Company Profile

德硅凯氟 DESIOPTOE

SHANGHAI DESIOPTOE TECHNOLOGY CO., LTD

光学晶体研究院
德硅凯氟 DESIOPTOE
DESIOPTOE Institute of Optical Crystals

德硅凯氟 DESIOPTOE
中国科学院 CHINESE ACADEMY OF SCIENCES
上海德硅凯氟光电科技有限公司
中国科学院上海硅酸盐研究所
氟化物晶体联合实验室

中小企业
上海德硅凯氟光电科技有限公司
上海市经济和信息化委员会

Shanghai Desioptoe Technology Co., Ltd is a leading supplier of fluoride crystals. Founded through a collaboration between the Shanghai Institute of Ceramics, Chinese Academy of Sciences and private capital, **DESIOPTOE** operates with a registered capital of 86.66 million RMB. It is headquartered in Nanxiang Town, Jiading District, Shanghai and employs a workforce of over a hundred professionals.

DESIOPTOE specializes in the growth, processing, and testing of high-quality fluoride and doped fluoride crystal materials—including CaF_2, MgF_2, BaF_2, LiF, and SrF_2—as well as the customization of various high-precision optical components.

KEY ADVANTAGES

R&D

Established DESIOPTOE Institute of Optical Crystals and jointly founded a laboratory with the Shanghai Institute of Ceramics, Chinese Academy of Sciences to engage in the R&D and industrialization of optical crystal materials.

Products

Self-developed fluoride such as CaF_2, MgF_2, BaF_2, LiF, SrF_2 and doped fluoride crystal materials have achieved domestically leading levels in multiple critical performance indicators, including monocrystal diameter, UV transmittance, laser durability, stress birefringence, optical homogeneity, etc.

Production Capacity

The production capacity of various fluoride crystals ranks among the top globally, enabling us to meet customers' bulk demands for high-quality optical crystal materials and high-precision optical components.

Quality

Formulated the national standard for calcium fluoride crystals (GB/T 44567 - 2024), equipped with advanced testing equipment, established a comprehensive quality management system, and achieved certifications to ISO9001:2015 and ISO14001:2015 standards.

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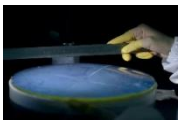
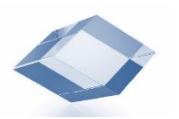
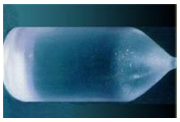
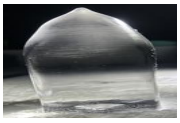
Tel: +86-21-31081290 **E-mail:** ib@desioptoe.com
Website: http://www.desioptoe.com/ **Facebook:** Desioptoe Shanghai
Add: Workshop 4, No. 485 Xiangjiang Road, Shanghai, China

Contents






Fluoride Crystal Materials

101	CaF_2
102	MgF_2
103	BaF_2
104	LiF
105	SrF_2
106	$LiYF_4$
107	$Nd:CaF_2$
108	$Yb:CaF_2$
109	$BaF_2:Y$

Fluoride Coating Materials

201	CaF_2
202	MgF_2
203	BaF_2
204	LiF
205	LaF_3
206	AlF_3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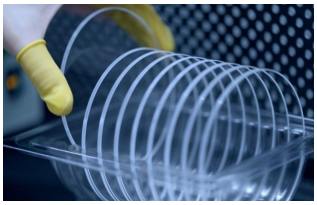

Customized Optical Components		
	301	Plate
	302	Lens
	303	Prism
	304	Cylindrical Lens
	305	Infrared Measurement Window

Ceramics		
	401	Magnesium Aluminate Spinel ($MgAl_2O_4$)

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Calcium Fluoride

CaF_2 Datasheet

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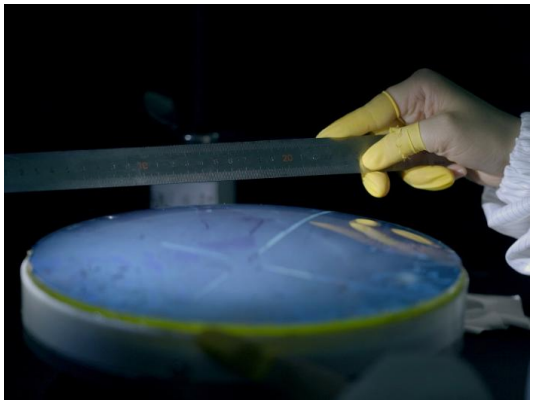


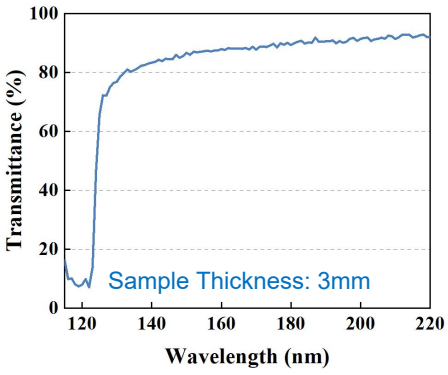
DESIOPTOE is a professional manufacturer of fluoride crystals. With our superior crystal growth technology, **DESIOPTOE** has improved the durability of CaF_2 crystal under long-term exposure to high-power UV lasers, making it an excellent choice for semiconductor lithography, semiconductor inspection, excimer lasers, DUV solid lasers, deep space exploration, microscopy, and other DUV applications.

Due to the excellent transmittance performance of CaF_2 crystal in the DUV-VIS-IR spectrum, as well as its physical stability, chemical inertness and good processability, CaF_2 crystal can be widely used in various optical applications, such as astronomy, photography, HDTV zoom lenses, microscopes, infrared systems, spectrometers, and medical lasers, etc.

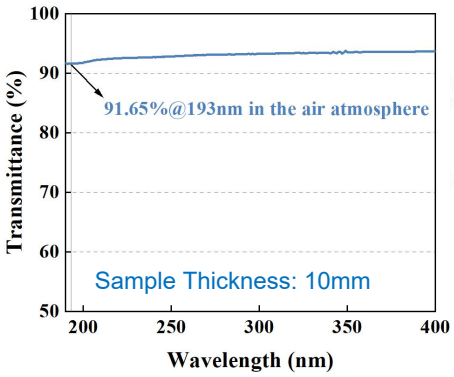
DESIOPTOE provides CaF_2 crystal blanks and optical components in various specifications within 600mm, offering products with standard crystal orientations and supporting customized crystal orientations.

