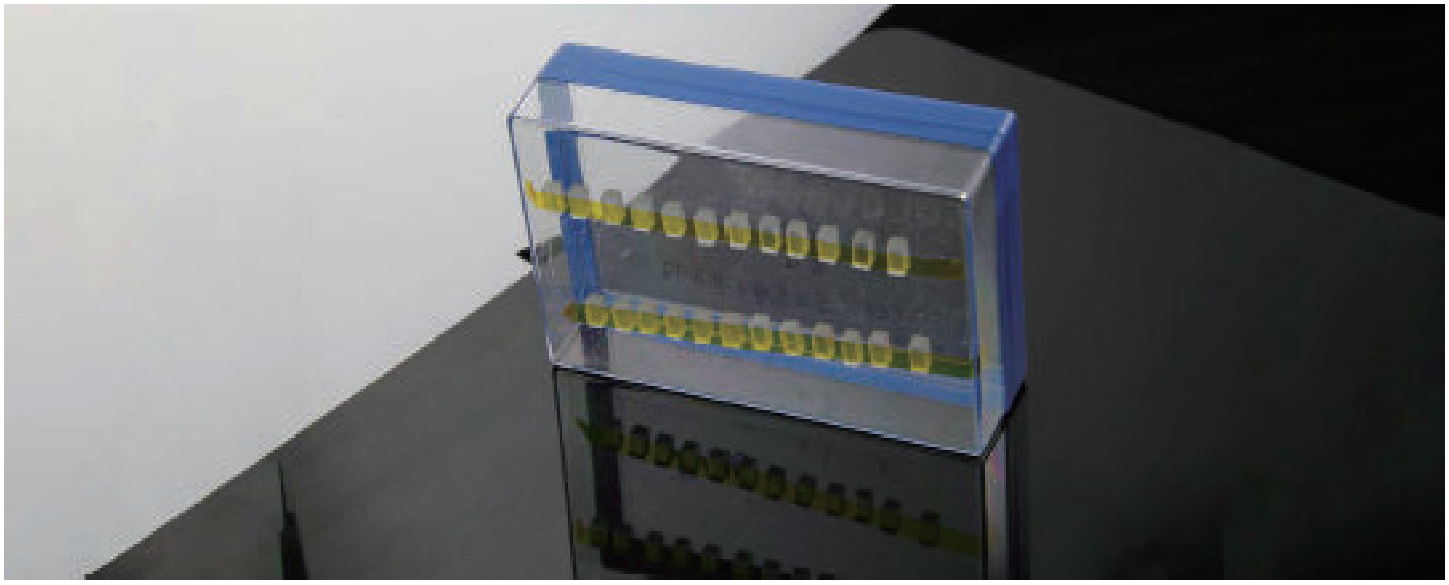
CLBO



DESCRIPTION

CLBO (Cesium Lithium Borate, $CsLiB_6O_{10}$) is a new type of nonlinear crystal. It has a wide transparent spectral range (175~2800 nm), a high nonlinear coefficient, 2.2 times that of KDP, and a small dispersion angle. The laser damage threshold is high, up to 26GW/cm^2, and the multiplicative conversion efficiency is 60% (SHG). It can work at room temperature and is well suited for Nd:YAG lasers to produce 4w (266 nm) and 5w (213 nm) octave light output. Can be used for UV parametric oscillation (OPG) and parametric amplification (OPA).

FEATURES

- Small discrete angle
- Low absorption coefficient
- High frequency conversion efficiency
- Easy-to-grow single crystal
- High laser damage threshold
- Efficient nonlinear optical coefficients
- Its uv absorption edge reaches 180 nm
- Larger angle, spectral and temperature bandwidth values

APPLICATIONS

- PCB drilling
- Semiconductor lithography
- Optical parametric oscillator
- All solid-state UV laser

PHYSICOCHEMICAL PROPERTIES

attribute	numerical value
chemical formula	$CsLiB_6O_{10}$
crystal structure	Tetragonal negative uniaxial crystal, 42 m
lattice constant	a=10.494Å,c = 8.939Å,Z=4
Mass density	2.461 g/cm^3
Mohs hardness	5.5
melting point	1118 K
molecular mass	364.706
thermal conductivity	1.25 W/m K

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PHYSICOCHEMICAL PROPERTIES

Lo coefficient	$deff(I)=d_{36}\sin\theta m\sin(2\varphi)$
	$deff(II)=d_{36}\sin(2\theta m)\cos(2\varphi)$
Damage threshold	26 GW/cm^2
Wavelength (nm)	532 + 532 = 266
	1064 + 266 = 213
Phase matching angle (°)	61.7
	68.4
Flow (PM / V)	0.84
	0.87
Angle tolerance (mrad · cm)	0.49
	0.42
Deflection angle (°)	1.83
	1.69
Spectral acceptance (nm · cm)	0.13
	0.16
Temperature acceptance (℃· cm)	8.3
	4.6

LINEAR OPTICAL PROPERTIES

attribute	Value
Transparent range	180-2750 nm
absorption coefficient	0.0013 cm^{-1}

REFRACTIVE INDEX

1.064μm	n_e = 1.4340, n_o = 1.4838
0.532μm	n_e = 1.4445, n_o = 1.4971
Sellmeier equation（ λin μm）	$n_o^2 = 2.2104+0.01018/(\lambda^2-0.01424)-0.01258\lambda^2$
	$n_e^2 = 2.0588+0.00838/(\lambda^2-0.01363)-0.00607\lambda^2$

EXPERIMENTAL VALUE OF REFRACTIVE INDEX

λ[μm]	n_o	n_e
0.42	1.5058	1.4517
0.45	1.503	1.4493
0.48	1.5006	1.4474
0.5	1.4991	1.4462
0.532	1.4971	1.4445
0.56	1.4957	1.4434
0.59	1.4943	1.4422
0.61	1.4935	1.4414
0.6328	1.4928	1.4409
0.67	1.4915	1.4398
0.7	1.4907	1.4392
0.72	1.4902	1.4387
1.064	1.4838	1.434

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EXPERIMENTAL VALUE OF REFRACTIVE INDEX

Interaction wavelength[μm]	θpm [deg]	T [◦C]	$\Delta\theta^{int}$ [deg]	ΔT [◦C]
SHG, o + o → e				
0.946 →0.473	90	-15		5
0.5235 →0.26175	65.8	~160		
0.5321 → 0.26605	62	~140		
	61.4	20	0.23	6.2
1.0642 → 0.5321	29.5	20	0.043	52.7
1.3382 → 0.6691	27.7	20		68.7
SFG, o + o → e				
1.0642 + 0.26605 →0.21284	67.3	20		3.6
1.547 + 0.221 → 0.19338	61.7	150		
1.9079 + 0.2128 →0.1914	55	20		1.2
1.0642 + 0.35473 → 0.26605	50.6	20		6.1
1.0642 + 0.5321 → 0.35473	39.1	20		18
SHG, e + o → e				
1.0642 →0.5321	42.4	20		49.4
SFG, e + o → e				
1.9079 + 0.2128 → 0.1914	57.4	20		1.1
1.0642 + 0.5321 → 0.35473	48.9	20		17

SPECTRA