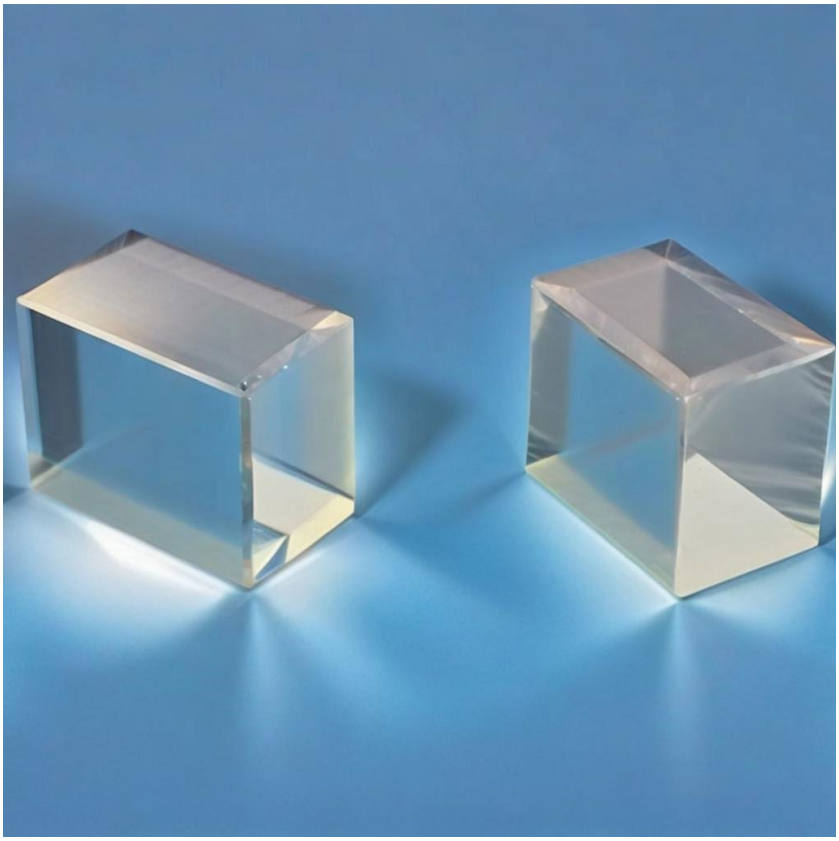
Photonics On Crystals

POC-OC-122474-LiF Crystal Datasheet

1 Main Features

- Exceptional optical transmittance over a wide spectral range (105 nm to 6 µm).
- Smallest refractive index among infrared materials.
- High radiation resistance suitable for harsh environments.
- Ideal for thermal imaging, aerospace optics, and excimer laser optics.
- Custom dimensions, orientations, and coatings available on request.



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2. Material General Description

Lithium Fluoride (LiF) crystal is known for its remarkable optical properties, including high transmittance in the ultraviolet (UV), visible, and near-infrared regions, spanning wavelengths from 105 nm to 6 µm. It possesses the lowest refractive index among commonly used infrared materials, making it indispensable for applications that demand minimal optical distortion. LiF crystals are highly resistant to radiation damage, which enhances their reliability in extreme environments such as aerospace and thermal imaging applications. They also feature excellent thermal and chemical stability, contributing to their usability in high-energy optics. Additionally, LiF is employed as optical elements in X-ray diffraction devices due to its unique crystal lattice properties.

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3. General Applications and Examples

LiF crystals find extensive applications across various fields:

1. **Thermal Imaging Systems:** With their exceptional optical transmission and low refractive index, LiF crystals are perfect for use in thermal imaging systems, offering clear and precise image capturing in harsh environments.
2. **Aerospace and Military Applications:** LiF's high radiation resistance and lightweight properties make it an ideal choice for optical components in aerospace and defense technologies.
3. **Excimer Laser Windows:** The superior UV transmittance of LiF crystals ensures their efficiency as windows for excimer laser systems operating at 193 nm and other UV wavelengths.
4. **X-Ray Diffraction Devices:** Thanks to its crystalline structure, LiF serves as an essential component in X-ray spectrometers and diffraction applications.
5. **High-Resolution Optics:** LiF crystals are used in lenses and prisms for optical instruments requiring high transmittance and low distortion, especially in the visible and UV ranges.

These properties make LiF crystals a versatile material for cutting-edge technological advancements.

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4. Chemical, Physical, and Structural Properties

Property	Value
Density (g/cm^3)	2.64
Melting Point (°C)	845
Thermal Conductivity ($W \cdot m^{-1} \cdot K^{-1}$)	11.3 @ 314 K
Thermal Expansion ($°C^{-1}$)	37×10^{-6}
Hardness (Mohs)	4
Dielectric Constant	9.0 @ 100 Hz
Elastic Coefficient	C_{11}=112; C_{12}=45.6; C_{44}=63.2
Crystal Structure	Cubic System
Cleavage Plane	(100)
Solubility (g @ 18°C)	0.27
Refractive Index	1.3733 @ 2.5 µm

