

MgF₂

- MgF₂ Crystal은 110nm~7.5um까지 파장으로 Optical Lens, Prisms, Windows 용도로 사용된다.
- ArF Excimer Laser를 위한 Window로 가장 적절한 재료이다.
- 193nm파장에서 좋은 투과율이 있기 때문에 자외선 영역에서 광 편광소자로 효과적이다.

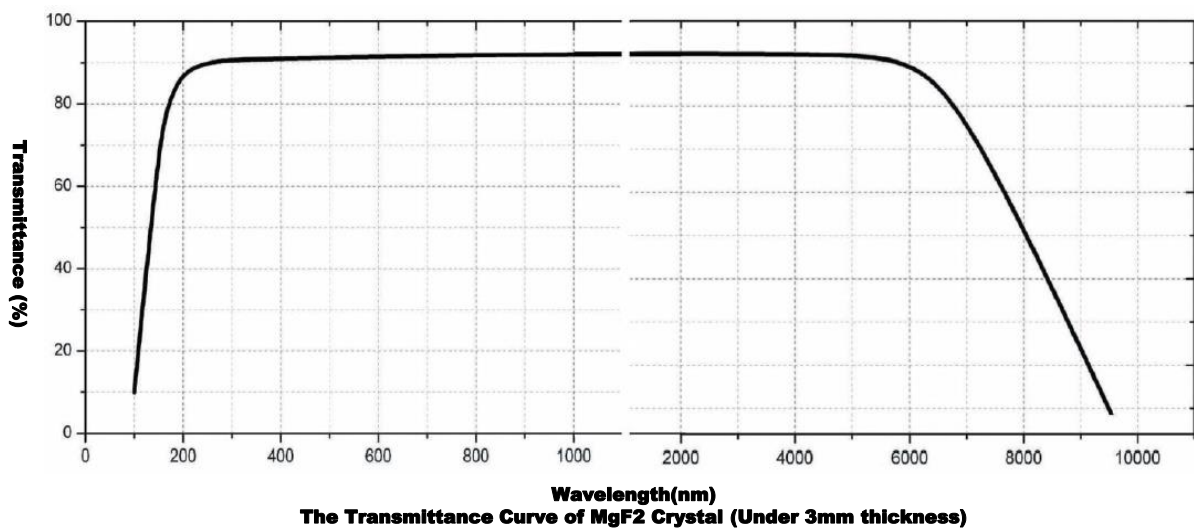


4meo is Able to Offer

- MgF₂ 결정 재료를 사용한 IR & VUV 어플리케이션을 위한 다양한 Optical Viewport & Windows 공급
- ArF Excimer 레이저를 위한 MgF₂ VUV Windows 공급
- 고품질의 MgF₂ Crystals & Material 공급
- 고품질의 MgF₂ Crystals OEM Service

Capabilities

Maximum Diameter	Ø170
Clear Aperture	85%
Surface Flatness	λ/4 @ 633nm
Surface Quality	20 / 10



MgF₂ Crystal Properties

Optical Properties

Transmittance Range / μm	0.11 ~ 7.5
Transmittance	>90% @0.193~6 μm
Refractive Index	$n_o=1.37608$; $n_e=1.38771$ (@0.7 μm)
Reflection Loss	5.2% @0.6 μm (both surfaces)
Residual Radiation Peak / nm	20
Absorption coefficient / cm^{-1}	0.04 @ 2.7 μm
dn/dT / $^{\circ}\text{C}$	2.3×10^{-6} // C-axis; 1.7×10^{-6} \perp c-axis

Physical Properties

Density / $\text{g}\cdot\text{cm}^{-3}$	3.18
Melting Point / $^{\circ}\text{C}$	1,255
Thermal Conductivity / $\text{W}\cdot\text{m}^{-1}\text{K}^{-1}$	0.3 @300K
Thermal Expansion / $^{\circ}\text{C}^{-1}$	13.7×10^{-6} // c-axis; 8.9×10^{-6} \perp c-axis
Knoop Hardness / $\text{Kg}\cdot\text{mm}^{-2}$	415 with 100g indenter
Specific Heat Capacity / $\text{J}\cdot\text{Kg}^{-1}\text{K}^{-1}$	1,003
Dielectric Constant	1.87@1MHz // c-axis; 1.45@1MHz \perp c-axis
Youngs Modulus (E) / Gpa	138.5
Shear Modulus (G) / Gpa	54.66
Bulk Modulus (K) / Gpa	101.32
Elastic Coefficient	$C_{11}=164$; $C_{12}=53$; $C_{44}=33.7$; $C_{13}=63$; $C_{66}=96$;
Apparent Elastic Limit / Mpa	49.6
Poisson Ratio	0.276

