Tm:YLF

DESCRIPTION

Thulium doped yttrium fluoride lithium (Tm:YLF) crystals have a low nonlinear refractive index and thermo optic constant, which are very suitable for the application in the fields of scientific research, production, education, and other optoelectronic fields. Tm:YLF crystal is a negative uniaxial crystal with a negative refractive index temperature coefficient, which can offset some thermal distortion and thus has high beam quality output. The pump wavelength is 792 nm, and the linear polarized laser with the wavelength of 1900nm outputs in the direction of an axis. outputting light from the c axis is non-linear polarized. High power laser output can be obtained by selecting the proper crystal size and doping concentration. Two-micron Tm^{3+} lasers are of interest for many applications in the scientific, defense, and medical fields. Thulium readily substitutes many crystal hosts that are suitable for high-average-power laser systems and it has an absorption band at ~0.8 μm allowing excitation with commercially available high power laser diodes.

FEATURES

- Low nonlinear refractive index
- Low thermo-optical constant
- Low polarization loss
- Long upper energy level fluorescence lifetime
- Small up-conversion effect
- No absorption loss of sensitized ions

APPLICATIONS

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

Material processing

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Tm:YLF

PARAMETERS

MATERIAL SPECIFICATIONS

Concentration Tolerance (atm%)	2-4 at.%
Lattice Constants	4~5
Orientation	a-cut, other orientations also available
Parallelism	<10”
Perpendicularity	<5”
Surface Finish	10-5 S/D
Wavefront Distortion	λ/8 @ 633nm
Flatness	λ/10 @ 633nm
Clear Aperture	95%
Length Tolerance	±0.1 mm
Face Dimensions Tolerance	+0/-0,1 mm
Chamfer	<0,1 mm @45°
Damage Threshold	over 15J/cm^2 TEM_{00}, 10ns, 10Hz

PHYSICAL AND CHEMICAL PROPERTIES

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

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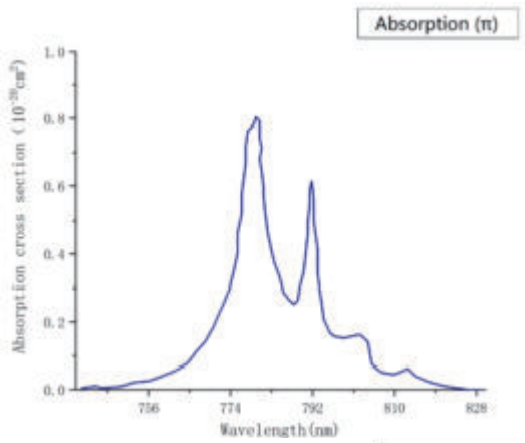
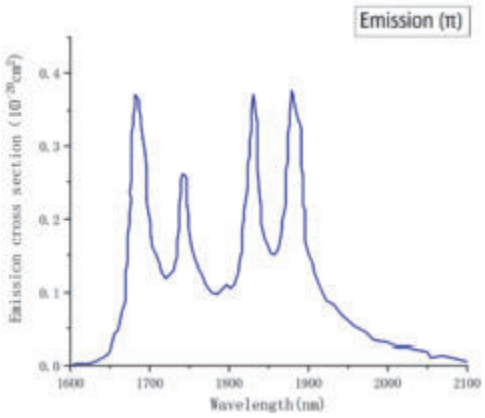
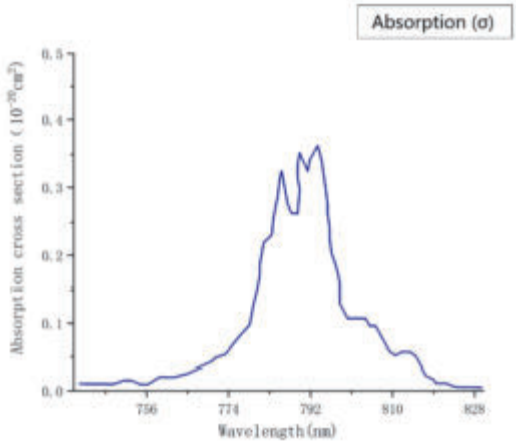
OPTICAL AND SPECTRAL PROPERTIES

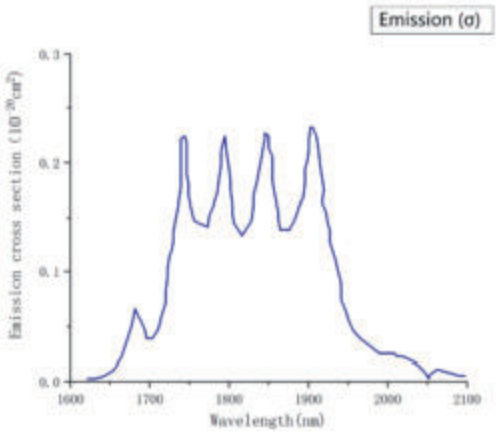
Laser Transition	$^3F_4 \rightarrow {}^3H_6$
Laser Wavelength	π:1880 nm; σ:1908 nm
Absorption Cross-section at Peak	0.55×10^{-20} cm^2
Absorption Bandwidth at Peak Wavelength	16 nm
Absorption Peak Wavelength	792 nm
Lifetime of $^3F_4$ Thulium Energy Level	16 ms
Quantum Efficiency	2
Quantum Efficiency n_2	0.6×10^{-13}
Optical Quality	$< 0.3 \times 10^{-5}$
Refractive Index @1064 nm	no=1.448, ne=1.470
Laser Induced Damage Threshold	>10 J/cm^2 @1900 nm, 10 ns
Coatings	R<0,5% @792 nm + R<0,15% @1800-1960 nm on both sides; custom coatings also available

SPECTRA









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