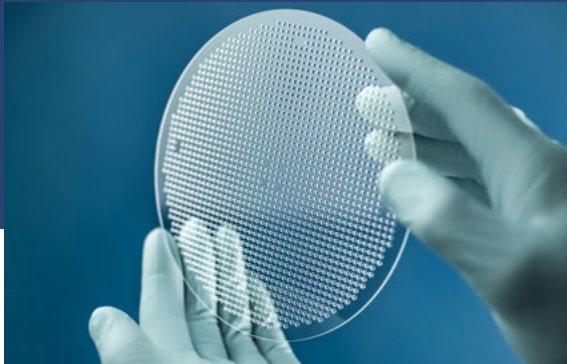
Precision glass rod for fiber optic collimators, ferrules, alignment fixture



Sapphire drilling top view

Glass drilling | Range

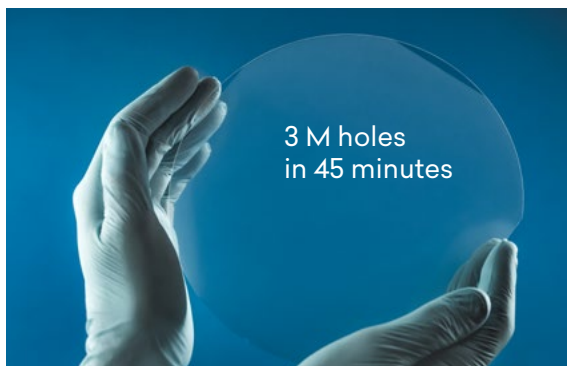
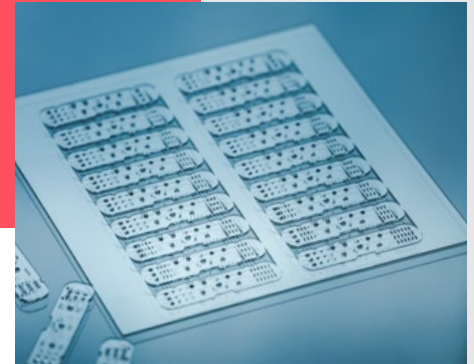
wophotonics.com



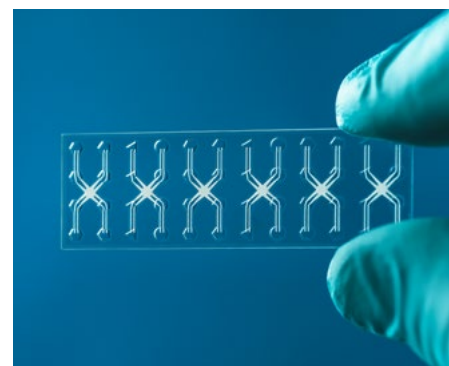
Glass spacers | Interposers



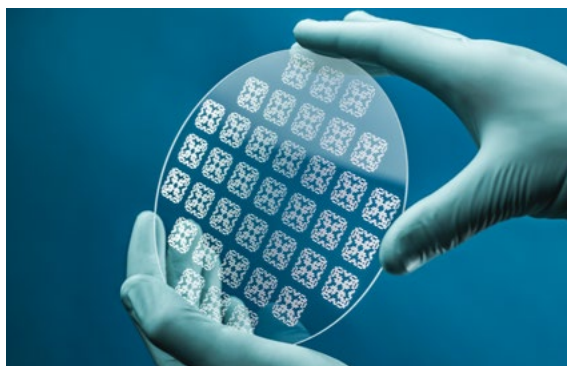
Guide plates for probe cards



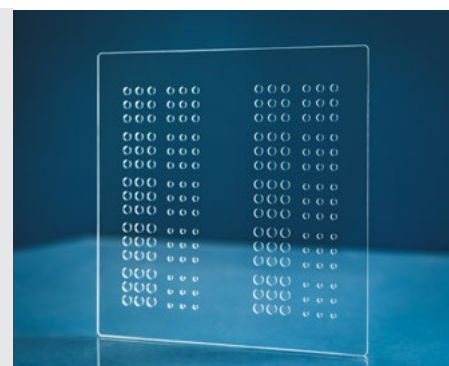
Glass carrier wafers > 8" diameter, 500 μ m thickness fused silica wafer



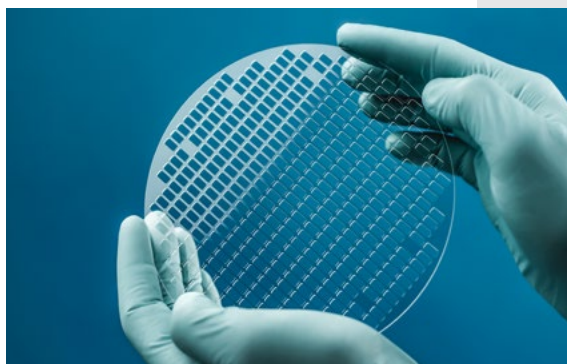
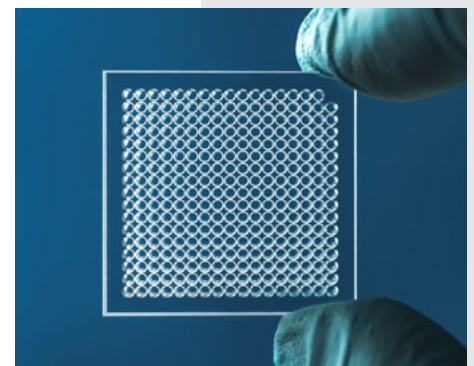
Microfluidic chips channels drilling



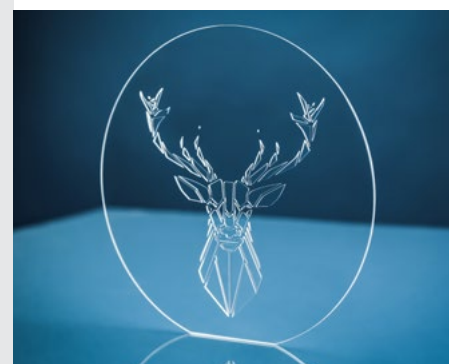
Through glass via (TGV) wafers



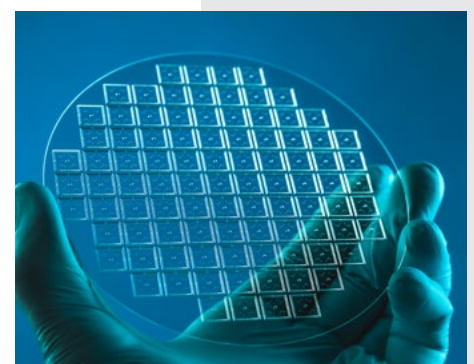
Multiwell plates



Packaging glass products



Your any application



Glass & sapphire cutting



Ultra high precision
& quality



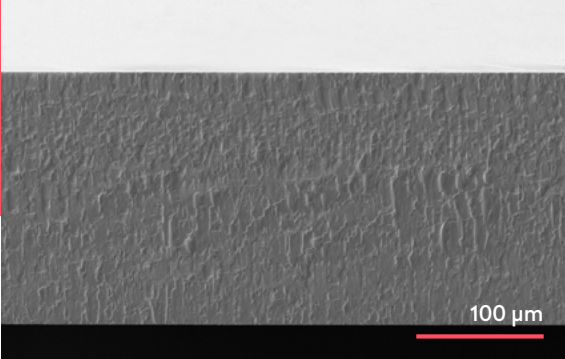
Tempered glass
Non-tempered glass
Sapphire



