

LASER CRYSTALS

Ti:Sapphire Laser Crystal

Product Brochure & Technical Reference

Ti:Sapphire gain crystals for tunable and ultrafast laser projects. Specify the pump conditions, crystal cut, geometry, optical quality and spectral coating requirements.



Reference product image. Shown geometry is illustrative.

Material reference properties / options

Property	Typical Value
Absorption range	400-600 nm
Emission peak	Approx. 795 nm
Absorption peak	Approx. 488 nm
Absorption cross section at peak wavelength	Approx. $38 \times 10^{-20} \text{ cm}^2$
Absorption cross section at 532 nm (π -polarized reference)	Approx. $4.9 \times 10^{-20} \text{ cm}^2$
Absorption cross section at 490 nm (π -polarized reference)	Approx. $6.4 \times 10^{-20} \text{ cm}^2$
Emission cross section at 790 nm	Approx. $41 \times 10^{-20} \text{ cm}^2$
Refractive index	Approx. 1.76 at 800 nm

Reference values and options for selection. Confirm the material grade, geometry, test conditions and acceptance criteria for the quoted configuration.

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Configuration & quotation

Define the component around your application

Application examples: Femtosecond and ultrafast laser oscillators; Ti:Sapphire regenerative amplifiers and CPA systems; Broadly tunable CW and pulsed laser systems

Specifications of Ti:Sapphire Laser Crystal

Parameter	Typical Value / Option
Material	Ti:Sapphire / Ti3+:Al2O3
Orientation	Optical axis C normal to the rod axis, or custom orientation according to cavity design
Ti2O3 concentration	0.03-0.25 wt%; final concentration to be confirmed by absorption and FOM requirement
Figure of merit, FOM	100-250, or higher values upon customer request and material availability
End configuration	Flat / flat or Brewster / Brewster ends
Flatness	$\lambda/8$ to $\lambda/10$ at 633 nm
Parallelism	≤ 10 arcsec
Surface finishing	10/5 scratch-dig, MIL-O-13830A
Clear aperture	>90%
Chamfer	<0.1 mm at 45 degrees
Size	Custom size upon customer request
Coating	AR or HR coating upon customer request
Damage threshold	About 750 MW/cm ² at 1064 nm, TEM00, 10 ns, 10 Hz; confirm test basis for final acceptance
Quality warranty period	One year under proper use, subject to final sales terms

Optical and Spectral Properties of Ti:Sapphire

Property	Typical Value
Tuning range	660-1050 nm, with broader ranges possible in specific laser designs
dn/dT	Approx. $13 \times 10^{-6} \text{ K}^{-1}$
Thermal conductivity	Typical supplier values around 33 W/(m K); some data sources report higher values depending on measurement condition
Laser action	4-level vibronic
Fluorescence lifetime	Approx. 3.2 us at 300 K

Physical Properties of Ti:Sapphire Crystal

Property	Typical Value
Chemical formula	$\text{Ti}^{3+}:\text{Al}_2\text{O}_3$
Crystal structure	Hexagonal, $a = 4.758 \text{ \AA}$, $c = 12.991 \text{ \AA}$
Density	Approx. 3.98 g/cm^3
Melting point	Approx. 2040 C
Mohs hardness	9

Prepare your quotation

RFQ Item	Information to Provide
Laser application	Oscillator, amplifier, tunable CW laser, spectroscopy source, OPO pump, or custom research system.
Material requirement	Ti2O3 concentration, target FOM, absorption coefficient, and acceptable loss level.
Geometry	Diameter or rectangular size, length, clear aperture, end configuration, Brewster angle if required, and drawing.
Optical specification	Flatness, parallelism, scratch-dig, wavefront distortion, coating bandwidth, and damage threshold requirement.
Laser design	Pump wavelength, pump power, output wavelength range, pulse duration, cavity type, cooling method, and beam size.
Order information	Prototype quantity, batch quantity, inspection criteria, packaging requirement, and delivery schedule.

Reference values and options for selection. Confirm the material grade, geometry, test conditions and acceptance criteria for the quoted configuration.

Send drawings for engineering review

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