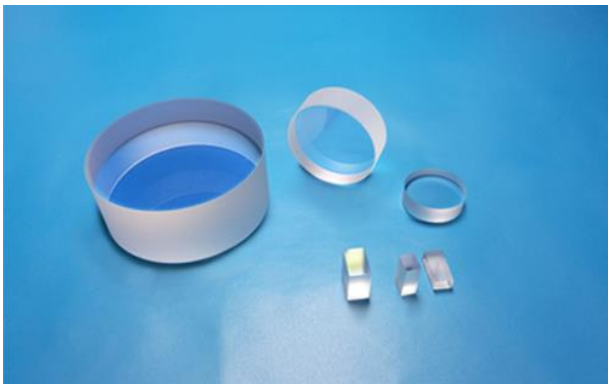
OPTICS CATALOG

High Precision Optics

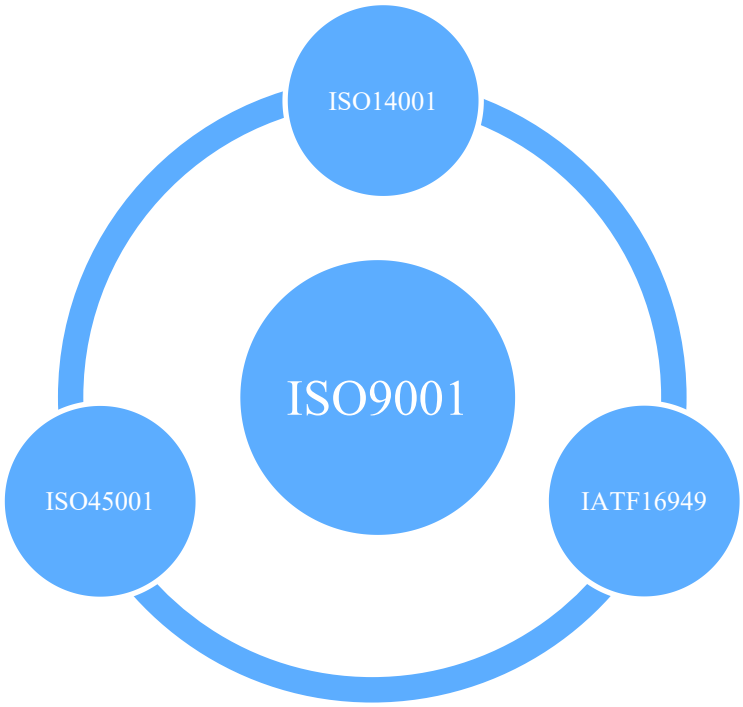
CASTECH®
福晶科技



GWU-Lasertechnik

CASTECH®
福晶科技

- CASTECH was founded in 1990 by FIRSM (Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, a world famous institute on material research).
- A public company (2008, Shenzhen, China, Stock Code: 002222)
- Sales Revenue US$80 Millions
- More than 1000 Employees
- 40,000 M^2 Facility
- Sales 50% China and 50% International



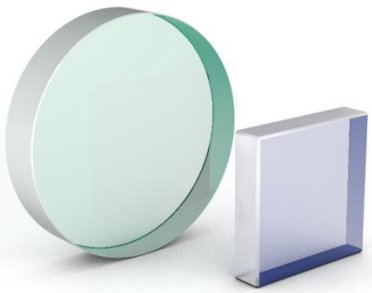
CASTECH is a pioneer and global leader in nonlinear optical crystals, laser crystals, precision optics and laser components for laser, optical communication, biomedical and LiDAR applications. Based on more than 30 years of worldwide known expertise and unique technologies of crystal growing, precision polishing and high LIDT coating, CASTECH has built a wide selection of high performance precision optics category and solutions including Aspherical/Spherical Lenses, Flats, Prisms, Waveplates, Gratings, polarization components, as well as featured products for most commanding applications like ultrafast lasers, to assist with our customers from prototype to mass production stage.

CONTENTS

Precision Optics

Featured Optics

Optical Windows



- Material from DUV to FIR
- Custom dimensions and shapes
- Diameter from 0.5 to 600 mm
- Clear aperture: Central 90% of diameter
- Flatness: λ/20@632.8nm (λ/40 by IBF)
- Surface quality: 10-5 S/D
- Parallelism:＜3″
- Standard and custom AR coating options available
- High laser damage threshold

CASTECH offers windows either in substrates made from multitude of Optical glass, Fused Silica, Calcium Fluoride(CaF_2), Barium Fluoride(BaF_2), Germanium (Ge), Silicon (Si), Zinc Selenide (ZnSe) or coated parts with multiple anti-reflection coating options covering wavelength range of Ultraviolet (UV), visible, or Infrared (IR).

Millions of stock and custom precision windows are manufactured by different processing methods such as double-sided polishing, conventional polishing and ion beam figure(IBF) to guaranty high surface figure, low scatter, and high laser damage threshold to satisfy even the most demanding requirements.

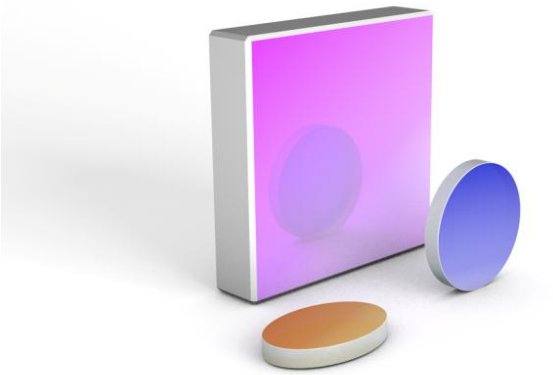
Metrology

CASTECH equipped with state-of-the-art optical metrology, including ZYGO interferometer, 4D interferometer, Taylor Hobson LuphoScan 260, Microscope and so on to ensure consistent high-quality performance of optical windows for challenging applications of laser, thermal imaging, medical and spectroscopy.

ZYGO Interferometer for high accuracy measurement of wave front & flatness & parallelism
With λ/50 accuracy
Parallelism measure accuracy: 0.5 ″

4D Interferometer(FizCam 2000) for high accuracy measurement of flatness

Optical Mirrors



- Substrate material from DUV to IR
- Custom dimensions and shapes
- Diameter from 5 to 300 mm
- Clear aperture: Central 90% of diameter
- Flatness: λ/10@632.8nm
- Surface quality: 10-5 S/D
- Parallelism:＜3′
- Partial and high reflectivity optical mirrors are available upon custom request
- High laser damage threshold

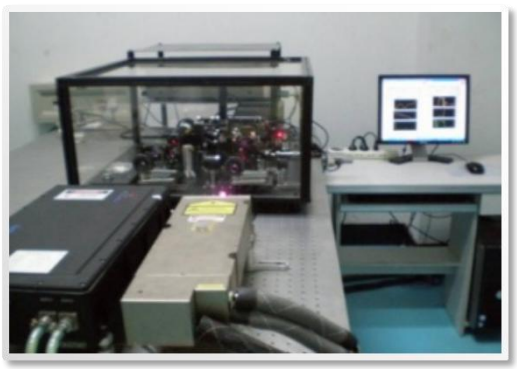
CASTECH offers a large comprehensive selection of optical mirrors for use with light in DUV to IR spectral region, ranging from laser line mirrors, board-band dielectric/metallic mirrors to ultrafast laser mirrors to provide ideal solutions for specialized applications especially at high laser power.

Featured Products

- Narrow Band Laser Line Mirrors
- Board-Band Dielectric/Matallic Mirrors
- Ultrafast Laser Mirrors (page 18&19)
- High Reflectivity Mirrors (page 20)
- High Laser Damage Threshold Mirrors (page 23)

Metrology

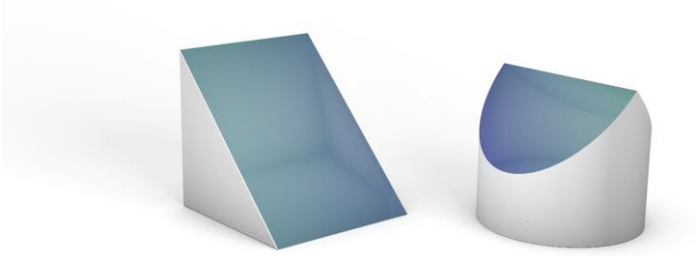
CASTECH employs a wide variety of metrology equipment to guarantee high reflectivity, including Cavity-Ring-Down Lossmeter, Agilent Cary-7000, Agilent Cary-6000i, Perkin Elmer Lambda-950 and Spectrum 100FTIR. Every coating batch is tested to promise high-performance reflectivity values. Surface absorption measurement by PCI is available as requested.



