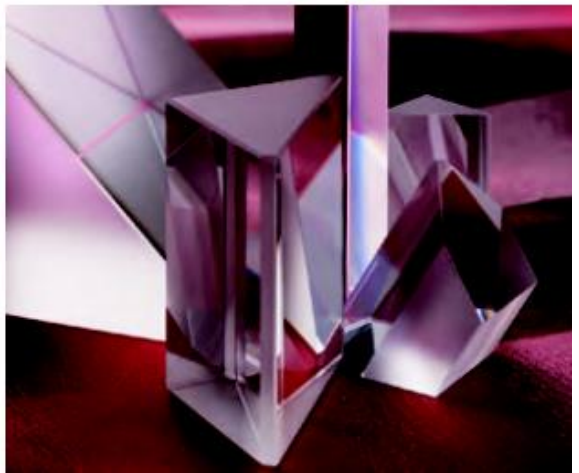


OPTOSIGMA EUROPE

Mirrors

OptoSigma
www.optosigma.com

Our Mirrors

Dielectric mirrors

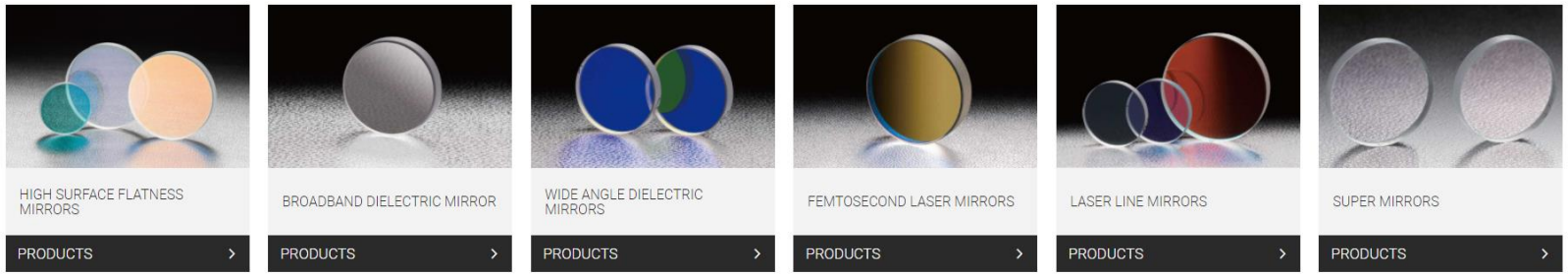
- High power
- Super mirrors
- Femtosecond lasers
- Laser line
- Broadband
- Wide angle

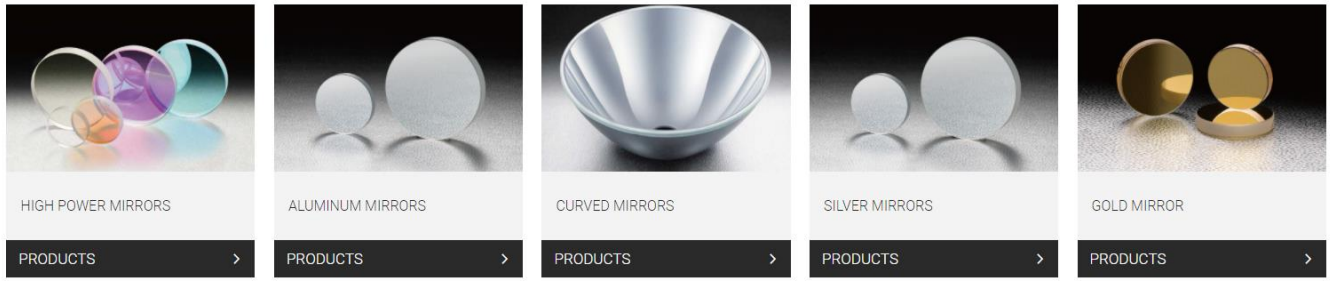
Aluminum mirrors

- Standard
- Reasonable
- Ellipsoidal
- Parabolic

Other Mettalic Mirrors

- Gold mirrors
- Frameless unit
- Surface accuracy guaranteed
- Silver Mirrors





Manufacturing Capabilities - Substrates

Available Substrates

- BK7
- BK7-G18
- Fused Silica
- ZnSE
- CaF_2
- Si
- Ge
- Zerodur
- etc

Specifications	Values
Min/Max Diameter/Size	1mm to 250mm/1000mm
Diameter/Size tolerance	0,025mm
Centration	< 1'
Parallelism/Wedge	< 1"
Surface flatness	λ/100
Transmitted wavefront	λ/50
Scratch and dig	10 / 2
Surface Roughness	< 0,4 Ra

Coating capabilities

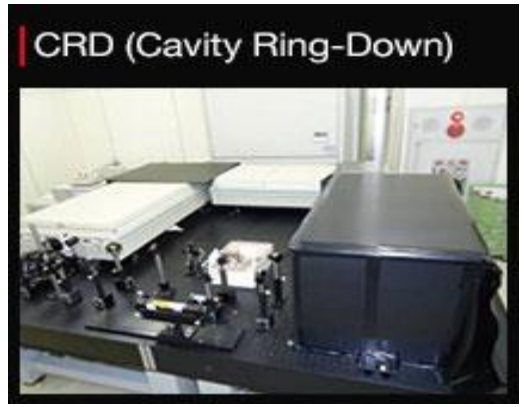
WL Range: 150nm ~ 20 um

PROCESS

- E-Beam Vapor Deposition
- IBS: High Finesse
- IAD: Ion Assisted Deposition
- Dielectric: Metallic

METROLOGY

- Perkin Elmer Lambda 900
- Perkin Elmer Lambda 950
- UV-IR Spectrometer
- Laser Cavity Ring Down
- Chromatis (GDD Measurements



Coating capabilities (2)

