



Defence announcement

Public Defence on 06 October 2023

Pressurized hot water extraction as a wood modification method

Title of the doctoral thesis	Pressurized hot water extraction as a modification method for solid wood
Content of the doctoral thesis	<p>Pressurized hot water extraction (HWE) is a method, where high-temperature water is kept in a liquid phase with high pressure in order to extract components from a material. In the field of wood science, HWE treatment enables the simultaneous obtainment of carbohydrates and modification of the solid wood. Like traditional thermal modification, the efficiency of the method is based on partial controlled degradation of the wood. However, HWE treatment has only negligible effect on the important material properties including dimensional stability and durability. Also increasing the size of treated wood considerably decreases the efficiency of the method. Therefore, the commercialization of HWE treatment is currently unattainable apart from extracting valuable components from sawdust or waste wood. Finding solutions to these limitations could enable the utilization of HWE treated wood in engineered products.</p> <p>The thesis investigated the material properties of HWE treated wood in view of its potential in engineered products. The results showed that a high amount of degradation products remained in solid wood with larger dimensions after the HWE treatment, which considerably contributed to the decrease in the efficiency of the method. These degradation products accumulated on the wood surface and were removable via surface planing or water-leaching. The removal of the degradation products with either method improved resistance against mould discolouration. During HWE treatment the space formed due to partial wood degradation is filled with water. It was concluded that this space can be utilized for a subsequent chemical modification. The results presented in the thesis expanded knowledge regarding the challenges of HWE treatment as a wood modification method.</p>
Field of the doctoral thesis	Wood Material Science
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Public defence date and time	06 October 2023 at 13 o'clock (in Finnish time)
Remote defence	https://aalto.zoom.us/j/64522768795
Place of public defence	Aalto University School of Chemical Engineering, Lecture hall Ke2, Kemistintie 1 (main door at Biologinkuja), Espoo
Opponent(s)	Professor Henrik Heräjärvi, University of Eastern Finland
Custos	Professor Lauri Rautkari, Aalto University School of Chemical Engineering
Link to electronic thesis	https://aaltodoc.aalto.fi/handle/123456789/51
Keywords	durability, heat treatment, hydrolysis, wood-water relations, wood modification