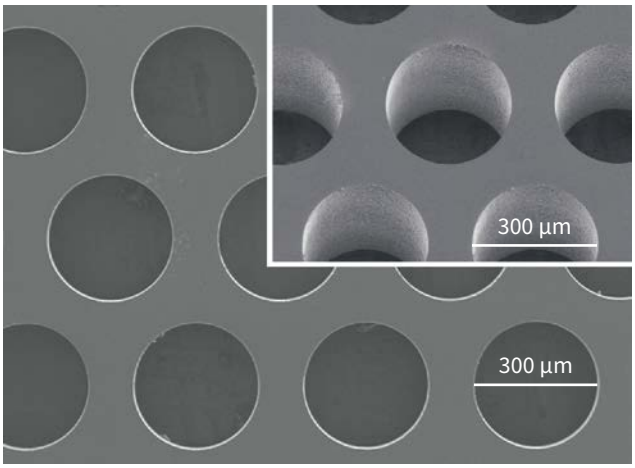
Micro- and Nanofabrication

Birefringent volume modification in glass

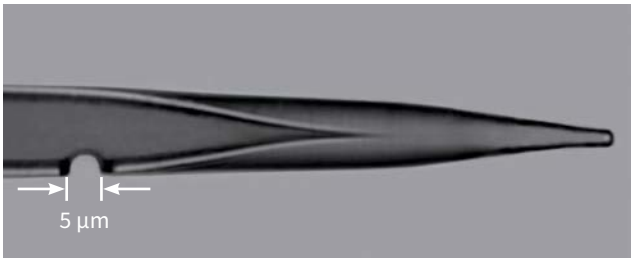
Form induced birefringence-retardance variation results in different colors in parallel polarized light.
Source: Workshop of Photonics.

High precision glass drilling



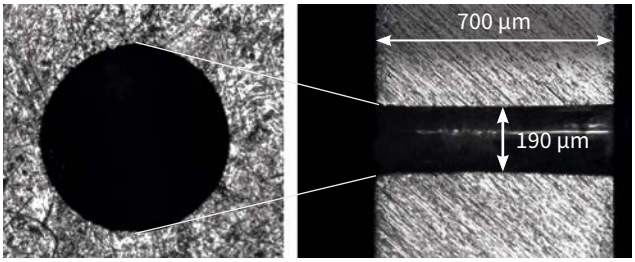
Various glass drilling.
Source: Workshop of Photonics.

Glass needle microdrilling



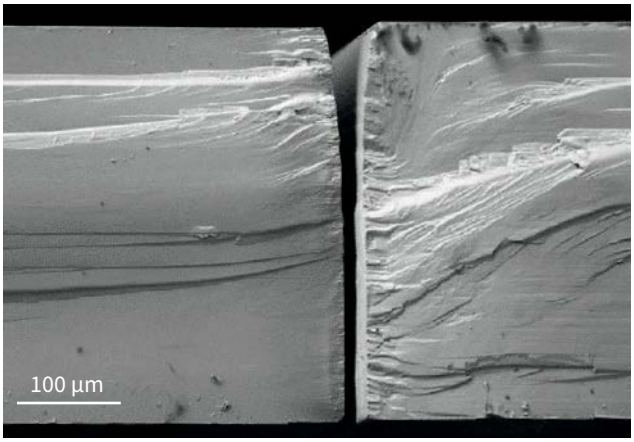
Glass needle microdrilling.
Source: Workshop of Photonics.

Steel drilling



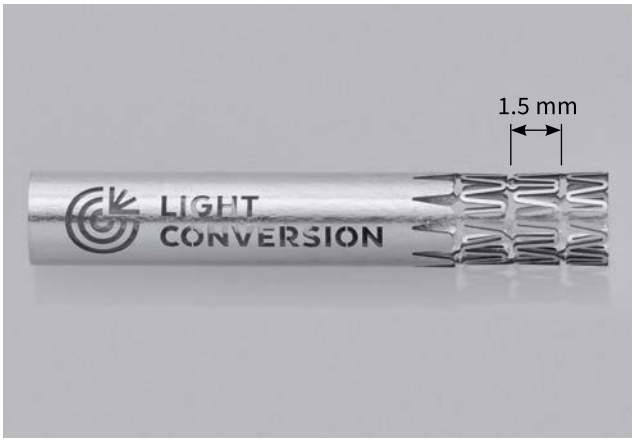
Taperless hole microdrilling in stainless steel alloys.
Source: Workshop of Photonics.

