

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

On the Isothermal Crystallization of PVDF-BaTiO₃ Nanocomposites DANIELLE VALDEZ, DORINA CHIPARA, JAMES HINTHORNE, MIRCEA CHIPARA, University of Texas Rio Grande Valley — Polyvinylidene fluoride (PVDF) is a unique polymer with ferroelectric, piezoelectric, and pyroelectric features. Barium titanate is a piezoelectric and ferroelectric ceramic. To enhance the ferroelectric and piezoelectric features, nanocomposites of polyvinylidene fluoride-barium titanate (PVDF-BaTiO₃) have been obtained by dispersing BaTiO₃ nanoparticles (from Nanostructured & Amorphous Materials Inc.) within PVDF via melt mixing. To achieve a uniform distribution of nanoparticles, the melt mixing consisted of 3 segments (190 °C and 60 rotations per minute (rpm) for 30 minutes, 210 °C and 80 rpm for 15 minutes, and 180 °C and 60 rpm for 30 minutes). The mixing was set at a relatively high temperature as the melting temperature of PVDF is about 177 °C. Detailed isothermal Differential Scanning Calorimetry (DSC) data have been recorded in order to analyze the effect of BaTiO₃ nanoparticles on the crystallization of the polymeric matrix. The DSC data are analyzed within the Avrami approach framework including newer developments (such as Ozawa, and the combined Avrami–Ozawa). An original mathematical framework is suggested. Supplementary Raman studies are discussed.

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Date submitted: 09 Nov 2016

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