
FRAUNHOFER INSTITUTE FOR LASER TECHNOLOGY ILT

GLASS PROCESSING

Laser Technology for Glass Processing

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Glass Processing

Custom made 3d glass parts

- Technology
 - Selective Laser Etching SLE
- Procedure
 - Part design (CAD)
 - Automated laser processing
 - Wet-chemical etching
- Specifications
 - Lateral dimensions of parts up to 100 x 100 mm²
 - Maximum part height 15 mm
 - Spatial precision ~ 1 μm
 - Surface roughness ~ 1 μm, down to Ra ~ 10 nm possible

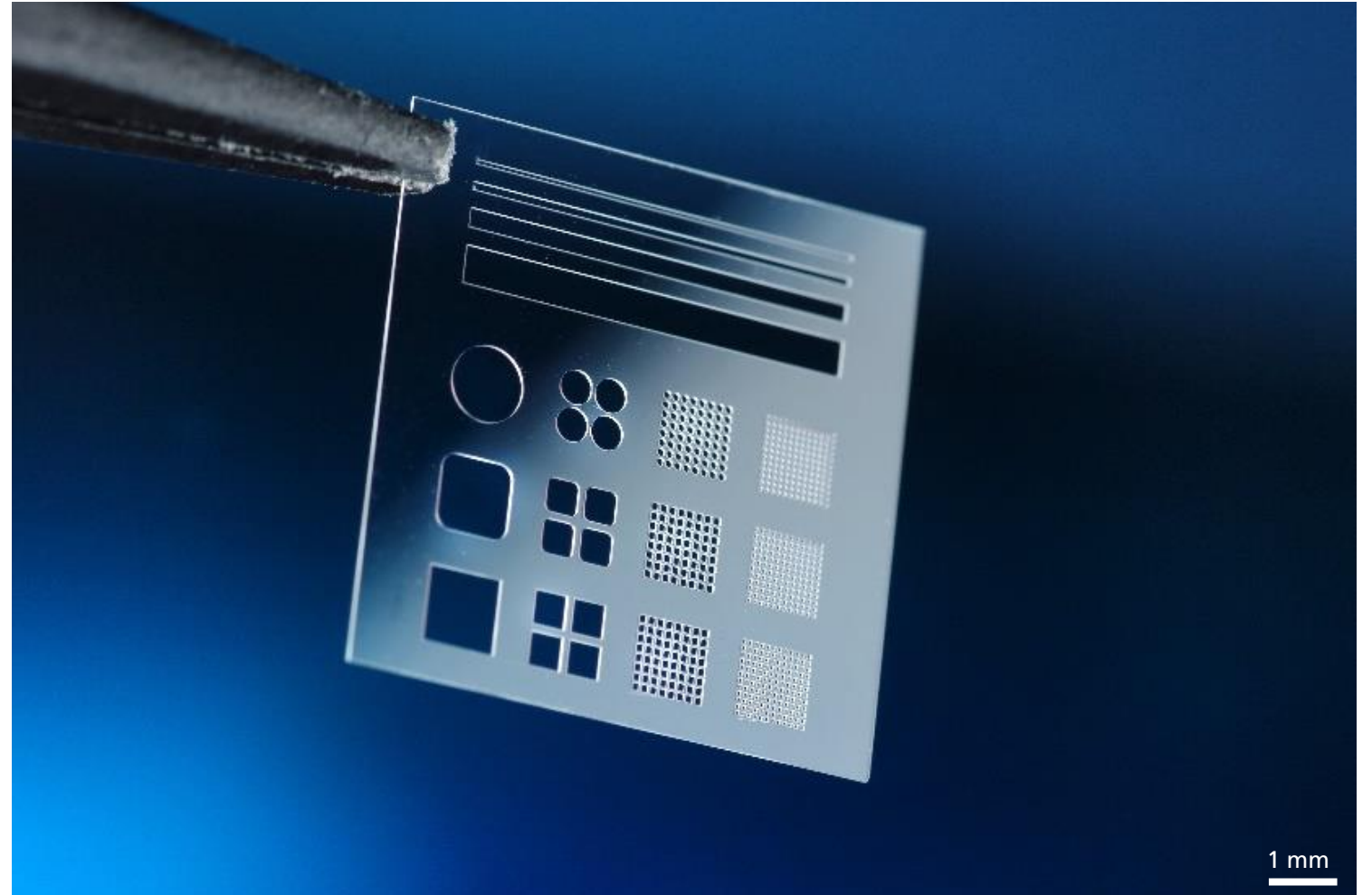


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Glass Processing

Shaped holes in thin glass

- Technology
 - Selective Laser Etching SLE
- Specifications
 - Borosilicate glass
 - Glass thickness 130 μm
 - Minimum hole size $\sim 10 \mu\text{m}$
 - No thermal stress
 - Different hole shapes
- Applications
 - Consumer electronics
 - Semiconductor electronics, e.g. interposer

