

Polypropylene/natural rubber composites filled with recycled newspaper: Effect of chemical treatment using maleic anhydride-grafted polypropylene and 3-aminopropyltriethoxysilane

Abstract

A study on effect of chemical treatment using maleic anhydride-grafted polypropylene (MAPP) and 3-aminopropyltriethoxysilane (3-APE) was investigated. The performance of the MAPP and 3-APE were investigated by means of torque development, mechanical properties, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), scanning electron microscopy morphology, and water absorption. The results revealed that the use of MAPP or 3-APE in the composites has increased the stabilization torque, tensile strength, Young's modulus, water absorption, and thermal stability of the PP/NR composites. The incorporation of MAPP in the composites shows higher stabilization torque, tensile strength, E_B , Young's modulus, and lower water uptake when compared with the use of 3-APE in the PP/NR composites. TGA and DSC results indicated that primary and secondary peak of DTG curve, initial degradation temperature (T_0), degradation temperature (T_{deg}), melting temperature (T_m), heat of fusion of composites ($\Delta H_{f(com)}$), crystallinity of composites (X_{PP}), and PP (X_{PP}) increased, while total weight loss and thermal degradation rate decreased for both treated composites. The MAPP-treated RNP-filled PP/NR composites were found to be more thermal resistance and more crystalline than 3-APE-treated filled PP/NR RNP composites.