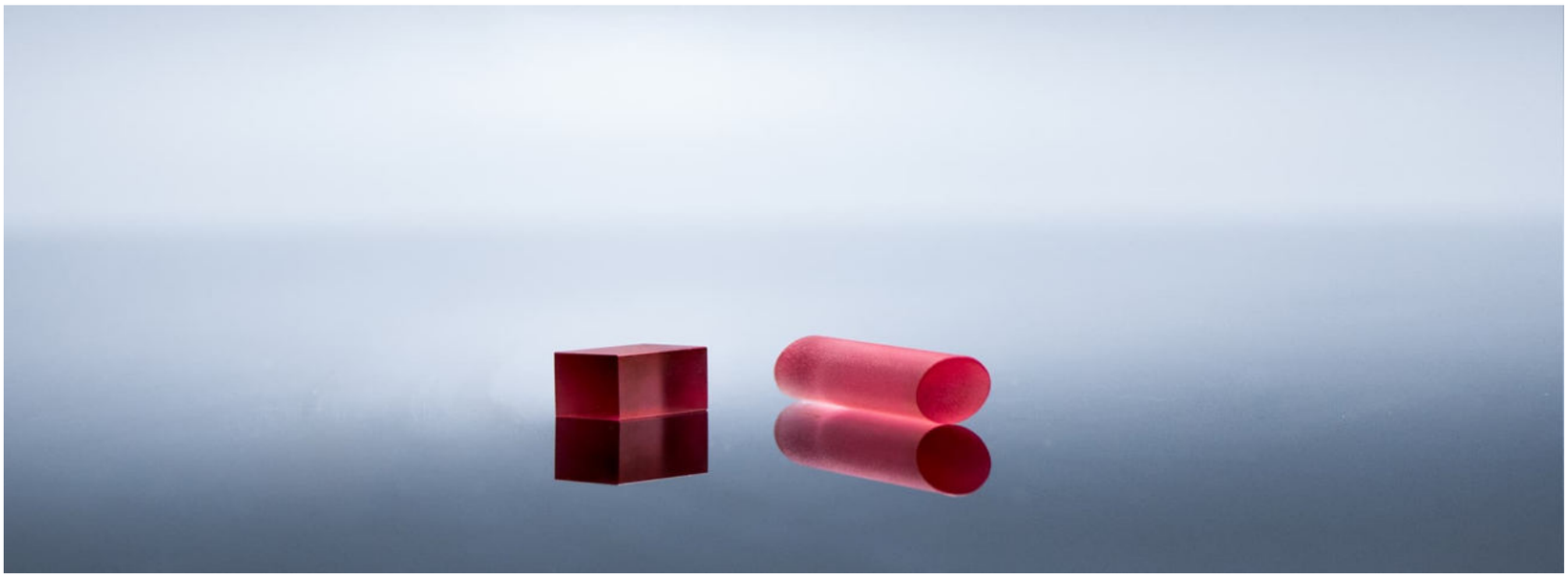
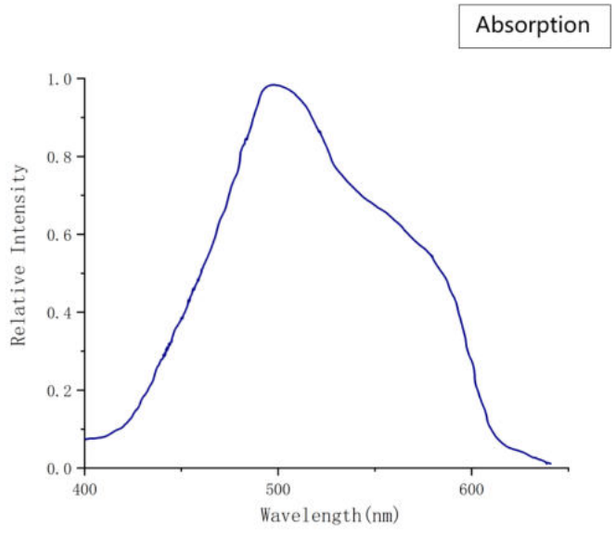
Ti:Sapphire

