MEDNARODNA PODIPLOMSKA ŠOLA JOŽEFA STEFANA

JOŽEF STEFAN INTERNATIONAL POSTGRADUATE SCHOOL

BASIC STUDY OF RELAXORS: MATERIALS FOR HIGH TECHNOLOGICAL DEVICES

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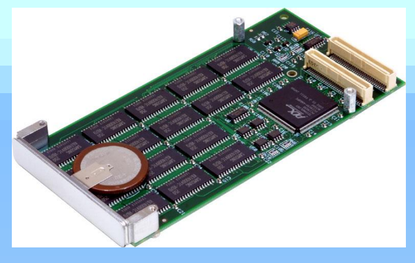
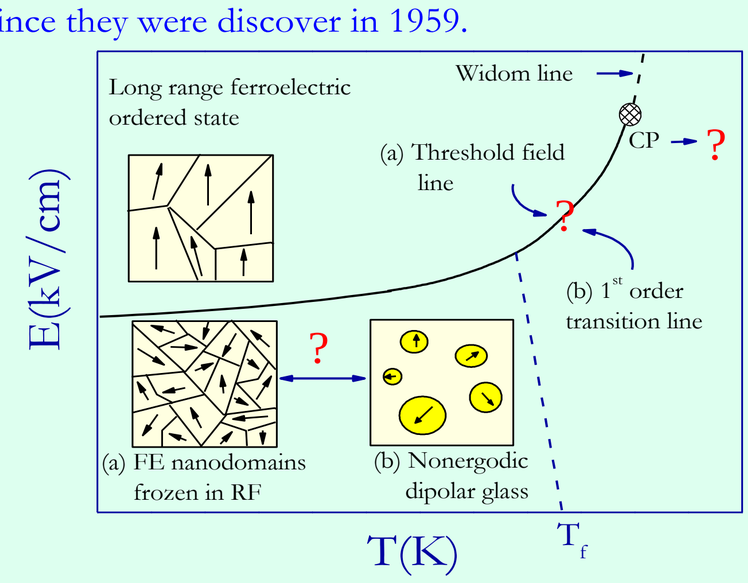
Abstract

Relaxor ferroelectric materials represent a subgroup of ferroelectrics and are charcterized by extraordinery properties which are useful for various applications in high technological devices. Relaxors exhibit high permittivity, ferroelectric hysteresis, high piezoelectric effects, high pyroelectric coefficients, strong electro-optic effects and anomalous temperature coefficients of resistivity.

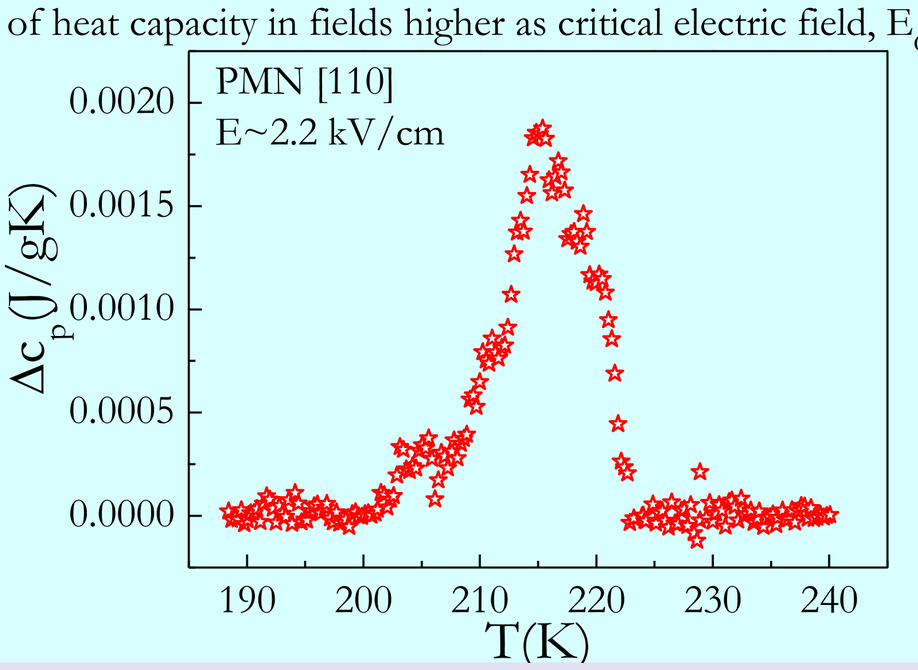


Our work is dedicated to understanding of ordering processes in these materials which is of a fundamental need for further application progress. Here, we address a long standing question about the nature of relaxor ground state in zero electric field. Over the years two possible relaxor ground state were presented as shown in electric field temperature diagram.

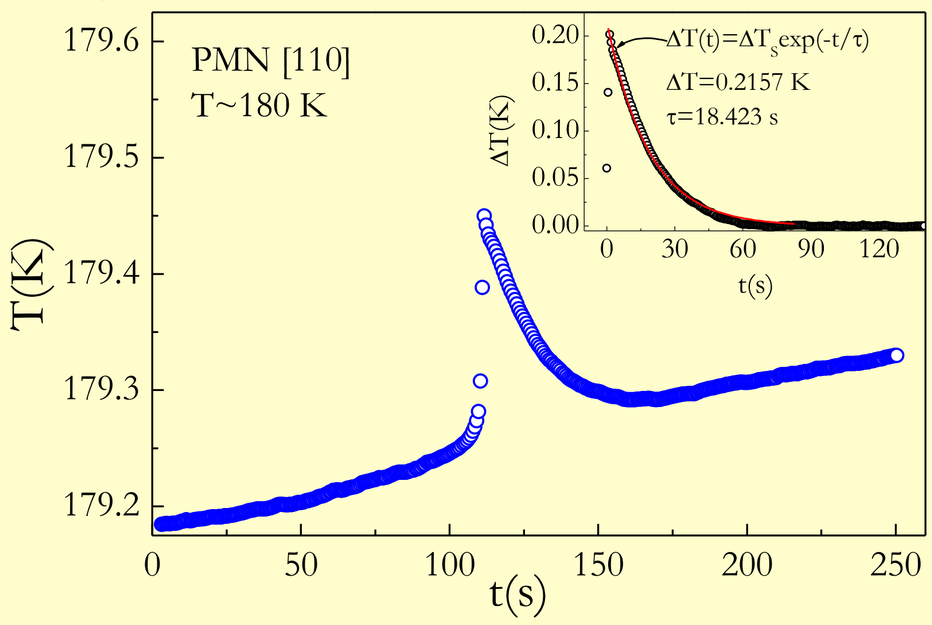
The nature of relaxors ground state is a matter of discussion since they were discover in 1959.



The isofield measurement obtained in ac mode show an excess of heat capacity in fields higher as critical electric field, E_C.



Anomaly of sample temperature observed in isothermal relaxation measurements is a consequence of the released latent heat at the ferroelectric transition.



Conclusion

[1] The ac and relaxation calorimetric measurements show an excess of the heat capacity as well as sharp increase of the sample temperature as a consequence of the released latent heat at the electric field induced ferroelectric transition.

[2] The detected excess heat capacity and latent heat confirm the existence of true thermodynamic first order phase transition in ferroelectric relaxor PMN [110] single crystal.

[3] Our findings firmly support the physical picture of dipolar glass like relaxor ground state for PMN relaxor.