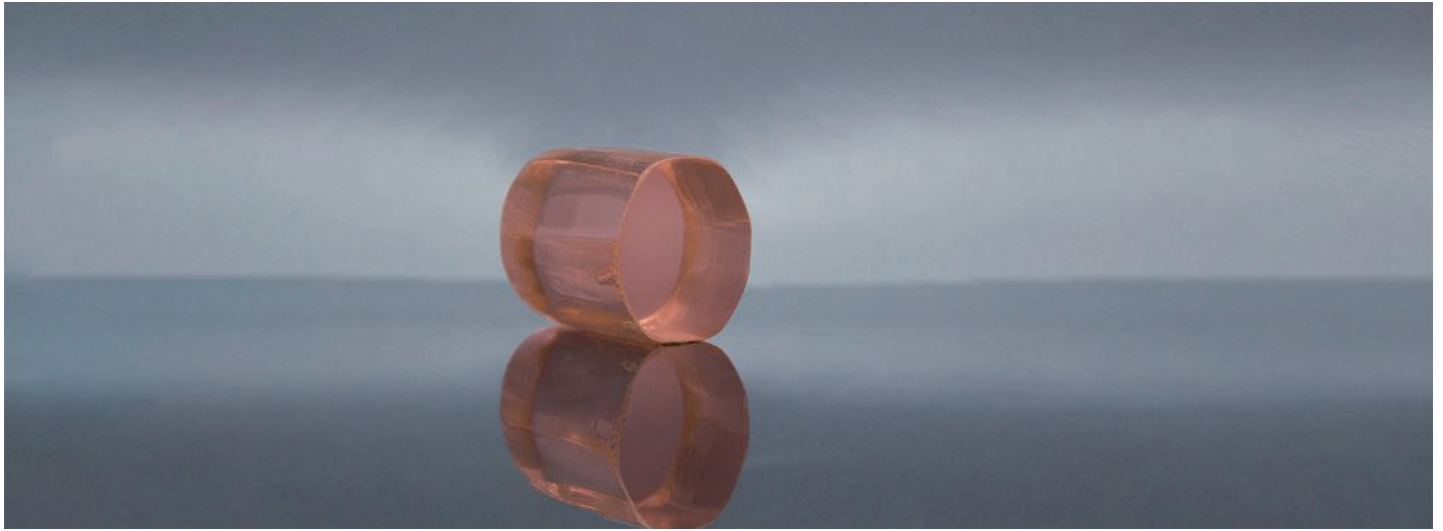


# Ho:YAG



## DESCRIPTION

The radiation wavelength of  $\text{Ho}^{3+}$  ions is near 2100nm, which is located in the human eye safe band and has high transmittance in the atmosphere and has important application prospect in the fields of remote sensing detection, laser ranging, and laser radar, etc. Meanwhile, 2100nm locates in the absorption peak of the water molecule, which is highly absorbed by human tissues. When Ho laser is used for medical surgery, its penetration depth in the human body is only a few tens of micrometers, and it has little heat damage to the surrounding tissues of the human body. Therefore, it is widely used in medical surgery and treatment. Ho laser can also be used as a pump source, through the non-linear effect of crystal (such as ZGP crystal), an infrared laser with the wavelength of 3 ~ 5 mm can be realized.

## FEATURES

- High laser gain
- Safe for eyes and good atmosphere transmission
- High-energy storage capability
- Low quantum defect
- Long fluorescence life
- Large emission cross section
- High slope efficiency
- Low up-conversion loss and re-absorption loss

## APPLICATIONS

- 2100nm laser



# Ho:YAG

## PARAMETERS

### MATERIAL AND SPECIFICATIONS

Materials	Ho: YAG
Concentration Tolerance (atm%)	0.2% ~3%(as per customers request)
Orientation	<111>crystalline direction
Parallelism	<10"
Perpendicularity	<5"
Surface Quality	10/5 Scratch/dig per MIL-O-1380A
Wavefront Distortion	$\lambda/8$ per inch @633nm
Surface Flatness	$\lambda/10@$ 633 nm
Clear Aperture	>90
Thickness/Diameter Tolerance	Rods with diameter:(+0、-0.05)mm,( $\pm 0.5$ ) mm

