

Analysis of the sub-switching regime of the P-E characteristics of PZT films by First Order Reversal Curves diagrams

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First Order Reversal Curves (FORC) diagrams have been recently proposed [1] as a method for the characterisation of the switching process in ferroelectrics, by considering the distribution of the elementary switchable units over their coercive and bias fields. The method allows a numerical separation of the reversible and irreversible contributions to the total polarization. The sub-switching region of the P-E hysteresis loops of PZT films has been analyzed using the FORC diagrams. The threshold fields determining the different regimes in the sub-switching range of fields were determined from FORCs as function of various parameters such as the frequency of the applied electric field, orientation of crystallites within the film and the fatigued state of the material. Peculiar geometrical aspects of the FORC diagrams are explained by computer simulation of ferroelectric switching as a nucleation-growth process.

Reference

[1] A. Stancu, D. Ricinschi, L. Mitoseriu, P. Postolache and M. Okuyama, Appl. Phys. Lett. 83, 3767 (2003)