

Rheological and Thermomechanical Properties of Graphene/ABS/PP Nanocomposites

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Abstract : In the present study, the incorporation of graphene into blends of acrylonitrile-butadiene-styrene terpolymer with polypropylene (ABS/PP) was investigated focusing on the improvement of their thermomechanical characteristics and the effect on their rheological behavior. The blends were prepared by melt mixing in a twin-screw extruder and were characterized by measuring the MFI as well as by performing DSC, TGA and mechanical tests. The addition of graphene to ABS/PP blends tends to increase their melt viscosity, due to the confinement of polymer chains motion. Also, graphene causes an increment of the crystallization temperature (T_c), especially in blends with higher PP content, because of the reduction of surface energy of PP nucleation, which is a consequence of the attachment of PP chains to the surface of graphene through the intermolecular CH- π interaction. Moreover, the above nanofiller improves the thermal stability of PP and increases the residue of thermal degradation at all the investigated compositions of blends, due to the thermal isolation effect and the mass transport barrier effect. Regarding the mechanical properties, the addition of graphene improves the elastic modulus, because of its intrinsic mechanical characteristics and its rigidity, and this effect is particularly strong in the case of pure PP.

Keywords : acrylonitrile-butadiene-styrene terpolymer, blends, graphene, polypropylene

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

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020