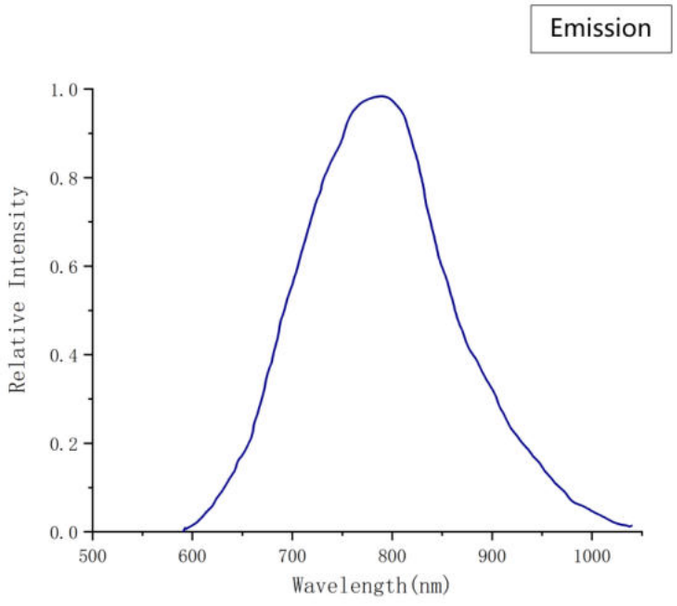


DESCRIPTION

Titanium-doped sapphire (Ti^{3+}:sapphire) as an optically pumped, solid-state laser crystal is widely used in wavelength tunable laser which tunable range is 650-1100nm, and peaking at 800nm, it is one of the widest wavelength tunable laser crystal. The upper-state lifetime of Ti:sapphire is short to 3.2μs, because of high saturation power, it's hard to pump it by lamp, argon ion lasers or frequency-doubled Nd:YAG laser etc. is usually adapted. Using self-mode-locking technology, the Ti:Sapphire laser can output laser pulse with pulse width as short as 6.5fs directly, which is the narrowest laser pulse of all lasers that directly output from the resonant cavity. Through frequency-double technol-ogy, the wavelength of laser beam can cover wide band from blue to deep ultraviolet, produced 193 nm laser has been used in lithography machine.

SPECTRA





PARAMETER

Material and Specifications

Materials	Ti3+:Al_2O_3
Concentration	(0.05~0.35) wt%
Orientation	A-Axis within 5°，E-vector parallel to C-Axis
Parallelism	30″
Perpendicularity	5′
Figure of Merit(FOM)	100~300
Wavefront Distortion	< λ /4@632 nm
Surface Flatness	<λ /8@632 nm
Clear Aperture	>90%
Surface Quality	10-5(MIL-PRF-13830B)
Coatings	Standard coating is AR with R < 5.0% each face @532 nm and R < 0.5% each face, from 650 nm to 850 nm. Custom coatings
Chamfer	<0.2×45°

FEATURES

- Wide wavelength tunability
- Broad absorption pump band
- Preeminent output efficiency
- Short upper-state lifetime(3.2 μs)
- Narrow locked mode width
- High damage thresholdExcellent thermal conductivity

APPLICATIONS

- 800nm Laser
- fs Laser

Physical and Chemical Properties

Crystal Structure	Hexagonal
Density	3.98 g/cm^3
Melting Point	2040 °C
Thermal Conductivity	33 W / (m K)
Temperature dependence of refractive index	13 × 10−^{6}K^{-1}
Thermal shock resistance parameter	790 W/m
Thermal Expansion	≈ 5 × 10-6K^{-1}
Hardness (Mohs)	9
Young`s Modulus /GPa	335
Specific heat	0.1 cal/g
Tensile Strength/Mpa	400
Diameter	4-12mm
Ti density for 0.1% at. doping	4.56 × $10^{19}$$cm^{-3}$

Optical and Spectral Properties

Laser Transition	$F_{3/2}$→$F_{1/2}$
Fluorescence emission wavelength range	600 1200 nm
Peak emission wavelength	~780 nm
Center	800 nm
Tunable Absorption Band	400 600 nm
Absorption Peak	488 nm
Peak stimulated emission cross section: parallel to the c axis	4.1x10 ^{19}cm^2
Peak stimulated emission cross section: perpendicular to the c axis	2.0x10 ^{19}cm^2
Stimulated emission cross section at 795 nm	2.8x10 ^{19}cm^2
Saturation flux at 795 nm	Es=0.9J/cm^2
Fluorescence Lifetime	3.2 μs
Emission Line Width	650 1100 nm
Refractive Index	1.77@ 532 nm; 1.76@800 nm; 1.75@1100 nm
Absorption Coefficient	0.8 ~ 7.0 cm 1
Damage threshold (10ns, 1064nm)	10J/cm2

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