BBO

DESCRIPTION

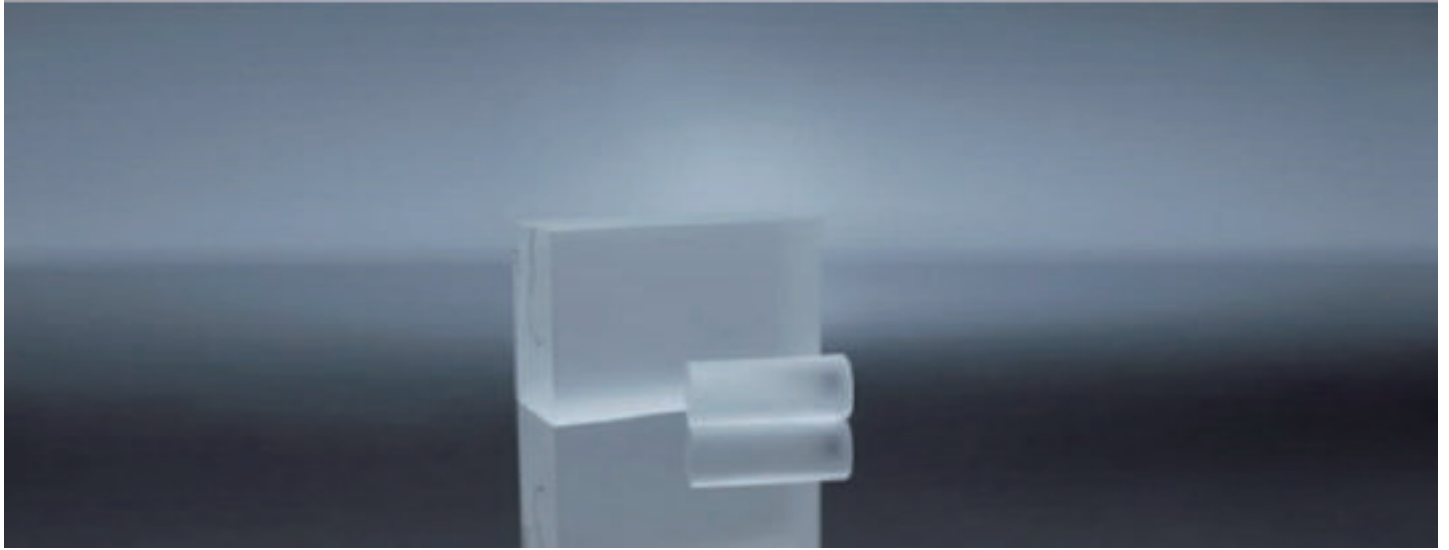β-BaB_2O_4 (Barium Metaborate) A widely used nonlinear crystal for frequency conversion in the UV, visible and NIR. It has large birefringence and low dispersion, high damage threshold, wide phase matching range, good temperature stability, large nonlinear optical effects, and a frequency multiplication factor six times higher than that of KDP crystals. It can be used in Nd:YAG and Nd:YLF lasers for frequency doubling, tripling and mixing of dye lasers, Ti:Sappire and Alexandrite lasers for frequency doubling, tripling and quadrupling, optical parametric amplifiers (OPA) and optical parametric oscillators (OPO), argon ion, ruby and Cu vapor lasers for frequency doubling, in all-solid-state tunable Laser, ultrafast pulsed laser, deep ultraviolet laser and other high, precise and advanced laser technology fields of research and development.

APPLICATIONS

- Electro-optical crystals for Pukels cells
- 266nm laser for material processing
- 532nm laser for medical applications

FEATURES

- Good physical properties
- Appropriate mechanical properties
- Temperature bandwidth about 55°C
- High optical uniformity: $\delta n \approx 10\text{-}6/cm$
- Transmission range from 190 nm to 3500 nm
- Phase matching range from 6 nm to 3500 nm
- Large effective SHG (second harmonic generation) coefficient
- 100 ps pulse damage threshold of 10 J/cm2 at 1064 nm

www.laser-crylink.com
sales@crylink.com
+86-21-66566068
Building 7, No.718 Baoqi Road, Baoshan District, Shanghai, China

