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Mechanical Energy Harvesting Behaviour Of Soft Polymeric Materials

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Abstract

This study is concentrated on the preparation of the soft polymeric materials with flexoelectric effect. The flexoelectricity can be defined as reversible process of the electrical energy harvesting upon dynamical mechanical strain deformation. When the material is mechanically stimulated the charges embedded in the polymer structure are excited and the result of this induction is voltage output generation. Material exhibits such behaviour can find useful applications in power supporting of low-voltage devices or sensors for detection of vibrations.
Porous polypropylene (PP) electret film is studied and presented as a potential material exhibiting flexoelectric properties. The treatment of this electret film with gamma-irradiation are presented as a useful tool to improve the physical properties which are very important for the future applications. These properties are investigated using differential scanning calorimetry (DSC), thermogravimetric analysis (TGA) and dynamical mechanical analysis (DMA). Using various techniques, the microstructure of the treated samples was improved at low doses and the impact on the energy harvesting properties were upgraded. The improvement in mechanical and energy harvesting properties are due to crosslinking of the polymers at low gamma irradiation. Higher doses caused degradation and chain scissions.

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