KEY ADVANTAGES

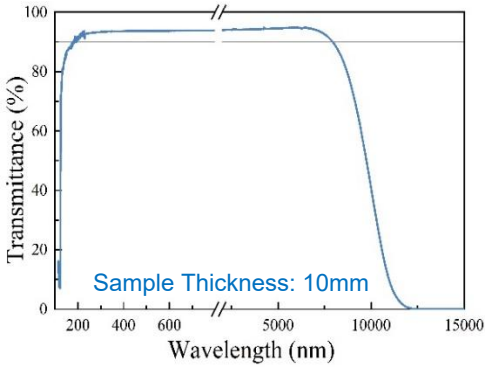
- **Broad Spectrum High Transmittance**
- **High Laser-Induced Damage Threshold**
- **Low Stress Birefringence**
- **High Optical Homogeneity**



VUV Transmittance



UV Transmittance: 91.65%@193nm



Full-SpectrumTransmittance

General Grades

Material Grade	Internal Transmittance	Laser Durability	Stress Birefringence	Recommended Wavelength
CAF - A	>99.8%@193nm	LD-1	0-10nm/cm on request	ArF excimer laser (193nm)
CAF - B	>99.8%@248nm	LD-2		KrF excimer laser (248nm)
CAF - C-I	>99.8%@365nm	LD-3		i-line 365nm
CAF - C-II	>99.8%@365nm	~		UV region
CAF - D-I	~	~		VIS region, IR region, Monocrystal
CAF - D-II	~	~		Polycrystal

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Optical Properties

n_d =1.43384
n_e =1.43492
v_d =95.23
v_e =94.96
N_F - N_c =0.00456
$N_{F'}$ - $N_{c'}$ =0.00459

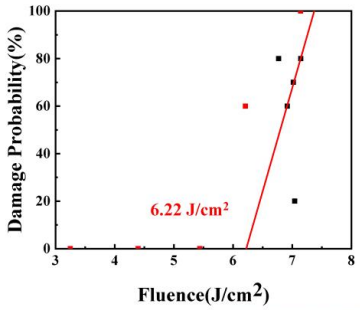
Refractive index

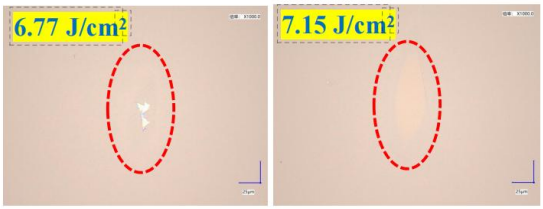
Measured at 22 ℃, Nitrogen gas 1013hPa

	λ_{vac}[nm]	n	△n/△T(N_2)[10^{-6}/K]
n_{2325}	2325.59	1.42212	—
n_{1970}	1970.56	1.42401	—
n_{1530}	1530	1.42612	—
n_{1060}	1060	1.42851	—
n_t	1014.25	1.42879	-9.6
n_s	852.35	1.43002	-9.7
n_r	706.71	1.43166	-9.7
n_C	656.45	1.43245	-9.8
$n_{C'}$	644.03	1.43267	-9.8
n_{He-Ne}	632.98	1.43288	-9.8
n_D	589.46	1.4338	-9.8
n_d	587.73	1.43384	-9.8
n_e	546.23	1.43493	-9.8
n_F	486.27	1.43701	-9.8
$n_{F'}$	480.13	1.43726	-9.8
n_g	435.96	1.43948	-9.7
n_h	404.77	1.44149	-9.6
n_i	365.12	1.44488	-9.4
n_{334}	334.24	1.44848	-9.1
n_{312}	312.66	1.45173	-8.8
n_{296}	296.82	1.45463	-8.5
n_{280}	280.43	1.45824	-8.1
n_{248}	248.35	1.46791	-6.9
n_{194}	194.23	1.5006	-3.2
n_{193}	193.37	1.50143	-3.2
n_{184}	184.95	1.51055	-2.5
n_{157**}	157.63	1.55927	—

Relative Partial Dispersion		Deviation of Relative Partial Dispersion	
$P_{s,t}$	0.2698	△PC,t	-0.194
$P_{C,s}$	0.5333	△PC,s	-0.092
$P_{d,C}$	0.3046	△PF,e	0.0183
$P_{e,d}$	0.2388	△Pg,F	0.0552
$P_{g,F}$	0.5389	△Pi,g	0.2636
$P_{i,h}$	0.7462	△PC,t	-0.194

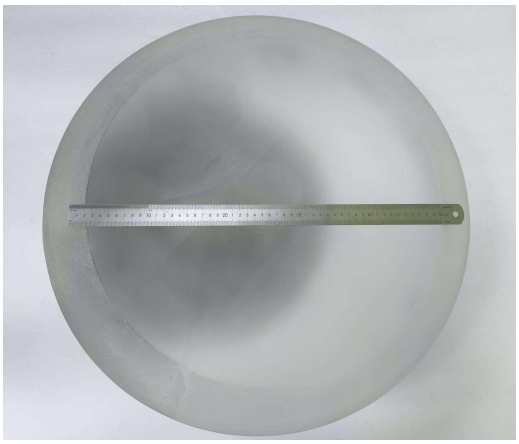
Laser-Induced Damage Threshold (LIDT) of Calcium Fluoride (CaF_2)





Laser-Induced Damage Threshold:
@193nm: ~ 6.22J/cm² (6.7ns @193 nm)
~7.5J/cm² (10ns @ 193nm)

Calcium Fluoride Crystal Diameter: 620mm



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Physical Properties

Crystal Structure	Cubic, Fluorite Type
Cleavage Plane	(111)
Lattice Constant	a=0.546
Molecular Mass	78.08 g/mol
Density	3.18 g/cm³
Melting Point	1420 ℃
Solubility	1.6 g/L H_2O at 20 ℃

Chemical/Electrical Properties

Dielectric Constant		6.81 at 27 ℃
Weathering Resistance Class	CR	1
Acid Resistance Class	SR	4.5
Alkali Resistance Class	AR	2.3
Phosphate Resistance Class	PR	1.3
Stain Resistance Class	FR	0

Thermal Properties

Specific Heat Capacity	0.893 J/(g · K)
Thermal Conductivity	9.70 W/(m · K)
Thermal Diffusivity	35.6×10^{-7} m²/sec
Linear Thermal Expansion Coefficient	20.8×10^{-6}/K at (20 ~ 300 ℃) 18.41×10^{-6}/K at (-30 ~ 70 ℃) 18.5×10^{-6}/K at (0 ~ 25 ℃)

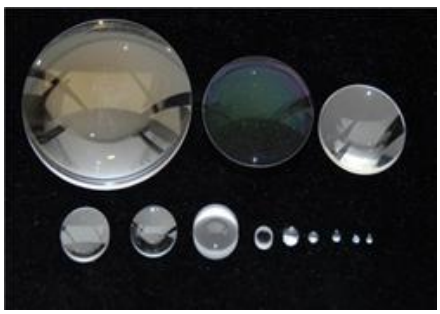
Mechanical Properties

Bulk Modulus	(GPa)	83.8
Shear Modulus	(GPa)	34.6
Young's Modulus	(GPa)	<100> 146 <110>101 <111>91
Poisson's Ratio	μ	0.343
Knoop Hardness		82
Mohs Hardness		4

Optical Fabrication Capacity

DESIOPTOE can provide various types of optical fabrication, such as grinding, polishing, and coating.

