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About Us

SUSS MicroOptics SA was formed in 1999 with the remit to supply its parent SUSS MicroTec AG with micro-optical elements for their lithography equipment. As the market for micro-optics grew, SUSS MicroOptics expanded to meet the new and diverse requirements, developing its product portfolio and expertise to become one of the leading producers of precision refractive and diffractive micro-optics in the world.

SUSS MicroOptics is recognized by Carl Zeiss SMT GmbH as a Preferred Supplier and first became ISO 9001 certified in 2008. In 2013 it moved to its current premises, complete with state-of-the-art cleanroom, from where it continues to deliver excellence to its international customer base.

SUSS MicroOptics is a wholly owned subsidiary of SUSS MicroTec SE, a leading supplier of products and solutions for backend lithography, wafer bonding and photomask processing.

Our Quality Policy

SUSS MicroOptics is committed to providing the highest quality products and services.

We value our customers and aim for the total satisfaction of their needs through enjoyable, efficient and effective interactions. Our goal is zero defects through preventive actions.
We strive to do the right thing the first time. If a problem does arise, we take immediate action to resolve it in an efficient and effective manner.

Quality is everyone’s responsibility.

For more information please visit suss.com and suss-microoptics.com
Our Certifications

SUSS MicroOptics is certified according to the international standards **ISO 9001:2015** and **IATF 16949:2016** (automotive).
Thick film photoresists are optimized for mask aligner lithography. Exposed areas become transparent and guide the exposure light linearly in deeper resist regions. After wet-chemical development and drying, the resist structures are melted in an oven or on a hotplate at temperatures around 150 °C – 180 °C.

SUS MicroOptics is committed to providing the highest quality components through leading edge manufacturing techniques. Combined with a unique blend of people skills, its innovative advances in technology make SUS MicroOptics a leader in its product offerings.
SUSS MicroOptics has currently class-100, 1000 and 10000 cleanrooms, along with fully operational production lines for 6” and 8” wafers.
Microlens arrays increase the efficiency for all kinds of telecom and datacom applications. Our semiconductor-based manufacturing technology together with unique metrology processes allows us to deliver elements with outstanding performance.

**Materials**
- Fused silica (various grades), Silicon

**NA**
- Typically 0.1 to 0.6

**Mode Field Diameter (MFD)**
- 0.8 μm to 50 μm

**Fiber / WG Types**
- SMF, MMF (FMF & special waveguide modes possible)

**Back focal distance**
- Typically 0 to 300 μm

**Pitch**
- According to customer requirements

**Lens type**
- Circular, cylindrical

**Lens profile**
- Spherical, aspherical (DOE / Fresnel lenses also available)

**Arrays**
- Linear, quadratic, hexagonal, custom

**Number of lenses per array**
- According to customer requirements

**AR coating**
- UV, VIS, NIR - front side, back side, against air or glue
KEY FEATURES
- 1D & 2D Microlens Arrays
- Highest quality and precision
- Bulk material: fused silica, silicon, borofloat
- Wavelength range: DUV (193nm) to IR (5um)
- Lens profiles: spheres, aspheres
- Sub-μm position accuracy

ADDITIONAL FEATURES
- Trenches for glue stops and glue pockets, pupils, pinholes, alignment marks, mounting posts
- Double sided lens arrays with precise front-to-back alignment
- AR-Coating, Metalization, Wafer-Level Packaging
- Wafer thinning

LARGE SELECTION OF STANDARD ARRAYS AVAILABLE OFF-THE-SHELF
- Pitches 127um, 250um, 500um, 750um, 1000um, 1250um in stock
- Array sizes available up to 120x120 mm²

TAILOR-MADE CUSTOMIZED ARRAYS
Customized microlens arrays along with all important measurement data (ROC, conic, uniformity, coating) can be supplied if requested.

