

FIELD-DEPENDENT DIELECTRIC PERMITTIVITY
IN DISORDERED DIELECTRICS LIKE $\text{KTaO}_3\text{:Li}$
AND $\text{KTaO}_3\text{:Nb}$

*V.A. Stephanovich, E.V. Kirichenko, M.D. Glinchuk*¹,
*M. Maglione*²

Institute of Mathematics and Informatics,
University of Opole
(45-052 Opole, Poland),

¹Institute for Problems of Materials Science,
Nat. Acad. Sci. of Ukraine
(3, Krzhyzhanovsky Str., 03142 Kyiv, Ukraine),

²University Bordeaux
(87, Dr. Schweitzer Ave., F-33608 PESSAC
Cedex, France)

S u m m a r y

We calculate the field-dependent susceptibility $\chi(E, T)$ of disordered dielectrics with dipole impurities of $\text{KTaO}_3\text{:Li}$ and $\text{KTaO}_3\text{:Nb}$. The calculations had been carried out in the framework of our random field method. They had shown that the coefficients $\chi_{nl}^{(k)}(T, n)$ in the power series of susceptibility $\chi(E, T) = \sum_{k=0}^{\infty} \chi_{nl}^{(k)} E^{2k}$ diverge at the same temperature $T = T_m$ that depends on the concentration of impurity dipoles. We compare the predictions of our theory with experimental data for $\text{KTa}_{1-x}\text{Nb}_x\text{O}_3$ ($0.0075 \leq x \leq 0.05$). The fair coincidence between theory and experiment shows that our theory can describe the main peculiarities dependence of the observed nonlinear dielectric susceptibility as a function of temperature, electric field, and concentration.