Lithium Fluoride
LiF

🔷 Key Properties of Lithium Fluoride (LiF)

🌈 Exceptional UV–IR Transmission: Extremely broad range from ~0.12 µm to 6.5 µm — ideal for VUV, UV, visible, and IR optical systems.
🔍 Low Refractive Index: ~1.39 at 1 µm, making LiF one of the lowest-index crystalline optical materials available.
📉 Very Low Dispersion: Provides high clarity and stable imaging for broadband lasers, spectroscopy, and precision optical assemblies.
🧪 Non-Hygroscopic: Resistant to moisture absorption, unlike highly hygroscopic materials such as MgF_2, NaCl, and KBr.
⚡ Excellent Radiation Resistance: Suitable for space optics, vacuum UV applications, and high-energy environments.
⚙️ Good Thermal Stability: Performs reliably under temperature variation, though softness requires careful mechanical handling.
🔬 Laser & Spectroscopy Ready: Ideal for excimer lasers, VUV windows, prisms, and broadband UV–IR analytical instruments.

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🛠️ Applications of Lithium Fluoride (LiF)

🔬 VUV & UV Spectroscopy: Ideal for deep-UV and vacuum-UV optical systems due to its outstanding 0.12–6.5 μm transmission range.

⚡ Excimer & UV Laser Optics: Widely used for lenses, windows, and beam-delivery optics in F_2, ArF, and KrF laser systems thanks to high UV transparency and radiation resistance.

🛰️ Space & High-Energy Instruments: Excellent radiation hardness makes LiF suitable for satellites, space telescopes, and particle-detection optics.

🔍 Broadband Imaging: Low refractive index and low dispersion provide stable imaging performance across UV, visible, and IR wavelengths.

🧭 UV–IR Windows & Prisms: A reliable choice for precision windows, prisms, and beam-steering components spanning a wide UV-IR spectral range.

⚙️ Analytical & Scientific Instruments: Used in laboratory equipment, radiometry, and photometric systems requiring optical purity and broadband performance.

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📐 Technical Parameters of Lithium Fluoride (LiF)

Property	Typical Value
Transmission Range	0.12 µm – 6.5 µm
Refractive Index	1.39 @ 1 µm
Density	2.64 g/cm³
Melting Point	848 °C
Hardness (Knoop)	~102 kg/mm² (soft)
Thermal Expansion	37×10^{-6} /°C
Crystal Type	Cubic (single crystal)
Hygroscopic	No
Chemical Formula	LiF
Applications	VUV windows, excimer lasers, UV–IR optics, space and high-energy systems

Lithium Fluoride (LiF) is a broad-spectrum optical material with excellent transmission from 0.12–6.5 µm, making it ideal for VUV/UV optics, excimer lasers, thermal imaging, and aerospace instruments.

It features a low refractive index (~1.39), very low dispersion, and is non-hygroscopic, offering better durability than salts like NaCl or KBr. Although soft, LiF provides stable performance and can be fabricated into windows, lenses, and prisms for UV–IR applications.

