



# OPTICAL SOLUTIONS

## FOR LIFE SCIENCE APPLICATIONS

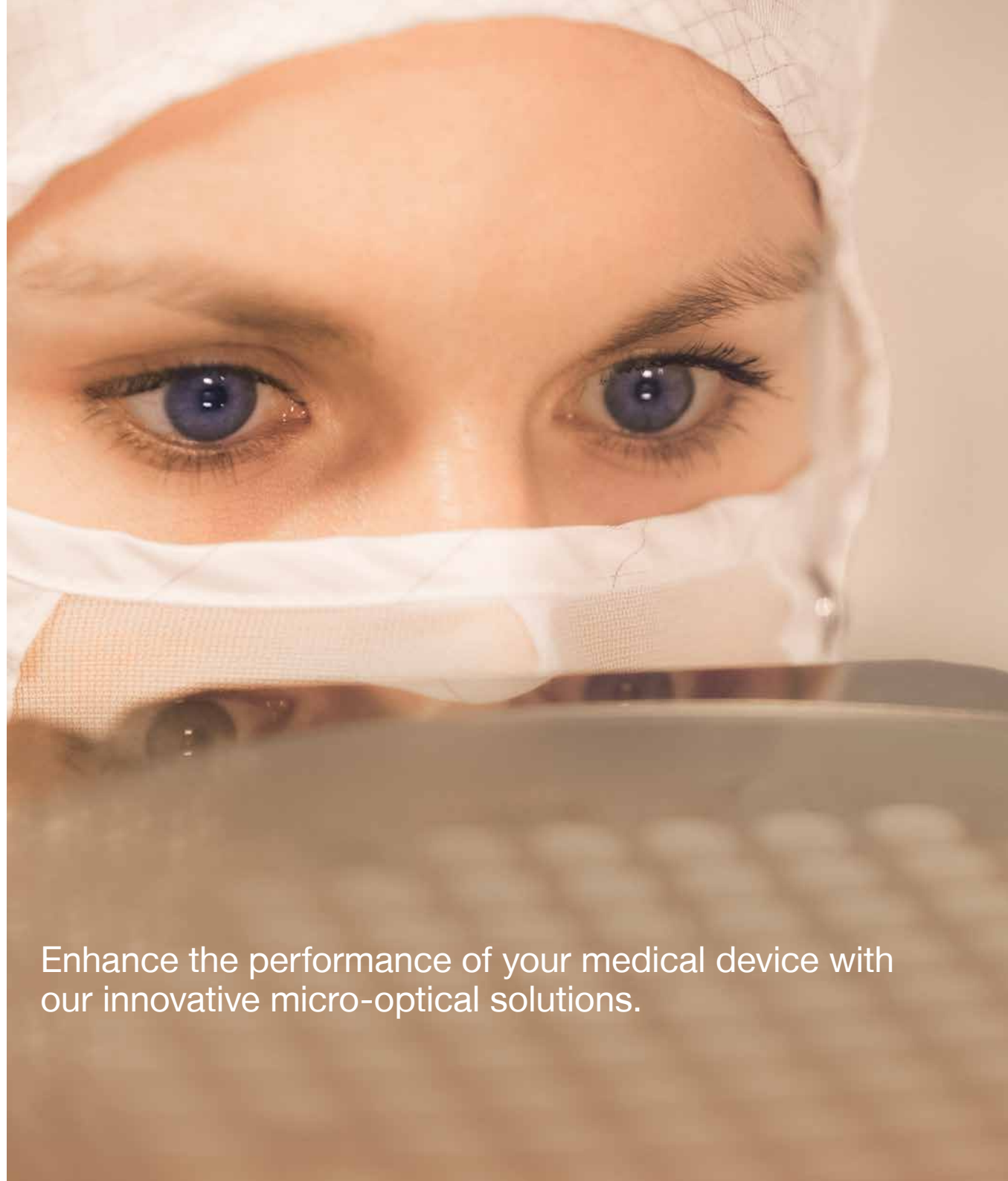




SUSS MicroOptics SA is a world-leading micro-optics manufacturer. Founded in 1999 in Neuchâtel, Switzerland, SUSS MicroOptics produces tailored refractive and diffractive micro-optics for imaging, sensing, and beam-shaping applications.

