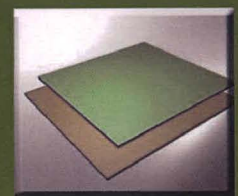
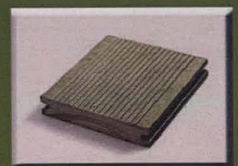
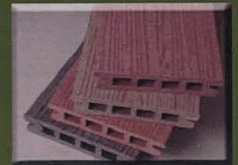


ADVANCES IN COMPOSITE MATERIALS



Iskandar Idris Yaacob
Md Abdul Maleque
Zahurin Halim



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The Effect of Hard Nanofillers on Mechanical Properties of PVC Nanocomposites

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Keywords: alumina, pvc, mechanical properties, nanocomposites, impact, modulus.

Abstract: The mechanical properties and morphology of a series of PVC/alumina nanocomposites were investigated and presented in this chapter. The nanocomposites were fabricated at different composition of alumina (0, 1, 2.5 and 5wt %) and silane was used to modified the surface area of the nanoparticles. The mechanical properties were studied via tensile and impact properties and the scanning electron microscope (SEM) were used to examine the morphology of the nanocomposties. The results showed that the mechanical properties of strength decreases slightly and modulus of the nanocomposites increases with addition of 2.5 wt% of alumina. Optimum impact strength was also obtained at 2.5 wt% of alumina.

Introduction

Light weight and ease in processing have made polymers as a main choice material for a wide range of applications. In spite of these advantages, polymers have poor mechanical, thermal and electrical properties as compared to metals and ceramics. The most common approach to improve these drawbacks is by incorporating fillers and this new material is known as polymer composites. Polymers that filled with nano-sized particles have offered unique properties, which are not obtained with micron-sized particles. The incorporation of small amount (less than 20 wt%) of nanofillers results in improvement in the modulus and strength of nanocomposites.

Indeed, the outstanding properties of polymer nanocomposites are associated with the interaction between the nanoparticles and polymer. This indicates that the filler-matrix interface is crucial as it affects significantly the properties of nanocomposites. In addition, it is well known that the nano-sized particles tend to agglomerate due to its high surface area. As a result, surface modification of nano particles with coupling agents such as silanes and titanates is required to ensure homogeneous distribution of these nanoparticles in polymer matrix. Alumina (Al_2O_3) nanoparticle has successful reinforced some polymers [1]. Therefore, the nano-sized alumina was used to reinforce PVC in the current study. And silane was used to modify the surface of alumina nanoparticle.

Experimental Procedure