Bulk and surface absorption measurement by PCI (355nm,532nm,1064nm)

Agilent Cary-7000 (2sets）for reflectivity measurement ranging from175-3300nm

Optical Prisms



- Material from DUV to IR
- Custom dimensions and shapes
- A wide range of optical prism types
- Diameter from 0.5 to 100 mm
- Clear aperture: Central 90% of diameter
- Flatness: λ/10@632.8nm
- Surface quality: 10-5 S/D
- Angular tolerance :＜15″
- Standard and custom coating options available
- High laser damage threshold

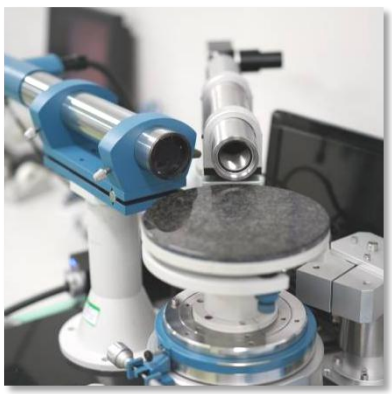
CASTECH offers a wide range of prism types in a variety of designs, substrates, or coatings such as Penta Prisms, Right Angle Prisms, Dove Prisms, Roof Prisms, Porro Prisms, Retro-Reflectors, Anamorphic Prism Pairs, Pellin Broca Prisms, Equilateral Dispersive Prisms and so on.

We employ different processing methods such as conventional polishing, continuous polishing, or ion beam figure(IBF) as well as top metrology equipment, tailored to deliver high precision optical prisms for the most demanding requirements in high power laser, scientific and industrial applications.

Metrology

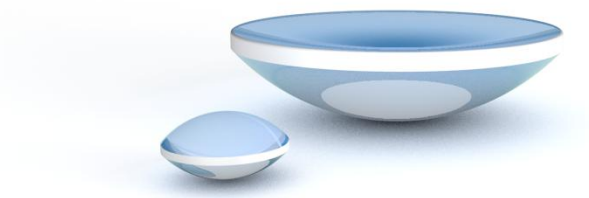
CASTECH equips with not only ZYGO interferometer and 4D interferometer to guarantee high surface flatness, but also Trioptics PrismMaster and microscope to promise high precision angle tolerance and surface quality to meet your needs.

ZYGO Interferometer for high accuracy measurement of wave front & flatness & parallelism
With λ/50 accuracy
Parallelism measure accuracy: 0.5 ″



Trioptics PrismMaster for high-precision optical angle measurement with angular accuracy: 0.75 ″

Spherical Lenses



- Material from DUV to IR
- Custom dimension and shapes
- Diameter from 5 to 500 mm
- Clear aperture: Central 90% of diameter
- Irregularity: λ/20@632.8nm
- Surface quality: 10-5 S/D
- Centration: ＜1′
- Standard and custom coating options available
- High laser damage threshold

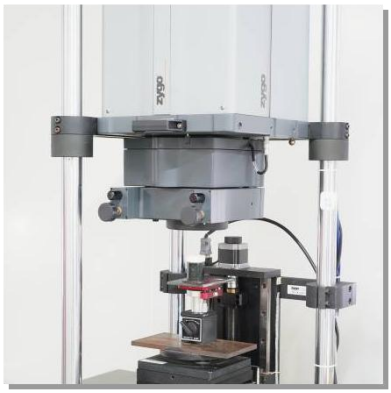
CASTECH offers an extensive line of spherical lenses, including Plano-Convex Lenses, Plano-Concave Lenses, Bi-Convex Lenses, Bi-Concave Lenses, Meniscus Lenses, Negative Meniscus Lenses as well as Achromatic Lenses.

CASTECH's precision spherical lenses are made from a wide variety of optical substrates such as Optical glass, Calcium Fluoride(CaF_2), Magnesium Fluoride(MgF_2), Fused Silica, Sapphire, Germanium (Ge), Silicon (Si), Zinc Selenide (ZnSe). Together with our multiple coating designs covering wavelength range of Ultraviolet (UV), visible, or Infrared (IR), we offer options that are ideal for use in various applications.

Metrology

ZYGO Interferometric Radius Slide System(IRS, based on ZMI): measure radius of curvature with high accuracy
Resolution: 10nm
Accuracy: greater than 3um or 0.001%

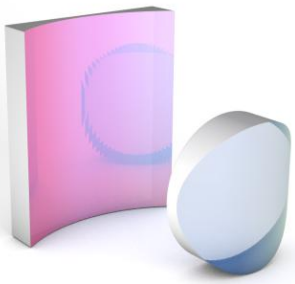
Trioptics OptiSpheric for comprehensive testing of optomechanical parameters of lenses



ZYGO GPI-XP Interferometer
measure power & irregularity(P-V)
with λ/50 accuracy

Trioptics Spherometer for radius of curvature measurement

Cylindrical Lenses

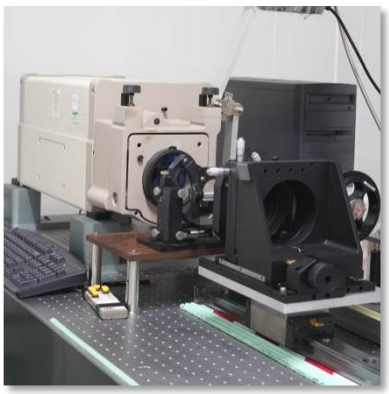


- Material from DUV to IR
- Custom dimension and shapes
- Diameter from 5 to 300 mm
- Clear aperture: Central 90% of diameter
- Irregularity : λ/10@632.8nm
- Surface quality: 10-5 S/D
- Centration: ＜1′
- Standard and custom coating options available
- High laser damage threshold

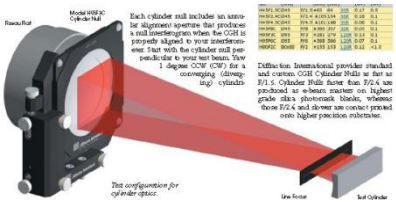
Cylindrical lenses condense or expand light in only one single dimension. CASTECH offers Plano-Convex Cylindrical Lenses, Plano-Concave Cylindrical Lenses and Achromatic Cylindrical Lenses, which are made of Optical glass, Fused Silica, CaF2 or ZnSe with uncoated or coated options and cover from ultraviolet(UV) to infrared(IR) spectral region. Utilizing a range of processing technologies including tradition polishing, high speed polishing or ion beam figure(IBF) and best-in-class metrology, CASTECH has the ability to ensure consistent high-quality performance of each lens.

Metrology

Computer Generated-Hologram (CGH) is commonly utilized as null for testing cylindrical optics. CASTECH equips with cylinder CGH which creates cylindrical wavefront to test a specific cylindrical surface. Each cylinder CGH is able to measure a family of cylindrical surfaces of similar F/# but different sizes.



