No. 2B-2 Li_2O–Nb_2O_5–MO (M = Mg, Cu, Zn)

1b	Transition temperature: Figs. 2B-2-001...2B-2-007.	
	Phase diagram of Li_2O–Nb_2O_5–MgO system: Fig. 2B-2-008; see also	92Wes
2a	Growth of MgO doped single crystal fibers by a drawing down method: see	91Ogu
	Growth and characterization of MgO doped crystals for electrooptic devices: see	90Fur
3a	Unit cell parameters: Table 2B-2-001; Figs. 2B-2-009...2B-2-011.	86Min
b	Crystal structure: Fig. 2B-2-012.	89Ito, 94Fei
5a	Dielectric constant: Fig. 2B-2-013.	
7a	Piezoelectricity: Fig. 2B-2-014.	
8a	Elastic compliance: Fig. 2B-2-015.	
9a	Refractive index: Table 2B-2-002; Fig. 2B-2-016.	
	IR absorption: Fig. 2B-2-017.	
	Dispersion of the refractive indices of Mg and Y doped crystals: see	91Ale
	Excited-state absorption in Tm^{3+} doped $LiNbO_3$:MgO: see	94Bre
	Infrared absorption in $LiNbO_3$:MgO crystal: see	93Fen
	Absorption properties of Zn doped crystals: see	94LiH
	Optical absorption and emission spectra of Ho^{3+} ion in pure and MgO doped crystals: see	94Lor
	Effect of annealing on electrooptic constants of undoped and MgO doped crystals: see	91Lay
	1.06...0.53 μm second-harmonic generation in MgO doped crystals: see	90Yao
	Optical parametric oscillation in $LiNbO_3$:MgO: see	90Ger
	Second-harmonic generation in $LiNbO_3$:MgO:Ti crystal: see	92XuG
	Photorefraction-resistant crystal: $LiNbO_3$:MgO: see	89Vol
	Nonlinear optical properties of optical damage resistant Zn doped crystals: see	92Vol
10	Raman scattering: Fig. 2B-2-018, Fig. 2B-2-019.	
11	Photovoltaic effect in MgO doped crystals: see	90Wen
	Photovoltaic effect in Mg and Fe doped crystals: see	89Som
	Photoconductivity of $LiNbO_3$:MgO:Nd: see	90Fen1
13a	NMR spectra of Mg nuclei in Mg doped crystals: see	90Fen2
b	ESR: Table 2B-2-003.	
	ESR of Cr^{3+} in $LiNbO_3$:MgO:Cr^{3+}: see	91Cor1, 91Cor2
	ESR studies of Fe^{3+} in Mg doped crystals: see	90Fen3
14c	EXAFS: Fig. 2B-2-020.	
15a	Microdomain structure of $LiNbO_3$:MgO:Ti: see	93LiH
16	Proton-exchanged $LiNbO_3$:MgO optical waveguides using adipic acid: see	93Pun
	Lattice site investigation for Mg in $LiNbO_3$ by combined RBS-PIXE-NRA channeling experiment: see	92Kli
	Proton-exchanged waveguides in $LiNbO_3$:MgO using phosphoric acid: see	91Pun
	$LiNbO_3$:MgO:Nd^{3+}. Fluorescence spectra: see	91LiJ
	Waveguide laser using $LiNbO_3$:MgO:Nd see	90Lal1
	Diffusion of H and D in pure and Mg doped crystals: see	90Kov1
	$LiNbO_3$:MgO:Nd waveguide laser and amplifier: see	90Lal2
	OH-related defects in metal doped $LiNbO_3$:MgO: see	90Kov2

Defect chemistry of MgO doped crystals: see	90Fen4
Lattice location of Nd^{3+} ions in $LiNbO_3$:Nd and $LiNbO_3$:MgO:Nd: see	93Gar
UV-excited luminescence of MgO doped crystals: see	89Klo
Cu doped crystal: see	94Obu
Photorefraction in MgO doped crystals: see	90Wen
Resistance to laser damage in rare-earth doped $LiNbO_3$:MgO: see	91Fen
Optical-damage-resistant impurities: Mg, Zn, In: see	94Vol
Photorefraction-resistant crystal: $LiNbO_3$:MgO: see	89Vol
Photorefractive properties of optical damage resistant Zn doped crystals: see	92Vol

Table 2B-2-001. $LiNbO_3$:Mg. a, c, ρ and relative unit cell volume (V/V_0) with different MgO doping [90Zha].