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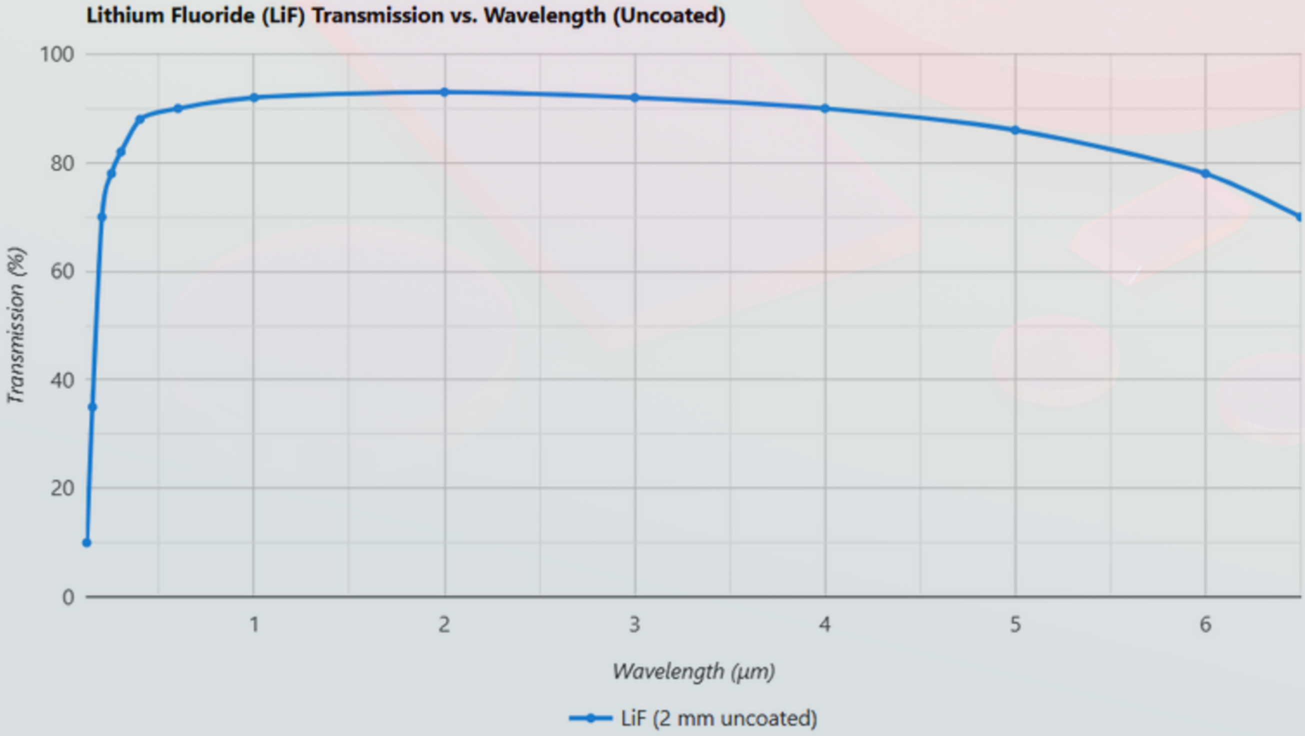
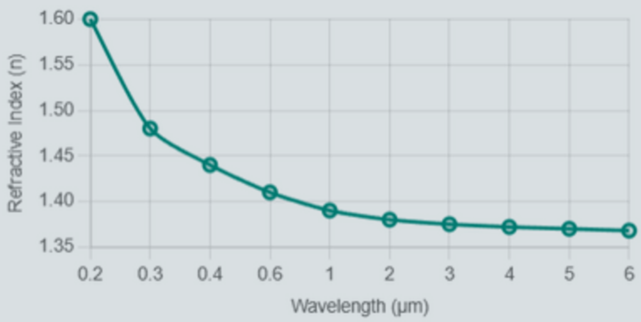
Lithium Fluoride (LiF) Transmission Graph



Refractive Index of Lithium Fluoride (LiF) vs. Wavelength



Wavelength (µm)	Refractive Index (n)
0.2	1.6
0.3	1.48
0.4	1.44
0.6	1.41
1	1.39
2	1.38
3	1.375
4	1.372
5	1.37
6	1.368

