



A-Star Photonics, Inc., specializes in Projection Display Optical Elements, Crystals Material, Precision Optics & Optical Communication Components, is a high-tech enterprise integrated R&D, manufacturing and selling.

The biggest advantage of A-star is to have a strong team consist of experienced experts who are dedicated to photonics over 20 years, and to have a whole set of clean and dust-free workshop, automated ultrasonic cleaning production line, most advance production equipments and test instruments to ensure the quality. To offer value maximization for all clients is our root of existence.

A-Star at present have four production lines including plane, sphere, crystal and coating workshop.

A-Star Products include:

BBO/LBO NLO crystals, YVO4 crystal, ND:YVO4 laser chip, LN Wedge, KTP+ND:YVO4(DPM);

Wave plates, High-accuracy Windows, High-precision Prism, Glan Polarizer Prism, Polarizing Beamsplitters, NPBS, Laser Mirrors & Filters; High-precision Lenses, Plano Convex and Plano Concave Lens, C-Lens, D-Lens, G-Lens, & Fiber Pigtail. Which selling Domestic and Foreign, were widely used in Laser Industry, Laser Display, Precision Instruments, Optical Communication & Semiconductor field, Micro-measurement System, Building Surveying & mapping, Nondestructive Detection, Medical Devices, Automation Equipment, High-energy Laser Equipment, Military Equipment and so on. North America, Europe, Israel, Japan and Korea are the mainly customer base areas we exported.

“Quality Products, Excellent Service, and Trustworthy Honest Management” has earned numbers of recognition and reliance form customers, and established good reputation and high prestige all over the world market.

A-Star has always been oriented by Modern Enterprise Management with continuing research, management

innovation to establish solid and feasible Modern EnterpriseManagement System. To enhance our core competitiveness, A-start self-developed the enterprise management system ERP, which is completely realized the management in selling, purchasing, producing, financing & shipping and ensures the high efficiency of management and production as well as the quality traceability, let A-Star be managing efficiently.

Best Reputation, Recognition and Reliance from customer is our foothold to the marketing.

Keeping improve to reach the top and providing for customer value maximization is our fundamental. And Let science and technology change lives is our pursuit.

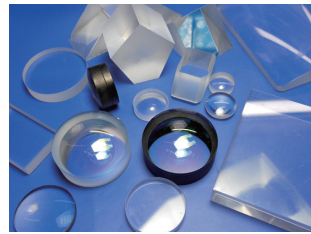
Building A-Start to be an international brand is a common dream of all staff in A-Star.

A-star is working hard to be a new bright star in the field of photonics.

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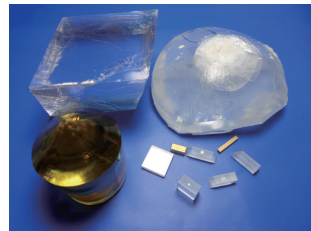
CONTENTS

Optical Component



Lens	4
Achromatic Double Lens	6
Cylindrical Lens	7
Fused Silica Window	8
BK7 Window	9
CaF2 Window	9
Sapphire Window	10
Borofloat Window	10
Penta Prism	11
Beamsplitter Penta Prism	11
Corner Cube Retroreflector	12
Right Angle Prism	12
Dove Prism	13
Dispersing Prism	13
Cube Beamsplitter	14
Non-Polarizing Cube Beamsplitter	14
Beamsplitter Plate	15
Other Beamsplitter	16
Multi-Coated Filter	17
Colored Glass Filter	17
IPL- filter	18
Mirror	19

Crystals



NLO crystals	
BBO	20
LBO	22
LiNbO3	24
KTP	25
KTA	26
DKDP &KDP	27
Laser crystals	
Nd:YAG	28
Nd:YVO4	29
Er:YAG	31
ND:GdVO4	32
Ti:Sapphire	33
Birefringent crystals	
α-BBO	34
Calcite	35
YVO4	36

Polarization Optics



Polarizer

Polarizer	37
Glan Taylor Polarizer	38
Glan Laser Polarizer	39
Glan Thompson Polarizer	40
Wollaston Polarizer	41
Rochon Polarizer	42
Depolarizer	43
Polarizing Cube Beamsplitter	44
High Extinction PBS	44

Waveplate

Low Order Waveplate	45
Single Plate Low Order Waveplate	45
Zero Order Waveplate	46
Zero Order Waveplate – Optical Cemented	46
Zero Order Waveplate – Cemented	47
Zero Order Waveplate - Air-spaced	48
Zero Order Waveplate-Single Plate	48
True Zero Order Waveplate – Cemented	49
Dual Wavelength Waveplate	50
Achromatic Waveplate	51
Polarization Rotator	52



Optical Assemblies	53
--------------------	----

Coating



Anti-Reflection Coating	54
High-Reflection (HR) Coating	55
Partial-Reflection Coating	56
Polarization Beamsplitter Coating	56

Lens

Optical lenses are transparent, made of one or more pieces of optical-quality material (ground and polished or molded) and curved (always spherical) to converge or diverge transmitted rays from an object. These rays then form a real or virtual image of the object.

A-Star provides many kinds of spheric lens forms or shapes, that determine the imaging characteristics of the lenses; they are plano-convex, plano-concave, double-convex, double-concave and meniscus.



Specifications:

Attribute	General	High Precision
Material:	BK7, Fused Silica, etc.	BK7, Fused Silica, etc.
Paraxial Focal Length Tolerance:	±2%	upon request
Dimension Tolerance (mm):	±0.2	±0.05
Centration:	<3 arc min	upon request
IRR (@633nm):	λ/4	λ/10
Clear Aperture:	>80%	>95%
Surface Figure (@633nm):	<1.5λ	<λ/4
Surface Quality:	60/40	10/5
Bevel (mm):	<0.25	upon request
Coating:	Uncoated, AR, PR, HR, etc.	Uncoated, AR, PR, HR, etc.

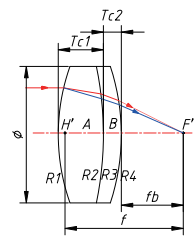
Note

- Other optical glass materials from Schott or Chinese CDGM are also available upon request.
- For standard table products please see our website. Custom-made Spheric Lenses at any size from dimension 2.0mm to 300mm are available upon request.
- Typical paraxial focal length tolerance is ±2%, better tolerance is available upon request.
- Typical centration is 3 arc minutes, better precision is available upon request.
- Besides uncoated AR, HR, PR coating are available upon request.

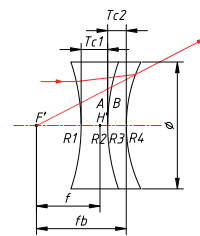
Lense		Illustration	Properties and applications
Plano-Convex Lens			Plano-convex Lenses present a curved interface and a planar interface. They are for instance the microlenses situated on top of a wafer, and also encountered in macroscopic optical systems.
Plano-Concave Lens			Plano-concave Lenses have one concave surface. It has negative focal length. It is often used to expand light or to increase focal length in existing systems.
Double-Convex Lens			Double-convex Lenses are manufactured with an identical convex surface on both sides of the lens. This kind of lenses has positive focal length and form both real and virtual images.
Double-Concave Lens			Double concave lens is the most common form of Negative lens. Negative lens is most suited to producing diverging light or a virtual image, where the input light is converging.
Meniscus	Positive		Meniscus lens has a positive or negative focal length, it forms a real or virtual image of objects
	Negative		

Achromatic Double Lens

Achromatic lenses are very common type of viewer lenses, they consist of two or more lens elements, which have been corrected for chromatic aberration with respect to two selected wavelengths. The elements must be fixed in relation to one another by either mounting or cement. Achromatic Lenses are designed to specifically function within the infrared, visible, or ultra-violet wavelength ranges, and they are not symmetric devices. They must be installed with the correct front-to-back orientation (thicker element usually faces the eyes). If installed incorrectly, with the lens orientation installed backwards the result will be extensive distortion and aberration.



Positive Achromatic Lens



Negative Achromatic Lens

Specifications:

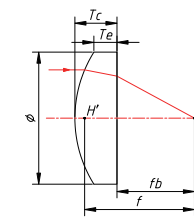
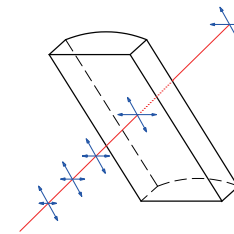
Attribute	General	High Precision
Material:	BK7, Fused Silica, etc.	BK7, Fused Silica, etc.
Paraxial Focal Length Tolerance:	±2%	upon request
Dimension Tolerance(mm):	±0.2	±0.05
Centration:	<3 arc min	upon request
IRR(@633nm):	λ/4	λ/10
Clear Aperture:	>80%	>95%
Surface Figure(@633nm):	<1.5λ	<λ/4
Surface Quality:	60/40	10/5
Bevel(mm):	<0.25	upon request
Coating:	Uncoated, AR, PR, HR, etc.	Uncoated, AR, PR, HR, etc.

Cylindrical Lens

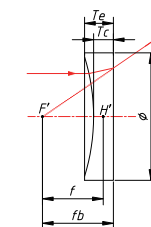
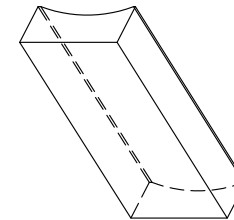
Cylindrical lenses are used to correct astigmatism in the eye and in rangefinders, to produce astigmatism, stretching a point of light into a line, they are widely used in bar code scanning, projection optics systems, laser measurement systems and holography.

Cylindrical lenses are available in either plano-concave or plano-convex configurations from A-STAR, Plano-concave lenses have a negative focal length and are used for image reduction or to spread light. Plano-convex lenses have a positive focal length, which makes them ideal for collecting and focusing light for many imaging applications.

Plano-Convex Cylindrical Lens



Plano-Concave Cylindrical Lens

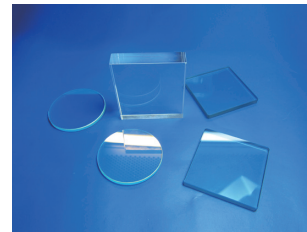
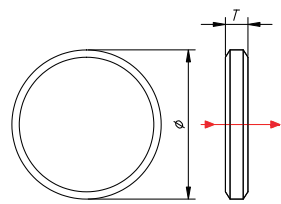


Specifications:

Attribute	Specification
Material	BK7, fused silica, etc.
Surface Figure(@633nm):	λ / 2
Surface Quality:	60/40
Dimension Tolerance(mm):	+ 0.0, - 0.1
Thickness Tolerance(mm):	± 0.2
Chamfer(mm):	<0.25
Centration:	<3 arc min
Focal Length Tolerance:	± 1%
Antireflection Coating:	R<0.25% for V-type AR coating R<0.5% for BBAR coating
Clear Aperture:	>85%

Window Besides standard windows, A-star offers all kinds of custom-made windows upon customersarc minutes requirement:

- Windows made from materials such as N-BK7, Fused Silica, Sapphire, CaF2, Silicon, Borofloat, Pyrex, or other optical glass supplied by Schott and Chinese CDGM are available upon request.
- Windows at any size is available upon request.
- Windows at shape of round, quadrate, triangular or other polygonal are available upon request.
- Windows with single-layer or multi-layer AR, HR, PR coatings are available upon request.

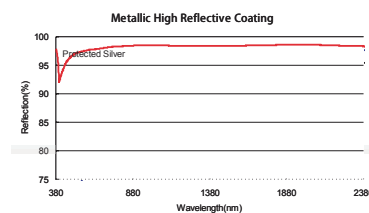
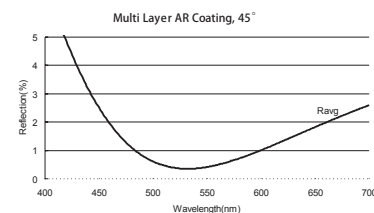


Fused Silica Window

Fused silica is a superior optical material possesses excellent optical, chemical and physical properties what is formed by chemical combination of silicon and oxygen. Advantages of fused silica material include: good UV and IR transmission, stability and resistance to thermal shock over large temperature excursions, low thermal expansion, wider thermal operating range and high laser damage threshold.

Specifications:

Attribute	General	High Precision
Dimension(mm):	10,12.7,15,----50.8,etc.	10,12.7,15,----50.8,etc.
Thickness(mm):	2.0,3.0,6.0,6.35,etc.	2.0,3.0,6.0,6.35,etc.
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.02
Thickness Tolerance(mm):	±0.2	±0.005
Surface Quality:	60/40	10/5
Clear Aperture:	>80%	>95%
Flatness(@633nm):	λ/2	λ/10
Parallelism:	<3 arc min	<3 arc sec
Coating:	Uncoated, AR, HR, PR, etc.	Uncoated, AR, HR, PR, etc.