ZYGO Interferometer for high accuracy cylindrical surface measurement
CGH transmission spheres: λ/10 surface accuracy



CGH Transmission Spheres

Aspherical Lenses

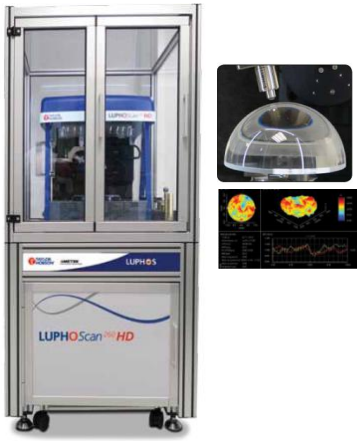
- Material from DUV to IR
- Custom dimension and shapes
- Diameter from 5 to 200 mm
- Clear aperture: Central 90% of diameter
- Irregularity : λ/10@632.8nm
- Surface quality: 10-5 S/D
- Centration: ＜3′
- Standard and custom coating options available
- High laser damage threshold

Aspheric lenses have its advantages in a range of applications where eliminated spherical aberration or (and) single element design is required. CASTECH offers CNC precision-polished aspherical and acylindrical lenses, with or without anti-reflection (AR) coatings. Our CNC polished aspheric lenses are iteratively ground and polished by a software supported computer-controlled processing center to provide better controlled surface quality, irregularity and focal length deviation.

Metrology

CASTECH employs rigorous verification procedure to guaranty the high performance of our each aspheric lens. Taylor Hobson Form Talysurf PGI profilometer allows contact measurement in grinding process while Taylor Hobson LuphoScan 260 non-contact 3D optical surface profilometer performs ultra precision optical surfaces form measurement in polishing process.

Taylor Hobson Form Talysurf PGI
Measure range: from 0.1 to 200 mm
Resolution ratio: 0.8nm



Taylor Hobson LuphoScan 260 for irregularity measurement
Measure range: from 5 to 260 mm
High surface accuracy: ±50nm

Single Wavelength Waveplates

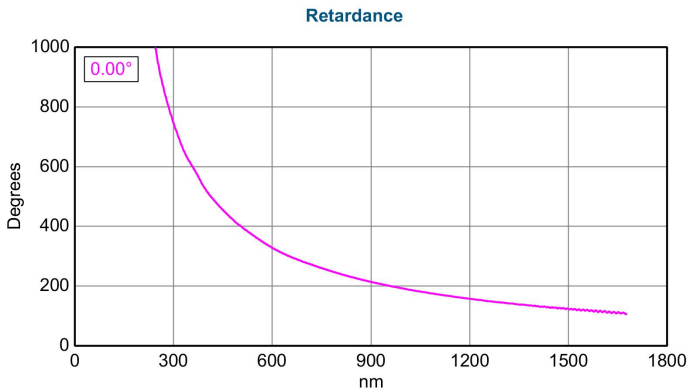
- Material: Crystal Quartz, MgF_2
- Custom dimension and shapes
- Diameter from 5 to 100 mm
- Clear aperture: Central 90% of diameter
- Transmission wavefront: λ/10@632.8nm
- Surface quality: 10-5 S/D
- Parallelism:＜3″
- Retardation accuracy: λ/500
- Standard and custom coating options available
- High laser damage threshold
- Mounted and unmounted waveplates are available

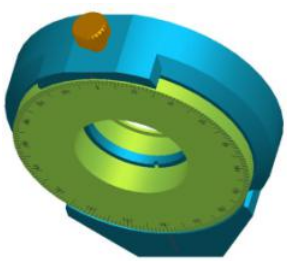
Wave retarders are used widely in applications like rotating polarization, transforming between linear and circular polarization. CASTECH offers quarter- and half-wave plates in a variaty of options including Multiple Order Waveplates, Cemented Zero-Order Waveplates, Airspaced Zero-Order Waveplates, True Zero-Order Waveplates, Dual Wavelength waveplates. CASTECH's waveplates feature high precision, high damage threshold level and more importantly, we have the capacity to design and customize specific ideal waveplates to fit your exact application.

Metrology

ZYGO Interferometer: parallelism& wave front
Parallelism measure accuracy: 0.5 ″

JAW Ellipsometry Retardation Measurement

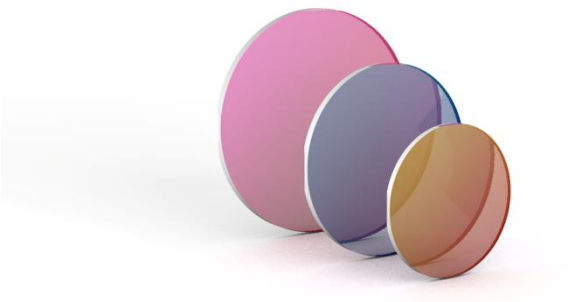




Rotating Holder

Retardance at 1064nm =180.005 (order =0) measured by JAW Ellipsometry

Achromatic Zero-Order Waveplates

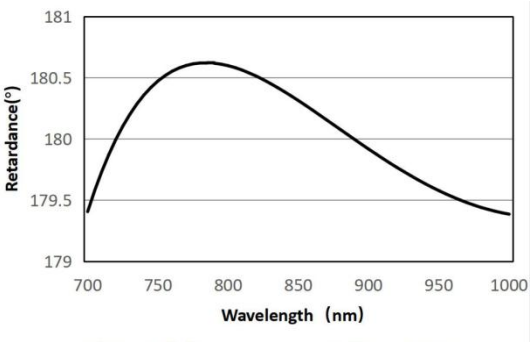


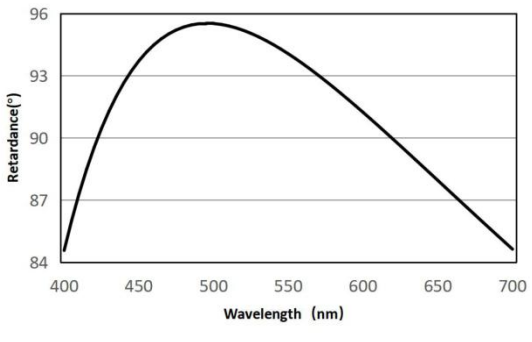
- Material: Crystal Quartz & MgF_2
- Custom dimension and shapes
- Diameter from 5 to 100 mm
- Clear aperture: Central 90% of diameter
- Transmission wavefront: λ/10@632.8nm
- Surface quality: 20-10 S/D
- Parallelism:＜1 ′
- Retardation tolerance up to λ /100 over the wavelength range
- Multiple wavelength ranges available
- High laser damage threshold
- Mounted and unmounted waveplates are available

Achromatic Zero-Order waveplates are made of two different birefringent crystalline materials, such as Crystal Quartz and MgF_2 to achieve wavelength independence comparing to single material waveplates which are very sensitive to the wavelength change. Achromatic waveplates is an ideal choice for tunable, multiple and board band wavelengths applications.

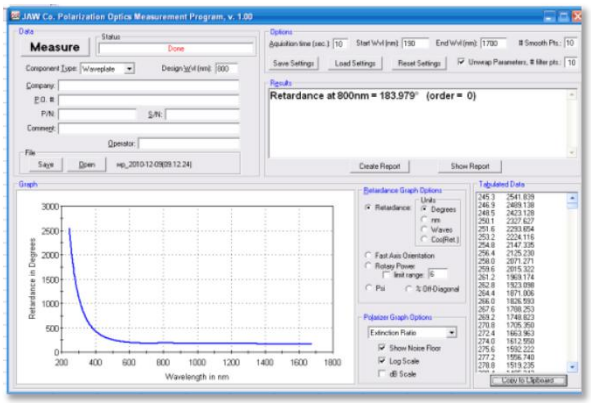
CASTECH designs Achromatic Zero-Order Crystal Quartz-MgF_2 waveplates with working wavelength range larger than 300nm and retardation accuracy better than λ/50 for λ/2 waveplate and better than λ/100 for λ/4 waveplate.

Metrology





JAW Ellipsometry Retardation Measurement



Retardation measured by Ellipsometry

Crystal Polarizers

- Material: Calcite, α-BBO, YVO_4, MgF_2 or Crystal Quartz
- Custom dimension and shapes
- Diameter from 5 to 25.4 mm
- Clear aperture: Central 90% of diameter
- Wavefront distortion: λ/4@632.8nm
- Surface quality: 20-10 S/D
- Beam deviation :＜3′
- Extinction ratio: 100,000:1
- Standard and custom coating options available
- High laser damage threshold

CASTECH offers an extensive production line of birefringent crystals for polarization applications. Our crystal polarizer family includes Glan-Taylor Polarizers, Glan-Laser Polarizers, Glan-Thompson Polarizers, Wollaston Polarizers, Rochon Polarizers and Quartz Polarization Rotators. Substrate options have α-BBO (UV), calcite (visible to Near-IR), yttrium orthovanadate (YVO_4, Near-IR to Mid-IR), MgF_2 (UV to Mid-IR), and crystal quartz (UV to Near-IR). Both the mounted and unmounted crystals are available. Contact us freely to select the ideal combination of construction type, substrate, coating design, angle of operation and laser damage resistance level to suit your applications.

