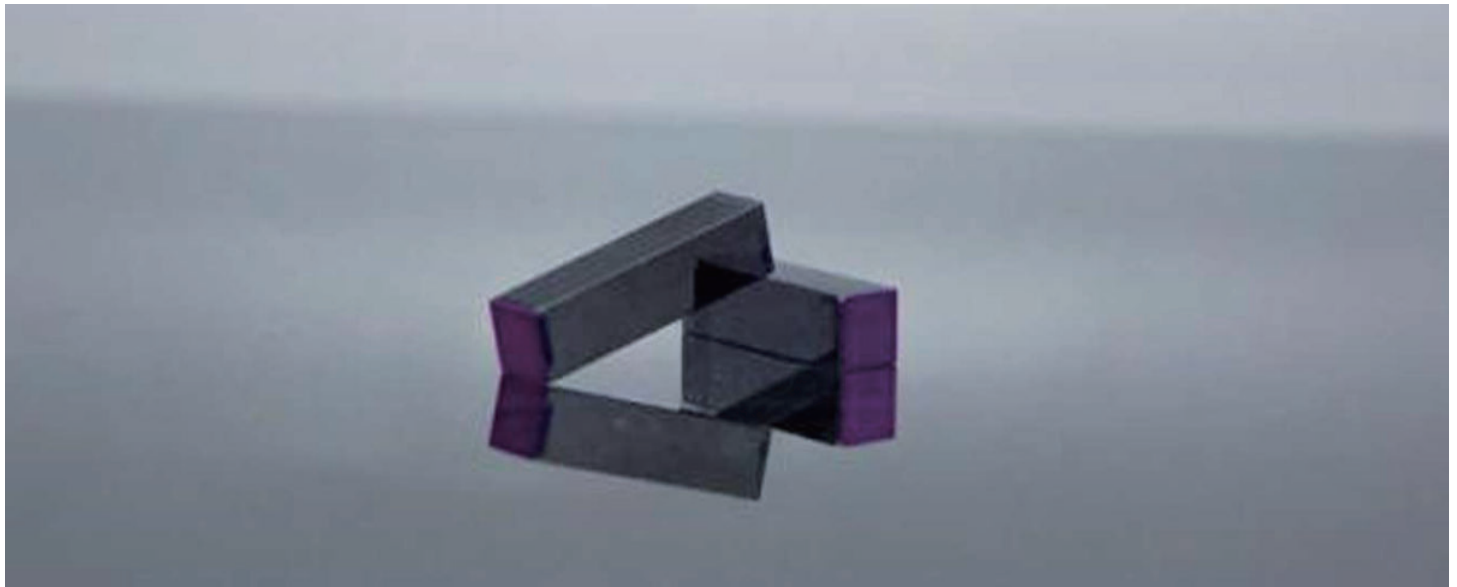


ZGP



DESCRIPTION

Zinc Phosphor Germanium (ZnGeP_2 , or ZGP) crystals are positive uniaxial crystals. It is one of the most commonly used nonlinear crystals for optical parametric oscillator (OPO) technology, ZGP crystal has a large effective nonlinear coefficient ($d_{\text{eff}}=75 \text{ pm/V}$, several or tens of times more than other commonly used nonlinear crystals), high damage threshold ($>30\text{GW/cm}^2$), wide transmission band ($0.74\sim 12.4 \mu\text{m}$), small absorption coefficient (absorption coefficient of $2\sim 3\mu\text{m}$ less than 0.04cm^{-1}), high thermal conductivity ($360\text{mW/cm}\cdot\text{K}$), stable performance, and mature fabrication process. It has many advantages such as the ability to grow large size crystals. It is an ideal crystal for OPO in the mid-infrared of $3\sim 5\text{m}$ band.

FEATURES

- Large nonlinear coefficient
- The transmission region is $74 \mu\text{m}$ to $12\mu\text{m}$
- The relative damage threshold is high
- High thermal conductivity
- Wide transparent area
- Phase matching over a wide spectral range

APPLICATIONS

- Pulse selector
- Optical parametric oscillation
- Electro-optic Q switch
- Laser power/phase modulation

