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Optical stimulated transfer from glass state to polar phase in relaxors

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Relaxors have been subject to intensive research. Interest in these compounds is determined by a combination of ferroelectric, piezoelectric and optical properties and the ability to use these materials in optoelectronics and data storage systems. The distinguishing features of relaxors are a strongly diffuse maximum in the temperature behavior of permittivity, the shift of this maximum toward higher temperatures with rising measuring field frequency, and a strong frequency dependence of permittivity at very low frequencies. Numerous experimental data show that the properties of the low-temperature phase depend on the history of samples, so nonergodic behavior is observed in the low-temperature phase [1]. In an applied electric field, the transition to a uniform state of polarization is observed in the low-temperature phase after zero-field cooling. Such a phase transition was observed in [1] after a sufficiently long delay time had passed from the beginning of field application. The dependences of delay time t_0 of the phase transition on temperature T and external electric field E were established.

The observed regularities have been discussed using an approach [2] developing on the basis of the model of diffuse phase transition in the system with defects [3]. It is shown that in the frame of that approach the delay phase transition in polar phase in relaxor could be explain if the dynamic of electron system would be take in consideration [2]. For examine that model we investigate the effect of illumination on the delay time t_0 of the phase transition in $PbMg_{1/3}Nb_{2/3}O_3$ in [110] orientation. The delay time t_0 of the phase transition have been measured for different temperatures and applied electric field. The photoconductivity has been investigated and the correlation of observed results with developed model is discussed.

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