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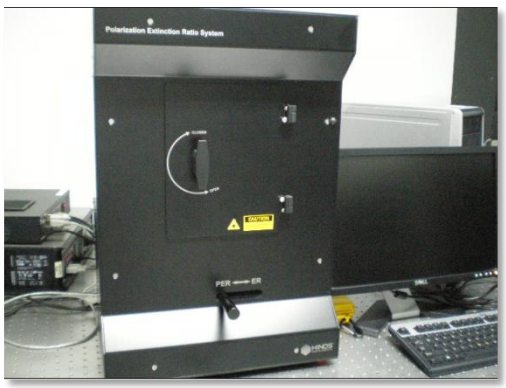
Metrology

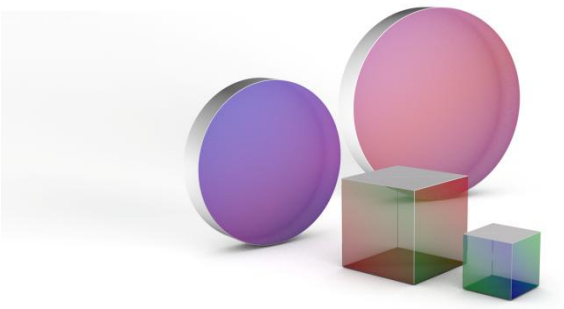
Extinction ratio is a important factor to consider when choosing a polarizer. CASTECH employs Polarization Extinction Ratio (PER) System which is an easy-to-use highly sensitive instrument for measuring both polarization extinction ratio (PER) and extinction ratio (ER).

ZYGO Interferometer for wave front & parallelism measurement
With λ/50 accuracy
Parallelism measure accuracy: 0.5 ″



Extinction Ratio Measurement
PER:>50dB
ER:>250000:1

Polarizing Beamsplitters

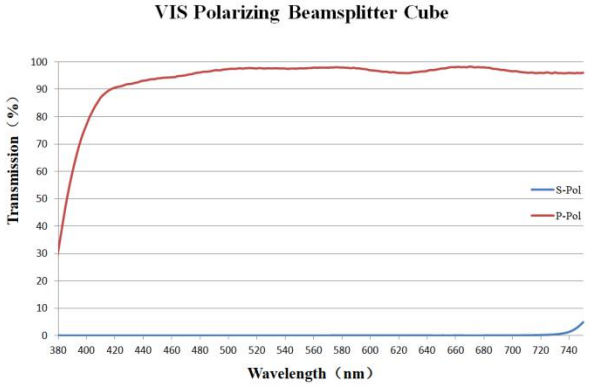


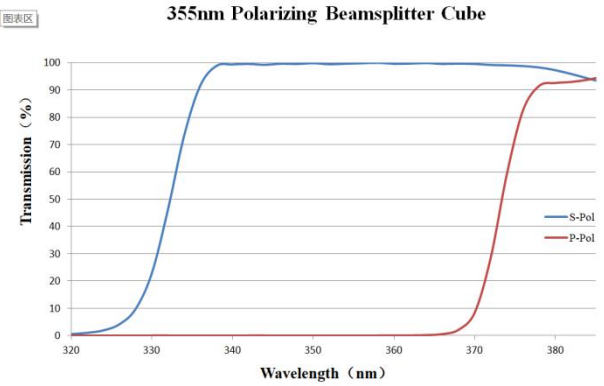
- Material from DUV to IR
- Custom dimension and shapes
- Diameter from 1 to 100 mm
- Clear aperture: Central 90% of diameter
- Wavefront distortion : λ/4@632.8nm
- Surface quality: 10-5 S/D
- Beam deviation :＜5′
- Extinction ratio: >1000:1 for Cube
- Standard and custom beamsplitter coating options available
- High laser damage threshold

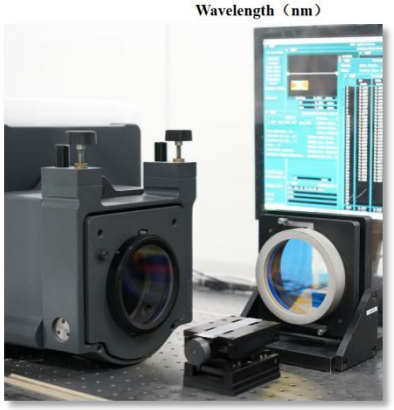
Polarizing Beamsplitters divide unpolarized beam into two orthogonal, linearly polarized parts. A wide variety of Polarizing Beamsplitters configurations are offered by CASTECH, including UV Laser Line Polarizing Beamsplitter Cubes, Laser Line Polarizing Beamsplitter Cubes, Broadband Polarizing Beamsplitter Cubes, Laser Line Polarizing Plate Beamsplitters, Broadband Polarizing Plate Beamsplitters. Coating is a critical portion of a high performance Polarizing Beamsplitters. CASTECH has extensive coating techniques and expertise of IBS, IAD, E-Beam & MS coating to suit high extinction ratio and high damage threshold needs.

High-energy Laser Line Polarizing Beamsplitter Cubes are constructed by optically contacting rather than cementing. With damage threshold up to 20 J/cm^2, they are ideal for high power laser application.

Metrology



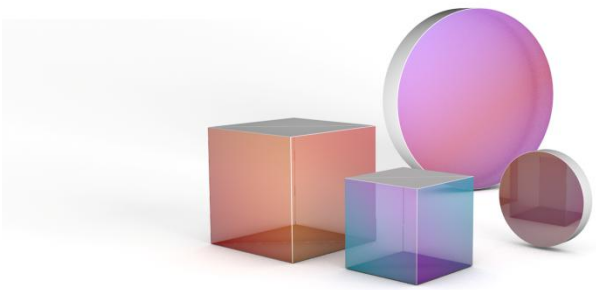




ZYGO Interferometer for wave front & parallelism Measurement
With λ/50 accuracy
Parallelism measure accuracy: 0.5 ″

Agilent Cary-7000 (2sets) for reflectivity testing ranging from175-3300nm

Non-Polarizing Beamsplitters

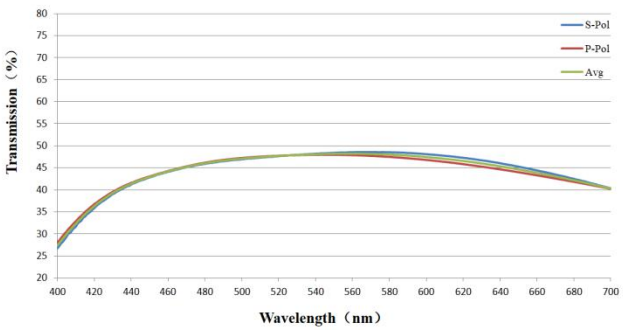


- Material from DUV to IR
- Custom dimension and shapes
- Diameter from 1 to 100 mm
- Clear aperture: Central 90% of diameter
- Wavefront distortion : λ/4@632.8nm
- Surface quality: 10-5 S/D
- Beam deviation :＜5′
- Custom beamsplitting coatings
- High laser damage threshold