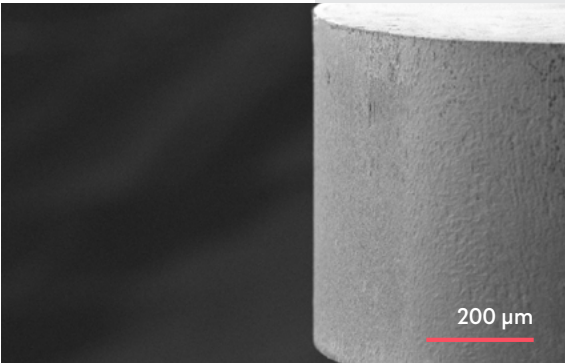
High speed
up to 1000 mm/s



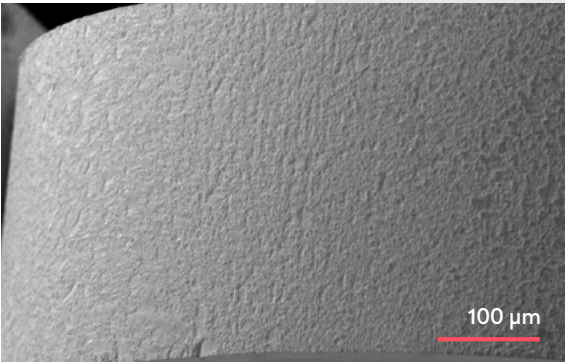
Low chipping
<10 μm



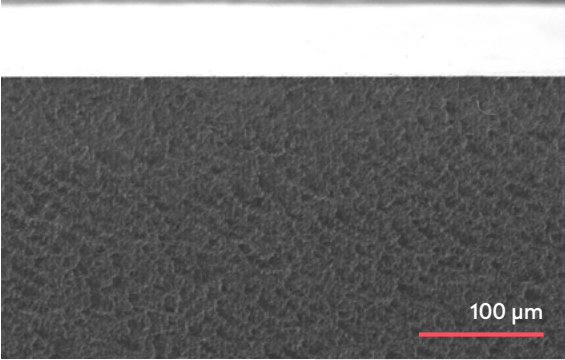
Fused silica glass, thickness 250 μm



Sapphire, thickness 700 μm



Sapphire, thickness 400 μm

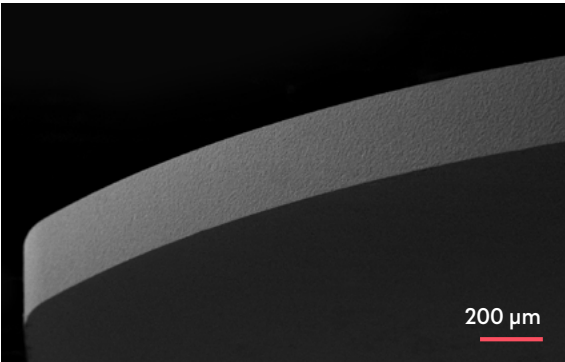


Sapphire, thickness 700 μm



Thin glass &
sapphire

30 μm – 3 mm

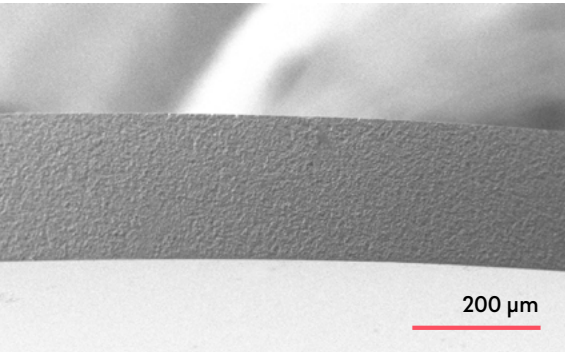


D263T glass, thickness 300 μm



Various shapes

circular, square,
irregular



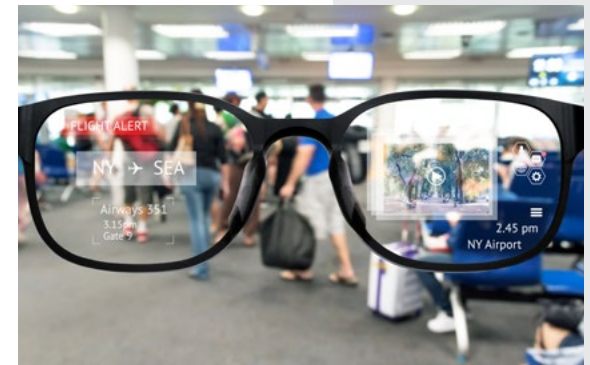
D263T glass, thickness 300 μm

Glass & sapphire cutting applications

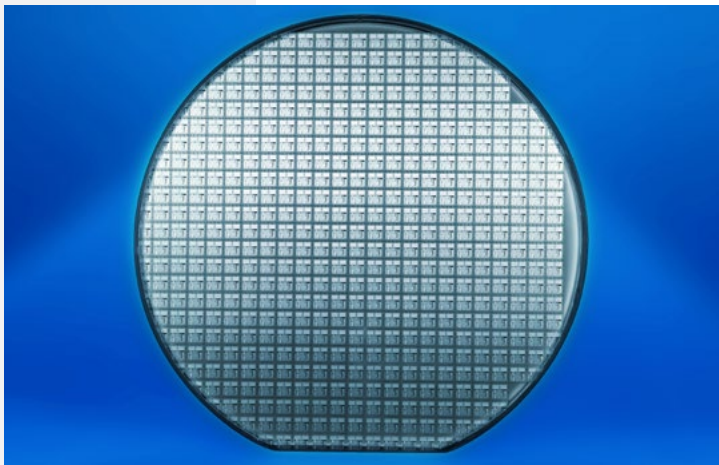
wophotonics.com



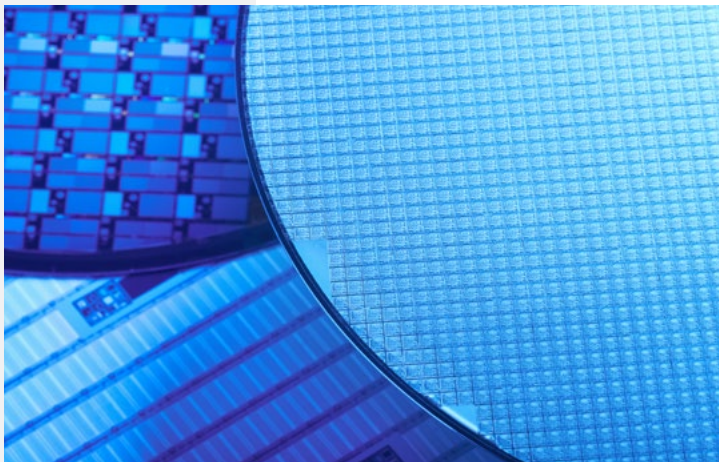
Mobile phone sapphire screens



Augmented reality, smart glasses screens



Wafer level glass product dicing



Microoptics elements

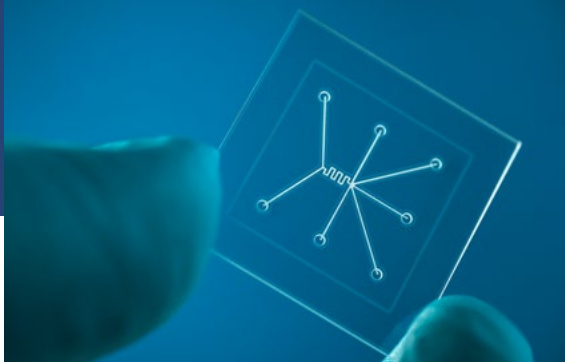


Mobile phones sapphire buttons

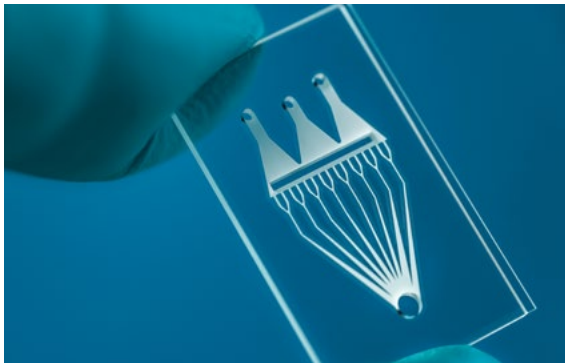


Mobile phones camera lenses