Mg [mol%]	a [nm]	c [nm]	V/V_0	ρ_{exp} [$\cdot 10^3$ kg m^{-3}]
0	0.5150	1.3867	1	4.637
1.00	0.5149	1.3866	0.99954	4.634
2.70	0.5150	1.3866	0.99993	4.631
5.00	0.5150	1.3866	0.99993	4.642
6.00	0.5151	1.3876	1.00097	4.639
9.00	0.5152	1.3878	1.00157	4.594

Table 2B-2-002. $LiNbO_3$:Mg:Ti. Principal refractive indices of the 5 mol% Mg and 0.2 mol% Ti doped crystal [93Zen].

T [°C]		0	15	65	110	150
539.8 nm	n_o	2.31238	2.31269	2.31358	2.31439	2.31525
	n_e	2.21798	2.21916	2.22238	2.22536	2.22864
632.8 nm	n_o	2.28001	2.28024	2.28057	2.28116	2.28159
	n_e	2.19061	2.19165	2.19428	2.19700	2.19967
1079.5 nm	n_o	2.22554	2.22565	2.22590	2.22604	2.22647
	n_e	2.14441	2.14527	2.14749	2.14961	2.15195
1341.4 nm	n_o	2.21332	2.21333	2.21377	2.21378	2.21403
	n_e	2.13404	2.13478	2.13720	2.13891	2.14132

Table 2B-2-003. $LiNbO_3$:Mg. Spin Hamiltonian parameters for O^- center [91Zar]. *A*: nearly isotropic hyperfine interaction with ^{93}Nb nucleus.

		x	*y*	*z*
g_1	2.029(10)	0.539(10)	0.791(10)	–0.290(10)
g_2	2.049(10)	–0.718(10)	0.252(10)	–0.648(10)
g_3	2.006(10)	0.440(10)	–0.558(10)	–0.704(10)
A [mT]	1.5(2)			

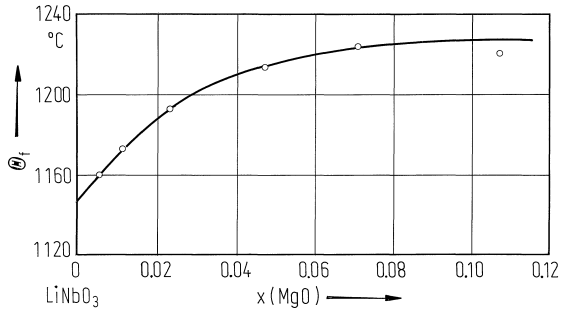

Fig. 2B-2-001. (1–x)$LiNbO_3$·x MgO. Θ_f vs. x [86Gra]. x: MgO concentration in the grown crystals. Li/Nb ratio in the melts is 48.6/51.4.

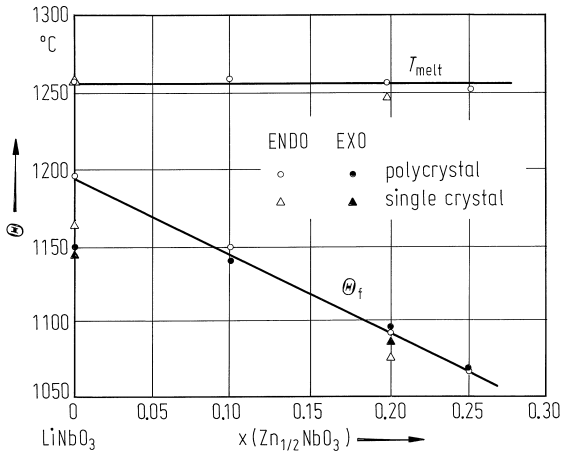

Fig. 2B-2-002. $Li_{1-x}Zn_{x/2}NbO_3$. Θ vs. x [86Kaw]. ENDO: data from endotherms, EXO: data from exotherms.

