

Tm:YAG



DESCRIPTION

Tm:YAG operating on the $^3H_4 - ^3H_6$ transition in the 0.82 μm wavelength range. It can be pumped with efficient diode lasers in the 0.78 – 0.8 μm wavelength range. The transition has a small quantum defect for low thermal dissipation. The upper state lifetimes can be long, on the order of a millisecond for good energy storage. It also has sufficient gain bandwidth to support sub-ps-long pulses depending on the host material and temperature of operation. Compared with the single-crystal material, the transparent ceramic materials combine the advantages of single crystals and glasses. The transparent ceramic materials are fabricated by solid-state reaction and vacuum sintering. So, they not only possess good optical and thermal properties as fine as single crystals but also can be fabricated with large size, high concentration. Furthermore, they also have other superiorities, such as a short fabrication period, less cost, and multifunctional samples.

FEATURES

- High quantum efficiency
- High efficiency with LD pump
- Long upper state lifetime
- Sufficient gain bandwidth
- Small quantum defect
- High damage threshold

APPLICATIONS

- Radar and Ranging
2000nm laser
- Medical Applications
2000nm laser



Tm:YAG

PARAMETERS

MATERIAL AND SPECIFICATIONS

Tm Concentration Tolerance (atm%)	Tm:0.5~5at%
Orientation	[111], <5°
Parallelism	≤10"
Perpendicularity	≤5'
Surface Quality	10-5 (MIL-O-13830A)
Wavefront Distortion	≤ 0.125λ/25 mm @632.8nm
Surface Flatness	λ/8@632nm
Clear Aperture	>95%
Chamfer	0.15±0.05mm
Size	D: 2~10mm, L: 3~150mm
Coatings	AR: ≤0.25% @2μm

PHYSICAL AND CHEMICAL PROPERTIES

Crystal Structure	Cubic
Lattice Constants	12.01 Å
Density	4.56±0.04g/cm ³
Melting Point	1970°C
Thermal Conductivity /W/m/K@20°C	14W/m/K@20°C; 10.5W/m/K@100°C
Specific Heat (J/g. cm ³ @0-20°C)	0.59
Thermal Optical Coefficient(dn/dT)	7.3×10 ⁻⁶ /K
Thermal Expansion	[100]: 8.2×10 ⁻⁶ /K@0~250°C
	[110]: 7.7×10 ⁻⁶ /K@0~250°C
	[111]: 7.8×10 ⁻⁶ /K@0~250°C
Hardness (Mohs)	8.5
Young`s Modulus	3.17×10 ⁴ Kg/mm ²
Shear Modulus	310GPa
Extinction Ratio	≥ 25dB @632.8nm
Tensile Strength/Gpa	0.13~0.26
Solubility	Insoluble in water, slightly soluble in ordinary acids
Poisson Ratio	0.25
Thermal Shock Resistance	790W/m



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OPTICAL AND SPECTRAL PROPERTIES

Laser Transition	${}^3F_4 \rightarrow {}^3H_6$
Laser Wavelength	1.87~2.16 μm
Temperature Dependence of Refractive Index	$7.3 \times 10^{-6}/\text{K}$
Absorption Cross Section	$7.5 \times 10^{-21} \text{cm}^2$
Diode Pump Band	785nm, 680nm
Emission Cross Section@2013nm	$2.9 \times 10^{-20} \text{cm}^2$
Fluorescence Lifetime	11ms
Refractive Index @632nm	1.83

SPECTRA

