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Dielectric and Mechanical Relaxation Behavior of PVDF/OMS Nanocomposites[1] LEI YU, B. SEYHAN INCE-GUNDUZ, PEGGY CEBE, Tufts University — We report dynamic mechanical (DMA) and dielectric (DEA) relaxation behaviors of poly(vinylidene fluoride), PVDF, and its nanocomposites with Lucentite^{TM} organically modified silicate, OMS. Nanocomposites were made with compositions ranging from 0-4.0 wt.% OMS. Smaller OMS content favors the non-polar alpha crystallographic phase of PVDF, while the larger OMS content favors crystallization into the polar beta phase. Solution cast nanocomposite films were compression molded, and allowed to crystallize by slowly cooling from the melt. DMA (frequency 1-50Hz) and DEA (frequency 10kHz-1MHz) were performed from -120C to 170C. We observe two relaxation peaks in both studies: the lower temperature β relaxation, attributed to the amorphous phase glass transition, and the higher temperature α relaxation from the PVDF crystals. The addition of the OMS enhances the strength of the α relaxation. The ratio of the relaxation strength of α to β is smallest for pure PVDF, and generally increases as the OMS content increases. Wide and small angle X-ray scattering, Fourier Transform infrared, and differential scanning calorimetery are used to identify the crystalline phase of PVDF and structure of the samples we used in DMA and DEA studies.

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