Two Dimensional Distribution of the Relaxation Times

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Relaxors and dipolar glasses show very broad distribution of the relaxation times. Due to that the usual models, such as Cole – Cole equation or Davidson – Cole or Havriliak – Negami equations are working not very well especially at low temperatures, where the distribution of the relaxation times becomes extremely broad. To address these shortcomings a calculation program was created, which allowed to extract one dimensional distribution of the relaxation times. If we assume, that each relaxation time follows the Arrhenius law, with certain activation energy and attempt relaxation time, we can obtain two dimensional distribution function of attempt relaxation times and activation energies.

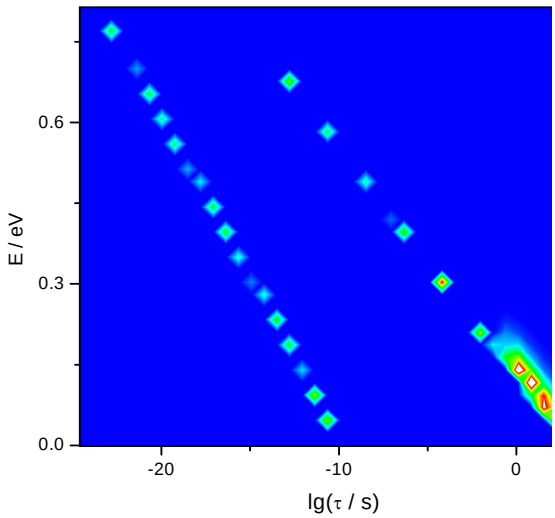

Fig.1 Two dimensional distribution of activation energies and attempt relaxation time of PMN crystal measured from 10^{-3} Hz to GHz frequency range.

Such calculations have been performed for different materials, such as classical dipolar glasses BP/BPI, classical relaxors PMN (Fig.1) and PLZT. The graphs allow us to distinguish between dipolar glasses and relaxors. Also, the results confirmed Meyer – Neldel law [1] with different values of the linear coefficients. The differences and common features of these two classes of materials will be presented.

References

1. A.Yelon, B.Movaghar and H.M.Branz, , Phys. Rev. B **46**, 12244 (1992)