



KTP crystal-titanium oxygen potassium phosphate :

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KTP potassium titanium oxygen phosphate (KTiOPO₄, KTP) is a double frequency crystal with excellent performance, and is widely used in commercial and military lasers, including laboratories, medical systems, range detectors, lidar, optical communications and industrial laser systems.

Main features:

- Large nonlinear optical coefficient
- Large receiving angle and small discrete angle
- Wide temperature range and Wide spectral range
- High photoelectric coefficient and low dielectric constant
- Large resistance ratio
- No water absorption, stable chemical and mechanical properties

Material Properties:

Crystal structure	Orthorhombic crystal system, space group Pna 21, Point group m
Crystal lattice parameters	a=6.404Å, b=10.616Å, c=12.814Å, Z=8
Melting point	1172 °C
Mohs hardness	5
Density	3.01 g/cm ³
Thermal conductivity	13W/m/K
Thermal expansion coefficient	$\alpha_x=11 \times 10^{-6}/^{\circ}\text{C}$, $\alpha_y=9 \times 10^{-6}/^{\circ}\text{C}$, $\alpha_z=0.6 \times 10^{-6}/^{\circ}\text{C}$

Optical and nonlinear optical properties:

Transparent band range	350~4500nm
SHG phase-matching range	497 ~ 1800nm (Type II)
Thermal Light Coefficient (/°C)	$dn_x/dT=1.1 \times 10^{-5}$ $dn_y/dT=1.3 \times 10^{-5}$ $dn_z/dT=1.6 \times 10^{-5}$
Absorbance index	< 0.1%/cm at 1064nm < 1%/cm at 532nm
Type II SHG / Nd:YAG @ 1064 nm	Temperature reception: 24°C · cm Spectral reception: 0.56nm · cm Angle reception: 14.2mrad · cm (φ); 55.3mrad · cm (θ) Discrete angle: 0.55°
Nonlinear coefficient	$d_{eff(II)} \approx (d_{24} - d_{15}) \sin 2\phi \sin \theta - (d_{15} \sin 2\phi + d_{24} \cos 2\phi) \sin \theta$
Non vanised nonlinear magnetization coefficient	$d_{31}=6.5 \text{ pm/V}$ $d_{24}=7.6 \text{ pm/V}$ $d_{32}= 5 \text{ pm/V}$ $d_{15}=6.1 \text{ pm/V}$ $d_{33}=13.7 \text{ pm/V}$



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Sellmeier equation (λ/μ M)	$n_x^2 = 3.0065 + 0.03901 / (\lambda^2 - 0.04251) - 0.01327\lambda^2$ $n_y^2 = 3.0333 + 0.04154 / (\lambda^2 - 0.04547) - 0.01408\lambda^2$ $n_z^2 = 3.3134 + 0.05694 / (\lambda^2 - 0.05658) - 0.01687\lambda^2$
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Typical applications:

Laser with frequency doubling Nd: YAG and other Nd doped crystals

KTP is also being used for mixing 810nm diode pump light and 1064nm Nd: YAG laser to generate blue light, and for intracavity frequency doubling with 1300nm light from Nd: YAG laser or Nd: YAP laser

Optical parametric amplification and oscillation (OPO and OPA)

Amplification of pump light generated by X-cut KTP crystals using non critical phase matching KTP crystals

Its insulation characteristics make it widely used in E-O, especially as an adjustable E-O device. Due to its high damage threshold, wide optical transmission band (>15GHz), stable thermal and chemical properties, and low absorption, LiNbO3 crystal is more suitable for E-O devices compared to LiNbO3 crystal

Optical waveguide application:

Product Parameter:

Wavefront distortion	$\leq \lambda/8$ @ 633nm
Dimensional tolerance	(W \pm 0.1mm)x(H \pm 0.1mm)x(L+0.5mm/-0.1mm) (L \geq 2.5mm) (W \pm 0.1mm)x(H \pm 0.1mm)x(L+0.1mm/-0.1mm) (L < 2.5mm)
Optical aperture	$\geq 90\%$
Flatness	$\lambda/8$ @ 633nm
Finish	10/5
Parallelism	$\leq 20''$
Verticality	$\leq 5'$
Angular deviation	$\Delta\theta \leq 0.25^\circ, \Delta\phi \leq 0.25^\circ$
Damage threshold (GW / cm ²)	> 10 @ 1064nm, TM 00, 10ns, 10H z (polished only) > 1 @ 1064nm, TEM 00, 10ns, 10H z (AR coated) > 0.5 @ 532nm, TEM 00, 10ns, 10H z (AR coated)
Quality guarantee period	Normal use within one year