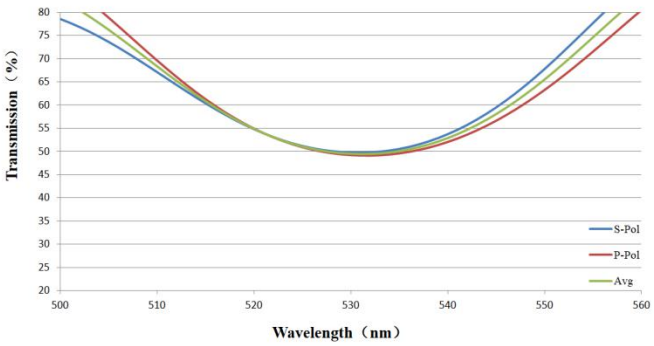
Non-Polarizing Beamsplitters divide incident beam into a specific percentage without altering the S and P-polarization state. CASTECH offers a variety of Non-Polarizing Beamsplitters in configuration including UV Laser Line Non-Polarizing Beamsplitter Cubes, Laser Line Non-Polarizing Beamsplitter Cubes, Broadband Non-Polarizing Beamsplitter Cubes, Broadband Non-Polarizing Plate Beamsplitters, Laser Line Non-Polarizing Plate Beamsplitters. Equipped with state-of-art coaters, our Beamsplitters are coated with all-dielectric coatings or broadband metal-dielectric hybrid coatings to increase system performance while maintaining high laser damage thresholds,

Metrology

VIS Non-Polarizing Beamsplitter Cube



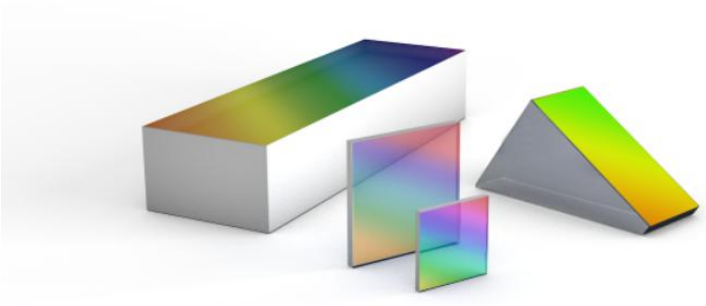
532nm Non-Polarizing Beamsplitter Cube



ZYGO Interferometer for wave front & parallelism measurement
With λ/50 accuracy
Parallelism measure accuracy: 0.5 ″

Agilent Cary-7000 (2sets) for reflectivity testing from 175mm to 3300nm spectral region

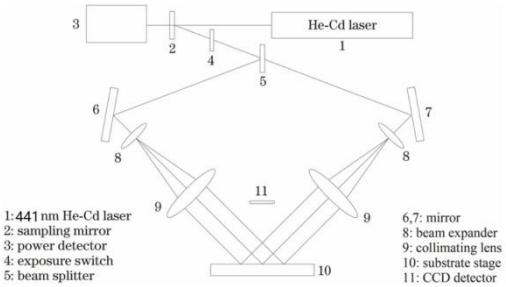
Diffraction Gratings for Telecommunication



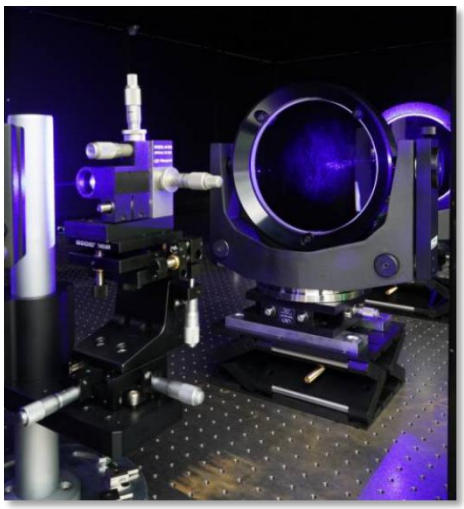
- Material from DUV to IR
- Custom dimension and shapes
- Wafer type: Plano or Prism
- Grating type: Transmission or reflection grating
- Line density: 940, 966.2,1200, and even up to 3000line/mm
- Line density tolerance: ± 0.5 line/mm
- Wavelength range: 1525-1575nm
- Central wavelength: 1550 nm
- Angle of incidence(AOI): Littrow or Customized
- Optical polarization: TE/TM
- Diffraction efficiency: ＞94.0%
- Clear aperture: ≥95%
- Wavefront distortion: λ/4@632.8nm
- Surface quality: 40-20 S/D
- Parallelism:＜ 0.1°
- Coating: Au or Dielectric coatings

CASTECH typically employs fused silica or ULE characterized with low absorption and superior stability for the fabrication of gratings. Other optical glass are also available upon request.

Our high DE reflection and transmission grating is ideal for WSS and other applications in optical communication industry. Generated by our state-of-art projection photolithography, holographic and ion etching technology, the precise realization of grating designs enable gratings to provide high diffraction efficiency and perfect uniformity. Customized solution is available from prototype building to high volume production.

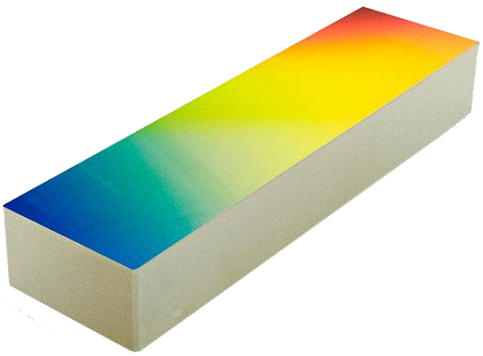


Kimmon He-Cd (Helium Cadmium) Laser



Holographic System

Diffraction Gratings for Pulse Compression



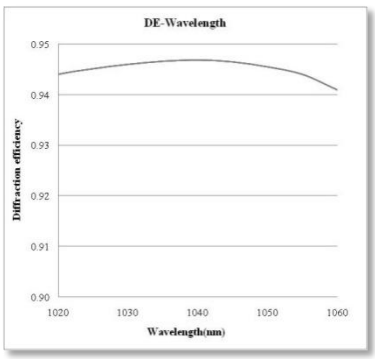
- Material from DUV to IR
- Custom dimension and shapes
- Grating type: Plano grating
- Line density: 1700line/mm
- Line density tolerance: ± 0.5 line/mm
- Wavelength range: 1020-1050nm
- Central wavelength: 1040 nm
- Angle of incidence(AOI): Littrow incidence
- Optical polarization: TM
- Diffraction efficiency: ＞94.0%
- Clear aperture: >90%
- Wavefront distortion: λ/4@632.8nm
- Surface quality: 40-20 S/D
- Parallelism:＜ 0.1°
- Coating: Au layer

CPA technique is widely used for generation of ultra-short and high energy pulse of lasers. Grating is one of the most critical components in the pulse stretch and compression system to determine their performance.

CASTECH's reflection grating has been successfully applied on pulse compression, which is created by our unique holographic, iron etching and replication technique. The grating delivers low scattering, high diffraction efficiency and features in extreme competitive pricing as well.

Customized solution is available from prototype building to high volume production.

Metrology



DE of Pulse Compressed Grating

Agilent Tunable Laser

Diffraction Efficiency Testing System

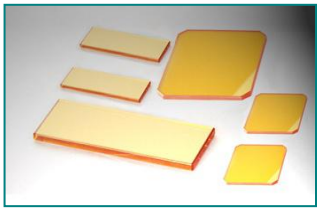
IR Optics

IR Optics

Spherical/Cylindrical Lenses

Reflection Mirrors

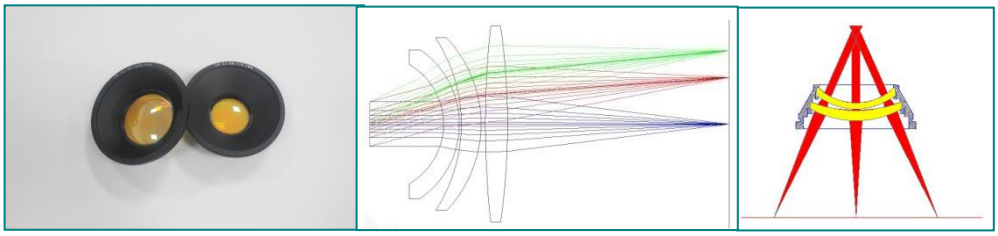
Prisms



Brewster Windows

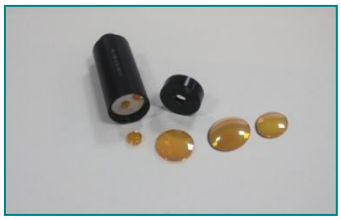
- Material: CVD ZnSe or ZnS with low absorption, high quality Si or Ge and Ghalcogenide Glass
- Custom dimension and shapes
- HR/AR coatings available upon custom request
- Competitive price and fast delivery.