BK7 Window

This kind of windows is made from SCHOTT N-BK7 Glass, which has transparent range from 330-2100nm. The BK7 window has good performance over visible and near IR spectrum for most application. The refractive index is 1.5168 at 587.6nm.

Specifications:

Attribute	General	High Precision
Dimension(mm):	10,12.7,15,----50.8,etc.	10,12.7,15,----50.8,etc.
Thickness(mm):	2.0,3.0,6.0,6.35,etc.	2.0,3.0,6.0,6.35,etc.
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.02
Thickness Tolerance(mm):	±0.2	±0.005
Surface Quality:	60/40	10/5
Clear Aperture:	>80%	>95%
Flatness(@633nm):	λ/2	λ/10
Parallelism:	<3 arc min	<3 arc sec
Coating:	Uncoated, AR, HR, PR, etc.	Uncoated, AR, HR, PR, etc.

CaF2 Window

This kind of windows is made from Custom-made CaF2. Fluorides are usually toxic to humans, however CaF2 is considered relatively harmless due to its extreme insolubility. The material is commonly used as a window material for both infrared and ultraviolet wavelengths, since it is transparent in these regions (about 0.15 μm to 9 μm) and exhibits extremely weak birefringence. The birefringence of calcium fluoride exceeds tolerable limits. This problem with birefringence can be mitigated through optimised growth process. It is particularly important as an ultraviolet optical material for integrated circuit lithography.

Specifications:

Attribute	General	High Precision
Dimension(mm):	8.0,10,12.7,15,----30,etc.	8.0,10,12.7,15,----30,etc.
Thickness(mm):	2.0,3.0,6.0,6.35,etc.	2.0,3.0,6.0,6.35,etc.
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.1
Thickness Tolerance(mm):	±0.2	±0.05
Surface Quality:	80/50	20/10
Clear Aperture:	>80%	>95%
Flatness(@633nm):	λ	λ/4
Parallelism:	<3 arc min	<10 arc sec
Coating:	Uncoated, AR, HR, PR, etc.	Uncoated, AR, HR, PR, etc.

Sapphire Windows

Specifications:

Attribute	General	High Precision
Dimension(mm):	8.0,10,12.7,15,----30,etc.	8.0,10,12.7,15,----30,etc.
Thickness(mm):	2.0,3.0,6.0,6.35,etc.	2.0,3.0,6.0,6.35,etc.
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.1
Thickness Tolerance(mm):	±0.2	±0.05
Surface Quality:	80/50	20/10
Clear Aperture:	>80%	>95%
Flatness(@633nm):	λ	$\lambda/4$
Parallelism:	<3 arc min	<10 arc sec
Coating:	Uncoated, AR, HR, PR, etc.	Uncoated, AR, HR, PR, etc.

Borofloat Window

Specifications:

Attribute	General	High Precision
Dimension(mm):	10,12.7,15,----50.8,etc.	10,12.7,15,----50.8,etc.
Thickness(mm):	2.0,3.0,6.0,6.35,etc.	2.0,3.0,6.0,6.35,etc.
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.02
Thickness Tolerance(mm):	±0.2	±0.005
Surface Quality:	60/40	10/5
Clear Aperture:	>80%	>95%
Flatness(@633nm):	$\lambda/2$	$\lambda/10$
Parallelism:	<3 arc min	<3 arc sec
Coating:	Uncoated, AR, HR, PR, etc.	Uncoated, AR, HR, PR, etc.

Note for Borofloat Window:

- (1). Custom-made Borofloat windows at any size are available. Besides round, Borofloat windows at shape of quadrangle, triangular, or other polygonal are available
- (2). Thickness from 1.0mm to 50.0 mm is available upon request.
- (3). Better bevel is available upon request.
- (4). Windows with Anti-Reflective(AR), High-Reflective(HR), Partial-Reflective(PR) coating are available.

Penta Prism

Penta Prism is a five-sided prism containing two reflecting surfaces at 45° to each other, and two refracting faces perpendicular to the entering and emerging beams. The standard Penta Prism reflecting surfaces are coated with aluminum or enhanced aluminum. By adding a wedge for deviation correction in output beam surface in output beam surface, it can be used as Precision Penta Prism. It is often used in Plumb Level, Surveying, Alignment, Range finding and Optical Tooling.

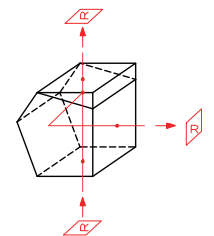


Specifications:

Attribute	General	High Precision
Material:	BK7 ,etc.	BK7,etc.
Dimension(mm):	2.5×2.5~100.0×100.0	2.5×2.5~100.0×100.0
Dimension Tolerance(mm):	±0.2	±0.05
90° Deviation Tolerance:	<1 arc min	<3 arc sec
Flatness(@633nm):	$\lambda/2$	$\lambda/4$
Reflection(@400-700nm):	R>90%	R>95%
Surface Quality:	60/40	10/5
Coating:	Uncoated,AR Coated,etc.	Uncoated,AR Coated,etc.

Beamsplitter Penta Prism

By adding a wedge and with partial reflective coating on first reflective surface,Penta Prism can be used as Beamsplitter.We supply Beamsplitter Penta Prism with standard Transmission/reflection (T/R) ratio of 20/80,50/50.Other T/R ratio is available upon request.

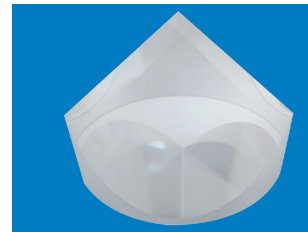


Specifications:

Attribute	General	High Precision
Material:	BK7 ,Fused Silica,etc.	BK7 ,Fused Silica,etc.
Dimension Tolerance(mm):	±0.2	±0.05
90° Deviation Tolerance:	<1 min	<3 sec
Flatness(@633nm):	$\lambda/2$	$\lambda/4$
Surface Quality:	60/40	20/10
Beamsplitter Ratio Transmissio Reflection:	20/80±5 or 50/50±5	20/80±5 or 50/50±5
Coating :	Uncoated,AR Coating,etc.	Uncoated,AR Coating,etc.

Corner Cube Retroreflector

Corner Cube Retroreflector has three mutually perpendicular surfaces and a hypotenuse face. Light entering through the hypotenuse is reflected by each of the three surfaces in turn and will emerge through the hypotenuse face parallel to the orientation of the incident beam.

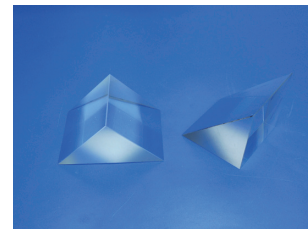


Specifications:

Attribute	Specification
Material:	BK7 ,etc
Dimension Tolerance(mm):	+0.0/-0.2
Deviation:	180°±3 arc sec
Flatness(@633nm):	$\lambda/4$ on big surface, $\lambda/10$ on other surfaces
Clear Aperture:	>80%
Surface Quality:	60/40,10/5
Bevel(mm):	0.1-0.5
Coating:	Upon request

Right Angle Prism

Right Angle Prism is used as a mirror to deviate light through 90 degree, and also as a retroreflector to deflect light through 180 degree by total internal reflection.

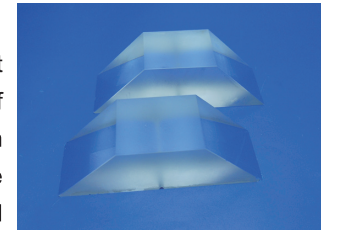


Specifications:

Attribute	General	High Precision
Material:	BK7,Fused Silica ,etc.	BK7,Fused Silica ,etc.
Dimension(mm):	1.0*1.0*1.0~300.0*300.0*300.0	2.5*2.5~100.0*100.0
Dimension Tolerance(mm):	+0.0, -0.2	+0.0, -0.05
Clear Aperture:	>80%	>95%
Angle Tolerance:	<3 min	<3 sec
Flatness(@633nm):	$\lambda/2$	$\lambda/4$
Surface Quality:	60/40	60/40
Coating:	Uncoated,AR,PR,HR Coating,etc.	Uncoated,AR,PR,HR Coating,etc.

Dove Prism

The Dove Prism is also called Image Rotator. The prism rotates the image without changing the direction of the input beam, which is parallel to hypotenuse. Rotation of the prisms in relation to the subject causes double rotations of the image. Dove Prism should be used in the parallel beam. A-STAR also offers Dove prisms AR coated on the hypotenuse for use in beam-folding applications. As the S1 and S2 sides are used in a total internal reflection (TIR) manner, it is extremely important to keep these two surfaces clean.



Specifications:

Attribute	General	High precision
Material:	BK7 ,etc.	BK7 ,etc.
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.05
Deviation:	3 arc min	Upon request
Flatness(@633nm):	$\lambda/2$	$\lambda/4$
Clear Aperture:	>80%	>95%
Surface Quality:	60/40	20/10
Bevel(mm):	0.1-0.5	upon request
Coating:	upon request	upon request

Dispersing Prism

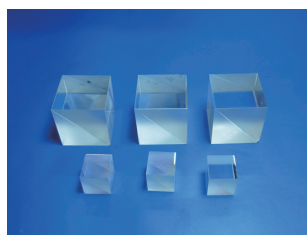
Dispersing Prisms are used to separate a beam of white light into its component colors. Generally, the light is first collimated and then dispersed by the prism. A spectrum is then formed at the focal plane of a lens or curved mirror. In laser work, dispersing prisms are used to separate two wavelengths following the same beam path. Typically, the dispersed beams are permitted to travel far enough so the beams separate spatially. A prism exhibits magnification in the plane of dispersion if the entrance and exit angles for a beam differ.

Specifications:

Attribute	General	High Precision
Material:	BK7,UVFS,etc	BK7,UVFS,etc
Dimension(mm):	4~100	4~100
Dimension Tolerance(mm):	<0.1	0/-0.05
Clear Aperture:	>90%	>95%
Surface Quality:	60/40	20/10
Flatness(@633nm):	$\lambda/2$	$\lambda/4$
Angular accuracy:	<3arc min	Upon request
Pyramid Error:	<5arc min	Upon request
Coating:	Upon request	Upon request

Cube Beamsplitter

Cube Beamsplitters are constructed by cementing two precision right angle prism together with appropriate interference coating on the hypotenuse surface. The absorption loss to the coating is minimal transmission and reflection approach 50% (average) though output is partially polarized. If polarization sensitivity is critical to your online ordering, we recommended that you select from our Polarization Cube Beamsplitter or Non-polarization Cube Beamsplitter.



Specifications:

Attribute	Specification
Material:	BK7 ,etc
Dimension Tolerance(mm):	±0.2
Flatness(@633nm):	λ/4
Surface Quality:	60/40
T/R:	50/50±5%, for random polarization T=(Ts+Tp)/2, R=(Rs+Rp)/2
Beam Deviation:	<3 arc min
Coating:	Hypotenuse face: Partial reflection coating All input and output faces: Anti reflection coating
Standard Coating wavelength(nm):	Narrow Band: 488, 532, 632.8, 650, 808, 850, 980, 1064, 1310, 1550 Broad Band: 450-650, 650-900, 900-1200, 1200-1550, 1500-1610

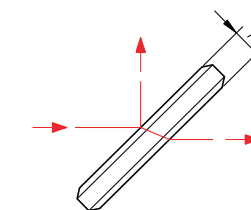
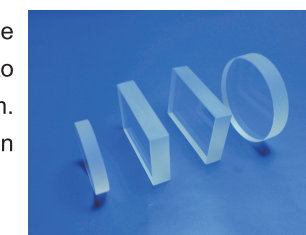
Non-Polarizing Cube Beamsplitter

Consists of a pair of precision high tolerance right angle prisms cemented together with a metallic-dielectric coating on the hypotenuse of one of the prisms. The low polarization dependence of the metallic-dielectric coating allows the transmission and reflection for S- and P- polarization states to be within 5% of each other. This means that they will not change the state of polarization of the incident beam.

We offer both broadband and single wavelength non-polarizing cube beamsplitters (NPBS). An antireflective coating has been applied to each face of the beamsplitter in order to produce maximum transmission efficiency for the appropriate wavelength range.

Beamsplitter Plate

The common Beam splitters are used to split or combine laser beam. However Polarization BeamSplitters are used to split or combine two perpendicular polarization laser beam. The performance of beamsplitters is mainly dependent on the coating specifications.