Anti-Reflective
- Broadband, Narrowband, Multiband-Band
- R < 0.05% ~ 0.5%
- High Laser Damage Threshold

High Reflectors
- Broadband, Narrowband
- Low Negative Dispersion
- R > 99.999%
- Aluminum, Gold, Silver

Custom Designs
- Dichroic, High Reflectors, Anti-Reflective
- Wavelength, Angle, Polarization Dependent

CUSTOMIZE SUBSTRATE
- Material
- Diameter
- Surface shape (spherical concave)

CUSTOMIZE COATING
- Wavelength (~ 216 nm to 2 μm)
- LIDT (slightly)
- R

Trade off R / λ / LIDT

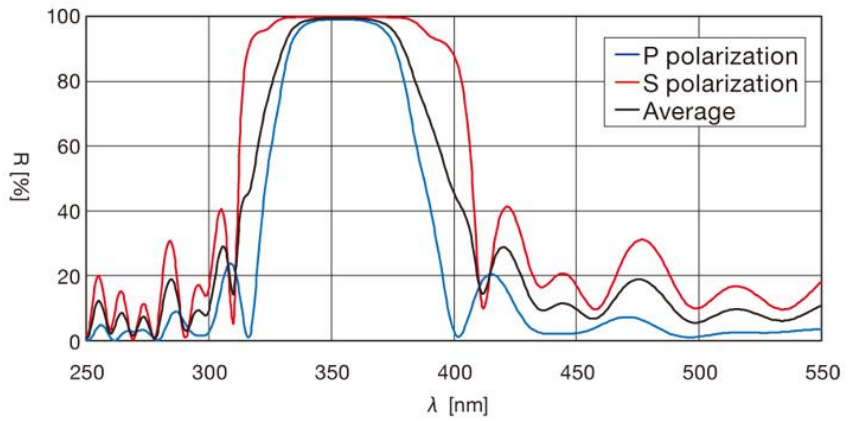
Dielectric mirrors

- High power
- Super mirrors
- Laser line
- Femtosecond lasers
- Broadband
- Wide angle

High Power Mirrors

- IBS, E-beam, IAD
- STD diameters:
  - 25,4 mm
  - 30 mm
  - 50 mm

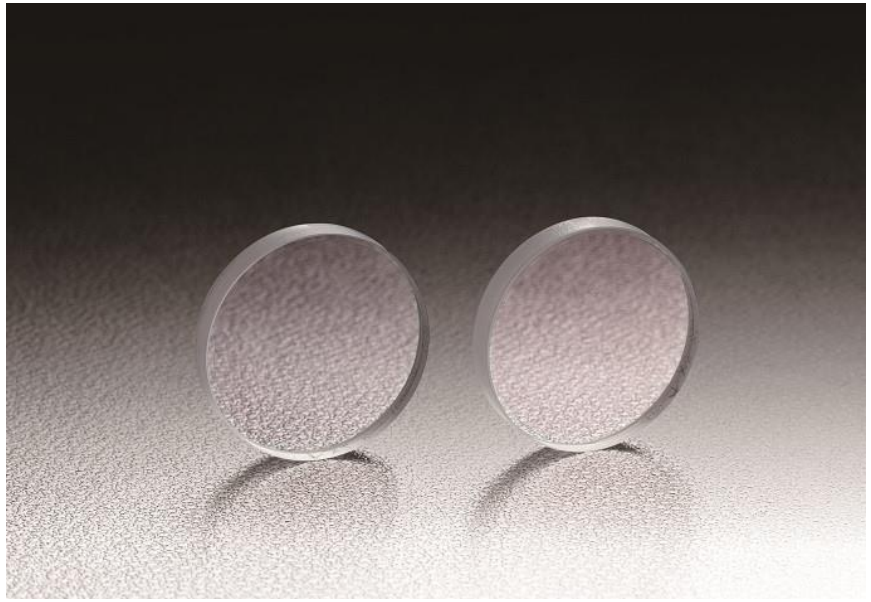
λ (nm)	R (%)	LIDT (J/cm²)
193	> 95	2
248	> 98	4
266	> 98	5
355	> 99	8
532	> 99	26,5
1064	> 99	28

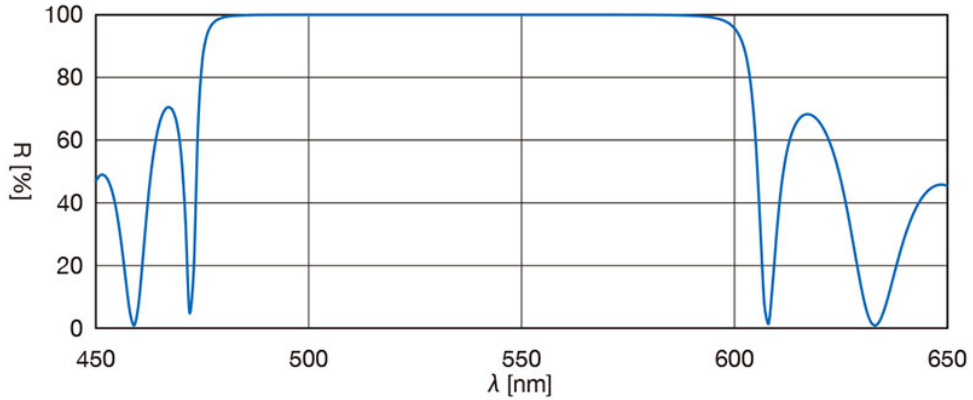


Specs	Data
R max	99%
Surface type	Flat
AOI	45° ± 3°
Substrate flatness	λ/10
Parallelism	<3'
S/D	10/5 – 20/10

Super Mirrors

- IBS coating
- Surface treatment fo Ra<0,1nm
- Substrates: fused silica (main)
- STD wavelengths:
  - 532 nm
  - 1064 nm
- STD diameters:
  - 12,7 mm
  - 25/25,4 mm
  - 30 mm
  - 50 mm



