

# Microoptics for high-end optical systems

## Overview

### Microoptics for EUV to infrared applications

Microstructured optical components are of key importance to applications that cannot be achieved using conventional optics. They can further improve existing optical systems to enable better performance and new functionalities. Micro optical components are widely used in applications such as

- Illumination systems
- Beam shaping and homogenizing
- Laser materials processing
- Laser surgery
- Industrial metrology systems

The increasing spectrum of applications based on the enabling function of microoptics demands a close cooperation between a customized, technology adapted design and high-performance manufacturing.

Carl Zeiss Jena GmbH provides an end-to-end customer support from complete optical design to manufacturing: from the hand-made high-end unique component up to batch production.

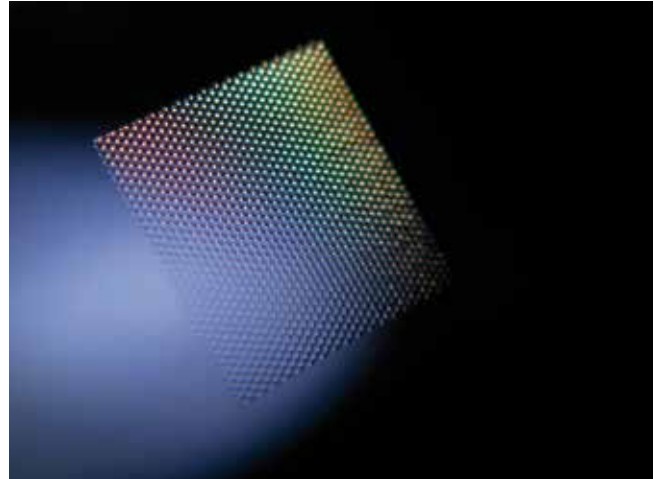
The application range of our diffractive and refractive components varies from EUV to IR. The performance can be optimized for single wavelength applications and for high efficient achromatic properties as well.

### Our Products

- Homogenizing systems
- Beam shaping systems
- Achromatic diffusers
- Beam splitters
- Custom specific microstructures (wedges, coupling prisms, alignment marks, grids, calibration targets ...)

### General Specifications

- Working wavelength:  $13 \text{ nm} < \lambda < 10 \text{ }\mu\text{m}$
- Materials:  $\text{CaF}_2$ , fused silica, high index glass, Si, IR-materials, plastic-replica optics...
- Substrate dimensions: up to 6"
- AR coating: custom specific



Hexagonal microlens array (NA=0.2)

### Micro lens arrays

Microlens diameter: 15  $\mu\text{m}$  ... custom specific

Sag: 0.2  $\mu\text{m}$  ... 10  $\mu\text{m}$

Microlens profile: spherical, cylindrical, parabolic...

Array uniformity: < 1 % (rms)

Focal length accuracy: < 1 %

Fill factor: > 99 %

Surface roughness: 0.2 nm ... 0.5 nm

### Beam shapers

Far field: top hat, gauss, single-line, custom

FWHM angle: 1 mrad ... 100 mrad

Efficiency: > 97 %

Zero order: no zero order

### Achromatic diffusers

Far field: top hat, gauss, single-line, custom

FWHM angle: 1 mrad ... 100 mrad

Efficiency: > 97 %

Zero order: no zero order

Surface roughness: 0.2 nm ... 0.5 nm

### Beam splitters

Efficiency: up to 90 %

Zero order: < 1 %

Undesired ghost beams: custom specific designs

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We make it visible.