Specification:

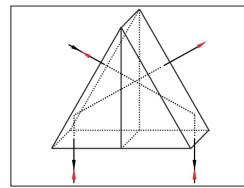
Attribute	Specification
Material:	BK7 ,etc.
Dimension Tolerance(mm):	±0.2
Thickness Tolerance(mm):	±0.2
Flatness(@ 633 nm):	λ/4
Surface Quality:	60/40
Parallelism:	<1 arc minute
T/R:	50/50±5%, for random polarization T=(Ts+Tp)/2, R=(Rs+Rp)/2
Beam Deviation:	<1 arc minute
Coating (Incidence angle: 45°):	Surface1: Partial Reflection Coating Surface2: Anti Reflection Coating
Standard Coating wavelength(nm):	Narrow Band: 488, 532, 632.8, 650, 808, 850, 980, 1064, 1310, 1550 Broad Band: 450-650, 650-900, 900-1200, 1200-1550, 1500-1610

Standard Products:

Size(mm)	Narrow Band	Broadband
	Part No.	Part No.
10x10x2	BSP1103	BSP1203
12.7x12.7x2	BSP1104	BSP1204
25.4x25.4x2	BSP1105	BSP1205
φ25.4x2	BSP1106	BSP1206

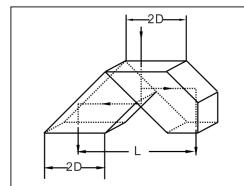
Ordering Information:
Part No, - wavelength
For example, BSP1203 - 1500-1610,
Beamsplitter 10X10mm, 1500-1610 nm broadband coating.

Other Beamsplitter



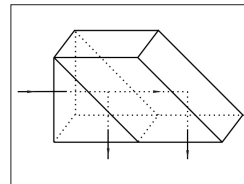
Koster Prism

This special Beam Splitter is made of two special designed prisms. The cemented surface of one prism is beam splitter coating. The Prism enables splitting beam of light per two beams parallel to each other, and parallel to the input beam with high accurate. The distance between two output beams can be different for different prism size, but, shall be at least 4 times of beam size. The two-split beams have the same optical path.



Parallel Splitting Prism

This special Beam Splitter is made of two special designed prisms. The cemented surface of one prism is beam splitter coating. The Prism enables splitting beam of light per two beams parallel to each other, and parallel to the input beam with high accurate. The distance between two output beams can be different for different prism size, but, shall be at least 4 times of beam size. The two-split beams have the same optical path.



Beam-Splitting Prism

This special prism consists of one Right Angle prism and one Rhomboid Prism. The hypotenuse surface of the Right Angle Prism is beam-splitting coated and cemented to the Rhomboid Prism. The two split output beams are parallel to each other, and perpendicular to the input beam at high accurate. Distance of two-output beam can be different by changing the length of the rhomboid prism. The optical path of the two-split beams is different.

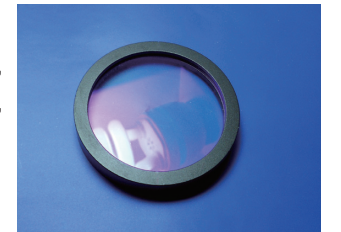
Standard Specifications:

Attribute	Specification
Material:	BK7, etc.
Range of Size(mm):	2x2~ 50x50
Dimension Tolerance(mm):	±0.1
Clear Aperture:	>90%
Angle Accuracy:	<30 arc sec
Beam Deviation Tolerance:	<1 arc min
Flatness (@633nm):	<λ/2
Surface Quality:	60/40
Spectral Range(nm):	100-2500
Splitting Ratio R: T (%):	10:90 to 90:10
Coating:	upon request

Note: Upon Customer arc minutes requirement, we can make non-standard Beam Splitting Prisms with significantly higher optical parameters: 20/10, 10, beam divergence up to ±15 arc sec Prism in mountings is also available.

Multi-Coated Filter

Multi-Coated Filter is made of optical materials such as BK7, Fused Silica, Colored Glass, Sapphire and so on. Hundreds Optics offers Multi-Coated Filters include bandpass filters, dichroic filters, short-pass filters and long-pass filters.



Specifications:

Attribute	General	High Precision
Material:	BK7 Glass, Fused Silica ,etc.	BK7 Glass, Fused Silica ,etc.
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.05
Thickness Tolerance(mm):	±0.2	±0.05
Surface Quality:	80/50	40/20
Clear Aperture:	>90%	>95%
Flatness(@633nm):	λ/2	λ/10
Parallelism:	<3arc min	<3arc sec
Coating:	Uncoated, AR, HR, PR, etc.	Uncoated, AR, HR, PR, etc.

Colored Glass Filter

Colored Glass Filter Colored Glass Filter is widely used in the field of display, CCD, microscopy, photometry, radiometry, imaging, astronomy, instrumentation, aerospace etc. We can supply a variety of different Schott, Hoya, and Chinese colored glasses covering the UV, visible, and near-infrared wavelength regions.

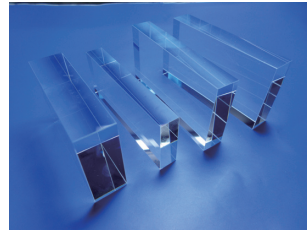


Specifications:

Attribute	General	High Precision
Material:	Color glass	Color glass
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.05
Thickness Tolerance(mm):	±0.2	±0.05
Surface Quality:	60/40	10/5
Clear Aperture:	>85%	>90%
Flatness(@633nm):	λ	λ/10
Parallelism:	<3arc min	<3arc sec
Coating:	upon request	upon request

IPL- filter

IPL filter is the key optical element for IPL (intense Pulsed Light) machine, which filters the UV wave and reserve the useful wave from 400nm to 1200nm for cosmetic laser, such as photorejuvenation, hair removal, vascular and acne treatment. The available wavelength are 550, 560, 570, 590, 615, 645, 695, 755,780 nm



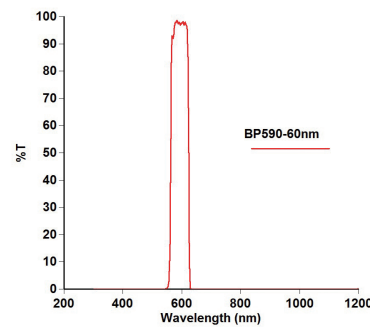
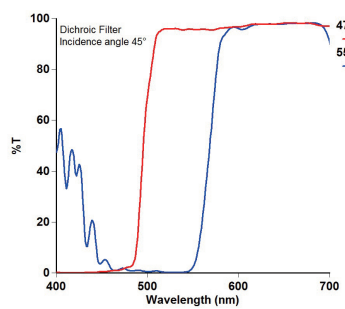
Specifications:

Attribute	General	High Precision
Material:	BK7,etc.	BK7,etc.
Dimension Tolerance(mm):	±0.1	±0.01
Thickness Tolerance(mm):	±0.2	±0.005
Surface Quality:	60/40	60/40
Clear Aperture:	>90%	>90%
Flatness(@633nm):	$\lambda / 2$	$\lambda / 8$
Parallelism:	<3 arc min	<5 arc sec
Bevel(mm):	0.2~0.5	0.2~0.5
Coating:	Uncoated, AR, HR, PR, etc.	Uncoated, AR, HR, PR, etc.

Available wavelength:515~1200, 530~1200, 550~1200, 560~1200, 570~1200, 590~1200, 615~1200, 645 ~ 1200, 695~1200, 755~1200, 780~1200 nm

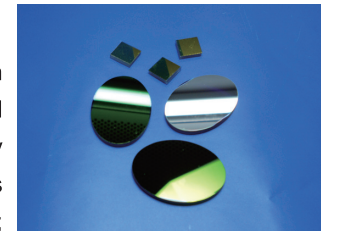
Note: A-Star provides a wide variety of custom design IPL filters upon request

- 1、 Custom Size is available upon request
- 2、 Custom coated wavelength is available upon request
- 3、 Custom made mounter for the IPL filter is available



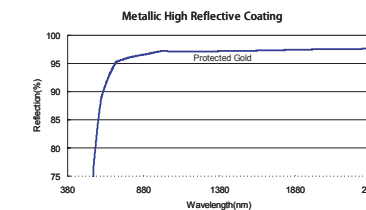
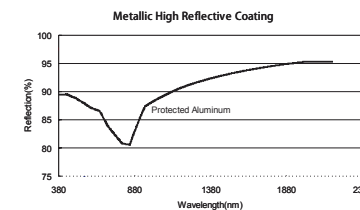
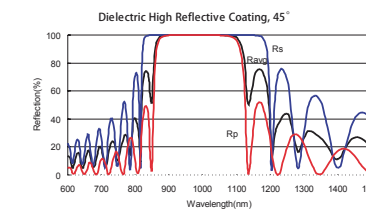
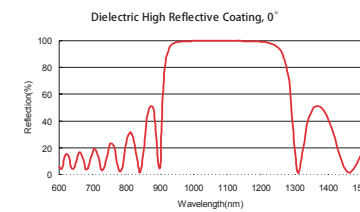
Mirror

Mirror is an object with a surface that has high reflection. It is smooth enough to form an image. The most familiar type of mirror is the plane mirror, which has a flat surface. Curved mirrors are also used, to produce magnified or diminished images or focus light or simply distort the reflected image. Mirrors are used in scientific apparatus such as telescopes and lasers, cameras, and industrial machinery. Most mirrors are designed for visible light; however, mirrors designed for other types of waves or other wavelengths of electromagnetic radiation are also used, especially in non-optical instruments.



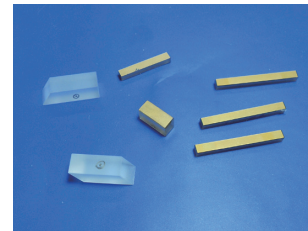
Specifications:

Attribute	General	High Precision
Dimension Tolerance(mm):	+0.0/-0.2	+0.0/-0.02
Thickness Tolerance(mm):	±0.2	±0.05
Surface Quality:	60/40	10/5
Clear Aperture:	>90%	>90%
Flatness(@633nm):	$\lambda/2$	$\lambda/10$
Parallelism:	<3arc min	<3arc sec
Coating:	Al, Ag, Au, or HR Coating, etc.	Al, Ag, Au, or HR Coating ,etc.



BBO

BBO is a nonlinear optical crystal with combination of number of unique features. Wide transparency and phase matching ranges, large nonlinear coefficient, high damage threshold and excellent optical homogeneity provide attractive possibilities for various nonlinear optical applications



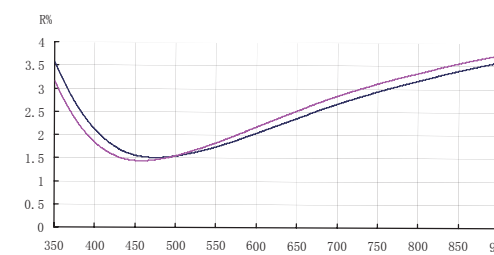
Capabilities:

Attribute	Specification
Flank Size(W*H)(mm):	1×1~23*23
Length(L)(mm):	0.1~20(without substrate)0.005-0.1mm(with substrate)
Phase Matching Angle(θ,φ)	Angel or upon customer request
Match Type:	type I or type II
Angle Tolerance:	Δθ<±0.2°; Δφ<±0.2°
Size Tolerance(mm):	(W ±0.1) x (H ±0.1) x (L +0.2/-0.05)
Flatness(@633nm):	<λ/8
Surface Quality:	20/10
Parallelism:	<30 arc sec
Perpendicularity:	<10 arc min
Wave front Distortion(@ 633nm):	<λ/8
Clear Aperture:	> 90%
Coating:	P-coating or upon customer request

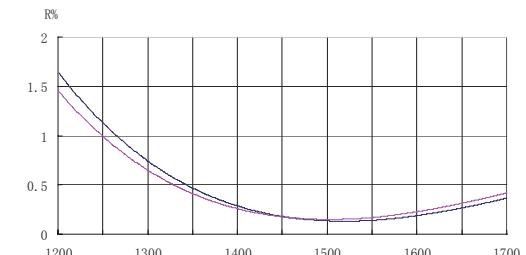
Physical and Optical Properties:

Crystal Structure	trigonal, space group R3c
Cell Parameters:	a = b = 12.532Å, c = 12.717Å, Z = 6
Melting Point(°C):	1095 ±5
Transition Temperature(°C):	925 ±5
Optical Homogeneity:	Δn ≈10 ⁻⁶ /cm
Mohs Hardness:	4.5
Density(g/cm ³):	3.85
Absorption Coefficient (/cm@1064 nm):	< 0.1%
Hygroscopic Susceptibility	low
Resistivity	>10 ¹¹ ohm-cm

Relative Dielectric Constant:	$\epsilon_{11}^T / \epsilon_0 : 6.7, \epsilon_{33}^T / \epsilon_0 : 8.1 \text{ Tan}\sigma < 0.001$
Thermal Expansion Coefficients(in the range of 25°C - 900°C)	a, $4 \times 10^{-6} /K$ c, $36 \times 10^{-6} /K$
Thermal Conductivity:	$\perp c, 1.2 \text{ W/m/K}; \parallel c, 1.6 \text{ W/m/K}$
Phase-matchable SHG range(nm):	189-1750
NLO coefficients:	$d_{11} = 5.8 \times d_{36}(\text{KDP})$ $d_{31} = 0.05 \times d_{11}, d_{22} < 0.05 \times d_{11}$
Electro-Optic Coefficients:	$\gamma_{11} = 2.7 \text{ pm/V}, \gamma_{22}, \gamma_{31} < 0.1\gamma_{11}$
Damage Threshold at 1.064 μm at 0.532 μm	5 GW/cm ² (10 ns); 10GW/cm ² (1.3ns) 1 GW/cm ² (10 ns); 7 GW/cm ² (250 ps)
Transparency Range(nm):	189 - 3500
Refractive Indices at 1.0642 μm at 0.5321 μm at 0.2660 μm	$n_o = 1.5425, n_e = 1.6551$ $n_o = 1.5555, n_e = 1.6749$ $n_o = 1.6146, n_e = 1.7571$
Therm-Optic Coefficients:	$dn_o/dT = -9.3 \times 10^{-6}/^\circ\text{C}$ $dn_e/dT = -16.6 \times 10^{-6} /^\circ\text{C}$
Sellmeier Equations:	$n_o^2(\lambda) = 2.7359+0.01878/(\lambda^2-0.01822)-0.01354 \lambda^2$ $n_e^2(\lambda) = 2.3753+0.01224/(\lambda^2-0.01667)-0.01516 \lambda^2$



BBO P-Coating



BBO AR-Coating

LBO

Lithium Tri-borate (LBO) is one of the most useful nonlinear optical material not just for its relatively large conversion coefficient - 3x that of KDP, but also for its excellent physical properties.

