CTAG Centro Tecnológico de Automoción de Galicia
NEW MATERIALS

New Materials Magazine

ISSUE 2 – BIOMATERIALS

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EDITORIAL

Throughout the development of the automotive industry, the demand for light and cheap engineering plastics has increased exponentially. These materials have replaced metallic parts, whether in their primer form or as matrix for composites, as they can be processed into automotive components complying with mechanical standards and the customer's needs. As a consequence, modern cars contain on average 120kg of plastic materials, which represents around 15% of its total weight. The global plastic industry dedicates 7% of its output to the automotive sector.

However, environmental concerns, related to this important volume of consumption of hydrocarbon-based materials, have appeared within the public, among automotive OEMs and inside regulatory institutions. The latter now ask the automotive industry to progressively lower its dependence on fossil fuel as well as its ecological footprint. Environment-friendly propulsion devices and improvement of their energy efficiency cannot be the only solution to achieve these objectives. Consequently, a decrease in the content of conventional (fossil-fuel based) plastics used in future cars becomes a necessity.

To address this challenge and study alternatives to polymers materials made from non-renewable energy sources, CTAG has set its focus on bio-based materials. Being sensitive to the public environmental awareness and OEMs' long term policies regarding "green materials", CTAG is carrying out several projects in which it will build knowledge to help the automotive industry introduce these materials into cost-effective and industrially viable applications. These solutions must meet both automotive standards and customer's requirements and help diminish the dependence on fossil-fuel sources.

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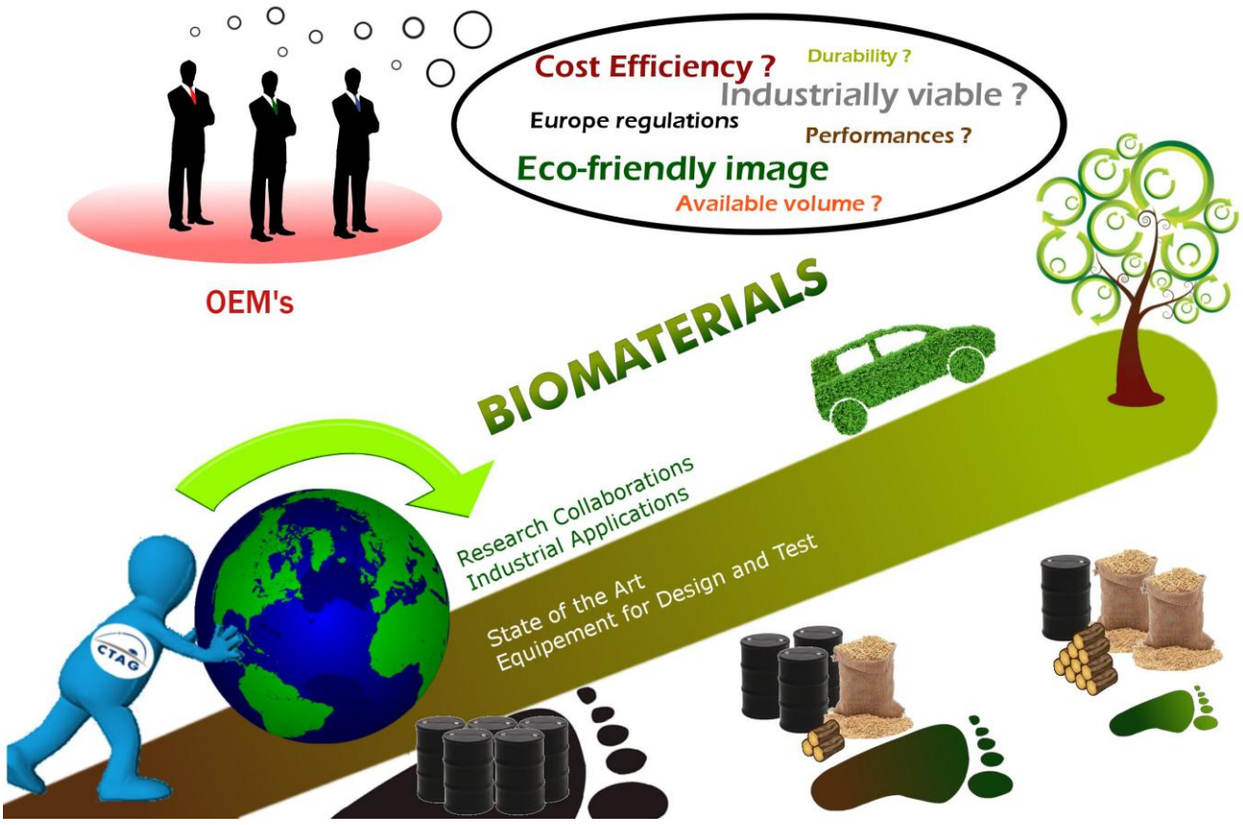
GreenMotion

