

## ELECTROCERAMICS IX

### Time-dependent phenomena in ferroelectric printing

A.Yu. Belov, W. Kreher, S. Reuter

Digital print technology can be based on imagewise poling of ferroelectric PZT films. The imaging process includes binding of polarization by screening surface charges and creating printing and non-printing areas in accordance with the polarization distribution. This process is self-consistent and essentially nonlinear, since the polarization switching in ferroelectric films depends itself on the screening charge and continues upon its fixing. Experimentally, the polarization development is investigated by measuring the time dependence of the electrical surface potential. In the model proposed the temporal behaviour of the surface potential in PZT films is simulated using a phenomenological viscoplastic (rate-dependent) model. In this approach the process of polarization switching in polycrystalline ferroelectrics is described in terms of the rate equations for the volume fractions of domains with different spontaneous polarization. The model employed is characterized by 6 possible domain orientations and allows for both  $90^\circ$  and  $180^\circ$  polarization switching. It is shown that being suitably parameterized the viscoplastic model can describe both the short-term ( $t < 10$  s) and long-term ( $10$  s  $< t < 1800$  s) behaviour of the surface potential upon the screening charge fixing. A comparison of the simulation results with the experimental data for PZT films is presented.

[15] Ferroelectrics