ISGC 2022

N°365 / OC
TOPIC(s) : Waste and side streams valorization / Polymers or composites

Nanocellulose and biobeating as sustainable adhesive replacement in the manufacture of fiberboard from wheat straw residue

AUTHORS
Eduardo ESPINOSA / UNIVERSIDAD DE CÓRDOBA, MARIE-CURIE BUILDING, CAMPUS DE RABANALES, UNIRSIDAD DE CÓRDOBA, CÓRDOBA

PURPOSE OF THE ABSTRACT

In a society that is increasingly aware of the environmental impact of human anctivity and with the importance of developing in an economic model such as the bioeconomy and sustainable development, it is getting more and more important to reduce the environmental impact of industrial products.

Usually, fiberboards are produced from lignocellulosic fibers mixed with synthetic adhesives to promote the bonding between fibers. The use of fiberboard are increasing annually due to the demand for fiber-based produced rather than products coming of plastics or non-renewable sources. For this reason, it is necessary to find alternative sources for the production of fiberboard, as a substitute for wood fiber, such as agricultural residues. On the other hand, in industry the most widely used adhesives due to their low cost are forlmaldehide-based resins, mainly urea-formaldehide and phenol-formaldehyde. However, the use of these resins resultes in the emission of formaldehyde, a suspected human carcinogen, during the fiberboard production and using. The elimination of synthetic adhesives for the production of self-bonded and all-lignocellulosic fiberboards are gaining attention in the last years. This requires increasing the bonding capacity of the surface of fibres by pretreatments or the addition of natural agents with high bonding capacity.

Enzymatic pretreatment (biobeating) and cellulose nanofibers have been described as sustainable adhesive replacement in the manufacturing of fiberboards. The incrase in the boding capacity of the fiber surface by the assisted action of enzymes and the high specific surface and mechanical propeties of cellulose nanofibers, allow the patial or total replacement of synthetic adhesives maintaining or even increasing the properties of the fiberboards.

In this work, biobeating and the addition of cellulose nanofibers (separately and in combination) have been studied as replacements for the synthetic adhesives used in the industry. The final products were analyzed for their physical and mechanical properties as well as their water absorption and swelling capacity.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
nanocellulose | fiberboards | bioeconomy | adhesive replacement

BIBLIOGRAPHY