Brittle & highly thermal-sensitive material cutting



Multi-pass cadmium tungstate cutting.
No cracks. All thermal trace effects eliminated.
Source: Micronanics Laser Solutions Centre.

Stainless steel stent cutting



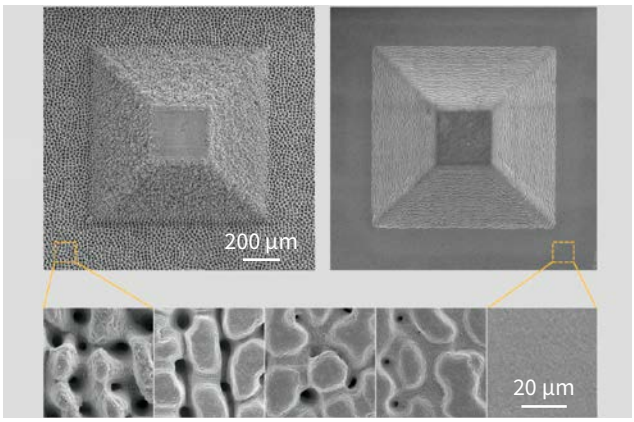
Cutting from stainless steel.
Example of stent cut from stainless steel.

Milling of complex 3D surfaces

3D milled sample in copper. Zoom-in SEM image.

Source: “Highly-efficient laser ablation of copper by bursts of ultrashort tuneable (fs-ps) pulses”, A.Žemaitis, P.Gečys, M.Barkauskas, G.Račiukaitis, M.Gedvilas. Scientific Reports (2019).

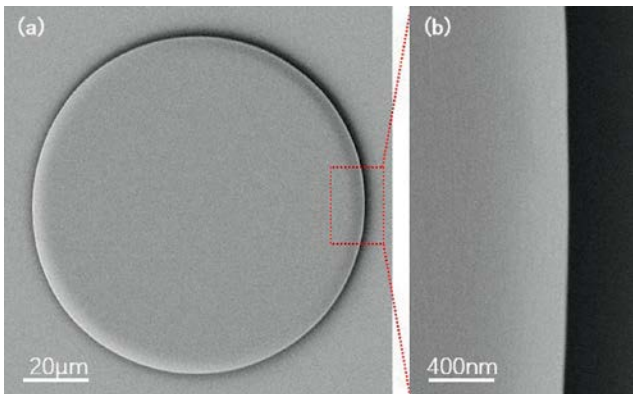
Stainless steel polishing



SEM imags of structures ablated in stainless steel, before and after polishing using GHz burst (from left to right).

Source: “High quality surface treatment using GHz burst mode with tunable ultrashort pulses”, D.Metzner , P.Lickschat and S.Weißmantel. Applied Surface Science (2020).

Selective ablation



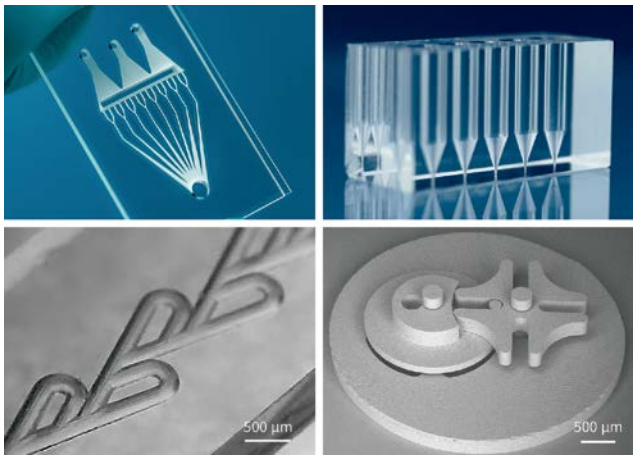
Lithium niobate microdisks fabricated using selective ablation.

Source: “Fabrication of crystalline microresonators of high quality factors with a controllable wedge angle on lithium niobate on insulator”, J.Zhang, Z.Fang, J.Lin, J.Zhou, M.Wang, R.Wu, R.Gao, Y.Cheng. Nanomaterials (2019).