Scratch/Dig Limit	10-5
Micro-roughness Limit	≤ 0.2nm
Wavefront errors Limit	λ/10
Crystal Orientations	Custom crystal orientations are available upon request
Surface Finishing	TSK/ Wire Cutting, Fine Grinding, Precision Polishing, Coating
Optical Components	Windows, Wedges, Prisms, Various Types of Lenses, etc.



Magnesium Fluoride

MgF_2 Datasheet

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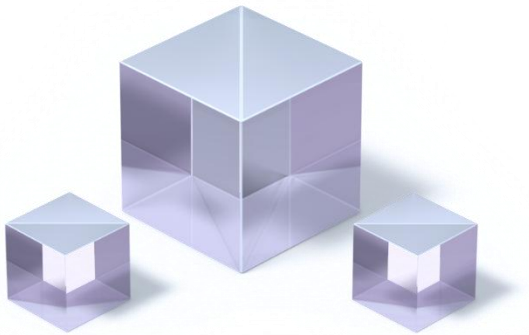


DESIOPTOE is a professional manufacturer of fluoride crystals.

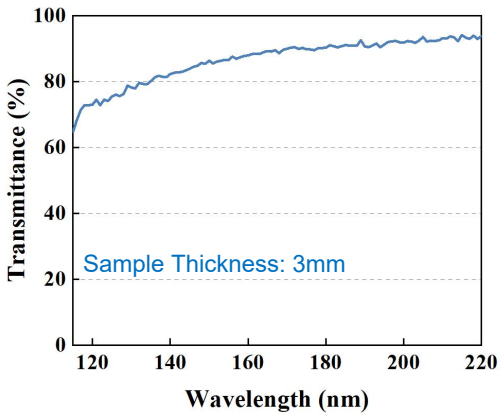
DESIOPTOE's superior crystal growth technology ensures the production of high-quality MgF_2 crystals, enabling them to be widely adaptable to optical applications across various wavelengths.

MgF_2 is a crystal material with excellent optical and mechanical properties. MgF_2 crystals manufactured by **DESIOPTOE** have a low absorption in the VUV-DUV-VIS-IR bands, making them suitable for high-power laser irradiation applications throughout these wavelength ranges and durable in high-power lasers. MgF_2 crystal exhibits natural birefringence, which enables their wide application in polarization optics.

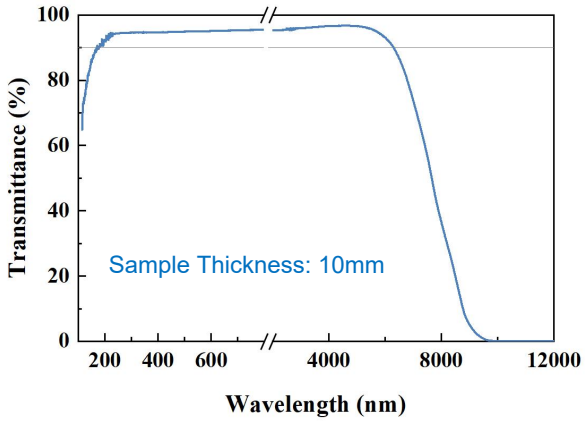
DESIOPTOE provides MgF_2 crystal blanks and optical components in various specifications within 200mm, offering products with standard crystal orientations of (001), (110) and (100) and supporting customized crystal orientations.

KEY ADVANTAGES

- **Broad Spectrum High Transmittance**
- **High Laser-Induced Damage Threshold**
- **Excellent mechanical properties**
- **Low absorption**



VUV Transmittance



Full-SpectrumTransmittance

General Grades

Material Grade	Crystal Structure	Recommended Wavelength
MGF-A	Single Crystal/ Monocrystal	VUV-UV
MGF-B	Polycrystal	VIS-IR
MGF-C	Polycrystal	-

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Physical Properties

Crystal Structure	Tetragonal System
Cleavage Plane	(100) (110)
Lattice Constant	a=4.64, c=3.06
Molecular Mass	62.302 g/mol
Density	3.148 g/cm³
Melting Point	1255 ℃
Dielectric Constant	parallel C axis 4.87 perp C axis 5.44

Thermal Properties

Heat Capacity	0.92 J/(g · K)
Thermal Conductivity	parallel C axis 21.0 W/(m · K) perp C axis 33.6 W/(m · K)
Linear Thermal Expansion Coefficient	parallel C axis 13.7 × 10^{-6}/K perp C axis 8.9 × 10^{-6}/K

Mechanical Properties

Bulk Modulus	(GPa)	101.32
Shear Modulus	(GPa)	54.66
Young's Modulus	(GPa)	138.5
Poisson's Ratio	μ	0.276
Knoop Hardness		415
Mohs Hardness		6

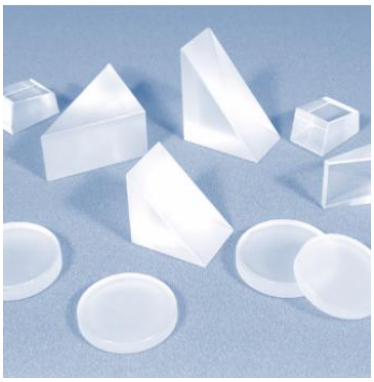
Refractive Index @ 19 ℃

λ(μm)	n_o	n_e	β（n_e-n_o）
0.2	1.42309	1.43657	0.01348
0.24	1.40567	1.41859	0.01292
0.28	1.3962	1.40877	0.01257
0.32	1.3904	1.40275	0.01235
0.36	1.38656	1.39875	0.01219
0.4	1.38387	1.39594	0.01207
0.44	1.38189	1.39389	0.012
0.48	1.3804	1.39233	0.01193
0.52	1.37923	1.39111	0.01188
0.56	1.37829	1.39013	0.01184
0.6	1.37752	1.38932	0.0118
0.64	1.37688	1.38865	0.01177
0.68	1.37633	1.38808	0.01175
0.72	1.37585	1.38758	0.01173
0.76	1.37543	1.38714	0.01171
0.8	1.37506	1.38674	0.01168
0.84	1.37472	1.38639	0.01167
0.88	1.3744	1.38606	0.01166
0.92	1.37411	1.38575	0.01164
0.96	1.37384	1.38546	0.01162
1	1.37358	1.38519	0.01161
1.4	1.37134	138281	0.01147
1.8	1.36908	1.3804	0.01132
2.2	1.36649	1.37763	0.0114
2.6	1.36346	1.3744	0.01094
3	1.35995	1.37063	0.01068
3.4	1.35591	1.36631	0.0104
3.8	1.35133	1.36141	0.01008
4.2	1.34618	1.35589	0.00971
4.6	1.34043	1.34972	0.00929
5	1.33404	1.34288	0.00884
5.1	1.32699	1.33532	0.00833
5.8	1.31923	1.327	0.00777
6.2	1.31072	1.31786	0.00714
6.6	1.30142	1.30787	0.00645
7	1.29125	1.29694	569

