# Fazinis virsmas $0.83PbMg_{1/3}Nb_{2/3}O_3$-$0.17PbTiO_3$ kristale

# Relaxor to ferroelectric phase transition in $0.83PbMg_{1/3}Nb_{2/3}O_3$-$0.17PbTiO_3$ single crystal

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Lead based relaxor ferroelectrics are technologically important materials. The compositions consisting of canonical relaxor and normal ferroelectric exhibit morphotropic phase boundary (MPB). The compositions in the vicinity of MPB show superior piezoelectric and dielectric properties.

One of the most popular system is lead magnesium niobate – lead titanate ($PbMg_{1/3}Nb_{2/3}O_3$-$PbTiO_3$ – PMN-PT) which besides excellent properties show very interesting crossover from purely relaxor behaviour to normal ferroelectric. The intermediary compositions have a spontaneous 1st order phase transition from relaxor to normal ferroelectric phase. These phase transitions are very interesting from the point of view of lattice dynamics.

This work is devoted to the study of dielectric properties of PMN-17PT single crystals in a broad frequency (20 Hz – 120 GHz) and temperature (100 - 500 K) interval. These studies allowed us to thoroughly investigate the dynamics of this peculiar relaxor to ferroelectric phase transitions.

The 1st order phase transition was detected by the dielectric spectroscopy. It will be shown that PMN-17PT single crystal has a broad relaxor-like dispersion above 1 MHz frequency. The dielectric spectra were described by the empirical formulas and the temperature dependence of mean relaxation time was extracted from the approximations.

The thorough studies of temperature and frequency dependences revealed interesting features about dipole dynamics in PMN-17PT. The main scope of this work is to present the dynamics of this phase transition and reveal some controversies which were observed. Figure 1 represents the temperature dependence of complex dielectric permittivity.

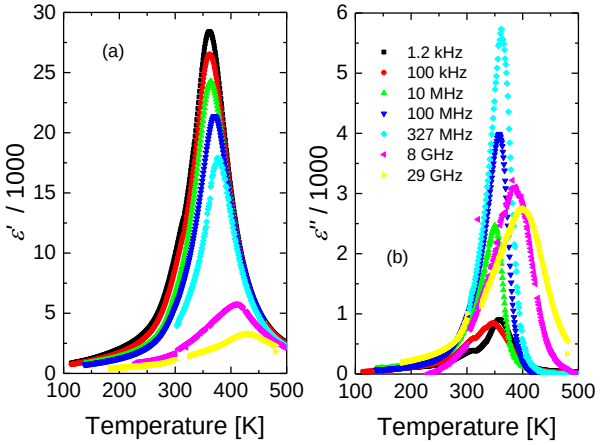


Fig 1. Temperature dependence of complex dielectric permittivity at different frequencies.

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