

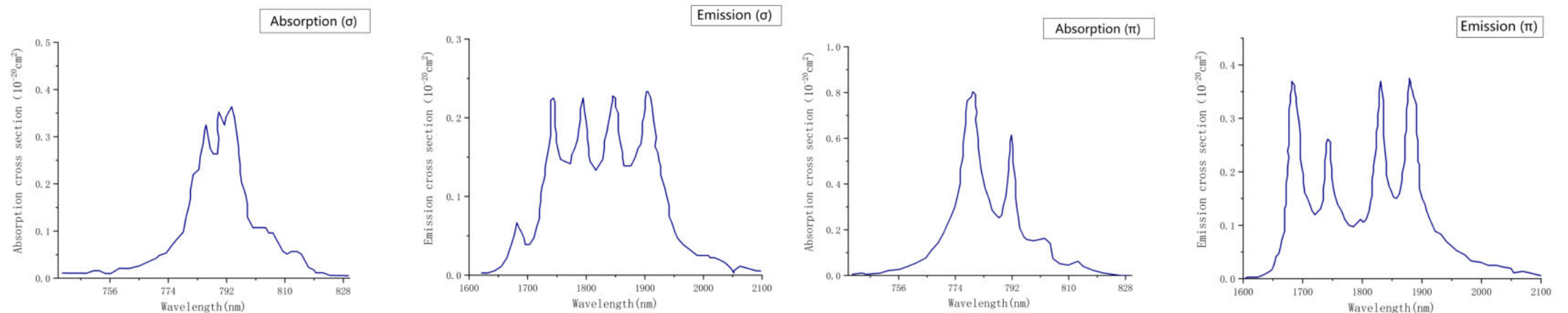
Tm:YLF



DESCRIPTION

Thulium doped yttrium fluoride lithium (Tm:YLF) crystals have 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 wavelength of 1900nm outputs at in the direction of a axis. outputting light from c axis is non-linear polarized. High power laser output can be obtained by selecting proper crystal size and doping concentration. Two-micron Tm³⁺ lasers are of interest for many applications in the scientific, defence, and medical fields. Thulium readily substitutes into 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.

SPECTRA



PARAMETER

Material and Specifications

Concentration Tolerance	2-4 at. %
Lattice Constants	4~5
Orientation	a-cut, other orientations also available
Parallelism	<10"
Perpendicularity	<5"
Surface Quality	10-5 scratch & dig
Wavefront Distortion	$\lambda/8$ @ 633nm
Surface Flatness	$\lambda/10$ @ 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/cm ² TEM00, 10ns, 10Hz

Optical and Spectral Properties

Laser Transition	3F4→3H6
Laser Wavelength	n :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 3F4 Thulium Energy Level	16 ms
Quantum Efficiency	2
Non-linear Index n ₂	0.6×10^{-13}
Optical Quality	< 0.3×10^{-5}
Refractive Index @1064 nm	$n_o=1.448$, $n_e=1.470$
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

Physical and Chemical Properties

Crystal Structure	Tetragonal
Lattice Constants	a=5.16Å; c=10.85Å
Density	3.99 g/cm ³
Melting Point	819°C
Thermal Conductivity	6 Wm-1K-1
Thermal Optical Coefficient(dn/dT)	$n = 4.3 \times 10^{-6} \times ^\circ K^{-1}$; $\sigma = 2.0 \times 10^{-6} \times ^\circ K^{-1}$
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

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

- 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

