Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Effect of Stress on Dielectric Loss Behavior in Ba0.7Sr0.3TiO3 Thin-Films RICARDO ZEDNIK, PAUL MCINTYRE, JOHN BANIECKI, MASATOSHI ISHII, KAZUAKI KURIHARA, KAZUNORI YAMANAKA, Stanford University — We present the results of a systematic dielectric study of barium strontium titanate thin-film planar capacitors measured over a wide temperature range of 20 K to 575 K for frequencies between 1 kHz and 1 MHz. Sputter deposition on substrates with different thermal expansion coefficients were used to produce barium strontium titanate thin-films that differ only in their stress states. Over a narrow temperature range, near room temperature, the dielectric dispersion can be understood in terms of the phenomenological Curie-von Schweidler relationship (Universal Relaxation Law), with the complex permittivity following a power law dependence on frequency. However, outside this range, dielectric-loss peaks are observed in the temperature and frequency domains that can be closely fit to the Vogel-Fulcher expression used in describing relaxors. Additionally, the loss peaks shift with the stress state of the film. These observations suggest that the relaxor-like dielectric behavior of our barium strontium titanate thin-films may be affected by a possible phase transition. The dependence of the dielectric loss behavior on film stress in the Curie-von Schweidler and Vogel-Fulcher regimes will be contrasted and mechanisms for the observed stress dependent dielectric loss behavior discussed.

Ricardo Zednik
Stanford University

Date submitted: 01 Dec 2006 Electronic form version 1.4