High-contrast marking

High-contrast black-and-white marking on stainless steel clips using the BiBurst option.

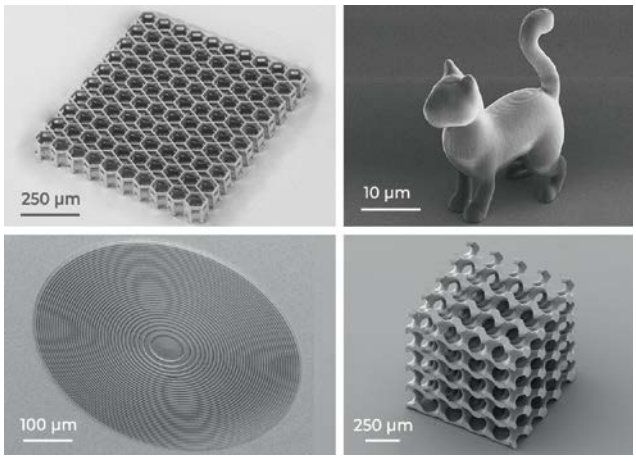
3D glass etching



Various structures fabricated in fused silica glass.

Source: Workshop of Photonics & Femtika.

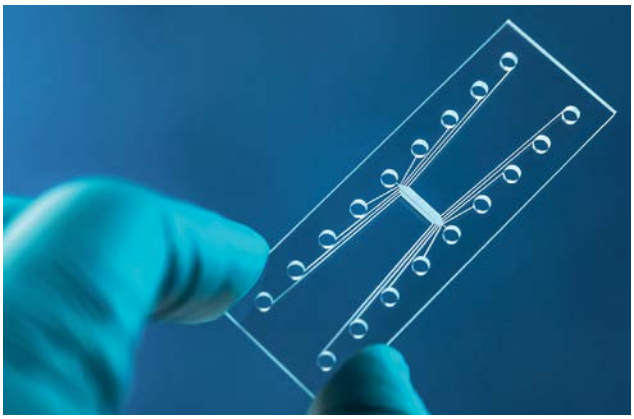
3D multiphoton polymerization



Various 3D structures fabricated in SZ2080 polymer using multi-photon polymerization.

Source: Workshop of Photonics & Femtika.

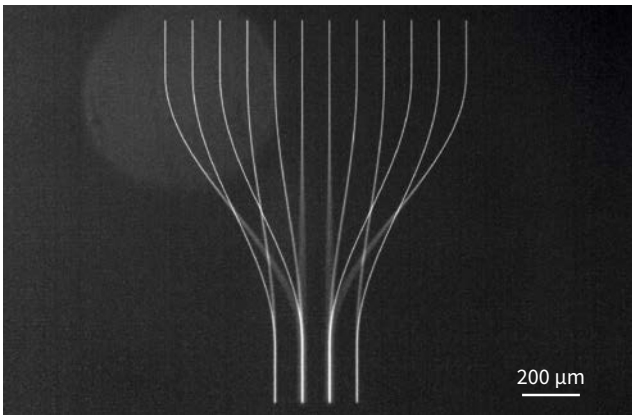
Microfluidic channel ablation and welding



Microfluidic chip manufacturing with channels sealing.

Source: Workshop of Photonics.

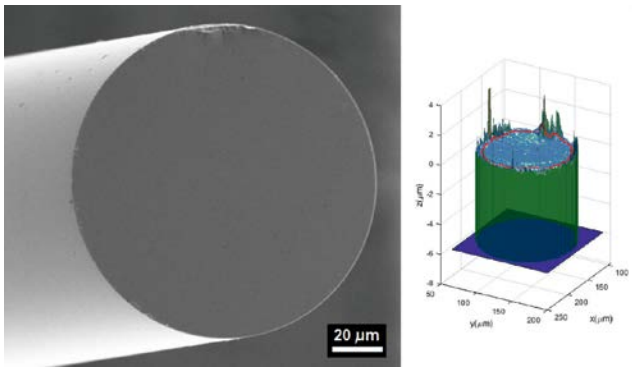
3D waveguides



3D waveguides fabricated in fused silica glass.

