No. 1B-c14 Pb($In_{1/2}Nb_{1/2}$)O_3
(M = 359.1)

1a	Dielectric anomaly in Pb($In_{1/2}Nb_{1/2}$)O_3 was found by Kupriyanov and Fesenko in 1965.		65Kup
b			

phase	III	(II)	I
state		(F)	P
crystal system	monoclinic	monoclinic	cubic
Θ [°C]	≈50...90	≈200	

84Kup

Ferroelectricity in disordered Pb($In_{1/2}Nb_{1/2}$)O_3 was reported, however, antiferroelectricity smeared in ordered Pb($In_{1/2}Nb_{1/2}$)O_3. 89Yas, 84Kup

2a	Crystal growth: flux method (PbO–B_2O_3).	90Kan
3a	$a = c$ = 4.102 Å, b = 4.078 Å, β = 90°12' at RT.	90Kan
4	Thermal distortion: Fig. 1B-c14-001, Fig. 1B-c14-002.	
5a	Dielectric constant: Figs. 1B-c14-003...1B-c14-009. Phase diagram in regard to E_{bias}: Fig. 1B-c14-010. Ordering effect in annealing: see	84Bok
c	Polarization: Fig. 1B-c14-011, Fig. 1B-c14-012.	
d	Pyroelectricity: see Fig. 1B-c14-012.	

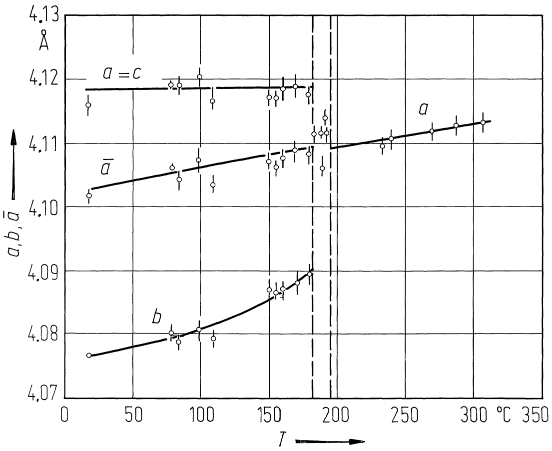

Fig. 1B-c14-001. $Pb(In_{1/2}Nb_{1/2})O_3$ (crystal). Unit cell parameters vs. *T* [84Kup]. $\bar{a}$: mean parameter of perovskite unit cell. *a*, *b*, *c*: unit cell parameters of monoclinic phase for *T* < 200 °C.

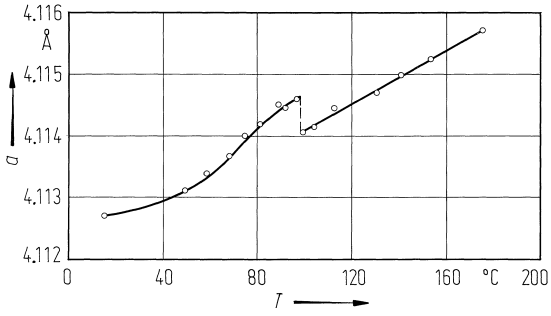

Fig. 1B-c14-002. $Pb(In_{1/2}Nb_{1/2})O_3$. *a* vs. *T* [83Kup]. *a*: unit cell parameter.

