

Synergistic Effect of Carbon Nanostructures and Titanium Dioxide Nanotubes on the Piezoelectric Property of Polyvinylidene Fluoride

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Abstract : Integrating efficient energy harvesting materials into soft, flexible and eco-friendly substrates could yield significant breakthroughs in wearable and flexible electronics. Here we present a hybrid filler combination of titanium dioxide nanotubes and the carbon nanostructures-carbon nanotubes and reduced graphene oxide- synthesized by hydrothermal method and then introduced into a semi crystalline polymer, polyvinylidene fluoride (PVDF). Simple mixing method is adopted for the PVDF nanocomposite fabrication after ensuring a high interaction among the fillers. The films prepared were mainly tested for the piezoelectric responses and for the mechanical stretchability. The results show that the piezoelectric constant has increased while changing the total filler concentration. We propose integration of these materials in fabricating energy conversion devices useful in flexible and wearable electronics.

Keywords : dielectric property, hydrothermal growth, piezoelectricity, polymer nanocomposite

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