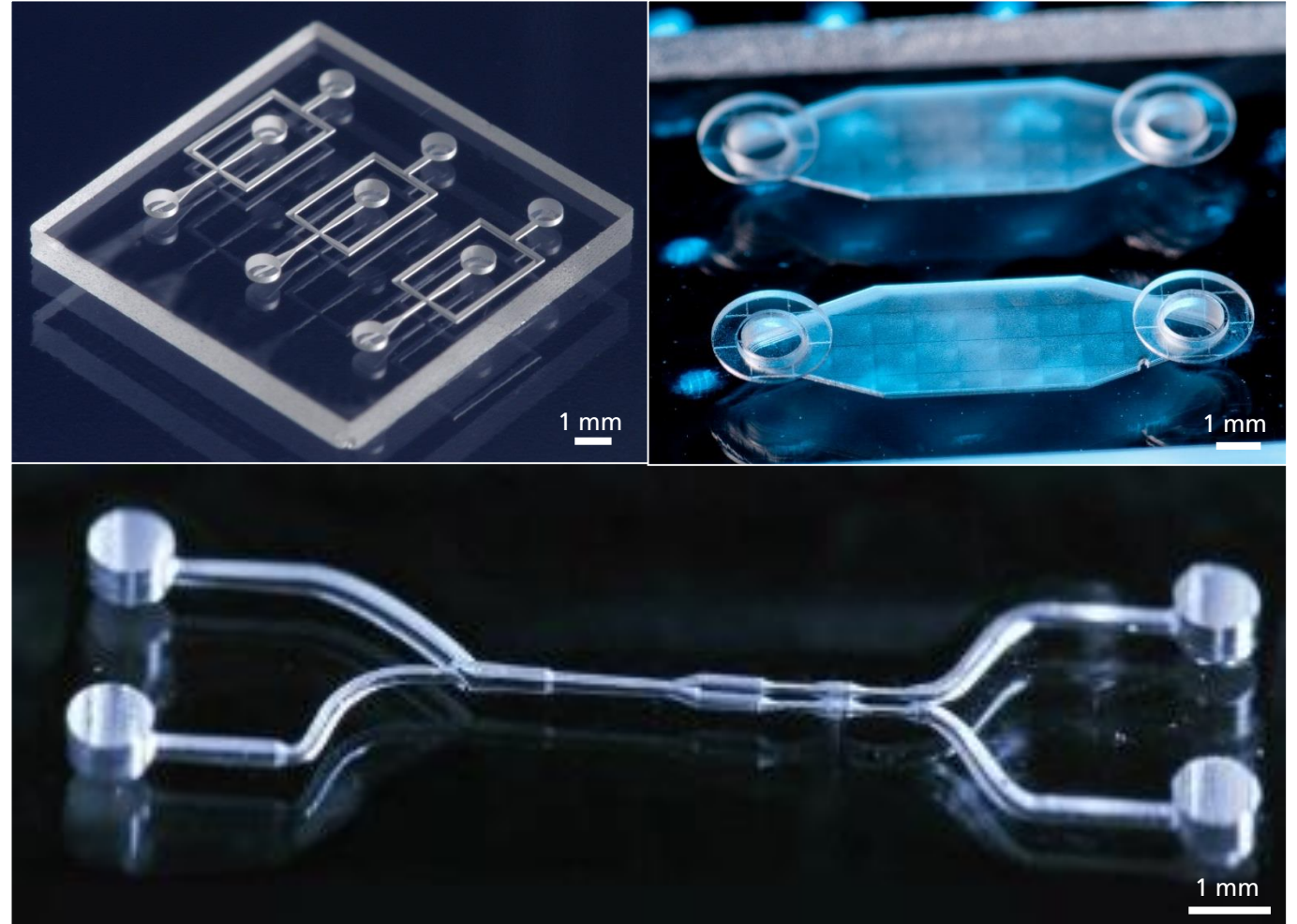


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Glass Processing

Integrated micro fluidic devices

- Technology
 - Selective Laser Etching SLE
- Specifications
 - Customized layouts
 - Channel length up to 100 mm
 - Channel height $> 15 \mu\text{m}$
 - Positioning precision $\sim 1 \mu\text{m}$
 - Surface roughness $\sim 1 \mu\text{m}$, down to $R_a \sim 10 \text{ nm}$ possible
- Applications
 - Medical analysis with microfluidic chips
 - Lab-/Organ-on-a-chip



