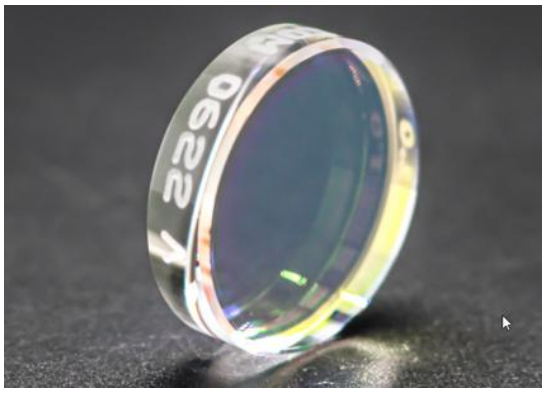
Super-smooth Ultra-high Reflectivity Concave Mirror 1530-1600nm 12.7x6.35mm



Product Description

The so-called super mirrors, used in ring laser gyroscopes or certain scientific applications, require coating optical components with extremely low loss (i.e., absorption and scattering). These mirrors also exhibit a maximum reflectivity of R > 99.998% and total losses < 10 ppm. Idealphotonics uses a German-improved IBS machine, which is capable of producing coatings on ultra-polished substrates. The cleanliness of the machine and environment is maintained in a dedicated clean room, where extensive substrate pre-treatment and post-treatment processes are carried out. Measurement devices for inspection, such as white light profilometers and high-resolution microscopes (up to x 1000), are in place. Customized cavity decay setups allow for the determination of reflectivity and reference losses with accuracy up to four decimal places.

Part Number

CRD-126-49-1572

● Product features

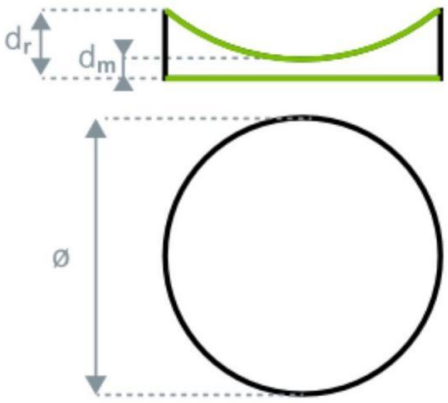
Extremely high reflectivity (R > 99.99% in the visible and near-infrared spectrum range, with R > 99.999% confirmed at several wavelengths between 1000-1600 nm). 、 The center wavelength can be customized. 、 All mirrors used for CRD experiments are equipped with anti-reflective coatings on the back. 、 They feature flat and spherical curved fused silica substrates with high-quality polishing, and an RMS roughness of ≤ 1.5 Å.

● Application area

Laser gyroscope 、 CRD cavity decay system design 、 Optical path diagnostics

Parameters

Dimensional Drawing



Main Parameters

The Fraunhofer Institute for Applied Optics and Precision Engineering in Jena measured the total backscatter (TSB, as described in ISO 13696) of our currently produced 633nm super mirrors, achieving a TSB value of 1.1 ppm. A typical absorption and residual transmission rate of < 15 ppm corresponds to a reflectance of at least 99.998%. For longer wavelengths, this can even reach 99.999%, which is very close to the perfect laser mirror with R = 100%.

The results have been confirmed by our internal cavity decay setup and

scattering measurements. For the above values, ultra-polished substrates with a surface roughness of < 1 Å rms are essential. Their quality was checked with a white light profiler. Below are some measurement values:

	Scatter TSB	Absorption	Reflection CRD
HR 532 nm / 0°	4.9 ppm 1) (int. ARS)	10.2 ppm 2)	> 99.997% 2) (T~5 ppm)
HR 633 nm / 0°	1.1 ppm 1)		> 99.998% (T~5 ppm)
HR 1064 nm / 0°	(< 1 ppm) 3)	< 2 ppm 4)	> 99.999% (T~5 ppm)
HR 2940 nm / 0°	24 ±12 ppm 6)		99.994% 5) (T=36 ppm)

1) Measured at IOF Jena; 2) Measured at LZH; 3) Calculated from surface roughness; 4) Measured at ILT Aachen;5) measured by customer; 6) 1-R-T

Material	Infrared-grade fused silica Infrasil
Shape	Round
Diameter(Ø)	12.7， 25.4 mm ,50.8(-0.1 mm)
Thickness (t)	6.35 mm (±0.1 mm)
Edge Thickness	6.35 mm
Parallelism	5’