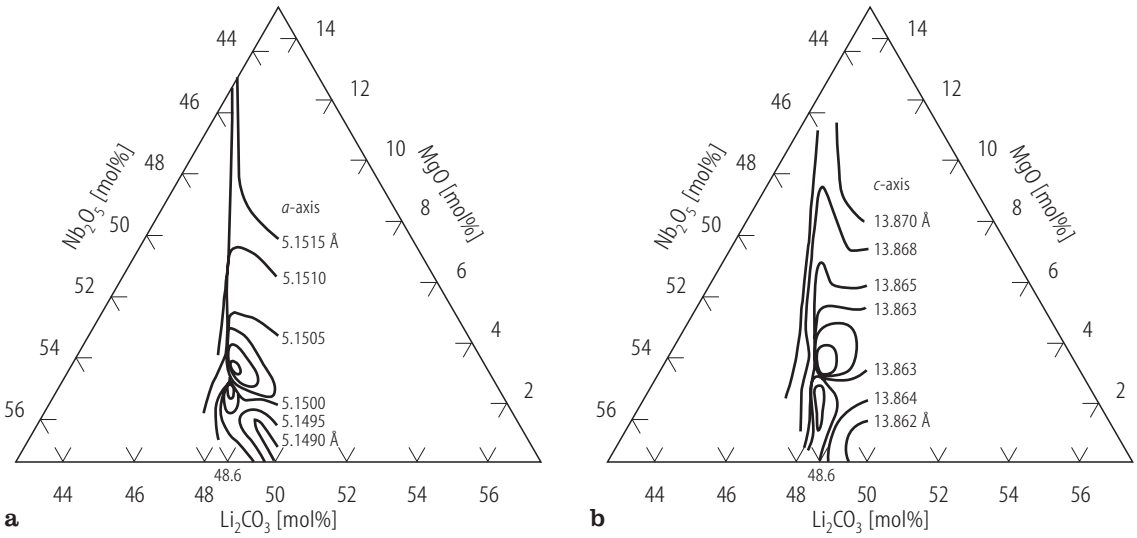

Fig. 2B-2-003. $LiNbO_3$:MgO. Variation in hexagonal lattice parameters in the MgO-Li_2CO_3-Nb_2O_5 system [94Kat].

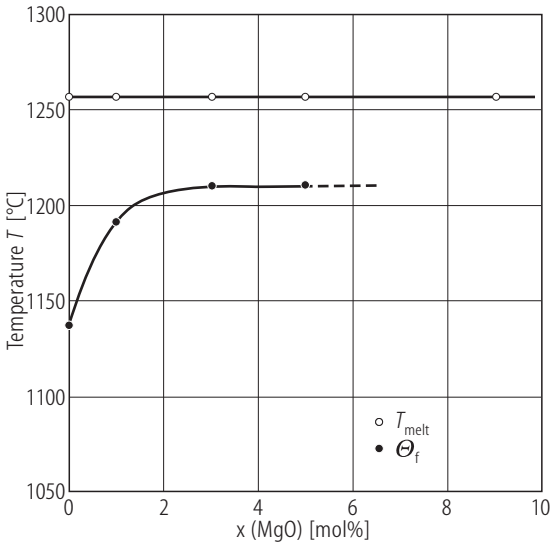

Fig. 2B-2-004. $LiNbO_3$:MgO. T_{melt}, Θ_f vs. x [94Kat]. x: mol% MgO content.

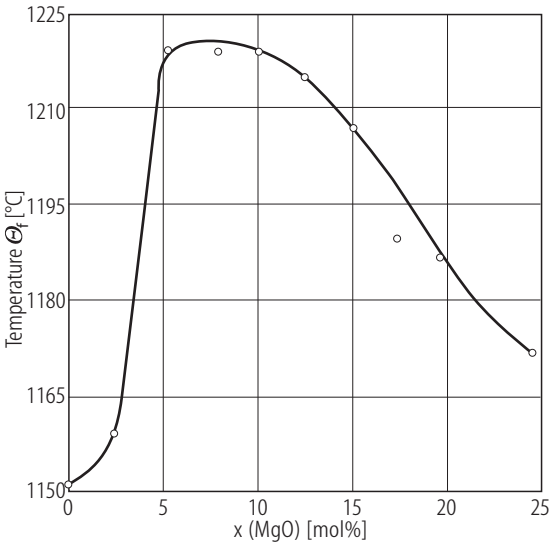

Fig. 2B-2-005. $LiNbO_3$:MgO. Θ_f vs. x [91HuL2]. x: mol% MgO content.