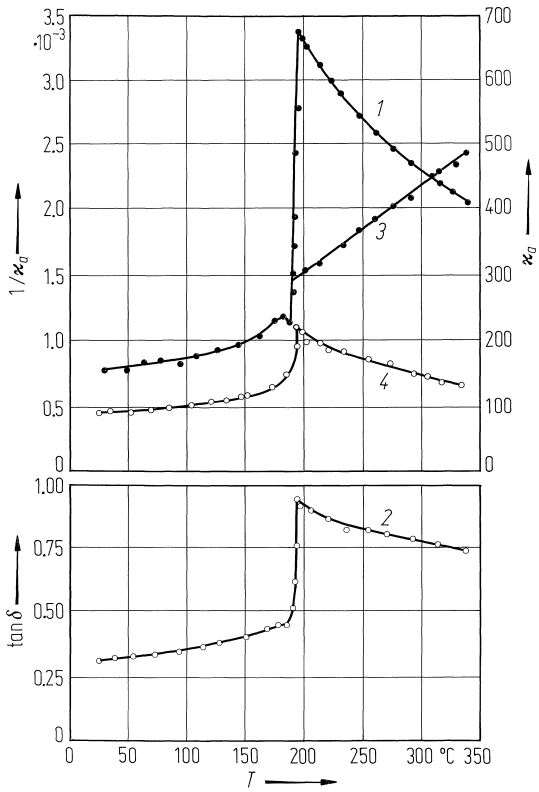

Fig. 1B-c14-003. $Pb(In_{1/2}Nb_{1/2})O_3$ (crystal). κ_a, κ_a^{-1}, tan δ vs. *T* [85Tur]. Ordered by annealing at 500 °C for 5 h. Curves *1, 2, 3*: f = 15 kHz, curve *4*: f = 1 GHz.

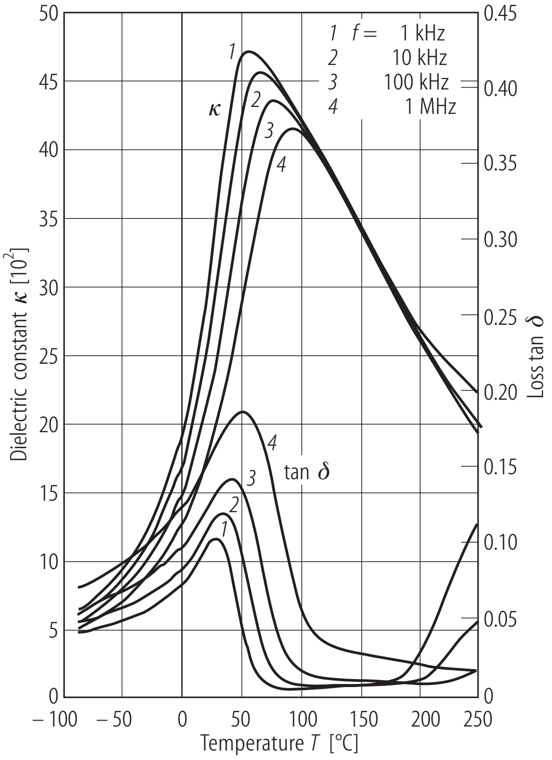

Fig. 1B-c14-004. $Pb(In_{1/2}Nb_{1/2})O_3$ (ceramics). κ, tan δ vs. T [91Par]. Parameter: f.

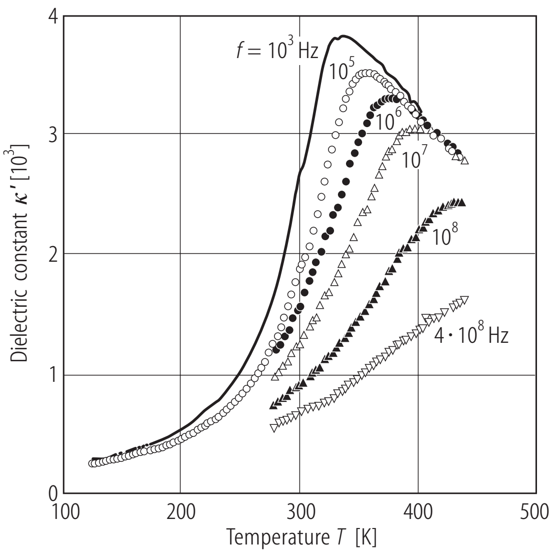

Fig. 1B-c14-005. $Pb(In_{1/2}Nb_{1/2})O_3$. κ' vs. T [94Eli]. Parameter: *f*.

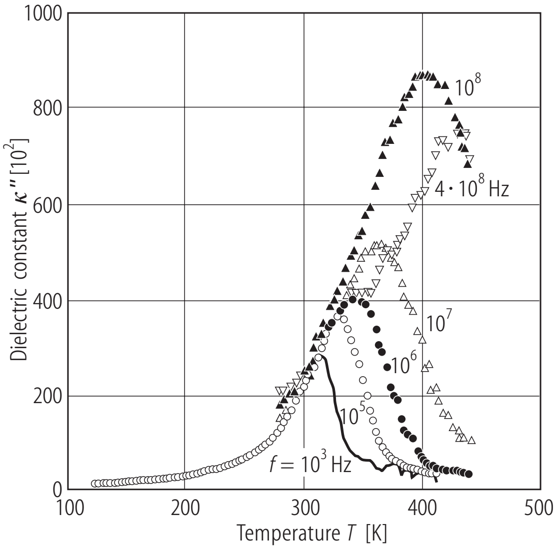

Fig. 1B-c14-006. Pb($In_{1/2}Nb_{1/2}$)O_3 (ceramics). *κ*'' vs. *T* [94Eli]. Parameter: *f*.

