Tm:YLF

DESCRIPTION

Tm:YLF is the important middle infrared laser crystal. Because Tm:YLF is negative uniaxial crystal, whose thermal refractive index coefficient is negative, some thermal distortion may be counteracted and high-quality light can be output. Conveniently pumped at 792nm, 1.9μm linearly polarized beam is output in a axis, and non-linearly polarized beam is output in c axis. The YLF crystals has low non-linear refraction index value and thermo optical constants, which makes theses crystals applicable in research, development, education, production, photonics, optic, laser technology and telecommunications.

Tm3+:YLF lasers are ideal to be used as pump source for Ho3+:YAG lasers.
Yttrium lithium fluoride (YLF) is a particularly attractive choice as the host medium for thulium, when it is used as pump source for a 2.1 μm Ho:YAG laser. This is due to the good overlap of the emission peaks with the absorption spectrum of Ho:YAG. YLF is a naturally birefringent material, capable of producing linearly polarized output with virtually no depolarization loss.

APPLICATIONS

- Medical diagnosis and treatment
- Laser radar
- Laser ranging
- Electro-optical countermeasure
- Laser remote sensing
- Laser imaging
- Optical signal processing
- Material processing

FEATURES

- Linearly polarized output beam
- Little heat effect while laser
- Effective cross relaxing of Tm ions
- Relatively high efficiency with LD pumping
- Low nonlinear refractive index
- Low thermo-optical constant
- Low polarization loss

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PARAMETERS

Material and Specifications

Concentration Tolerance (atm%)	2-4 at.%
Lattice Constants	4~5
Orientation	a-cut
Parallelism	<10”
Perpendicularity	<5”
Surface Quality	10-5 scratch & dig
Wavefront Distortion	λ/8 @ 633nm
Surface Flatness	λ/10 @ 633nm
Clear Aperture	0.95
Length Tolerance	±0.1 mm
Face Dimensions Tolerance	+0/-0,1 mm
Protective Chamfers	<0,1 mm at 45°
Damage Threshold	over 15J/cm2 TEM00, 10ns, 10Hz

Physical and Chemical Properties

Crystal Structure	Tetragonal
Lattice Constants	a=5.16Å; c=10.85Å
Density	3.99 g/cm³
Melting Point	819℃
Thermal Conductivity	6 Wm-1K-1
Thermal Optical Coefficient (dn/dT)	π = 4.3 x 10-6 x °K-1; σ = 2.0 x 10-6 x °K-1
Thermal Expansion / （10-6·K-1@25°C ）	10.1×10-6 (//c) K-1, 14.3×10-6(//a) K-1
Hardness (Mohs)	5
Shear Modulus /Gpa	85
Specific Heat	0.79 J/gK
Poisson Ratio	0.3

Optical Characteristics

Laser Transition	3F4→3H6
Laser Wavelength	π:1880 nm; σ:1908 nm
Absorption Cross Section at Peak	0.55×10-20 cm2
Absorption Bandwidth at Peak Wavelength	16 nm
Absorption Peak Wavelength	792 nm
Lifetime of 3F4 Thulium Energy Level	16 ms
Quantum Efficiency	2
Non-linear Index n2	0.6 x 10-13
Optical Quality	< 0.3 x 10-5
Refractive Index @1064 nm	no=1.448, ne=1.470
Laser Induced Damage Threshold	>10 J/cm2@1900 nm, 10 ns
Coatings	R<0,5% @792 nm + R<0,15% @1800-1960 nm on both sides; custom coatings also available

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Absorption and Emission Spectrum