Abstract

Characteristics of wood plastic composite depends on contact resistance of its constitutive components on the between phases area. In order to improve the connection adhesion between two phases in wood-plastic composite, there are two views: modification the polymer context phase or modification the lignocellulosic phase. The aim of this study is be evaluate the effect of chemical treatment of wood flour and effect of Nano particles of titanium dioxide on physical mechanical and morphological properties, of composite obtained from polypropylene (PP) / wood flour (WF) / Nano-titanium dioxide (TiO_2). For this purpose, mixture of wood flour of hardwoods from northern of Iran they were exposed under the different chemical treatments, such as treatment with sodium hydroxide, acetic acid and heated water and they were compared with control samples (untreated). After performing the chemical treatment, wood flour and polypropylene with a weight ratio at 50 to 50 with different levels of nano-TiO_2 (0, 1, 3 and 5 phc (per hundred compounds)) and 3 phc of compatibilizer material were combined in internal mixer device and ultimately wood-plastic composite were made by using injection molding method. Then the mechanical tests such as resistance of bending, tensile, impact and physical tests such as water absorption and thickness swelling and density on the samples according to the (ASTM) standard were performed. Also in order to evaluate the morphology of composites scanning electron microscope (SEM) was used. The results showed that all of the mechanical strength and as well as density on effect of chemical modification were increased and water absorption and thickness swelling also decreased. On the other hand, the bending and tensile strength and tensile modulus with increasing the amount of nano-TiO_2 from 0 to 3 phc and bending modulus and density with increasing the Nano particles from 0 to 1 phc were increased and then with increasing of this Nano particles up to 5 phc were decreased of amount of this resistances. Also, by adding nano-TiO_2 from 0 to 5 phc impact resistance were decreases and density were increases. Water absorption and swelling of Nano composites were decreased with increases the Nano particles from 0 to 5 phc after 24 hours. The morphological results showed that the treated samples have a better surface connection than the unmodified samples with polymeric matrix. Also samples containing of 3 phc Nano TiO_2 showed higher regularity and better distribution. In order to ensure of applying the chemical treatments, the Fourier transform infrared (FTIR) and weight percent changes (WPG) tests was performed on wood flour.

Keywords: Chemical treatment, FTIR spectrum, Morphology, Mechanical properties, Nano-TiO_2.

University of Zabol
Graduate School
Faculty of Natural Resources
Wood Science and Technology Department

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The effect of chemically treatment of wood material on the characteristics of hybrid Nano composites of polypropylene-Nano Titanium dioxide TiO_2

Supervisor:
Ph.D. Babak Nosrati

Advisors:
Ph.D. Hamidreza Mansori
M.Sc. Rahim Mohebbi Gargari

By:
Masih Masoudi far

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