

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Fluoropolymer Microstructure and Dynamics: Influence of Molecular Orientation Induced by Uniaxial Drawing¹ DANIEL MIRANDA, CHAOQING YIN, JAMES RUNT, Pennsylvania State Univ — Fluorinated semi-crystalline polymer films are attractive for dielectric film applications due to their chemical inertness, heat resistance, and high thermal stability. In the present investigation we explore the influence of orientation induced by uniaxial drawing on the crystalline microstructure and relaxation processes of poly(ethylene-tetrafluoroethylene) (ETFE), in order to ascertain how morphological control can benefit polymer dielectric design. When drawn below or near the T_g , the crystallinity of the drawn films is unchanged, and oriented amorphous structures and crystalline microfibrils form at high draw ratios. This orientation slows segmental relaxation, reflected by an increase in the dynamic T_g , and also delays the transition to the high temperature crystalline form of ETFE. When drawing above the T_g , the films undergo strain-induced crystallization at high draw ratios. For these films an increase in the dynamic T_g is also observed, in addition to a second segmental relaxation process, appearing as a shoulder on the primary process. We propose that this represents a contribution from a rigid amorphous fraction, having slowed chain dynamics.

¹Supported by Office of Naval Research

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Date submitted: 04 Nov 2015

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