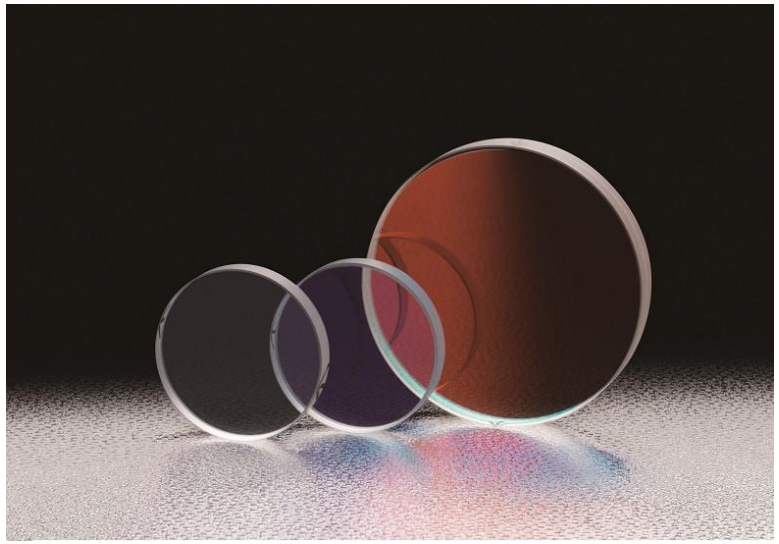


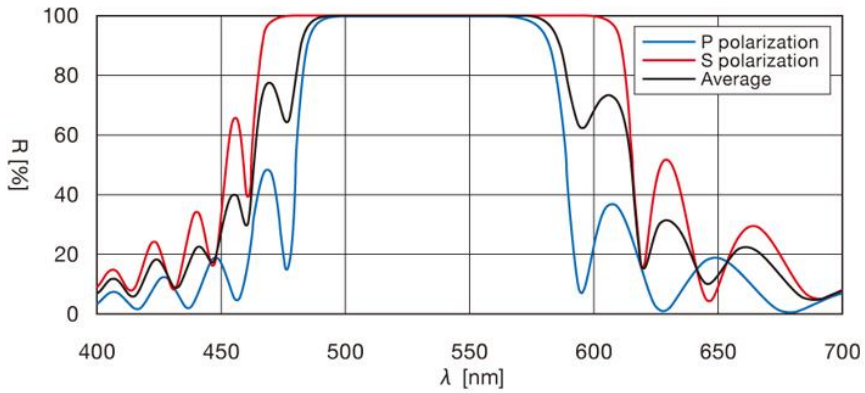
Specs	Data
R	**99,999%**
Surface type	Flat
AOI	0°
Substrate flatness	λ/10
Parallelism	<5"
S/D	10-5
Rear Surface R	<0,15%

Laser line mirrors

- Dielectric multilayer coating
- Coating R
  - UV > 95%
  - VIS/NIR > 99%
- Polarization dependance:
  $R = (R_s + R_P) / 2$
- LIDT up to 20 J/cm²

λ (nm)	R (%)	LIDT (J/cm²)
157	> 95	0,5
266	> 99,2	2
532	> 99,5	8
1064	> 99,5	20





Specs	Data
R max	99,5%
Surface type	Flat
AOI	45°
Substrate flatness	λ/10
Parallelism	<3"
S/D	10-5 / 20/10

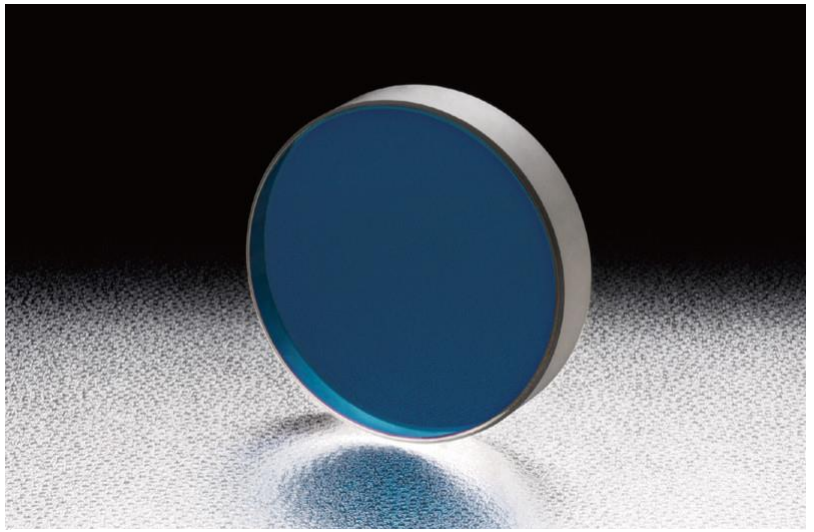
Femtosecond mirrors – Low dispersion

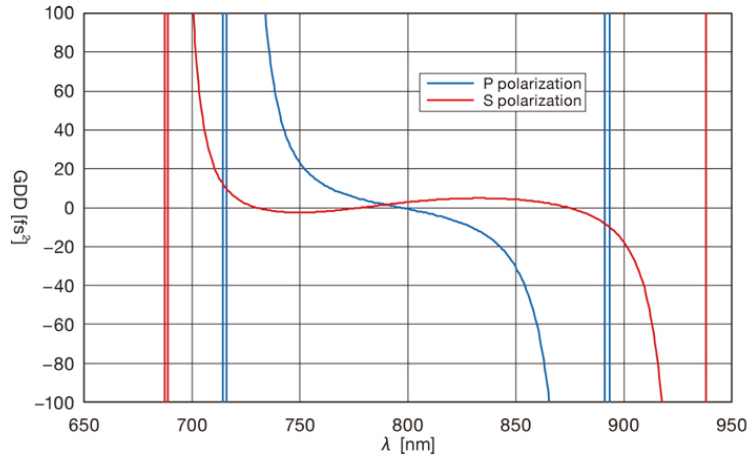
STD diameters:

