

Nd:Ce:YAG

Nd:Ce:YAG crystal is an excellent laser material used for no-water cooling and miniature laser systems. In double doped Nd:Ce:YAG crystals Cerium are chosen as sensitizer for Nd³⁺ ions because of its strong absorption in UV spectral region at flash lamp pumping and efficient energy transfer to the Nd³⁺ excited state. As a result - thermal distortion in Nd:Ce:YAG is appreciably less and the output laser energy is greater than that in Nd:YAG at the same pumping. Therefore it is possible to realize high power lasers with good beam quality. Lasing wavelength at 1064 nm, laser damage threshold and thermal conductivity of the Nd:Ce:YAG crystals are the same as for Nd:YAG.



Advantages of Nd:Ce:YAG Crystals

- Ultra compact
- Low threshold
- Very high slope efficiency
- Good anti-UV irradiation property
- Good thermal stability
- High optical quality

Basic Properties

Crystal Structure	Cubic
Lattice Constants	12.01Å
Mohs Hardness	8.5
Melting Point	1950°C
Density	4.55 g/cm ³
Modulus of Elasticity	310GPa
Thermal Conductivity	14 W/m/K @20°C, 10.5 W/m/K @100 °C
Thermal Expansion	8.2 x 10 ⁻⁶ /K [100]
	7.7 x 10 ⁻⁶ /K [110]
	7.8 x 10 ⁻⁶ /K [111]
Specific Heat	0.59 Jg ⁻¹ /K
Thermal Shock Resistance	790 Wm ⁻¹
Thermal Optical Coefficient (dn/dt)	7.3 x 10 ⁻⁶ /°C

Optical and Special Properties

Dopant Concentration	Nd: 1.1 ~ 1.4at%, Ce: 0.05 ~ 0.1at%
Lasing System	Four Level
Lasing Upper State	⁴ F _{3/2}
Lasing Wavelength	1064 nm
Photon Energy	1.86×10 ⁻¹⁹ J@ 1064nm
Fluorescent Lifetime (Nd 1at%)	230 μs
Emission Linewidth	4.5Å @1064nm
Emission Cross Section (Nd 1at%)	2.7~8.8 x 10 ⁻¹⁹ cm ²
Refractive Index	1.82 @1064 nm

Standard Specifications

Orientation	<111> within $\pm 5^\circ$
Wavefront Distortion	$\leq 0.2\lambda/\text{inch}$
Extinction Ratio	≥ 28 dB
Rod Sizes	Diameter: 3~6mm, Length: 40~80mm
Dimensional Tolerances	Diameter: +0.00/-0.05mm, Length +0.5/-0.2 mm
Flatness	$\lambda/10$ @633 nm
Parallelism	< 10 arc seconds
Perpendicularity	< 5 arc minutes
Surface Quality	10/5 Scratch/Dig per MIL-O-13830A
Barrel Finish	50 - 80 micro-inch (RMS)
Chamfer	0.006" \pm 0.002" at $45^\circ \pm 5^\circ$
Clear Aperture	> Central 90%
AR Coatings	R < 0.10% @1064 nm per surface

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