MICROLENS ARRAYS – FORM FACTOR OPTIONS

PROTRUDING LENSES
- Most economic options

RECESS LENSES
- For stacking with other micro-optical elements

RECESS LENSES WITH FIDUCIALS
- Best for large volume packaging

PACKAGE
 SUSS MicroOptics offers innovative solutions for packaging to ensure the most efficient integration into customers’ systems. Packaging options include recessed lenses, cavities, integrated microprisms and fiducial markers.

MARKETING
 SUSS MicroOptics offers recycling solutions for packaging to ensure the most efficient integration into customers’ systems. Packaging options include recessed lenses, cavities, integrated microprisms and fiducial markers.

TYPICAL APPLICATIONS

- TELECOM/DATACOM
- 3D SENSING
- MEDICAL

... AND ANY COMBINATION OF THE ABOVE!
SUSS MicroOptics is a premium supplier for high-end diffractive optical elements suitable for very demanding applications like DUV wafer stepper illumination systems, high-power laser beam shaping, vortex lenses for fiber interconnects, random DOE for beam smoothing, metrology, medical devices and masters for imprint or replication.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Fused silica (various grades) and Silicon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>2 (binary) to 16 levels</td>
</tr>
<tr>
<td>Precision</td>
<td>Typically overlay error &lt; 70 nm</td>
</tr>
<tr>
<td>Minimum feature size</td>
<td>500 nm to 1 μm depending on step height and/or etch depths</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Up to 98 %</td>
</tr>
</tbody>
</table>

Diffractive optical elements (DOEs) can be used instead of micro lenses where size or weight in an application is a concern. They are also excellent beam homogenizers and shapers and – unlike their microlens counterparts – have no shape constraint for the illumination they produce.

In the images beside you can see an example of 8-Level diffractive optical element (Fresnel Design) for excimer laser beam shaping (193 nm).
KEY FEATURES

- Fused Silica, Silicon, Borofloat, CaF2
- 6” or 8” wafer scale
- Binary, 8-level, 16-level
- 0.5 μm min feature size
- < 70nm overlay accuracy
- Diffraction efficiency up to 98%
- 190nm to 5μm wavelength range

ADDITIONAL FEATURES

- MLAs and DOEs on one element
- Custom designs
- Fiducials, ID marks
- Pedestals & trenches
- AR coatings & metallisation
- Delivery options

TYPICAL APPLICATIONS

BEAM SHAPING
PHASE PLATES
LASTEK
HOMOGENIZERS/DIFFUSERS
3D SENSING
SPOT GENERATOR

Why SUSS MicroOptics

Design capabilities, custom solutions

Our optical engineers understand your need to design products that meet or exceed requirements and can be made cost-effectively. SUSS MicroOptics can help bring your vision to life with our custom lens design solutions both in prototyping and volume production.

- 8-LEVEL GRATING
- 16-LEVEL GRATING
- 52 μm
- 32 μm
- > 96% DIFFRACTION EFFICIENCY
- After fabrication, our metrology specialists will validate the compliance of the DOEs with the optical specifications.

- 16-LEVEL DOE LENSES
- STEPPER TECHNOLOGY
- DOUBLE-SIDE AR COATING
Most applications such as **UV curing**, **gluing** and **illumination** require a uniform light distribution in order to achieve the best possible results. With SUSS MicroOptics homogenization components, you will have an easy solution even for very demanding applications.

**Homogenize your light source**

**BEAM HOMOGENIZERS**

<table>
<thead>
<tr>
<th>Materials</th>
<th>Fused silica (various grades) and Silicon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angular spectrum</td>
<td>Typically &lt; 1 to 20 degrees</td>
</tr>
<tr>
<td>Area of illumination</td>
<td>Linear, circular, rectangular, square</td>
</tr>
<tr>
<td>Source-workplane distance</td>
<td>Typically 30 to 1000 mm</td>
</tr>
<tr>
<td>AR coating</td>
<td>UV, VIS, NIR - front side, back side, to air, to glue</td>
</tr>
<tr>
<td>Lens array dimensions</td>
<td>According to customer requirements</td>
</tr>
</tbody>
</table>
WHY SUSS MicroOptics

Off-the-shelf products and simulations available

Our micro-optical elements offer near-perfect decoupling of output illumination from the properties of the incoming beam. Generate 2-dimensional rectangular or square areas of uniform illumination, as well as lines and spot patterns with our refractive microlenses, or create the shape of your choice with uniform illumination using a diffractive optical element. We can create any shape you need and do simulation tests of the desired effect.

