

PREFACE

Energy harvesting is the process of acquiring the energy from ambient and use it for energy harvesting. There are several approaches for energy harvesting, here we have used piezoelectric approach for mechanical energy harvesting. This work is dedicated to development of Poly(vinylidene fluoride) hybrids and its application towards piezoelectric energy harvesting. The nanoclay and bio-waste materials were used to fabricate the hybrids for energy harvesting. The reuse of waste material for this purpose is a very interesting work as it is cost effective and environment friendly. Poly(vinylidene fluoride) is a well-known polymer which is used in piezoelectric applications. Here we have induced piezoelectricity in the polymer by mechanical processing and by the reinforcement of fillers in it. Precisely, this thesis throws light on hybrids of Poly(vinylidene fluoride) and their potentiality in the electronic domains for more comprehensive study in this area.

In this thesis, we have discussed the development and characterization of hybrids of PVDF with nanoclay and different bio-waste materials for fabrication of low cost and efficient nanogenerators. The main objective of the thesis is to develop light weight, flexible and scalable nanogenerators which can harvest waste mechanical energy into electrical energy. The complete synthesis, characterization and possible applications of the material have discussed in the thesis.

The thesis consists of seven chapters. In first chapter gives a brief introduction about energy harvesting, different materials used and PVDF, also, a detailed literature survey has been carried out. Second chapter gives details about materials and experimental process. In third chapter the induction of piezoelectric phase in copolymer of PVDF is discussed using nanoclay. In fourth chapter the piezoelectric phase is induced in PVDF on mechanical stretching. In fifth chapter the induction of piezoelectric phase in PVDF

with clay nanoparticles and stretching is discussed. In sixth chapter the used of bio-waste materials in inducing the piezoelectric phase in PVDF has discussed and finally the last chapter gives major observation and future scopes of the work related to the thesis.