

PbTiO₃ – P(VDF-TrFE) – Nanocomposites for Pressure and Temperature Sensitive Skin

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Nanocomposites of a ferroelectric matrix polymer with dispersed ferroelectric ceramic nanoparticles can be polarized to be piezo- or pyroelectric alone at a given temperature, due to the different origin of piezoelectricity in polymers (dipole density) and ceramics (intrinsic). With a two-step poling procedure, which allows selective poling of the ceramic inclusion and the ferroelectric polymer, bifunctionality is achieved in the same material. The selective poling of filler and matrix phase is proved by ferroelectric hysteresis measurements at room temperature. Such bifunctional materials may be interesting for artificial skin, sensitive to changes in pressure and temperature.

Keywords Nanocomposites; ferroelectricity; flexible electronics

Introduction

Poling is an essential step in the preparation of ferroelectric polymer films, which may be used in flexible electronics as memory elements [1, 2] as well as in sensors sensitive to pressure and temperature changes via the piezo- and pyroelectric response [3–5]. For sensor applications, reducing cross-sensitivity is a challenge, since ferroelectric polymer films are always piezo- and pyroelectric, making discrimination between pressure and temperature changes virtually impossible. Composites of a ferroelectric polymer matrix and dispersed ferroelectric nanoparticles are interesting for such applications, since the material

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