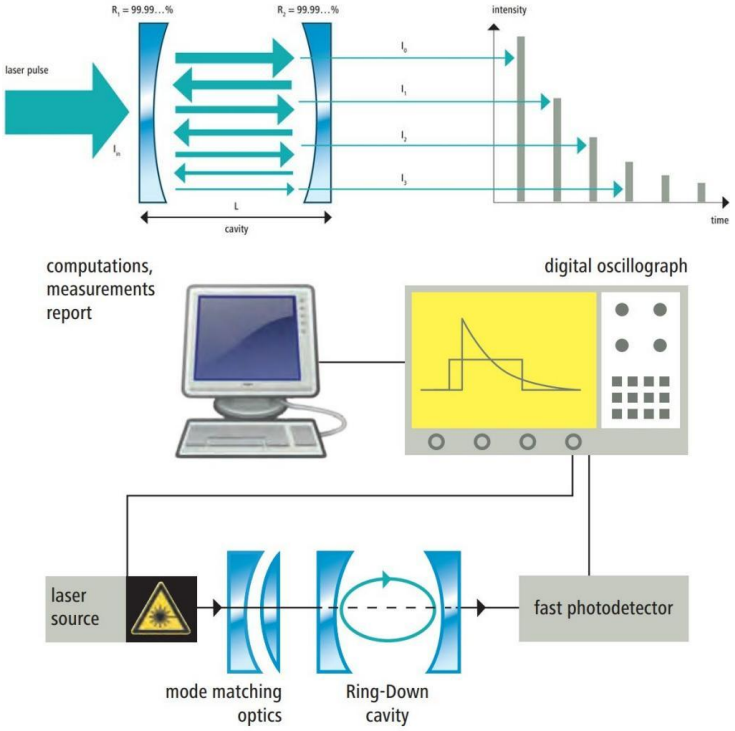
	Guaranteed Roughness	Flatness	Availability
Premium	RMS<0.2 nm*(<2Å)	<λ/20	Ø12.7-25 mm always 2,000 pcs.on stock (various radii and plane)
superpolished	RMS<0.1 nm*(<1Å)	<λ/10	on request

* Tested with Zygo NewView 9000 within sample length 3- 1000 um

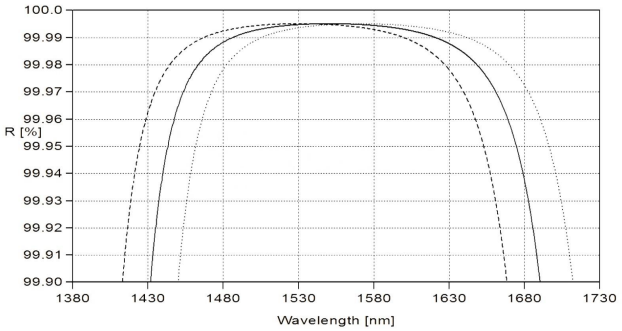
Optical Parameters	Front (S2)	Optical Parameters	Back (S1)
Shape	Concave	Shape	Plain
Radius of Curvature	1,000 mm (±1 %)	Chamfer	0.3 mm (±0.1 mm)
Chamfer	0.3 mm (±0.1 mm)	Test Area Øe	20
Test Area Øe	20	Surface Tolerance	3/0.2(0.2) [L/10 @546.1nm]
Surface Tolerance	3/-(0.2) [L/10 reg. @546.1nm]	Cleanliness	5/2x0.04; L1x0.004