BBO

PHYSICOCHEMICAL PROPERTIES

Properties	numerical value
chemical formula	BaB_2O_4
crystal structure	Trilateral system, 3M
Lattice parameters	a=b=12.532Å,c=12.717Å, Z=6
Mass density	3.85 g/cm^3
Mohs hardness	4
melting point	Approx. 1095 ° C
thermal conductivity	1.2 W/m/K ($\perp$c); 1.6 W/m/K (//c)
Coefficient of thermal expansion	a,4×10^{-6}/K; c,36×10^{-6}/K
Birefringence	Negative uniaxial

NONLINEAR OPTICAL PROPERTIES

attribute	numerical value
SHG phase matching range	409.6～3500nm (Type I); 525～3500nm (TypeII)
NLO coefficient	$d_{11}= 5.8$ x d_{36}(KDP);
	$d_{31} = 0.05$ x d_{11};
	$d_{22}< 0.05$ x d_{11}
	$d_{eff}(I)=d_{31}\sin\theta+ (d_{11}\cos3\varphi - d_{22}\sin3\varphi)\cos\theta$
	$d_{eff}(II)=(d_{11}\sin3\varphi+ d_{22}\cos3\theta)\cos2\theta$
Thermooptic coefficient	$dn_o/dT = - 9.3$ x 10^{-6}/°C
	$dn_e/dT = -16.6$ x 10^{-6}/°C
Electro optic coefficient	$g_{11}= 2.7$ pm/V, g_{22}, $g_{31}< 0.1$ g_{11}
Half wave voltage	48 KV (@ 1064 nm)
Damage threshold is 1.064 μ m	5 GW/cm^2 (10 ns); 10 GW/cm^2 (1.3 ns)
Damage threshold is 0.532 μ m	1 GW/cm^2 (10 ns); 7 GW/cm^2 (250 ps)

LINEAR OPTICAL PROPERTIES

attribute	Numerical value
Transparent range	189 – 3500 nm
absorption coefficient	a<0.1%/cm @1064nm
Refractive Index@1.0642μm	$n_e = 1.5425$, $n_o = 1.6551$
Refractive index@0.5321μm	$n_e = 1.5555$, $n_o = 1.6749$
Refractive index@0.2660μm	$n_e = 1.6146$, $n_o = 1.7571$
Sellmeier equation (λin μm)	$n_o^2(\lambda) = 2.7359+0.01878/(\lambda^2-0.01822)-0.01354\lambda^2$
	$n_e^2(\lambda) = 2.3753+0.01224/(\lambda^2-0.01667)-0.01516\lambda^2$

SPECTRA

BBO

EXPERIMENTAL VALUE OF THE INTERNAL ANGLE BANDWIDTH AT T = 293K

Interaction wavelength [µm]	θ_{pm} [deg]	$\Delta\theta^{int}$ [deg]
SHG, o+o ⇒ e		
1.0642⇒0.5321	22.8	0.021
	22.7	0.03
0.5321⇒0.26605	47.3	0.01
0.53⇒0.265	47.6(298K)	0.006
SFG, o+o ⇒ e		
1.0641+0.53205⇒0.3547	31.3	0.011
1.0642+0.5321⇒0.35473	31.1	0.015
2.44702+0.5712⇒0.4631	22.1	0.026
2.68823+0.5712⇒0.4711	21.8	0.028
SHG, e+o ⇒ e		
1.0642⇒0.5321	32.7	0.034
	32.4	0.046
SFG, e+o ⇒ e		
1.0642+0.5321⇒0.35473	38.4	0.02
SFG, o+e ⇒ e		
1.0642+0.5321⇒0.35473	58.4	0.05

EXPERIMENTAL VALUE OF PHASE MATCHING ANGLE (T = 293K)

Interaction wavelength (nm)	θ_{exp} [deg]
SHG, o+o → e	
400 → 200	90
415 → 207	79.2
476 → 328	57
510 → 255	50
532 → 266	47.3
604 → 302	40
710 → 355	33
780 → 390	30
800 → 400	26.5
946 → 473	24.9
1064 → 532	22.7
SHG, e+o → e	
532 → 266	81
710 → 355	48
1064 → 532	32.4

BBO

SPECTRA

www.laser-crylink.com
sales@crylink.com
+86-21-66566068
Building 7, No.718 Baoqi Road, Baoshan District, Shanghai, China