

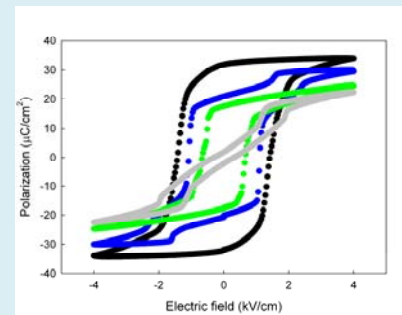
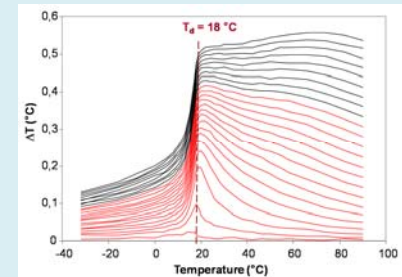
RESEARCH TOPIC

Electrically induced thermal and dielectric phenomena in ferroelectric-based materials (Sähköisesti indusoidut termiset ja dielektriset ilmiöt ferrosähköisyyteen perustuvissa materiaaleissa)

ABSTRACT

Ferroelectric-based materials are a group of materials known to hold many advantageous electrical, mechanical and optical features. Majority of these properties are attributed to material's complex structure and phase stability, especially under the effect of applied electric field or thermal energy. Thermally-driven or electric field-induced phase and polarization changes lead to variety of interesting phenomena that are useful for future applications.

This research mainly concentrates on investigating field-induced thermal and dielectric changes in relaxors and conventional ferroelectrics. Special attention is paid to the electrocaloric effect, which has been seen as a basis of potential technology for future cooling and energy harvesting applications.



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MAIN PUBLISHED RESULTS

- * J. Hagberg, A. Uusimäki, and H. Jantunen, "Electrocaloric characteristics in reactive sintered $0.87\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3 - 0.13\text{PbTiO}_3$," *Appl. Phys. Lett.* 92, 132909 (2008).
- * A.S. Starkov, S.F. Karmanenko, O.V. Pakhomov, A.V. Es'kov, D. Semikin, and J. Hagberg, "Electrocaloric response of a ferroelectric capacitor to a periodic electric field," *Physics of the Solid State* 51, 1510 (2009).
- * J. Peräntie, J. Hagberg, A. Uusimäki, and H. Jantunen, "Temperature characteristics and development of field-induced phase transition in relaxor ferroelectric $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})_{0.87}\text{Ti}_{0.13}\text{O}_3$ ceramics," *Appl. Phys. Lett.* 93, 132905 (2008).
- * J. Peräntie, J. Hagberg, A. Uusimäki, and H. Jantunen, "Field-induced thermal response and irreversible phase transition enthalpy change in $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$," *Appl. Phys. Lett.* 94, 102903 (2009).
- * M. Valant, L.J. Dunne, A.-K. Axelsson, N. McN. Alford, G. Manos, J. Peräntie, J. Hagberg, H. Jantunen, and A. Dabkowski, "Electrocaloric effect in a ferroelectric $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{-PbTiO}_3$ single crystal," *Phys. Rev. B* 81, 214110 (2010).

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