

Laser Crystals

Tm:YAP and Tm:YAG



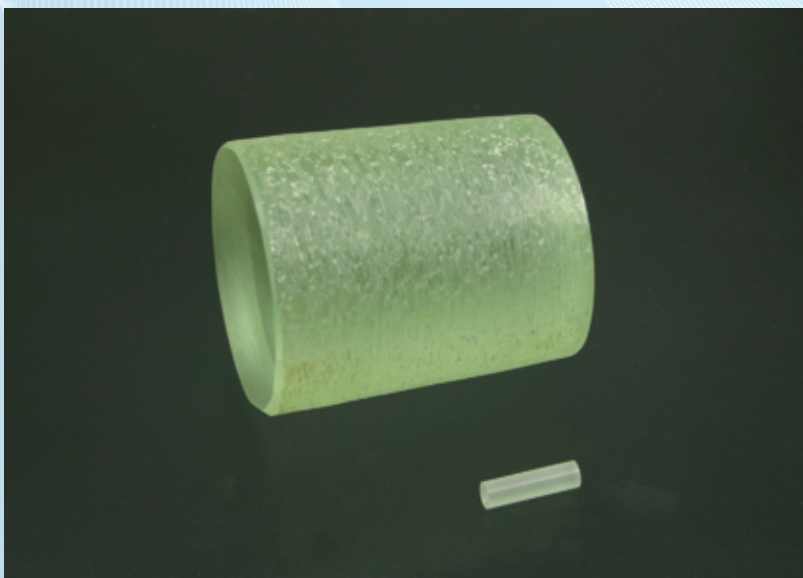
Tm doped crystals embrace several attractive features that nominate them as the material of choice for solid-state laser sources with emission wavelength of around 2 μm . There is a self-quenching mechanism between the $^3\text{H}_4$ and $^3\text{F}_4$ levels that produces two excitation photons in the upper laser level for one absorbed pump photon. This makes the laser potentially very efficient with high quantum efficiency.

The absorption band of **Tm:YAP** between the $^3\text{H}_6$ and $^3\text{H}_4$ levels with a peak at 795 nm is easily accessible with high power AlGaAs laser diode pumping. Also, the 4-nm wide absorption peak of Tm:YAP is broader compared to Tm:YAG, resulting in better tolerance to pump diode wavelength variations.

The emission wavelength of a Tm:YAP laser depends on crystal orientation. Crystals cut along the "a" or "b" axis (ref. to Pbnm space group) are mostly used.

Tm:YAP	"a" cut	"b" cut
Absorption peak	794.8 nm	793.5 nm
Peak effective pump absorption coefficient	$\alpha_a = 3.6 \text{ cm}^{-1}$	$\alpha_a = 3.3 \text{ cm}^{-1}$
Emission wavelength	1.98 μm	1.94 μm

Tm:YAP





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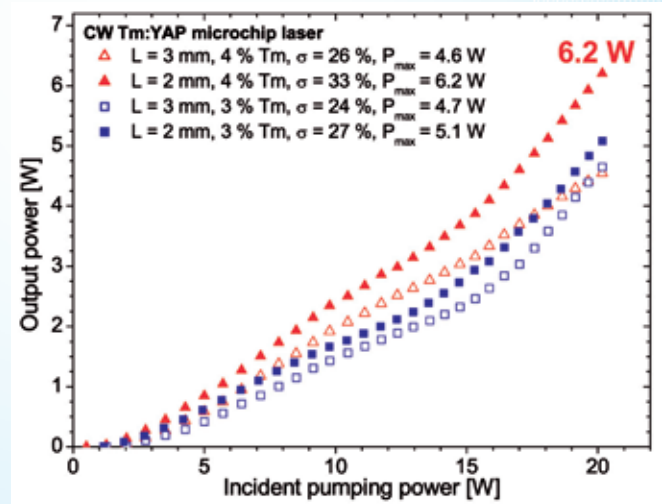
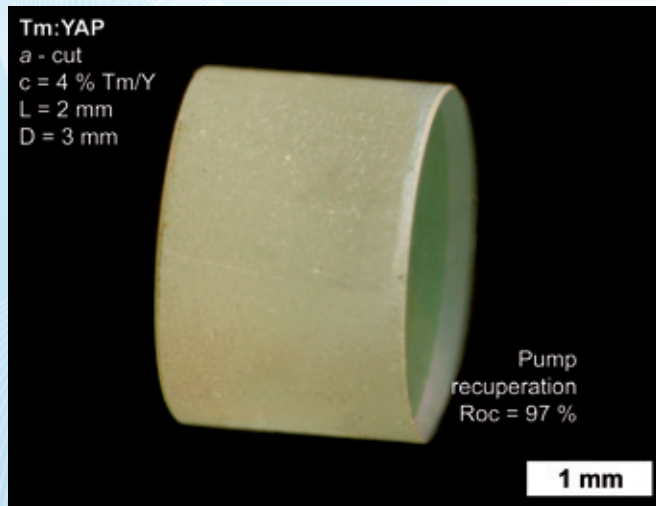
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Application example: **CW Tm:YAP microchip laser**

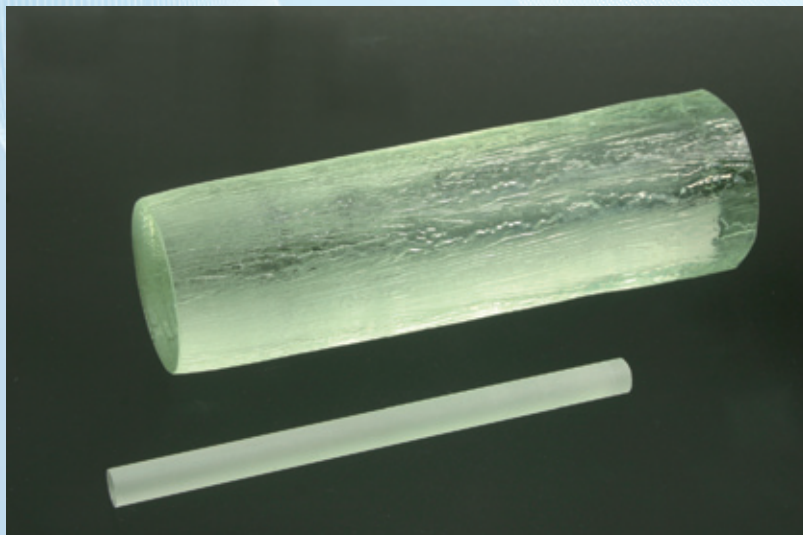
Gain medium: Tm:YAP 2 – 3 mm long, "a"- cut

Coating: side 1: HR@1,98 μ m + HT@793 nm

side 2: R_{OC} = 97 % @1,98 μ m + HT@793 nm



Tm:YAG



finds its application in laser radar and other atmospheric sensing applications due to its operating wavelength at 2013 nm. The absorption band peaking at 785 nm is suitable for pumping by semiconductor diodes.

Our standard offer of Tm doped YAP and YAG crystals includes:

- Tm dopant concentrations from 1 at. % up to 8 at. % of Tm/Y
- Rod diameters from 2 mm up to 7 mm
- Rod lengths of up to 100 mm
- Variety of anti-reflection, partial or high reflection coatings in the range of 2 μ m