Based on extensive experience in optical design, engineering, wafer-level manufacturing, metrology, and packaging, we support our customers from concept to mass production.

By innovatively combining different process technologies we simplify device assembly and improve traceability, by, for example, adding alignment and identification marks. We also incorporate optical features such as prisms and well-defined spacer volumes which enable greater flexibility in the optical system design.



Enhance the performance of your medical device with our innovative micro-optical solutions.



**OUR SOLUTIONS**  
FOR LIFE SCIENCE APPLICATIONS

## MICRO-OPTICS SOLUTIONS FOR DERMATOLOGY

### + Tattoo removal:

Laser tattoo removal utilizes high-power laser radiation that penetrates deep into the skin to permanently destroy the ink particles. SUSS MicroOptics' tailored microlenses are compatible with high-power laser applications and focus the beam into the smallest, uniform point, enabling you to target the smallest inked areas whilst avoiding damage to the surrounding tissue.

### + Skin rejuvenation:

Laser fractional skin treatment lessens the appearance of wrinkles on the face. It also improves skin tone and complexion. SUSS MicroOptics' point generators are specifically used at 2.94  $\mu\text{m}$  to generate a homogenous point pattern on the skin and enhance the performance of the treatment.

### + Hair removal:

Laser hair removal is a cosmetic procedure that utilizes ruby lasers at 694 nm, diode lasers at 810 nm, or intense pulsed light (IPL) to remove unwanted hair. The energy destroys hair follicles in the skin, which disrupts hair growth. SUSS MicroOptics' tailored micro-optics enhance the precision of the laser beam enabling you to target the hair melanin whilst avoiding damage to the surrounding tissue and obtaining an effective and permanent result.

### SUSS MicroOptics Solutions

- + Spot Generators
- + Diffractive Optical Elements (DOEs)

### Benefits

- + Enhance treatment performance
- + Perfect uniformity
- + Minimize side effects
- + Custom design to address customer needs



## MICRO-OPTICS SOLUTIONS FOR OPHTHALMOLOGY

### + LASIK:

Laser eye surgery is based on the precise and controlled removal of corneal tissue by a special laser at 193nm which reshapes the cornea changing its focusing power. SUSS MicroOptics' tailored microlenses improve the performance of the laser beam to precisely modify the shape of the cornea, obtaining the desired surgery result whilst reducing the risk of adverse effects.

### + Shack-Hartmann Arrays:

Wave front sensing enables the non-invasive measurement of eye aberrations. SUSS MicroOptics' Shack-Hartmann Arrays are decisive elements that allow for precise measurement of the cornea and hence improving the precision of the "LASIK"-procedure.

### SUSS MicroOptics Solutions

- + Shack-Hartmann Arrays
- + Diffractive Optical Elements (DOEs)

### Benefits

- + Enhance treatment performance
- + Minimize side effects
- + Custom design to address customer needs



## MICRO-OPTICS SOLUTIONS FOR ODONTOLOGY

### + 3D Dental Imaging:

An intraoral scanner (IOS) is a device that is used to capture a direct optical impression. The scanner projects a light source onto the area to be scanned and the images are captured by imaging sensors and processed by scanning software, which then produces a 3D surface model.

3D dental imaging is not only less invasive than traditional x-rays, but is also more accurate and more comfortable. SUSS MicroOptics' high-quality micro-optics enable imaging applications and can be easily integrated into the optical assemblies of the intraoral scanner systems, facilitating a reduced system size for better patient comfort and enhancing the optical performance of the device.

### SUSS MicroOptics Solutions

- + Microlens Arrays (MLAs)
- + Diffractive Optical Elements (DOEs)

### Benefits

- + Enhance system performance
- + Reduce system size
- + Custom design to address customer needs



## MICRO-OPTICS SOLUTIONS FOR ENDOSCOPY

### + Endoscopy:

SUSS MicroOptics' high-quality micro-optics enable imaging applications. Wafer-level packaging allows for miniaturized easy-touse objectives and can be easily integrated into the optical assemblies of endoscopes,

enhancing the overall optical performance, including image quality and system performance. Furthermore, there is the potential to highly improve the efficiency of the system with better MLA-based illumination optics.