LBO crystal has broad optical transparency range from 160 to 2600nm. It excels in high power SHG with minimal thermal lensing as compared to KTP. Its large acceptance angle paired with small walk-off angle which reduces the beam quality requirement for source LBO also allows temperature controllable type I non-critical phase-matching(NCPM) for 1000 – 1300nm and type II NCPM for 800 to 1100nm at room temperature. With a high optical homogeneity ($dn \sim 10^{-6}$), the material is grown virtually inclusion free. With a damage threshold of up to 45 GW/cm² @ 1064nm, it is again the material of choice for high power applications.

LBO is widely used for SHG and THG of Nd:YAG, Nd:YLF, Nd:YVO4 and ultra-fast Ti:sapphire lasers. OPOs(Optical Parametric Oscillators) and OPAs(Optical Parametric Amplifier).



Capabilities:

Attribute	Specification
Flank Size(W*H) (mm):	1×1~15×15
Length(L) (mm):	0.1~20(without substrate)0.005-0.1(with substrate)
Phase Matching Angle(θ, ϕ)	Angel or upon customer request
Match Type:	type I or type II
Angle Tolerance:	$\Delta\theta < \pm 0.2^\circ$; $\Delta\phi < \pm 0.2^\circ$
Size Tolerance(mm):	(W ± 0.1) x (H ± 0.1) x (L +0.2/-0.05)
Flatness(@633nm):	$< \lambda/8$
Surface Quality:	20/10
Parallelism:	< 30 arc sec
Perpendicularity:	< 10 arc min
Wave front Distortion(@ 633nm):	$< \lambda/8$
Clear Aperture:	$> 90\%$
Coating:	P-coating or upon customer request

Physical and Optical Properties :

Chemical Formula	LiB ₃ O ₅
Crystal Structure	Orthorhombic

Cell Parameters:	a = 8.4473Å, b = 7.3788Å, c = 5.1395Å, Z = 2
Melting point:	834°C
Optical homogeneity:	$dn \sim 10^{-6}/cm$
Mohs hardness:	6
Density:	2.47 g/cm ³
Absorption coefficient:	$< 0.1\%/cm$ (@1064nm and 532nm)
Specific heat:	1.91J/cm ³ /K
Hygroscopic susceptibility:	low
Thermal expansion coefficients:	a, $4 \times 10^{-6}/K$; c, $36 \times 10^{-6}/K$
Thermal conductivity:	$\perp c$, 1.2 W/m/K; //c, 1.6 W/m/K
Transparency range:	160-2600nm
Refractive indices:	@ 1064nm : $n_x = 1.5656, n_y = 1.5905, n_z = 1.6055$ @ 532nm : $n_o = 1.5785, n_e = 1.6065, n_z = 1.6212$ @ 355nm : $n_o = 1.5971, n_e = 1.6275, n_z = 1.6430$
Therm-optic coefficients:	$dn_o/dT = -9.3 \times 10^{-6}/^\circ C$ $dn_e/dT = -16.6 \times 10^{-6}/^\circ C$
Sellmeier Equations (λ in mm):	$n_o^2(\lambda) = 2.7359 - 0.01354\lambda^2 + 0.01878/(\lambda^2 - 0.01822)$ $n_e^2(\lambda) = 2.3753 - 0.01516\lambda^2 + 0.01224/(\lambda^2 - 0.01667)$
Phase-matchable output wavelength:	554 - 2660nm (type I), 790 – 2150nm (type II)
NLO coefficients:	$d_{33} = 0.06$; $d_{32} = 1.2$; $d_{22} = 1.1$
Walk-off Angles(@1064nm):	0.4° (Type I SHG), 0.3° (Type II SHG)
Acceptance Angles(@1064nm) for SHG Type I	9.6(mrad-cm) CPM @ 25°C 248(mrad-cm) NCPM @150°C
Electro-optic coefficients:	$g_{11} = 2.7$ pm/V, $g_{22}, g_{31} < 0.1g_{11}$
Conversion Efficiency:	$> 90\%$ (1064 -> 532nm) Type I SHG
Damage threshold @ 1064nm @ 532nm @ 355nm	45 GW/cm ² (1 ns); 10 GW/cm ² (1.3 ns) 26 GW/cm ² (1 ns); 7 GW/cm ² (250 ps) 22 GW/cm ²

Note: Different cuts, sizes and AR coating are available upon request.

LiNbO3

LiNbO3 Crystal is widely used as frequency doublers for wavelength > 1 μm and optical parametric oscillators (OPOs) pumped at 1064 nm as well as quasi-phase-matched (QPM) devices. Due to its large Electro-Optic (E-O) and Acousto-Optic (A-O) coefficients. A-star provides high quality and large size LiNbO3 crystals for laser frequency doublers, OPOs and quasi-phase-matched doublers, as well as waveguide substrate and SAW wafers.



Capabilities :

Attribute	Specification
Dimension Tolerance(mm):	±0.1
Flatness(@633nm):	<λ/8
Surface Quality:	10/5
Parallelism:	<20 arc sec
Perpendicularity:	<15 arc min
Angle Tolerance:	Δθ<±0.2°; Δφ<±0.2°
Coating:	AR coating

Physical and Optical Properties :

Crystal Structure	Trigonal, space group R3c
Cell Parameters:	a=b=5.15Å, c=13.863Å, Z=6
Melting Point:(°C):	1255 ±5
Curie Point:(°C):	1140 ±5
Mohs Hardness:	5
Density(g/cm ³):	4.64
Solubility:	insoluble in H ₂ O
Thermal Expansion Coefficients @25°C :	a, 2.0 x 10 ⁻⁶ /K c, 2.2 x 10 ⁻⁶ /K
Thermal Conductivity:	38 W /m /K @ 25°C
Transparency Range(nm):	420 - 5200
Refractive Indices:	n _e = 2.146, n _o = 2.220 @ 1300 nm n _e = 2.156, n _o = 2.322 @ 1064 nm n _e = 2.203, n _o = 2.286 @ 632.8 nm
Optical Homogeneity (cm ⁻¹)	~ 5 x 10 ⁻⁵
Sellmeier Equations(λ in μm):	n _o ² (λ) = 4.9048+0.11768/(λ ² - 0.04750) - 0.027169λ ² n _e ² (λ) = 4.5820+0.099169/(λ ² - 0.04443) - 0.021950 λ ²

KTP

KTP (KTiOPO₄) is a nonlinear optical crystal, which possesses excellent nonlinear and electro-optic properties. It has large nonlinear optical coefficients and wide angular bandwidth and small walk-off angle, etc. which make it suitable for various nonlinear frequency conversion and waveguide applications. Due to very high effective nonlinearity (d_{eff} ~8.3xd₃₆ (KDP) at 1.06 μm) and excellent optical properties, KTP perfectly suits as lasing material in various applications. The phase matching range of KTP crystal lies in 0.99-3.3 μm region. This allows us to use KTP as an intracavity and extracavity frequency double for the most commonly used lasers, such as Nd:YAG, Nd:Glass and Nd:YLF.



Capabilities :

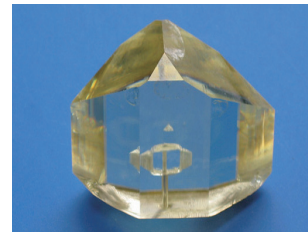
Attribute	Specification
Flank Size(W*H)(mm):	1×1~10×10
Length(L) (mm):	0.05~20
Phase Matching Angle(θ,φ):	Angel or upon customer request
Match Type:	type II
Angle Tolerance:	Δθ<±0.2°; Δφ<±0.2°
Size Tolerance (mm):	(W ±0.1) x (H ±0.1) x (L +0.2/-0.05)
Flatness(@ 633nm):	<λ/8
Surface Quality:	10/5
Parallelism:	<20 arc sec
Perpendicularity:	<5 arc min
Wave front Distortion(@ 633nm):	<λ/8
Clear Aperture:	> 90%
Coating:	a) AR @1064nm R<0.1%; AR @ 532nm, R<0.25%. b) HR @1064nm, R>99.8%; HT @808nm, T<0.5% Different coating specification upon customer request.

Physical and Optical Properties :

Crystal Structure:	orthorhombic system, space group Pna21, point group mm ²
Cell Parameters:	a=6.404Å b=10.616Å, c=12.814Å, Z=8
Melting Point:	About 1172°C
Mohs Hardness:	~5
Density(g/cm ³):	3.01
Thermal Conductivity:	0.13W/cm/K
Therm-Optic coefficients:	dn _x /dT=1.1x10 ⁻⁵ /°C, dn _y /dT=1.3x10 ⁻⁵ /°C, dn _z /dT=1.6x10 ⁻⁵ /°C

KTA

KTA crystal, is an excellent nonlinear optical crystal for Optical Parametric Oscillation (OPO) application. It has better non-linear optical and electro-optical coefficients, significantly reduced absorption in the 2.0-5.0 μm region, broad angular and temperature bandwidth, low dielectric constants. And its low ionic conductivities result in higher damage threshold compared with KTP .



Capabilities :

Attribute	Specification
Flank Size(W*H)(mm):	1×1~ 15×15
Length(L)(mm):	0.1~30
Angle Tolerance:	$\Delta\theta < \pm 0.2^\circ$; $\Delta\phi < \pm 0.2^\circ$
Size Tolerance(mm):	(W ± 0.1) x (H ± 0.1) x (L ± 0.05)
Flatness(@633nm):	$< \lambda/8$
Surface Quality:	10/5
Parallelism:	< 20 arc sec
Perpendicularity:	< 5 arc min
Wave front Distortion(@633nm):	$< \lambda/8$

Physical and Chemical Properties:

Crystal Structure:	Orthorhombic, point group mm^2 ,
Lattice parameter:	$a=13.125\text{\AA}$, $b=6.5716\text{\AA}$, $c=10.786\text{\AA}$
Melting point:	1130°C
Mohs Hardness:	near 5
Density:	3.454g/cm ³
Thermal conductivity:	K1:1.8W/m/K; K2: 1.9W/m/K; K3: 2.1W/m/K
The Sellmeier equations (λ in μm):	$n_x^2 = 1.90713 + 1.23522\lambda^2 / (\lambda^2 - 0.196922) - 0.01025\lambda^2$ $n_y^2 = 2.15912 + 1.00099\lambda^2 / (\lambda^2 - 0.218442) - 0.01096\lambda^2$ $n_z^2 = 2.14768 + 1.29559\lambda^2 / (\lambda^2 - 0.227192) - 0.01436\lambda^2$

DKDP &KDP

Potassium Dihydrogen Phosphate (KDP) and Deuterated Potassium Dihydrogen Phosphate (DKDP) are nonlinear optical materials (NLO) known for their large NLO coefficients, wide transparency range and high optical damage threshold. These materials are widely used as frequency multipliers for generation of the second, third and fourth harmonics for Nd:YAG Nd:YLF lasers. Both crystals are also applied in electro-optics: as Q-switches for Nd:YAG, Nd:YLF, Ti:sapphire and Alexandrite lasers and Pockels cells.