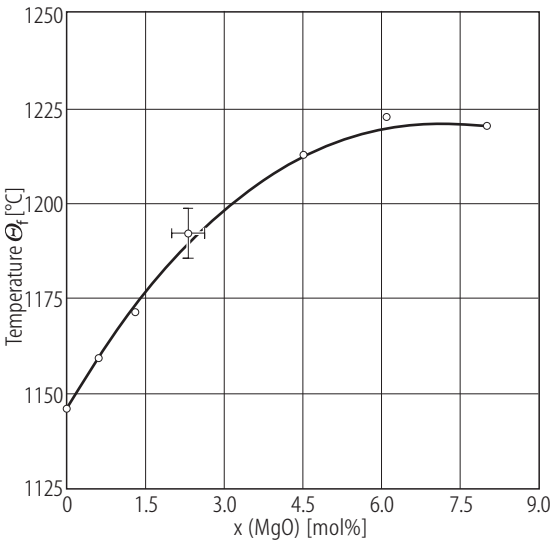

Fig. 2B-2-006. $LiNbO_3$:MgO. Θ_f vs. x [91Gra]. x: mol% MgO content.

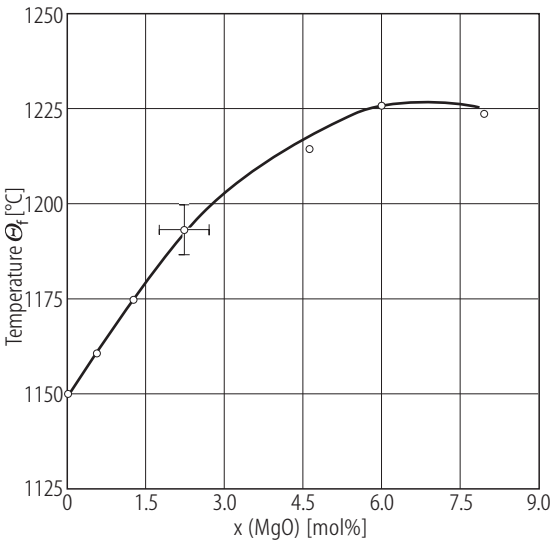

Fig. 2B-2-007. $LiNbO_3$:MgO. Θ_f vs. x [89Ros]. x: mol% MgO content.

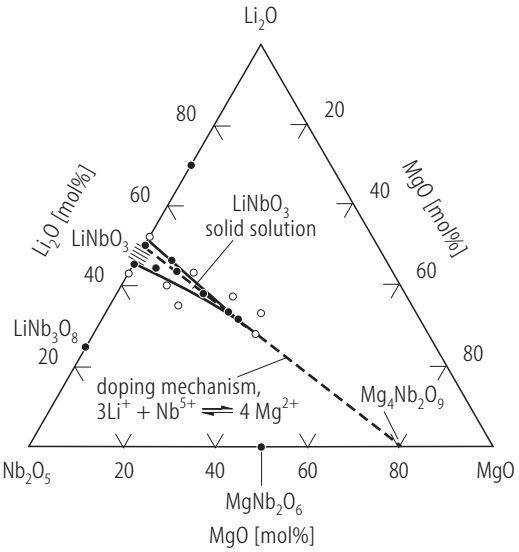

Fig. 2B-2-008. Li_2O-MgO-Nb_2O_5. Formation of $LiNbO_3$ solid solutions in the composition triangle Li_2O-MgO-Nb_2O_5 [87Vil].

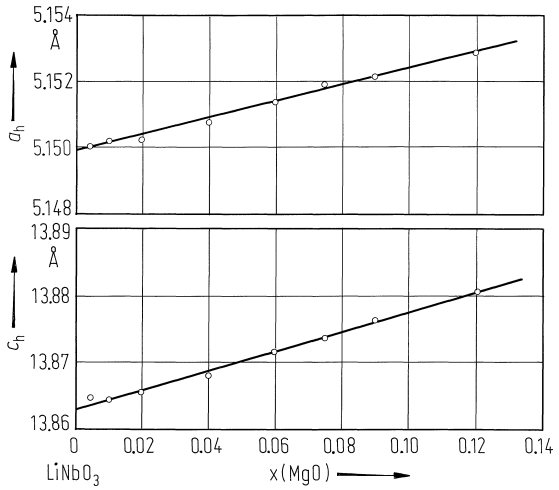

Fig. 2B-2-009. (1–x)$LiNbO_3$·x MgO. Unit cell parameters vs. x [86Gra]. x: MgO concentration in the melts. Li/Nb ratio in the melts is 48.6/51.4.