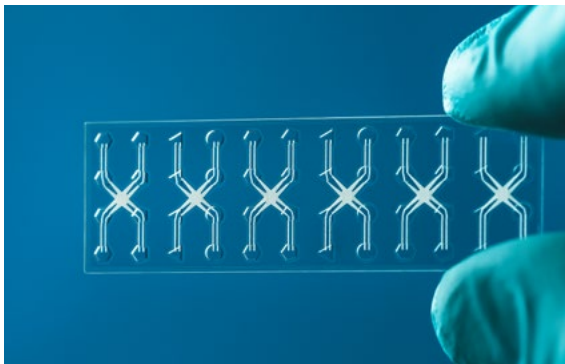
Microfluidic chips & devices



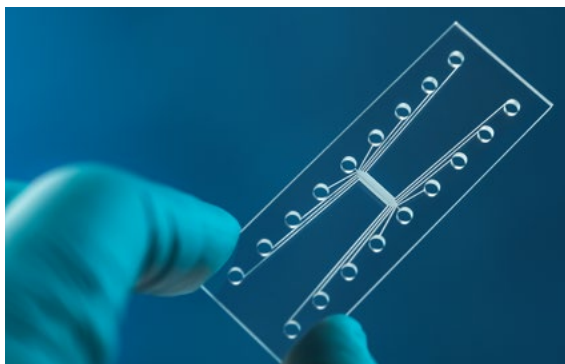
Microfluidics for point-of-care



Microfluidics for single-cell analysis

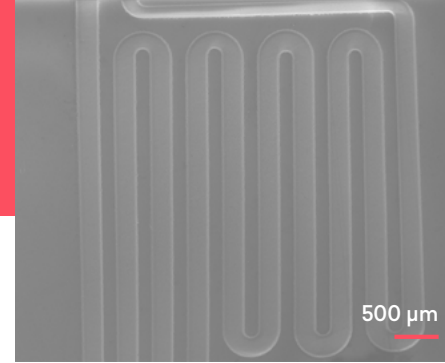


Droplet based microfluidics

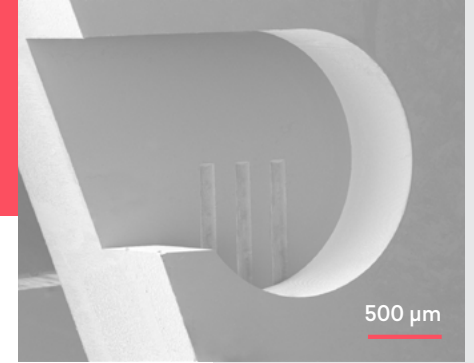


Microfluidics for any custom application

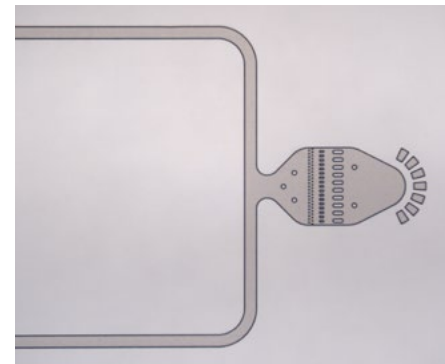
- Materials: Glass, Silicon, Polymers (PDMS)
- Custom design
- Rapid prototyping
- Contract manufacturing services



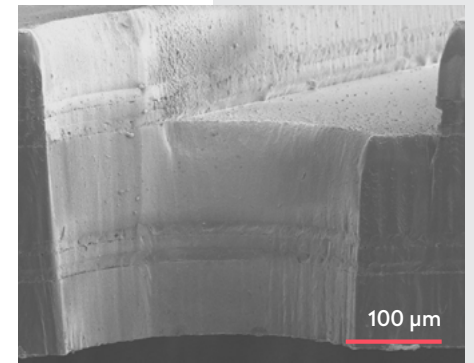
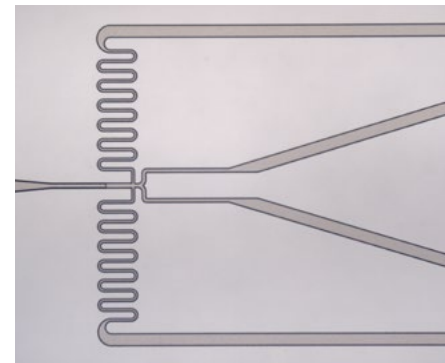
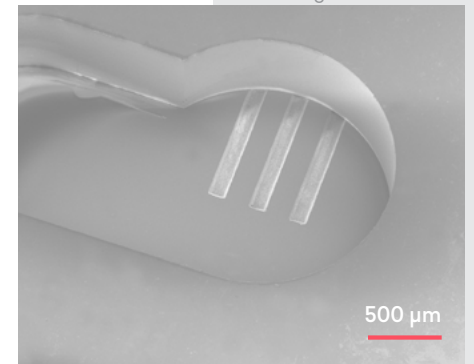
Microfluidic chip channels formation



Microfluidic chip channels micro drilling with laser ablation and laser bonding

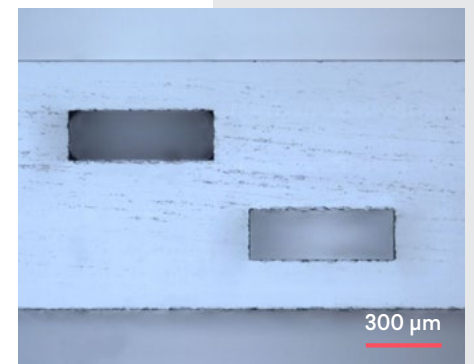


Microfluidic chip channels formation

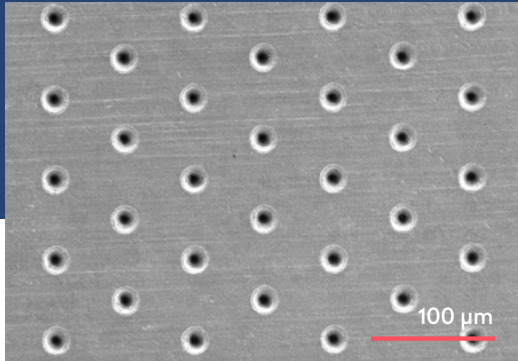


Microfluidic chip channel drilling

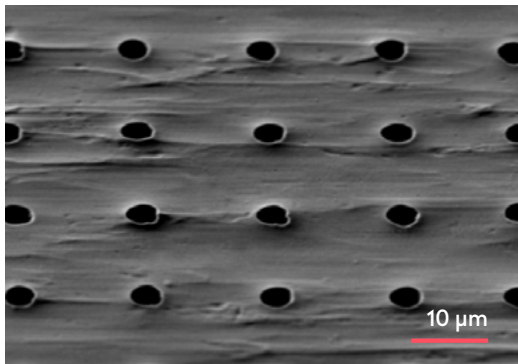
- Cleanroom environment
- No debris on surface
- No mold needed



