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Ferroelectric Polymer Composite with Enhanced Breakdown Strength KUO HAN, MATTHEW GADINSKI, QING WANG, Department of Materials Science and Engineering, The Pennsylvania State University, Univeristy Park — Numerous efforts have been made in the past decades to improve the energy storage capability of dielectric capacitors by incorporating ceramic addictives into polymers. Ferroelectric polymers have been particularly interesting as matrix for dielectric composites because of their highest dielectric permittivity and energy density. However, most polymer composites suffer from significantly reduced breakdown strength, which compromises the potential gain in energy density. In this work, various metallic alkoxide were introduced into the functionalized ferroelectric poly(vinylidene fluoride-*co*- chlorotrifluoroethylene), P(VDF-CTFE), via covalent bonding. The composite with the optimized composition exhibited the Weibull statistical breakdown strength of 504.8 MV/m, 67.6 % higher than the pristine polymer. The enhanced breakdown strength was mainly ascribed to the cross-linking and the formation of deep traps, which effectively reduced the conduction and further lowered the energy loss. Additionally, the homogeneous dispersion of the inorganic phase and the small contrast in permittivity between the polymer and amorphous oxides also contribute to the improved dielectric strength. The dielectric spectra of the composites have been recorded at varied temperatures and frequencies, which revealed the presence of the interfacial polarization layer in the composites.

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