Capabilities

Attribute	Specification
Dimension Tolerance(mm):	± 0.1
Flatness(@633nm):	$< \lambda/8$
Surface Quality:	10/5
Parallelism:	< 20 arc sec
Perpendicularity:	< 5 arc min
Angle Tolerance:	$\Delta\theta < \pm 0.2^\circ$; $\Delta\phi < \pm 0.2^\circ$
Coating:	AR coating
Clear Aperture:	$> 90\%$
Transmitting Wave front Distortion(@633nm):	$< \lambda/8$

Physical and Optical Properties :

Characteristics:	KDP	DKDP
Chemical formula:	KH_2PO_4	KD_2PO_4
Crystal structure:	tetragonal	tetragonal
Refraction coefficient:	$n_o = 1.4938$	$n_o = 1.4948$
Density(g/cm ³):	2.332	2.335
Transmission Range(mm):	0.2-1.5	0.2-1.6
Electro-optical Coefficients (pmV ⁻¹):	$R_{41} = 8.8$, $r_{63} = 10.3$	$R_{41} = 8.8$, $r_{63} = 25$
Nonlinear Coefficient:	$D_{36} = 0.44$	$D_{36} = 0.40$
Optical Damage Threshold, GW/cm ² ($\lambda = 1.064$ mm, $t = 10$ ns):	5	3
Mohs Hardness:	2.5	2.5

Nd:YAG

Nd:YAG (neodymium-doped yttrium aluminium garnet; $\text{Nd:Y}_3\text{Al}_5\text{O}_{12}$) is a crystal that is used as a lasing medium for solid-state lasers. The dopant, triply ionized neodymium, typically replaces yttrium in the crystal structure of the yttrium aluminium garnet (YAG), since they are of similar size. Generally the crystalline host is doped with around 1% neodymium by atomic percent.



Applications:

Nd:YAG absorbs mostly in the bands between 730–760 nm and 790–820 nm. At low current densities krypton flash lamps have higher output in those bands than do the more common xenon lamps, which produce more light at around 900 nm. The former are therefore more efficient for pumping Nd:YAG lasers.

Capabilities:

Attribute	Specification
Nd Dopant Concentration:	0.5--1.2atm% tolerance within 10% of concentration
Dimension(mm):	3~14
Length(L) (mm):	1~160

Typical Specification and Tolerance:

Orientation:	<111> crystalline direction ($\pm 0.5^\circ$)
Wavefront Distortion:	< $\lambda/10$ @633nm for 3 ~ 7mm, < $\lambda/8$ per inch @ 633nm for ≥ 7 mm
Surface quality:	20/10
Parallelism:	<10 arc sec
Perpendicularity:	<5 arc min
Surface flatness(@633nm):	< $\lambda/10$
Clear aperture:	90%
Chamfer:	0.15x45°
Damage threshold:	>15J/cm ² (rods without coating) >700 MW/cm ² (coated)
Coating:	AR@1064nm, R< 0.1% AR@1064nm,R< 0.1% & HT@808nm, T>95% HR@1064nm, R>99.8%&HT@808nm, T>95% HR@1064nm,R>99.8%&HT@808nm, T>95%&HR@1064nm, R>99%

Nd:YVO4

Nd:YVO4 crystal is one of the most efficient laser host crystal currently existing for diode laser pumped solid state lasers. Its large stimulated emission cross-section at lasing wavelength, high absorption coefficient and wide absorption bandwidth at pump wavelength, high laser induced damage threshold as well as good physical, optical and mechanical properties make Nd:YVO4 an excellent crystal for high power, stable and cost effective diode pumped solid-state lasers.



Typical Applications

- For Single-longitudinal-mode output and compact design
- Diode laser-pumped Nd:YVO₄ compact laser and its frequency-doubled green, red or blue laser will be the ideal laser tools of machining, material processing, spectroscopy, wafer inspection, light show, medical diagnostics, laser printing and other most widespread applications

Capabilities:

Attribute	Specification
Nd Dopant Concentration:	0.1--3atm% tolerance within 10% of concentration
Dimension(mm):	1*1 ~ 16*16
Length(L)(mm):	0.02~20

Typical Specification and Tolerance:

Orientation	A-cut crystalline direction ($\pm 0.2^\circ$)
Wavefront Distortion(@633nm):	< $\lambda/8$
Surface quality:	20/10
Parallelism:	<10 arc sec
Perpendicularity:	< 5 arc min
Surface flatness(@633nm):	< $\lambda/10$
Clear aperture:	95%
Chamfer:	0.15x45°
Damage threshold:	>15J/cm ² (rods without coating) >700 MW/cm ² (coated)
Coating:	AR@1064nm, R< 0.1% AR@1064nm,R< 0.1% & HT@808nm, T>95% HR@1064nm, R>99.8%&HT@808nm, T>95% HR@1064nm,R>99.8%&HT@808nm, T>95%&HR@1064nm, R>99% AR@1064nm, R< 0.1%&AR@532nm, R< 0.3%

Cr:YAG

Cr⁴⁺:YAG (Y3Al5O12) is an ideal material for passive Q-switching of Nd:YAG and other Nd and Yb doped lasers in the wavelength range of 0.8 to 1.2 μm. One of the remarkable features of Cr⁴⁺:YAG is high damage threshold of 500-1000 MW/cm². Passive Q-Switching is preferred for simplicity of manufacturing and operation, low cost and reduced system size and weight.



Physical and Chemical Properties:

The preliminary experiments of Cr:YAG showed that the pulse width of passively Q-switched lasers could be as short as 9 ns for diode pumped Nd:YAG lasers and repetition as high as 10kHz for diode pumped Nd:YVO₄ lasers. Furthermore, an efficient green output @ 532 nm, and UV output @ 355 nm and 266 nm were generated, after a subsequent intracavity SHG in KTP or LBO, THG and 4HG in LBO and BBO for diode pumped and passive Q-switched Nd:YAG and Nd:YVO₄ lasers.

Capabilities:

Attribute	Specification
Cr ⁴⁺ Dopant Concentration:	0.5 ~ 3 mol% tolerance within 10% of concentration
Dimension(mm):	2*2~14*14
Length(L)(mm):	0.1~12
Initial Transmission	10%~99%

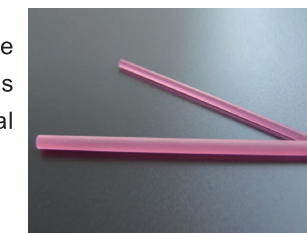
Typical Specification and Tolerance:

Attribute:	Specification
Dimension Tolerance(mm):	(W ± 0.1) x (H ± 0.1) x (L ± 0.2)
Wavefront Distortion(@633nm):	λ/8
Clear Aperture:	>90%
Flatness(@633nm):	λ/8
Surface Quality:	10/5
Parallelism:	<20 arc sec
Perpendicularity:	<5 arc min
Chamfer	0.15x45°
Damage threshold:	>15J/cm ² (rods without coating) >700 MW/cm ² (coated)
Coating:	1)AR@1063nm, R< 0.1% & HT@808nm, T>95% 2)HR@1063nm, R>99.8% & HT@808nm, T>95% 3)AR@1063 nm, R<0.1%

Note: When ordering Cr⁴⁺:YAG crystal, please specify the aperture, initial transmission(T₀) and coatings.

Er:YAG

Er:YAG is an excellent laser crystal which lases at 2.94 μm, This wavelength is the most readily absorbed into water and hydroxylapatite of all existing wavelengths and is considered a highly surface cutting laser. It has wide applications in medical applications, such as dental (hard tissues), orthopedics, etc.



Advantages of Er:YAG Crystal

- * High slope efficiency
- * Operate well at room temperature
- * Operate in a relatively eye-safe wavelength range

Capabilities

Dopant concentration:	Er: ~50 at%
Wavefront Distortion(@1064nm):	<λ/8
Extinction Ratio(dB):	≥25
Rod Sizes(mm):	Diameter:3 ~ 6, Length:50 ~ 120 Upon request of customer
Dimensional Tolerances:	Diameter:+0.000 arc sec/-0.002 arc sec, Length: ± 0.02 arc sec
Barrel Finish:	Ground Finish: 400# Grit
Parallelism:	≤10 arc sec
Perpendicularity:	≤5 arc min
Flatness:	<λ/10
Surface Quality:	10/5
Chamfer:	0.006 arc sec±0.002 arc sec @ 45°± 5°
AR Coating Reflectivity(@2940nm):	≤ 0.25%

Optical and spectral Properties:

Laser Transition:	⁴ I _{11/2} to ⁴ I _{13/2}
Laser Wavelength(nm):	2940
Photon Energy(@2940nm):	6.75×10 ⁻²⁰ J
Emission Cross Section(cm ²):	3×10 ⁻²⁰
Index of Refraction(@2940nm):	1.79
Pump Bands(nm):	600~800

ND:GdVO4

Neodymium doped Gadolinium Orthovanadate single crystal (Nd:GdVO₄) is an excellent laser crystal. This crystal is ideal laser host material for the DPSS (Diode pumped Solid State) micro/mini lasers as its good physical, optical and mechanical properties. It has higher slope efficiency than Nd:YAG and better thermal conductivity, higher power output than Nd:YVO₄, so it is a good choice to use Nd:GdVO₄ for high power output DPSS lasers



Capabilities:

Nd Dopant Concentration:	0.2--3.0atm% tolerance within 10% of concentration
Dimension(mm):	1*1~16*16
Length(L)(mm):	0.02~20

Typical Specification and Tolerance:

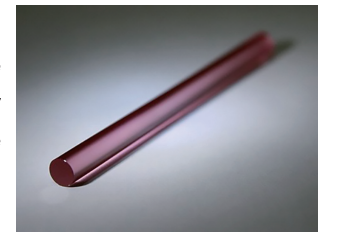
Orientation	a-cut crystalline direction(±0.20)
Dimensional tolerance:	±0.1mm (typical) High precision ±0.005mm can be available upon request.
Wavefront Distortion(@633nm):	<λ/8
Surface quality:	20/10
Parallelism:	<10 arc sec
Perpendicularity:	<5 arc min
Surface flatness(@633nm):	<λ/10
Clear aperture:	95%
Chamfer:	0.15x45°
Damage threshold:	over 15J/cm ² (rods without coating) over 700 MW/cm ² (coated)
Coating:	1)AR@1063nm, R< 0.1% & HT@808nm, T>95% 2)HR@1063nm, R>99.8% & HT@808nm, T>95% 3)AR@1063 nm, R<0.1%

Nd:GdVO₄ properties compare with Nd:YVO₄

-	Nd:GdVO ₄ , 1.2 atm% Nd	Nd:YVO ₄ 1.1 atm% Nd
Melting temperature (T°C)	1780	1825
Fluorescence lifetime (t)	95 μs	100 μs
Thermal conductivity coefficient	11.7w/m/k	5.10w/m/k

Ti:Sapphire

A-star supplies high quality Ti:Sapphire by the advanced growth method of Temperature Gradient Technique (TGT), Ti:Sapphire is an excellent substitute for dye lasers in many applications. By harmonics using NLO crystals such as BBO in an ultra-thin, Ti:Sapphire can be used to generate UV and DUV laser sources with ultrafast pulses below 10fs



Capabilities:

Attribute	Specification
Ti2O3 Concentration:	0.06~0.5wt%
Figure of Merit(mm):	100~300
Dimension(mm):	2~50
Length(mm):	2~130
End Configuration:	Flat/flat or brewster/brewster ends or specified

Specification:

Crystal structure:	Hexagonal System
Density(g/cm ³):	3.98
Transmission Range(nm):	150-5500
Thermal Conductivity(W/m/K):	25.12
Thermal Shock Resistance(W/m) :	790
Thermal Expansion Coefficient(K):	5.8x10 ⁻⁶
Mohs Hardness:	9

Optical and spectral Properties:

Orientation	Optical axis C normal to rod axis
α490(cm ⁻¹):	1.0~7.5
flatness(@ 633nm):	<λ/10
Parallelism:	<10 arc sec
Surface quality:	60/40
Wavefront Distortion(@ 633nm):	<λ/4
Coating:	WE can make many kind coating on Ti:sapphire upon requirement,please specify when order

α-BBO

High temperature phase of BaB₂O₄ is an excellent birefringent crystal; it is characterized by large birefringent coefficient and wide transmission window from 189nm to 3500nm, particularly it is suitable to make the high power UV polarizer, due to its unique UV transparency and good mechanical properties. The physical, chemical, thermal and optical properties of β-BBO crystals are similar to those of α-BBO, for instant high optical homogeneity (better than 1x10⁻⁶/cm), extremely low absorption in the UV to IR range (<0.5% from 300-2300nm), low hygroscopic susceptibility, high damage threshold. However, the nonlinear optical properties of α-BBO is vanished due to the centric symmetry with its crystal structure. α-BBO is an excellent crystal to replace Calcite, TiO₂ and LiNbO₃, etc. in Glan-Taylor and Glan-Thompson polarizers as well as walk-off beam splitters, especially for high power and UV polarizer, due to its unique UV transparency, good mechanical properties and high damage threshold.



