

BiB₃O₆ (BIBO) Crystal

Introduction

BiB₃O₆ (BIBO) is a newly developed nonlinear optical crystal. It possesses large effective nonlinear coefficient, high damage threshold and inertness with respect to moisture. Its nonlinear coefficient is 3.5 - 4 times higher than that of LBO, 1.5 -2 times higher than that of BBO. It is a promising doubling crystal to produce blue laser. The top-seeded solution growth (TSSG) technique is used at CASTECH for the growth of BIBO single crystals.

CASTECH offers

- Strict quality control;
- Large crystal size up to 10x10x15mm³ ;
- AR-coating, mounts and repolishing services;
- Fast delivery.

Table 1. Chemical and Structural Properties

Crystal Structure	Monoclinic, Point group 2
Lattice Parameter	a=7.116 Å , b=4.993 Å , c=6.508 Å , β=105.62°, Z=2
Melting Point	726°C
Mohs Hardness	5-5.5
Density	5.033 g/cm ³
Thermal Expansion Coefficient	α _a =4.8 x 10 ⁻⁵ /K , α _b = 4.4 x 10 ⁻⁶ /K, α _c =-2.69 x 10 ⁻⁵ /K

Table 2. Optical and Nonlinear Optical Properties

Transparency Range	286- 2500 nm
Absorption Coefficient	<0.1%/cm at 1064nm
Physical Axis	X // b, (Z,a)=31.6° ,(Y,c)=47.2°
SHG of 1064/532nm	Phase matching angle: 168.9° from Z axis in YZ plane Deff: 3.0 ± 0.1 pm/V Angular acceptance: 2.32 mrad·cm Walk-off angle: 25.6 mrad Temperature acceptance: 2.17 °C·cm

Sellmeier coefficients	$n_i^2(\lambda) = A + B/(\lambda^2 - C) - D\lambda^2$ (λ in μm)			
	A	B	C	D
n ₁	3.6545(4)	0.0511(2)	0.0371(3)	0.0226(1)
n ₂	3.0740(3)	0.0323(1)	0.0316(3)	0.01337(6)
n ₃	3.1685(3)	0.0373(1)	0.0346(3)	0.01750(8)



CASTECH's Warranty on BIBO Specifications

- Dimension tolerance: $(W \pm 0.1\text{mm}) \times (H \pm 0.1\text{mm}) \times (L + 0.5/-0.1\text{mm})$ ($L \geq 2.5\text{mm}$)
 $(W \pm 0.1\text{mm}) \times (H \pm 0.1\text{mm}) \times (L + 0.1/-0.1\text{mm})$ ($L < 2.5\text{mm}$)
- Clear aperture: central 90% of the diameter
- Flatness: less than $\lambda/8$ @ 633nm
- Transmitting wavefront distortion: less than $\lambda/8$ @ 633nm
- Chamfer: $\leq 0.2\text{mm} \times 45^\circ$
- Chip: $\leq 0.1\text{mm}$
- Scratch/Dig code: better than 10/ 5 to MIL-PRF-13830B
- Parallelism: better than 20 arc seconds
- Perpendicularity: ≤ 5 arc minutes
- Angle tolerance: $\Delta\theta \leq 0.25^\circ$, $\Delta\phi \leq 0.25^\circ$
- Damage threshold[GW/cm²]: > 0.3 for 1064nm, TEM00, 10ns, 10HZ
- Quality Warranty Period: one year under proper use.