Optical Fabrication Capacity

Internal Transmittance	>99.8%@193nm
Refractive Properties	Birefringent Crystal
Bubbles/Inclusions	ISO 10110 – 1 x 0.02
Scratch/Dig Limit	10-5
Micro-roughness Limit	≤ 0.2nm
Crystal Orientations	(111) (001) (100) orientations are offered
Surface Finishing	TSK/ Wire Cutting, Fine Grinding, Precision Polishing, Coating
Coatings	Anti-Reflection, High-Reflection

DESIOPTOE can provide various types of optical fabrication, such as grinding, polishing, and coating.



Barium Fluoride

BaF_2 Datasheet

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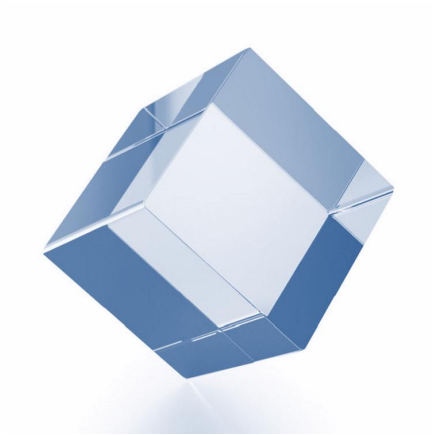

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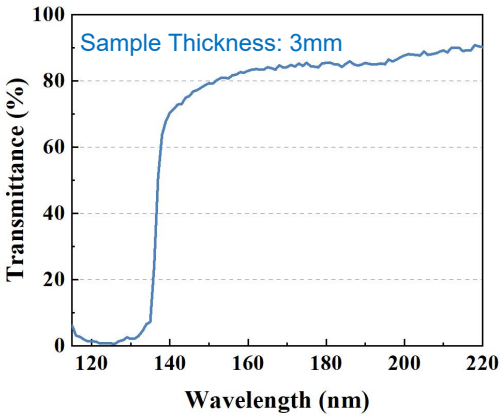
With our superior crystal growth technology, BaF_2 crystals manufactured by **DESIOPTOE** have good optical transmittance performance, enabling their wide application in thermal imaging, night vision, and broadband surveillance imaging detectors (integrating applications VIS-IR).

The low spectral dispersion of BaF_2 makes it an excellent material choice for aberration and color correction. BaF_2 is an excellent scintillation crystal and performs well under high-energy γ radiation.

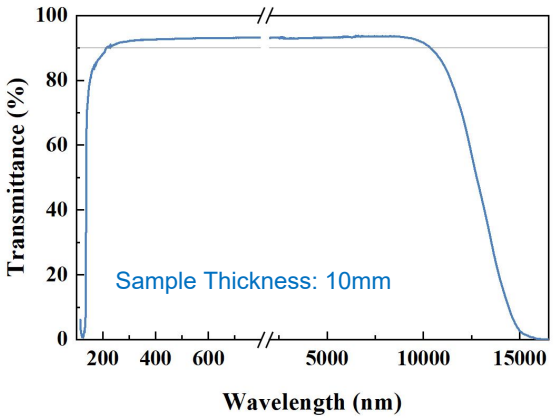
DESIOPTOE can supply BaF_2 crystal blanks and optical components in various specifications within 300mm, supporting customization of different crystal orientations for customers.

KEY ADVANTAGES

- **Low Refractive Index**
- **Low Spectral Dispersion**
- **Scintillator Crystal**
- **High Transmittance in the VIS/Near-IR/Mid-IR Range**



VUV Transmittance



Full-SpectrumTransmittance

General Grades

Material Grade	Crystal Structure	Stress Birefringence	Recommended Wavelength
BAF-A	Single Crystal/ Monocrystal	≤10nm/cm on request	Optical Grade
BAF-B	Polycrystal		Optical Grade
BAF-C	Polycrystal		IR Windows

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Physical Properties

Crystal Structure	Cubic
Cleavage Plane	(111)
Lattice Constant	a=0.6196 Å
Molecular Mass	175.3 g/mol
Density	4.89 g/cm³
Melting Point	1386 ℃
Solubility	1.6 g/L (20 ℃)

Abbe Number	
Vd=81.61	Ve=81.02

Thermal Properties

Heat Capacity	410 J/(kg · K)
Thermal Conductivity	11.72 W/(m · K)
Linear Thermal Expansion Coefficient	18.1×10^{-6}/K

Mechanical Properties

Bulk Modulus	(GPa)	56.4
Shear Modulus	(GPa)	25.4
Young's Modulus	(GPa)	53.07
Poisson's Ratio		0.343
Mohs Hardness		3
Knoop Hardness		82

Refractive Index @ 19 ℃

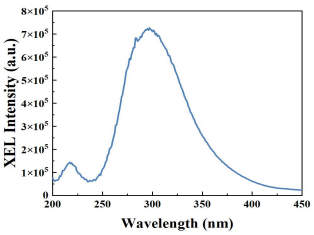
λ[nm]	n	λ[nm]	n
265.2	1.51217	1014	1.46847
280.4	1.50668	1128.7	1.46779
289.4	1.5039	1367.3	1.46673
296.7	1.50186	1529.5	1.46613
302.2	1.50044	1681	1.46561
313	1.49782	1701.2	1.46554
325.5	1.49521	1970.1	1.46472
334.1	1.49363	2152.6	1.4641
340.4	1.49257	2325.4	1.46356
346.6	1.49158	2576.6	1.46262
361.1	1.48939	2673.8	1.46234
366.3	1.48869	3243.4	1.46018
404.7	1.48438	3422	1.4594
435.8	1.48173	5138	1.45012
486.1	1.47855	5343	1.44878
546.1	1.47586	5549	1.44732
589.3	1.47443	6238	1.44216
643.8	1.47302	6633.1	1.43899
656.3	1.47274	6855.9	1.43694
706.5	1.47177	7044.2	1.43529
852.1	1.46984	7268	1.43314
894.4	1.46942	9724	1.40514
		10346	1.39636

Optical Fabrication Capacity

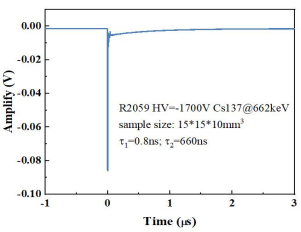
DESIOPTOE can provide various types of optical fabrication, such as grinding, polishing, and coating.