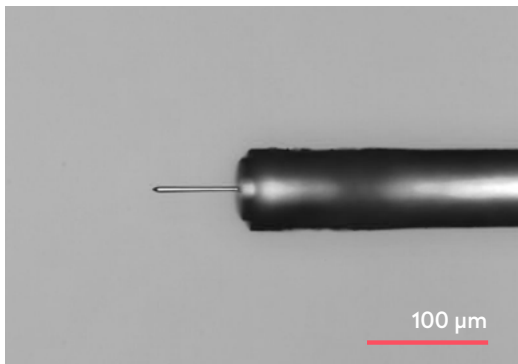
Microfluidic chip, 5 layers bonded, side view



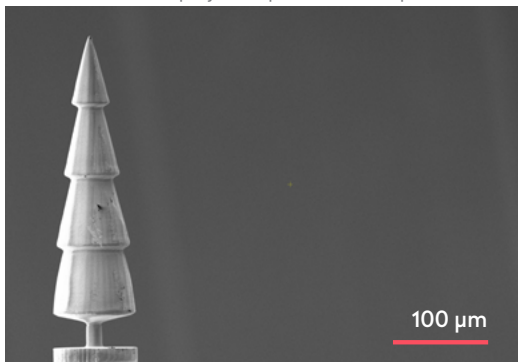
Metal | Steel foil drilling



Steel foil drilling



Tungsten needle micromachining for biomedical R&D project. Tip diameter $\geq 5 \mu\text{m}$



100 μm tungsten wire micromachining



Various shapes

circular, square,
irregular



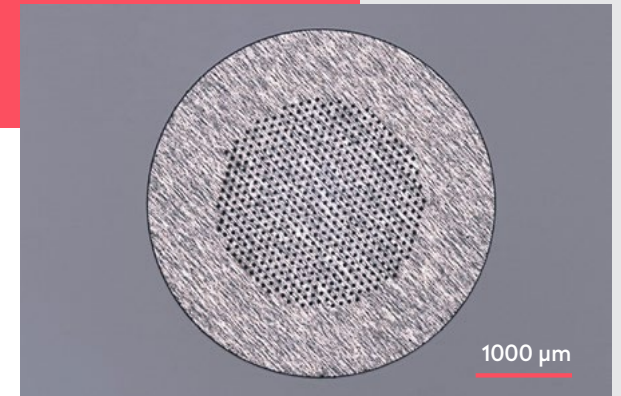
Hole diameter

from 1 μm

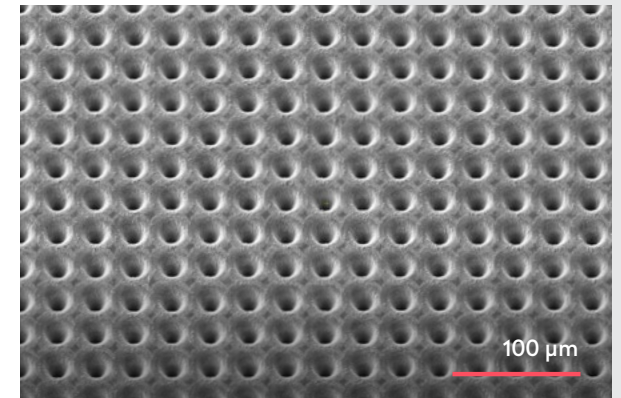


Smooth sidewalls

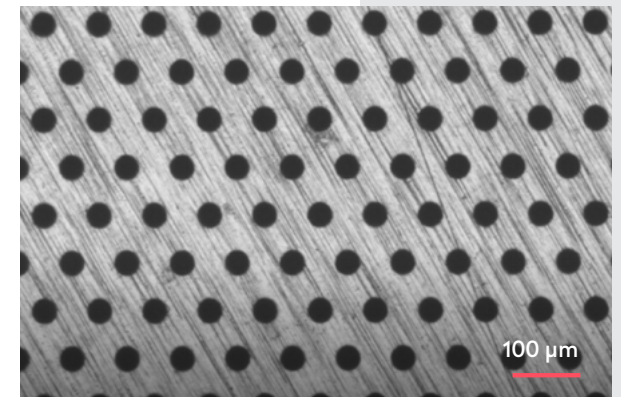
$R_a < 1 \mu\text{m}$



Mesh filter, circular 5 mm diameter.
Zone with holes - 3 mm. Back illumination.



Mesh filter - 100 μm thickness AISI 316 steel sheets with high
tensile strength perforation.

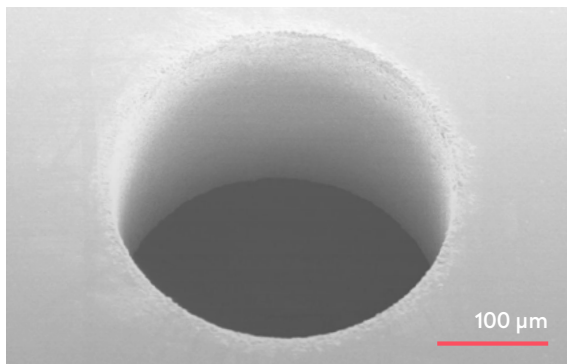
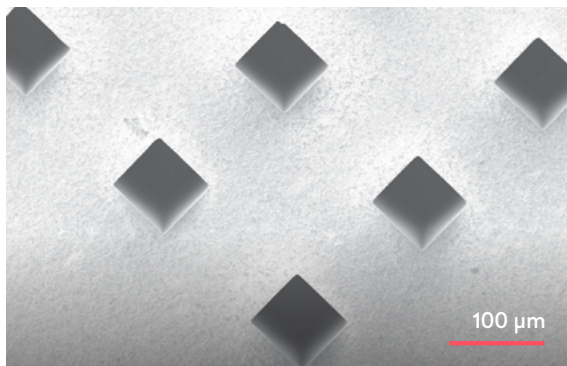
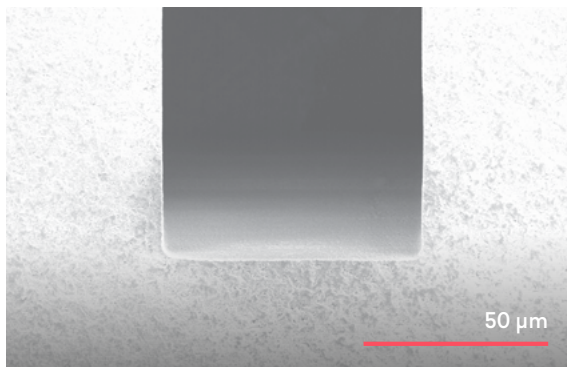


