World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:14, No:05, 2020

Investigation on Reducing the Bandgap in Nanocomposite Polymers by Doping

Authors : Sharvare Palwai, Padmaja Guggilla

Abstract : Smart materials, also called as responsive materials, undergo reversible physical or chemical changes in their properties as a consequence of small environmental variations. They can respond to a single or multiple stimuli such as stress, temperature, moist, electric or magnetic fields, light, or chemical compounds. Hence smart materials are the basis of many applications, including biosensors and transducers, particularly electroactive polymers. As the polymers exhibit good flexibility, high transparency, easy processing, and low cost, they would be promising for the sensor material. Polyvinylidene Fluoride (PVDF), being a ferroelectric polymer, exhibits piezoelectric and pyro electric properties. Pyroelectric materials convert heat directly into electricity, while piezoelectric materials convert mechanical energy into electricity. These characteristics of PVDF make it useful in biosensor devices and batteries. However, the influence of nanoparticle fillers such as Lithium Tantalate ($LiTaO_3$/LT), Potassium Niobate ($KNbO_3$/PN), and Zinc Titanate ($ZnTiO_3$/ZT) in polymer films will be studied comprehensively. Developing advanced and cost-effective biosensors is pivotal to foresee the fullest potential of polymer based wireless sensor networks, which will further enable new types of self-powered applications. Finally, nanocomposites films with best set of properties; the sensory elements will be designed and tested for their performance as electric generators under laboratory conditions. By characterizing the materials for their optical properties and investigate the effects of doping on the bandgap energies, the science in the next-generation biosensor technologies can be advanced.

Keywords : polyvinylidene fluoride, PVDF, lithium tantalate, potassium niobate, zinc titanate
Conference Title : ICMPPS 2020 : International Conference on Materials Physics and Polymer Science
Conference Location : Vancouver, Canada
Conference Dates : May 21-22, 2020