Lithium Fluoride (LiF)

Lithium Fluoride is grown by vacuum Stockbarger technique in ingots approximately 100mm diameter. Lithium Fluoride cleaves easily and must be worked with extreme care. Polishing, particularly steep radii, often causes surface "rip-out".

APPLICATIONS: Lithium fluoride is the material with the most extreme UV transmission of all and is used for special UV optics. Lithium fluoride transmits well into the VUV region at the hydrogen Lyman-alpha line (121nm) and beyond. Lithium fluoride is also used for X-ray monochromator plates where its lattice spacing makes it the most useful analysis crystal.

Transmission Range	0.12 to 6µm
Refractive Index	1.392 at 0.6µm (1)
Reflection Loss	5.2% at 0.6µm (2 Surfaces)
Absorption Coefficient	5.9×10^{-3} cm^{-1}at 4.3µm @ 300K (5)
Reststrahlen Peak	25µm
dn/dT	-16×10^{-6} at 1.15µm
dn/dµ = 0	1.3µm
Density	2.639 g/cc
Melting Point	848 °C (6)
Thermal Conductivity	11.3 W m^{-1} K^{-1} at 314 K (2)
Thermal Expansion	37×10^{-6} K^{-1} at 283 K (2)
Hardness	Knoop 102 with 600g indenter (2)
Specific Heat Capacity	1562 J Kg^{-1} K^{-1}
Dielectric Constant	0.1
Youngs Modulus (E)	64.97 GPa (2)
Shear Modulus (G)	55.14 GPa (2)
Bulk Modulus (K)	62.03 GPa (2)
Elastic Coefficients	C_{11}=112; C_{12}=46; C_{44}=63.5 (3)
Apparent Elastic Limit	11.2 MPa (1620 psi) (4)
Poisson Ratio	0.326 (calculated)
Solubility	0.27g / 100g water at 20 °C
Molecular Weight	25.94
Class/Structure	Cubic FCC, Fm3m (#221), NaCl Structure (100) cleavage

(1) Laporte et. al. J.Opt. Soc. Am. V73, No 8, p1062
(2) Combes et. al. J.Opt. Soc. Am. V41, p215. 1951
(3) Huntingdon, Phys Review. V72, p321, 1947
(4) Ballard et. al. J.Opt. Soc. Am. V42, p684. 1952
(5) H.H.Li, Absorption Coefficients, Int.J.Therm, V1, No. I, 1980
(6) T.B.Douglas & J.L.Dever, J. Am. Chem.Soc, 1954,76 (19), p4826

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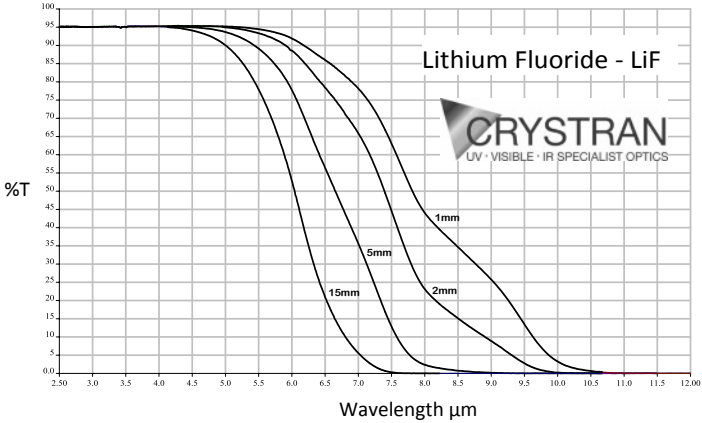
µm	No	µm	No	µm	No
0.106	1.9130	0.108	1.8330	0.110	1.7770
0.121	1.6240	0.130	1.5690	0.140	1.5300
0.150	1.5030	0.160	1.4840	0.170	1.4690
0.180	1.4850	0.190	1.4455	0.200	1.4391
0.220	1.4291	0.250	1.4189	0.260	1.4164
0.270	1.4141	0.280	1.4121	0.290	1.4103
0.300	1.4087	0.310	1.4073	0.320	1.4060
0.330	1.4048	0.340	1.4037	0.350	1.4028
0.360	1.4019	0.400	1.3989	0.500	1.3943
0.600	1.3918	0.700	1.3902	0.800	1.3890
0.900	1.3880	1.000	1.3871	1.500	1.3832
2.000	1.3788	2.500	1.37327	3.000	1.3666
3.500	1.3587	4.000	1.3494	4.500	1.3388
5.000	1.3266	5.100	1.3240	5.200	1.3213
5.300	1.3186	5.400	1.3158	5.500	1.3129
5.600	1.3099	5.700	1.3069	5.800	1.3038
5.900	1.3007	6.000	1.2975		



Routine transmission at 121nm is usually a minimum of 40% through a 2mm sample.

This curve represents the maximum transmission that we can achieve under ideal conditions of material and polish at high cost.