Saud Aldajah, J Nanomater Mol Nanotechnol 2018, Volume 9
DOI: 10.4172/2157-7439-C8-087

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Thermal and mechanical characteristics of polypropylene/nanoclay nanocomposites

This paper addresses the effect of Nanoclay (NC) on the mechanical and thermal properties of polypropylene (PP) nanocomposites. Many researchers have considered layered silicate as a reinforcement for polypropylene in order to enhance its thermal and mechanical behavior. These enhancements can include higher moduli, increased strength and heat resistance, decreased permeability and flammability. Hence, nanoclays attracted interest due to the fact that they offer intercalation and exfoliation. Conventional composites usually require as much as 10-50% by weight of filler loading in order to divulge the desired mechanical or thermal properties to the original polymer, but organically modified layered silicates (organoclay) can achieve the same properties with typically 1-5% by weight of filler, thereby producing materials of lower density and better processability. It has been reported that the dispersion of such fillers at the level of a few nanometers induces a significant improvement in mechanical properties compared to the virgin polymer. In this study 5 different samples were tested. The influence of NC on the mechanical and thermal behavior of the nanocomposite was studied by Tensile, Nanoindentation, DCS, TGA, SEM and FTIR tests. The mechanical properties of strength, modulus and hardness of the nanocomposites increase with the addition of Nanoclay. TGA analysis showed no significant change in the thermal resistance resulted from NC addition.

Biography

Department Head August 2014 - Present Director of the Material Science and Engineering Graduate Program September 2009 - September 2014 (5 years 1 month) Assoc. Prof. September 2009 - October 2013 (4 years 2 months) Mechanical Engineering Assistant Professor September 2004 - September 2009 (5 years 1 month) Mechanical Engineering Research Associate at Argonne National Laboratory January 2000 - July 2004 (4 years 7 months) Tribology, surface technology and coatings Education Illinois Institute of Technology Doctor of Philosophy (PhD), Mechanical Engineering, 1999 - 2003 Illinois Institute of Technology Master of Science (MS), Mechanical Engineering, 1996 - 1998.

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