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Glass Processing

Surface microfluidic parts

■ Technology

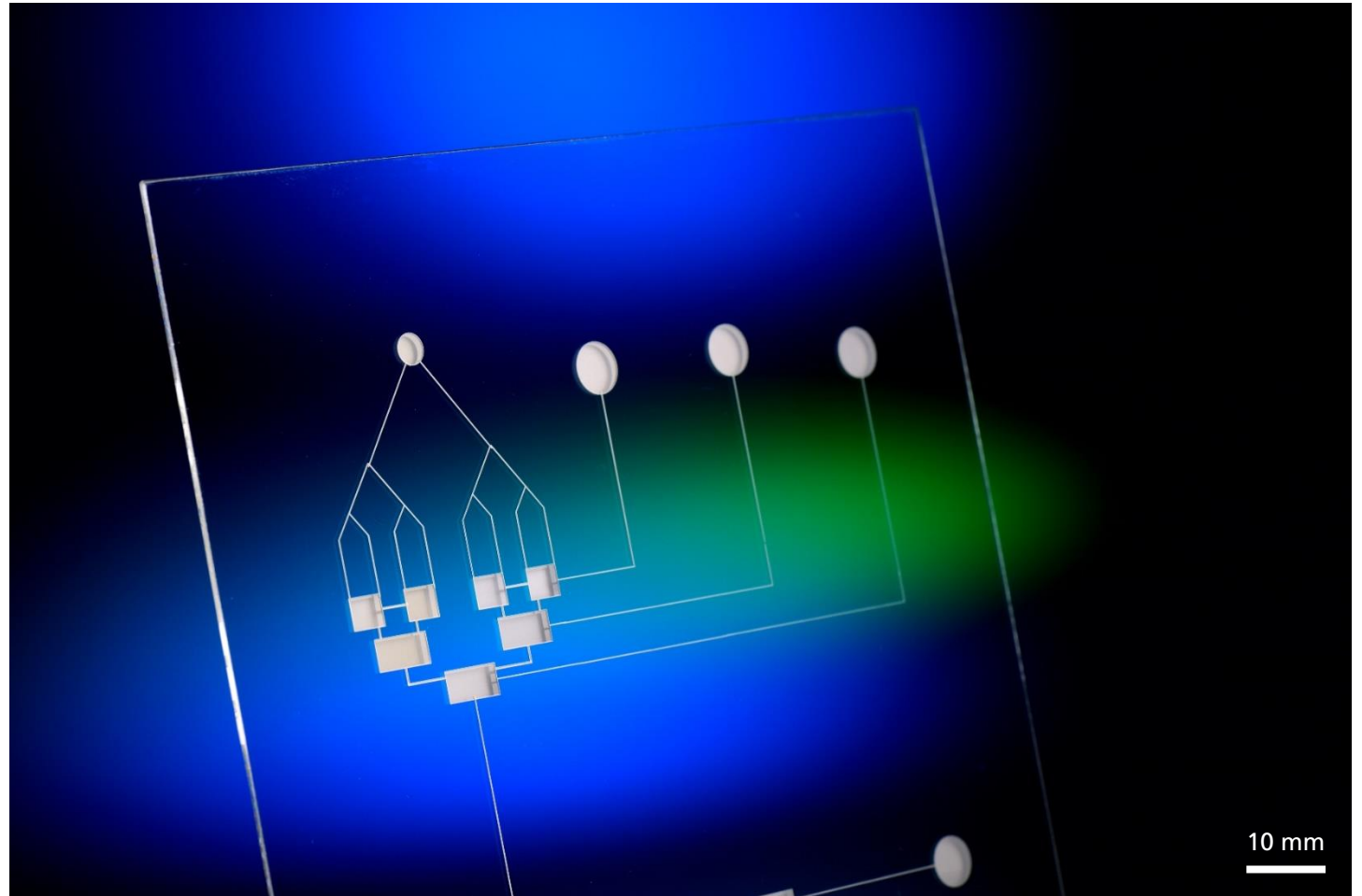
- Surface structuring and drilling by ultrafast laser ablation

■ Specifications

- Direct manufacturing process of complex chip layouts
- Lateral dimensions up to 300 x 300 mm²
- Spatial precision ~ 1 μm
- Smallest channel width ~ 2 μm
- Surface roughness ~ 1 μm, down to Ra ~ 10 nm possible

■ Applications

- Lab-/Organ-on-a-chip



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Glass Processing

High precision optics mount

- Technology
 - Selective Laser Etching SLE
- Specifications
 - Inner diameter 6 mm
 - Length 45 mm
 - Specific features to mount optics (e.g. grin lenses)
 - Resulting positioning precision <math>< 5 \mu\text{m}</math>
- Applications
 - Monolithic, customized mounts
 - Compact optical systems

