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Valorization of lignocellulosic biomass by green composites with humins matrix

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PURPOSE OF THE ABSTRACT

Renewable energies and green chemistry have attracted great interest of the scientific and industrial communities in the past decades. The necessity to focus on biorefinery technologies is exemplified by the growing concern on climate change and exhaustion of fossil raw materials. The valorization of lignocellulosic biomass is one of the most promising solutions to avoid the extensive use of petroleum-based chemicals. Lignocellulosic materials represent one of the most abundant renewable raw material resources on earth. The use of all ?green? composite materials is a sustainable opportunity in automotive and specific structural applications. A new type of all green composite has been prepared by compression moulding flax fibres with humins as the matrix. Humins are macromolecular heterogeneous furanic biorefinery co-products. For many years, scientists focused on finding a way to avoid humin formation during biorefinery processes, but this appears to be almost inevitable. The research is now focussed on developing high-value products from humins. It has been previously shown that humins are easily processed for preparing thermoset-like resins. For the first time, the potential of all-humins-matrix in combination with natural fibres was investigated in this study. We were able to obtain a thermoset polymer with different properties, based on the process used. Mechanical properties showed promising results and a good interface was observed by analysis using SEM. It was demonstrated that humins interacts with the hydrophilic, natural fibres used thus creating a good interphase and leading to improved properties. This study demonstrated the possibility of using this biorefinery co-product as added-value materials for the next generation of biobased thermoset composites.

FIGURES

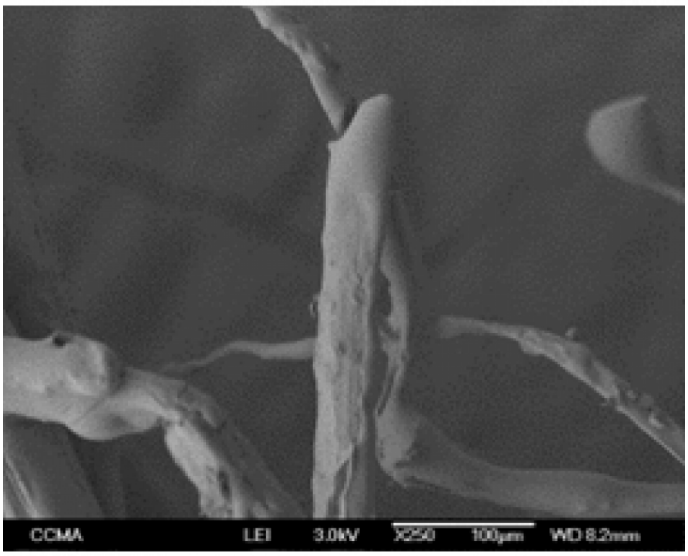

FIGURE 1

FIGURE 2

Figure 2

SEM images of tensile fracture surface of Humins/Flax fibres composites

KEYWORDS

Biomass valorisation | Humins | Green composites | Thermomechanical properties

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