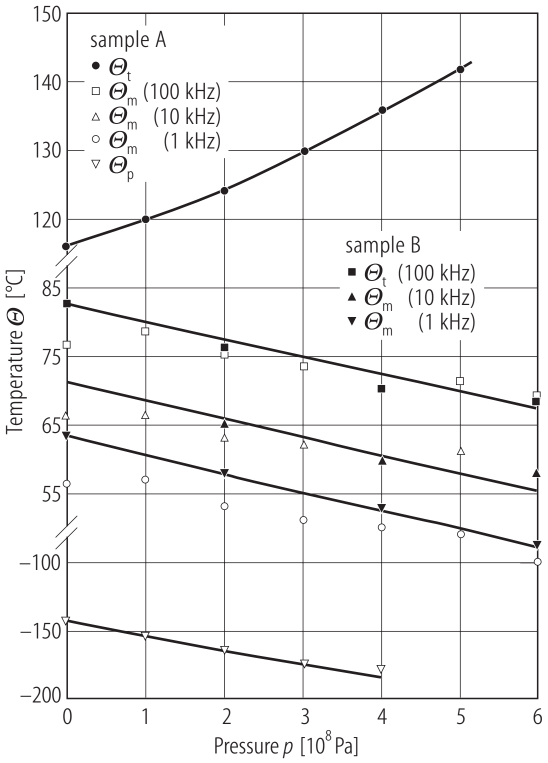

Fig. 1B-c14-007. $Pb(In_{1/2}Nb_{1/2})O_3$ (ceramics). Θ_m, Θ_t, Θ_p vs. p [92Yas]. Θ_m: temperature of κ maximum. Θ_t: temperature of dielectric anomaly above Θ_m. Θ_p: paraelectric Curie temperature. Sample A: sample prepared by conventional method. Sample B: sample prepared by utilizing fast firing.