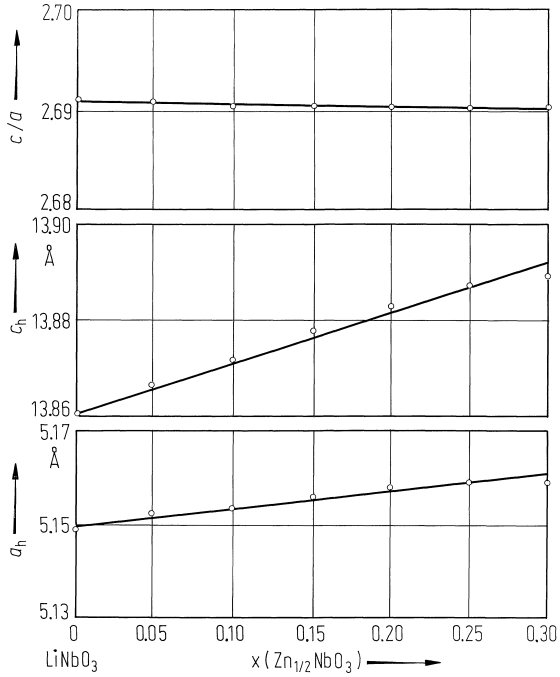

Fig. 2B-2-010. $Li_{1-x}Zn_{x/2}NbO_3$. Unit cell parameters vs. x [86Kaw].

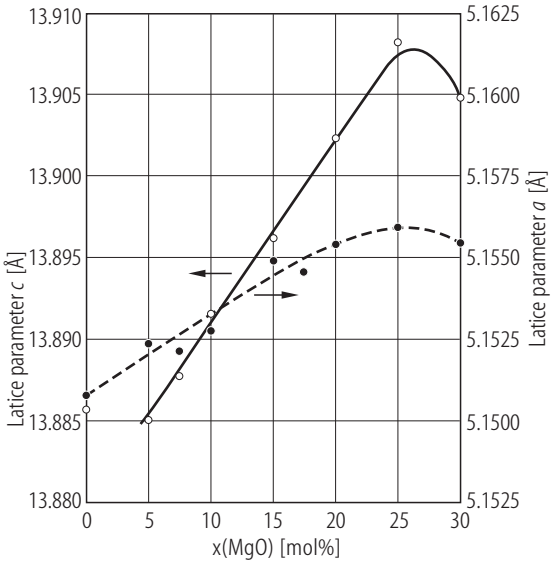

Fig. 2B-2-011. $LiNbO_3$:MgO. *a*, *c* vs. x [91HuL2]. x: MgO mol%.

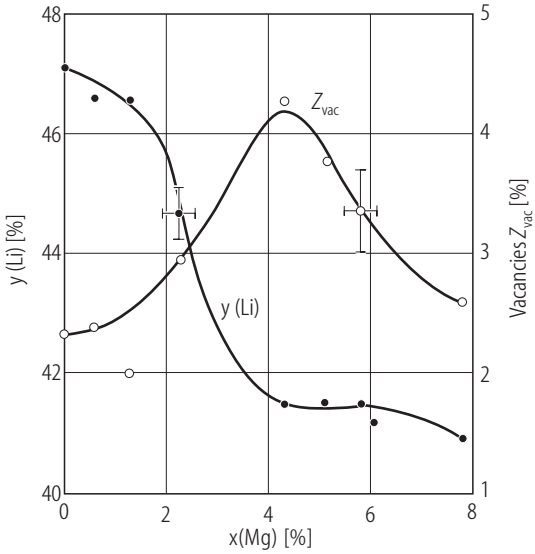

Fig. 2B-2-012. $LiNbO_3$:MgO. y_{Li}, Z_{vac} vs. x [91Gra]. x: mol% MgO content; y_{Li}: mol% Li_2O content; Z_{vac}: mol% vacancy content.

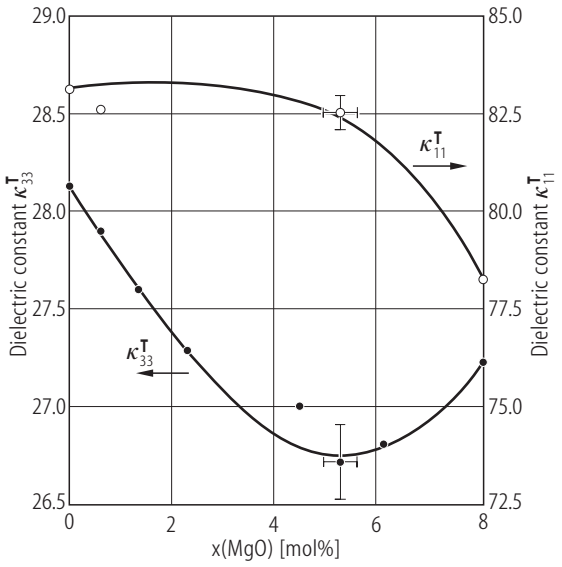

Fig. 2B-2-013. $LiNbO_3$:MgO. $\kappa_{11}^T, \kappa_{33}^T$ vs. x [91Gra]. x: mol% MgO content.