### SUSS MicroOptics Solutions

- + Microlens Arrays (MLAs)
- + Single lenses
- + Wafer-level packaging
- + Wafer-level optics

### Benefits

- + Enhance optical performance
- + Improve efficiency of the imaging system
- + Reduce system size
- + From design support to production
- + Customized, ready-to-use packaging



## MICRO-OPTICS SOLUTIONS FOR MICROSCOPY

### + **Confocal Microscopy:**

SUSS MicroOptics' lens- and pinhole discs are often used in tandem for high-speed imaging in confocal microscopes. They support the generation of high contrast, sharply focused

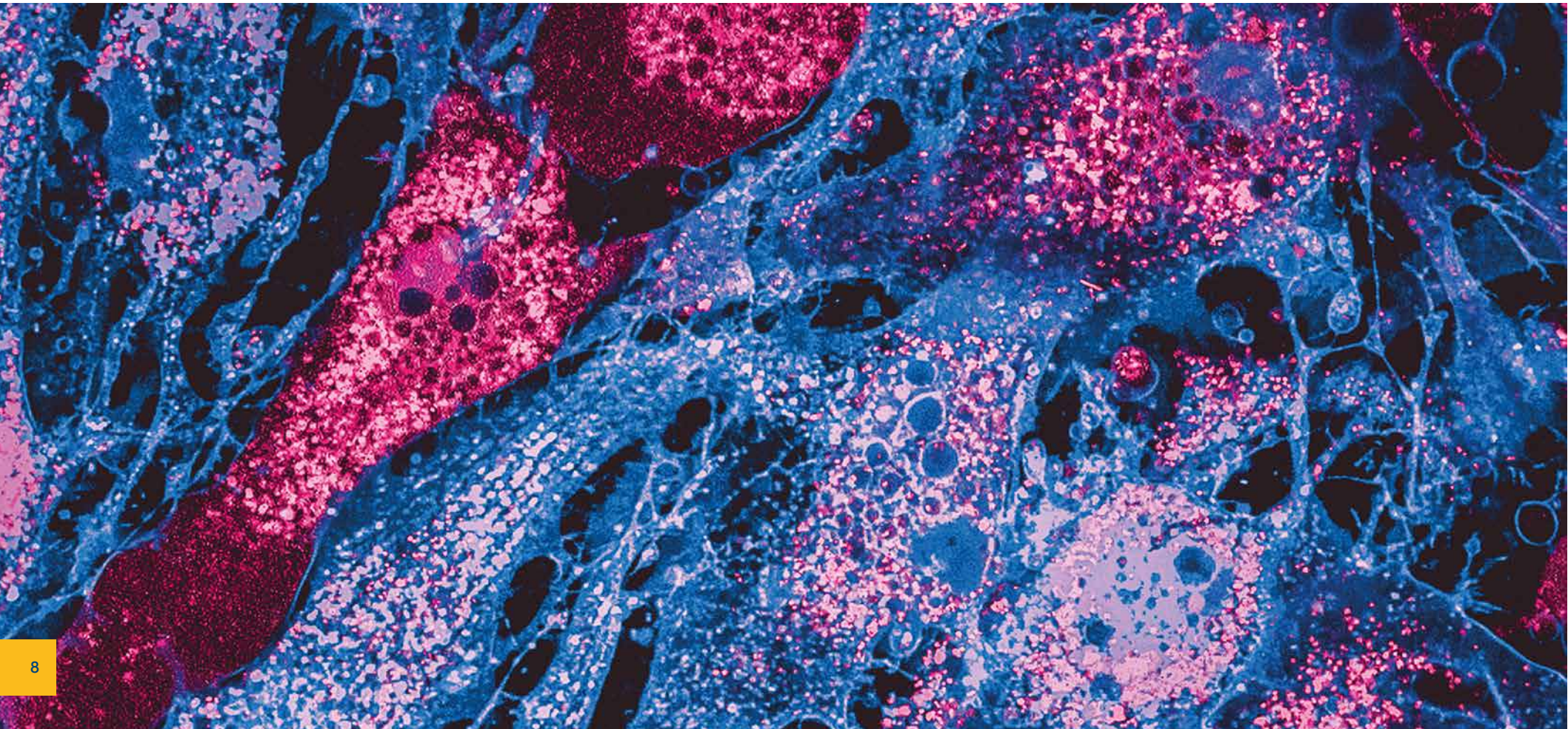
images and enable 3D reconstructions to be made of many different sample types, from inert materials to living specimens. SUSS MicroOptics' components form the backbone of many of the world's leading systems.