IR Optics Components



F-Theta Scanning Lenses

Thermal Imaging



Beam Expanders

Focus Lenses

Coatings

Coating Centre

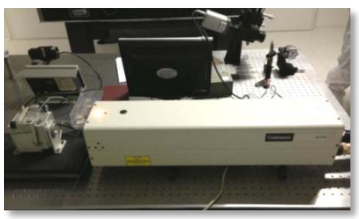
CASTECH has 30 sets of advanced chambers with advanced IBS, IAD, E-Beam & MS coating techniques. Various HR, AR, PR & Metallic coatings with an optimum of coating performance and high laser damage threshold in full spectrum are designed and manufactured.

Coating Technology	Coater	Qty
MS	China	3
IBS	Veeco	7
IAD	Veeco	1
IAD	Leybold	4
IAD	Optorun	4
IAD	Shincron	4
E-Beam	China	7

Metrology

CASTECH equips with a wide variety of metrology equipment to guarantee the coating specification, including Cavity-Ring-Down Loss Meter, Agilent Cary-5000, Agilent Cary-6000i, Agilent Cary-7000, Perkin Elmer Lambda-950, Spectrum 100FTIR and absorption measurement(PCI). For high laser damage threshold products, we have set up LDT measurement at multiple wavelengths. Every coating batch is tested to confirm your high-performance reflectivity values.

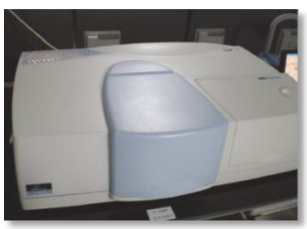
Surface absorption testing by PCI (355nm,532nm,1064nm)



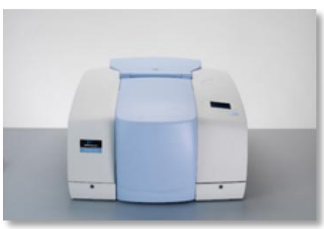
LDT Testing(266nm,355nm, 532nm, 1064nm)

Reliability Testing

Agilent Cary-6000i for 175-1800nm spectral region

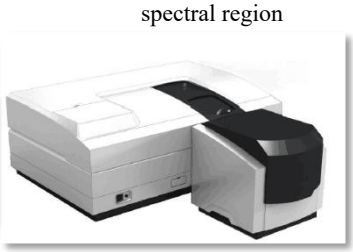


Perkin Elmer Lambda-950 for 175-3300nm spectral region



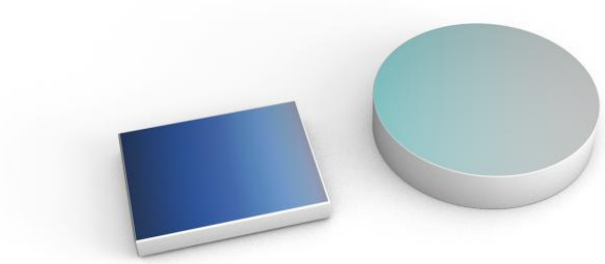
Spectrum 100FTIR for 2500-20000nm spectral region

Agilent Cary-5000 for 175-3300nm spectral region



Agilent Cary-7000 (2sets） for 175-3300nm spectral region

Broadband Low GDD Ultrafast Mirrors



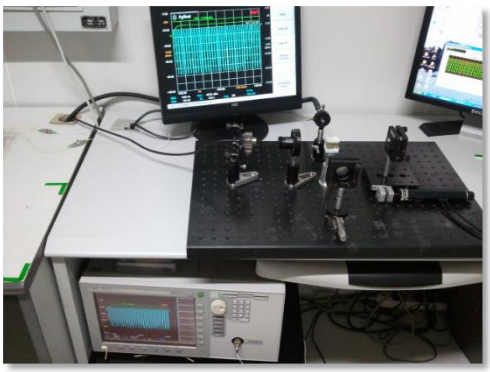
- Material: Fused Silica or N-BK7
- Custom reflectivity and GDD
- Dielectric broadband coatings
- High damage threshold

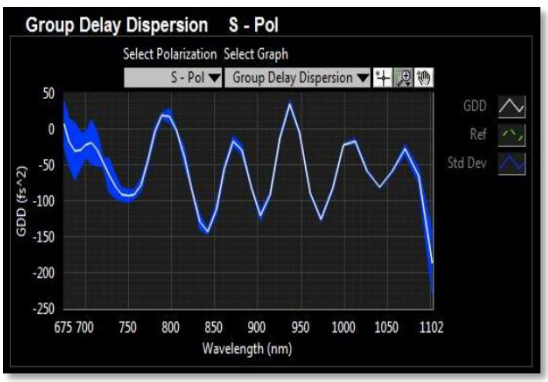
Broadband low GDD ultrafast mirrors are designed to be used in femtosecond laser applications. They are coated using electron beam multilayer dielectric or ion beam sputtering technologies. CASTECH offers different coatings for broadband low GDD ultrafast mirrors upon request.

Metrology

CASTECH offers group delay dispersion report by specialized GDD measurement in house. We have a wide range of measure instrument to guarantee high reflectivity, including Cavity-Ring-Down, Agilent Cary-5000, Agilent Cary-6000i, Agilent Cary-7000, Perkin Elmer Lambda-950 and Spectrum 100FTIR. Every coating batch is tested to promise high-performance reflectivity values to fit your needs.

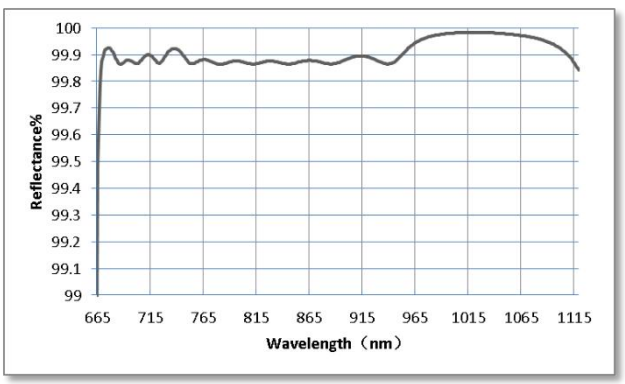
GDD Measurement System
GDD resolution: ± 5 fs^2





GDD= -50±100 fs^2

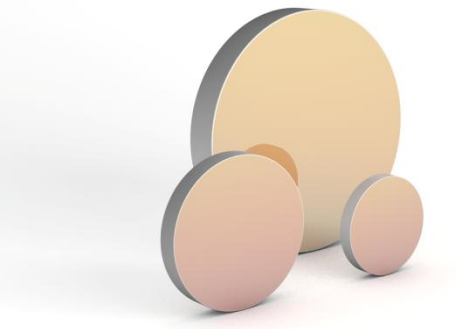
Angle of Incidence: 0-5°



R>99.7%@(675-1100)nm

Angle of Incidence: 0-5°

Gires-Tournois Mirrors



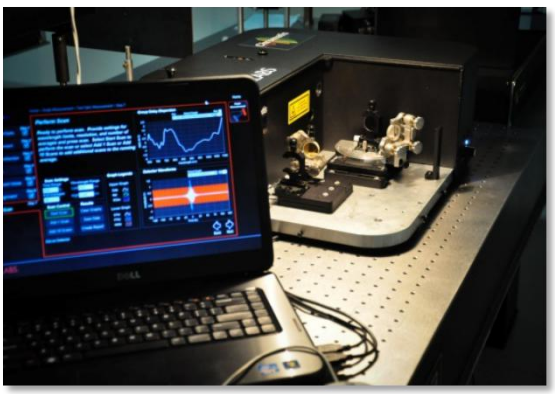
- Material: Fused Silica or N-BK7
- Custom reflectivity and GDD
- R_s & R_p >99.8% @design wavelength
- GDD from -250 to -600 fs^2
- High damage threshold

Below lists two standard dielectric broadband coatings offered by CASTECH. Other coatings can be designed upon your request.

