

UTILIZATION OF ESTONIAN CULTIVATED HEMP FIBRE (A BY-PRODUCT OF CANNABIDIOL PRODUCTION), AS A REINFORCING MATERIAL FOR BIO-BASED THERMOPLASTIC COMPOSITE

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In achieving the EU green deal policy, there is a need to utilize more locally sourced materials and replace synthetic polymers. Given this, there is a redesigning of processes and product utilization, resulting in a higher inclination to use biobased, sustainable and renewable resources [1]. However, due to susceptibility to ambient conditions, the performance and durability of these natural materials during service can be challenging. Hence, in this research, Estonian cultivated hemp fibre was pretreated with water (WH) and sodium hydroxide (AH) combined with silane treatment (WSH & ASH) and utilized as a reinforcing material for polylactide (PLA). Two composite fibre composition (30wt.% & 50wt.%) were fabricated by thermocompression at 180 °C, under 3 MPa for 10 min. Fourier transform infrared, thermogravimetric analysis and, scanning electron microscope (SEM) show alterations in the fibre structure. At the composite scale, the SEM observations displayed better fibre individualization and dispersion following treatment. Additionally, there was enhanced resistance against hygroscopic sorption and water absorption (See Fig 1). While, the composite tensile (62 MPa), flexural strength (113 MPa) and Young's modulus (7.6 GPa) for the PLA reinforced with 30 wt.% treated (combined NaOH and silane) hemp fibre (ASH) were the best [2].

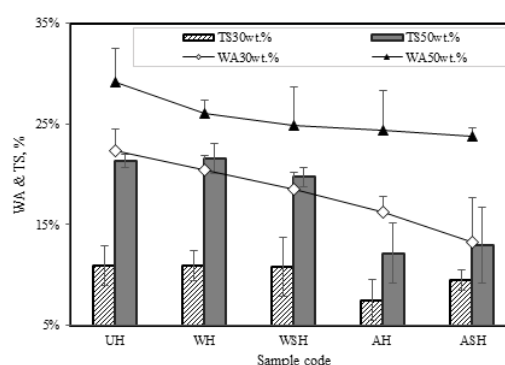


Fig.1 Water absorption and thickness swelling of the HPLA composites

References

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