Mesh filter, front side, top illumination

Ceramics drilling



Guide plate for probe cards



Hole diameter

from 1 μm



Various shapes

circular, square,
irregular



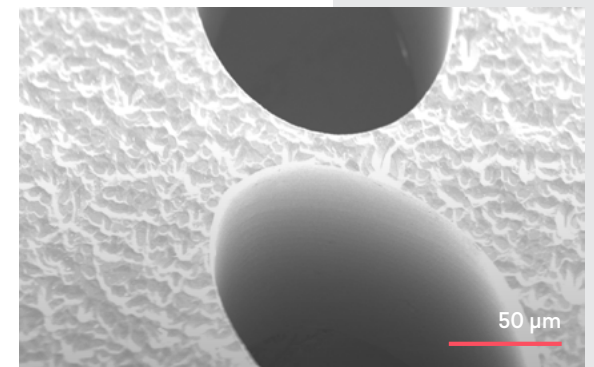
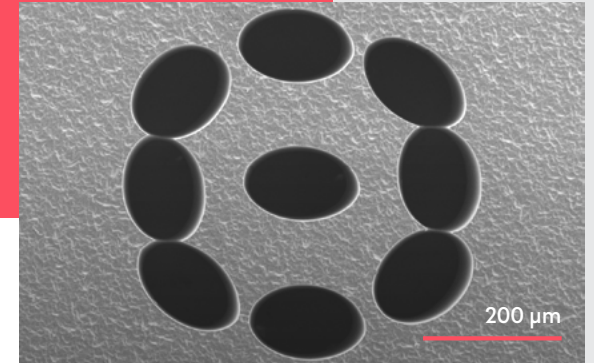
Low chipping

<20 μm



No melting or micro cracks

Silicon drilling



Smooth sidewalls

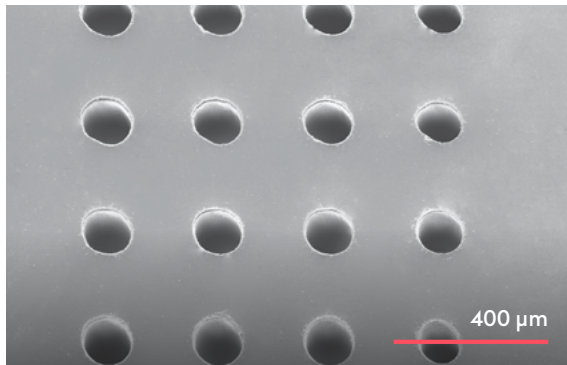
Ra <200 μm



Substrate

thickness of
up to 1 mm

Plastic cutting & drilling



Various shapes

circular, square,
irregular

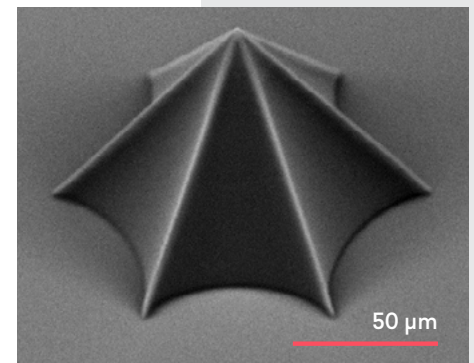
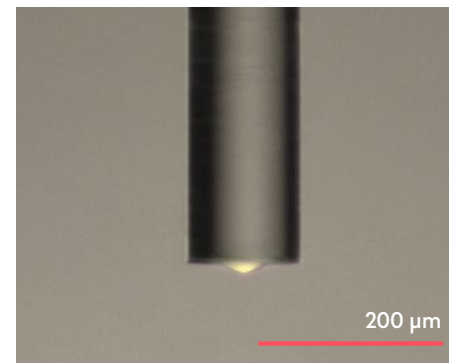
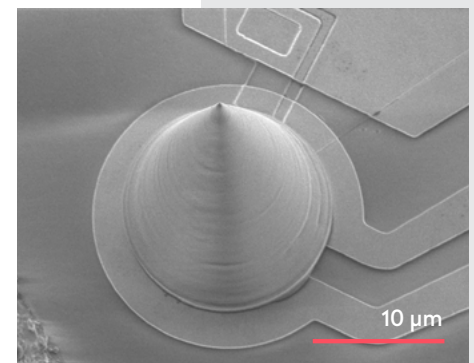
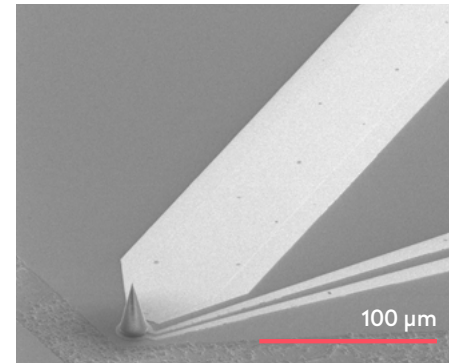
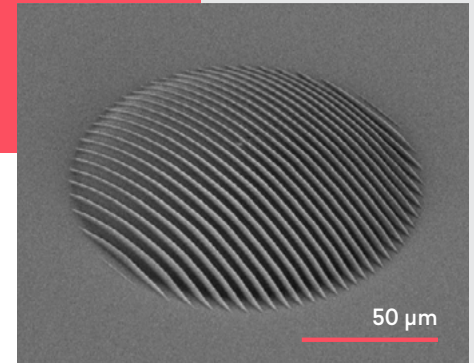
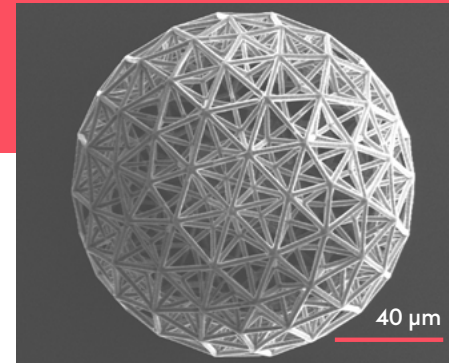


Smooth sidewalls

$R_a < 1 \mu\text{m}$

Multiphoton polymerization | MPP

wophotonics.com



Writing resolution

200 nm - 10 µm



Cost effective

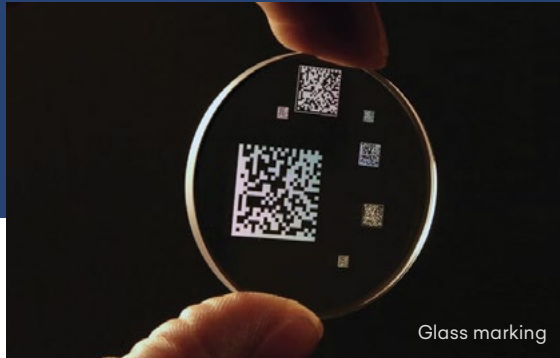


Complex 3D objects



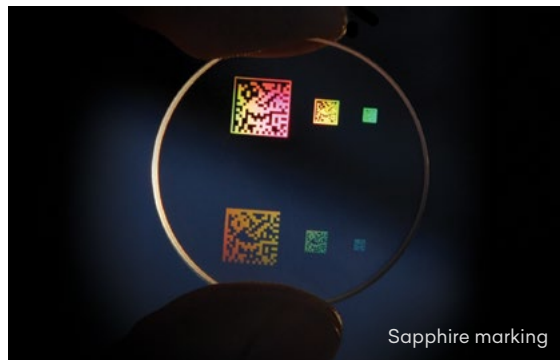
Small footprint

Laser marking



Glass marking

Written directly inside the object by making refractive index irregularities without damaging the surface.



Sapphire marking

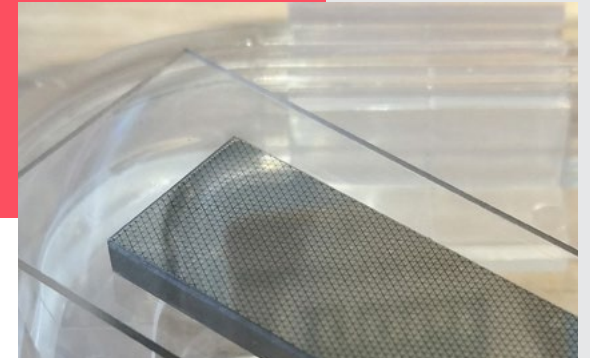
Written directly inside the object by making refractive index irregularities without damaging the surface.