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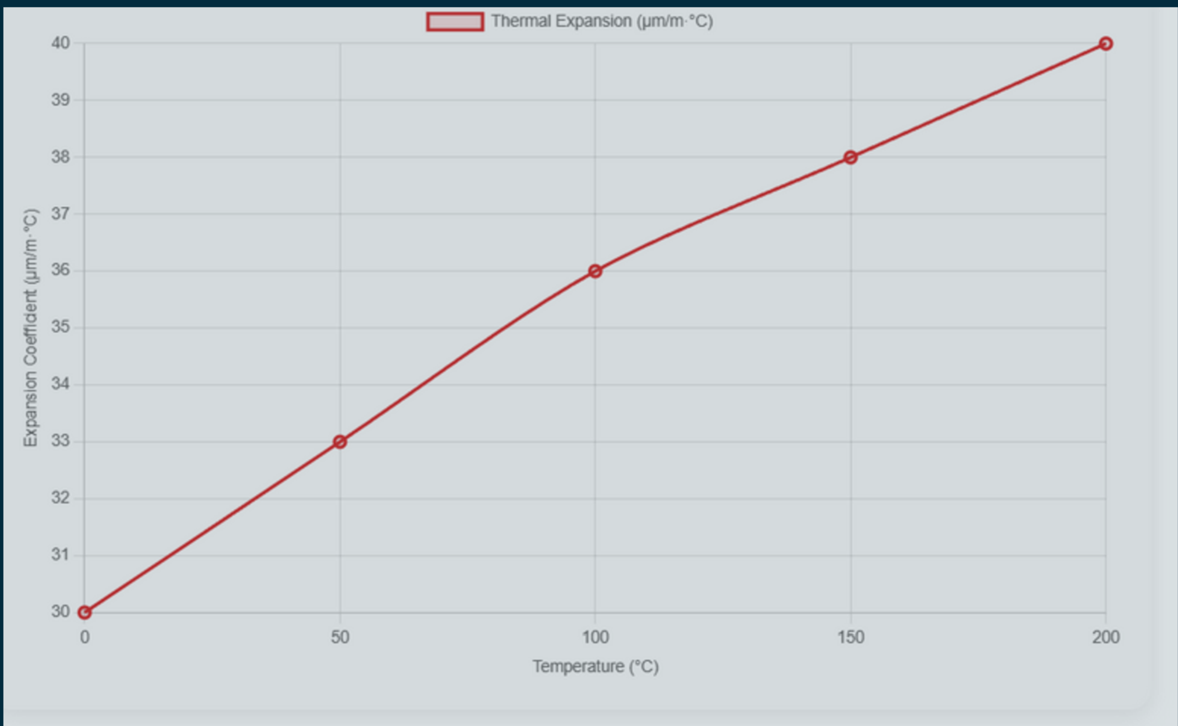
Lithium Fluoride (LiF) provides excellent broadband transmission from 0.12 µm to 6.5 µm, covering the deep-UV through to the infrared. With its low refractive index (~1.39) and very low dispersion, LiF is well suited for VUV/UV optics, excimer lasers, spectroscopy, and broadband UV–IR windows and lenses.

LiF offers good thermal stability and maintains reliable optical performance under typical laboratory and field conditions. Although mechanically soft, it can be fabricated to high precision for windows, prisms, and UV–IR components.

As a non-hygroscopic and chemically stable crystal, LiF is easy to handle and remains a dependable choice for UV, VUV, and broadband optical applications.



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FAQ

Q: What is Lithium Fluoride (LiF) used for?
A: Lithium Fluoride is used in VUV and UV spectroscopy, excimer laser systems, aerospace and radiation-exposed optics, thermal imaging, and broadband UV–IR windows and lenses, thanks to its extremely wide 0.12–6.5 µm transmission range.

Q: Why choose LiF compared with other fluoride materials?
A: LiF offers exceptional deep-UV and VUV transparency, a low refractive index (~1.39), very low dispersion, strong radiation resistance, and non-hygroscopic stability, making it superior to hygroscopic salts such as NaCl and KBr.

Q: Is Lithium Fluoride hygroscopic?
A: No. LiF is non-hygroscopic and does not absorb moisture, giving it better durability and storage stability than common halide crystals.

Q: Is LiF suitable for high-power UV lasers?
A: Yes. LiF performs well in excimer and UV laser systems due to its good laser-damage threshold and deep-UV transmission, making it ideal for beam delivery and focusing optics.

Q: What optical components can be manufactured from LiF?
A: LiF can be fabricated into windows, lenses, prisms, wedges, and UV/IR optical elements, polished to high precision for scientific, defence, and industrial applications.

Q: Does LiF have good environmental and chemical stability?
A: Yes. LiF is chemically stable, non-reactive, and maintains its optical properties under typical laboratory and field conditions.
Its only limitation is mechanical softness, so care is required during handling.

Q: Can LiF be anti-reflective coated?
A: Yes. LiF optics can be supplied uncoated or with specialised UV/IR AR coatings, depending on the target wavelength range and application.

Q: Is LiF safe to handle?
A: LiF is non-toxic and safe to handle using standard optical-component precautions. Gloves are recommended to protect the soft surface from scratches or contamination.

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