

Influence of transverse electric fields on physical properties of the Rochelle salt $\text{NaKC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$

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A four-sublattice order-disorder model with taking into account piezoelectric interactions and external transverse electric fields is developed for description of phase transitions dielectric, piezoelectric, elastic and thermal properties of the Rochelle salt crystal. Our model is a generalization of four-sublattice model proposed in [1] and Mitsui model with taking into account the piezoelectric effects [2]. Within a mean field approximation specific heat, dielectric constants $\varepsilon_{11}^{\varepsilon}$, $\varepsilon_{22}^{\varepsilon}$, $\varepsilon_{33}^{\varepsilon}$ for a clamped crystal and $\varepsilon_{11}^{\sigma}$, $\varepsilon_{22}^{\sigma}$, $\varepsilon_{33}^{\sigma}$ for a free crystal, elastic constants c_{44}^E , c_{55}^E , c_{66}^E at constant field and c_{44}^P , c_{55}^P , c_{66}^P at constant polarization, piezoelectric moduli d_{14} , d_{25} , d_{36} , e_{14} , e_{25} , e_{36} , h_{14} , h_{25} , h_{36} , g_{14} , g_{25} , g_{36} under external transverse electric fields E_2 and E_3 are calculated. The set of the theory parameters providing the best fit to the available experimental data is found.

1. I.V. Stasyuk, O.V. Velychko // *Ferroelectrics*, **316**, 51 (2005).
2. R.R. Levitskii, I.R. Zachek, T.M. Verkholyak, A.P. Moina. *Phys. Rev. B* **67**, 174112 (2003).
3. R.R. Levitsky, I.R. Zachek, A.S. Vdovych. Preprint of the Institute for Condensed Matter Physics, ICMP-09-02U, Lviv, 2006 (in Ukrainian).