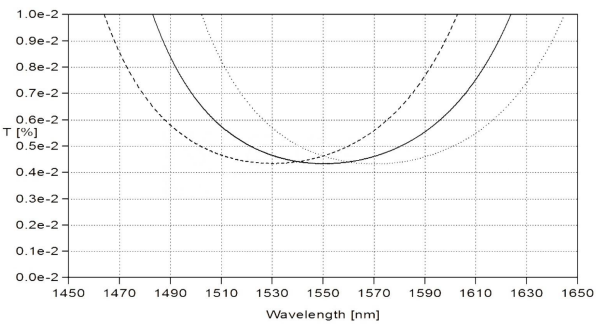
Cleanliness	5/2x0.04; L1x0.004		

Test Plan

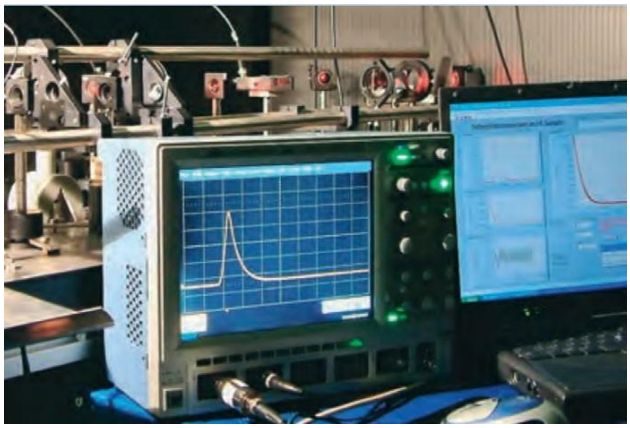


Related Tests

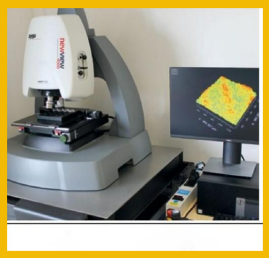




Direct Measurement of Optical Loss

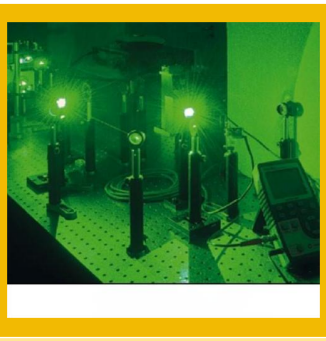


Internal Testing Equipment



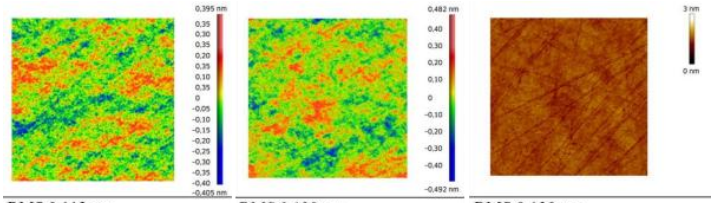
Optical Surface Quality Analysis

Automated Roughness Testing



Laser Loss Testing

The low roughness values are consistently maintained across all spatial frequencies. Exemplary roughness measurements of Premium substrates at different magnifications demonstrate high quality regardless of the sampling length.

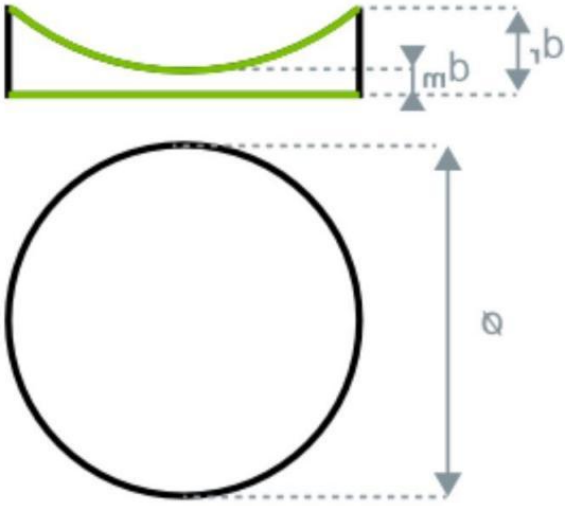


RMS 0.113 nm
WLI Measurement
Field of view: 1000 x 1000 um
Magnification: 5.5 x

RMS 0.129 nm
WI Measurement
Field of view:
170 x 170 um
Magnification: 50 x

RMS 0.130 nm
AFM Measurement*
Field of view:
10 x 10 um
*conducted at Fraunhofer IOF

Customized product parameters example



Ordering info

CRD- □□□□-☆-▽

□□□□: Size

126: Diameter: 12.7mm × Thickness: 6.35mm

256: Diameter: 25.4mm × Thickness: 6.35mm

508: Diameter: 50.8mm × Thickness: 8mm (other sizes available)

☆ : Reflectivity

39: > 99.9%
49: > 99.99%

▽: Operation Wavelength Range

760: 760nm
980: 980nm
1064: 1064nm
1512: 1512nm
2000: 2000nm
2327: 2327nm

Wavelength	Substrate material	Diameter(Inch)	curvature	reflectivity	angle of incidence	optical wedge	PN #
2327	Infrasil 302	0.5"	1m ROC	> 99.99 %	0	None	CRD-126-49-2327
2004	Infrasil 302	1.0"	1m ROC	> 99.99 %	0	None	CRD-246-49-2004
2050	Infrasil 302	0.5"	1m ROC	> 99.99 %	0	None	CRD-126-49-2050
1742	Infrasil 302	0.5"	1m ROC	> 99.99 %	0	None	CRD-126-49-1742
1650	Corning 7980	0.5"	1m ROC	> 99.99 %	0	None	CRD-126-49-1650
1600	Corning 7980	0.5"	1m ROC	> 99.99 %	0	None	CRD-126-49-1600
1550	Corning 7980	0.5"	1m ROC	>99.99%	0	None	CRD-126-49-1550
1550	Corning 7980	1.0"	1m ROC	>99.99%	0	None	CRD-246-49-1550
1512	Corning 7980	0.5"	1m ROC	>99.99%	0	None	CRD-126-49-1512
1434	Infrasil 302	1.0"	1m ROC	>99.99%	0	None	CRD-246-49-1434
0760	Corning 7980	0.5"	1m ROC	> 99.995 %	0	None	CRD-126-49-0760
0760	Corning 7980	1.0"	1m ROC	> 99.995 %	0	None	CRD-126-49-0760
1392	Corning 7980	0.5"	1m ROC	> 99.99 %	0	30'	CRD-126-49-1392
0633	Corning 7980	1.0"	1m ROC	> 99.99 %	0	None	CRD-246-49-0633
1064	Corning 7980	1.0"	1m ROC	> 99.99 %	0	None	CRD-246-49-1064