

## Preparation of Carbon Nanofiber Reinforced HDPE Using Dialkylimidazolium as a Dispersing Agent: Effect on Thermal and Rheological Properties

**Authors :** J. Samuel, S. Al-Enezi, A. Al-Banna

**Abstract :** High-density polyethylene reinforced with carbon nanofibers (HDPE/CNF) have been prepared via melt processing using dialkylimidazolium tetrafluoroborate (ionic liquid) as a dispersion agent. The prepared samples were characterized by thermogravimetric (TGA) and differential scanning calorimetric (DSC) analyses. The samples blended with imidazolium ionic liquid exhibit higher thermal stability. DSC analysis showed clear miscibility of ionic liquid in the HDPE matrix and showed single endothermic peak. The melt rheological analysis of HDPE/CNF composites was performed using an oscillatory rheometer. The influence of CNF and ionic liquid concentration (ranging from 0, 0.5, and 1 wt%) on the viscoelastic parameters was investigated at 200 °C with an angular frequency range of 0.1 to 100 rad/s. The rheological analysis shows the shear-thinning behavior for the composites. An improvement in the viscoelastic properties was observed as the nanofiber concentration increases. The progress in the modulus values was attributed to the structural rigidity imparted by the high aspect ratio CNF. The modulus values and complex viscosity of the composites increased significantly at low frequencies. Composites blended with ionic liquid exhibit slightly lower values of complex viscosity and modulus over the corresponding HDPE/CNF compositions. Therefore, reduction in melt viscosity is an additional benefit for polymer composite processing as a result of wetting effect by polymer-ionic liquid combinations.

**Keywords :** high-density polyethylene, carbon nanofibers, ionic liquid, complex viscosity

**Conference Title :** ICPN 2018 : International Conference on Polymers and Nanotechnology

**Conference Location :** Dublin, Ireland

**Conference Dates :** August 16-17, 2018