Bubbles/Inclusions	ISO 10110 – 1 x 0.02
Scratch/Dig Limit	40-20
Micro-roughness Limit	≤ 0.35nm
Wavefront Errors Limit	λ/10
Crystal Orientations	(111) (001) (100) orientations are offered
Surface Finishing	TSK/ Wire Cutting, Fine Grinding, Precision Polishing, Coating
Optical Components	Window, Wedge, Prism, Plano-Convex Lens, Plano-Concave Lens, Biconvex Lens, Biconcave Lens, Meniscus Lens
Coatings	Anti-Reflection, High-Reflection

Scintillation Performance



Radioluminescence Spectrum of BaF_2 Crystal



Scintillation Decay Time Spectrum of BaF_2 Crystal

Fast/Slow Ratio	1:5
Radioluminescence Peak Wavelength (nm)	220/300
Absolute Light Yield (ph/MeV)	7128
Decay Time (ns)	0.8/660

Lithium Fluoride

LiF Datasheet

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DESIOPTOE is a professional manufacturer of fluoride crystals.

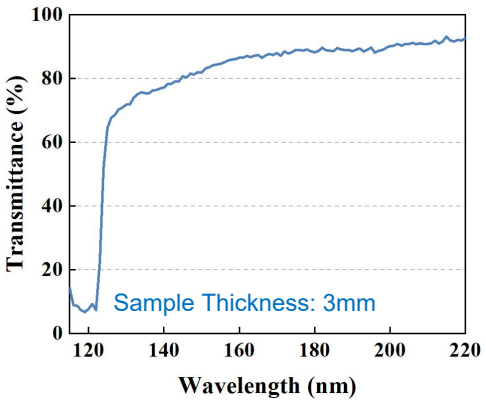
DESIOPTOE's superior crystal growth technology ensures the continuous production of high-quality LiF crystals.

LiF crystals manufactured by **DESIOPTOE** feature high transmittance in the DUV range and a short cut-off wavelength, making them widely applicable in DUV–IR windows, X-ray imaging and detection, OLED encapsulation coatings, and related fields.

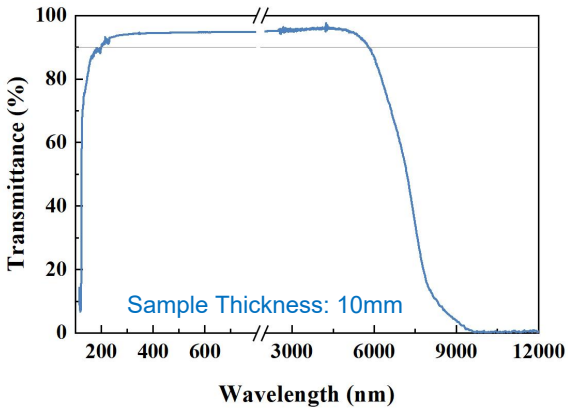
DESIOPTOE can provide LiF crystal blanks and optical components in various specifications within 300mm, support customization of crystal orientations, and offer LiF windows, prisms, lenses, and other products for vacuum ultraviolet, visible, and infrared ranges.

KEY ADVANTAGES

- **Excellent Broadband Transmittance**
- **High Thermal Stability**
- **Low Stress Birefringence**
- **High Refractive Index Uniformity**



VUV Transmittance



Full-SpectrumTransmittance

General Grades

Material Grade	Crystal Structure	Recommended Wavelength
LIF-A	Single Crystal/ Monocrystal	Optical Grade
LIF-B	Single Crystal/ Monocrystal	IR Windows
LIF-C	Polycrystal	-

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Physical Properties

Crystal Structure	Cubic
Cleavage Plane	(100)
Lattice Constant	a=4.026 Å
Molecular Mass	25.9394 g/mol
Density	2.635 g/cm³
Melting Point	870 ℃
Solubility	0.27 g/L H_2O at 20 ℃

Refractive Index

n = 1.3921

v_d = 95-100

Thermal Properties

Heat Capacity	1.562 J/(g · K)
Thermal Conductivity	11.3 W/(m · K) @314K
Linear Thermal Expansion Coefficient	37.0 × 10^{-6}/K

Mechanical Properties

Young's Modulus	(GPa)	64.79
Poisson's Ratio		0.22
Mohs Hardness		4

Optical Fabrication Capacity

Bubbles/Inclusions	ISO 10110 – 1 x 0.02
Scratch/Dig Limit	40-20
Micro-roughness Limit	≤ 0.5nm
Wavefront errors Limit	λ/10
Crystal Orientations	(111) (001) (100) orientations are offered
Surface Finishing	TSK/ Wire Cutting, Fine Grinding, Precision Polishing, Coating
Optical Components	Window, Wedge, Prism, Plano-Convex Lens, Plano-Concave Lens, Biconvex Lens, Biconcave Lens, Meniscus Lens
Coatings	Anti-Reflection, High-Reflection

Strontium Fluoride

SrF_2 Datasheet

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DESIOPTOE is a professional manufacturer of fluoride crystals.

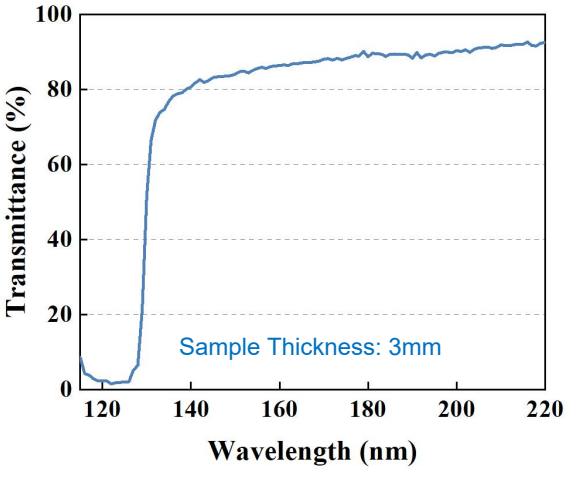
SrF_2 crystal offers excellent optical properties, with broad transmission from vacuum ultraviolet to infrared, ensuring stable and precise light propagation.

Widely used in laser technology, SrF_2 serves as a laser crystal substrate and, when doped with rare-earth ions, enables efficient laser emission for research, medical, and industrial applications. Its high infrared transmittance makes it ideal for IR windows, lenses, and components in night vision and infrared detection. SrF_2 also enhances optical instruments by improving performance and resolution.