### PHYSICAL AND CHEMICAL PROPERTIES

Crystal Structure	Cubic
Lattice Constants	12.01Å
Density	4.56g/cm <sup>3</sup>
Melting Point	1970°C
Thermal Conductivity	14W/m/K, 20°C; 10.5W/m/K, 100°C
Thermal Shock Resistance	790W/m
Thermal Optical Coefficient(dn/dT)	$7.3 \times 10^{-6} / K$
Thermal Expansion / ( $10^{-6} \cdot K^{-1}@25^{\circ}C$ )	[100]: $8.2 \times 10^{-6} / K@ 0 \sim 250^{\circ}C$
	[110]: $7.7 \times 10^{-6} / K@0 \sim 250^{\circ}C$
	[111]: $7.8 \times 10^{-6} / K@0 \sim 250^{\circ}C$
Hardness (Mohs)	8.5
Young`s Modulus /GPa	$3.17 \times 10^4$ Kg/mm <sup>2</sup>
Shear Modulus /Gpa	310GPa
Extinction Ratio	>28dB
Specific Heat	0.59J/g.cm <sup>3</sup> @0-20°C
Solubility	Insoluble in water, slightly soluble in ordinary acids
Poisson Ratio	0.3

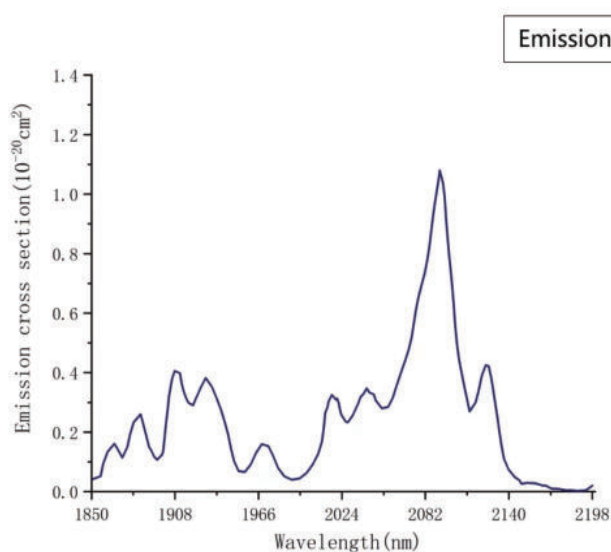


# Ho:YAG

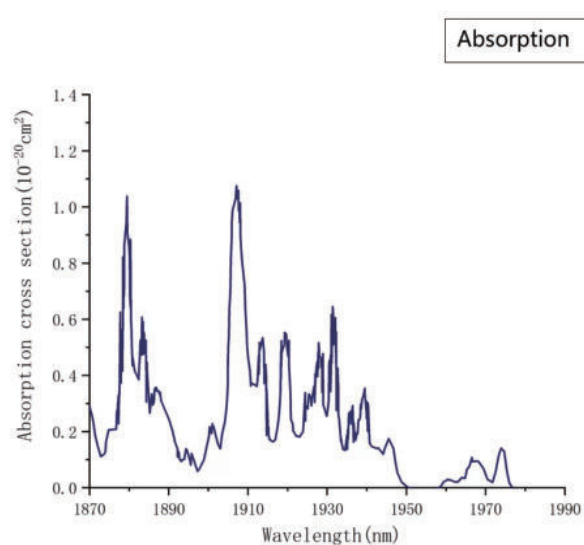
## OPTICAL AND SPECTRAL PROPERTIES

Laser Transition	$^5I_7 \rightarrow ^5I_8$
Laser Wavelength	2.05 $\mu\text{m}$
Effective Stimulated Absorption Cross Section	$1.09 \times 10^{-20} \text{cm}^2$
Effectively Stimulated Emission Cross Section	$1.14 \times 10^{-20} \text{cm}^2$
Pump Wavelength	1908 nm
Laser Wavelength	2090 nm
Fluorescence Lifetime	7 ms
quantum Efficiency	1
Refractive Index @1.030 $\mu\text{m}$	1.82
Upper Conversion Loss Factor	1.8, 2.6, $5.3 \times 10^{-18} \text{cm}^3/\text{s}$

## SPECTRA



Ho:YAG laser crystal emission spectrum



Ho:YAG laser crystal absorption spectrum

