

MECHANICAL AND PHYSICAL PROPERTIES OF THERMALLY MODIFIED WOOD FLOUR REINFORCED POLYPROPYLENE COMPOSITES

Heikko Kallakas¹, Triinu Poltimäe¹, Andres Krumme², Jaan Kers¹.

¹Laboratory of Wood Technology, Department of Materials and Environmental Technology, Tallinn University of Technology, Ehitajate tee 5, 19086 Tallinn, Estonia

²Laboratory of Polymers and Textile Technology, Department of Materials and Environmental Technology, Tallinn University of Technology, Ehitajate tee 5, 19086 Tallinn, Estonia
e-mail of presenting author: heikko.kallakas@ttu.ee

Heat treatment of wood helps to lower the hydrophilic and polarity of wood fibres used in wood-plastic composites. With heat treatment, it is possible to reduce access to hydroxyl (OH) group, which causes hydrophilic and polarity of wood fibres. Therefore improving compatibility between the wood and polymer matrix.

In this research, the effect of wood flour heat treatment and chemical modification with 3-aminopropyltriethoxysilane (APTES) were investigated. WPC test samples were prepared using alder (*Alnus incana*) wood flour with mesh size of 0.05mm as a filler material mm and polypropylene (PP) as matrix material. Wood flour was chemically modified with NaOH and APTES to increase the adhesion and compatibility of wood flour to polymer matrix. Composites were manufactured using twin-screw extruder and test samples were made by injection molding. Composites mechanical properties were tested using three-point bending test and Charpy impact test. Composite physical properties were investigated with Fourier transform infrared spectroscopy (FTIR) and scanning electron microscope (SEM). Effect of silane (APTES) and NaOH modification on thermally treated and untreated wood flour was examined with contact angle measurement.

Comparisons were made between the untreated wood flour and thermally treated wood flour. Also the effect of NaOH and silane (APTES) modification of thermally modified and unmodified wood flour composite properties were investigated. Using wood flour as filler material increased flexural properties, while impact strength decreased by making material more rigid and brittle. Test results revealed that there was no significant difference in mechanical properties with between thermally treated and untreated composites. However, chemical modification increased mechanical properties of the composites.



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