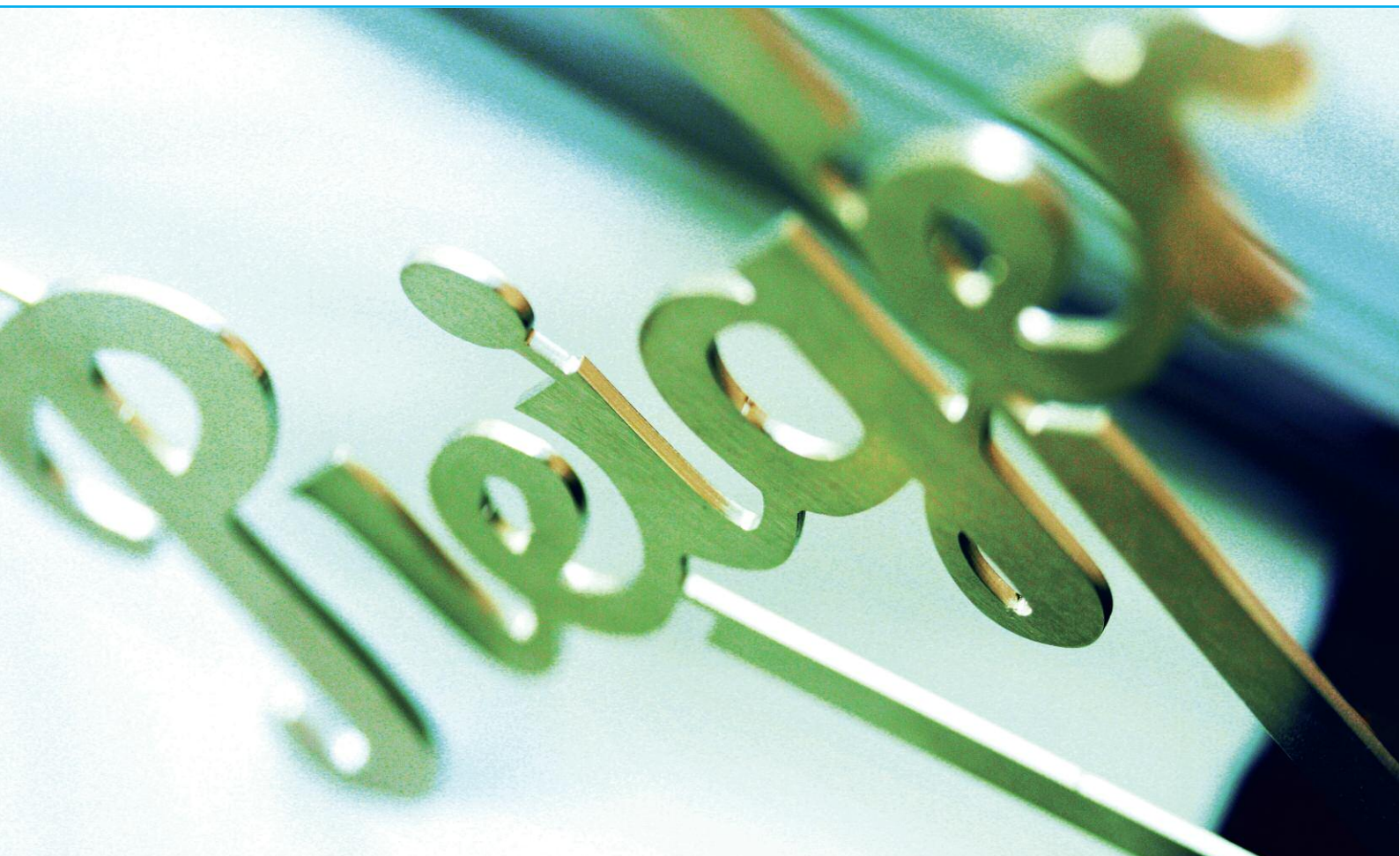


Mirrors, Lenses, and IR Components

High performance optical components and coating services



PLEIGER Laseroptik – A benchmark for quality

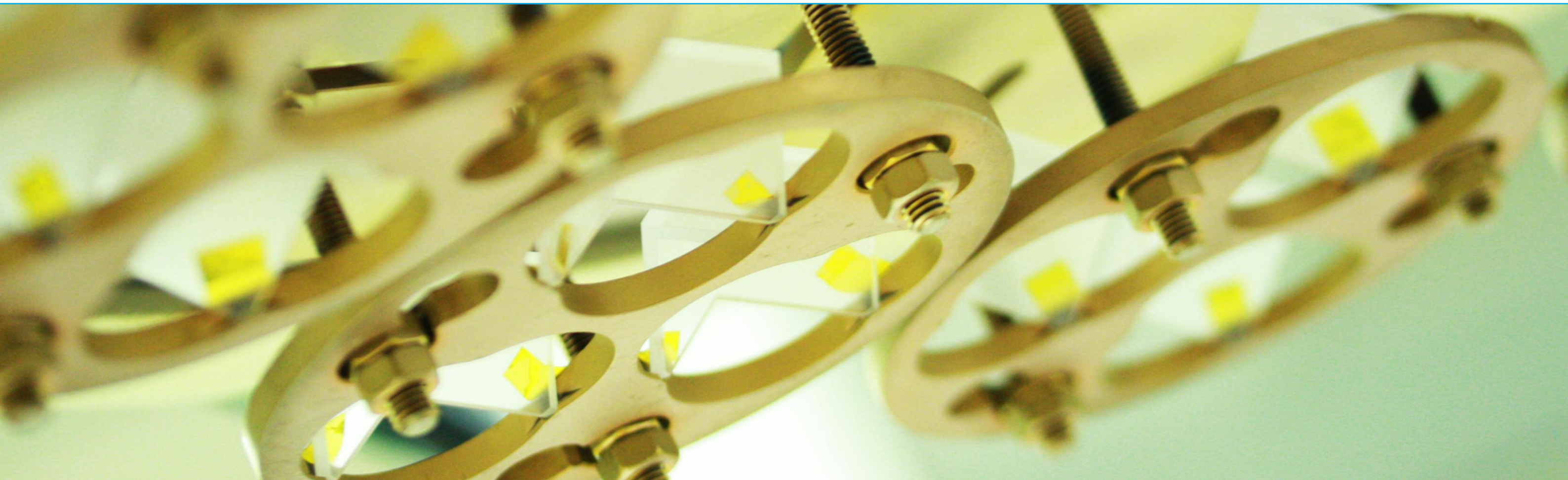
- CO₂ mirrors
- ZnSe lenses
- IR components
- Coating services



PLEIGER Laseroptik

PLEIGER offers optical components for worldwide delivery. Our coating services range from UV to IR applications. We assure that our products fulfill the highest customer requirements by continuous measuring and quality checks, beginning with our research and development up to pre-delivery inspection. The application determines the coating, therefore we work closely with our customers to develop the exact optics required. We are a member of the PLEIGER Group of companies with its headquarter in Witten, Germany. The PLEIGER Group has production facilities in Germany, Korea, China, and the USA.

PLEIGER'S high precision mirrors and lenses are used in laser material processing, medical technology, measurement technology, spectroscopy, aerospace applications, and FLIR. Our research and development department allows for a speedy design process and subsequent production of customized optics and coatings. PLEIGER Laseroptik's quality, reliability, and expertise has made us a long-term partner for a wide variety of optical industrial sectors.



PLEIGER Laseroptik - Optical components of the highest grade

PLEIGER quality

- Continuous quality control with advanced technology
- The strictest tolerances and high-precision coatings with maximum homogeneity
- Thorium-free coatings

Applications and sectors:

