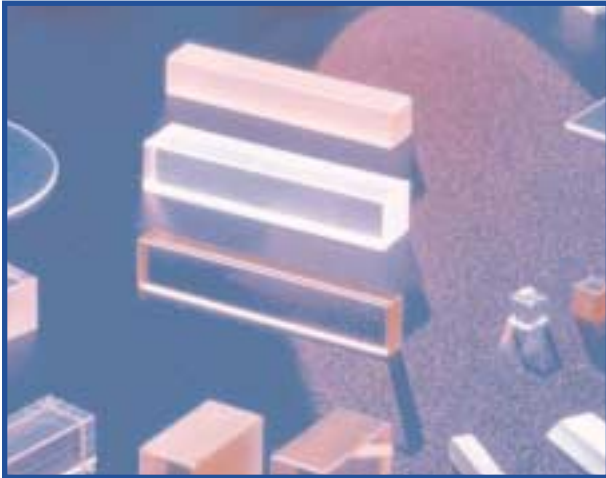


LITHIUM NIOBATE, NONLINEAR OPTICAL APPLICATIONS



DESCRIPTION

Lithium Niobate is a noncentrosymmetric large band-gap ferroelectric oxide crystal. It has nonlinear optical applications in harmonic generation, optical parametric oscillation and electro-optic modulation. It offers excellent transmission properties coupled with a high extinction ratio and low half-wave voltage.

Deltronic Crystal grows large diameter high-optical quality crystals from a congruent melt, using the Czochralski method.

FEATURES

Excellent Transmission Properties

High Extinction Ratio

Grown by Czochralski Method

APPLICATIONS

Electro-optic Amplitude Modulators

Electro-optic Phase Modulators

Electro-optic Q-switches

BPM Optical Parametric Conversion

Binary Optics

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Dover, NJ 07801
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DRAWINGS

Figure 1. Type I Phasematching Angle and Effective Second-Order Nonlinear Susceptibility

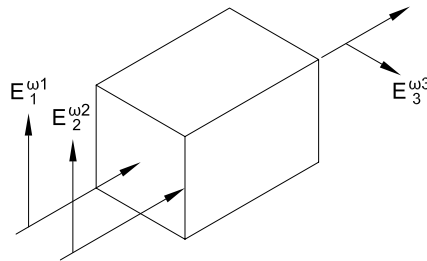


Figure 2. Type II Phasematching Angle and Effective Second-Order Nonlinear Susceptibility

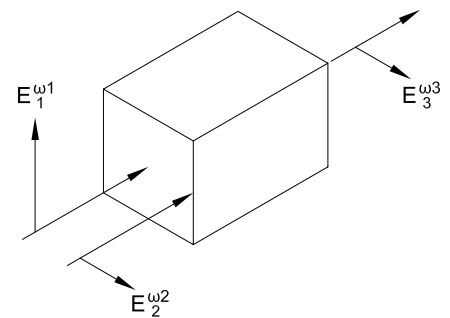
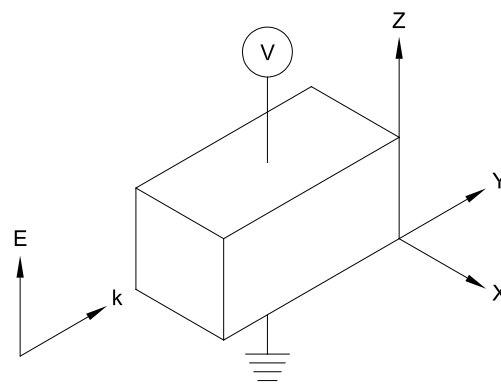


Figure 3. Transverse Electro-optic Modulator



PROPERTIES

Property at 25°C	Value
Empirical Formula	LiNbO ₃
Congruent Melt Composition	48.6 mole%Li ₂ O
Congruent Melting Point (°C)	1253
Crystal Structure	trigonal
Space Group	R3c
Point Group	3m
Curie Temperature (°C)	1143
Density (g-cm ⁻³)	4.612
Hardness (moh)	5
Thermal Expansion Coefficient (°C ⁻¹)	a=16.7x10 ⁻⁶ , c=2.0 x 10 ⁻⁶
Resistivity (ohm-cm)	>10 ¹⁴ at 200°C
Bandgap (eV)	3.7
Lattice Constant (Å)	a=5.14829 (hex) c=13.8631 (hex)
Spontaneous Polarization (Coul/m ²)	0.71
Dielectric Constants	$\epsilon_{33}^s=29$, $\epsilon_{11}^s=44$ $\epsilon_{33}^s=30$, $\epsilon_{11}^T=84$
NLO Coefficients at 1064nm (pm/V)	d ₃₁ =-1.4, d ₃₃ =-2.1, d ₂₂ =2.2
Refractive Index, 1064nm	n _o =2.2340, n _e =2.1554
Electro-optic Coefficients at 633nm [pm/V] (constant tension)	r ₁₃ =9.6, r ₂₂ =6.8, r ₃₃ =30.9 r ₅₁ =32.6, r _c =21.1

SPECIFICATIONS

Crystallographic Orientations, Dimensions, and Tolerances	
Standard Sizes	Specify
Dimension tolerances	±0.25mm on polished faces
Orientations	Specify, X-ray oriented within ±0.2 degrees
Flatness	<λ/10 at 633nm
Surface Quality	<10/5 μm (scratch/dig)
Transmitted Wavefront	<λ/10 at 633nm
Edges	0.1 to 0.15mm chamfer at 45°
Dopants	Specify
Anti-reflection Coating	Specify wavelength of operation