## Properties of Stoichiometric $LiNbO_3$

| Properties | | 【Stoichiometric】 $LiNbO_3$ (SLN) |
|---|---|---|
| Crystal system | | Trigonal |
| Space group | | R3c |
| Curie temperture | $T_c$ (℃) | ～1200<br>～1220(MgO doped) |
| $[Li_2O]:[Nb_2O_5]$ mol ratio<br>(estimated from $T_c$) | | 49.9：50.1 |
| Lattice parameters | $c_0$ (nm) | 0.51482 |
| | $a_0$ (nm) | 1.3857 |
| Absorption edge [1]<br>data | nm | 305 |
| Refractive indices<br>(@633nm) | $n_o$ | 2.2865 |
| | $n_e$ | 2.1898 |
| Birefringence | $n_o$-$n_e$ | 0.0967 |
| Linear EO constants [2] | $r_{33}$ (pm/V) | 29.0 at 633nm |
| Nonlinear optical constants [3] | $d_{31}$ (pm/V) | 4.7 |
| | $d_{33}$(pm/V) | 23.8 |
| Domain switching E-field[4] data<br>(coercive field) | $E_c$(kV/mm) | ＜ 4 |
| Thermal conductivity [5]<br>data | W/(m・K) | 5.97<br>5.62 (MgO doped) |
| Laser damage threshold (MgO doped only) | $GW/cm^2$ | ～14 (at 1053nm, 1ns pulse) |
| Photorefractive damage threshold [6]<br>data<br>(MgO doped only) | $MW/cm^2$ | 2 (at 532nm, cw) |
| GRIIRA [7]<br>data | $ppm/cm^2$ | ～300 |

[1] Y. Furukawa et al., "Improved Properties of Stoichiometric $LiNbO_3$ for Electro-Optic Applications", J. Intel. Mat. Sys. Struc. **10**, p.470(1999)
[2] S. Mori et al., The 55th Spring Meeting, 2008, The Jpn. Soc. Appl.Phys. 28a-ZG-4, p.1222 (2008)
[3] I. Shoji et al., The 67th Autumn Meeting, 2006, The Jpn. Soc. Appl. Phys. 30p-ZX-2, p.1080 (2006)
[4] V. Gopalan et al. "The role of nonstoichiometry in 180°domain switching of $LiNbO_3$ crystals", Appl. Phys. Lett. **72**, p.1981 (1998)
[5] K. Kitamura et al., Oyo buturi **74**, p.573 (2005)
[6] Y. Furukawa et al., "Stoichiometric Mg:$LiNbO_3$ as an effective material for nonlinear optics", Opt. Lett. **23**, p.1981 (1998)
[7] Y. Furukawa et al., "Elimination of photorefraction and green-induced-infrared-absorption in MgO-doped near-stoichiometric $LiNbO_3$" Topical meeting on Advanced Solid-State Lasers (ASSL), p.480 (2000)

