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Wood modification by a new biobased treatment based on humins resin

AUTHORS

Anna SANGREGORIO / AVANTIUM, ZEKERINGSTRAAT 29, AMSTERDAM

Nathanael GUIGO / UNIVERSITÉ CÔTE D AZUR, INSTITUT DE CHIMIE DE NICE, 28 AVENUE VALROSE, NICE

Carlo ANGELICI / AVANTIUM, ZEKERINGSTRAAT 29, AMSTERDAM

Ed DE JONG / AVANTIUM, ZEKERINGSTRAAT 29, AMSTERDAM

Nicolas SBIRRAZZUOLI / UNIVERSITÉ CÔTE D AZUR, INSTITUT DE CHIMIE DE NICE, 28 AVENUE VALROSE, NICE

Corresponding author : Nathanael GUIGO / nathanael.guigo@unice.fr

PURPOSE OF THE ABSTRACT

There is a growing interest in developing technologies using renewable resources to replace non-renewable ones. Valorisation of lignocellulosic biomass is one of the most promising solutions to face the depletion of fossil feedstocks worldwide. Wood is a very relevant example of a renewable resource derived from biomass which has been used for centuries. Its peculiar physical and mechanical properties combined with low density and low price make wood a very good candidate for building applications. For these types of applications, wood often will be exposed to atmospheric agents. To guarantee long-lasting wood products, a very good dimensional stability and fungal and bacterial resistance are required. Different industrial processes have been developed to find valuable wood treatment solutions. This study presents a novel treatment based on wood modification with humins resin. Humins are heterogeneous and polydisperse macromolecules formed during sugar dehydration. Humins contain mainly furanic rings bearing aldehydes, ketones and alcohols as main functional groups. Humins valorisation is more and more in the spotlight, due to the growing attention of industries in green chemistry and biomass valorisation. It has already been demonstrated that this biorefinery co-product can be easily processed to prepare thermoset resins. Moreover, a good affinity with lignocellulosic materials was observed. Several process options were evaluated for wood impregnation with humin resin. Dimension and weight stability after immersion in water confirmed improved hydrophobicity of the final material. Mechanical properties were studied by DMA. This study demonstrates that this new impregnation technique can improve dimensional stability of wood, without compromising on the mechanical properties.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Biomass valorisation | Humins | Wood modification | Dimensional stability

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