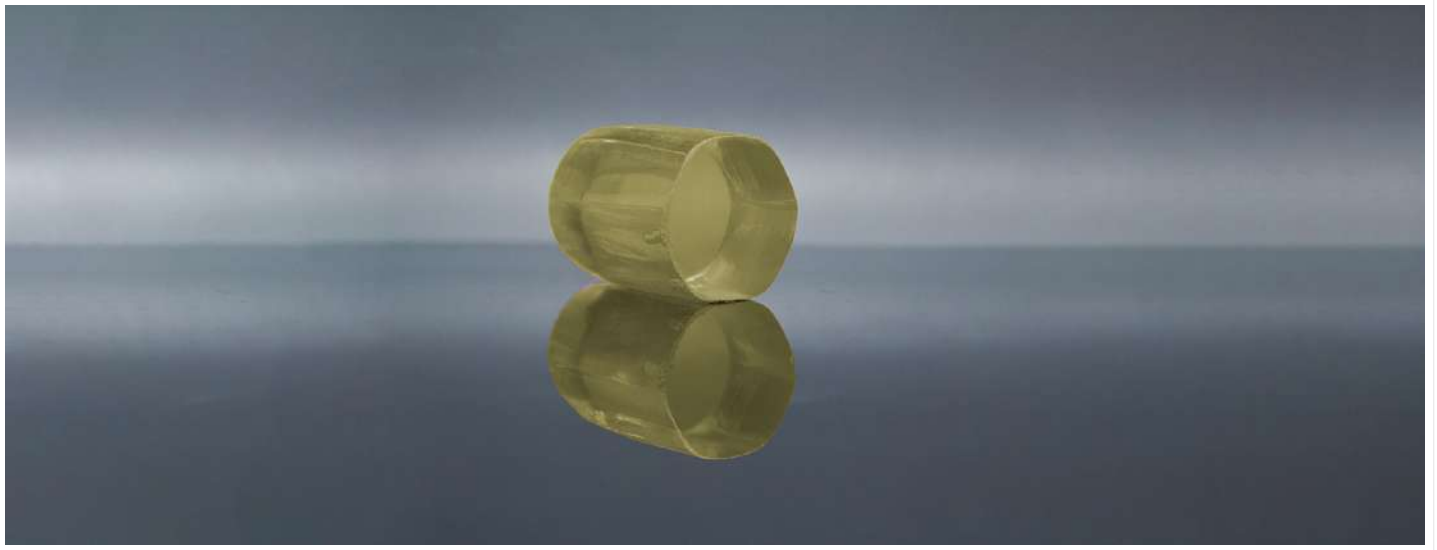


# Ho:YLF



## DESCRIPTION

Ho:YLF is a very attractive laser material, because the lifetime of the upper laser level is much longer ( ~ 14 ms) than in Ho:YAG and the emission cross sections are higher. Additionally the thermal lens in Ho:YLF is much weaker, which helps to generate diffraction limited beams even under intense end-pumping.

The primary advantage of directly pumping the Ho 5I7 is that it does not have to depend on energy transfer, which lends itself to various radiative and non-radiative losses. Up-conversion losses that have deleterious effect in high-energy Q-switched lasers are eliminated. In the near future experiments with different Ho:YLF crystals are planned to reduce the laser threshold and increase the maximum output power.

## APPLICATIONS

- Remote Sensing
- Pollutant Control
- Military Defense

## FEATURES

- Long upper laser level lifetime ~ 15 ms
- Higher emission cross-section
- Naturally birefringent material
- Low  $dn/dT$  → weak thermal lensing
- Efficient Q-switched operation (up to 37 mJ per pulse)
- Highest (to the best of our knowledge) CW output of 21 W for 2- $\mu\text{m}$  Ho:YLF laser



# Ho:YLF

## PARAMETERS

### Material and Specifications

Orientation	a-cut
Clear aperture	>90%
Face dimensions tolerance	+0/-0,1 mm
Length tolerance	±0,1 mm
Parallelism error	<10 arcsec
Perpendicularity error	<10 arcmin
Protective chamfers	<0,1 mm at 45°
Surface quality	10-5 S-D
Surface flatness	<λ/10@632,8 nm
Coatings	R<0,35%@1900-2100 nm on both faces
LIDT	>10 J/cm <sup>2</sup> @2060 nm, 10 ns
Mount	Unmounted

### Physical and Chemical Properties

Crystal structure	tetragonal
Density	3.95 g/cm <sup>3</sup>
Mohs hardness	5
Thermal conductivity	6 Wm <sup>-1</sup> K <sup>-1</sup>
dn/dT	-4.6×10 <sup>-6</sup> (  c) K <sup>-1</sup> , -6.6×10 <sup>-6</sup> (  a) K <sup>-1</sup>
Thermal expansion coefficient	10.1×10 <sup>-6</sup> (  c) K <sup>-1</sup> , 14.3×10 <sup>-6</sup> (  a) K <sup>-1</sup>
Typical doping level	0.5-1%

### Optical Characteristics

Absorption peak wavelength	1940 nm
Absorption cross section at peak	1.2×10 <sup>-20</sup> cm <sup>2</sup>
Absorption bandwidth at peak wavelength	~18 nm
Laser wavelength	2060 nm
Lifetime of 5I7 energy level	10 ms
Emission cross-section	1.8×10 <sup>-20</sup> cm <sup>2</sup>
Refractive index @1064 nm	n <sub>o</sub> =1.448, n <sub>e</sub> =1.470

### Spectrum

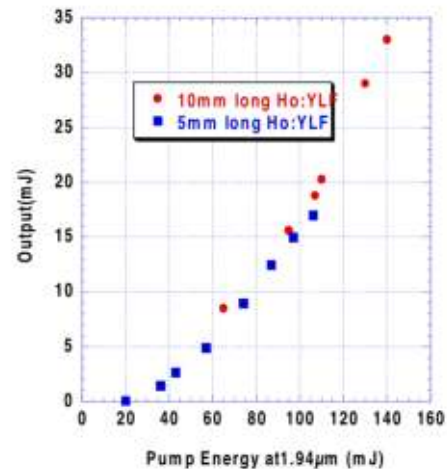
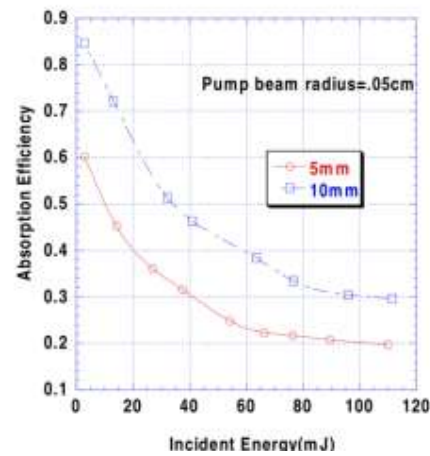


Figure 4. Ho: YLF laser performance