Capabilities :

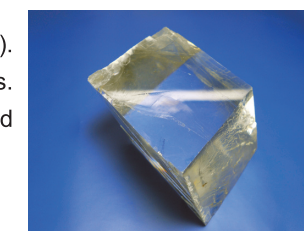
Attribute	Specification
Dimension (mm):	max. 40~50
Length (mm):	max. 25~35
Surface Quality:	20/10
Optical Deviation:	<1 arc min
Optical Axis Orientation:	±0.5°
Flatness (@633nm):	<λ/8
Wave front Distortion (@633nm):	<λ/8
Coating:	Upon customer request

Physical Properties:

Transparency Range (nm):	189-3500
Density (g/cm ³):	3.85
Therm-Optic Coefficients:	$dn_o/dT = -9.3 \times 10^{-6}/^{\circ}\text{C}$ $dn_e/dT = -16.63 \times 10^{-6}/^{\circ}\text{C}$
Optical Homogeneity (1/cm):	$\Delta n \approx 10^{-6}$
Damage Threshold:	1 GW/cm ² @ 1064nm; 500 MW/cm ² @ 532nm
Hygroscopic Susceptibility:	Low
Thermal Expansion Coefficients (25°C -900°C)	$\alpha_a = 4 \times 10^{-6}/\text{K}$ $\alpha_c = 4 \times 10^{-6}/\text{K}$
Linear Absorption Coefficients:	$a < 0.005 \text{ cm}^{-1}$ from 300nm to 2300nm
Refractive Indices, Birefringence ($\Delta n = n_e - n_o$) and Walk-Off Angle @ 45°C (ρ):	$n_o = 1.58462, n_e = 1.65790, \Delta n = -0.073282; \rho = -4.9532^{\circ}$ @ 1064nm $n_o = 1.60206, n_e = 1.67755, \Delta n = -0.075491; \rho = -5.0407^{\circ}$ @ 532nm $n_o = 1.67190, n_e = 1.76171, \Delta n = -0.089805; \rho = -5.6926^{\circ}$ @ 266nm
Sellmeier Equation (λ in μm):	$N_o^2 = 2.7471 + 0.01878/(\lambda^2 - 0.01822) - 0.01354\lambda^2$ $n_e^2 = 2.37153 + 0.01224/(\lambda^2 - 0.01667) - 0.01516\lambda^2$

Calcite

Calcite is a carbonate mineral and the most stable polymorph of calcium carbonate (CaCO₃). It is a negative uniaxial crystal and mostly used as visible and near IR polarizers. It has high birefringence, wide spectral transmission and availability in reasonably sized rhombs.



Specifications:

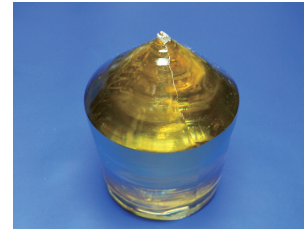
Attribute	Specification
Dimension (mm):	max.30~45
Length (mm):	max.25~35
Surface Quality:	20/10
Optical Deviation:	<3 arc min
Optical Axis Orientation:	±0.5°
Flatness (@ 633nm):	<λ/4
Wave front Distortion (@ 633nm):	<λ/4
Coating:	Upon customer request

Physical Properties:

Transparency Range	350~2300nm
Partical Shape	Crystalline rhombihedral
Density(g/cm ³):	2.7
Thermal Expansion Coefficient	Low susceptibility to moisture
Mohs Hardness	3
Thermal Expansion Coefficient	$a_a = 24.39 \times 10^{-6}/\text{k}; a_c = 5.68 \times 10^{-6}/\text{k}$
Crystal Class	Negative uniaxial with $n_o = n_a = n_b, n_e = n_c$
Refractive index, birefringence($\Delta n = n_e - n_o$) and walk-off angle @ 45°C (ρ)	$n_o = 1.6557, n_e = 1.4852$ $\Delta n = -0.1705, \rho = 6.20^{\circ}$ @ 630nm $n_o = 1.6380, n_e = 1.4783$ $\Delta n = -0.1596, \rho = 5.83^{\circ}$ @ 1300nm
Sellmeier Equation (λ in μm)	$n_o^2 = 2.69705 + 0.0192064/(\lambda^2 - 0.01820) - 0.0151624\lambda^2$ $n_e^2 = 2.18438 + 0.0087309/(\lambda^2 - 0.01018) - 0.0024411\lambda^2$

YVO4

Yttrium Vanadate (YVO₄) crystals are positive uniaxial crystals grown using the Czochralski method. They have good mechanical and physical properties and are ideal for optical polarizing components because of their wide transparency range and large birefringence. They are an excellent synthetic substitute for Calcite (CaCO₃) and rutile (TiO₂) in many applications including fiber optic isolators and circulators, beam displacer, Glan polarizer and other polarizing optics.



Capabilities :

Attribute	Specification
Dimension(mm):	max.25
Length (mm):	max.30
Surface Quality:	20/10
Optical Deviation:	<1 arc min
Optical Axis Orientation:	±0.2°
Flatness(@633nm):	<λ/8
Wave front Distortion(@633nm):	<λ/8
Coating:	Upon customer request

Physical Properties:

Transparency Range(nm):	400~5000
Crystal Symmetry:	Zircon tetragonal, space group D4h
Crystal Cell:	a=b=7.12Å, c=6.29Å
Density(g/cm ³):	4.22
Hygroscopic Susceptibility:	Non-hygroscopic
Mohs Hardness:	5
Thermal Optical Coefficient:	Dn _o /dT=8.5×10 ⁻⁶ /K; dn _e /dT=3.0×10 ⁻⁶ /K
Thermal Conductivity Coefficient:	C: 5.23 w/m/k; ⊥ C:5.10w/m/k
Crystal Class:	Positive uniaxial with n _o =n _a =n _b , n _e =n _c
Refractive Indices,Birefringence(Δn=n _e -n _o) and Walk-Off Angle @ 45°(ρ):	n _o =1.9929,n _e =2.2154,Δn=0.2225,ρ=6.04°,@ 630nm n _o =1.9500,n _e =2.1554,Δn=0.2054,ρ=5.72°,@ 1300nm n _o =1.9447,n _e =2.1486,Δn=0.2039,ρ=5.69°,@ 1550nm
Sellmeier Equation (λ in μm):	n _o ² =3.77834+0.069736/(λ ² -0.04724)-0.0108133λ ² n _e ² =4.5905+0.110534/(λ ² -0.04813)-0.0122676λ ²

Polarizer

A-star manufactures a wide range of polarizers (Glan Laser, Glan Taylor, Glan Thompson, Wollaston and Rochon) by employing birefringent crystals: α-BBO, Calcite, YVO4 and quartz. The material properties of birefringent crystals are great influence on your selection of right type polarizers.

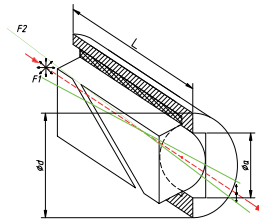
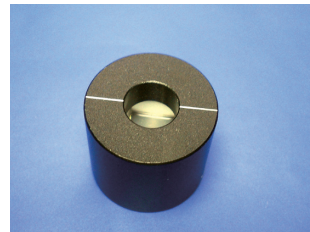
Polarizer	Material	Illustration	Properties and Application
Glan-Taylor Polarizer	α-BBO (200-3500nm) Calcite (350-2300nm) YVO 4 (400-5000nm)		Air-spaced Close to Brewsterarc minutes Angle Cutting Low L/A Mounted without escape windows For low to medium power
Glan-Laser Polarizer	α-BBO (200-3500nm) Calcite (350-2300nm) YVO4 (400-5000nm)		Air Spaced Close to Brewsterarc minutes angle Cutting Mounted with escape windows Suitable for high power L/A=1.5
Wollaston Polarizer	α-BBO (200-3500nm) Calcite (350-2300nm) YVO4 (400-5000nm) Quartz (200-2300nm) MgF2(130-6000nm)		Cemented Separate ordinary and extraordinary beams at certain angle Suitable for low power and where the large deviation is required
Glan-Thompson Polarizer	α-BBO (220-1100nm) (200-3300nm) Calcite (350-2300nm)		Cemented Suitable for low power Wide acceptance angle
Rochon Polarizer	α-BBO (200-3500nm) YVO4 (400-500nm) Quartz (200-2300nm)		α-BBO is used to guarantee a wide transmission range Especially, suitable for UV Split the ordinary and extraordinary ray, but only ordinary beam is deviated

Glan Taylor Polarizer

Glan Taylor prism polarizer is made of two same birefringent material prisms that are assembled with an air space. It has a length to aperture ratio less than 1.0 makes it a relatively thin polarizer. The polarizer with no side escape windows are suitable for low to medium power online ordering where the side rejected beams are not required, which is suitable for a wide variety of online orderings, particularly with collimated input beams. The angular field of different materials of polarizers listed below for comparison.(Fo for o-ray; Fe for e-ray)

Features:

- 1.Air-Spaced
- 2.Close to Brewsterarc minutes Angle Cutting
- 3.High Polarization Purity
- 4.Short-Length
- 5.Suitable for low to medium power application



Capabilities :

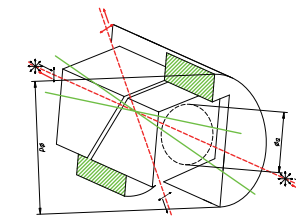
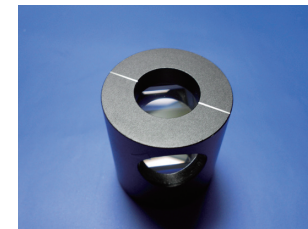
Attribute	Specification
Material:	α-BBO, Calcite or YVO4
Wavelength Range:	α-BBO,200-3500nm, Calcite,350-2300nm, YVO4 ,400-5000nm
Extinction Ratio:	α-BBO:5×10^{-6}, Calcite:5×10^{-5}, YVO4 :5×10^{-6}
Surface Quality:	20/10
Beam Deviation:	3 arc min
Flatness(@633nm) :	$\lambda/4$
Damage Threshold(MW/cm ²):	>200
Coating:	Single Layer MgF2
Holder:	Black Anodized Aluminum

Glan Laser Polarizers

Glan Laser prism polarizer is made of two same birefringent material prisms that are assembled with an air space. The polarizer is a modification of the Glan Taylor type and is designed to have less reflection loss at the prism junction. The polarizer with two escape windows allow the rejected beam to escape out of the polarizer, which makes it more desirable for high energy lasers. The surface quality of these faces is relatively poor as compared to that of entrance and exit faces. No scratch dig surface quality specifications are assigned to these faces. The polarized field F1 and F2 of these is shown in the plot below.

Features:

- 1.Air-Spaced
- 2.Close to Brewsterarc minutes Angle Cutting
- 3.High Polarization Purity
- 4.Short-Length
- 5.Suitable for High Power Application



Capabilities :

Attribute	Specification
Material:	α-BBO, Calcite or YVO4
Wavelength Range:	α-BBO:200-3500nm, Calcite:350-2300nm, YVO4 :400-5000nm
Extinction Ratio:	α-BBO:5×10^{-6}, Calcite:5×10^{-5}, YVO4 :5×10^{-6}
Surface Quality:	20/10
Beam Deviation:	3 arc min
Flatness(@633nm):	$\lambda/4$
Damage Threshold(MW/cm ²):	>500
Coating:	Single Layer MgF2
Holder:	Black Anodized Aluminum

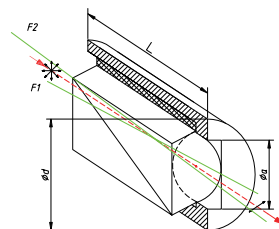
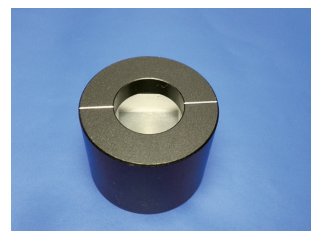
Note: Order based on client requirement, including non-standard product and holder.

Glan Thompson Polarizer

Glan Thompson polarizer is made of two calcite prisms or a -BBO prisms cemented together. Two types of Glan Thompsons are available. One is the standard form and the other is the long form. Their length to aperture ratios are 2.5 : 1 and 3.0 : 1 respectively. Glan Thompsons tend to have higher extinction ratio than air spaced polarizers. In the ultra violet spectrum, their transmission is limited by absorption in birefringent materials as well as the cement layer. a -BBO polarizers and Calcite polarizers can be used from about 220 to 900nm and 350 to 2300 nm respectively. The polarizers have the widest field angle of any design. The standard form of this polarizer with 2.5:1 length to aperture ratio has a full acceptance cone angle of more than 15 ° @ 589nm, symmetric about the input axis, whilst the long form with 3:1 ratio has a field angle >26 ° . The polarized field F1 and F2 of all these is shown in the plot below.