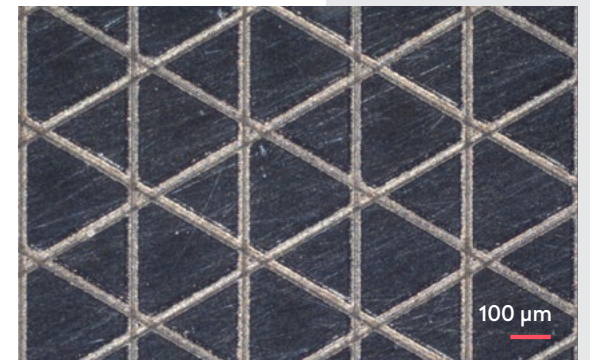
Laser marking using selective laser ablation on a sapphire substrate removing a 10 nm thickness ceramics layer.

- Colourful structures in glass and sapphire
- Surface not affected
- No cracks near markings
- Low influence on the strength of the substrate
- No heat-affected zones
- High positioning accuracy (3D marking available)

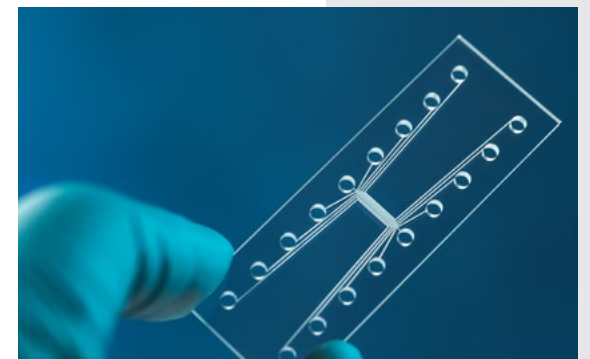
Laser welding



Glass to metal micro welding

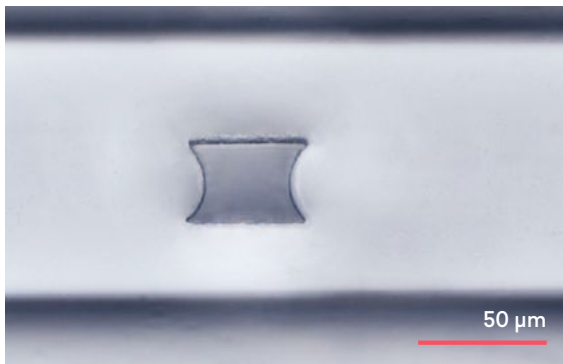
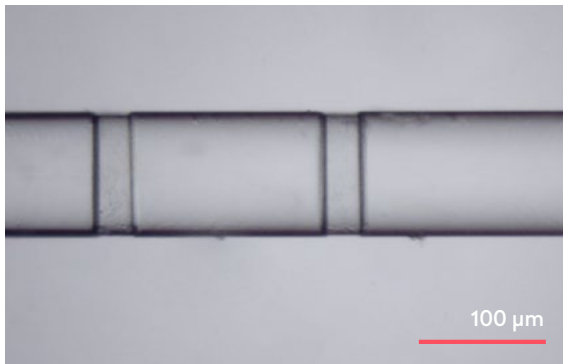
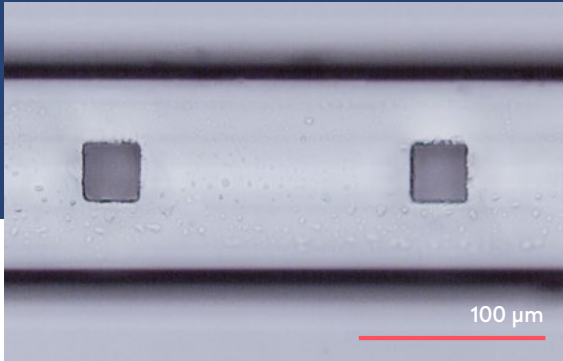


Glass to metal micro welding



Microfluidic channels laser sealing

- High precision
- Good mechanical strength
- No extra bonding material is needed
- Hermetic sealing
- Minimum heat-affected zones



Hole diameter

from 10 μm

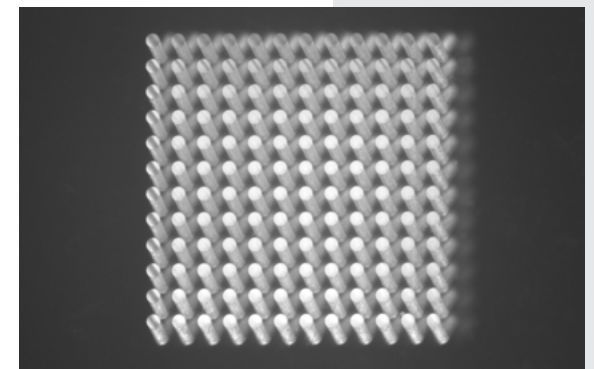
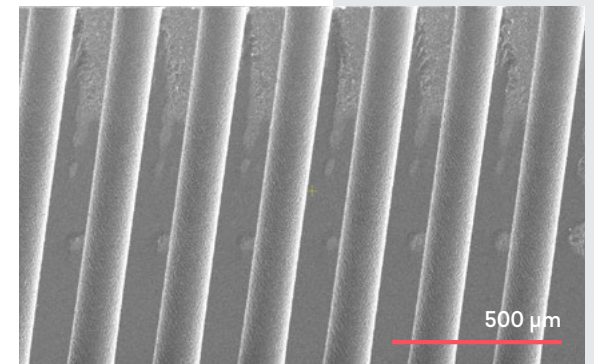
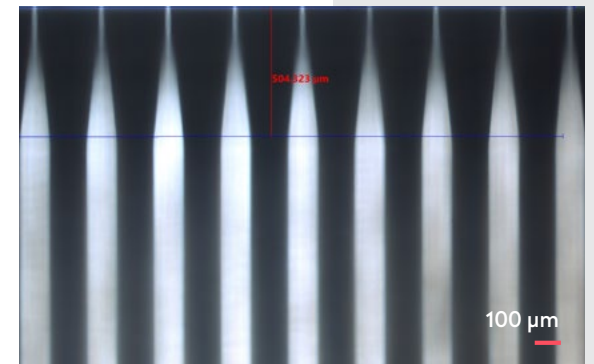
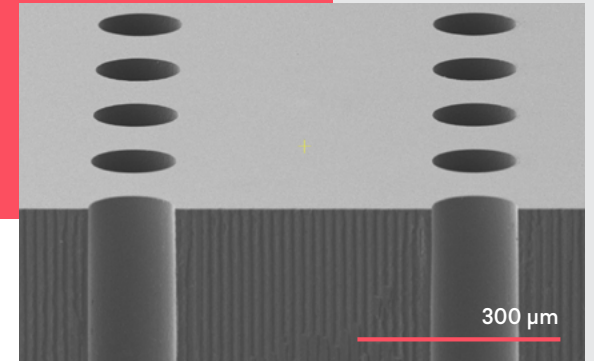