- 12,7 mm
- 25,4 mm
- 30 mm

λ (nm)	R (%)	LIDT (J/cm²)
720-900	> 99,8	1
700-940	> 99,8	0,5
745-855	> 99	2

High Power





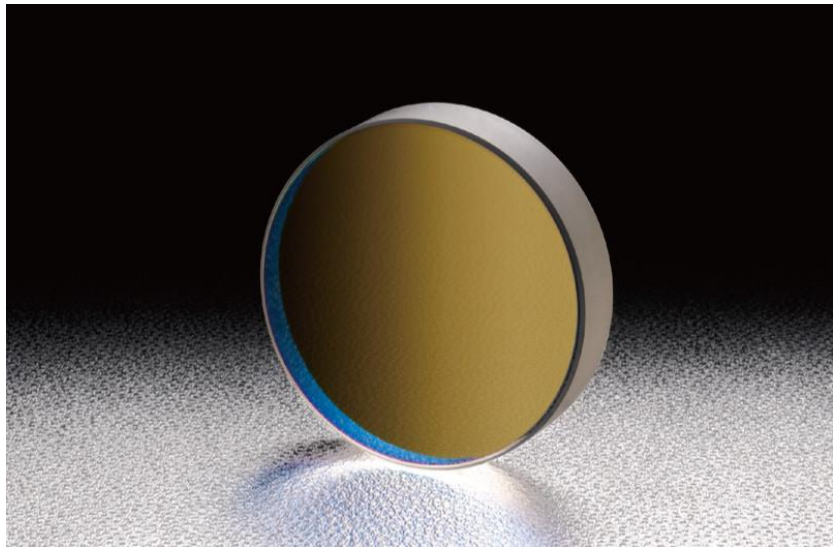
Specs	Data
R max	99,5%
Surface type	Flat
AOI	45° ± 3°
Substrate flatness	λ/10
Parallelism	<5''
S/D	10/5

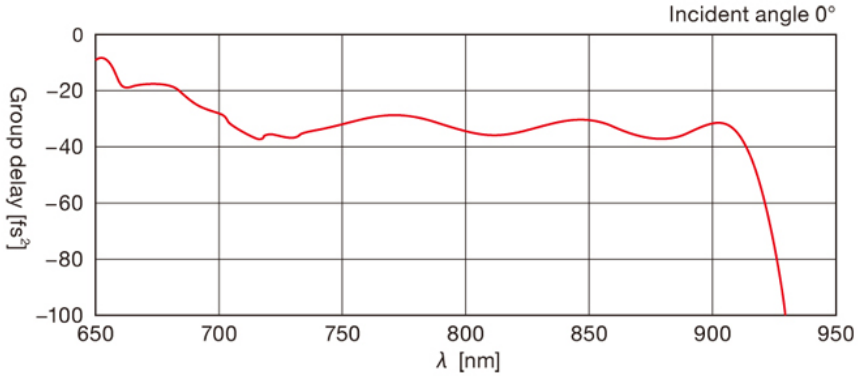
Femtosecond mirrors – Negative dispersion

STD diameters:
- 12,7 mm
- 25,4 mm
- 30 mm

Wavelength: 700-900 nm

λ (nm)	R (%)	LIDT (J/cm²)
Plane	> 99,8	0,5
Concave	> 99,8	0,5



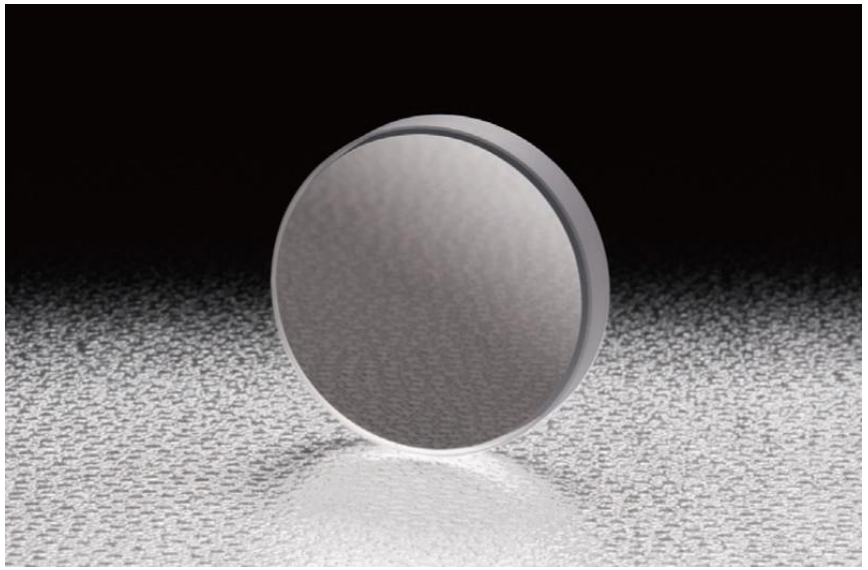


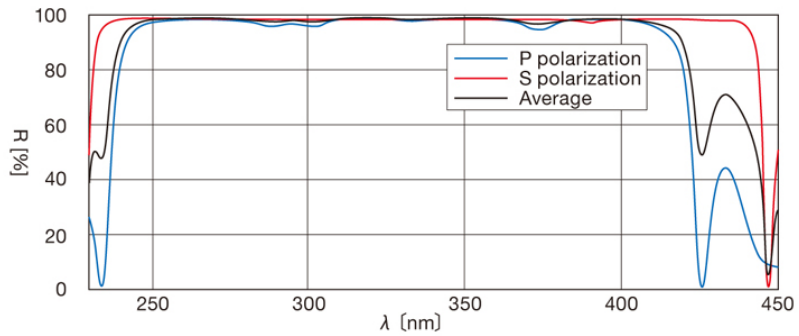
Specs	Data
R max	99,8%
Surface type	Flat / Spherical
AOI	0° - 20°
Substrate flatness	λ/10
Parallelism	<5''
S/D	10/5

