Yb:YAG crystals

Yb:YAG is one of the most promising laser-active materials and more suitable for diode-pumping than the traditional Nd-doped systems. Compared with the commonly used Nd:YAG crsytal, Yb:YAG crystal has a much larger absorption bandwidth to reduce thermal management requirements for diode lasers, a longer upper-laser level lifetime, three to four times lower thermal loading per unit pump power. Yb:YAG crystal is expected to replace Nd:YAG crystal for high power diode-pumped lasers and other potential applications.

Yb:YAG shows great promise as a high power laser material. Several applications are being developed in the field of industrial lasers, such as metal cutting and welding. With high quality Yb:YAG now available, additional fields and applications are being explored.

Yb:YAG crystals

- Very low fractional heating, less than 11%
- Very high slope efficiency
- Broad absorption bands, about 8nm@940nm
- No excited-state absorption or up-conversion
- Conveniently pumped by reliable InGaAs diodes at 940nm(or 970nm)
- High thermal conductivity and large mechanical strength
- High optical quality

Basic Properties	
Chemical Formula	$Y_3Al_5O_{12}$:Yb (0.1% to 15% Yb)
Crystal Structure	Cubic
Output Wavelength	1.029 um
Laser Action	3 Level Laser
Emission Lifetime	951 us
Refractive Index	1.8 @ 632 nm
Absorption Bands	930 nm to 945 nm
Pump Wavelength	940 nm
Absorption band about pump wavelength	10 nm
Melting Point	1970°C
Density	4.56 g/cm^3
Mohs Hardness	8.5
Lattice Constants	12.01Ä
Thermal Expansion Coefficient	7.8x10^{-6} /K , [111], 0-250°C
Thermal Conductivity	7.8x10^{-6} /K , [111], 0-250°C

Yb:YAG crystals

Technical Parameters	
Orientation	within 5°
Diameter	3 mm to 10mm
Diameter Tolerance	+0.0 mm/- 0.05 mm
Length	30 mm to 150 mm
Length Tolerance	± 0.75 mm
Perpendicularity	5 arc-minutes
Parallelism	10 arc-seconds
Flatness	0.1 wave maximum
Surface Finish	20-10
Barrel Finish	400 grit
End Face Bevel:	0.075 mm to 0.12 mm at 45° angle
Chips	No chips allowed on end face of rod; chip having maximum length of 0.3 mm permitted to lie in the area of bevel and barrel surfaces.
Clear aperture	Central 95%
Coatings	Standard coating is AR at 1.029 um with R<0.25% each face. Other coatings available.

Applications

- With a wide pump band and excellent emission cross-section Yb:YAG is an ideal crystal for diode pumping.
- High Output Power 1.029 1mm
- Laser Material for Diode Pumping
- Materials Processing, Welding and Cutting