◆Absorption spectra

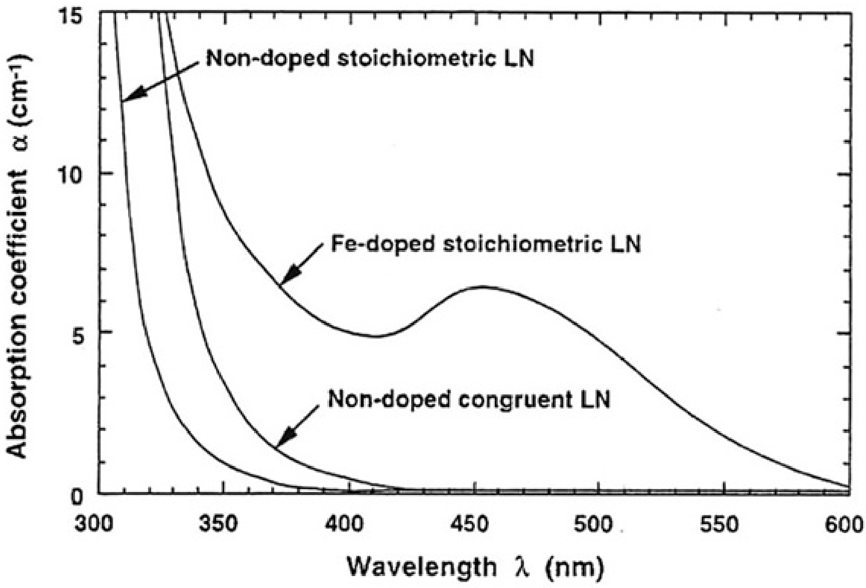


*Figure 5. Absorption spectra of as-grown $LiNbO_3$ crystals.*

◆Switching fields

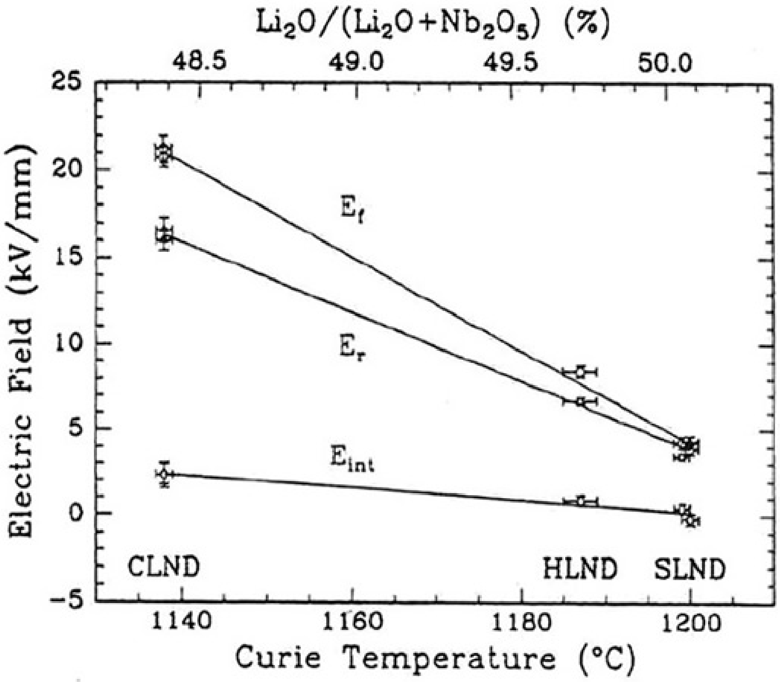


FIG. 2. The switching fields, $E_f$ for forward poling and $E_r$ for reverse poling, and internal field $E_{int}$ as a function of the measured Curie temperatures, $T_c$, of $LiNbO_3$ crystals with low hydrogen content (samples CLND, SLND, and HLND).

◆Thermal conductivity

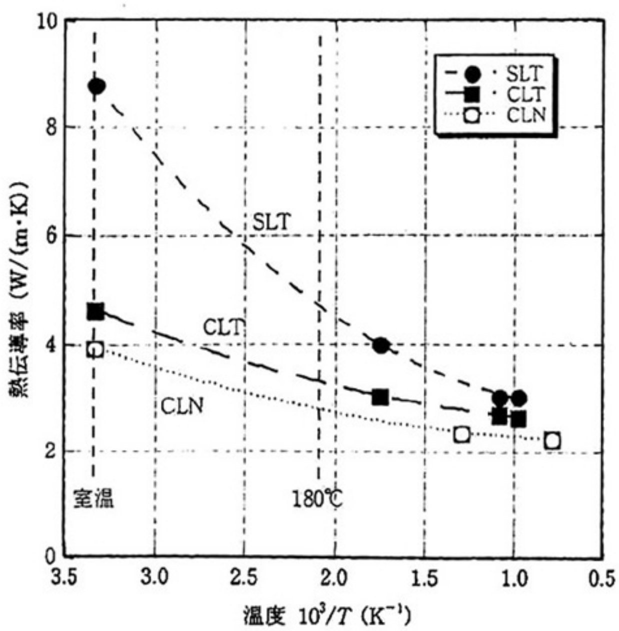


図 9　SLT，CLT，CLN の熱伝導率の温度依存性．熱伝導率は温度と反比例し，室温から 200℃まで上昇すると著しく減少する．

◆Photorefractive damage threshold

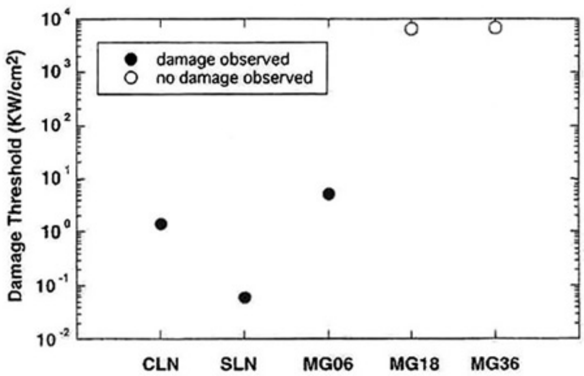


Fig. 1. Photorefractive damage threshold for CLN (congruent $LiNbO_3$), SLN (stoichiometric $LiNbO_3$), MG06 (MgO 0.6-mol.% doped SLN), MG18 (MgO 1.8-mol.% doped SLN), and MG36 (MgO 3.6-mol.% doped SLN).

◆GRIIRA

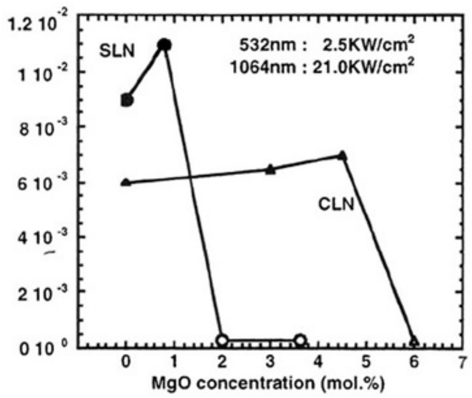


Fig. 3. Green induced infrared absorption versus MgO concentration in SLN and CLN crystals.