

Abstract Submitted
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Reduction of Dielectric Hysteresis in Multilayered Film via Nanoconfinement¹

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.

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Lei Zhu

Department of Macromolecular Science and Engineering,
Case Western Reserve University, Cleveland, Ohio 44106-7202

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