Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Reduction of Dielectric Hysteresis in Multilayered Film via Nanoconfinement[1] LEI ZHU, MATHEW MACKEY, DONALD SCHUELE, Department of Macromolecular Science and Engineering, Case Western Reserve University, Cleveland, Ohio 44106-7202, LIONEL FLANDIN, LEPMI, UMR 5279, CNRS, Université de Savoie, F-73376 Le Bourget Du Lac Cedex, France, MASON WOLAK, JAMES SHIRK, US Naval Research Laboratory, Washington, DC 20375, USA, ANNE HILTNER, ERIC BAER, Department of Macromolecular Science and Engineering, Case Western Reserve University, Cleveland, Ohio 44106-7202 — Micro-/nano-layer coextrusion was used to fabricate polycarbonate (PC)/poly(vinylidene fluoride) (PVDF) layered films with significantly reduced dielectric losses while maintaining high energy density. The high-field polarization hysteresis was characterized for layered films as a function of PVDF layer thickness (6000 to 10 nm) and composition (10 to 70 vol.% PVDF), and was found to decrease with decreasing layer thickness and PVDF content. To gain a mechanistic understanding of the layer thickness (or nanoconfinement) effect, wide angle X-ray diffraction, polarized Fourier transform infrared spectroscopy, and broadband dielectric spectroscopy were employed. The results revealed that charge migration, instead of dipole flipping, was responsible for the hysteresis in multilayered films.

[1]Financial support: National Science Foundation through the Center for Layered Polymeric Systems (CLiPS) Science and Technology Center (DMR-0423914) and the Office of Naval Research (N00014-10-1-0349)

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Date submitted: 05 Dec 2011 Electronic form version 1.4