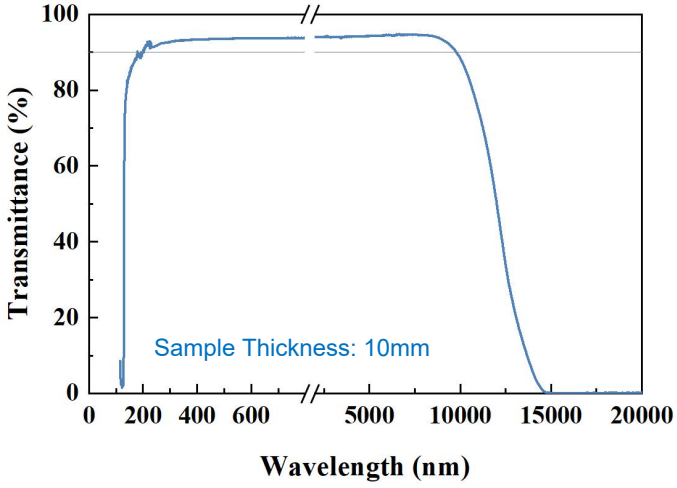
DESIOPTOE can provide SrF_2 crystal blanks and optical components in various specifications within 200mm.

KEY ADVANTAGES

- **Wide Transmission Wavelength Range**
- **High Transmittance**
- **Excellent Optical Uniformity**
- **Stable and Precise Light Propagation**



VUV Transmittance



Full-SpectrumTransmittance

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Physical Properties

Crystal Structure	Cubic
Cleavage Plane	(111)
Lattice Constant	a=5.56 Å
Molecular Mass	125.62 g/mol
Density	4.24 g/cm³
Melting Point	1473 ℃
Solubility	1.16 g/L H_2O at 20 ℃

Thermal Properties

Heat Capacity	0.543 J/(g · K)
Thermal Conductivity	8.3 W/(m · K) @293K
Linear Thermal Expansion Coefficient	18.4×10^{-6}/K @293K

Mechanical Properties

Young's Modulus (GPa)	99.9
Poisson's Ratio	0.274
Mohs Hardness	3.54

Refractive Index

n = 1.442

v_d = 81

Optical Fabrication Capacity

Bubbles/Inclusions	ISO 10110 – 1 x 0.02
Scratch/Dig Limit	40-20
Micro-roughness Limit	≤ 0.5nm
Wavefront errors Limit	λ/10
Crystal Orientations	(111) (001) (100) orientations are offered
Surface Finishing	TSK/ Wire Cutting, Fine Grinding, Precision Polishing, Coating
Optical Components	Window, Wedge, Prism, Plano-Convex Lens, Plano-Concave Lens, Biconvex Lens, Biconcave Lens, Meniscus Lens
Coatings	Anti-Reflection, High-Reflection

Yttrium Lithium Fluoride

YLF Datasheet

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DESIOPTOE is a professional manufacturer of fluoride crystals.

YLF crystal exhibits transmittance and low absorption across a broad wavelength range. As a laser substrate material, YLF enables efficient energy conversion and laser output, making it widely used in solid-state lasers for material processing, medical applications, and scientific research.

With moderate hardness, YLF provides mechanical stability while allowing easy fabrication into various shapes and sizes. Its strong chemical stability prevents reactions with common substances, ensuring reliable performance in different environments. Additionally, its unique crystal structure makes it valuable in scintillation applications, effectively converting high-energy radiation into visible signals for X-ray and gamma-ray detection in nuclear research and security screening.

KEY ADVANTAGES

- **Excellent Transmittance**
- **Efficient Energy Conversion and Laser Output**
- **Moderate Hardness for Both Mechanical Stability and Workability**
- **Good Chemical Stability**

DESIOPTOE Doped YLF Series Products

Products	Concentration
Nd:YLF	0.1-2.0%
Pr:YLF	0.1-2.0%
Tm:YLF	0.1-12%
Er:YLF	0.1-60%
Ho:YLF	0.1-12%
Yb:YLF	0.1-25%

Physical Properties

Crystal Structure	Tetragonal System
Cleavage Plane	(100) (110)
Lattice Constant	a=5.16 Å, c=10.72 Å
Molecular Mass	171.9 g/mol
Density	3.99 g/cm³
Melting Point	825 ℃
Solubility	Almost Insoluble

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Neodymium-doped Calcium Fluoride

Nd:CaF_2 Datasheet

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DESIOPTOE is a professional manufacturer of fluoride crystals.

KEY ADVANTAGES

- **Excellent Optical Uniformity**
- **Low Phonon Energy**
- **Broad Emission Spectrum Coverage**
- **Long Fluorescence Lifetime**

Nd:CaF_2 is a new optical material formed by doping calcium fluoride (CaF_2) with neodymium (Nd) ions. CaF_2 itself offers excellent optical uniformity and low phonon energy, while Nd doping enhances its optical properties. Nd:CaF_2 features multiple absorption and emission peaks, with strong fluorescence in the near-infrared region due to Nd^{3+} energy transitions. Its broad emission spectrum and long fluorescence lifetime make it valuable for laser applications.

As a laser gain medium, Nd:CaF_2 enables high-power and high-efficiency laser output for material processing, medical treatment, and scientific research. It is widely used in laser cutting, welding, and drilling in industrial settings, and in surgeries and diagnostics in healthcare. Additionally, Nd:CaF_2 holds potential for optical communications and sensing applications, with ongoing research expected to drive further advancements.

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Ytterbium-Doped Calcium Fluoride

Yb:CaF_2 Datasheet

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DESIOPTOE is a professional manufacturer of fluoride crystals.

Yb:CaF_2 is a new laser crystal created by doping ytterbium (Yb) ions into calcium fluoride (CaF_2) using a specific process.

KEY ADVANTAGES

- **Wide Absorption and Emission Bandwidth**
- **Efficient Absorption of Pump Light Energy**
- **High-power, High-efficiency Laser Output**
- **Long Fluorescence Lifetime**

Yb:CaF_2 crystals exhibit a wide absorption and emission bandwidth, with an absorption peak in the near-infrared region that matches well with common laser diode pump sources, ensuring efficient energy absorption. Their near-infrared emission characteristics enable high-power, high-efficiency laser output. Their long fluorescence lifetime support energy storage and the generation of high peak-power laser pulses.

Thanks to these properties, Yb:CaF_2 crystals are widely used in laser processing, precision cutting, and micro-machining. They are also essential for high-power solid-state lasers in research fields like laser spectroscopy and nonlinear optics, with potential medical applications, such as laser surgery and imaging.

