

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Electrocaloric and Pyroelectric Properties of Ferroelectric Films

JIALAN ZHANG, GEORGE ROSSETTI, PAMIR ALPAY, University of Connecticut — We use a non-linear thermodynamic model to investigate the electrocaloric and pyroelectric response of thin film perovskite ferroelectrics under the influence of differing electrical, thermal and mechanical boundary conditions including bias and driving field, temperature, lateral clamping, and misfit strain. A comparison of ferroelectric solid solutions comprised of BaTiO_3 , PbTiO_3 and/or SrTiO_3 illustrates the influence of composition and lateral clamping effect on the electrocaloric properties. The theoretical analysis of a variety of ferroelectric thin films on IC-friendly substrates such as Si and sapphire shows that the room temperature dielectric and electrothermal responses of these films depend strongly on the synthesis/processing temperature. These combined results provide insights concerning how the deposition temperature, substrate material and composition can be adjusted to obtain desired electrothermal properties.

Jialan Zhang
University of Connecticut

Date submitted: 16 Nov 2010

Electronic form version 1.4