

Er:YAG

Erbium-doped YAG



DESCRIPTION

Er YAG laser Crystal—50% Erbium doped in YAG which can stimulate 2940nm laser used in medical and dentistry

Erbium doped Yttrium Aluminum Garnet ($\text{Er:Y}_3\text{Al}_5\text{O}_{12}$ or Er:YAG) combine various output wavelength with the superior thermal and optical properties of YAG. It is an excellent laser crystal which lasers at $2.94\mu\text{m}$. This wavelength is the most readily absorbed into water and hydroxylapatite of all existing wavelengths and is considered a highly surface cutting laser. It is a well known material for medical applications.

The emission wavelength of Er:YAG with doping concentration of 50% is 2940nm, which is at the position of water absorption peak and can be strongly absorbed by water molecules. Therefore, it is widely used in the field of plastic surgery and dentistry. At present, the projects we have participated in include laser blood collection instrument, which adopts the structure of both sides of Er:YAG rods coated and xenon lamp end pumped. the Er-YAG laser wavelength is an excellent choice for improvement of a variety of skin conditions and features of aging, including dyschromia, actinic photodamage, solar elastosis, acne and traumatic scarring, fine lines and mild to moderate rhytidosis, coarse skin texture, and skin laxity.

FEATURES

- High doping concentration
- Abundant energy level structure
- Excellent optical quality
- Low scattering loss
- High output and damage threshold

APPLICATIONS

- 1600nm laser used in optical communication
- 2940nm laser used in glaucoma surgery
- 2940nm laser used in vitreoretinal surgery
- 2940nm laser used in penetrating keratoplasty
- 2940nm laser used in cataract surgery



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PARAMETERS

MATERIAL AND SPECIFICATIONS

Property	Value
Orientation	[100] or [100] $\leq \pm 0.5$
Parallelism	10
Maximum Dimensions	Diameter:2mm-50mm Length:5mm-180mm
Perpendicularity	5'
Surface Quality	10-5
Wavefront Distortion	$< \lambda/8 @ 632 \text{ nm}$
Surface Flatness	$< \lambda/10 @ 632.8 \text{ nm}$
Clear Aperture	$> 90\%$
Chamfer	0.1mm@45°
Thickness/Diameter Tolerance	$\pm 0.05 \text{ mm}$
Coatings	$< 0.25\% @ 2940 \text{ nm}$

PHYSICAL AND CHEMICAL PROPERTIES

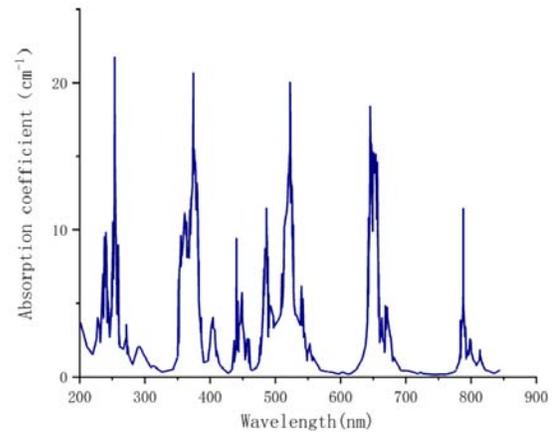
Property	Value
Crystal Structure	cubic – Ia3d
Lattice Constants	12.01Å
Density	4.56-5.11 g/cm ³
Melting Point	1950°C
Thermal Conductivity/(W·m ⁻¹ ·K ⁻¹ @25°C)	0.14W
Specific Heat/(J·g ⁻¹ ·K ⁻¹)	0.59
Thermal Shock Resistance	790W/m
Thermal Expansion /(10 ⁻⁶ ·K ⁻¹ @25°C)	7.8
Hardness (Mohs)	8.5
Young`s Modulus /GPa	317
Shear Modulus /Gpa	54.66
Extinction Ratio/dB	30
Chips	$< 0.1 \text{ mm}$
Barrel Finish	Ground Finish 400#Grit
Poisson Ratio	0.25

OPTICAL AND SPECTRAL PROPERTIES

Property	Value
Laser Transition	$^4I_{11/2} \rightarrow ^4I_{13/2}$ (highly doped) $^4I_{13/2} \rightarrow ^4I_{15/2}$ (highly doped)
Laser Wavelength	2940 nm (highly doped) 1645 nm (low doped)
Photon Energy	$6.75 \times 10^{-20} \text{ J} @ 2940 \text{ nm}$
Pump Absorption Band Width	600~800 nm (highly doped) 1530 nm (low doped)
Damage Threshold	$> 500 \text{ MW/cm}^2$
Emission Cross Section	$3 \times 20 \text{ cm}^2$
Fluorescence Lifetime	0.23 ms (highly doped) 2~5 ms (low doped)
Refractive Index	1.7838@2940 nm

SPECTRA

Absorption



Emission