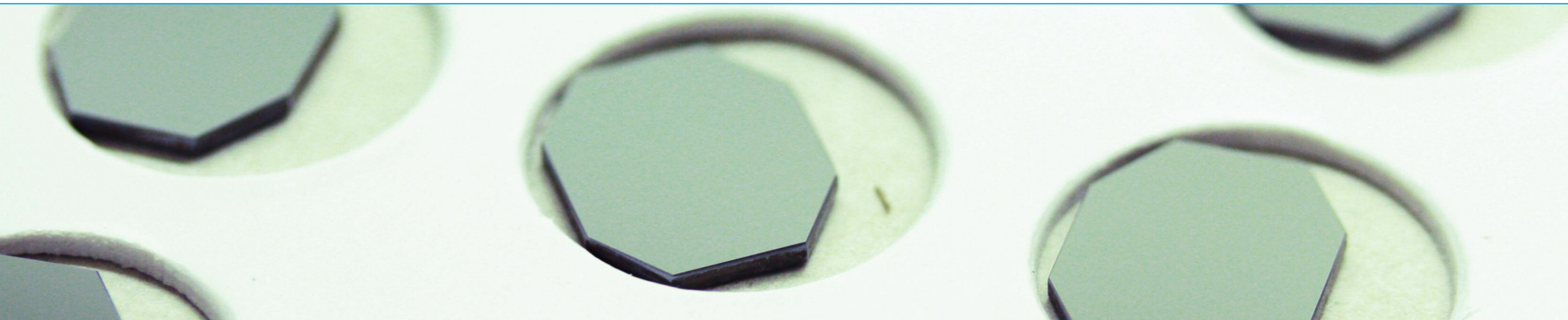
- Optical components for laser and infrared applications
- Laser cutting, laser welding, e.g. for steel
- Laser marking, e.g. PET, metals or wood
- Measurement technology, e.g. bar code scanners
- Medical technology, e.g. correction of eyesight
- Aerospace, e.g. IR measuring technology

CO₂ mirrors

High quality for high-power CO₂ lasers

Pleiger Laseroptik's precision mirrors are used in resonators, deflection units, and for beam bending. Our product range includes flat mirrors and spherical optics of silicon, copper, silicon carbide, and fused silica. Combined with our gold-based high-power coatings, we offer precisely the suitable optics for any application with a wavelength of 10.6 μm. We also offer scanner mirrors for laser marking, plane mirrors for laser cutting, and bending mirrors for medical technology.

Material: Silicon, copper, silicon carbide, glass
Coating: Zero phase, dual band, molybdenum, protected gold



PLEIGER Laseroptik - Optical components of the highest grade

PLEIGER high performance with all types of mirrors:

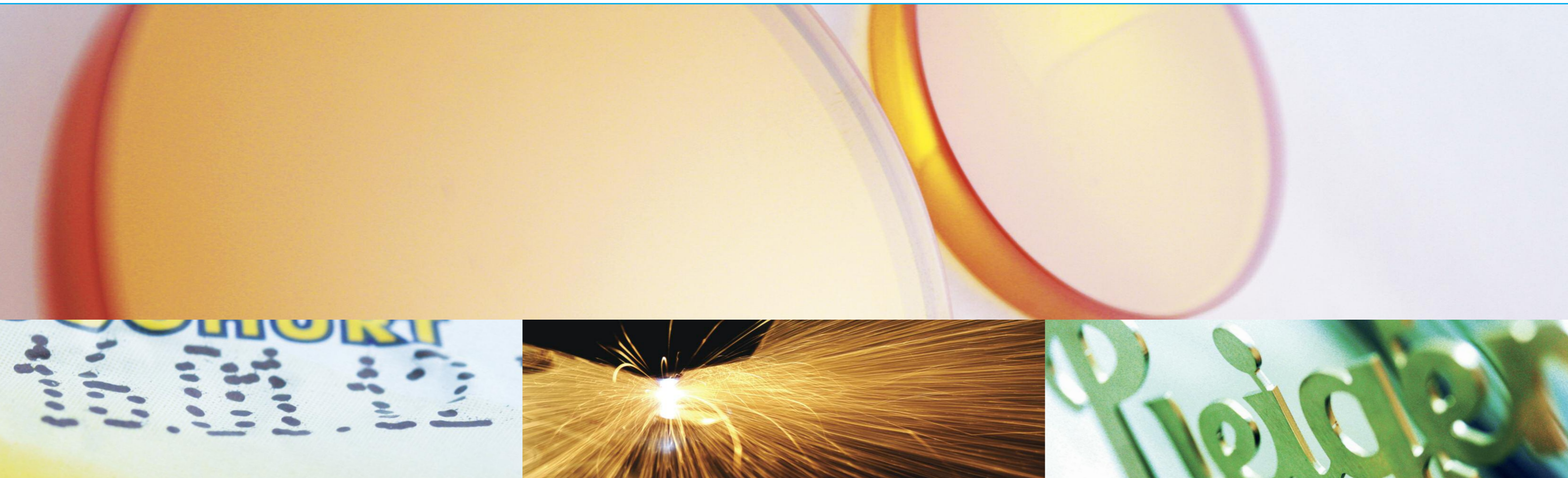
	HR mirrors	HR dual band mirrors	Phase retarder	Zero phase mirrors	Molybdenum	Protected Gold
R @ 10.6 μm 45°-s	99.9 %	99.8 %	*	99.8 %	98.4 %	99.1 %
R @ 10.6 μm 45°-p	99.7 %	99.6 %	*	99.5 %	96.6 %	98.4 %
Phase Shift @ 10.6 μm 45°-r	0±3°	0±5°	90±3°	0±2°	<2°	<2°
R @ 0.633 μm 45°-r	>45 %	>75 %	>45 %	>75 %	>50 %	>90 %

