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BOOK OF ABSTRACTS

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Thermal Expansion and Polarization of (1-x)$PbNi_{1/3}Nb_{2/3}O_3$-x$PbTiO_3$ Solid Solutions

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The prospects of the PNN-PT solid solutions – (1-x)$Pb(Ni_{1/3}Nb_{2/3})O_3$-x$PbTiO_3$ - for applications are associated with high dielectric permittivity, large piezoelectric and electrostriction coefficients. The PNN belongs to multiferroic compounds of relaxor behaviour with $T_m \approx 153$ K and $T_N \approx 5$ K, respectively. Well-studied typical ferroelec-tric lead titanate undergoes cubic-to-tetra-gonal phase transition at $T_c \approx 750$ K. The T-x phase diagram of the PNN-PT system demonstrates a morphotropic region existing around x ~ 0.35 where several phases may coexist: the cubic, pseudo-cubic, tetragonal, and rhombohedral [1].

The present investigation describes the detailed studies of thermal expansion in the series of the (1-x)PNN-xPT solid solutions with x= 0 - 0.8 performed in the temperature range from 100 to 780 K. The anomalous and lattice contributions of deformation and the coefficient of thermal expansion are analysed and used to estimate the Burns temperature and the mean square polarization P_d (Figure 1). The obtained results are discussed within thermodynamic theory [2], and coefficients 2-4-6 of Landau potential for solid solutions are determined.

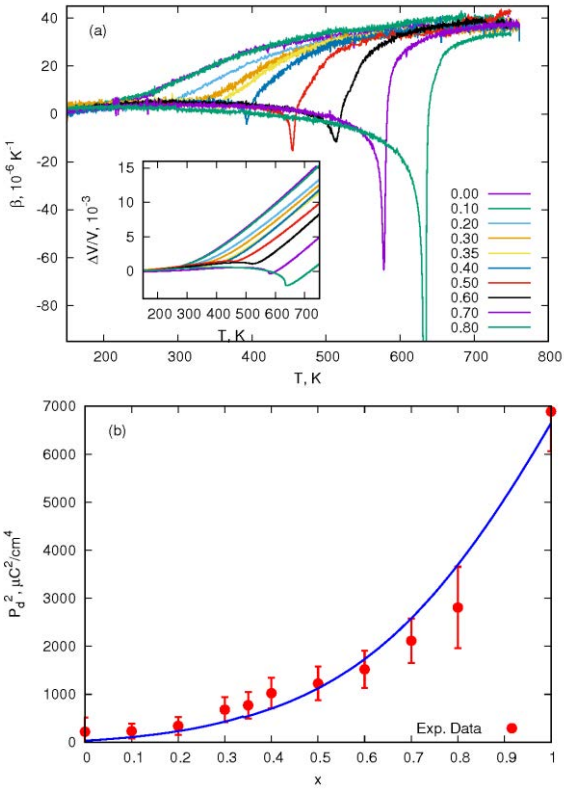

Fig.1. Thermal expansion (a) and polarization (b) of solid solutions (1-x)$PbNi_{1/3}Nb_{2/3}O_3$-x$PbTiO_3$

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