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## Cesium Lithium Borate ( $\text{CsLiB}_6\text{O}_{10}$ , CLBO)

### Introduction

Cesium Lithium Borate ( $\text{CsLiB}_6\text{O}_{10}$ , CLBO) is a newly developed crystal with excellent UV nonlinear feature, and widely used for semiconductor inspection, micro processing, bio-medical, UV-LIDAR, etc. Compared to BBO, it has larger spectral and temperature acceptance, larger angle tolerance and smaller walk-off angle (see Table 1). These advantages make CLBO obtain larger SHG conversion efficiencies than BBO. Moreover, it is suitable for FOHG and FHG of high-power Nd:YAG laser.

### CLBO is featured by

- Cut-off wavelength up to 180nm;
- Maximum FOHG and FHG conversion efficiencies of Nd:YAG laser;
- Relatively large effective NLO coefficient (about two times that of KDP);
- Wide acceptance angle and small walk-off angle;
- The VUV output at 193nm is available by phase matching;
- No saturation for high-power generation;
- Short grow cycle and large size.

### CASTECH offers

- Strict quality control
- Cut angle and dimensions upon request;
- AR-coating, sealed-housing and repolishing services;
- Fast delivery(10 working days for polished only, 15 working days for AR-coated).

Table1. Nonlinear Optical properties of CLBO and BBO Crystal

Wavelength (nm)	NLO Crystal	Phase Matching Angle (deg)	Deff (pm/V)	Angle Tolerance (mrad·cm)	Walk-off Angle (deg)	Spectral Acceptance (nm·cm)	Temperature Acceptance (°C·cm)
532+532 =266	CLBO	61.7	0.84	0.49	1.83	0.13	8.3
	BBO	47.7	1.32	0.17	4.80	0.07	4.5
1064+266 =213	CLBO	68.4	0.87	0.42	1.69	0.16	4.6
	BBO	51.1	1.26	0.11	5.34	0.08	3.1



Table 2. Structural Properties of CLBO

Crystal Structure	Tetragonal, Space group $I\bar{4}2d$
Lattice Parameter	a=b=10.494Å c=8.939Å
Symmetry	Z=4
Melting Point	About 844.5°C

Table 3. Optical and Nonlinear Optical Properties of CLBO

Transparency Range	180-2750nm
Effective NLO Coefficient	1.01pm/V at 532nm, 1.16pm/V at 488nm, 0.95pm/V at 1064nm
Damage Threshold	26GW/cm <sup>2</sup>
Walk-off Angle	1.78° at 1064nm, 1.83° at 532nm, 0.98° at 488nm
Angle Acceptance(mrad·cm)	1.02 at 1064nm, 0.49 at 532nm, 0.84 at 488nm
Spectral Acceptance (nm·cm)	7.03 at 1064nm, 0.13 at 532nm, 0.09 at 488nm
Temperature Acceptance (°C·cm)	9.4
NLO Coefficients	$d_{\text{eff}}(\text{I})=d_{36}\sin\theta_m\sin(2\phi)$ $d_{\text{eff}}(\text{II})=d_{36}\sin(2\theta_m)\cos(2\phi)$
Sellmeier Equations ( $\lambda$ in $\mu\text{m}$ )	CLBO at 20°C $n_o^2=2.2104+0.01018/(\lambda^2-0.01424)-0.01258\lambda^2$ $n_e^2=2.0588+0.00838/(\lambda^2-0.01363)-0.00607\lambda^2$ (0.1914 < $\lambda$ < 2.09 $\mu\text{m}$ )

**Notes:**

**CLBO crystal is very hygroscopic, and please use or keep it in dry and sealed environment.**