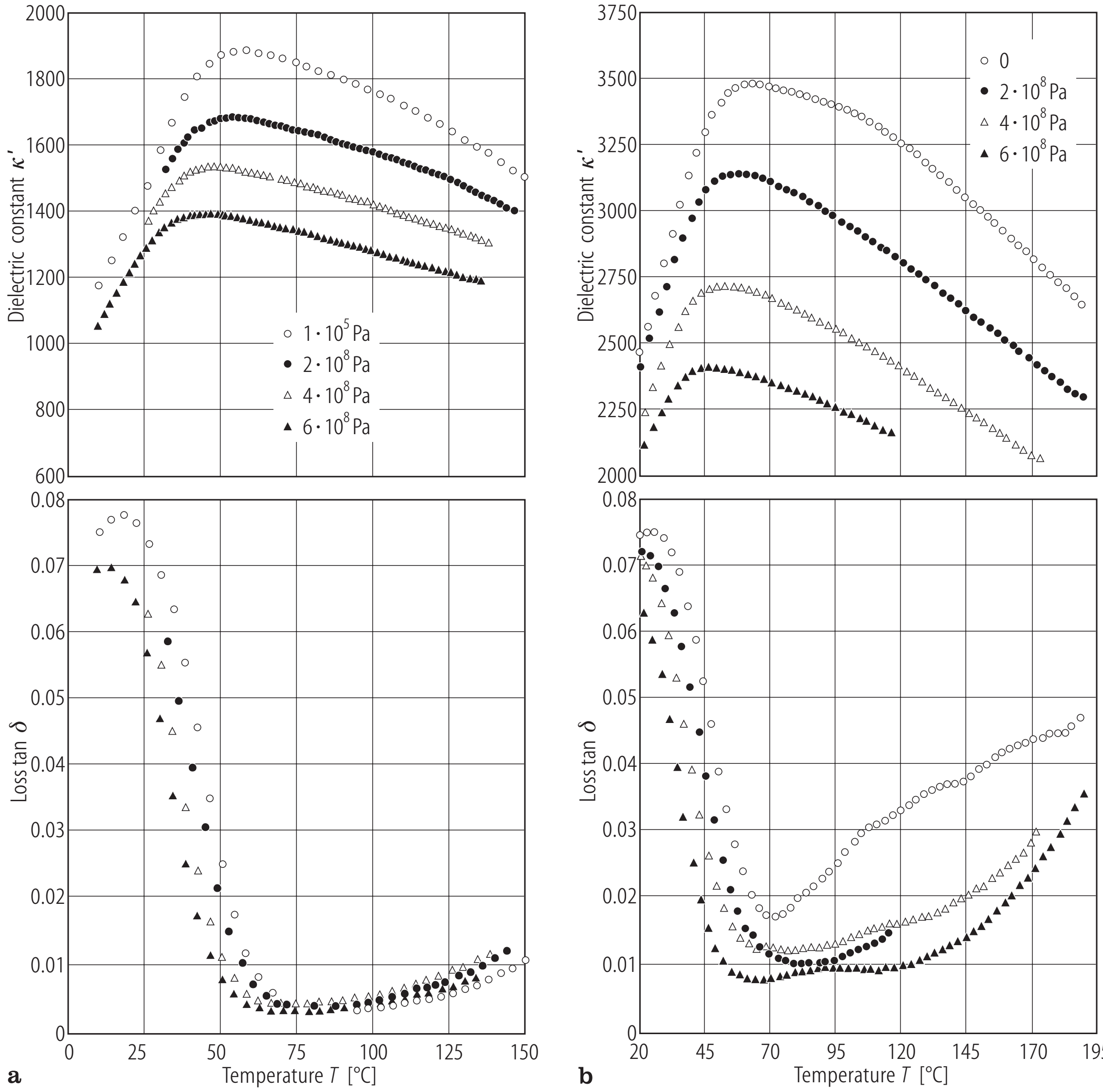

Fig. 1B-c14-008. $Pb(In_{1/2}Nb_{1/2})O_3$ (ceramics). κ', $\tan\delta$ vs. T [92Yas]. Parameter: *p*. *p*: hydrostatic pressure. f = 1 kHz. (**a**) Sample A: sample prepared by conventional technique. (**b**) Sample B: sample prepared by utilizing fast firing.

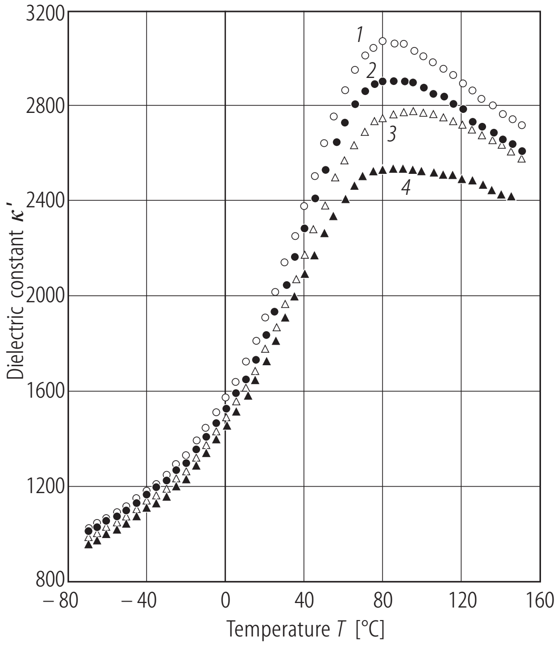

Fig. 1B-c14-009. $Pb(In_{1/2}Nb_{1/2})O_3$ (ceramics). *κ*' vs. *T* [92Yas]. *f* = 1 kHz. The sample was prepared by utilizing fast firing. Curve *1*: without E_{bias} before poling. *2*: with E_{bias}. *3*: without E_{bias} after poling. *4*: with E_{bias} after poling. $E_{bias} = 11 \cdot 10^2$ kVm^{-1}. Poling field: $30 \cdot 10^2$ kVm^{-1}.

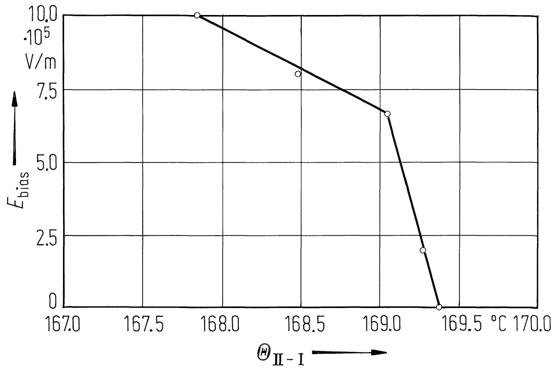

Fig. 1B-c14-010. $Pb(In_{1/2}Nb_{1/2})O_3$. E_{bias} vs. Θ_{II-I} [86Gro].

