KTP

DESCRIPTION

KTP crystal, also known as potassium titanium phosphate oxychloride crystal with the chemical formula $KTiOPO_4$, is a crystal product with excellent nonlinear and electro-optical properties. KTP has a high electro-optical coefficient and low dielectric constant and can operate at high frequencies and can be used as an electro-optical Q-modulation crystal. KTP also has excellent frequency doubling properties: large nonlinear coefficient, no deflection angle, high optical damage threshold, and phase matching. KTP crystals are advantageous due to their high nonlinearity, high mechanical stability, high optical quality, and transparency range of 350nm - 4500nm, and these properties determine the wide application of KTP crystals that are widely used as nonlinear media. It is an excellent solution for Nd-doped laser frequency doubling applications, especially for low to medium power applications in both intra-cavity and extra-cavity designs. It also has a wide range of applications related to frequency doubling (SHG) of Nd-doped lasers with green/red output and frequency mixing (SFM) of Nd lasers and diode lasers with blue output.

FEATURES

- High damage threshold
- High temperature stability
- Low half-wave voltage
- Easy to grow into large crystals
- Large reception angle
- High photoelectric coefficien
- low dielectric constant
- Wide temperature range and spectral range

APPLICATIONS

- Electro-optical modulator
- Electro-optical Q-switch
- Directional coupler
- Gamma-rays detection
- Optical waveguides for integrated NLO and EO devices
- KTP OPO and ZGP OPO in series for mid-infrared power generation

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CRYSTAL SPECIFICATION

Materials	$KTiOPO_4$
Tangential positioning accuracy	<30 arc min
Phase Matching	Type II ,θ=90°；φ=Phase Matching Angle
Phase Matching Range	497-3300nm
Angular Tolerance	$\Delta\theta \leq 0.25°$, $\Delta\Phi \leq 0.25°$
Dimensional Tolerance	（W± 0.1mm）×（H±0.1mm）×(L+0.5/-0.1mm) Length≥2.5mm
	（W±0.1mm）×（H±0.1mm）×(L+0.1/-0.1mm) Length<2.5mm
Flatness	<λ/8 @633nm
Surface quality	10/5 S/D
Parallelism	<10 arc sec
Perpendicularity	≤5 arc min
Coating	a) S1&S2:AR@1064nm R<0.1%
	AR@532nm, R<0.25%
	b) S1:HR@1064nm, R>99.8%
	High temperature@808nm, T>5%
	S2: HR@1064nm, R<0.1%
	AR@532nm, R<0.25%
	Custom coatings are available upon request

CRYSTAL PHYSICAL PROPERTIES

Crystal Structure	Orthogonal point set:mm^2
Lattice parameters	a=6.404Å,b=10.615Å,c=12.814Å,z=8
Melting point	~ 1172℃
Transformation temperature	936℃
Decomposition temperature	~ 1150℃
Optical uniformity	dn~10^{-6}/cm
Hardness	~ 5
Density	3.01g/cm^3
Specific heat	0.1737cal/g.℃
Absorption coefficient	a<1%/cm@1064nm and 532nm
Moisture absorption	no
Dielectric constant	13
Coefficient of thermal expansion (in the range of 25℃-900℃)	a_1=11×10^{-6} ℃$^{-1}$
	a_2=9×10^{-6} ℃$^{-1}$
	a_3=0.6×10^{-6} ℃$^{-1}$
Thermal conductivity	k_1=2.0×10^{-2} W/cm ℃
	k_2=3.0×10^{-2} W/cm ℃
	k_3=3.3×10^{-2} W/cm ℃
Electrical conductivity	3.5×10^{-8} s/cm(c-axis, 22℃, 1kHz）

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CRYSTAL OPTICAL PROPERTIES

Transparency range	497-1800nm
Thermal light coefficient	$dn_x/dT=1.1\times10\text{-}5/℃$
	$dn_y/dT=1.3\times10\text{-}5/℃$
	$dn_z/dT=1.6\times10\text{-}5/℃$
Sellmeier equation	$n_x{}^2=3.0065+0.03901/(I^2\text{-}0.04251)\text{-}0.01327I^2$
	$n_y{}^2=3.0333+0.04154/(I^2\text{-}0.04527)\text{-}0.01408I^2$
	$n_z{}^2=3.3134+0.05694/(I^2\text{-}0.05658)\text{-}0.01682I^2$
Effective nonlinear optical coefficient	$deff(∥)\approx(d_{24}\text{-}d_{15})\sin^2\theta\sin^2\varphi\text{-}(d_{15}\sin^2\varphi+d_{24}\cos^2\varphi)\sin\theta$
Damage Threshold	$>0.5GW/cm^3$ for 10ns pulse@1064nm

SPECTRA

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