

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 polarization.

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

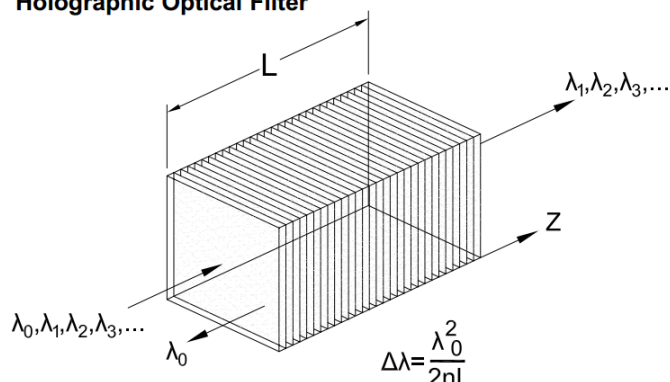
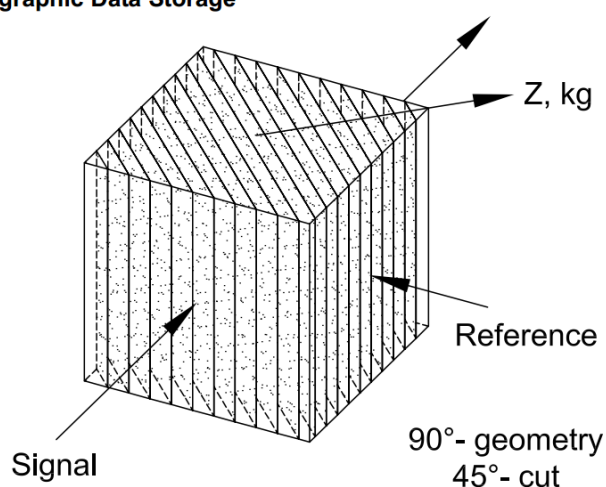


Figure 2. Holographic Data Storage



| Property at 25°C | Value |
|---|--|
| Empirical Formula | LiNbO ₃ :Fe |
| Congruent Melt Composition | 48.6 mole % Li ₂ O |
| 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 = 16.7x10 ⁻⁶ c = 2.0 x 10 ⁻⁶ |
| Resistivity (ohm-cm) | > 1014 at 200°C |
| Lattice Constant (Å) | a = 5.1508 (hex) c = 13.864 (hex) |
| Spontaneous Polarization (Coul/m ²) | 0.71 |
| Dielectric Constants | ā ₃₃ ^s = 29 ā ₁₁ ^s = 44 ā ₃₃ ^s = 30 ā ₁₁ ^T = 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 [pm/V] (constant tension) | $r_{13} = 9.6 \ r_{22} = 6.8 \ r_{33} = 30.9$ $r_{51} = 32.6 \ r_c = 21.1$ |

Crystallographic Orientations, Dimensions, and Tolerances

| | |
|--------------------------|--|
| Standard Sizes | 10x10x10mm ³ , 0° cut and 45° cut 10x10x20mm ³ , 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% |