### **SUSS MicroOptics Solutions**

- + Nipkow discs
- + Microlens discs

### **Benefits**

- + Enhance system performance
- + Custom design to address customer needs



## MICRO-OPTICS SOLUTIONS FOR METABOLIC SCREENING

### + Metabolic screening:

SUSS MicroOptics' high-quality microlenses are used in Photonic Integrated Circuits (PICs) as part of intelligent wearables to monitor heart rate, blood pressure, and sleep. Further-

more, our microlenses are used in noninvasive point of care devices to measure different metabolic parameters such as glucose, and  $O_2$ , allowing real-time, label-free monitoring and the miniaturization of the device.

### SUSS MicroOptics Solutions

- + Microlens Arrays (MLAs)
- + Diffractive Optical Elements (DOEs)

### Benefits

- + Custom design to address customer needs
- + Improve system efficiency
- + Reduce system size



A close-up photograph of a microscope's objective lens positioned just above a microarray slide. The slide features a grid of circular wells, each containing a dense array of small, light-colored spots. The background is softly blurred, emphasizing the precision of the scientific equipment.

# **OUR PRODUCTS**

## FOR LIFE SCIENCE APPLICATIONS

# BEAM HOMOGENIZER

Most laser applications such as dermatological applications, laser materials processing and semiconductor industry require a uniform light distribution in order to achieve the best possible results. With SUSS MicroOptics' homoge-

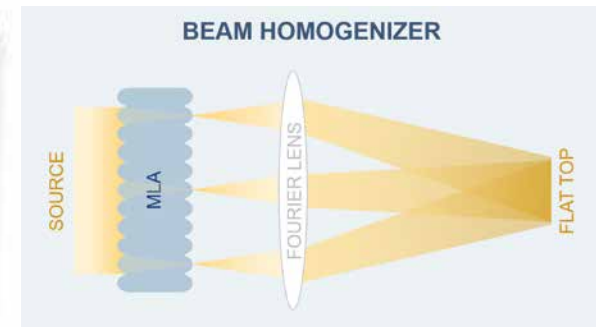
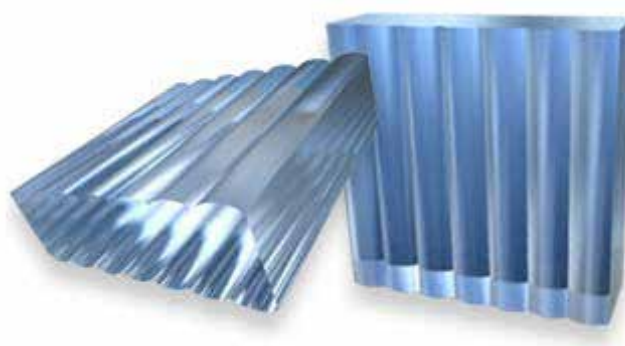
nization components, you will have an easy solution even for very demanding applications that are suitable for homogenizing of a wide variety of modern light emitters from line-narrowed Excimer Lasers to high-power LEDs.

