

# Er:YAG - Erbium Doped Yttrium Aluminum Garnet

## Introduction

Erbium Doped Yttrium Aluminum Garnet (Er:YAG) is an excellent laser crystal which lases at 2940 nm. This band is at the hydroxyl absorption peak which can be strongly absorbed by biological tissues. So it widely applies to medical area, such as dental (hard tissues), orthopedics, etc.

## CASTECH's laser crystal Er:YAG is featured by

- High slope efficiency
- Operate well at room temperature
- Operate in a relatively eye-safe wavelength range

Table 1. Optical and Spectral Properties

Laser Transition	$4I_{3/2} \rightarrow 4I_{11/2}$
Laser Wavelength	2940 nm
Photon Energy	$6.75 \times 10^{-20} \text{ J @} 2.940 \mu\text{m}$
Emission Cross Section	$3 \times 10^{-20} \text{ cm}^2$
Refractive Index	1.79 @2.940 $\mu\text{m}$
Pump Bands	600~800 nm

Table 2. Specifications

Dopant Concentration	Er: ~50 atm%
Rod Sizes	Diameter: 3~6 mm, Length: 50~120 mm; Upon request of customer
Dimensional Tolerances	Diameter: $\pm 0.1 \text{ mm}$ Length: $\pm 0.5 \text{ mm}$
Surface Quality (Scratch/Dig)	10/5 to MIL-PRF-13830B
Wavefront Distortion	$\lambda/8 @ 633 \text{ nm}$
Flatness	$\lambda/8 @ 633 \text{ nm}$
Parallelism	$\leq 30 \text{ arc sec}$
Perpendicularity	$\leq 15 \text{ arc min}$
Chamfer	$\leq 0.2 \text{ mm} \times 45^\circ$
Extinction Ratio	$\geq 25 \text{ dB}$
AR Coating Reflectivity	$\leq 0.2\% @ 2940 \text{ nm}$