KEY FEATURES

- Perfect uniformity in working plane (flat-top profile)
- Flat-top shapes: square, rectangular, circular, line
- Compact design
- Easy to use
- UV grade fused silica: very high power
- Suitable for all light sources (mercury arc lamps, excimer laser, UV LED)
- AR coatings for UV broad band or specific wavelengths available

A LARGE SELECTION OF MODULES AVAILABLE

- Standard off-the-shelf solutions
- Tailor-made specific modules

TYPICAL APPLICATIONS

- SEMICONDUCTOR
- LASER MACHINING
- OPTICAL INSTRUMENTS
- DISPLAYS
Solutions for diode laser collimation

FAST AND SLOW AXIS COLLIMATORS

Excellent collimation of the laser beam from a diode laser is often crucial for the overall performance of optical systems. SUSS MicroOptics provides a large variety of standard fast and slow axis collimators and cylindrical arrays for collimation of laser diode stacks or bars.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Fused silica (various grades), Silicon, Borofloat</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>Typically 0.1 to 0.6</td>
</tr>
<tr>
<td>Back focal distance</td>
<td>Typically 0 to 300 μm</td>
</tr>
<tr>
<td>Pitch</td>
<td>According to customer requirements</td>
</tr>
<tr>
<td>Lens type</td>
<td>Circular, cylindrical - fast axis &amp; slow axis</td>
</tr>
<tr>
<td>Lens profile</td>
<td>Spherical, aspherical</td>
</tr>
<tr>
<td>Arrays</td>
<td>Quadratic, hexagonal, custom</td>
</tr>
<tr>
<td>Number of lenses per array</td>
<td>According to customer requirements</td>
</tr>
<tr>
<td>AR coating</td>
<td>UV, VIS, NIR - front side, back side against air or glue</td>
</tr>
<tr>
<td>Fiber/ WG types</td>
<td>SMF, MMF (FMF &amp; special waveguide modes possible)</td>
</tr>
<tr>
<td>Alignment accuracy</td>
<td>&lt; 3 μm using mask aligner technology</td>
</tr>
</tbody>
</table>

Since the output of a laser diode is highly divergent, collimating optics are necessary. SUSS MicroOptics arrays have a fundamental role in the collimation process.
KEY FEATURES

- 2D Microlens arrays
- Highest quality and precision
- Bulk material: fused silica, silicon, borofloat
- Wavelength range: DUV (193 nm) to IR (5um)
- Lens profile: plano-convex, bi-convex, sphere, asphere
- Additional features: apertures, pinholes, alignment marks
- Circular and square lens shape

LARGE SELECTION OF STANDARD ARRAYS AVAILABLE OFF-THE-SHELF

- Pitches 170 μm, 200 μm, 250 μm, 300 μm, 400 μm, 500 μm, 1000 μm, 1015 μm on stock
- Array sizes available from 1x1 mm² to 120x120 mm²
- Customized lens design and consulting on request

TYPICAL APPLICATIONS

- TELECOM/DATACOM
- LASER MACHINING
- 3D SENSING

Why SUSS MicroOptics

Metrology

SUSS MicroOptics has a fully equipped state-of-the-art metrology lab for inspection and sorting of micro-optical components (ISO 9001, IATF 16949, Six Sigma). Our pick-and-place tools allow us to extend our capabilities in the high volume market and deliver our arrays in a wide variety of formats and tapes.