Variable holes geometry

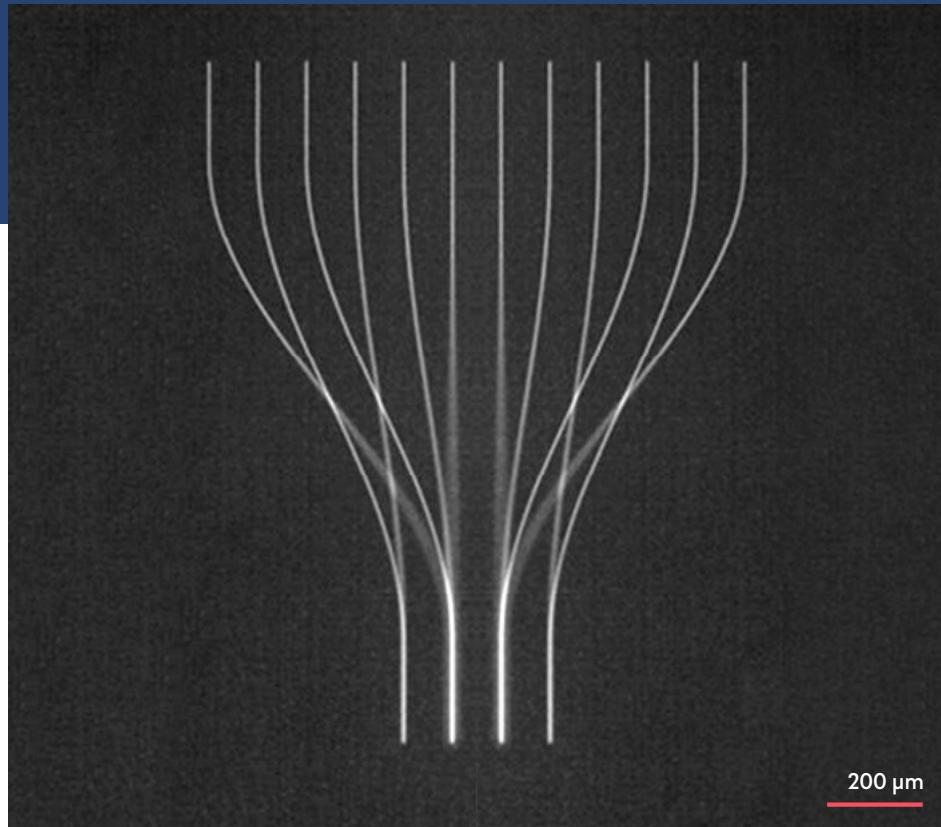


No melting or micro cracks

- Ultra-high precision
- Tight tolerances
- Straight or with cone for easier insertion
- Designed for standard smf fibers
- High density



Waveguide writing

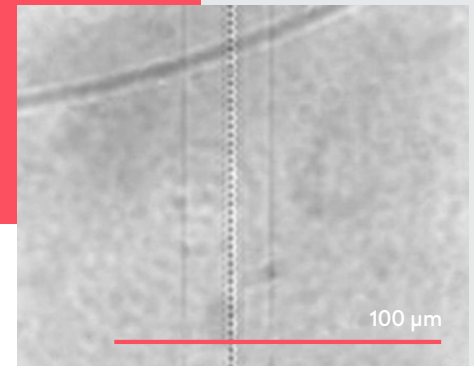


- 2D and 3D designs available
- High speed
- Low coupling and propagation losses
- Curved trajectories
- Visible and telecommunication wavelengths

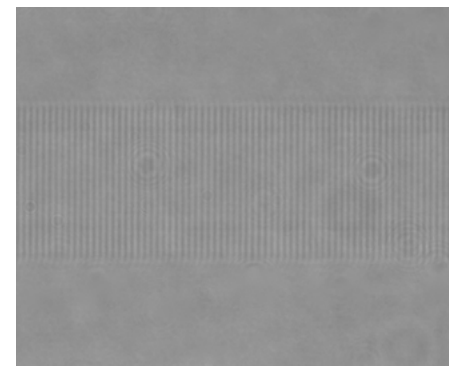
FBG writing



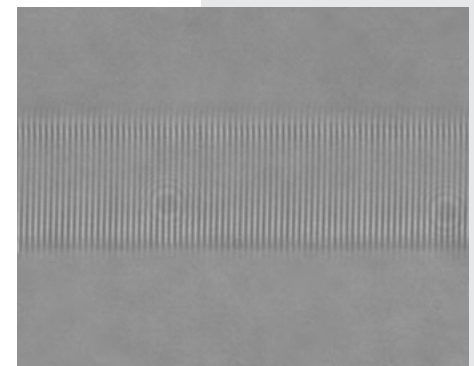
Multicore fiber



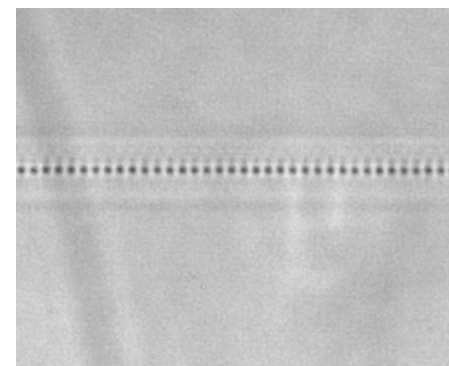
FBG writing in SMF



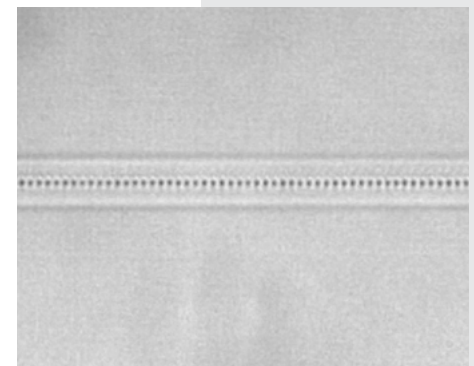
Line-by-Line (LbL) inscribed FBG top view



Line-by-Line (LbL) inscribed FBG view rotated by 90°



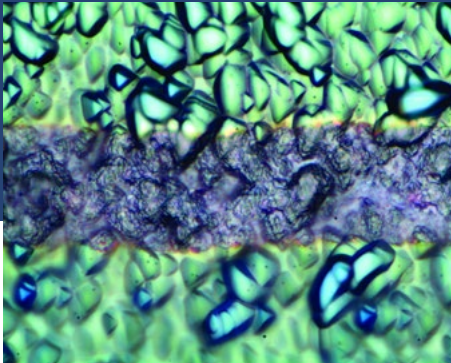
Point-by-Point (PbP) inscribed FBG top view



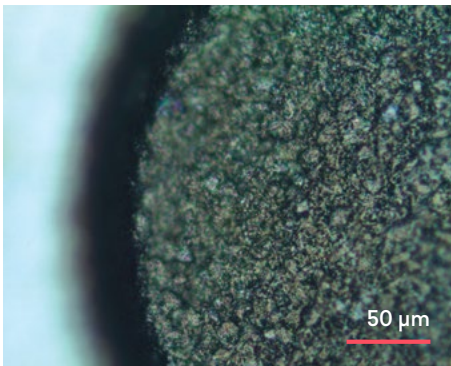
Point-by-Point (PbP) inscribed FBG view rotated by 90°

