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Use of natural fibers as reinforcement in the production of bio-based matrix composite plastic materials (Bio-polyethylene)

AUTHORS

Quim TARRÉS / UNIVERSITAT DE GIRONA, C/MARIA AURELIA CAPMANY 61, GIRONA
Marc DELGADO-AGUILAR / UNIVERSITAT DE GIRONA, C/MARIA AURELIA CAPMANY 61, GIRONA
Pere MUTJÉ / UNIVERSITAT DE GIRONA, C/MARIA AURELIA CAPMANY 61, GIRONA

PURPOSE OF THE ABSTRACT

Today's society has developed a greater awareness of the need for the use of environmentally sustainable materials. This increased environmental awareness in society is motivating Western governments and companies to undertake initiatives for the production of sustainable materials. In this sense, the elimination of the use of oil-based materials is both a necessity and a challenge. Consequently, the scientific community in plastic composites is clearly focused on the development of environmentally friendly materials. The LEPAMAP research group has been working for years on the substitution of mineral fibers used as reinforcement by natural fibers [1]. Currently, the main objective is to achieve fully bio-based composite plastics with high mechanical properties [2].

One of the ways to achieve this goal is the use of bio-based polymers such as bio-polyethylene. The use of polyethylene obtained from renewable sources makes it possible to establish a starting point similar to that of current materials in terms of mechanical properties and degradability. In this work we studied the incorporation of different percentages of natural fibers with a low production cost since they are obtained for the manufacture of paper and their origin is renewable. The formulated compounds contained between 10 and 40% natural fibers, reducing production costs and improving mechanical properties.

The composite materials were produced by means of the Gelimat multikinetic machine and the subsequent injection of the materials. For further mechanical characterization in terms of tensile, bending and impact properties as well as a micromechanical analysis to determine the quality of the interface between matrix and reinforcement. The results obtained showed a significant increase in properties by increasing the percentage of natural fibers in the composite material.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
composites | natural fibers | bio-polyethylene | bio-based

BIBLIOGRAPHY