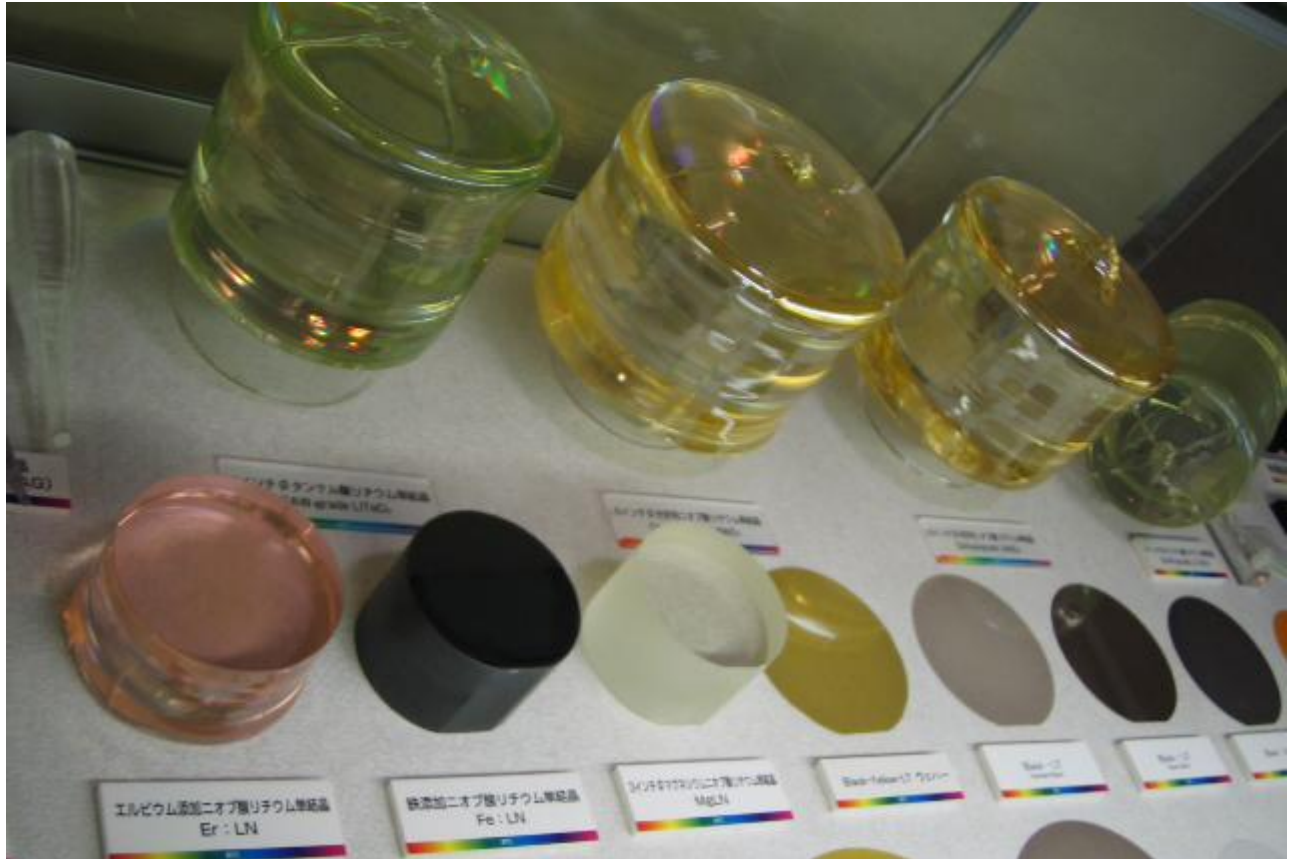


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. Lithium Niobate Properties



Fundamental Properties

Item		
Melting Point		1253° C
Crystal System		Trigonal
Point Group		3m
Crystal Density		4.647 x 10 ³ kg / m ³
Curie Temperature (T _c)		1133 ± 3°C
Heat Capacity (C _p)		89 J / k.mol
Dielectric Constants	(^T ₁₁)	85.2
Dielectric Constants	(^T ₁₁)	85.2
	(^T ₃₃)	28.7
Elastic Constants	(C ^E ₁₁)	2.03 x 10 ¹¹ N / m ²
	(C ^E ₁₂)	0.573
	(C ^E ₁₃)	0.752

Item		
	(C_{14}^E)	0.085
	(C_{33}^E)	2.424
	(C_{44}^E)	0.595
Piezoelectric Strain Constants	(e_{15})	$3.7 \text{ C} / \text{m}^2$
	(e_{22})	2.5
	(e_{31})	0.23
	(e_{33})	1.33

Typical Acoustic Properties

Surface Acoustic Wave Properties

Description	Propagation	Design	Surface Wave Velocity (m/s)	Coupling Coefficient k^2 (%)	Group Delay Time Temp Coefficient (ppm/°C)	Propagation Loss of SAW (dB/cm)
127.86° Y - Cut	X - Axis	SAW	3980	5.5	75	-
64° Y - Cut	X - Axis	L, SAW	4742	11.3	70	-
41° Y - Cut	X - Axis	L, SAW	4792	17.2	50	-
Y - Cut	Z - Axis	SAW	3488	4.9	94	0.31 (1GHz)
SAW = Surface Acoustic Wave L, SAW =Leaky SAW						

Selective Piezoelectric Coupling Factors & Frequency Constants

Plate Orientation	Wave Type	Coupling Factor	Resonance Frequency Constant (MHz-mm)
X	S	0.68	1.838
Z	E	0.17	3.615
36° Y - Cut	QE	0.49	3.300
163° Y - Cut	QS	0.62	1.866
E = extensional S = shear QE = quasi - extensional QS = quasi - shear			

Typical Optical Properties

Electro-Optic Coefficients $r(10^{-12} \text{ mV}^{-1})$ at 632.8 nm

r_{13}^T	10	r_{13}^S	11
r_{22}^T	6.8	r_{22}^S	3.4

r_{33}^T	32.2	r_{33}^S	36.7
r_{51}^T	32	r_{51}^S	18.2

Nonlinear Optical Coefficients at 1-06 μ m (*d₃₁=d₁₅)

$d_{22} / d_{36}^{KDP} $	6.5
$d_{31} / d_{36}^{KDP} $	-12.3
$d_{33} / d_{36}^{KDP} $	-86

Refractive Index at 632.8 nm

n_o	2.2880
n_e	2.2030
n_o : TE mode n_e : TM mode	

Optical constants of LiNbO₃ (Lithium niobate)

Option:

Ordinary ray (o)

▼

Wavelength:

0.6328

μm (0.4~5)

[\[line select\]](#)
[\[unit converter\]](#)

Refractive index

$n = 2.28646$

Chromatic dispersion

$dn/d\lambda = -0.269 \mu m^{-1}$

Abbe numbers

$V_d = 18.74$

$V_e = 18.64$

[Formulae](#)
[Abbe diagram](#)

Dispersion formula

$$n^2 - 1 = \frac{2.6734\lambda^2}{\lambda^2 - 0.01764} + \frac{1.2290\lambda^2}{\lambda^2 - 0.05914} + \frac{12.614\lambda^2}{\lambda^2 - 474.60}$$

[Expressions for n](#)

Conditions

21 °C; Congruently grown lithium niobate

Refractive index - Wikipedia

Wavelength (μm)	Refractive Index (n)
0.5	2.45
1.0	2.30
1.5	2.25
2.0	2.22
2.5	2.20
3.0	2.18
3.5	2.16
4.0	2.14
4.5	2.12
5.0	2.05

Sellmeier equation - Wikipedia