## Features

- + Perfect uniformity in working plane (flat-top profile)
- + High-power laser applications
- + High efficiency
- + Flat-top shapes: Square, rectangular, circular, line, laser sheet
- + Spectral wavelength 193 nm-5  $\mu$ m
- + Compact design
- + Easy to use
- + Anti-reflection coating optional
- + Various working distances and flat-top sizes

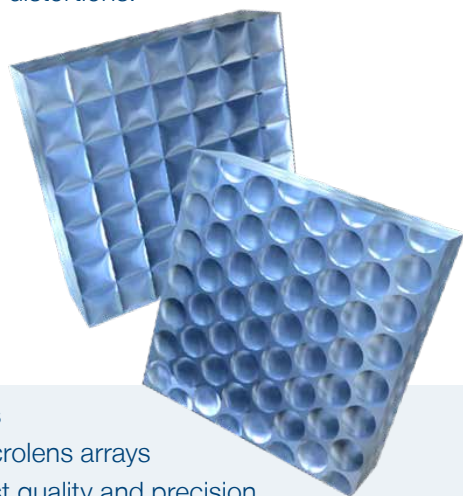
## Life Science Applications

- + Skin treatment
- + Ophthalmology
- + Fluorescence microscopy



# SHACK-HARTMANN ARRAYS

Shack-Hartmann wave front sensors are used to measure the intensity distribution and phase distortion accurately and in real time. They are widely used in measurement and diagnostic instruments, and in optical systems to compensate for phase distortions.



## Features

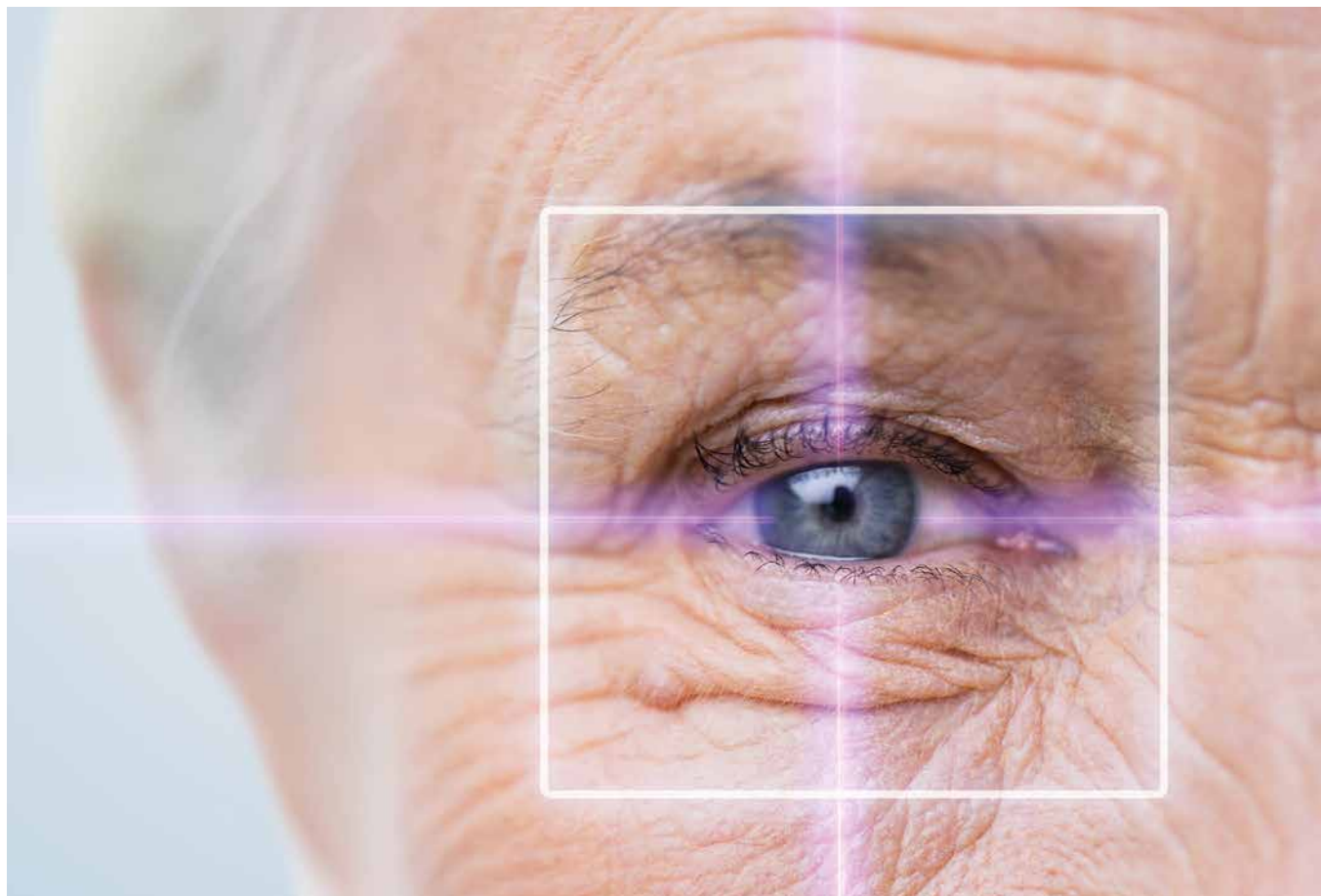
- + 2D Microlens arrays
- + Highest quality and precision
- + Material: Fused silica, silicon
- + Wavelength range: DUV (193nm) to IR (5  $\mu$ m)
- + Lens profile: plano-convex, bi-convex, aspheres, spheres
- + Additional features: alignment marks, pinholes, apertures
- + Circular and square lens shape

