

Lasers
Laser Components
Laser Optics

POTASSIUM TITANYL PHOSPHATE (KTiOPO₄) CRYSTALS (KTP)

Laser Mirror
Substrates

KTP is a nonlinear optical crystal, which possesses excellent nonlinear and electrooptic properties.

A combination of high nonlinear coefficient, wide transparency range, low susceptibility of the crystal to the angular misalignment and temperature fluctuations makes KTP very attractive for different nonlinear optical and electrooptical applications.

High Power
Laser Windows

BASIC PROPERTIES

Crystal structure	Orthorhombic
Point group	m2m
Lattice parameters	a=6.420 Å b=10.604 Å c=12.809 Å
Melting point	1150 °C
Mohs hardness	5
Density	3.0 g/cm ³
Transition temperature	936 °C
Specific heat	0.1737 cal/g·°C
Not hygroscopic	

OPTICAL PROPERTIES

Transmitting range: 350–4400 nm

Refractive indices:

λ, nm	n _x	n _y	n _z
1064	1.7377	1.7453	1.8297
532	1.7780	1.7886	1.8887

Thermo-optic coefficients in 400–1000 nm range:

$$dn_x/dT = 1.1 \cdot 10^{-5} \text{ K}^{-1};$$

$$dn_y/dT = 1.3 \cdot 10^{-5} \text{ K}^{-1};$$

$$dn_z/dT = 1.6 \cdot 10^{-5} \text{ K}^{-1}.$$

Wavelength dispersion of refractive indices:

$$n_x^2 = 2.1146 + 0.89188 / (1 - (0.20861/\lambda)^2) - 0.01320\lambda^2;$$

$$n_y^2 = 2.1518 + 0.87862 / (1 - (0.21801/\lambda)^2) - 0.01327\lambda^2;$$

$$n_z^2 = 2.3136 + 1.00012 / (1 - (0.23831/\lambda)^2) - 0.01679\lambda^2.$$

High Energy
Laser Mirrors

Thin Film Plate
Polarizers

High Energy
Beamsplitter

NON-LINEAR OPTICAL PROPERTIES

Phase matching range for

Type II SHG in x-y plane: 0.99–1.08 μm;

Type II SHG in x-z plane: 1.1–3.4 μm;

Walk-off for SHG (1064 nm): 1 mrad;

Angular acceptances for SHG (1064 nm)

$$\Delta\theta = 75 \text{ mrad};$$

$$\Delta\phi = 18 \text{ mrad}.$$

Thermal acceptance: 25 K·cm.

Up to 80% extracavity SHG efficiency.

Effective nonlinearity: Effective SHG nonlinear coefficient = 14·d₃₆ (KDP).

Damage threshold at 1064 nm (10 ns) > 500 MW/cm².

AR Coating: ARC for single band or for fundamental and SH ≤ 0.1% per surface.

Available sizes: (2–12) × (2–12) × (0.5–15) mm³.

Harmonic
Separators

KDP, DKDP
Crystals

KTP Crystals