LENS MEASUREMENT

Measured Lens Profile (white line) compared to Ideal Lens Profile (yellow dotted line) etched in Fused Silica (k = -1)
The quality of a Shack-Hartmann sensor is directly related to the excellence of the microlens arrays. SUSS MicroOptics is the leading supplier worldwide of microlens arrays for Shack-Hartmann sensors, with the highest ranking in lens array uniformity and beam-pointing accuracy.

### Microlens Array Features
- 2D Microlens arrays
- Highest quality and precision
- Bulk material: fused silica, silicon, borofloat
- Wavelength range: DUV (193 nm) to IR (5 μm)
- Lens profile: plano-convex, bi-convex, sphere, asphere
- Additional features: apertures, pinholes, alignment marks
- Circular and square lens shape

### Materials
- Fused silica (various grades), Silicon

### Lens Diameter
- 30 μm to 2.0 mm

### F-number (F#)
- Typically F/5 to F/100

### Effective Front Focal Length
- Typically 1 to 100 mm

### Wavefront Error (Surface Profile Deviation, rms Error)
- Typically 10 to 50 nm

### Array Size
- According to customer requirements

### AR Coating
- UV, VIS, NIR - front side, back side, against air or glue

### Typical Applications
- Wavefront Sensing
- Material Inspection
- Astronomy
- Medical

Our refractive microlens arrays with small lens apertures and relatively long focal lengths give high spatial resolution spot patterns which act as wave front sensors in metrology and astronomy applications.

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**SHACK-HARTMANN ARRAYS**

**Our refractive microlens arrays with small lens apertures and relatively long focal lengths give high spatial resolution spot patterns which act as wave front sensors in metrology and astronomy applications.**
POLYMER-ON-GLASS LENSES

After years of close cooperation with its parent company, SUSS MicroOptics is now able to provide replicated lenses with superior performance for applications where high fill factors and efficiency are needed, while offering the best possible price. Our company will assist you in all the steps of your custom development, from the optical simulation to the final test of the element.

PRODUCTION OF POLYMER-ON-GLASS, IMPRINT TECHNOLOGY

Wafer-Level Optics (WLO):
- aperture layers in bulk material
- excellent overlay control

TYPICAL APPLICATIONS

- AUTOMOTIVE
- SEMICONDUCTOR
- 3D SENSING
We started SUSS MicroOptics SA in 1999 to answer a growing demand for micro-optical components and within 20 years the company has grown from 3 to more than 90 employees.

In 2012 we moved to our current premises in Hauterive, Switzerland, and built a new 6”/8” wafer cleanroom fab.
In 2017 we launched a new production line for Wafer-Level Optics (WLO) dedicated to automotive lighting applications and in 2018 we successfully passed IATF 16949:2016 automotive qualification.
We are currently building a second cleanroom fab in Neuchatel, Switzerland, which will be fully operational in the second half of 2019.

Through the years, we’ve constantly evolved trying to find new ways to improve our production processes while following our main principles.

**Working with Integrity:** we build trust and commitment through our daily actions. Interactions with our customers, our suppliers, and our co-workers occur within a code of moral and ethical conduct that is above reproach.

**Technology:** we stay on the leading edge of technology in the development, production, testing and application of our products. Our investment in technology will ensure quality and reliability of our Micro-Optics. We motivate and train our collaborators.

**Advocating for the Customer:** we value our customers and do whatever it takes to satisfy their needs. We ensure that customer interactions are enjoyable, efficient, and effective.

**Delivering Quality:** we strive to do the right thing the first time. If a problem does arise, we take immediate action to resolve it. The quality of our people, our products, and our services will ensure the long-term viability of our company.

Today, we deliver high-quality micro-optics to more than 200 customers across the globe and we are recognized as preferred and leading supplier to major companies in optics, telecom, metrology, semiconductor and automotive industry.

Dr. Reinhard Völkel
SUSS MicroOptics CEO