## Life Science Applications

- + Ophthalmology
- + Microscopy  
(especially laser scanning microscopy)

Microlens arrays for Shack-Hartmann sensors tend to have small lens apertures to provide the high special resolution required for wave front sensing. Microlenses with a short focal length are usually better for detecting highly distorted wave fronts whereas longer focal length microlenses are more suited to detecting smaller aberrations.

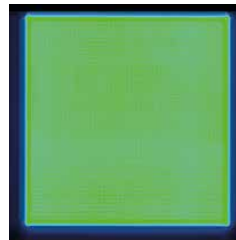
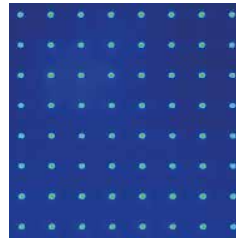
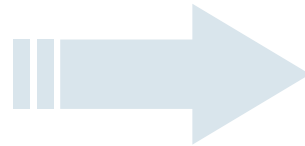
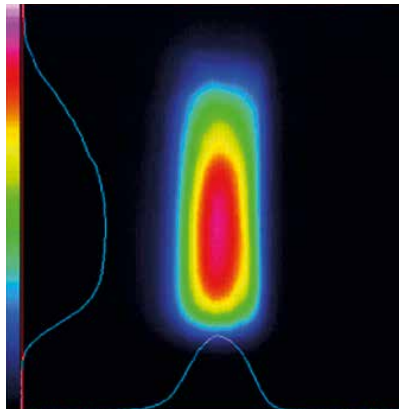
The quality of a Shack-Hartmann sensor is directly related to the excellence of the microlens array. SUSS MicroOptics is the leading supplier of microlens arrays for Shack-Hartmann sensors, with the highest ranking in lens array uniformity and beam-pointing accuracy.



# DIFFRACTIVE OPTICAL ELEMENTS

SUSS MicroOptics is a Premium Supplier for high-end Diffractive Optical Elements (DOEs) suitable for very demanding applications like metrology, medical laser treatments, or diagnostic instruments, among many others.

DOEs are used to pattern light in work areas for custom illumination. SUSS MicroOptics offers design advice for DOEs and supports you in all phases, ranging from the initial concept, and prototyping, to mass manufacture.

