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Enhanced dielectric properties of electrically poled poly(vinylidene fluoride) (PVDF) and polycarbonate (PC) multilayer films via interfacial polarization JUNG-KAI TSENG, MATTHEW MACKEY, ZHENG ZHOU, JOEL CARR, DONALD E. SCHUELE, ERIC BAER, LEI ZHU, Case Western Reserve University — Electrically poled poly(vinylidene fluoride) (PVDF) and polycarbonate (PC) multilayer films can be considered as a polymer electret, which stores quasi-permanent charges (i.e., ions) at PVDF/PC interfaces. In this study, the corresponding dielectric properties of electrically poled PVDF/PC multilayer films are investigated experimentally. First, the bipolar hysteresis loop becomes narrower for the poled PVDF/PC multilayer films upon increasing the poling time, because the impurity ions in PVDF are locked at the PVDF/PC interfaces. Second, asymmetric DC conductivity in poled PVDF/PC multilayer films is observed because of the pre-existing electric field in the electret layers. When the pre-existing field is in the same direction of the applied external field, enhanced DC conductivity is observed in the leakage current measurement. In contrast, if the pre-existing field is opposite to the applied external field, decreased DC conductivity is seen. More experimental evidence of polarized charge at the PVDF/PC interfaces in poled PVDF/PC multilayer films is also manifested by thermally stimulated depolarization current (TSDC) experiments.

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