- FBG writing in Single Mode Fibers
- FBG inscription in dual-cladding fibers

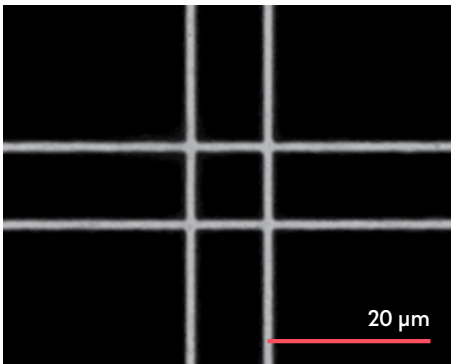
Selective laser ablation



Selective laser ablation of dielectric layers

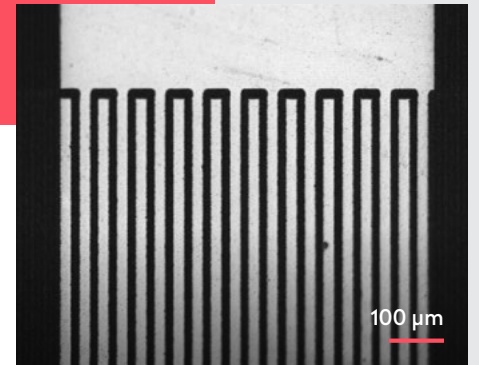


Ablation of polycrystalline diamond (PCD)

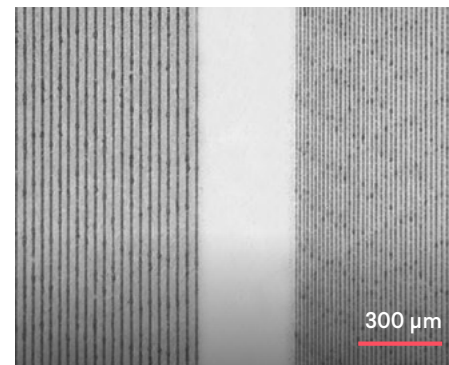


Titan coating selective ablation

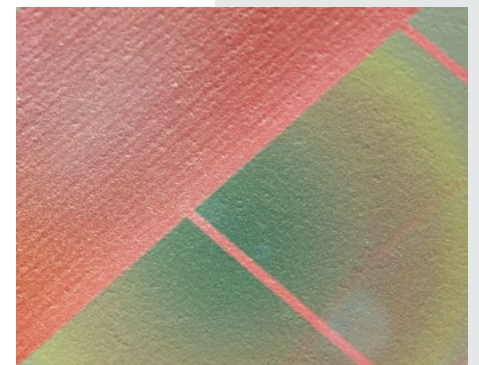
- High-speed laser processing
- No signs or burning
- No heat-affected zones
- High positioning accuracy
- High quality
- Micron resolution



Chrome ablation from glass substrate



Texturized sapphire surface

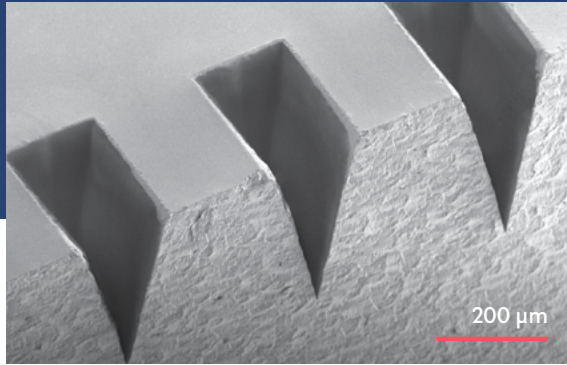


Ablated fingers and buss bars on a solar cell

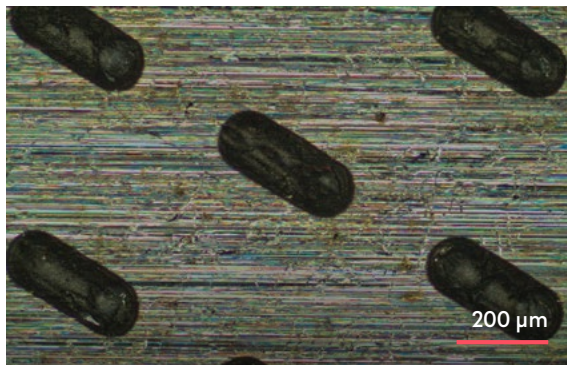


Selective laser ablation on a sapphire substrate removing a 10 nm thickness ceramics layer

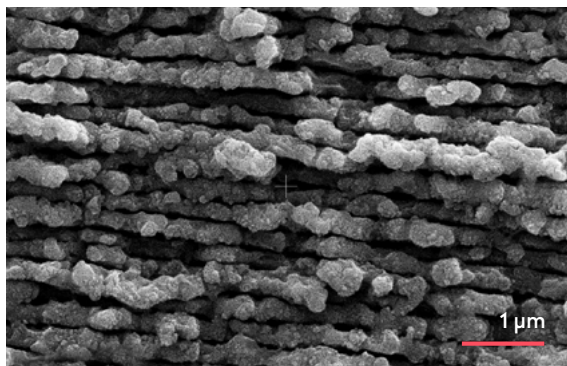
Functional surface modification



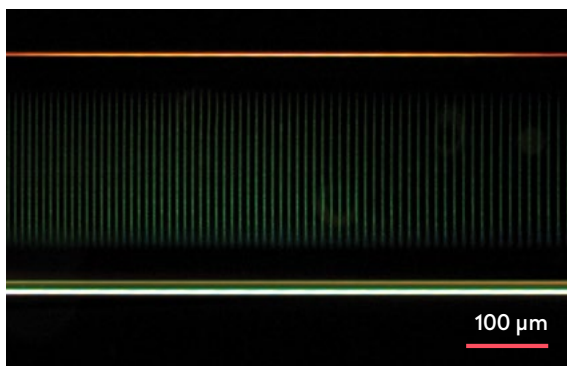
Metal surface grooving



Cast iron ablation



Surface micro nano structuring

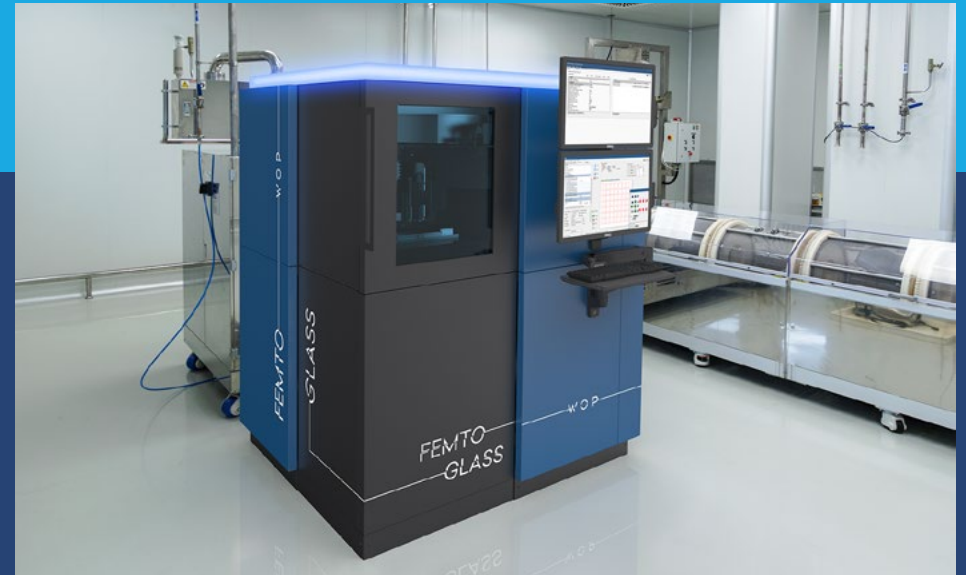


Optical fiber volume fabrication

- Friction reduction, lubricant retention
- Diffractive structures for optical applications
- Micro molds for micro, nano feature replication
- Roughness modification
- Hydrophobicity, hydrophilicity
- Marking

Our portfolio

wophotonics.com



Laser workstations development



WOP Transparent material cutting module



Space-variant retarders



Contract manufacturing services



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