

Elaboration and Characterization of PVDF/TiO₂ Nanocomposites

Authors : F. Z. Benabid, S. Kridi, F. Zouai, D. Benachour

Abstract : The aim of present work is to characterize the PVDF/TiO₂ blends as nanocomposites, and study the effect of TiO₂ on properties of different compositions and the evaluation of the effectiveness of the method used for filler treatment. Nanocomposite samples were synthesized by molten route in an internal mixer. The TiO₂ nanoparticles were treated with stearic acid in order to obtain a good dispersion, and the demonstration of the effectiveness of the treatment on the morphology and roughness of the nanofiller was established by microstructural analysis by FTIR and AFM. The various developed nanocomposite compositions were characterized by different methods; i.e. FTIR, XRD, SEM and optical microscopy. Rheological, dielectric and mechanical studies were also performed. The results showed a remarkable increase in the crystallinity of the PVDF/neat TiO₂ nanocomposite containing 1 wt% loading of filler, due to the nucleation effect of TiO₂ nanoparticles. A good dispersion was obtained in PVDF/treated TiO₂ nanocomposites. The rheological study showed an increase in the fluidity in all developed nanocomposite compositions, involved by the orientation of TiO₂ nanoparticles in the flow direction. The dielectric study revealed an increase in electrical conductivity in PVDF/neat TiO₂ nanocomposites. However, in PVDF/ treated TiO₂ nanocomposites, the electrical conductivity was decreased by the addition of 0.5 and 2 wt% loading of filler.

Keywords : nanocomposites, PVDF, TiO₂, comixing, mechanical treatment

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020