Chemical Properties

Solubility / g	0.0002 @ 20 $^{\circ}\text{C}$
Molecular Weight	62.32
Crystal Structure	Tetragonal System
Cleavage Plane	(110)

■ CaF₂

- CaF₂ Crystal은 130nm~9um까지 파장범위에서 양호한 광학 및 열 기계적 성질을 나타낸다.
- CaF₂는 High Power Lasers의 어플리케이션 에서 낮은 흡수, 낮은 굴절률, 등방성의 독특한 광학적 특성으로 Optical Lens, Prisms, Windows 용도로 사용된다.



4meo is Able to Offer

- 8um ~ 10um의 IR 영역의 온도기록을 위한 Optical Viewport & Windows 공급
- IR & VUV Application을 위한 Optical Viewport & Windows 공급
- 고품질의 Optical & Scintillation CaF₂ Crystals & Material 공급
- 고품질의 Optical & Scintillation CaF₂ Crystals OEM Service

Capabilities

Maximum Diameter	Ø375
Clear Aperture	85%
Surface Flatness	λ/4 @ 633nm
Surface Quality	20/10



■ CaF₂ Crystal Properties

Optical Properties

Transmittance Range / μm	0.13 ~ 9
Transmittance	>94% @ 0.3~7 μm
Refractive Index	1.39908 @ 5 μm
Reflection Loss	5.4% @ 5 μm (both surfaces)
Residual Radiation Peak / nm	-
Absorption coefficient / cm^{-1}	0.03 @ 2.6 ~2.9 μm
dn/dT / $^{\circ}\text{C}$	-10.6 x 10 ⁻⁶

Physical Properties

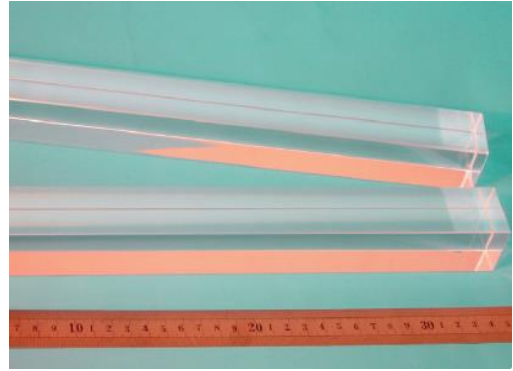
Density / g.cm^{-3}	3.18
Melting Point / $^{\circ}\text{C}$	1,360
Thermal Conductivity / $\text{W.m}^{-1}\text{K}^{-1}$	9.71 @ 286K
Thermal Expansion / $^{\circ}\text{C}^{-1}$	18.85 x 10 ⁻⁶ @ 273K
Knoop Hardness / Kg.mm^{-2}	158.3 with 100g indenter
Specific Heat Capacity / $\text{J.Kg}^{-1}\text{K}^{-1}$	854
Dielectric Constant	6.76 @ 1MHz
Youngs Modulus (E) / Gpa	75.80
Shear Modulus (G) / Gpa	33.77
Bulk Modulus (K) / Gpa	82.71
Elastic Coefficient	$C_{11}=164$; $C_{12}=53$; $C_{44}=33.7$
Apparent Elastic Limit / Mpa	36.54
Poisson Ratio	0.26

Chemical Properties

Solubility / g	0.0017 @20 $^{\circ}\text{C}$
Molecular Weight	78.08
Crystal Structure	Cubic System
Cleavage Plane	(111)

BaF₂

- BaF₂ Crystal은 150nm~12.5um까지 광범위한 투과 파장범위로 IR영역의 어플리케이션의 Optical Windows, Lens & Prisms 의 용도로 사용된다.
- 고품질의 BaF₂은 잘 알려진 섬광 결정으로써 다양한 응용 분야에 적용된다.