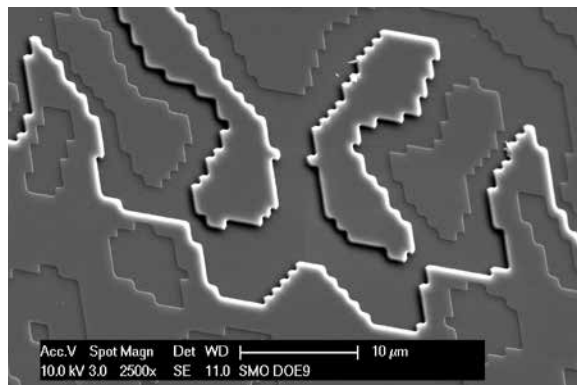


## Features

- + Materials: Fused silica (various grades) and silicon
- + 2 (binary) to 16 levels
- + Typ. overlay error < 70nm
- + Wavelength range: 190nm to 5µm
- + Minimum feature size: 500nm to 1µm depending on step height and/or etch depths
- + Efficiency: up to 98 %

## Life Science Applications

- + 3D Scanning
- + Ophthalmology
- + Sensing



**Diffractive Optical Elements (DOEs) can be used instead of microlenses where size 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.



# MICROLENS ARRAYS (MLAS) FOR SENSING APPLICATIONS

Refractive microlenses cover a range of 10  $\mu\text{m}$  to 2 mm lens diameters. Refractive microlenses are an interesting alternative for all applications where miniaturization and reduction of alignment and packaging costs are necessary, such as sensing.

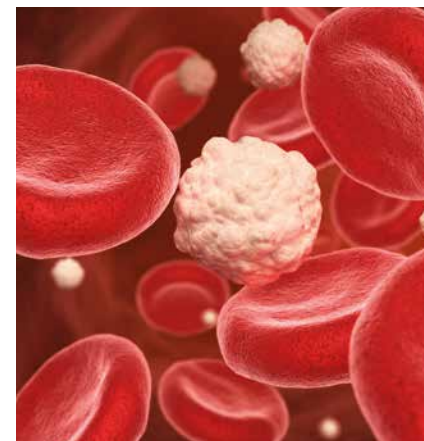
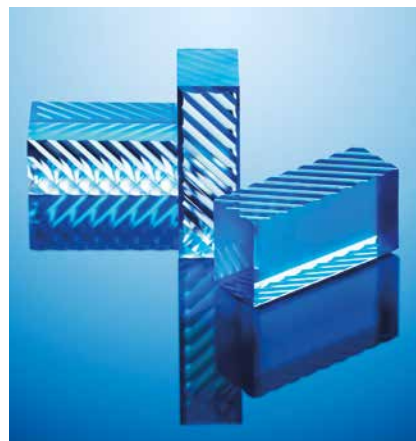
Various vital parameters like heart rate, oxygen saturation and temperature are monitored with smart watches. SUSS MicroOptics supports these and other applications with microlenses which are used for Photonic Integrated Circuits (PICs) in applications where each photon counts.

## TECHNICAL DATA

Angular spectrum	Typ. < 1 – 20 degrees
Material	Fused silica (various grades), silicon
Area of illumination	Linear, circular, rectangular, square
AR coating	UV, VIS, NIR – front side, back side, to air, to glue
Lens array dimensions	According to customer requirement

## Life Science Applications

- + 3D Scanning
- + Sensing
- + Metabolic Screening
- + PoC
- + DNA Sequencing



# NIPKOW DISCS

SUSS MicroOptics manufactures high quality lens- and pinhole discs (spinning discs), which are integral components of confocal microscopes. Our discs support the generation of high contrast, sharply focused images