NONLINEAR OPTICAL PROPERTIES

Attribute	~ Numerical
SHG Phase Matching Range	$3177 \sim 10357\text{nm}$ (Type I)
NLO Coefficient	$d_{36}=75 \pm 8 \text{ pm/V}$
	Type I $d_{\text{eeo}}=d_{36}\sin 2\theta\cos 2\varphi$
	Type II $d_{\text{o eo}}=d_{\text{e oo}}=d_{36}\sin\theta\sin 2\varphi$
Damage Threshold	
At $2.79 \mu\text{m}$	30 GW/cm^2 (150 ps)
At $10.6 \mu\text{m}$	1 GW/cm^2 (2 ns)



ZGP

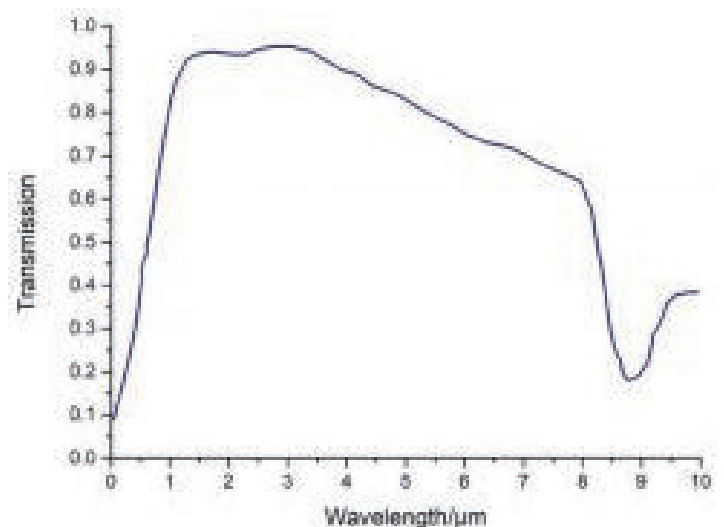
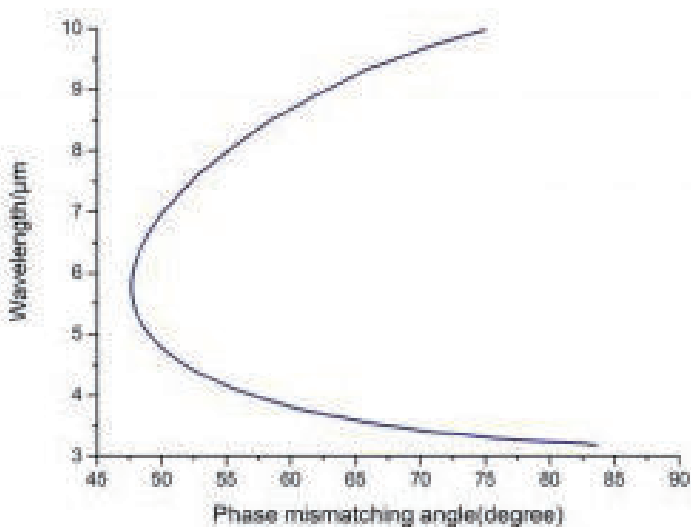
PHYSICAL AND CHEMICAL PROPERTIES

Attribute	Numerical
Chemical Formula	ZnGeP ₂
Crystal Structure	Tetragonal Crystal System, 42m
Lattice Constant	a=b=5.467Å, c=12.736Å
Mass Density	4.16 g/cm ³
Mohs Hardness	5.5
Melting Point	About 1040°C
Thermal Conductivity	180 W/m/K
Coefficient of Thermal Expansion	$\beta_{ }, 5 \times 10^{-6}/K$; $\beta_{\perp}, 7.8 \times 10^{-6}/K$
Birefringence	Single Shaft

LINEAR OPTICAL PROPERTIES

Attribute	Numerical
Transparent Range	0.74 – 12 μm
Absorption Coefficient	$\alpha < 0.05 \text{cm}^{-1}$ @2050-2100 nm
Refractive Index	
@ 2.05 μm	$n_o = 3.1478, n_e = 3.1891$
@ 2.79 μm	$n_o = 3.1333, n_e = 3.1744$
@ 5.30 μm	$n_o = 3.1136, n_e = 3.1547$
@ 10.6 μm	$n_o = 3.0729, n_e = 3.1143$
Sellmeier Equation (λ in μm)	$n_o^2(\lambda) = 4.64467 + 5.10087/(\lambda^2 - 0.13656) + 4.27777\lambda^2/(\lambda^2 - 1653.89)$ $n_e^2(\lambda) = 4.71539 + 5.26358/(\lambda^2 - 0.14386) + 2.37310\lambda^2/(\lambda^2 - 1000.82)$

SPECTRA



ZGP

SPECTRA