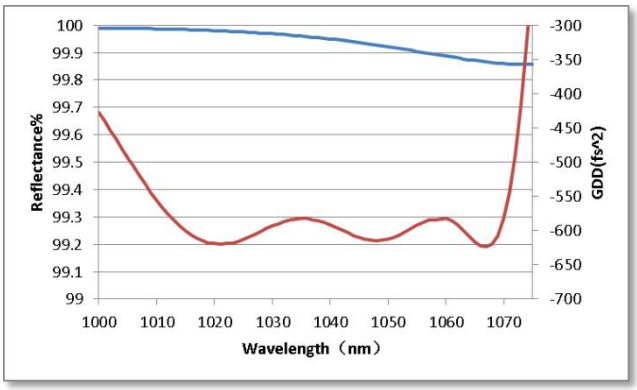
Coating Code	Center Wavelength (nm)	Angle of Incidence	Reflectivity per Surface
GT1	1020-1060	0°	R_s & R_p >99.8%
GT2	780-820	0°	R_s & R_p >99.8%

Metrology

The group delay dispersion (GDD) measurement system characterizes the GDD properties of reflective and transmissive optics that are used with femtosecond pulsed lasers. Ultrafast pulses broaden as they propagate through an optical system. Short pulse width can be recovered by knowing the GDD induced by each optics and compensating for the distortions appropriately. For highly accurate and reliable results, the GDD measurement uses time-domain white light interferometer to measure the GDD. This dispersion measurement system includes software that guides the user through beam alignment, automatically finds the zero time delay position, and rapidly and accuracy measures the dispersion. Every coating batch is tested in house by GDD measurement system to confirm your high-performance values.

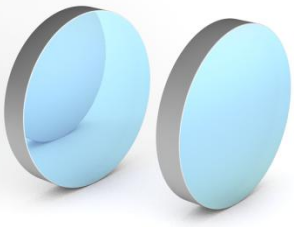


GDD Measurement System
GDD resolution: ± 5 fs^2



R_s & R_p >99.8% @(1020-1060)nm
Angle of Incidence: 0°

High Reflectivity Mirrors

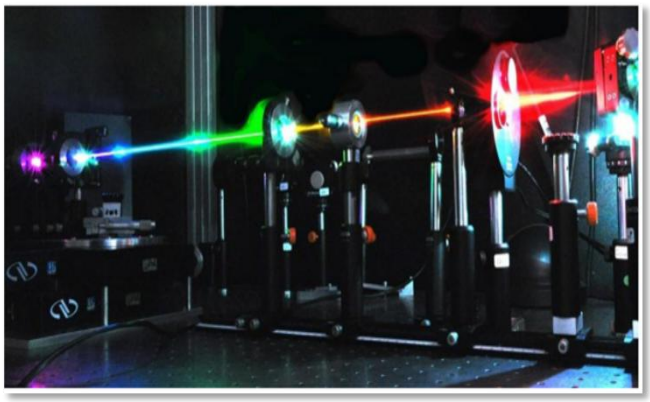


- Material from DUV to IR
- HR-266nm, HR-355nm, HR-532nm, HR-1064nm, HR-1550nm and custom wavelengths
- Best R>99.995% @1064nm
- Surface quality: 20-10 S/D
- Custom dimension and shapes

CASTECH designs and fabricates high reflectivity mirrors with high laser damage threshold for most demanding laser applications. We utilize super polishing and ion beam figure(IBF) technologies to prepare high-quality substrates. With multiple advanced coating systems and technologies, coupled with high accuracy total loss measurement based on Cavity-Ring-Down (CRD) and LDT measurement, we are able to deliver consistent high-quality mirrors featured not only high reflectivity, but high laser damage resistance and environmental stability.

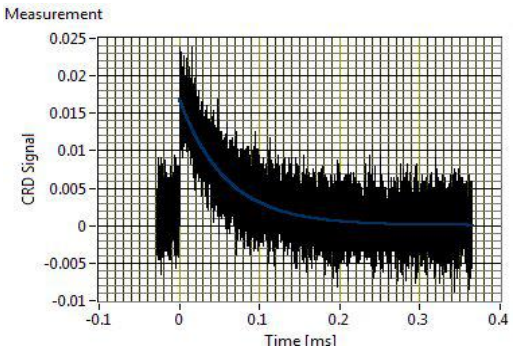
Metrology

High reflectivity in the order of R = 99.9~99.995% are measured by Cavity-Ring-Down technique. CRD technique is a direct absorption technique based upon the measurement of the rate of absorption rather than the magnitude of absorption of a light pulse confined in a closed optical cavity with a high Q-factor. CRD measure instrument guarantees high reflectivity accuracy.



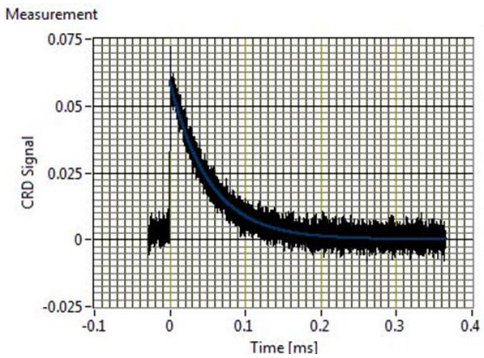
Cavity-Ring-Down (CRD) Technique

Reference Mirror: 0.999978
Calculated Reflectivity: 0.999951 +/- 0.000002



Reflectivity @532nm measured by CRD

Reference Mirror: 0.999973
Calculated Reflectivity: 0.999955 +/- 0.000002



Reflectivity @1064nm measured by CRD

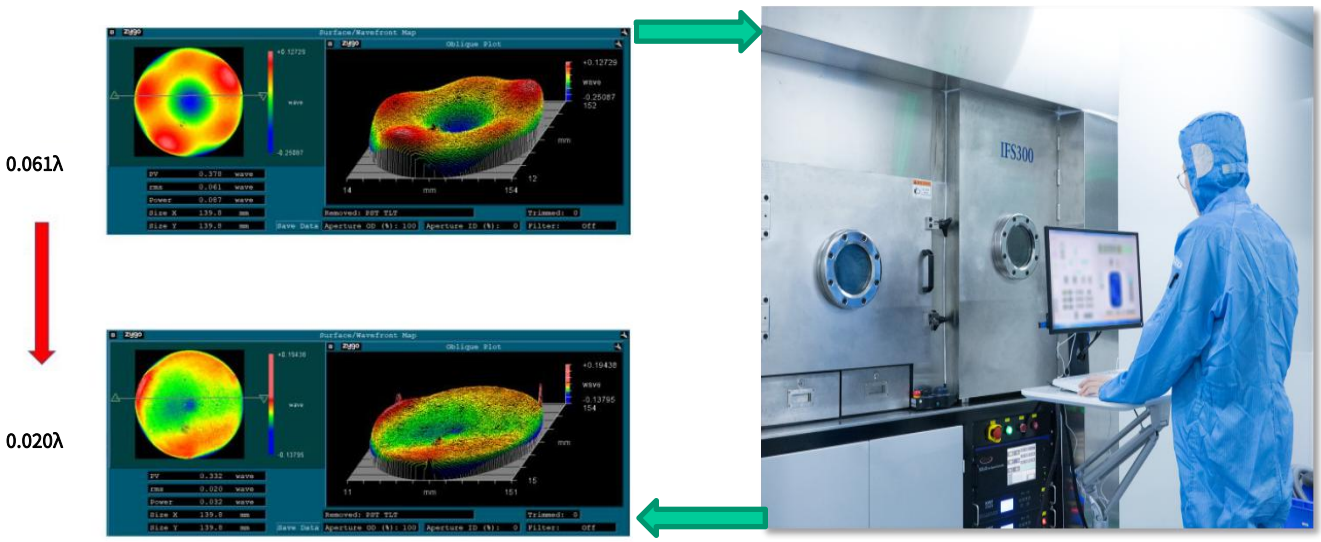
High Flatness Optics

Ion Beam Figuring(IBF)

The ion beam figuring (IBF) process is realized as the most precise technology of optical surface figure correction. A Gaussion formed beam of accelerated ions operating in a vacuum environment bombards into the surface of workpiece to remove the material by physical sputtering at the atomic level. Following the time dwell strategy employed, the accurately controlled Ion Beam spot transits over the surface to generate the desired surface shape.