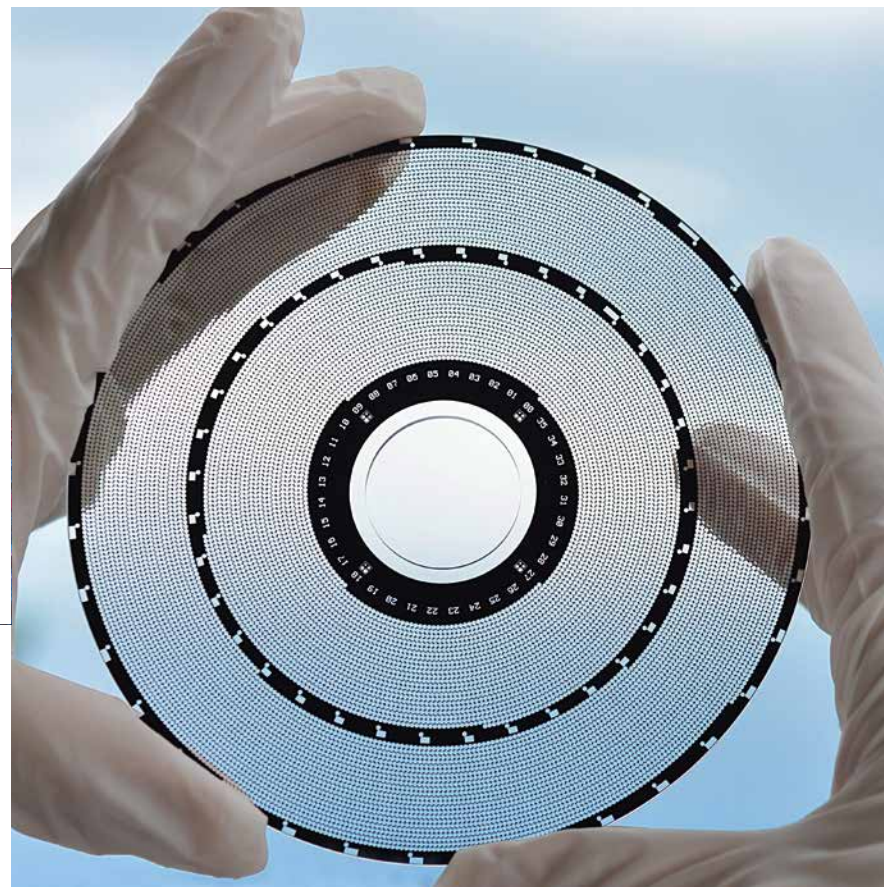
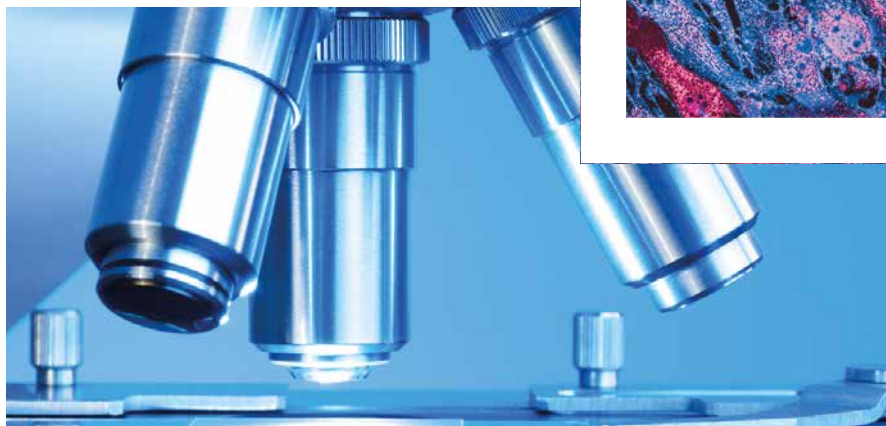
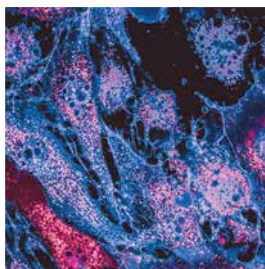
and 3D reconstructions of biological and other miniature difficult-to-image structures. Our parts form the backbone of many of the world's leading systems.

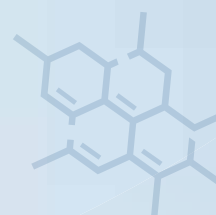
## TECHNICAL DATA

Disc diameter	≤ 160 mm
Material	Fused silica
Pinhole/lens pattern	Custom
AR coating	UV, VIS, NIR – front side, back side, to air, to glue
Cr coating	Custom

## Life Science Applications

+ Confocal microscopy





Visit [www.suss-microoptics.com](http://www.suss-microoptics.com)  
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