Features:

- 1.Cemented
- 2.Wide Acceptance Angle Field
- 3.Suitable for Low Power Application



Specifications:

Attribute	Specification
Material:	α-BBO, Calcite
Wavelength Range:	α-BBO:200-1100nm, Calcite:350-2300nm
Extinction Ratio:	α-BBO:5×10^{-6}, Calcite:5×10^{-6}
Surface Quality:	20/10
Beam Deviation:	3 arc min
Wave front Distortion(@633nm):	$\lambda/4$
Damage Threshold(MW/cm ²):	>200
Coating:	Single Layer MgF2
Holder:	Black Anodized Aluminum

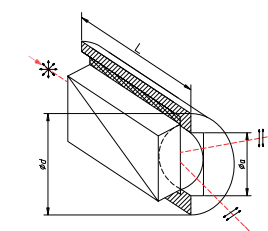
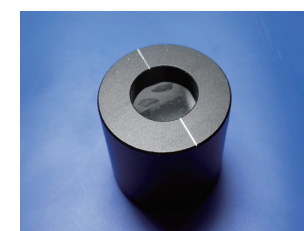
Note: Order based on client requirement, including non-standard product and holder.

Wollaston Polarizer

Wollaston polarizer is made of two birefringent material prisms that are cemented together. The deviations of the ordinary and extraordinary beams are nearly symmetrical about the input beam axis, so that the Wollaston polarizing beam splitter has approximately twice the deviation of the Rochon. The separation angle exhibits chromatic dispersion, as shown in the blow. Any separation angle can be designed upon the requirement. The separation angle of standard products vs wavelength is shown in the plot below.

Features:

- 1.Cemented
- 2.Separate Ordinary and Extraordinary Beams at Certain Angle
- 3.Suitable for Low Power Application and where the deviation is required



Specifications:

Attribute	Specification
Material:	MgF2, α-BBO, Calcite, YVO4 or Quartz
Wavelength Range:	MgF2:130-4000nm; α-BBO:190-3500nm; Calcite:350-2300nm; YVO4:400-5000nm; Quartz:200-2300nm
Extinction Ratio:	MgF2: 5×10^{-6}; α-BBO:5×10^{-6} Calcite:5×10^{-5}; YVO4 :5×10^{-6} Quartz: 5×10^{-5}
Surface Quality:	20/10
Beam Deviation:	1 arc min
Flatness(@633nm):	$\lambda/4$
Damage Threshold(MW/cm ²):	>500
Coating:	Single Layer MgF2
Holder:	Black Anodized Aluminum

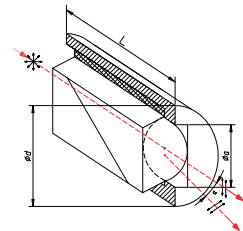
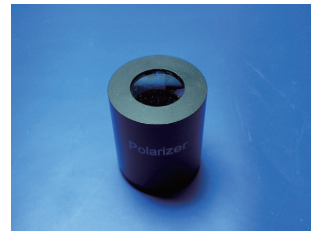
Note: Order based on client requirement, including non-standard product and holder.

Rochon Polarizer

Rochon polarizer is one of the earliest designs, which is made of two birefringent material prisms cemented together. Both ordinary and extraordinary beams propagate collinearly down the optic axis in the first prism under the ordinary refractive index. Upon entering the second prism the ordinary beam experiences the same refractive index and continues undeviated. The extra-ordinary beam, however, now has a lower refractive index and is refracted at the interface. The angle of refraction is further increased at the birefringent material/air exit surface. Any separation angle can be designed for specific wavelength upon the requirement. The separation angle of standard products vs wavelength is shown in the plot below.

Features:

1. Optical Cemented
2. High Polarization Purity
3. Suitable for Low or High Power Application



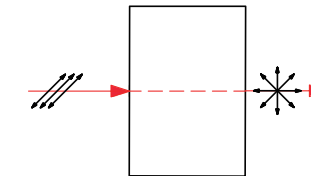
Specifications:

Attribute	Specification
Material:	MgF2, α-BBO, Calcite, YVO4 or Quartz
Wavelength Range:	MgF2:130-4000nm; α-BBO:190-3500nm YVO4:400-4000nm; Quartz:200-2300nm
Extinction Ratio:	MgF2:5×10^{-6}; α-BBO:5×10^{-6}; YVO4 :5×10^{-6} Quartz:5×10^{-5}
Surface Quality:	20/10
Beam Deviation:	3 arc min
Flatness(@633nm):	$\lambda/4$
Damage Threshold:	>500MW/cm ²
Coating:	Single Layer MgF2
Holder:	Black Anodized Aluminum

Note: Order based on client requirement, including non-standard product and holder.

Depolarizer

Plane polarized beam is not welcomed in some circumstances such as reflecting spectrometer. A depolarizer will change the plane polarization into a mix of polarization states by scrambling up the polarization, the result is to change plane polarized beam into pseudo-depolarized beam and produce depolarization. Depolarizer is widely used in polarization sensitive instrument.



The usual depolarizer can only be used at narrow band wavelength to avoid the big beam deviation. With our special design, our depolarizer can be used in a wide range of wavelength and keep the beam deviation in a acceptable range.

Usually we can get better result if we orient the input polarization state 45deg to the optical axis of the depolarizer. And also the effectiveness of the depolarizer increases with the size of the beam cross-section.

Specifications:

Attribute	Specification
Material:	Quartz 200-2500nm
Spectral rang	220-1100, 1100-2600nm
Dimension Tolerance(mm):	+0.0/-0.2
Surface Quality:	60/40
Beam Deviation:	3 arc min
Flatness(@633nm):	$\lambda/8$
Clear Aperture:	>90%
Coating:	Uncoated, AR coating available

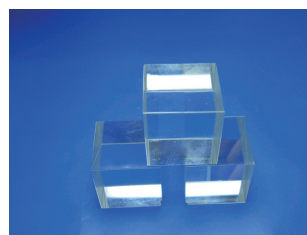
Depolarize Standard Products:

Part No.	Wavelength Range(nm)	Diameter(mm)
DOP10212	532-850	12.7

Note: Other sizes and wavelengths are available upon request.

Polarizing Cube Beamsplitter

Polarizing Cube Beamsplitters split randomly polarized beams into two orthogonal, linearly, polarized components-S-polarized light is reflected at a 90deg.Angle while P-polarized light is transmitted. Each beamsplitter consists of a pair of precision high tolerance right angle prisms cemented together with a dielectric coating on the hypotenuse of one of prisms.

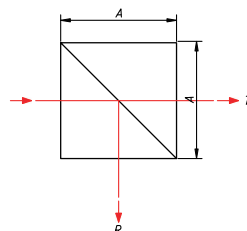


Specifications:

Attribute	Specification
Dimension Tolerance(mm):	±0.2
Flatness(@633nm):	λ/4
Surface Quality:	60/40
Extinction Ratio:	>100:1
Beam Deviation:	<3 arc min
Principal Transmittance:	>95% and Ts<1%
Principal Reflectance:	Rs>99% and Rp<5%
Coatings:	Polarization beamsplitter coating on hypotenuse face, AR-coatings (R<0.25%) on all input and output face.

High Extinction PBS

TP : TS > 1000:1 for Broad Band
 TP : TS > 3000:1 for Narrow Band

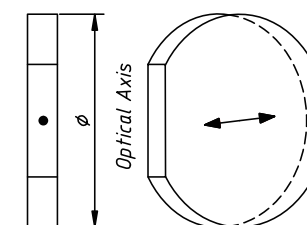


Specifications:

Attribute	Specification
Dimension Tolerance(mm):	±0.2
Flatness(@633nm):	λ/4
Surface Quality:	60/40
Beam Deviation:	<3 arc min
Extinction Ratio:	TP : TS > 1000:1 for Broadband TP : TS > 3000:1 for Narrowband
Principal Transmittance:	Tp>90% (RP<0.1%) for Broadband Tp>96% (RP<1.5%) for Narrowband
Principal Reflectance:	Rs>99%
Coatings:	Polarization beamsplitter coating on hypotenuse face, AR-coatings on all input and output face.

Low Order Waveplate

The low (multiple) order waveplate is designed to give a retardance of several full waves, plus the desired fraction. This result in a single, physically robust component with desired performance. However, even small changed in wavelength or temperature will result in significant changes in the desired fractional retardance. They are less expensive and find use in many applications where the increased sensitivities are not an important.



Capabilities :

Attribute	Specification
Material:	Quartz
Dimension Tolerance(mm):	+0.0/-0.1
Surface Quality:	20/10
Flatness(@633nm):	λ/8
Parallelism:	<1 arc sec
Retardation Tolerance:	λ/300
Clear Aperture:	>90%
Coating:	R<0.2%@Wavelength
Standard Wavelength(nm):	266, 355, 532, 63.28, 780, 808, 850, 980, 1064, 1310, 1480, 1550

Single Plate Low Order Waveplate

Standard Products:

Half Waveplates Part No.	Quarter Waveplates Part No.	Diameter (mm)
WPL910H	WPL910Q	10.0
WPL912H	WPL912Q	12.7
WPL915H	WPL915Q	15.0
WPL920H	WPL920Q	20.0
WPL925H	WPL925Q	25.4
WPL930H	WPL930Q	30.0

Zero Order Waveplate

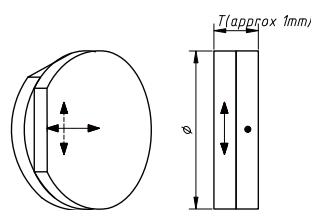
The zero order waveplate is designed to give a retardance of zero full waves, plus the desired fraction. Zero order waveplate shows better performances than multiple order waveplates, it has broad bandwidth and a lower sensitivity to temperature and wavelength changes. It should be considered for more critical online orderings.



Capabilities :

Attribute	Specification
Material:	Quartz
Dimension Tolerance(mm):	+0.0/-0.1
Surface Quality:	20/10
Flatness(@633nm):	$\lambda/8$
Parallelism:	<1 arc sec
Retardation Tolerance:	$\lambda/500$
Clear Aperture:	>90%
Coating:	R<0.2%
Standard Wavelength(nm):	266,355,532,63.28,780,808, 850,980,1064,1310,1480,1550

Zero Order Waveplate – Optical Cemented

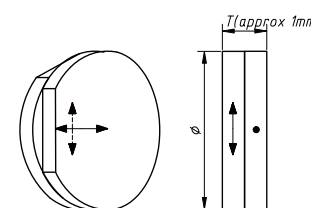


Optical Cemented
 High Damage Threshold
 AR Coated, R<0.2%
 Better Temperature Bandwidth
 Wide Wavelength Bandwidth

Standard Products:

Half Waveplates Part No.	Quarter Waveplates Part No.	Diameter (mm)
WPO910H	WPO910Q	10.0
WPO912H	WPO912Q	12.7
WPO915H	WPO915Q	15.0
WPO920H	WPO920Q	20.0
WPO925H	WPO925Q	25.4
WPO930H	WPO930Q	30.0

Zero Order Waveplate – Cemented

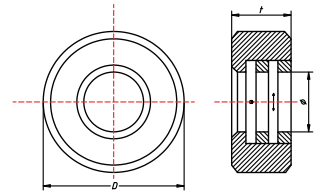


Cemented by Epoxy
 AR Coated, R<0.2%
 Better Temperature Bandwidth
 Wide Wavelength Bandwidth

Standard Products:

Half Waveplates Part No.	Quarter Waveplates Part No.	Diameter (mm)
WPC910H	WPC910Q	10.0
WPC912H	WPC912Q	12.7
WPC915H	WPC915Q	15.0
WPC920H	WPC920Q	20.0
WPC925H	WPC925Q	25.4
WPC930H	WPC930Q	30.0

Zero Order Waveplate - Air-spaced

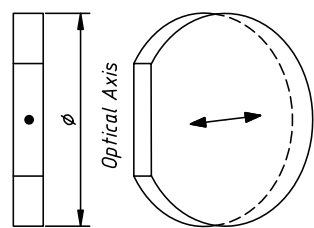


Double Plates
 AR Coated, R<0.2% and Mounted
 High Damage Threshold
 Broad Temperature Bandwidth
 Wide Wavelength Bandwidth

Standard Products:

Half Waveplates Part No.	Quarter Waveplates Part No.	Diameter (mm)
WPA910H	WPA910Q	10.0
WPA912H	WPA912Q	12.7
WPA915H	WPA915Q	15.0
WPA920H	WPA920Q	20.0
WPA925H	WPA925Q	25.4
WPA930H	WPA930Q	30.0

Zero Order Waveplate-Single Plate

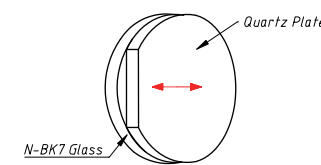


Single Plate
 Wide Angle Acceptance
 AR Coated, R<0.2% and Mounted
 High Damage Threshold
 Better Temperature Bandwidth
 Wide Wavelength Bandwidth
 Thin Thickness: 0.04~0.09 microns
 Standard Wavelength: $\lambda/4$: 1480nm, 1550nm, $\lambda/2$: 980nm, 1064nm, 1310nm, 1480nm, 1550nm

Standard Products:

Half Waveplates Part No.	Quarter Waveplates Part No.	Diameter (mm)
WPS910H	WPS910Q	10.0
WPS912H	WPS912Q	12.7
WPS915H	WPS915Q	15.0
WPS920H	WPS920Q	20.0

True Zero Order Waveplate – Cemented



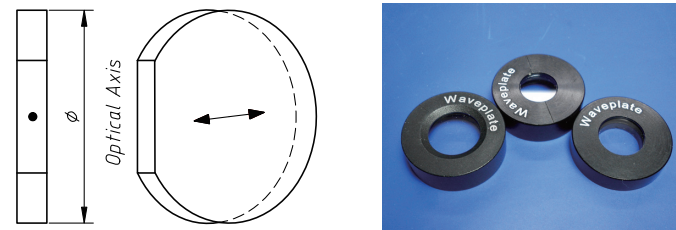
Cemented by Epoxy
 Wide Angle Acceptance
 AR Coated, R<0.2%
 Better Temperature Bandwidth
 Wide Wavelength Bandwidth

Standard Products:

Half Waveplates Part No.	Quarter Waveplates Part No.	Diameter (mm)
WPF910H	WPF910Q	10.0
WPF912H	WPF912Q	12.7
WPF915H	WPF915Q	15.0
WPF920H	WPF920Q	20.0
WPF925H	WPF925Q	25.4
WPF930H	WPF930Q	30.0

Dual Wavelength Waveplate

Dual wavelength waveplate is a multiple waveplate that provide a specific retardance at two different wavelengths, itarc minutes particularly useful when used in conjunction with other polarization sensitive components to separate coaxial laser beams of different wavelength.