Broadband mirrors

- STD diameters:
  - 25,4 mm
  - 30 mm
  - 50 mm

λ range (nm)	RAVG (%)
245-400	> 97
245-700	> 97
400-1100	> 98
400-2000	> 98
300-2000	> 97

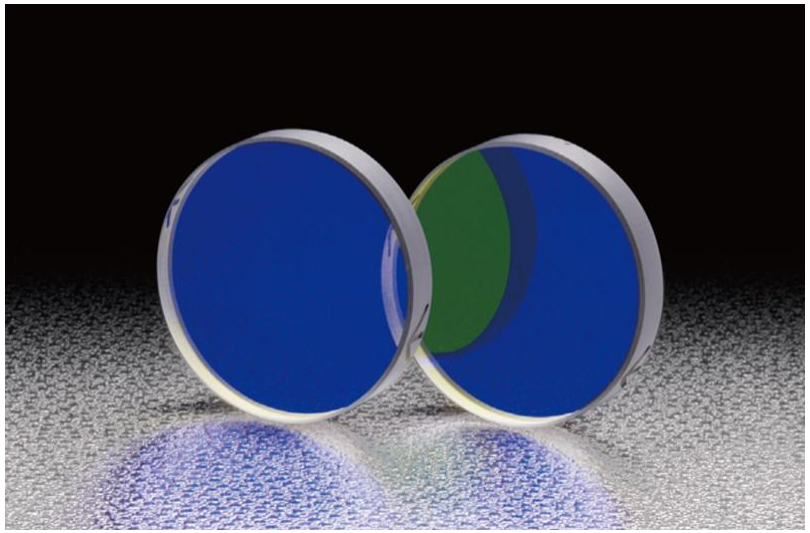


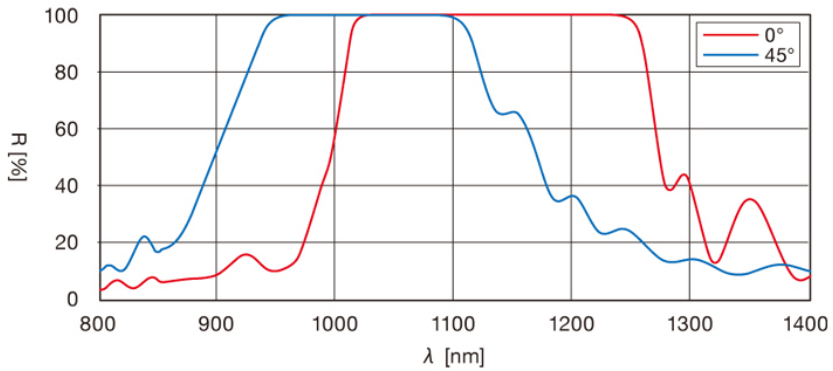


Specs	Data
Surface type	Flat
AOI	45° ± 3°
3°LIDT	0,5 J/cm²
Substrate flatness	λ/10
Parallelism	<3'
S/D	40/20

0°-45° Wide angle mirrors

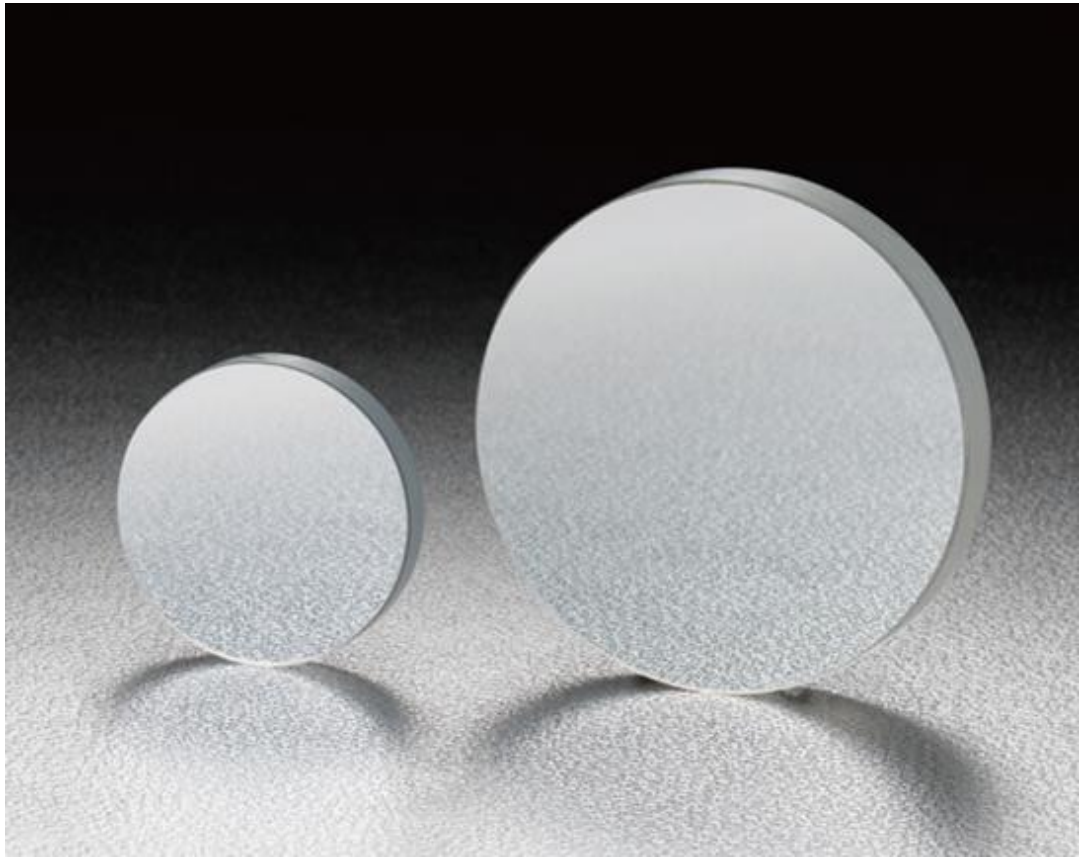
λ range (nm)	LIDT (J/cm²)
405	0,5
532	8
400-700	0,5
780-830	0,5
1064	20
1300	1
1550	1