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Yttrium-Doped Barium Fluoride

BaF_2:Y Datasheet

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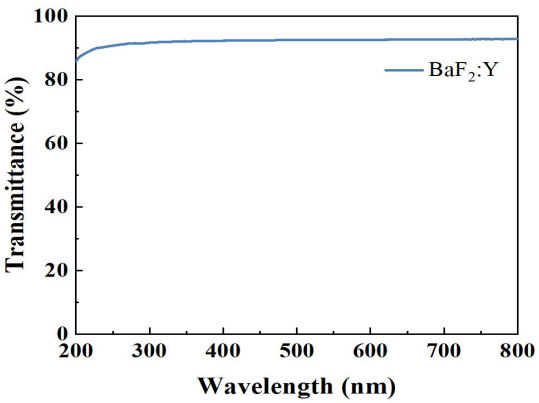
DESIOPTOE is a professional manufacturer of fluoride crystals.

Leveraging advanced crystal growth technology, we produce yttrium-doped barium fluoride (BaF_2:Y) crystals with excellent optical and scintillation properties.

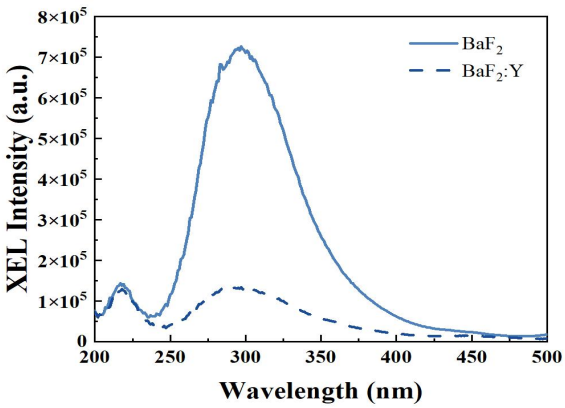
Undoped barium fluoride exhibits an ultrafast scintillation decay of 0.8ns at 195nm and 220nm emission wavelengths, but also suffers from a slow decay component of around 660ns at 310nm, which limits its practical application. To suppress the slow decay, we introduce yttrium ions as dopants, producing Y-doped BaF_2 crystals. The yttrium doping effectively suppresses the slow scintillation component at 310nm in pure BaF_2 and enhances the scintillation efficiency under ionizing radiation. These outstanding optical and scintillation characteristics make BaF_2:Y suitable for applications in nuclear medicine, high-energy physics, radiation detection, and related fields.

KEY ADVANTAGES

- **High Transmittance in the Radioluminescence Band**
- **Low Refractive Index**
- **Low Dispersion**
- **Yttrium Doping Effectively Suppresses Slow Decay Components**



BaF_2:Y Transmission Spectrum



BaF_2:Y Radioluminescence Spectrum

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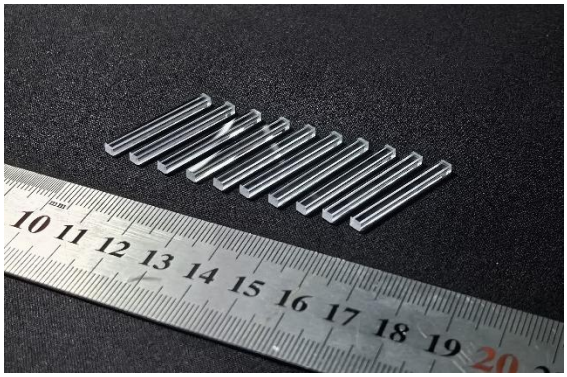
Optical Fabrication Capacity

DESIOPTOE can provide various types of optical fabrication, such as grinding, polishing, and array.



Array

Large Dimensions:
20mm*20mm*200mm

Conventional Parameters of BaF_2 and BaF_2:Y

Conventional Parameters	BaF_2	BaF_2:Y
Density (g/cm^3)	4.88	4.88
Decay Time (ns)	0.8/660	0.8/660
Fast/Slow Ratio	1:5	2:1
Radioluminescence Peak Wavelength (nm)	220/300	220/300
Absolute Light Yield (ph/MeV)	7128	2062
Melting Point (k)	1554	1554
Mohs Hardness	3	3
Refractive Index	1.56	1.56
Cleavage Plane	(111)	(111)

Fluoride Coating Materials

Contents

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DESIOPTOE offers a variety of fluoride crystal coating materials and can provide target materials and crystal fragments in various specifications according to customer requirements to meet different coating design needs.

Available crystal materials include: CaF_2, BaF_2, MgF_2, LiF, AlF_3, LaF_3, GdF_3, etc.

Granular Coating Materials

Crystal Type	Granular Diameter
CaF_2	1mm-3mm, 3mm-6mm (Customizable)
MgF_2	
BaF_2	
LiF	
LaF_3	
AlF_3	
GdF_3	

Crystal Type	Refractive index
CaF_2	1.43288 @ 22℃
MgF_2	1.389 @ 19℃
BaF_2	1.47326 @ 19℃
LiF	1.39126 @ 19℃
LaF_3	1.602 @ 19℃

Crystal Coating Target Materials

Crystal Type	Recommended Size
CaF_2	Customizable
MgF_2	
BaF_2	
LiF	

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Customized Optical Components

DUV-VIS-IR

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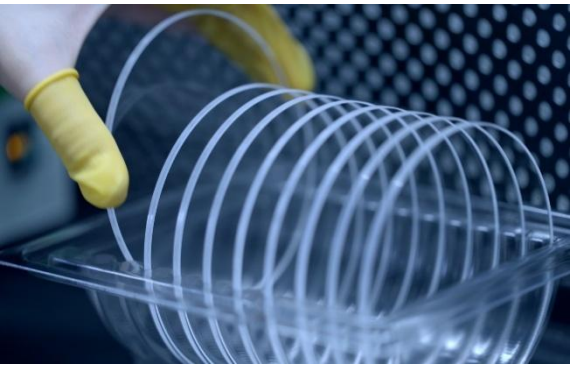
LENS

Plano-Convex, Plano-Concave, Biconvex, Biconcave, Convex-Concave

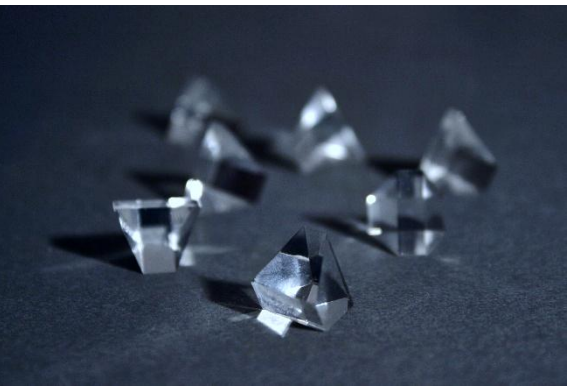
Diameter	Surface Quality	Surface Accuracy	Eccentricity
5-50 mm	10/5	λ/10	30s – 120s
50-100 mm	20/10	λ/8	30s – 120s
100-300 mm	40/20	λ/4	30s – 120s



PLATE

Window, Waveplate, Filter, Mirror, Spectroscope

Diameter/Width	Surface Quality	Surface Accuracy	Eccentricity
5-50 mm	10/5	λ/10	1s
50-100 mm	20/10	λ/8	2s
100-300 mm	40/20	λ/4	5s



PRISM

90 Degree Prism, Roof Prism, Dove Prism, Pentagon Prism, PBS

Diameter/Width	Surface Quality	Surface Accuracy	Eccentricity
5-50 mm	10/5	λ/10	30s – 180s
50-100 mm	20/10	λ/8	30s – 120s
100-300 mm	40/20	λ/4	30s – 60s

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DESIOPTOE's crystal materials have been widely used in **VUV-DUV-UV-VIS-IR** optical applications. We can provide **different grades of materials** to adapt to different application scenarios of customers.