CASTECH offers nanometer flatness quality by its IBF machine with a computer-controlled three-axes precision motion system. Up to 300mm large size components could be treated at most geometries by a diverse range of optical materials.

- Excellent stability of atomic level removal
- Contactless process without induced stress
- Flat, Spherical, Aspherical surfaces workable
- Surface quality PV < λ/40 achievable



4D Interferometer(FizCam 2000) for high accuracy measurement of flatness

ZYGO GPI-XP Interferometer for wave front & parallelism measurement
With λ/50 accuracy
Parallelism measure accuracy: 0.5 ″

Super Polished Optics

- Surface roughness down to 1Å (substrate made from Fused Silica)
- Ultra-low surface scatter
- Flatness: λ/10
- Surface quality: 10-5 S/D
- High laser damage threshold

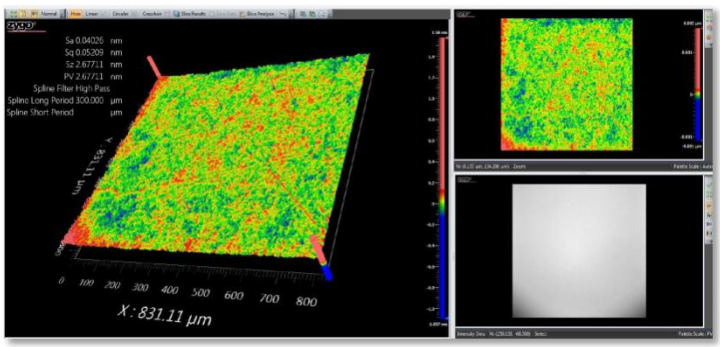
The emerging demands of ultraprecision optics driven by the industries of Semiconductor, Space Optics and Laser fusion requires not only high precision form accuracy but also super smooth surface on molecular scale.

CASTECH offers super polished optics with extremely smooth surfaces. Our unique technology could process a surface roughness below 1 Å roughness on plano surface made from Fused silica. We will be happy to help you determine the roughness values on basis of customized size, surface shapes and materials.

Metrology

The measurement of roughness is carried out by our Zygo New View 8300 coherence scanning interferometer or Atomic Force Microscopy (AFM) with excellent precision and accuracy.

Zygo New View 8300



Roughness measured by Zygo New View 8300

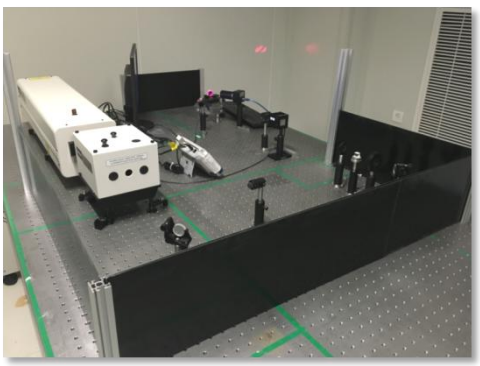
High Laser Damage Threshold Optics

The Laser Induced Damage Threshold (LIDT) is one of the most critical parameters for laser systems especially for high power applications. The damage may be initiated and driven by different mechanisms predominantly known as thermal effects or field strength effects. Absorption and Defects contribute to many cases of breakdown varied with different laser conditions.

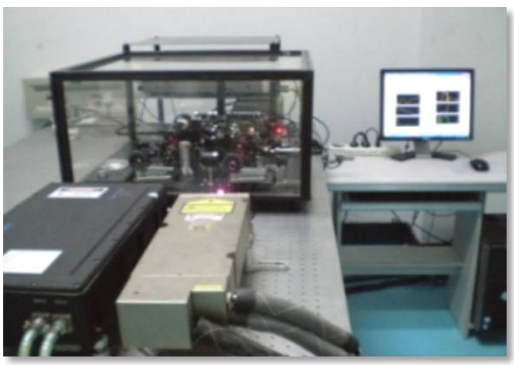
With decades of knowledge and experience in laser industry, CASTECH masters both super polishing and IBS coating techniques which could exhibit extremely low optical losses and high laser induced damage threshold. The weak absorption of coatings and substrates down to 1ppm could be detected by our photothermal common-path interferometer. Combined with the selected right materials, we are capable of delivering laser optics with remarkable performance for the challenging applications.

Metrology

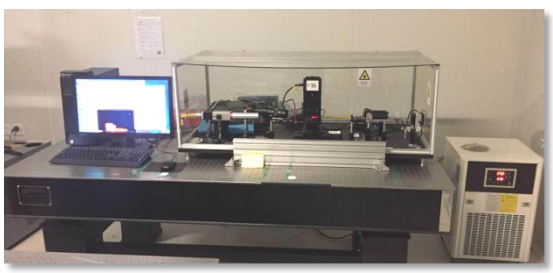
CASTECH has built LIDT measurement systems in house working at 266 nm, 355 nm, 532 nm and 1064 nm with pulse duration of 5ns. Either 1-on-1 or S-on-1 regime is available.



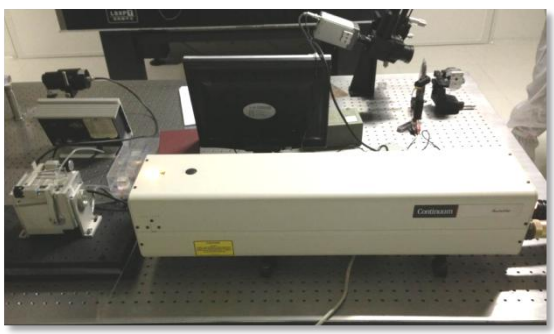
266nm laser damage threshold testing system
Repetition frequency : 1-10Hz
Pulse width: 5ns



Bulk and surface absorption testing by PCI
(355nm,532nm,1064nm)

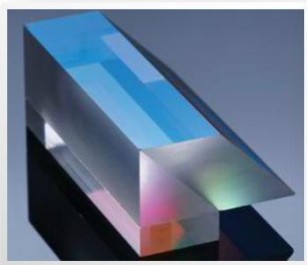


1064nm laser damage threshold testing system(CW,100W)



1064nm, 532nm & 355nm laser damage threshold testing system
Repetition frequency : 1-10Hz
Pulse width: 5ns

Optical Assembly



- Component types: Glass-Glass and Glass-Metal
- Bonding methods: Epoxy bonding, Optical Contact, Optical diffusion bonding
- Diameter ranged from 1 to 400 mm
- Transmitted wavefront Distortion : up to λ/20 @632.8nm
- Transmitted & reflected beam deviation : ± 1 ' to ±5 '
- Customized design available
- High laser damage threshold

CASTECH has integrated various polishing and coating technologies to address optimized solutions to different applications focusing on ultra-precise finishing with even fine subsurface properties or costs-efficiency. We work closely with our customers on engineering building and mass production of a complete portfolio of optics components including aspherical lens, spherical lens, cylinders, gratings, mirrors, windows, prisms and beamsplitters made out of an extensive range of materials.

By combining manufacturing with our advanced bonding processes, we are able to produce high quality multi-optical elements and optomechanical assemblies. Some typical parts include optical diffusion bonded polarization beamsplitter cubes used in high power laser systems, customized lens solutions like objective lenses, telecentric F-Theta lenses and collimators for a wide range of applications.

Metrology

CASTECH has strong testing capabilities to precisely characterize the performance of our optical assemblies. A variety of advanced metrology systems are applied to guarantee the precise measurements of optical, mechanical, and reliability properties.

Trioptics OptiSpheric

ZYGO GPI-XP Interferometer for wave front & parallelism measurement
With λ/50 accuracy
Parallelism measure accuracy: 0.5 ″

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