

Barium Fluoride (BaF₂)

Fairfield Crystal uses a unique source material purification with a vertical-Bridgman method to grow synthetic high-purity BaF₂ single crystals. Barium Fluoride is transparent from the ultraviolet (UV) to the infrared (IR) from 0.200 to 14.0 μm, and is used to make optical components, such as windows for infrared spectroscopy. Barium fluoride is also a very fast scintillator used for the detection of X-rays, gamma rays or other high energy particles. One of its applications is the detection of 511 keV gamma photons in Positron Emission Tomography (PET). It responds also to alpha and beta particles, but, unlike most scintillators, it glows in ultraviolet light. It can be also used for detection of high-energy neutrons, and use pulse shape discrimination techniques to separate them from simultaneously occurring gamma photons. In a dry environment BaF₂ can be used up to 800 °C, however prolonged exposure to moisture degrades transmission in the vacuum UV range. It is less resistant to water than calcium fluoride, but is the most resistant of all the optical fluorides to high-energy radiation, though its far ultraviolet transmittance is lower than theirs. It is quite hard, and very sensitive to thermal shock. Fairfield Crystal provides this excellent material to give our customers a quality product at a reasonable cost.



Substance	Form	Diameter Range	Thickness Range	Transmission Range (μm)	Surface Finish
Barium Fluoride	Single Crystal	5 to 150mm	1 to 50mm*	0.15 to 14.00	Fine Ground**

*Special orders available

**Standard finish – other finish available upon request

OPTICAL PROPERTIES

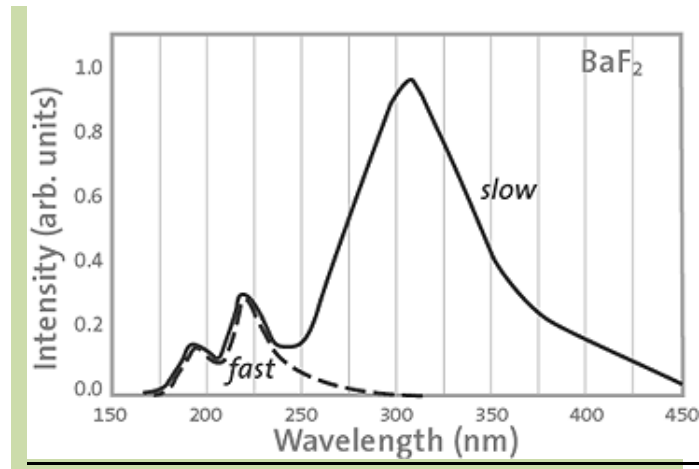
Transmission Range	0.20 to 14.0 microns
Internal Transmission	>99% @ 0.4 to 9.0 μm
Refractive Index Homogeneity	1.4759 @ n _e
Reflection Loss	% @ 3.0 μm (2 surfaces)
Cleavage Plane	<111>

PHYSICAL PROPERTIES

Density	4.89 gm/cc
Melting Point	1368°C
Hygroscopic	slightly
Solubility	1.7gm/kg water @25°C
Knopp Hardness	82.0 Knoop
Crystal Structure	Cubic <111> cleavage plane
Absorption Coefficient	3.2 x 10 ⁻⁴ @ 6μm
Thermal Expansion Coefficient	18.1 x 10 ⁻⁶

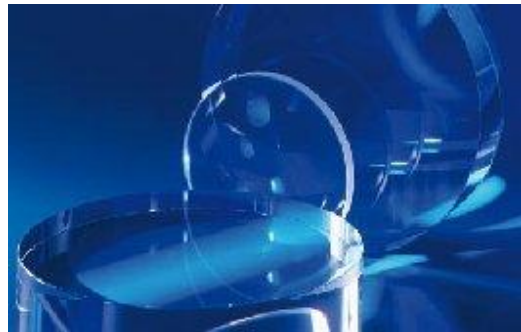
SCINTILLATOR PROPERTIES

Primary Decay Time	630 (slow); 0.6 – 0.8 (fast)
Wavelength Emission Max	310, 220(195) nm
Lower wavelength cutoff	135 nm
Refractive index @ emission max	1.50 (310nm), 1.54 (220nm)
Light Yield	10 (slow), 1.8 (fast) photons/keV γ
Photoelectron yield	16 (slow), 3 (fast) %of Na(Tl) for γ -rays



Fabrication

The material can be polished using diamond turning or standard pitch polish. Fairfield Crystal also provides polishing services. Our expertise in crystal growth and understanding of the crystal structure gives us an advantage and enables us to offer superior polished surfaces and surface figure to customers' rigorous specifications. For other specifications or specific requirements please contact our sales team.



Polishing Capabilities

- Surface figure: 1/20 λ @ 632.8nm
- Surface quality: 10/5 S/D, <5 angstrom RMS
- Parallelism: < 10 arc seconds
- Sizes: 4.0 to 100 mm Diameter

Hazard Labeling: Not regulated by Department of Transportation (DOT)
 Shipping Classification: UPS or FedEx: Ground, Air
 Fairfield Crystal Technology will be pleased to quote you price and delivery.

Contact us

- Sales email: atimmerman@fairfieldcrystal.com
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