DESIOPTOE can provide customers with a variety of **precision optical components**. The optical components we provide have been widely used in semiconductor lithography, high-power laser, infrared optics, medical, electric power, aerospace and other fields.

Processable Materials	Optical Components (Substrate and Coating)
Fluoride Crystals CaF_2, BaF_2, MgF_2, LiF, SrF_2, LaF_2, $LiYF_4$ (YLF) Doped Fluoride Crystals	Lenses Windows Prisms Wave Plates Spectroscopes Mirrors Filters Wedges
Other Crystal Materials Chromium tungstate (CWO) Yttrium Vanadate (YVO_4) Laser Crystals	
Infrared Materials Zinc Selenide (ZnSe) Zinc Sulfide (ZnS) Chalcogenide Glass Sapphire Silicon	
Optical Glasses Low Dispersion Glass (CDGM FK61 FK95)	
Fused Silica JGS1, JGS3 (OH<1PPM)	

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Infrared Measurement Window

Fluoride Crystal Window

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Infrared measurement windows are widely used in thermal imaging inspections. These windows allow light generated by thermal cameras at specified wavelengths to pass through, reducing the risk of electric arcs and electric shocks, enhancing personnel safety, and decreasing preventive maintenance time and costs.

DESIOPTOE offers fluoride crystal optical lenses in various sizes and shapes (both standard and custom).
Fluoride crystals are suitable for a wide range of infrared, visual, and ultraviolet inspection applications.

Window Type	Long-Wave Infrared Window	Short-Wave Infrared Window
Recommended Window Material	**BaF_2**	**CaF_2**
Working Wavelength	0.15-14um	0.2-10.5um
Transmittance	92% - 94%	92% - 94%
Working Temperature	<1386℃	<1420℃

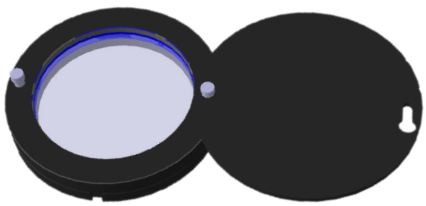
Window's size and shape can be customized

Quick Delivery on Various Window Sizes	**Recommended Standard Window Size (mm)**	100mm
		80mm
		75mm
		50mm

Typical Applications:

- Motor control center
- Dry-type transformer
- Distribution panel
- High-voltage and medium-voltage switchgear
- High breakers and medium breakers
- Control cabinet

Infrared windows with mechanical enclosures are available in customized specifications (such as anodized aluminum or stainless steel).



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$MgAl_2O_4$ Spinel Transparent Ceramic

$MgAl_2O_4$ Datasheet

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$MgAl_2O_4$ Spinel Transparent Ceramic features a broad transmission range from UV to MIR. It exhibits high mechanical strength, exceptional resistance to high temperatures and thermal shock, along with excellent durability against acid/alkali corrosion, sand erosion, and rain erosion. These properties make it suitable for a wide variety of applications.

In the UV, $MgAl_2O_4$ Spinel has a short cut-off wavelength, extending down to 160 nm. Its refractive index increases significantly as the incident light wavelength decreases, making it well-suited for use as UV lithography windows and miniaturized lenses.

KEY ADVANTAGES

- **Transmission Range: from UV to MIR**
- **High Strength, Excellent High-temperature Resistance and Thermal Shock Performance**
- **Resistance to Acid/Alkali Corrosion, Sand Erosion, and Rain Erosion**
- **Various Applications**

Within the visible spectrum, $MgAl_2O_4$ Spinel demonstrates high transmittance while offering advantages such as low density, high strength, and suitability for mass production. These characteristics enable it to serve as a replacement for bulletproof glass and sapphire in lightweight, high-performance armor materials.

$MgAl_2O_4$ Spinel is an ideal candidate material for infrared windows and radomes, and is also suitable for use in barcode scanners, watches, night vision systems, and high-temperature protective viewports.

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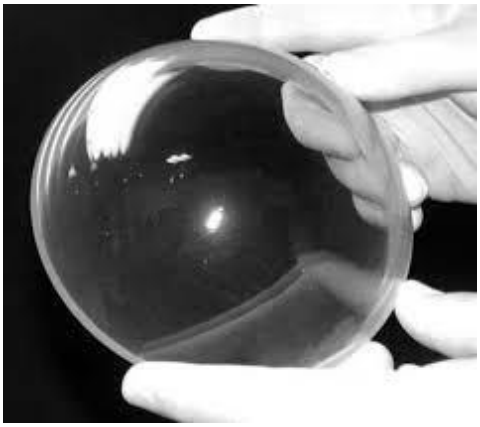
Material Properties

Melting Point	(℃)	2105 - 2135
Lattice Constant	(Å)	8.797-8.808
Density	(g/cm³)	3.58
Young's Modulus	(GPa)	260-310
Shear Modulus	(GPa)	192
Poisson Ratio		0.26
Vickers Hardness	(GPa)	12.0 - 16.8
Fracture Strength	(MPa)	190 - 400
Fracture Toughness	(MPa .$m^{-1/2}$)	1.4 - 2
Dielectric Constant	(1KHz-1MHz)	8.2-9
Refractive Index	(@532 nm)	1.7108
Abbe Number		60
Transmittance Range(μm)		0.19-7.0
Theoretical Tranmittance (@532 nm)		87%
Thermal Expansion Coefficient (25-100℃, 25-500℃, 25-1000℃•K^{-1})		6.09×10^{-6}, 7.3×10^{-6}, 7.9×10^{-6}
Thermal Conductivity (W/m•K)		14.7
Resistance to Chemical Corrosion		HF,H2S04,HN03,NaOH
Rain Erosion Resistance (756 km/h, 20 min, ⌀ 2 mm)		Non-Destructive
Sand Erosion Resistance (75 m/s, 3 mg/cm2, 38-44 gm)		Non-Destructive

Product Pictures



Application fields of $MgAl_2O_4$ Spinel