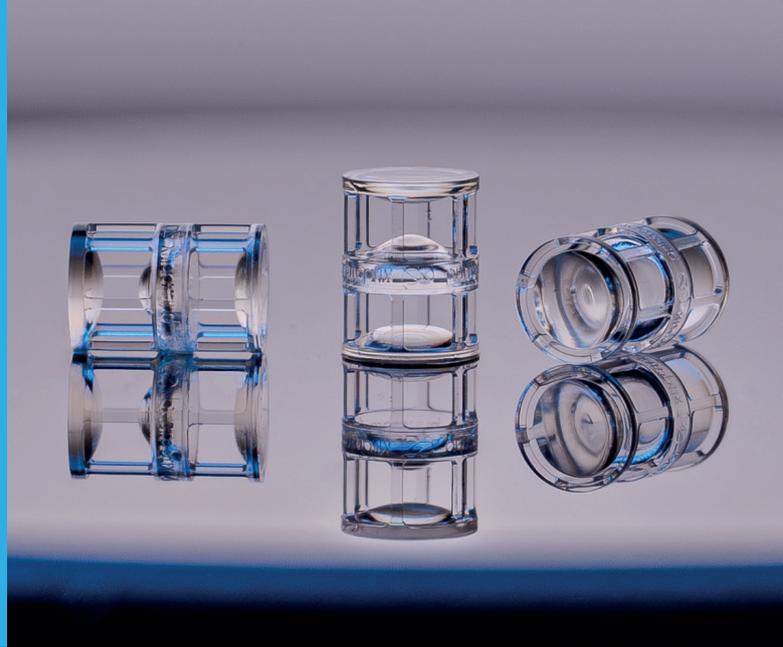




printoptix

Micro Objective Lenses

Custom all-aspheric objectives in the smallest possible form factors



Perfectly aligned all-freeform lens stacks

Our entirely new approach to lens fabrication allows for optical solutions that were previously unthinkable.

Examples:

- Wide angle objectives
- Distortion free objectives
- Tilted-viewed angle lenses
- Micro tele lenses
- Lenses with integrated sensor sleeves
- Integrated apertures

Key Features



Size ranges from 100 μm to 4 mm, very short variants possible.



Direct integration of black apertures and baffles, custom geometry adaptations.



Freeform surfaces that are inherently alignment free. Field of view range: 10° - 160° .



Biocompatible polymers that are longterm stable, autoclavable and highly transparent



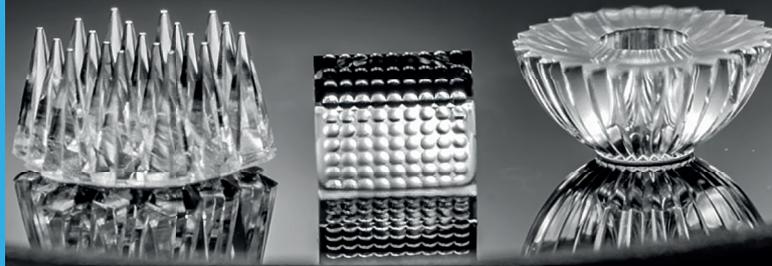
Surface roughness < 10 nm RMS.
Shape errors $< \text{diameter}/1000$ PTV.



Printing on sensors with < 1 μm alignment precision in x, y and z.

Micro-Optical Components

Micro-optical elements with arbitrary shape and size



Highly individualized parts

3D-Printing of micro-optical components allows for highly unusual and complex optics that open up entirely new applications.

Examples:

- Lenses
- Prisms
- Diffractive parts
- TIR lenses
- Lensed prisms
- Fresnel lenses
- Hybrid components

Key Features



Size Range from 20 μm to 4.5 mm.



Alignment-free integration of absorbing structures.



Full freeform surfaces and designs with undercuts are possible.



Highly transparent print materials with low fluorescence.



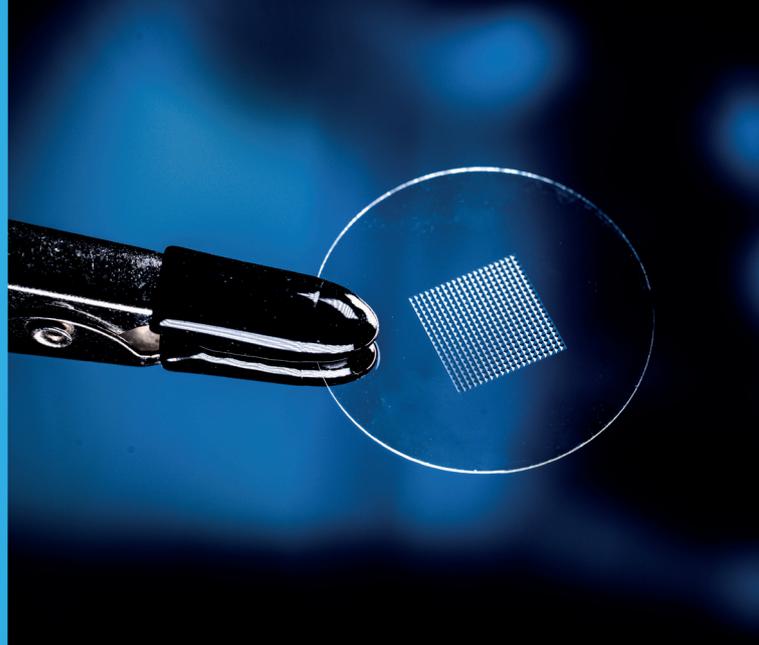
Surface roughness < 10 nm RMS.
Shape errors < diameter/1000 PTV.



Integration of mounting structures with no alignment errors.

Optical Arrays & Mastering

Custom optical arrays with freeform shapes, high aspect ratios and 100% fill factor



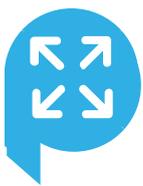
Custom optical arrays

Fabrication by 3D-Printing allows for almost unlimited design freedom and multiple options for replication.

Examples:

- Step & repeat scale-up
- Soft stamps
- UV nano-imprint lithography or roll-to-roll
- Hard stamps
- Electro-forming, hot embossing, roll-to-roll and micro injection molding
- Micro-displays
- Coupling optics
- Sensor arrays

Key Features



Array lateral dimensions from $< 100 \times 100 \mu\text{m}^2$ to 6" wafer size.



Element aspect ratios (height to diameter) of 10.



Lenses or unit cells sized from 3 μm to 4 mm, fill factors up to 100%.



Freeform elements, variable pitch, undercuts, randomised structures.



Surface roughness $< 10 \text{ nm RMS}$.
Shape errors $< \text{diameter}/1000$.



Aligned printing with $< 1 \mu\text{m}$ absolute precision in x, y and z.

Fiber Tip Optics

Highly compact refractive, reflective, diffractive, and hybrid optical structures



Powerful optical components, perfectly aligned to the fiber mode field

Our approach of direct fabrication on the fiber tips enables highly precise fiber optical systems.

Examples:

- Lensed fibers
- OCT probes
- Fiber-To-PIC coupling lenses
- Mode matching lenses
- Beam shaping
- Chromatic fiber probes
- Objective lenses on fibers

Key Features



Optical surface quality with feature sizes $< 1 \mu\text{m}$.



Custom integration of absorbing structures and encapsulation features.



Freeform segmented, or diffractive surfaces.



Direct integration of optics into common fiber connectors.



Surface roughness $< 10 \text{ nm RMS}$.
Shape errors $< \text{diameter}/1000 \text{ PTV}$.



Direct alignment to fiber mode field with $< 1 \mu\text{m}$ precision.