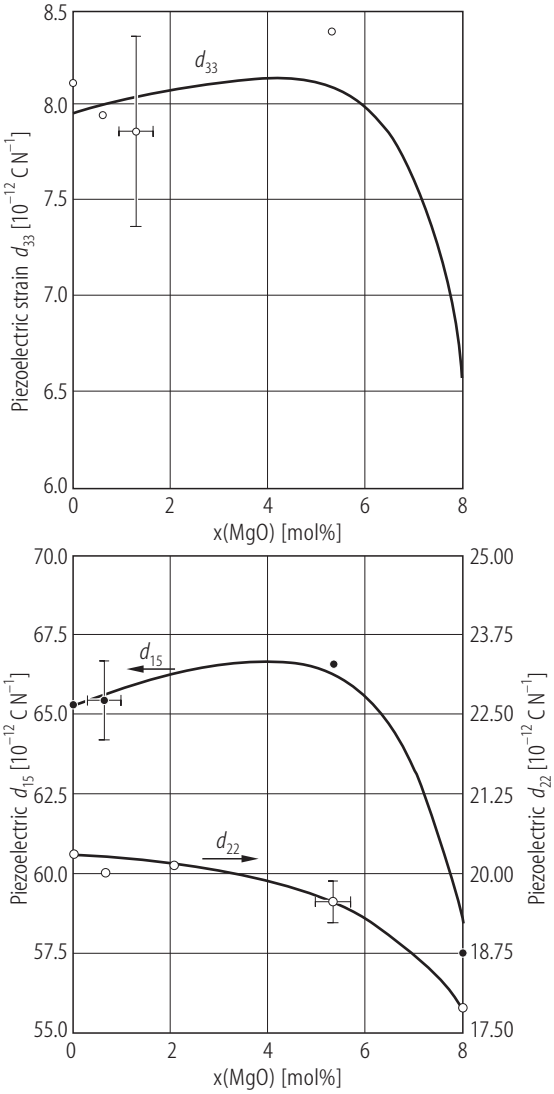

Fig. 2B-2-014. $LiNbO_3$:MgO. d_{15}, d_{22}, d_{33} vs. x [91Gra]. x: mol% MgO content.

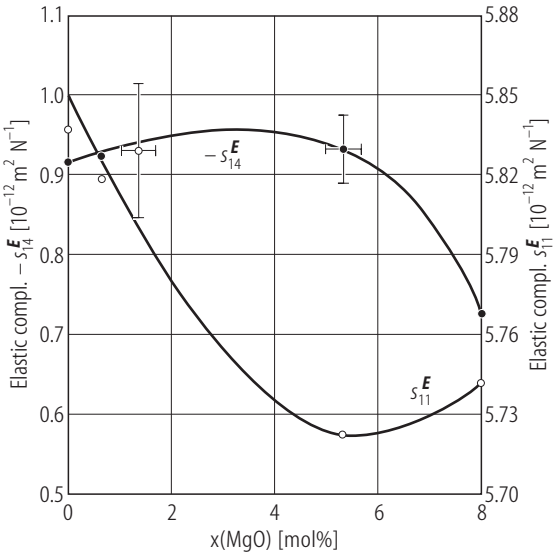

Fig. 2B-2-015. $LiNbO_3$:MgO. s_{11}^{E}, $-s_{14}^{E}$ vs. x [91Gra]. x: mol% MgO content.

