

BaF₂



DESCRIPTION

Barium fluoride (BaF₂) is a general-purpose optical window material that offers a wide range of transparency, from the ultraviolet to the long-wave infrared, with low reflectance loss and low dispersion. BaF₂ single crystal is an intensively studied scintillator for the detection of gamma radiation due to its relatively high stopping power, radiation hardness and extremely fast response. BaF₂ possesses the fast cross-luminescence component at 195 and 220 nm with a lifetime of several hundred picoseconds. However, this component coexists with slow one at 310 nm related to the self-trapped exciton (STE). BaF₂ is a broad band gap crystal with $E_g=10.9$ eV. It is currently regarded as the fastest inorganic scintillator which has cross-luminescence bands peaked at 195 and 220 nm and a broad band peaking at about 300 nm due to self-trapped excitons. Much attention has been focused on the luminescent properties of rare earth ions activated BaF₂.

APPLICATIONS

- Scintillator, IR optics
- Inorganic scintillator for subnanosecond timing
- Window and focusing mirror for deep uv and excimer lasers

FEATURES

- Excellent transmission from 150nm to 12um
- Chemically stable
- Low reflectance loss and low dispersion
- Special refractive index and relative dispersion value
- Broad band gap
- Practicality of a certain wavelength bandwidth
- Possesses the fast cross-luminescence component at 195 and 220 nm with a lifetime of several hundred picoseconds



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PARAMETERS

Material and Specifications

Orientation	[100] or [001] < ±0.5°
Orientation Tolerance	< 0.5°
Parallelism	<20"
Perpendicularity	5'
Surface Quality	10-5 (MIL-O-13830A)
Wavefront Distortion	<λ/4@633 nm
Surface Flatness	<λ/8 @633 nm
Clear Aperture	>90%
Thickness/Diameter Tolerance	±0.05 mm

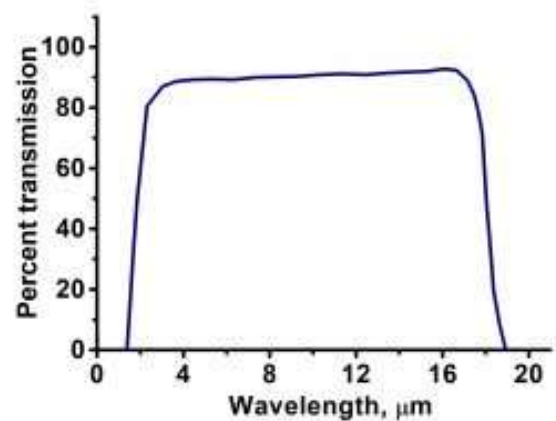
Physical and Chemical Properties

Crystal System	Isometric
Habit	Cubic
Space Group	Fm3m(Oh5)
Lattice Constants	6.2001 Å
Specific mass	4.886 g/cm ³
Melting Point	1354°C
Flexure Strength (MPa)	27
Tenacity	Brittle
Thermal Conductivity (W·cm ⁻¹ ·K ⁻¹ @25°C)	0.07
Specific Heat/ (J·g ⁻¹ ·K ⁻¹)	1.003
Thermal Expansion(10 ⁻⁶ ·K ⁻¹ @25°C)	13.7
Hardness (kg/mm ² @Knoop)	78
Young's Modulus /GPa	138.5
Fracture	{111} and {100}

Optical characteristics

Transmission Range	0.15 ... 12 μm
Reflective Loss	6 ... 16%@0.2 ... 10 μm
Thermo-optic coefficient (10 ⁻⁶ ·K ⁻¹ @30...90°C)	-18.8
Poisson Ratio	0.31
Dielectric Constant	7.33@f=2MHz

Spectrum



Index of Refraction

λ(μm)	n	λ(μm)	n	λ(μm)	n
0.2	1.5573	4	1.4558	9	1.4144
0.5	1.4779	5	1.4511	10	1.4011
1	1.4686	6	1.4441	11	1.3865
2	1.4647	7	1.4357	12	1.3696
3	1.4612	8	1.4258	12.5	1.3585
				15	1.305

