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Charge localization in the model of relaxor ferroelectrics

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Abstract

Phenomenological approach to a relaxor theory is developed and some experimental results in the support of this theory are received. The optical absorption spectrum, luminescent emission and photoconductivity are investigated in the wide temperature region in PbMg 1/3 Nb 2/3 O 3 . On the basis of this data the density of states on the impurity band and the velocity of charge carrier localization are found. The probability distribution of relaxation time, g (ln(τ)) d ln(τ), is found analytically as the function of the density of states in the impurity polaron band. The temperature dependences of dielectric response of relaxor ferroelectrics are described in the framework of the Landau-Ginzburg-Devonshire theory of phase transitions. We show that an additional condition for the relaxor behavior to appear is the coincidence of the phase transition temperature with the temperature region of thermo-localization of charges on the defects. The properties of local centers and polaron localization dynamics are studied.

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Keywords

Phenomenological theory, PMN, optical properties, Relaxor ferroelectrics