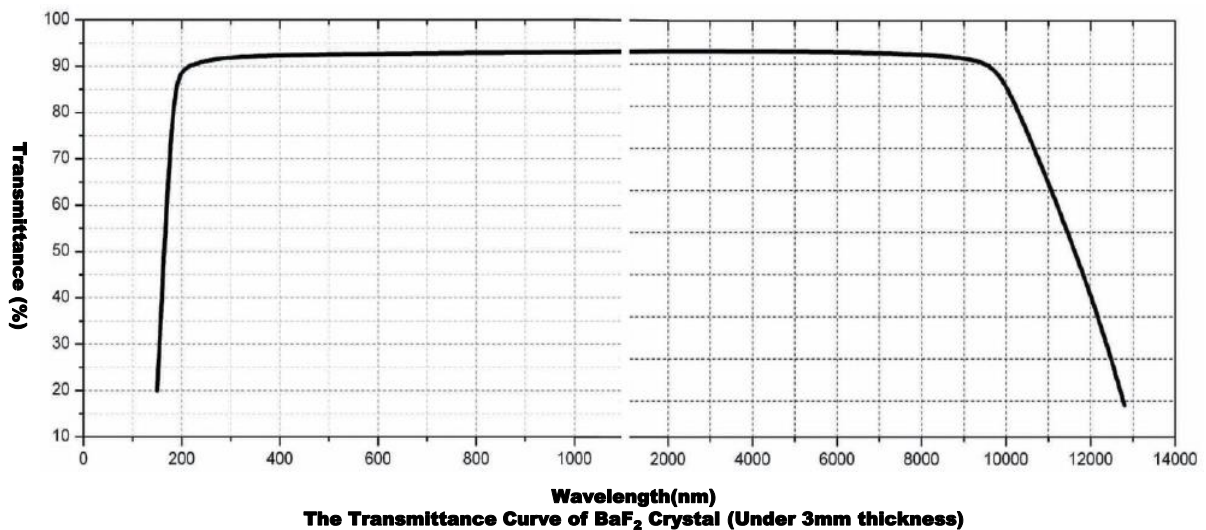


4meo is Able to Offer

- 8um ~ 14um의 IR 영역의 온도기록을 위한 View Port & Windows 공급
- IR & VUV Application을 위한 Optical Viewport & Windows 공급
- 고품질의 Optical & Scintillation BaF₂ Crystals & Material 공급
- 고품질의 Optical & Scintillation BaF₂ Crystals OEM Service

Capabilities

Maximum Diameter	Ø180
Clear Aperture	85%
Surface Flatness	λ/4 @ 633nm
Surface Quality	20/10



BaF₂ Crystal Properties

Optical Properties

Transmittance Range / μm	0.15 ~ 14
Transmittance	>94% @ 0.35~10.8 μm
Refractive Index	1.4624 @ 2.58 μm ; 1.3936@10.35 μm
Reflection Loss	6.8% @ 2.58 μm / 5.3%@10.35 μm
Radiation Length / mm	20.6
Residual Radiation Peak / nm	47
Emission Peak / nm	310 slow ; 220fast
Decay Constant / ns	620 slow ; 0.6fast
Light Output	20% slow ; 4% fast
Absorption coefficient / cm^{-1}	3.2×10^{-4} @ 6 μm
dn/dT / $^{\circ}\text{C}$	-15.2×10^{-6}

Physical Properties

Density / g.cm^{-3}	4.89
Melting Point / $^{\circ}\text{C}$	1,280
Thermal Conductivity / $\text{W.m}^{-1}\text{K}^{-1}$	11.72 @ 286K
Thermal Expansion / $^{\circ}\text{C}^{-1}$	18.1×10^{-6} @ 273K
Knoop Hardness / Kg.mm^{-2}	82 with 500g indenter
Specific Heat Capacity / $\text{J.Kg}^{-1}\text{K}^{-1}$	410
Dielectric Constant	7.33 @ 1MHz
Youngs Modulus (E) / Gpa	53.07
Shear Modulus (G) / Gpa	25.4
Bulk Modulus (K) / Gpa	56.4
Elastic Coefficient	$C_{11}=89.2$; $C_{12}=40.0$; $C_{44}=25.4$
Apparent Elastic Limit / Mpa	26.9 (3,900psi)
Poisson Ratio	0.343

Chemical Properties

Solubility / g	0.0017 @23 $^{\circ}\text{C}$
Molecular Weight	175.36
Crystal Structure	Cubic System
Cleavage Plane	(111)

LiF

● LiF Crystal은 105nm~6um범위의 Optical Windows , Lens 용도로 사용된다.