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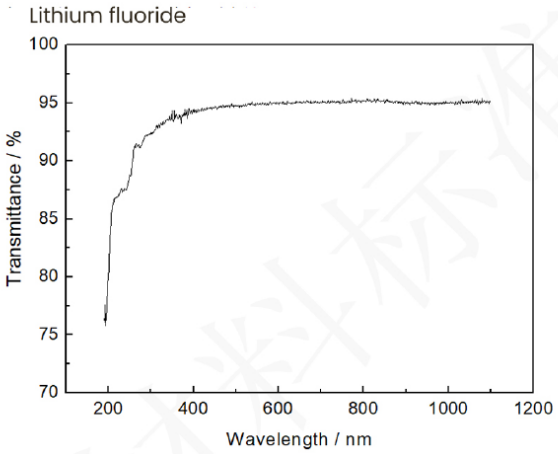
5. Optical Properties

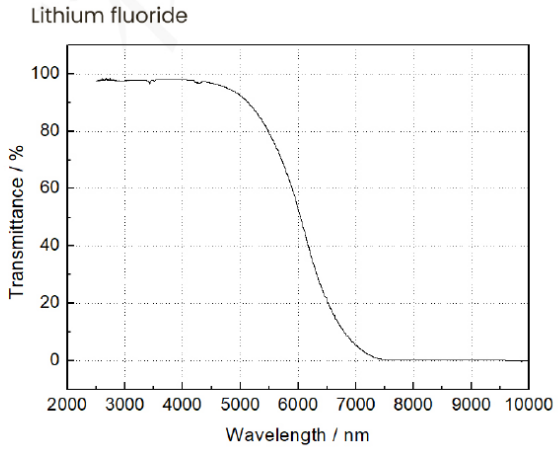
Property	Value

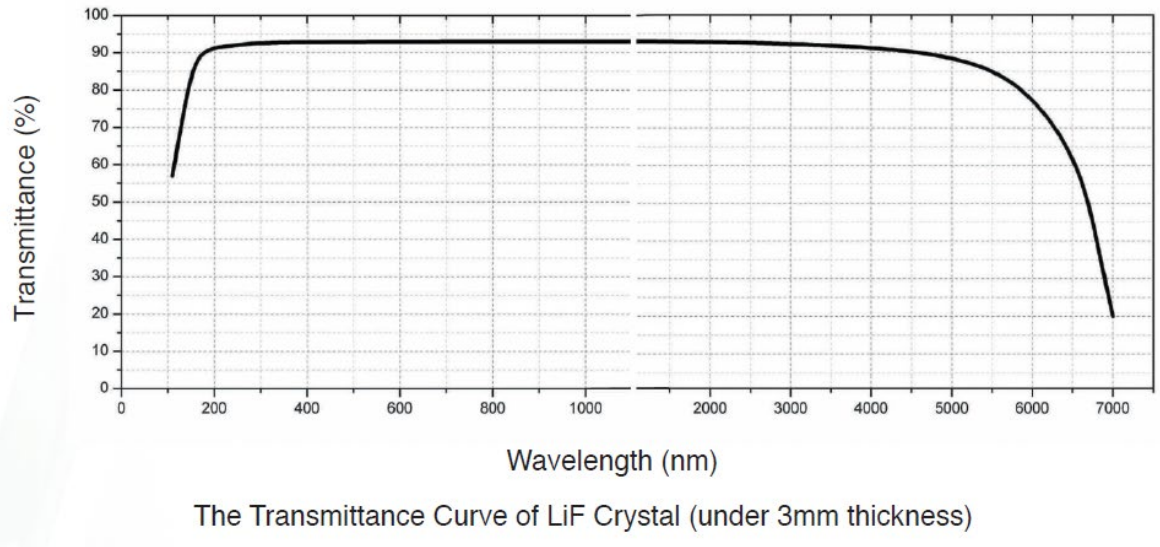
Transmittance Range (μm)	0.105–6
Transmittance (%)	>90% @ 0.3–4.5 μm
Refractive Index	n_o=1.3733 @ 2.5 μm; n_e=1.6240 @ 121 nm
Reflection Loss (%)	4.4% @ 4 μm (both surfaces)

6. Spectrum Transmission Curves

The transmission curve demonstrates LiF's superior transmittance across wavelengths ranging from 105 nm to 6 μm. This property highlights its efficiency for UV to IR optical systems. (Refer to the included graphs for visual representation.)







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

7. Coating Specification

LiF crystals can be customized with the following coatings to enhance their performance:

- Anti-Reflective (AR) Coating: Available for UV, visible, and IR wavelengths.
- Custom coatings for specific wavelength ranges.

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8. Standard Fabrication Specifications

Parameter	Specification
Dimension Tolerance	±0.1 mm
Surface Flatness	λ/4 @ 633 nm
Parallelism	<3 arcmin
Surface Quality	20/10 (Scratch/Dig)
Clear Aperture	>90%
Chamfer	<0.25 × 45°

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9. POC Strength and Capabilities

Photonics On Crystals (POC) excels in providing high-quality optical materials for advanced applications. POC's expertise in precision manufacturing and customizable options ensures optimal solutions tailored to customer requirements. Key strengths include:

- A dedicated R&D team ensuring cutting-edge innovation.
- Strict quality control procedures for flawless crystal performance.
- OEM capabilities to meet diverse industry standards.

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10. Standard Products

Dimension (mm)	Coating	SKU	Price (USD)
20 × 20 × 5	Uncoated	7301	150
30 × 30 × 5	AR Coating @ 0.3–4.5 µm	7302	180
40 × 40 × 10	AR Coating @ UV	7303	220
50 × 50 × 10	Custom	7304	250

For additional customization, please contact POC.