

Titanium Doped Sapphire



$\text{Al}_2\text{O}_3:\text{Ti}^{3+}$ – titanium-doped sapphire crystals combine supreme physical and optical properties with broadest lasing range.

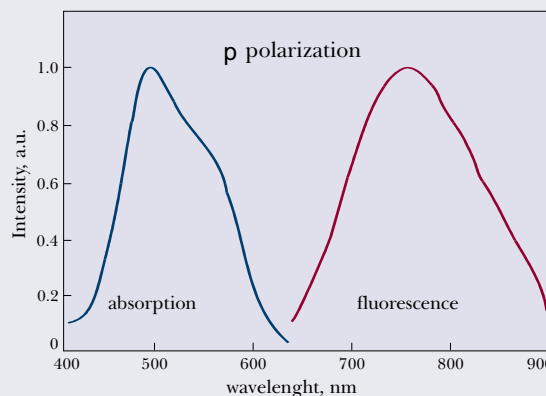
It's indefinitely long stability and useful lifetime added to the lasing over entire band of 660 – 1050 nm challenge “dirty” dyes in variety of applications. Medical laser systems, lidars, laser spectroscopy, direct femtosecond pulse generation by Kerr-type mode-locking – there are few of existing and potential applications.

The absorption band of Ti:Sapphire centered at 490 nm makes it suitable for variety of laser pump sources – argon ion, frequency doubled Nd:YAG and YLF, copper vapour lasers. Because of 3.2 ms fluorescence lifetime Ti:Sapphire crystals can be effectively pumped by short pulse flashlamps in powerful laser systems.

Czochralski grown Ti:Sapphire crystals of highest optical quality, figure of merit and different doping levels are routinely available from EKSMA Co.

STANDARD PRODUCT SPECIFICATIONS

Orientation	Optical axis C normal to rod axis
Ti_2O_3 concentration	0.03-0.25 wt %
Figure Of Merit	> 200 (> 300 available on special requests)
Size	up to 20 mm dia and up to 130 mm length
End configurations	Flat/Flat or Brewster/Brewster ends
Flatness	1/10 @ 633 nm
Parallelism	10 arcsec
Surface finishing	10/5 scratch/dig
Wavefront distortion	1/4 inch



Ti_2O_3 wt %	a @ 490 nm cm^{-1}	a @ 514 nm cm^{-1}	a @ 532 nm cm^{-1}
0.03	0.7*	0.6	0.5
0.05	1.1	0.9	0.8
0.07	1.5	1.3	1.2
0.1	2.2	1.9	1.7
0.12	2.6	2.2	2.0
0.15	3.3	2.8	2.5
0.2	4.3	3.7	3.4
0.25	5.4	4.6	4.1

* Presented values are given with $\pm 0.05 \text{ cm}^{-1}$ accuracy.

MATERIAL PHYSICAL AND LASER PROPERTIES

Chemical formula	$\text{Ti}^{3+}:\text{Al}_2\text{O}_3$
Crystal structure	Hexagonal
Lattice constants	$a=4.748$, $c=12.957$
Density	3.98 g/cm^3
Mohs hardness	9
Thermal conductivity	$0.11 \text{ cal}/(^{\circ}\text{C} \times \text{sec} \times \text{cm})$
Specific heat	0.10 cal/g
Melting point	2050°C
Laser action	4-Level Vibronic
Fluorescence lifetime	$3.2 \mu\text{sec}$ ($T=300\text{K}$)
Tuning range	660 – 1050 nm
Absorption range	400 – 600 nm
Emission peak	795 nm
Absorption peak	488 nm
Refractive index	1.76 @ 800 nm

Please contact EKSMA for further information or nonstandard specifications.