Nd:Ce:YAG - Neodymium, Cerium Co-doped Yttrium Aluminum Garnet

Introduction

In double doped Nd:Ce:YAG crystals, Cerium are chosen as sensitizer for Nd^{3+} ions because of its strong absorption in UV spectral region at flash lamp pumping and efficient energy transfer to the Nd^{3+} 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 or 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.

CASTECH's laser crystal Nd:Ce:YAG is featured by

- High efficiency
- Low threshold
- Good anti-violet radiation property
- Good thermal stability
- High optical quality

Table 1. Basic Properties

Laser Transition	$^4I_{3/2} \rightarrow {}^4I_{11/2}$
Laser Wavelength	1.064 μm
Photon Energy	1.86×10^{-19} J @1.064 μm
Emission Linewidth	4.5 Å @1.064 μm
Emission Cross Section (Nd 1 at.%)	$2.7\sim8.8 \times 10^{-19}$ cm^2
Fluorescence Lifetime (Nd 1 at.%)	230 μs
Refractive Index	1.8197 @1.064 μm

Table 2. Specifications

Dopant Concentration	Nd: 1.1~1.4 at.%, Ce: 0.05~0.1 at.%
Rod Sizes	Diameter: 3~6 mm, Length: 40~80 mm; Upon request of customer
Dimensional Tolerances	Diameter: ±0.1mm Length: ±0.5 mm
Surface Quality (Scratch/Dig)	10/5 to MIL-PRF-13830B
Wavefront Distortion	λ/4 @633 nm
Flatness	λ/8 @633 nm
Parallelism	≦30 arc sec
Perpendicularity	≦15 arc min
Chamfer	≦0.2 mm×45°
AR Coating	≦0.2% @1064 nm