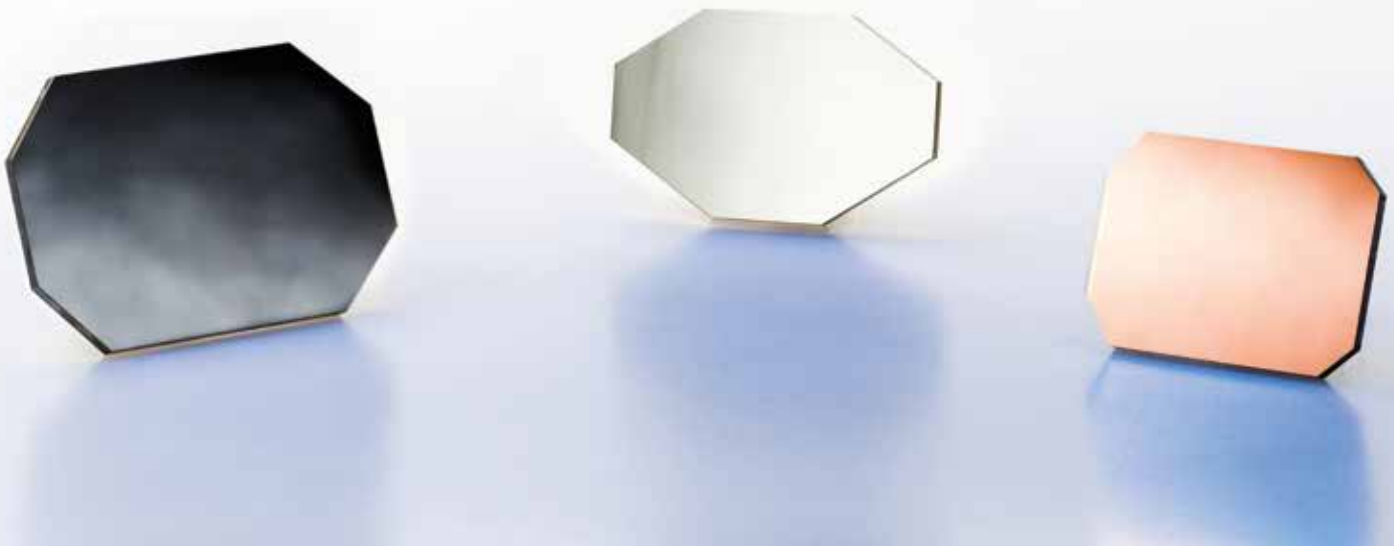


# Scanning Optics

High power applications



**SILICON CARBIDE, BERYLLIUM, SILICON**



## Scanning Mirrors

High precision mirrors are the key components for laser processing in scanheads. The beam position is controlled by two mirrors, and the lightness of the mirrors enables fast motion of the beam on the surface. The mechanical design of the mirror is based on weight, stiffness, thermal dissipation and moment of inertia.

Pleiger offers scanning mirrors made of glass, ceramic, and metals for many wavelengths and power levels.



## Comparative Material Properties

			Silicon Carbide	Beryllium	Silicon
Density	$\rho$	[g/cm <sup>3</sup> ]	> 3,16	1,85	2,33
Compressive strength	$R_s$	[MPa]	2200	280	120
Flexural strength, 4-pt bending	$\sigma$	[MPa]	510 (25 °C)	207	69
Young's modulus	E	[GPa]	420	303	130
Poisson ratio	$\mu$		0,17	0,18	0,24
Knopp hardness	HK	[GPa]	2450	160	1150
Fracture toughness	$K_{Ic}$	[MPa $\sqrt{m}$ ]	4	9-12	0,94
Thermal conductivity	$\lambda$	[W/mK]	150	216	163
Coefficient of thermal expansion	$\alpha$	[10 <sup>-6</sup> K <sup>-1</sup> ]	4,1 (500°C)	11,4 (25°C)	2,6 (400 °C)

## SiC, Silicon Carbide

Lightweight optics made of Silicon Carbide are a perfect combination of material properties and polishing technologies. This ceramic material offers high stiffness, thermal stability and good mechanical properties. SiC is a non-toxic replacement for Beryllium in high speed laser scanning systems without lowering the dynamic performance of the system.

## Be, Beryllium

The superior elastic stiffness of Beryllium has led to its extensive use in precision optical systems. The material provides the stiffness to weight ratio desired for low inertia, high speed scanning applications. With a specific gravity of 1,85 g/cm<sup>3</sup> Beryllium is the lightest metal that may be used for optical applications.

## Si, Silicon

Silicon galvo mirrors made of mirror grade silicon are the most used. They comprise thermal stability, high durability and low costs. These mirrors may be used with several kW of laser power.

## Coatings

	10,6 μm		1,064 μm		633 nm
	s-pol	p-pol	s-pol	p-pol	
PICO HR	99,9%	99,7%	*	*	> 45 %
PICO HR DB	99,8%	99,7%	*	*	> 75 %
PICO YAG	*	*	> 99,5 %	> 99,5 %	> 70 %
Protected Gold	99,1%	98,4%	> 95 %	> 95 %	> 82 %
Protected Silver	99,1%	98,7%	> 98 %	> 98 %	> 97 %

\* not intended for use with this wavelength

## Tradition and Experience

Ready-to-use polished and coated 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.



**INNOVATION AND QUALITY – MADE BY PLEIGER!**

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