● 고품질의 LiF는 잘 알려진 섬광 결정으로써 다양한 응용 분야에 적용된다.

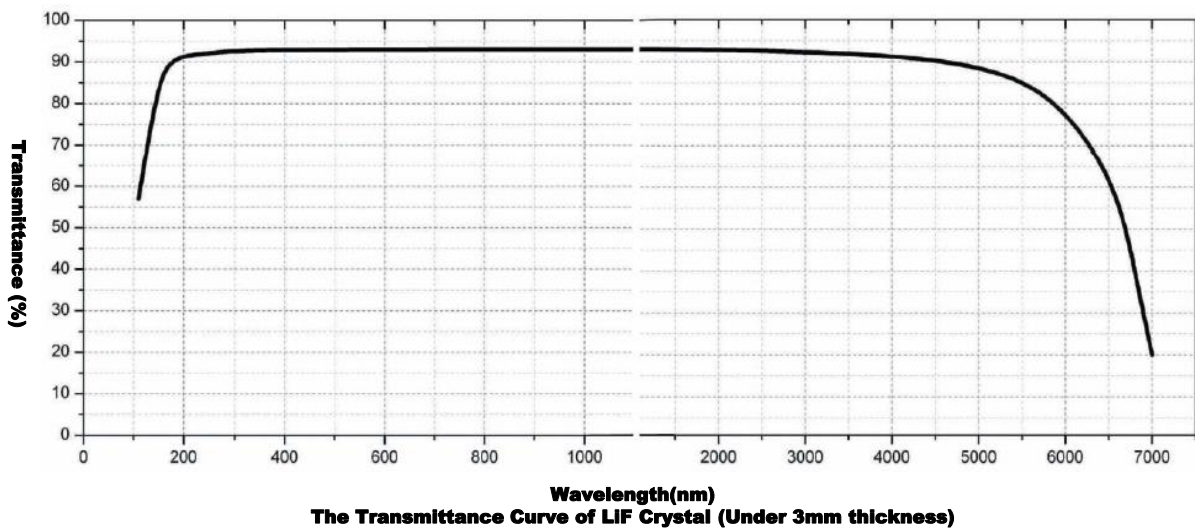


4meo is Able to Offer

- X-ray 회절 장치를 위한 광학소자
- IR & VUV Application을 위한 Optical Viewport & Windows 공급
- 고품질의 Optical LiF Crystals & Material 공급
- 고품질의 Optical LiF Crystals OEM Service

Capabilities

Maximum Diameter	Ø170
Clear Aperture	85%
Surface Flatness	$\lambda/4$ @ 633nm
Surface Quality	20/10



■ LiF Crystal Properties

Optical Properties

Transmittance Range / μm	0.105 ~ 6
Transmittance	>90% @0.3~4.5 μm
Refractive Index	1.3733 @ 2.5 μm ; 1.6240 @ 121nm
Reflection Loss	4.4% @ 4 μm (both surfaces)
Residual Radiation Peak / nm	-
Absorption coefficient / cm^{-1}	-
dn/dT / $^{\circ}\text{C}$	-

Physical Properties

Density / $\text{g}\cdot\text{cm}^{-3}$	2.64
Melting Point / $^{\circ}\text{C}$	845
Thermal Conductivity / $\text{W}\cdot\text{m}^{-1}\text{K}^{-1}$	11.3 @ 314K
Thermal Expansion / $^{\circ}\text{C}^{-1}$	37×10^{-6}
Knoop Hardness / $\text{Kg}\cdot\text{mm}^{-2}$	113 with 600g indenter(모스경도)
Specific Heat Capacity / $\text{J}\cdot\text{Kg}^{-1}\text{K}^{-1}$	1,562
Dielectric Constant	9.0 @ 100Hz
Youngs Modulus (E) / Gpa	64.79
Shear Modulus (G) / Gpa	55.14
Bulk Modulus (K) / Gpa	62.03
Apparent Elastic Limit / Mpa	10.8
Elastic Coefficient	$C_{11}=112$; $C_{12}=45.6$; $C_{44}=63.2$
Poisson Ratio	-

Chemical Properties

Solubility / g	0.27 @ 18 $^{\circ}\text{C}$
Molecular Weight	25.94
Crystal Structure	Cubic System
Cleavage Plane	(100)