Specs	Data
R	> 99 %
Surface type	Flat
AOI	0° - 45°
Substrate flatness	λ/10
Parallelism	<3'
S/D	10/5

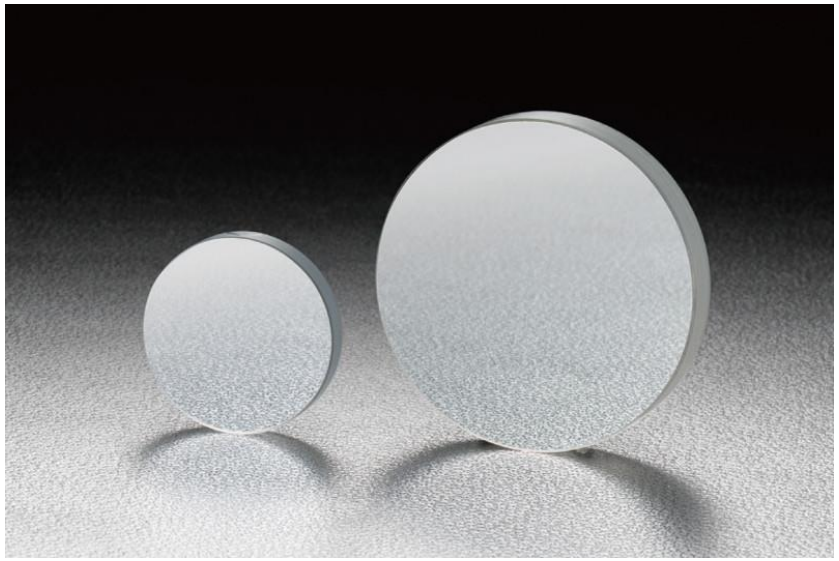
Aluminum mirrors

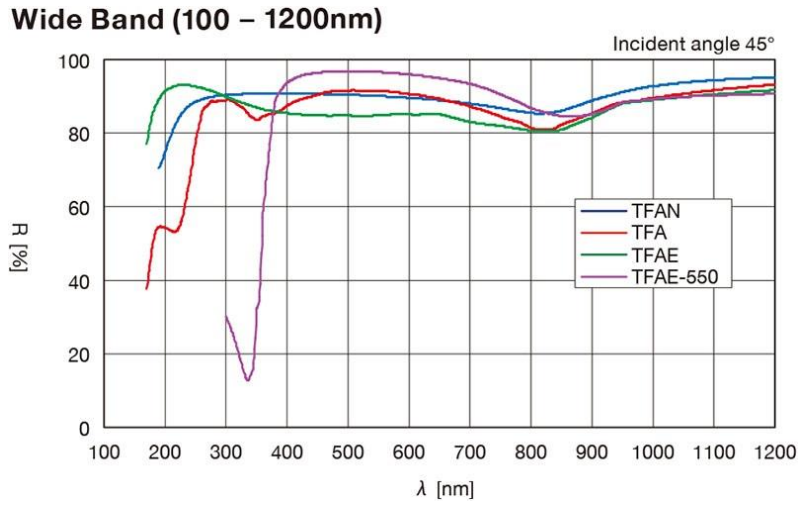


- Standard
- Reasonable flatness
- Squared
- Elliptical
- Parabolic

Standard aluminum coating

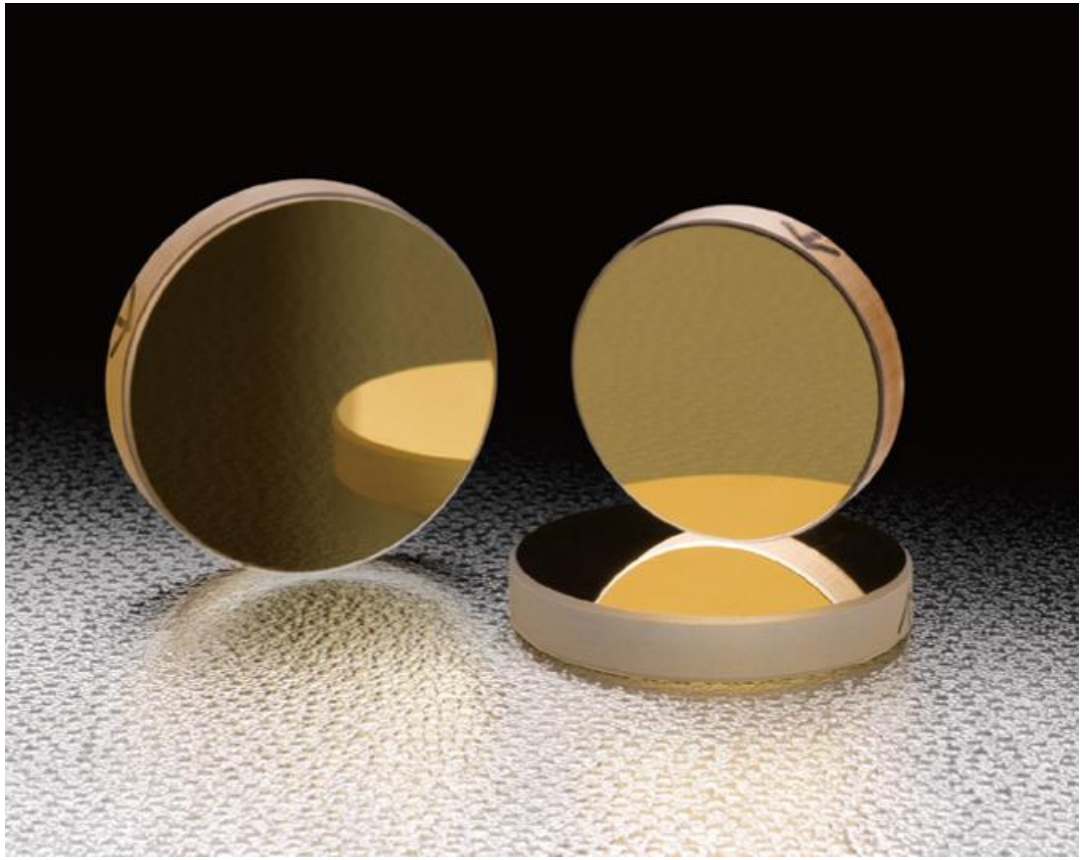
- Without protective coating:
  - Al
- Protective coatings:
  - Al + MgF_2
  - Al + SiO
  - Al + dielectric multilayer