ZnSe lenses

... focused precision for cutting and marking

The ZnSe lenses for laser cutting and marking are made of high-quality material with the lowest absorption values. Combined with an anti-reflex coating, PLEIGER optics allow the focusing of a high-power CO₂ laser with excellent precision. For the highest laser outputs above 4 kW, we offer a low-absorbing AR/AR coating, which minimizes the "thermal lensing".

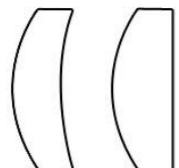
Transmission range	0.5 – 22 μm
Refractive index @ 10.6 μm	2.4028
Refractive index inhomogeneity @ 10.6 μm	3 x 10 ⁻⁶
Thermo-optic coefficient @ 10.6 μm	611 x 10 ⁻⁶ K ⁻¹
Absorption coefficient @ 10,6 μm	5.0 x 10 ⁻⁴ cm ⁻¹



PLEIGER Laseroptik - Optical components of the highest grade

PLEIGER high performance with all types of lenses:

- ZnSe lenses**
- Transmission > 99.3 %
 - Absorption < 0.2 %
 - Reflection < 0.2 %



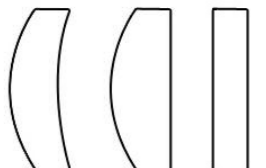
- f-theta lenses**
- Transmission > 99.3 %
 - Absorption < 0.2 %
 - Reflection < 0.2 %



- ZnSe windows**
- Transmission > 99.3 %
 - Absorption < 0.2 %
 - Reflection < 0.2 %



- Low-absorption lenses**
- Transmission > 99.3 %
 - Absorption < 0.15 %
 - Reflection < 0.2 %
 - Thorium-free

