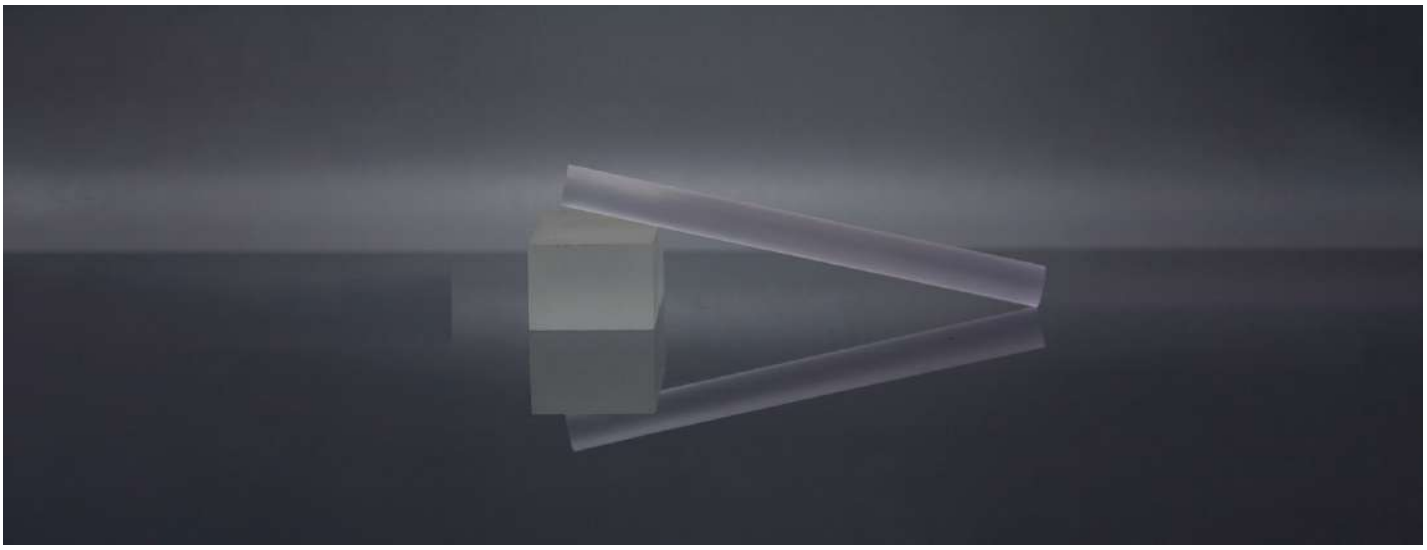
Nd:YLF



DESCRIPTION

Neodymium-doped Lithium Yttrium Fluorides (Nd:LiYF4 or Nd:YLF) is a crystal which lasers at 1047 nm and 1053 nm wavelength. Its main advantages are: large fluorescence line width, low thermal lensing, low threshold for CW applications and naturally polarized oscillation, which makes Nd:YLF an excellent material for CW, mode locked operation. The term YLF laser is usually used for lasers based on neodymium-doped YLF (Nd3+:YLF) crystals, although there are other rare-earth-doped YLF crystals, e.g. with ytterbium, erbium, thulium, holmium or praseodymium doping. YLF is the acronym for yttrium lithium fluoride (YLiF4). Due to the similar size, yttrium ions can be replaced with laser-active rare earth ions without strongly affecting the lattice structure. YLF is birefringent, which eliminates thermally induced depolarization loss. Also, the gain and the emission wavelength of Nd:YLF are polarization-dependent: there is the stronger 1047-nm line for π polarization, and a weaker one at 1053 nm for σ polarization. The 1053-nm line fits well to the gain peak of Nd:glass, which makes Nd:YLF seed lasers and preamplifiers suitable for Nd:glass amplifier chains. There are additional transitions at 1321 nm (π) and 1313 nm (σ), which allow for, e.g., red light generation via frequency doubling. The negative thermo-optic coefficient dn / dT leads to a defocusing thermal lens, which may be approximately compensated by the focusing lens from bulging of the end faces, if a suitable design is chosen. Nd:YLF lasers can be diode-pumped or lamp-pumped. Compared with Nd:YAG (YAG lasers), Nd:YLF has a lower thermal conductivity, but nevertheless exhibits weaker thermal distortions (due to the weakly negative dn / dT), thus allows a better beam quality, has significantly anisotropic thermal expansion and a lower fracture resistance (limiting the output power), and a longer upper-state lifetime (which is favorable for, e.g., diode-pumped Q-switched lasers with high pulse energy). Another remarkable feature is the high UV transparency, which is favorable for pumping with xenon flashlamps.

APPLICATIONS

- Nd:YLF seed lasers and preamplifiers
- Diode-pumped Q-switched lasers
- Pump with xenon flashlamps

Nd:YLF

PARAMETERS

Material and Specifications

Parallelism	<10″
Perpendicularity	<5′
Surface Quality	better than 10/5 Scratch Dig per MIL-O-13830A
Wavefront Distortion	<λ/4 per inch@632.8 nm
Surface Flatness	<λ/10 @632.8 nm
Clear Aperture	Central 90%
Diameter Tolerance	+0.0/-0.1 mm
Length Tolerance	+/-0.5mm
Chamfer	0.15mm@45°

Physical and Chemical Properties

Structure Symmetry	Tetragonal, I41/a
Lattice Constants	a=5.16, c=10.85 Å
Specific mass	3.99g/cm3
Melting Point	819°C
Thermal Conductivity (W·m-1·K-1)	6.3
Specific Heat(J·g-1·K-1)	0.79
Thermal Expansion (10-6·K-1)	8.3(⊥c), 13.3(‖c)
Hardness (kg/mm2@Mohs)	4~5
Young`s Modulus (108g/cm2)	7.65

Index of Refraction

λ(nm)	no	ne
262	1.464	1.442
350	1.47	1.448
525	1.479	1.456
1050	1491	1.473
2065	1.511	1.485

Optical Characteristics

Dopant Concentration(%)	0.5-1.5
Transmission Range	0.18 … 6.7 μm
Refractive Index (@1053nm)	No=1.448, ne=1.470
Loss Coefficient/cm	<0.003@1064nm
Thermo-optic Coefficient （10-6·K-1@ ）	-2.0(E⊥c), -4.3 (E‖c)
Scatter Loses(%/cm)	<0.2
Fluorescent Lifetime(μs)	485@1%Nd doping
Peak Emission Cross Section(10-19/cm2)	1.2(E⊥c)@1053nm, 1.8(E‖c)@1047nm
Lasing Wavelength(nm)	1053(E⊥c, σ-pol), 1047(E‖c, π-pol)
Peak Absorption Wavelength @1.2%Nd (cm-1)	10.8(792.0nm, E‖c), 3.59(797.0nm, E⊥c)

FEATURES

- High UV transparency
- Birefringent, which eliminates thermally induced de-polarization loss
- The gain and the emission wavelength are polarization-dependent
- The 1053-nm line fits well to the gain peak of Nd:glass
- Negative thermo-optic coefficient dn/dT leads to a defocusing thermal lens
- Significantly anisotropic thermal expansion and a lower fracture resistance and a longer upper-state lifetime

www.halide-crylink.com
sales@crylink.com
+86-21-69910952 / 69913696
No.200, Zhaoxian Road, Jiading District, Shanghai, China

Nd:YLF

SPECTR