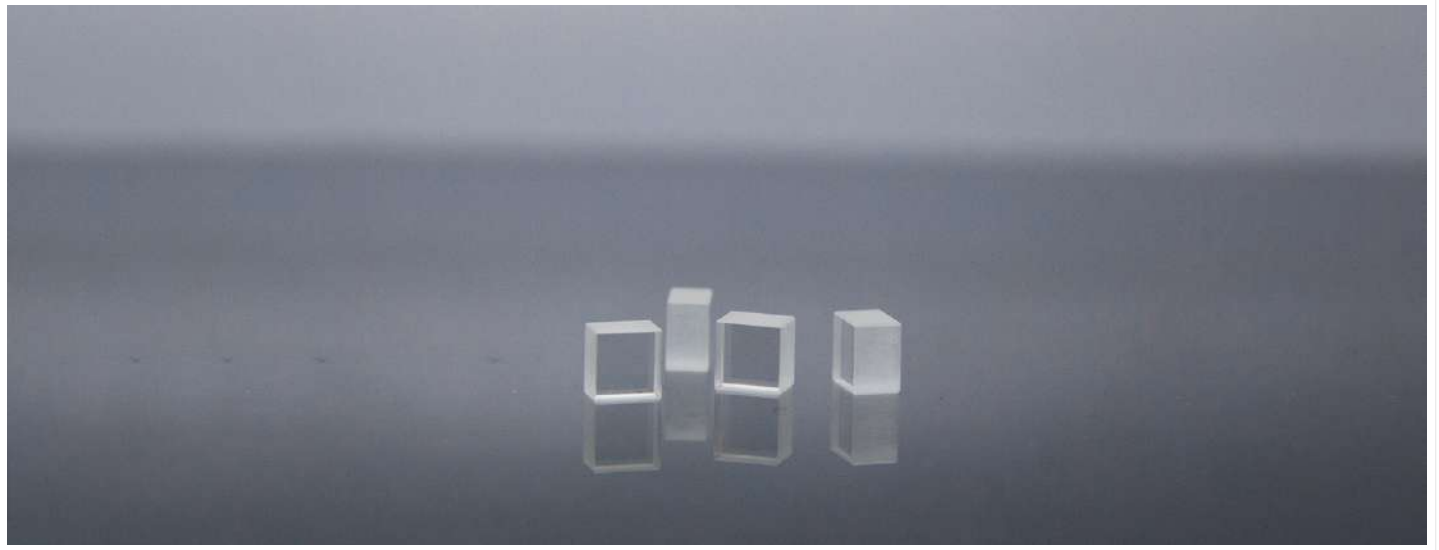


LiLuF₄



DESCRIPTION

The use of lutetium in place of the more common yttrium ion host is of interest because it leads to a better match of size and mass in the lattice with the heavier rare earths like Yb, Er and Tm. LiLuF₄ also melts congruently and has some physical characteristics superior to YLF. The use of Lu as a host ion can also result in subtle spectroscopic differences when compared to analogous Sc, Y, La or Gd based compounds. In general the fluorides probably have not received as much attention as the oxides as host materials. Fluoride crystal LiLuF₄ has a negative thermal dependence of refractive index, which compensates the positive thermal expansion coefficients. In addition, the growth of LiLuF₄ crystals needs not LiF excess because of its congruent crystallization nature, which would favour crystal growth with higher optical quality.

APPLICATIONS

- Lamp pumping, diode pumping
- Conventional sources used for pumping solid-state lasers

FEATURES

- Low optical nonlinearities
- Low phonon energies
- Lower up-conversion loss and laser threshold
- Good transparency from the ultraviolet to the infrared region of the spectrum
- Good resistance to optical damage
- Nothermally induced birefringence and output of linearly polarized laser



LiLuF₄

PARAMETERS

Material and Specifications

Doping Concentration	0.5–3.0%
Orientation Tolerance	5'
Dopant Concentration Tolerance	0.001
Parallelism	<10''
Perpendicularity	5'
Chamfer	0.1mm@45°
Surface Quality	10-5 (MIL-O-13830A)
Wavefront Distortion	<λ/8@633 nm
Surface Flatness	λ/10 @633 nm
Clear Aperture	0.95
Diameter	2-50.8 mm
Length	1-180mm

Optical Characteristics

Transmission Range	0.22 ... 8 μm
Thermal Coefficient of the Path Length(ppm/K)	17.0(E// a), 13.9(E// c)@300K
Thermal Coefficient of the Refractive Index (ppm/K)	-3.6(E// a), -6.0(E// c)@300K
Refractive Index	n=1.47
Nonlinear Refractive Index(10 ⁻¹⁶ cm ² /W)	1.5±0.5

Physical and Chemical Properties

Crystal Structure	Scheelite
Symmetry	Tetragonal
Space Group	I41/a
Lattice Constants	a=5.150, c=10.47 Å
Density (g/cm ³)	6.19
Melting Point	850±3°C
Thermal Conductivity(W/mK@298K)	5.0(a), 6.3(c)
Specific Heat(J/gK@300K)	0.53
Thermal Expansion(ppm/K@300K)	13.6(a), 10.8(c)
Band Gap	7.901eV