Specs	Data
R	> 80 %
Surface type	Flat
AOI	45°
Substrate flatness	λ/4 to λ/4
Parallelism	<2"/3"
S/D	10-5 / 20/10

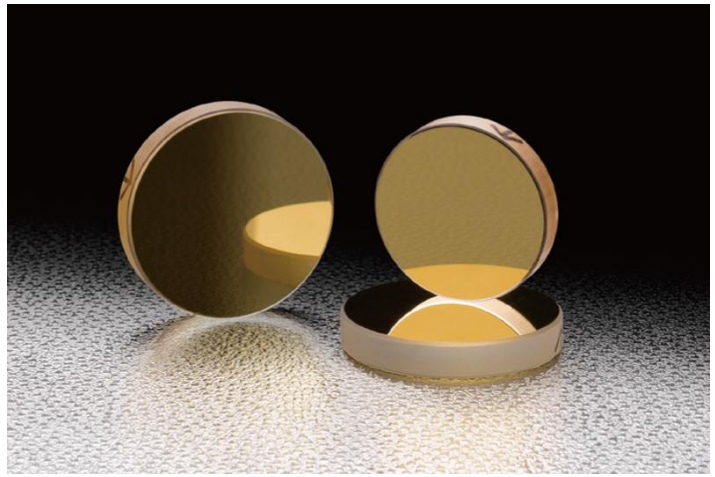
Other mirrors

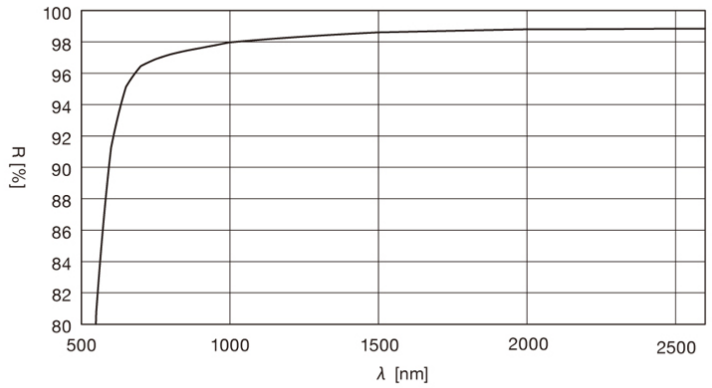


- Gold
- Silver

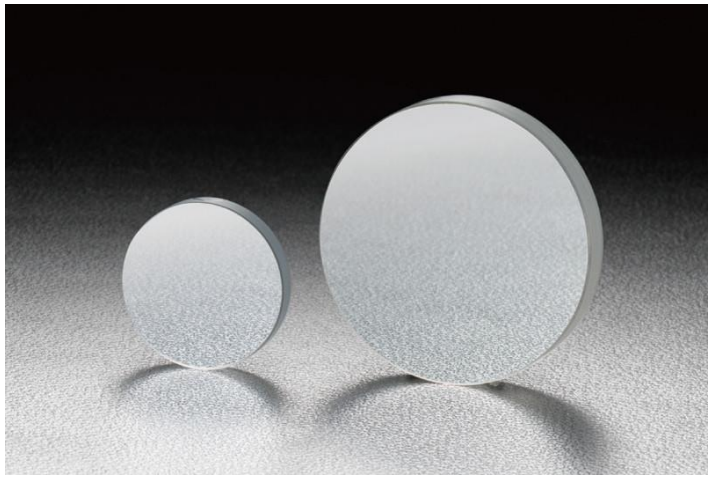
Gold and Silver

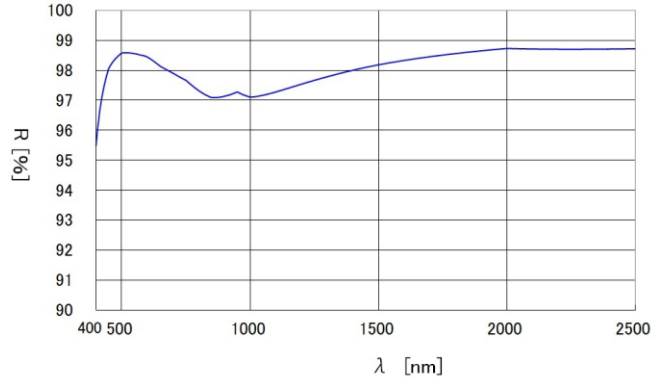
Gold





