

Lithium Triborate - LiB_3O_5

Features

- Small walk-off
- No grey-track
- Non-critical phase match at $T=150^\circ\text{C}$ for SHG @ 1064 nm
- Very high bulk damage threshold
- Fair efficiency

Application

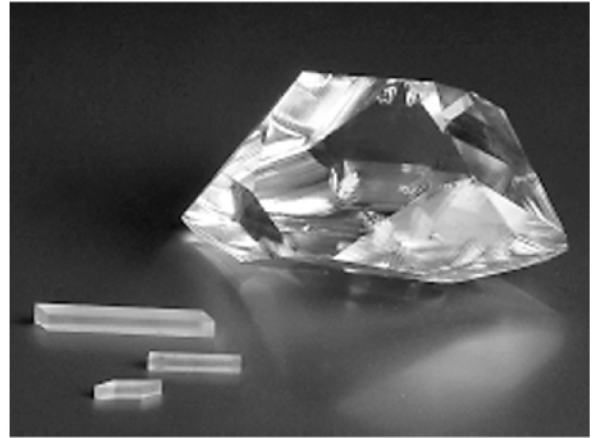
- High-power scientific CW lasers
- High rep. rate, high average power lasers for material processing
- UV lasers for material processing
- Gas lasers replacement

Standard Specifications

Flatness	better than $\lambda/6$
Parallelism	30 arc sec
Perpendicularity	30 arc min
Length Tolerance	+0.3 / -0.2 mm
Aperture Tolerance	± 0.1 mm
Surface Quality	10/5 scratch/dig
Clear Aperture	90% of full aperture

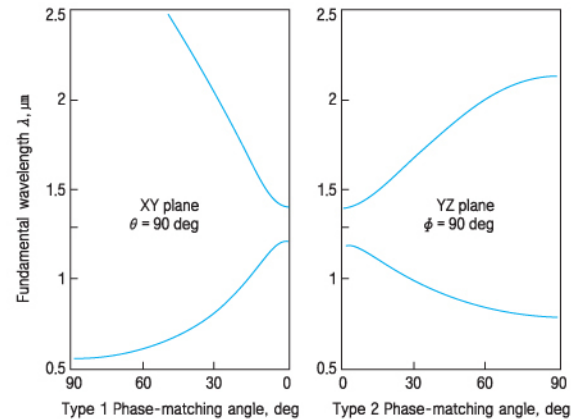
Physical and Optical Properties

Chemical Formula	LiB_3O_5
Crystal Structure	orthorhombic, mm^2
Optical Symmetry	Negative biaxial
Space Group	$\text{Pna}2_1$
Density	2.47 g/cm^3
Mohs Hardness	5.5
Optical Homogeneity	$\delta n \approx 10^{-6} \text{ cm}^{-1}$
Transparency Range	160 - 2600 nm
Linear Absorption Coefficient at 1064 nm	$< 0.01\% \text{ cm}^{-1}$
Average Refractive Index	1.6
Sellmeier Equations (λ [μm])	$n_x^2 = 2.4542 + 0.0113/(\lambda^2 - 0.0114) - 0.0139 \lambda^2$ $n_y^2 = 2.5390 + 0.0128/(\lambda^2 - 0.0119) - 0.0185 \lambda^2$ $n_z^2 = 2.5865 + 0.0131/(\lambda^2 - 0.0122) - 0.0186 \lambda^2$
Phase matching range Type 1 SHG	554 - 2600 nm
Phase matching range Type 2 SHG	790 - 2150 nm
NCPM SHG at 1064 nm Type 1 Temperature	149°C
NCPM SHG at 1319 nm Type 2 Temperature	43°C
Walk-off Angle	4 mrad (Type 1 SHG 1064 nm)
Thermal Acceptance	6.4 K x cm (Type 1 SHG 1064 nm)
Angular Acceptance	6.5 mrad x cm (Type 1 SHG 1064 nm) 248 mrad x cm (Type 1 NCPM SHG 1064 nm)
Nonlinearity Coefficients	$d_{31} = (1.09 \pm 0.09) \text{ pm/V}$ $d_{32} = (1.17 \pm 0.14) \text{ pm/V}$
Effective Nonlinearity	XY plane $d_{\text{ooo}} = d_{32} \cos \phi$ YZ plane $d_{\text{ooo}} = d_{31} \cos \theta$
Damage Threshold	500 MW/cm^2 AR-coated, at 10Hz, 10ns

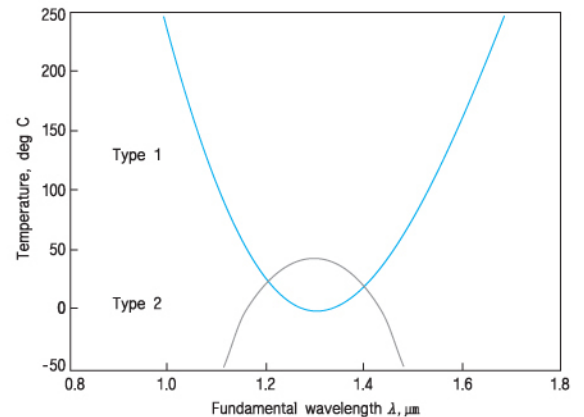


Offers

- Crystal aperture : up to $8 \times 8 \text{ mm}^2$
- Crystal length : up to 20mm
- AR, BBAR, P-coating



SHG tuning curves of LBO



NCPM SHG temperature dependence of LBO