

SUSTAINABLE COMPOSITES FOR CONSTRUCTION: A REVIEW.

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Introduction

As reflected in Directive 2012/27 / EU on energy efficiency, the construction sector, buildings, are responsible for 40% of final energy consumption in the European Union, and approximately 30% of emissions into the atmosphere. One of the methods recently adopted by the construction industry is green construction or sustainable construction. To make a construction sustainable it should be minimized the waste of materials by design, proper selection of quantity and quality of materials, and application of sustainable materials. In this sense, the use of alternative materials, such as bio-based composites materials or materials incorporating waste materials. In addition, recycling building materials is also essential to reduce the embodied energy in the building [1].

Bio-based composites - ECOXY

A bio composite is a material composed of two or more distinct constituent materials, at least one being naturally derived. In terms of the reinforcement, this could include plant fibres such as cotton, flax, hemp kenaf, jute, and sisal. Matrices may be polymers, ideally derived from renewable resources such as vegetable oils or starches.

AIMPLAS has been developing bio-based composites in projects such as ECOXY (Bio-based, recyclable, reshapable & repairable (3R) fiber reinforced thermoset composites). In the framework of ECOXY [2] project, a window profile has been designed, developed, and obtained by pultrusion process, using flax fibres and bio-based epoxy resin.



Composites from agro-waste - BASAJAUN

Reuse of such wastes as a sustainable construction material appears to be viable solution not only to pollution problem but also to the problem of the land-filling and high cost of building materials.

AIMPLAS has been working on the development of composites from agro-waste in projects such as BASAJAUN (Sustainable wood construction for rural development and urban transformation). In the framework of BASAJAUN [3] project, a biocomposite curtain wall for a façade system has been designed, developed and obtained by pultrusion process, using basalt fibres, bio-based polyester resin and agro-waste materials.



Disassembly and recyclability - ECOGLUE

Deconstruction is the process of dismantling a building to salvage its materials for recycle or reuse. Materials used for constructions have a relevant importance when deconstruction phase arrives.

AIMPLAS has been working on the development of disassembly systems and recyclable composites in projects such as ECOGLUE (Removable eco-adhesives for use in footwear, construction and transportation). In the framework of ECOGLUE [4] project, a removable or reversible bio-based adhesive has been developed for the construction sector.

Conlcusions

Clearly, there are eco-friendly building materials becoming available. Development of new technologies means that bio-based composites coming from natural resources or from waste materials are becoming easier and easier to produce, at a higher quality with an affordable cost. Moreover, disassembly and recyclability are being assessed from the beginning, selecting building materials which can be reused or recycled at their end of life.

[1] C. Galan. Materials 2016, 9, 465.

[2] ECOXY - BBI JU - European Union.

[3] BASAJAUN - Horizon 2020 - European Union.

[4] ECOGLUE – ERFD funds – Valencian Community.

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