Abstract

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Preparation of composite polymer for infrared detection

Five thin polymer/ceramic film systems are prepared to perform as pyroelectric detectors. PVDF blended with BaTiO3 are cast from DiMethyl Formamide (DMF). Poling process is used to convert unpolar polymers phase to polar phases and the effects of poling conditions are investigated. All samples are characterized by UltraViolet-Visible spectrophotometer (UV-Visible) at band (200: 900 nm), Fourier Transform Infrared (FTIR) spectroscopy at band (350:4000 nm), X-Ray Diffraction (XRD) at band (10o:80o), Scanning Electron Microscope (SEM) and Energy Dispersive X-Ray Analysis (EDX). Relative permittivity is measured. (TSDC) is studied for blend films and the pyroelectric coefficients are calculated. The incorporation of BaTiO3 into PVDF destroys the spherulitic structure and disperses in the PVDF matrix with nanosize particles. Composite BaTiO3 with PVDF improves the relative permittivity. The poling process enhances the polarization for the pure PVDF and the composites with BaTiO3. The highest pyroelectric coefficient of composite films at 30 oC is observed for PVDF/BaTiO3 with 70% wt. fraction of BaTiO3.