Source: Workshop of Photonics.

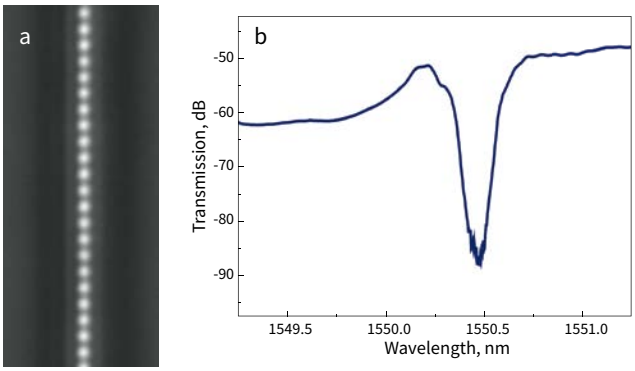
Fiber cleaving



Fiber end face after laser-based scribing (left) and its surface profile (right).

Source: Swiburne University of Technology, Melbourne.

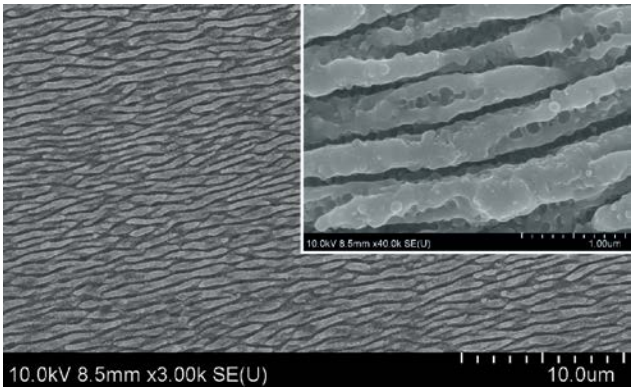
Bragg grating waveguide (BGW) writing



First-order Bragg gratings inscribed in waveguide (a). Resonant spectral transmission of inscribed BGW (b).

Source: "Ultrashort Bessel beam photoinscription of Bragg grating waveguides and their application as temperature sensors", G.Zhang, G. heng, M.Bhuyan, C.D'Amico, Y.Wang, R.Stoian. Photon. Res. (2019).

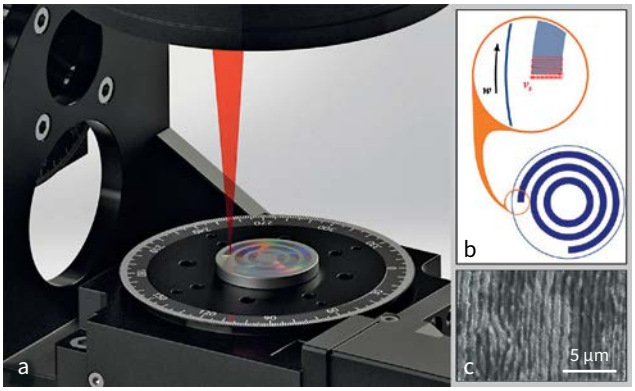
SERS sensor fabrication



SEM image of the Ti-6Al-4V (TC4) surface after irradiation with progressive laser scan.

Source: "Large-scale fabrication of nanostructure on bio-metallic substrate for surface enhanced Raman and fluorescence scattering", L.Lu, J.Zhang, L.Jiao, Y.Guan. Nanomaterials (2019).

Friction and wear reduction



Schematic of the laser treatment (a), laser patterning strategy (b), SEM image of induced LIPSS (c).

Source: "Tribological properties of high-speed uniform femtosecond laser patterning on stainless steel", I.Gnilitskyi, A.Rota, E.Gualtieri, S.Valeri, L.Orazi. Lubricants (2019).

Intraocular lens cutting

Laser-cut intraocular lens.
Source: LASEA.

Silicon carbide dicing

Single-pass (300 mm/s) dicing of 500 µm thick 4H-SiC wafer.

Cutting and welding

Cut and welded parts from brass using a single laser system.

Selective ablation

Selective laser ablation on a sapphire substrate removing a 10 nm thickness ceramic layer.
Source: Workshop of Photonics.

Surface texturing

Moon-like surface texturing on a watch bezel.
Sourse: LASEA.