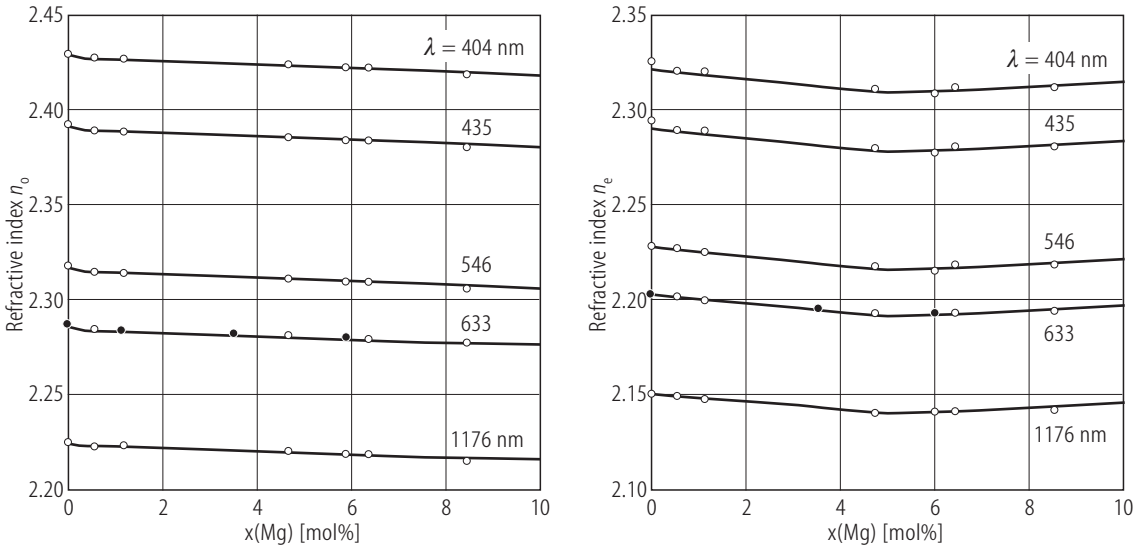

Fig. 2B-2-016. $LiNbO_3$:Mg. n_o, n_e vs. x [94Sch]. x: mol% Mg content. Parameter: λ.

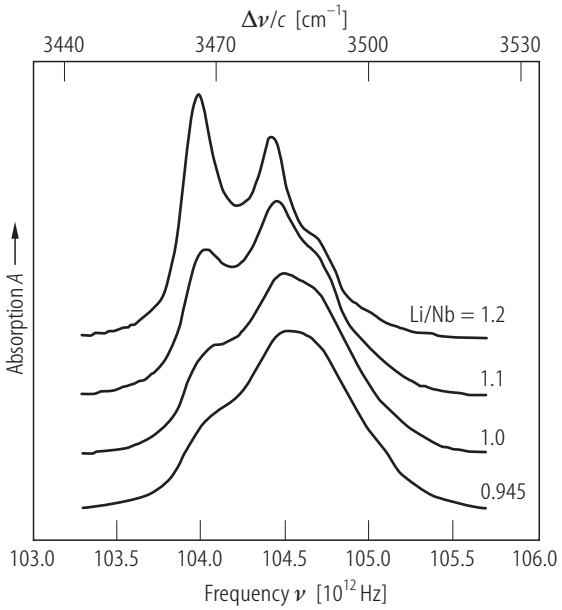

Fig. 2B-2-017. $LiNbO_3$. OH absorption bands [91Kov]. *A*: absorption. Parameter: melt composition.

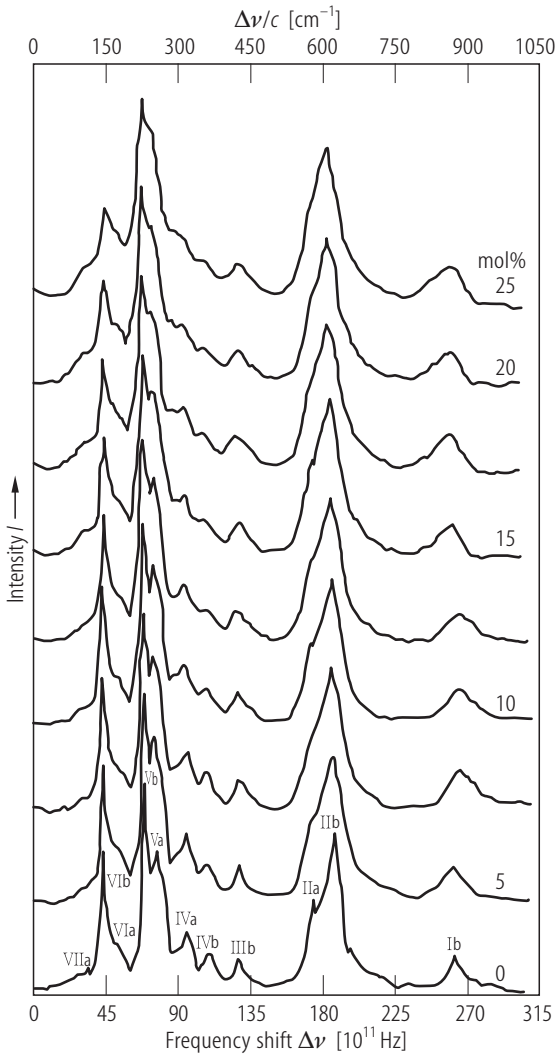

Fig. 2B-2-018. $LiNbO_3$:MgO. Raman spectra of the powder crystals [91HuL2]. Parameter: MgO content [mol%].

