Photonics On Crystals

POC-OC-122471-BaF_2 Crystal Datasheet

1 Main Features

- Wide transmittance range from UV to IR (150 nm to 14 µm).
- High transmittance of >94% at 350 nm to 10.8 µm.
- Excellent scintillation properties for high-energy physics applications.
- Low absorption coefficient suitable for precision optical components.
- Custom crystal dimensions and orientations available upon request.

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2. Material General Description

BaF_2 (Barium Fluoride) is a high-performance optical material belonging to the cubic crystal system. Known for its excellent optical transmittance across a wide spectral range from UV to IR wavelengths, BaF_2 crystals are widely utilized in optical windows, lenses, and prisms. These crystals exhibit excellent radiation resistance and scintillation properties, making them highly desirable in applications like high-energy physics, nuclear medicine, and spectroscopy.

BaF_2 also demonstrates remarkable thermal and mechanical stability, which enhances its performance in demanding environments. Its high UV transmittance is particularly suited for ultraviolet spectrometry and related fields. Additionally, BaF_2 is available in both monocrystalline and polycrystalline forms, ensuring versatility for diverse applications.

3. General Applications and Examples

BaF_2 crystals are utilized in a variety of fields due to their outstanding optical and scintillation properties:

1. **Optical Components**: Fabrication of optical windows, prisms, and lenses for UV and IR applications.
2. **Scintillation**: Used as scintillation crystals in high-energy physics experiments, nuclear medicine imaging, and radiographic detectors.
3. **Infrared Thermography**: Ideal for IR viewport windows ranging from 8 µm to 14 µm.
4. **UV Spectroscopy**: Employed in ultraviolet spectrometry due to high transmittance in the UV range.
5. **Custom Optical Devices**: OEM services for tailored BaF_2 crystal blanks, ensuring compatibility with specific optical system requirements.

4. Chemical, Physical, and Structural Properties

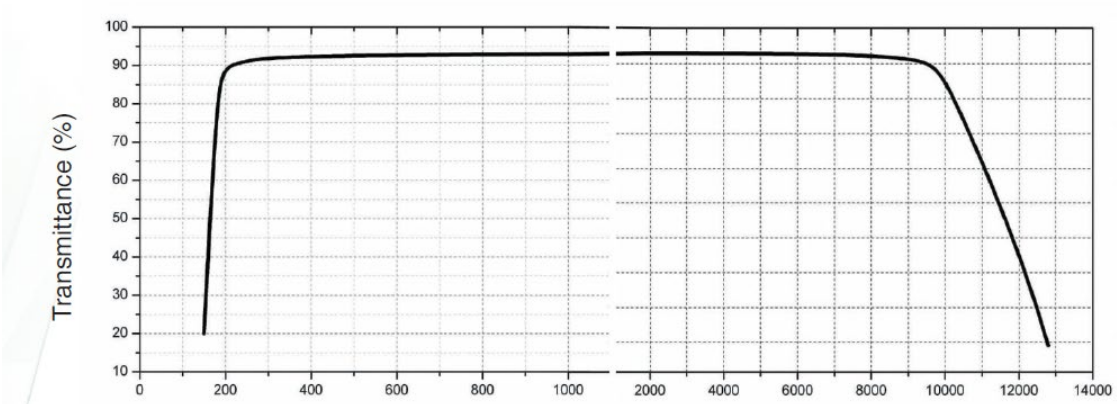
Properties	Details
Material Grade	VIR, UV, Scintillating Crystals
Crystal Structure	Cubic System
Cleavage Plane	(111)
Density	4.89 g/cm³
Melting Point	1280 °C
Thermal Conductivity	11.72 W/m·K at 286 K
Thermal Expansion	18.1×10^{-6} /°C at 273 K
Knoop Hardness	82 kg/mm²
Solubility	0.0017 g @ 23 °C
Young's Modulus (E)	53.07 GPa
Shear Modulus (G)	25.4 GPa
Bulk Modulus (K)	56.4 GPa
Apparent Elastic Limit	26.9 MPa (3900 psi)
Poisson Ratio	0.343

5. Optical Properties

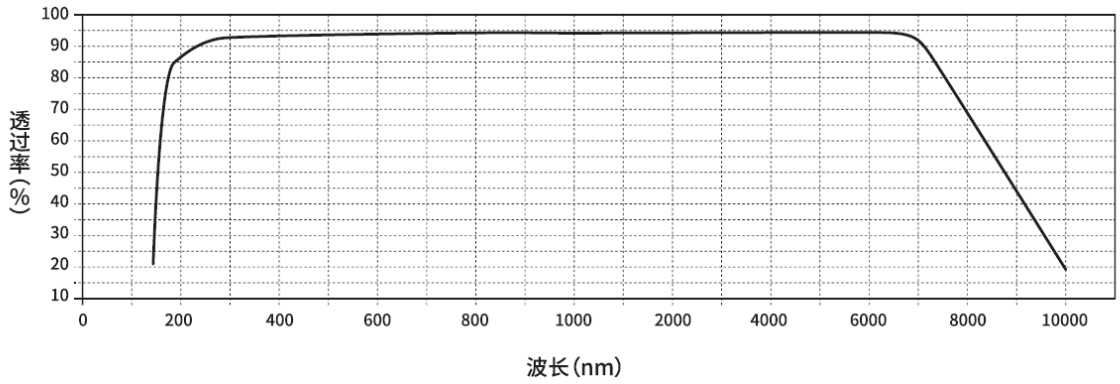
Properties	Details
Transmittance Range	0.15 µm – 14 µm
Transmittance	>94% at 350 nm – 10.8 µm
Refractive Index	1.4624 at 2.58 µm / 1.3936 at 10.35 µm
Reflection Loss	6.8% at 2.58 µm / 5.3% at 10.35 µm
Radiation Length	20.6 mm
Residual Radiation Peak	47 nm
Decay Constant	620 ns (slow), 0.6 ns (fast)
Emission Peak	310 nm (slow), 220 nm (fast)
Light Output	20% (slow), 4% (fast)
Absorption Coefficient	3.2×10^{-4} @6 µm
dn/dT	-15.2×10^{-6}

6. Spectrum Transmission Curves

Transparency Range: BaF_2 exhibits high transmittance from UV to IR, with >94% transmittance in the range of 150 nm to 10.8 µm.



The Transmittance Curve of BaF_2 Crystal (under 3mm thickness)



7. Coating Specifications

- **Coating Options**: AR coating (350-1200 nm) and custom coatings available upon request.
- **Surface Quality**: 20/10.
- **Flatness**: λ/4 @ 633 nm.

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8. Standard Fabrication Specifications

Specification	Details
Maximum Diameter	Up to 300 mm
Clear Aperture	>85%
Surface Quality	20/10
Surface Flatness	λ/4 @ 633 nm
Crystal Orientation	<111>, <100>, or custom
Mount	Upon Customer's Specification

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9. POC Strength and Capabilities

Photonics On Crystals (POC) offers unmatched expertise in providing high-quality BaF_2 crystals. Key strengths include:

- Custom manufacturing and OEM services for optical components.
- Precision engineering and stringent quality control for high performance.
- Expertise in handling large crystal diameters up to 300 mm.
- Capability to meet complex industrial and research demands with quick delivery.

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10. Standard Products

Photonics On Crystals

Face Dimensions (mm)	Length (mm)	Coating	SKU	Price (USD)
15 x 15	15	Uncoated	7273	440
30 x 30	30	AR (450-800 nm)	7276	600
50 x 50	50	AR (450-800 nm)	31051	900
Customization Available	**On Request**	**As per demand**	**N/A**	**Varies**