The Crystalline Microstructure, Surface Morphology and Ferroelectric Properties of β-Phase in the Poly(Vinylidene Fluoride)/Carbon Nanotubes (PVDF/CNTs) Composite Thin Film Using the Electrospinning Approach

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The Poly(Vinylidene Fluoride)/carbon nanotubes (PVDF/CNTs) piezoelectric composite films for electrical rotors have been fabricated using a modified electrospinning device with a rotating collector. β phase dominant ferroelectric PVDF thin films with a remnant polarization of 3.2 $\mu C/m^2$ were achieved by optimizing the concentration of 0.5 wt% of CNTs. The effect of concentration of CNTs in modifying PVDF crystalline phase structure has been enhancing β phase transformation in PVDF. This aspect has been confirmed throuhgt X-ray diffraction and infrared spectroscopy data. These structures were morphologically analyzed by scanning electron microscopy (SEM) with 600 ÷ 800 nm diameter of CNTs-PVDF. Overall, our results highlight the potential of the conductivity of the solution and the morphology of the mat obtained by electrospinning are related by the influence of the CNTs concentration.