Tm:YAP crystals

Tm doped crystals embrace several attractive features that nominate them as the material of choice for solid-state laser sources with emission wavelength tunable around 2um. It was demonstrated that Tm:YAG laser can be tuned from 1.91 up to 2.15um. Similarly,Tm:YAP laser can tuning range from 1.85 to 2.03 um.The quasi-three level system of Tm:doped crystals requires appropriate pumping geometry and good heat extraction from the active media.On the other hand,Tm doped materials benefit from a long fluorescence life time,which is attractive for high-energy Q-Switched operation.

Also,the efficient cross-relaxation with neighbouring Tm3+ ions produces two excitation photons in upper laser level for one absorbed pump photon.This makes the laser very efficient with quantum efficiency approaching two and reduces thermal loading.

Tm:YAG and Tm:YAP found their application in medical lasers, radars and atmospheric sensing. Properties of Tm:YAP depends on crystals orientation.Crystals cut along the 'a' or 'b' axis are mostly used.

Tm:YAP crystals

Basic properties	
Space group	D162h (Pnma)
Lattice constants(Å)	a=5.307,b=7.355,c=5.176
Melting point(℃)	1850±30
Melting point(℃)	0.11
Thermal expansion(10^{-6}·K^{-1})	4.3//a,10.8//b,9.5//c
Density(g/cm^{-3})	4.3//a,10.8//b,9.5//c
Refractive index	1.943//a,1.952//b,1.929//cat 0.589 mm
Hardness(Mohs scale)	8.5-9

Technical parameter	
Dopant conenteation	Tm: 0.2~15at%
Orientation	within 5°
"avefront distortion	<0.125A/inch@632.8nm
7od sizes	diameter 2~10mm, Length 2~100mm Jpon request of customer
Dimensional tolerances	Diameter +0.00/-0.05mm, Length: ± 0.5mm
Barrel finish	Ground or polished
Parallelism	≤10"
Perpendicularity	≤5′
Flatness	≤λ/8@632.8nm
surface Quality	L0-5(MIL-0-13830B)
Chamfer	3.15 ±0.05 mm
AR Coating Reflectivity	< 0.25%

Advantages of Tm:YAP Crysta:
Higher efficiency at 2μm range compared to Tm:YAG
Linearly polarized output beam
Wide absorption band of 4nm compared to Tm:YAG
More accessible to 795nm with AlGaAs diode than the adsorption peak of Tm:YAG at 785nm