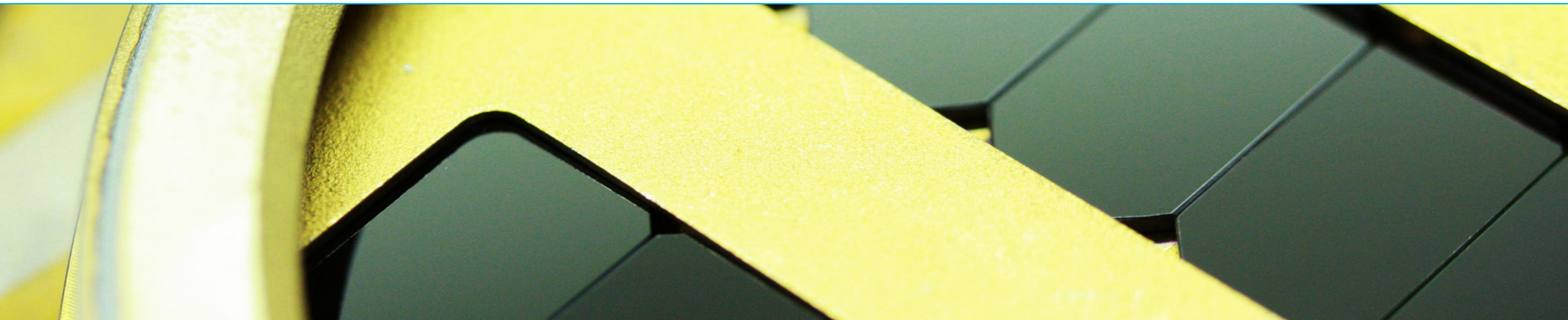


Superior-class IR components

High-grade components

PLEIGER optics of silicon, germanium, ZnSe, and ZnS are used in thermography, IR spectroscopy, night vision devices and for target tracking. Our product range includes windows, spherical and aspherical lenses, as well as high-reflecting mirrors for broadband applications from NIR to FIR.

Material	Transmission range	Heat conductivity	Density
Silicon	1.2 – 7 μm	159 W/Km	2.32 g/cm ³
Germanium	2 – 17 μm	58.6 W/Km	5.33 g/cm ³
ZnSe	0.5 – 22 μm	18 W/Km	5.27 g/cm ³
Copper	÷	400 W/Km	8.92 g/cm ³
Aluminium	÷	235 W/Km	2.70 g/cm ³



PLEIGER Laseroptik - Optical components of the highest grade

PLEIGER provides a wide range of mirrors:

- | | | |
|--|---|---|
| <p>HR</p> <ul style="list-style-type: none"> - Substrate material Si, Cu, SiC, Be | <p>Thermal absorption layers</p> <ul style="list-style-type: none"> - Sensors | <p>Phase retarder mirrors</p> <ul style="list-style-type: none"> - Substrate material silicon, copper |
| <p>HR DB</p> <ul style="list-style-type: none"> - Substrate material Si, SiC, Cu, Be | <p>Gold mirrors</p> <ul style="list-style-type: none"> - Substrate material Si, Cu, Al, Quarz | <p>Zero phase mirrors</p> <ul style="list-style-type: none"> - Substrate material Si, Cu, SiC |

Areas of use:

- IR lenses are used in image-processing procedures for temperature measurement, in night vision devices and for target tracking
- IR mirrors are used in spectroscopic devices for process control, chemical analysis, and quantitative analysis.
- IR absorption coatings are used in medical technology for measuring body temperature.

High-precision coatings

Meticulous processing, minimum tolerances, the purest materials

The precision coatings of PLEIGER Laseroptik offer the highest quality and stability for all applications from UV to infrared. Metallic coatings offer optimal properties for broadband applications in spectroscopy and lighting. Dielectric coating systems are designed for a laser wavelength and distinguish themselves through the highest reflection values.



PLEIGER Laseroptik – Superior coating services

PRODUCTS RANGE

- Protected Gold / silver / aluminum
- Enhanced aluminum VIS / UV
- Enhanced gold YAG
- Polygon coating up to a width across flats of 250 mm
- AR 3-14 μm

Overview of PLEIGER PICO coatings

- PICO HR: Highly reflective coating
- PICO HR DB: Dual-band highly reflective coating
- PICO RPR: 90° phase retarder coating
- PICO ZPS: Zero phase coating
- PICO PLM: Polarization locking coating
- PICO OC: Output coupler mirror coating
- PICO AR: Anti-reflection coating
- PICO ARLA: Anti-reflection coating, low-absorption

Tradition and Experience

Complete mirrors and coatings for laser mirrors - made by PLEIGER Laseroptik - are used in almost all laser applications. This is testament to the high quality of our products, and the high level of flexibility of our research, development and production. Pleiger is an innovative, family-owned, German high-tech company with a long tradition at its location in Witten. The PLEIGER Group has production facilities in Germany, Korea, China, and the USA.

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INNOVATION AND QUALITY – MADE BY PLEIGER!

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