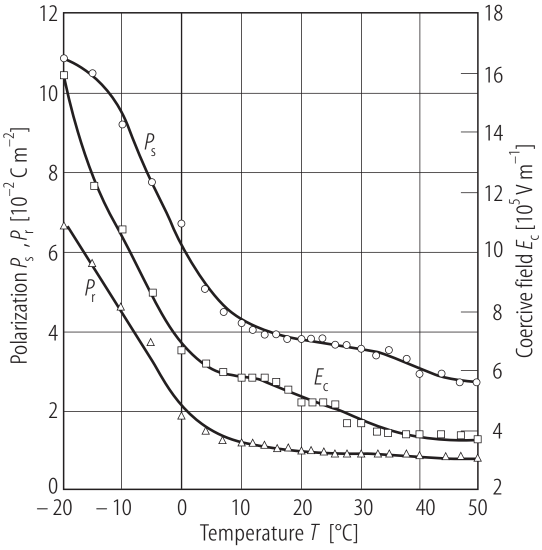

Fig. 1B-c14-011. $Pb(In_{1/2}Nb_{1/2})O_3$ (ceramics). P_s, P_r, E_c vs. T [89Yas].

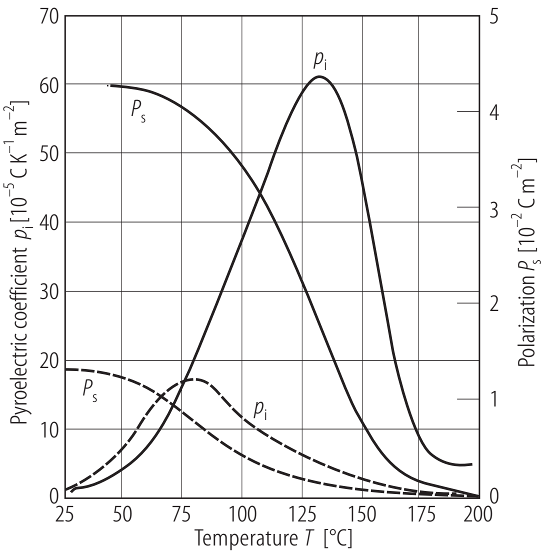

Fig. 1B-c14-012. $Pb(In_{1/2}Nb_{1/2})O_3$ (ceramics). p_i, P_s vs. T [91Par]. p_i : pyroelectric coefficient. Broken lines: specimen poled at RT. Solid lines: field-cooled specimen.

References

65Kup Kupriyanov, M.F., Fesenko, E.G.: Izv. Akad. Nauk SSSR, Ser. Fiz. **29** (1965) 925; Bull. Acad. Sci. USSR, Phys. Ser. (English Transl.) **29** (1965) 930.

83Kup Kupriyanov, M.F., Turik, A.V., Zaitsev, S.M., Fesenko, E.G.: Phase Transitions **4** (1983) 65.

84Bok Bokov, A.A., Raevskii, I.P., Prokopalo, O.I., Fesenko, E.G., Smotrakov, V.G.: Ferroelectrics **54** (1984) 241.

84Kup Kupriyanov, M.F., Turik, A.V., Kogan, V.A., Zaitsev, S.M., Zhestkov, V.F.: Kristallografiya **29** (1984) 794; Sov. Phys. Crystallogr. (English Transl.) **29** (1984) 470.

85Tur Turik, A.V., Kupriyanov, M.F., Zhestkov, V.F., Shevchenko, N.B., Kogan, V.A.: Fiz. Tverd. Tela **27** (1985) 2802; Sov. Phys. Solid State (English Transl.) **27** (1985) 1686.

86Gro Groves, P.: Phase Transitions **6** (1986) 115.

89Yas Yasuda, N., Shibuya, S.: J. Phys. Condens. Matter **1** (1989) 10613.

91Par Park, S.S., Choo, W.K.: Ferroelectrics **118** (1991) 117.

92Yas Yasuda, N., Inagaki, H.: Ferroelectrics **126** (1992) 115.

94Eli Elisalde, C., Weil, F., Ravez, J.: Mater. Sci. Eng. B **25** (1994) 85.