Capabilities :

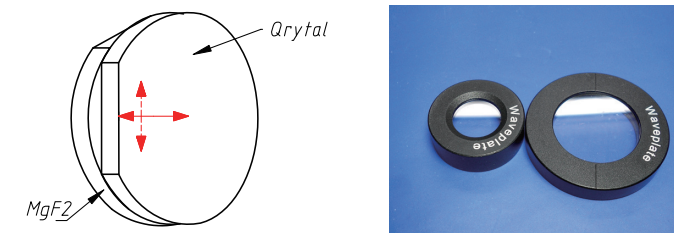
Attribute	Specification
Material:	Quartz
Dimension Tolerance(mm):	+0.0/-0.1
Surface Quality:	20/10
Flatness(@633nm):	$\lambda/8$
Parallelism:	<1 arc sec
Retardation Tolerance:	$\lambda/300$
Clear Aperture:	>90%
Coating:	R<0.2%
Standard Wavelength(nm):	800&400,1064&532,

Standard Products:

Waveplates Part No.	Diameter (mm)	Phase Retardation
WPD910A	10.0	$\lambda@1064\text{nm}\&\lambda/2@532\text{nm}$
WPD912B	12.7	$\lambda@1064\text{nm}\&\lambda/2@532\text{nm}$
WPD915A	15.0	$\lambda@1064\text{nm}\&\lambda/2@532\text{nm}$
WPD920A	20.0	$\lambda@1064\text{nm}\&\lambda/2@532\text{nm}$
WPD925A	25.4	$\lambda@1064\text{nm}\&\lambda/2@532\text{nm}$
WPD930A	30.0	$\lambda@1064\text{nm}\&\lambda/2@532\text{nm}$

Achromatic Waveplate

Unlike standard waveplates, Achromatic Waveplates (Retarders) provide a constant phase shift independent of the wavelength of light that is used. This wavelength independence is achieved by using two different birefringent crystalline materials. An Achromatic Waveplate, AWP, is similar to a Zero-Order Waveplate, which is made from two pieces of Crystal Quartz except that the AWP is composed of one piece of Crystal Quartz and one piece of Magnesium Fluoride, MgF2. Both of these materials are birefringent, however, by proper matching of the birefringent changes in one material with those of the second, retardation changes are minimized as the wavelength changes. This phenomenon produces a waveplate whose change in retardation is extremely small for large variations in wavelength.



Capabilities :

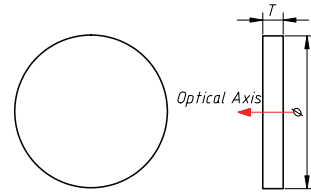
Attribute	Specification
Material:	Quartz & MgF2
Dimension Tolerance(mm):	+0.0/-0.1
Surface Quality:	40/20
Flatness(@633nm):	$\lambda/8$
Parallelism:	<1 arc sec
Retardation Tolerance:	$\lambda/100$
Retardation:	$\lambda/2$ & $\lambda/4$
Clear Aperture:	>90%
Coating:	R<0.2%@Wavelength

Standard Products:

Quarter Waveplates P/N #	Half Waveplates	Mounter	Clear
	P/N #	Diameter (mm)	Aperture (mm)
AWP 210Q	AWP 210H	25.4	10
AWP 212Q	AWP 212H	25.4	12.7
AWP 215Q	AWP 215H	25.4	15
AWP 220Q	AWP 220H	30	20
AWP 225Q	AWP 225H	30	23.5

Polarization Rotator

Polarization rotators offer 45deg or 90deg rotation at a number of common laser wavelength, the optical axis in a polarization rotator is perpendicular to the polished face of the optic. The result is that the orientation of in put linearly polarized light is rotated as it propagates through the device.



Capabilities :

Attribute	Specification
Material:	Optical Grade Crystal Quartz
Dimension Tolerance(mm):	+0.0, -0.2
Surface Quality:	20/10
Flatness(@633nm):	$\lambda/8$
Wavelength Range(nm):	440-1600
Retardation Accuracy:	<math><5</math> arc min
Clear Aperture:	>90%
Coating:	R<math><0.2\%</math>
Rotation Orientation:	counter-clockwise
Standard Wavelength(nm):	532, 633, 1064

Standard Products:

Rotator P/N#	Diameter (mm)	Rotation (Deg)
WPR4512	12.7	45
WPR4515	15	45
WPR4520	20	45
WPR4525	25.4	45
WPR9012	12.7	90
WPR9015	15	90
WPR9020	20	90
WPR9025	25.4	90

Optical Assemblies

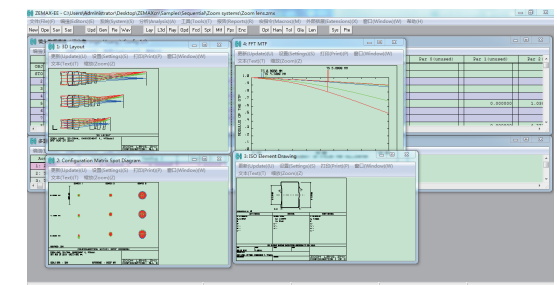
A-star focuses on the development and production of optical lenses, telescopes, and units, photo-electrical instruments. Focusing on innovation, inspire the future A-star Optics uses advanced technology, high quality standards, professional knowledge and lots of experience in the optical electronics industry, to provide first class products and excellent service support to our clients.

Optical assemblies	Illustration
Lenses Assemblies	
Precision optics assemblies (crystal, beamsplitters)	
Other lenses (OEM)	

Optical assemblies



- Trioptics ImageMaster MTF Measurer
- Full FOV MTF measuring
- Range: 450-950nm
- EFL, FFL measuring
- Distortion measuring
- Field Curvature measuring
- Astigmatism measuring
- Chromatic Aberration measuring



Zemax Lens Design

- Optical Assembly Design And Manufacture service
- Optical Lens Design Service
- Custom-Made Lens

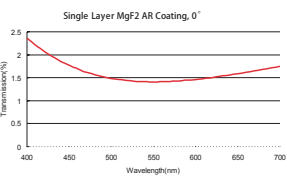
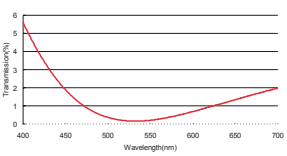
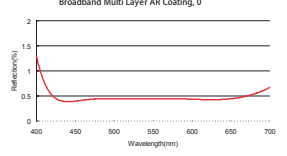
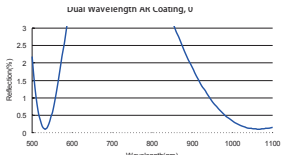
The Coating on the optical element is very important, which can improve the transmission, high reflection, etc. A-star offers all kinds of anti-reflective (AR coating), high reflective (HR Coating) and partial reflective (PR Coating) coating upon customer requirements. A-star produces a wide variety of coatings from simple single layer AR coating using MgF2 and mirror coatings to complex multi-layer dielectric coating. Typical types of dielectric coatings are BBAR, V-coatings, and Dual wavelength coatings.

Anti-Reflection Coating

Anti-Reflection Coating is a type of coating which can greatly reduce reflection when a light through the surface of optical devices. It is often called the AR-Coating. This improves the efficiency of the system since less light is lost. In complex systems, the reduction in reflections also improves the contrast of the image by elimination of stray light. The most common coating we can provide includes Single Layer MgF2 Anti-reflection Coating, Multi-Layer Sharp arc sec V arc sec Anti-reflection coating, Multilayer Broadband Anti-reflection Coating, Dual-Wavelength Anti-reflection coating. We also can provide Anti-Reflection upon customer request in special design.

Specifications:

- Single Layer MgF2 Antireflective Coatings
- MultiLayer Sharp arc sec V arc sec Anti-reflection coating
- MultiLayer Broadband Antireflective Coatings
- Dual Wavelength Band Antireflective Coatings (DAR)
- Coating Curve and Application

Coating Type	Coating Curve	Application
Single Layer MgF2 Anti-reflection Coating		Economic Lens & Prism Input & output surface
MultiLayer Sharp arc sec V arc sec Anti-reflection coating		High performance Element in laser system
Multilayer Broadband Anti-reflection Coating		High performance Lens & Prism Input & Output Surface
Dual-Wavelength Anti-reflection coating		High performance Laser devices Input & Output Surface

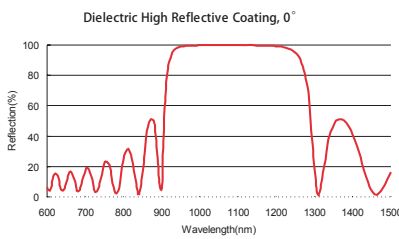
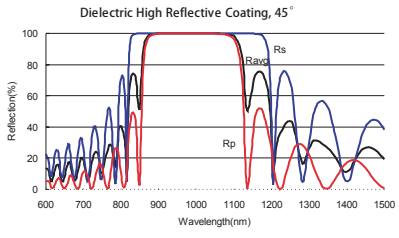
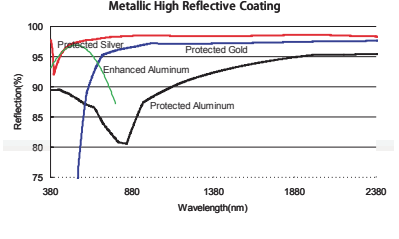
High-Reflection (HR) Coating

High-Reflection (HR) Coating work the opposite way to anti-reflection coating. Anti-reflection can greatly reduce reflection when a light through the surface of optical devices, high-reflection coating is to increase the reflectivity of a particular wavelength. Common high-reflection coating including: Dielectric High Reflection Coating, Dielectric High Reflection & High Transmittance Coating and Metallic High Reflection Coating.

Specifications:

- Dielectric High Reflection Coating
- Dielectric High Reflection & High Transmittance Coating
- Metallic High Reflection

Coating Curve & Application:

Coating Type	Coating Curve	Application
Dielectric High Reflection Coating		Economic Lens & Prism Input & output surface
Dielectric High Reflection & High Transmittance Coating		High performance Element in laser system
Metallic High Reflective Coating		High performance Lens & Prism Input & Output Surface

Partial-Reflection Coating

Partial-reflection coating is always used in beamsplitters application. There are two kinds of partial-reflection coating: Single Wavelength Partial-Reflection Coating and Broadband Wavelength Partial-Reflection Coating.

Coating Curve & Application:

Coating Type	Coating Curve	Application
Single Wavelength Partial-Reflection Coating		Beamsplitter with equal leg
Broadband Wavelength Partial-Reflection Coating		Beamsplitter with equal leg

Polarization Beamsplitter Coating

Polarization Beamsplitter Coating can generate special high reflectance to S-polarization and high anti-reflection to P-polarization for laser application. It can achieve nearly 100% reflectance to S-polarization and 100% transmission for P-polarization on a narrow wavelength range.

Coating Curve & Application:

Coating Type	Coating Curve	Application
Polarization Beamsplitter Coating		Polarization Beamsplitter Cube
Polarization Beamsplitter Plate Coating		Polarization Beamsplitter Plate