



## DESCRIPTION

Lithium fluoride (LiF) crystal has excellent VUV region transmittance. It is used for windows, prisms, and lenses in the visible and infrared in 0.104 $\mu$ m-7 $\mu$ m. LiF single crystal is sensitive to thermal shock and would be attacked by atmospheric moisture at 400°C. In addition irradiation produces color centers. Modest precautions should be taken against moisture and high energy radiation damage. Besides LiF softens at 600°C and is slightly plastic that can be bent into radius plates. The material can be cleaved along (100) plane and less commonly (110) plane. The optical characteristics are good and yet the structure is not perfect and cleavage is difficult. For good structure LiF is less commonly grown by the Kyropoulos method (air-grown) specifically for monochromator plates. High quality LiF is usually grown by modified Bridgman method.

## APPLICATIONS

- X-ray monochromator plates
- Optical material for VUV applications
- Windows, prisms, and lenses

## FEATURES

- Tends to create color centers
- Max temperature for application:400°C
- Excellent VUV region transmittance
- Sensitive to thermal shock



## PARAMETERS

### Material and Specifications

|                              |                                 |
|------------------------------|---------------------------------|
| Orientation                  | [100]<math>\pm 0.5^\circ</math> |
| Angle Tolerance              | <math>< 0.5^\circ</math>        |
| Parallelism                  | <math>< 20''</math>             |
| Perpendicularity             | 5'                              |
| Surface Quality              | 10-5 (MIL-O-13830A)             |
| Wavefront Distortion         | <math>\lambda/4</math>@633 nm   |
| Surface Flatness             | <math>\lambda/8</math> @633 nm  |
| Clear Aperture               | >90%                            |
| Thickness/Diameter Tolerance | $\pm 0.05$ mm                   |

### Physical and Chemical Properties

|   |   |
|---|---|
| Crystal Structure   | Cubic (NaCl)  |
| Lattice Constants   | 4.026   |
| Density   | 2.639 g/cm <sup>3</sup>   |
| Melting Point   | 870°C   |
| Thermal Conductivity / (W·m <sup>-1</sup> ·K <sup>-1</sup> @314k) | 4.01  |
| Specific Heat Capacity / (J·kg <sup>-1</sup> ·K <sup>-1</sup> )   | 1562  |
| Thermal Expansion / (10 <sup>-6</sup> ·K <sup>-1</sup> @283k)     | 37  |
| Hardness (Knoop)  | 102-113@600g  |
| Young's Modulus / (10 <sup>11</sup> dyne cm <sup>-2</sup> )       | 6.5-7.6   |
| Elastic Coefficient   | C <sub>11</sub> =112;<br>C <sub>12</sub> =46;<br>C <sub>44</sub> = 63.5 |
| Apparent Elastic Limit/ MPa                                       | 11.2@1620 psi   |
| Cleavage  | -100  |

### Optical characteristics

|   |   |
|---|---|
| Transmission Range                      | 0.105 ... 6 $\mu$ m   |
| Refractive Index                        | n <sub>o</sub> = 1.37327@2.5 $\mu$ m,<br>1.624@0.12 $\mu$ m |
| Reflective Loss                         | 4.4% @4.0 $\mu$ m   |
| Poisson Ratio                           | 0.326   |
| Absorption Coefficient/cm <sup>-1</sup> | 0.74 $\times 10^{-3}$ @2.7 $\mu$ m                          |

### Spectrum