Ag + Dielectric multilayer

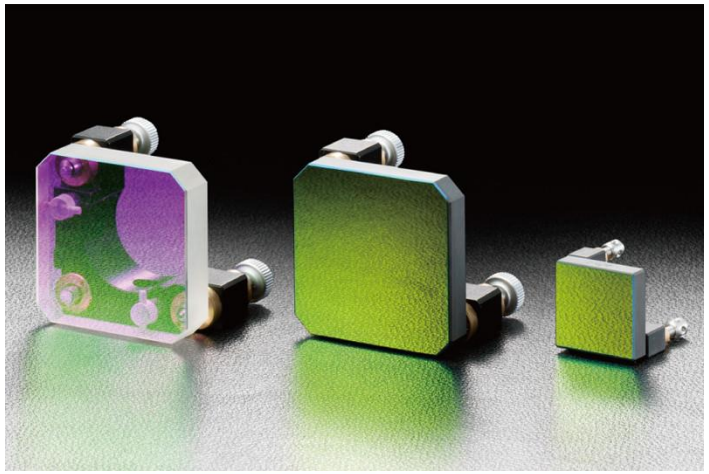




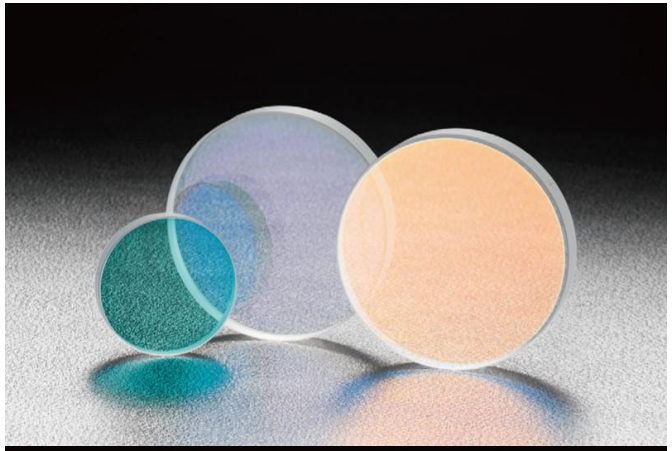
High flatness

- STD wavelengths:
  - 355nm
  - 532 nm
  - 1064 nm

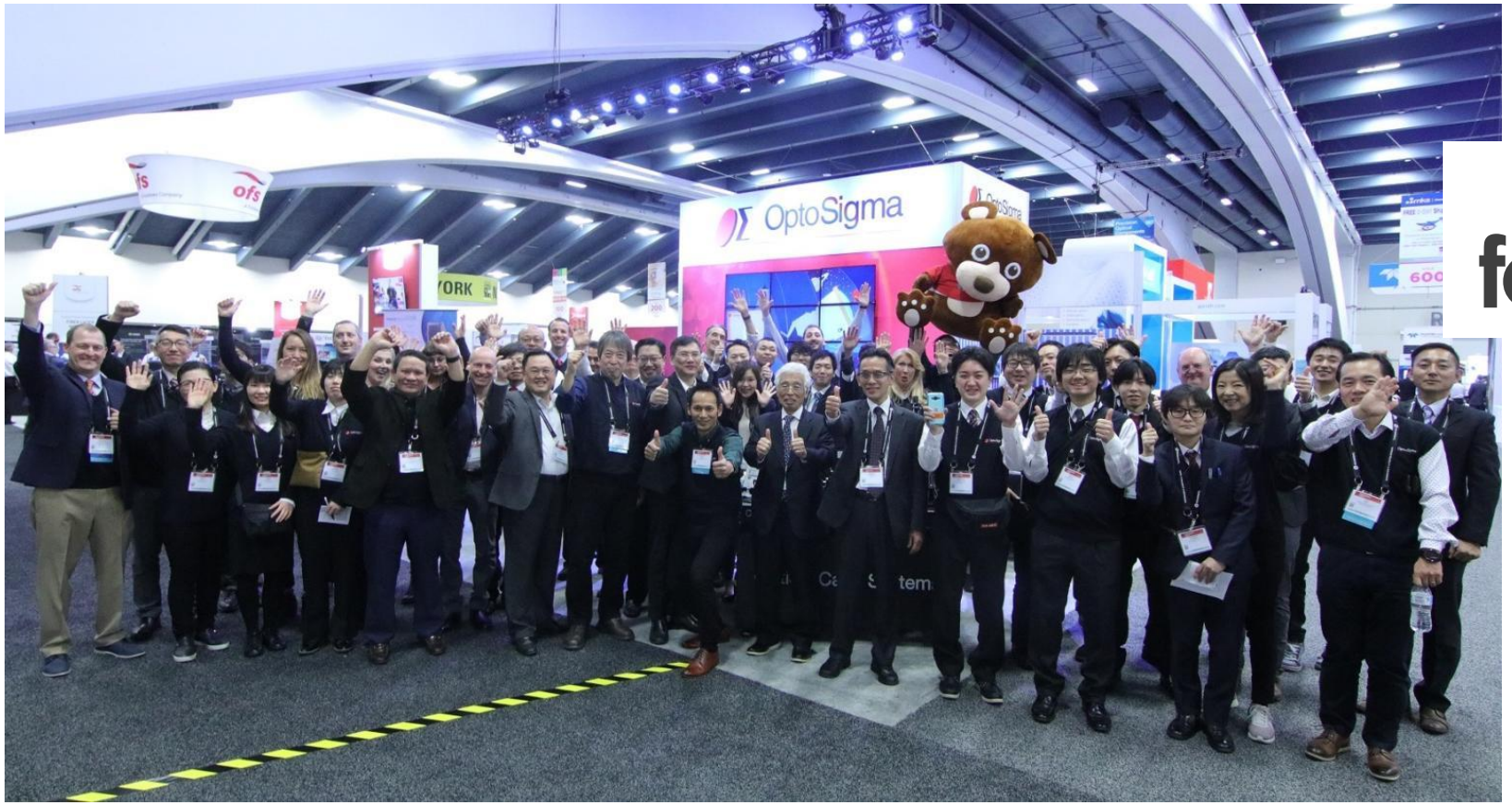
Frameless mirror



Guaranteed flatness λ/10
Mounted/Unmounted



APPRECIATION



Thank you for your attention !