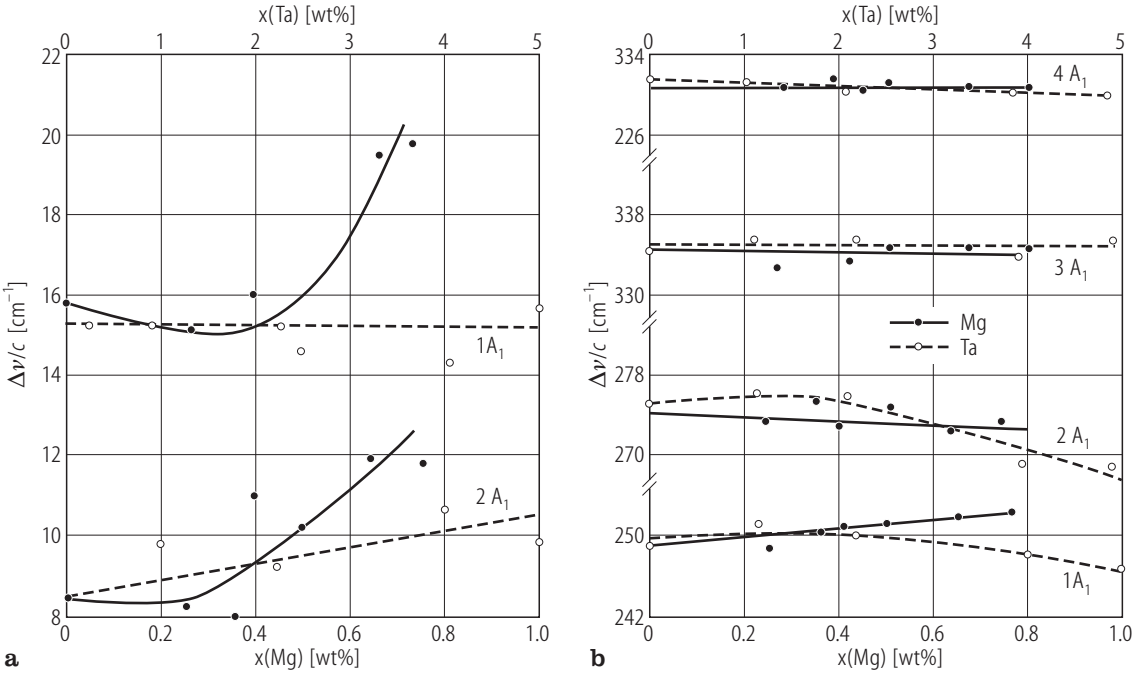

Fig. 2B-2-019. $LiNbO_3$:MgO. Γ/c and $\Delta\nu/c$ vs. x [93Ser]. Γ: Raman width ; $\Delta\nu$: Raman shift. x: Mg content [wt%].

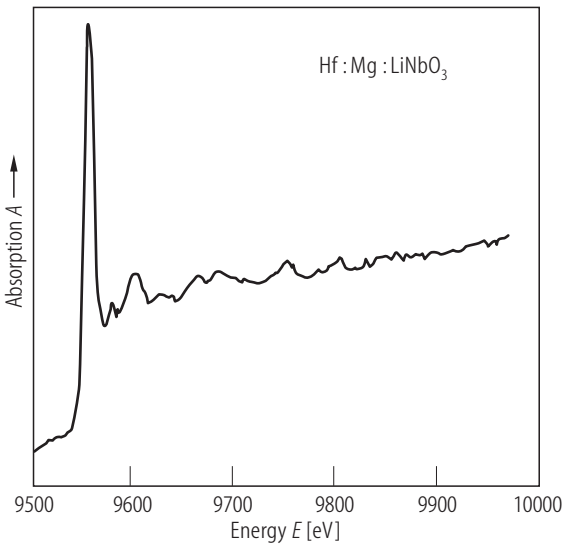

Fig. 2B-2-020. $LiNbO_3$ (Hf:Mg-codoped). Fluorescence EXAFS Hf spectra [94Pri]. *A*: fluorescence absorption. *E*: energy.

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