

CTH:YAG Crystals and Components

CTH:YAG -yttrium aluminium garnet laser crystals doped with chromium, thulium and holmium ions to provide lasing at 2.13 microns are finding more and more applications, especially in the medical industry. The inherent advantage of the crystal is that it employs YAG as the host. YAG's physical, thermal and optical properties are well known and understood by every laser designer.

Lasers operating at 2.13 microns couple well into water and body fluids, and can take advantage of using silica fibers for easy, accurate beam delivery. CTH:YAG can be readily Q-switched with either electro-optic material such as LiNbO₃ or acousto-optics. Lasers using CTH:YAG are successfully used for medical procedures such as fragmentation of gallstones and for vascular welding.

Proprietary crystal preparation technology has been developed to overcome poor lasing efficiency, one of the major impediments to the use of laser materials in the 2 microns wavelength range. This technology allows production of CTH:YAG laser crystals with high optical quality, low scattering losses, and high efficiency. CTH:YAG laser crystals optimise the usefulness of the sensitizer ions for the holmium basing conditions at room temperature.

CTH:YAG laser crystals are offered in sizes from 3 mm to 10 mm diameter, with lengths up to 150 mm long. Call upon our depth of experience in research, crystal growth and laser rod fabrication. ULTICRYSTAL will work with you to produce CTH:YAG laser crystals that meet the exact specifications for superior performance of your 2.13 microns laser system.

Designed for 2.13 μm output wavelength CTH:YAG is an excellent choice for Medical Laser Applications.

The Physical and Optical Properties of CTH:YAG Crystals

Properties	Values
Chemical formula	$\text{Cr}^{3+}, \text{Tm}^{3+}, \text{Ho}^{3+}:\text{Y}_3\text{Al}_5\text{O}_{12}$
Crystal structure	Cubic
Lattice Constants	12.01Å
Melting Point	1970 °C
Density	4.56 g/cm ³
Mohs hardness	8.5
Specific Heat (0-20)	0.59J/g.cm ³
Modulus of Elasticity	310GPa
Young's Modulus	3.17x10 ⁴ Kg/mm ²
Poisson Ratio	0.3(est.)
Tensile Strength	0.13~0.26GPa
Thermal Expansion Coefficient	[100]:8.2x10 ⁻⁶ / °C [110]:7.7x10 ⁻⁶ / °C [111]:7.8x10 ⁻⁶ / °C
Thermal Conductivity	14W/m/K(@25 °C)
Thermal Optical Coefficient (dn/dT)	7.3x10 ⁻⁶ / °C

Thermal Shock Resistance	790W/m
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Optical and Spectral Properties of CTH::YAG

Properties	Values
Laser Transition	517- 518
Laser Wavelength	2080nm
Photon Energy	9.55 x 10 ⁻²⁰ J
Emission Cross Section	7 x 10 ⁻²¹ cm ²
Fluorescence Lifetime	8.5 ms
Index of Refraction	1.80 @2.08 μm
Absorption Linewidth	4 nm
Diode Pump Band	781 nm
Major Pump Bands	400~800 nm

Standard Processing SpecificationsS of CTH:YAG Crystals

Specifications	Capability
Nd Doping Level	0.8% or 1.1%
Orientation	<111> crystalline direction
Surface Flatness	up to λ/10 at 633 nm
Parallelism	< 10 arcsec
Surface quality	10/5 scratch/dig as per MIL-O-13830A
Perpendicularity	< 5 arcmin
Angle tolerance	< 30 arcmin
Aperture tolerance	± 0.1 mm
Clear aperture	90% of full aperture
Chamfers	0.1 mm at 45 deg
Coating	both sides coated AR @ 1064 nm, R < 0.2%, AOI = 0 deg

Notes

- »| Our inspection standard is comply with MIL standard and ISO9001 standard
- »| OEM Specifications are available upon requested

Standard Product List

Code	Size,mm	Coating	Price
CTHY-101	Ø3x60	AR/AR@2130nm	Contact us
CTHY-102	Ø4x80	AR/AR@2130nm	Contact us



CTHY-103	Ø5x90	AR/AR@2130nm	Contact us
CTHY-104	Ø6x110	AR/AR@2130nm	Contact us
CTHY-105	Ø7x125	AR/AR@2130nm	Contact us
CTHY-106	Ø8x130	AR/AR@2130nm	Contact us
CTHY-107	Ø9x150	AR/AR@2130nm	Contact us
CTHY-108	Ø10x160	AR/AR@2130nm	Contact us

 **Notes**

»| Custom size is available upon requested.

