

PRODUCTION AND DEVELOPMENT OF CELLULOSE FIBER-REINFORCED POLYMER COMPOSITES AS A SUSTAINABLE ALTERNATIVE

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ABSTRACT

Nowadays, environmental awareness issues are prominently relevant, not only because of the depletion of natural resources or environmental impact but also because of the increasing demands of societies and governments.

Thus, the implementing processes that involve the development of products more focused on eco and green design is a reality, resulting in the search and need for more eco-sustainable raw materials that can meet the imposed requirements. The focus on matrices reinforced with natural fibers is proving to be an attractive alternative with innumerable different types of natural fibers used.

The main objective of this study is to understand and develop composites reinforced with cellulose fibers from the *Eucalyptus globulus*, traditional in the Portuguese forest, to obtain a material resulting in hybrid composites and, or totally green biocomposites or derived from them with good mechanical properties.

The compounding was conducted in a co-rotating twin-screw extruder, with the insertion of different percentages of cellulose fiber, to understand and analyze the influence of their variation. Additionally, the incompatibility between polymeric matrix and cellulose fiber resulted in a need for additive incorporation since natural fibers are hydrophilic and polymers are hydrophobic.

Subsequently, mechanical characterization was performed on the composites specifically tension and impact, to understand their mechanical behavior and variations.

The results showed that the incorporation of cellulose fibers in the matrices, until a determined percentage, allows obtaining composites with good mechanical properties for possible future applications in commercial products and thus meeting the growing demands of more sustainable materials and products produced.

Keywords: : Cellulose Fibers; Composites; Natural fibers, Mechanical Properties; Sustainability

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