Iron Doped Lithium Niobate

Product Description

Deltronic Crystal's Iron-Doped Lithium Niobate is one of the most preferred photorefractive materials due to its superior photorefractive properties.

Iron-Doped Lithium Niobate is a ferroelectric crystal with the paraelectric to ferroelectric phase transition around 1143 C°. Boules are electrically poled along the Z-axis to align antiparallel domains of the spontaneous polariztion.

Deltronic Crystal regularly grows large diameter boules of iron-doped lithium niobate for photorefractive applications. Lithium niobate is chemically stable at room temperature and is generally non-reactive to most solvents.

Applications

- Astronomical Filters
- Spectroscopic Filters
- Holographic Applications
- Holographic Data Storage
- Wavelength Division Multiplexing

Features

- Strong Photovoltaic Effects
- High Electro-optic Coefficients
- High Photorefractive Sensitivity
- High Diffraction Efficiency
- · Grown by Czochralski Method

Figure 1. Holographic Optical Filter

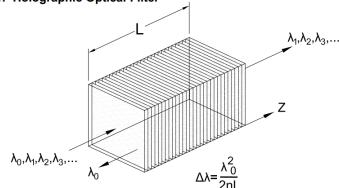
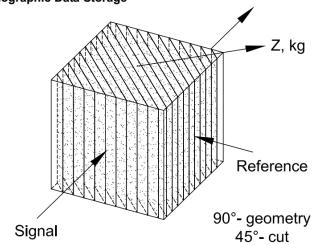


Figure 2. Holographic Data Storage



Property at 25°C	Value
Empirical Formula	LiNbO₃:Fe
Congruent Melt Composition	48.6 mole % Li₂O
Congruent Melting Point (°C)	1253
Crystal Structure	trigonal
Space Group	R3c
Bandgap (eV)	3.7
Point Group	3m
Curie Temperature (°C)	1143
Density (g-cm ⁻³)	4.612
Hardness (moh)	5
Thermal Expansion Coefficient (°C-1)	$a = 16.7 \times 10^{-6}$ $c = 2.0 \times 10^{-6}$
Resistivity (ohm-cm)	> 1014 at 200°C
Lattice Constant (Å)	a = 5.1508 (hex) c = 13.864 (hex)
Spontaneous Polarization (Coul/m2)	0.71
Dielectric Constants	ås ₃₃ = 29 ås ₁₁ = 44 ås ₃₃ = 30 åt ₁₁ = 84
Refractive index, 514.5nm	$n_o = 2.2029, n_e = 2.1476$
Refractive Index, 633nm	$n_o = 2.2884, n_e = 2.2019$

Refractive Index, 1064nm	$n_o = 2.2340, n_e = 2.1554$
Electro-optic Coefficients at 633nm	$r_{13} = 9.6 r_{22} = 6.8 r_{33} = 30.9$
[pm/V] (constant tension)	$r_{51} = 32.6 r_c = 21.1$

Crystallographic Orientations, Dimensions, and Tolerances		
Standard Sizes	10x10x10mm³, 0° cut and 45° cut	
	10x10x20mm³, 0° cut and 45° cut	
Dimension Tolerances	±0.1mm on polished faces	
	±0.1mm on lapped faces	
Orientations	X-ray oriented within ±10 arc-minutes	
Flatness	<λ/10 at 633nm	
Surface Quality	<10/5 (scratch/dig)	
Edges	0.1 to 0.15mm chamfer at 45°	
Parallelism	<10 arc-minutes	
Anti-reflective Coatings	Specify	
Other Dopants	Specify	
Fe Standard Dopants	0.015, 0.03, 0.05, 0.10 mole%	