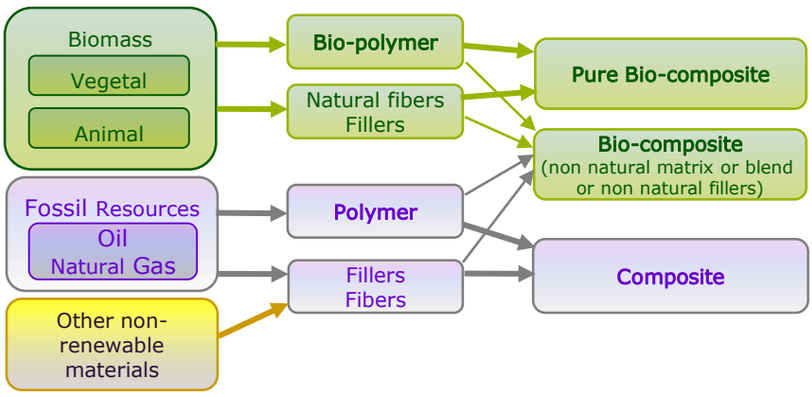


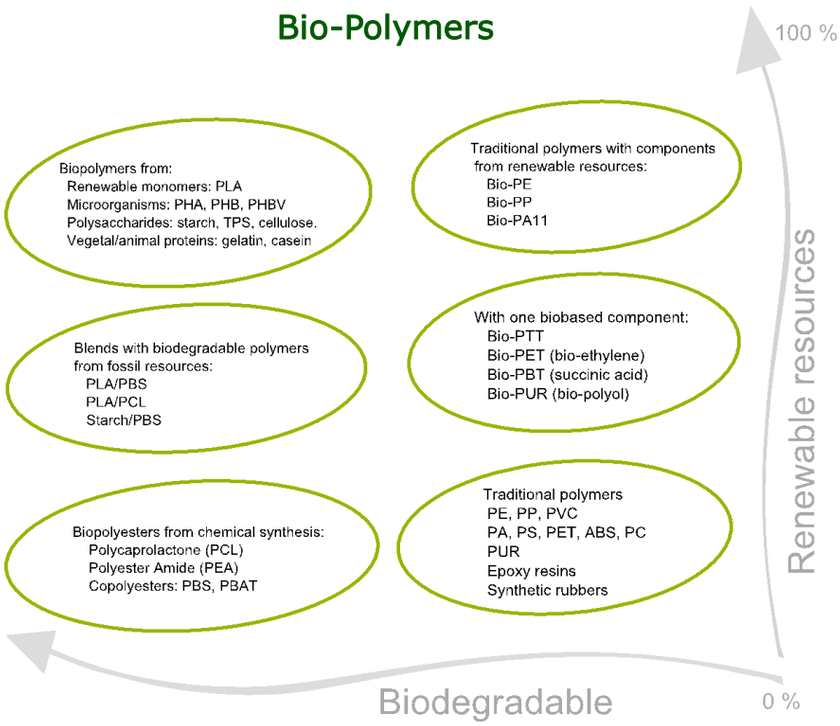
BIOMATERIALS

"Bio-based materials" or commonly labeled "biomaterials" refer to a material engineered from substances deriving from living matter. The definition applies to materials containing natural fibers or fillers, blend of components in which one of the latter at least is made of living matter, and eventually materials produced exclusively from biomass sources. "Bio-based materials" include bio-composites and bio-polymers.

Some bio-polymers, but not all, are biodegradable. They can be blended with polymers made with fossil fuel. The purpose of this substitution is to lower the dependence on non-renewable energy sources while conserving acceptable material properties.
As requirements are quite high in terms of thermo-mechanical characteristics in the automotive industry, bio-polymers and other materials in the vehicle must often be reinforced, thus becoming composites. CTAG has investigated the possibility to use natural and renewable materials as reinforcing agents (fibers, particles, additives). Wood or cellulose fibers may increase thermal and mechanical resistance of parts, making them more suitable for automotive applications.

Bio-materials could be an ecological solution to lower the content of materials heavily based on non-renewable sources. CTAG is working to encourage their incorporation in OEM environmental policies.





Biodegradation: The natural chemical process that occurs, through oxidation or hydrolysis mechanisms, and shortens the polymer chain, thus degrading progressively the material into its natural constituting components, namely carbon dioxide, water and biomass.

Renewable: A material is said to come from a renewable source if it is composed of a raw material produced by natural ecological cycles, as opposed to products elaborated using scarce resources.

Recyclable: A material is recyclable if it can be processed back into its raw form and reused to make new parts.

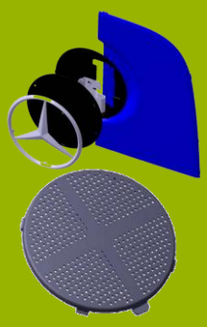
Bio-polymer: A polymer material elaborated partially or totally from a natural, living matter that is renewable. As opposed to conventional polymers, they are not obtained exclusively from chemical process involving hydrocarbons as raw material.

Bio-composite: One of the components constituting the composite comes from living matter. This component can be indifferently, the matrix (bio-polymer, wood…) or filler (fibers, particles, additives).

PROYECTO NATURPLAS

En el marco de diferentes proyectos colaborativos, CTAG ha alcanzado un amplio conocimiento sobre el estado del arte en el campo de los bio-materiales. El proyecto Naturplas aunó el esfuerzo de varios centros de investigación privados, con el objetivo de seleccionar biomateriales para el sector automoción. Inicialmente, el material para inyección se elaboró a partir de biomasa gracias al equipo de vanguardia de los socios del CTAG. Posteriormente, con los recursos software FEM (CATIA, Moldflow,…) y gracias a la experiencia en diseño y simulación, los ingenieros de desarrollo del CTAG diseñaron dos piezas para estudio: una de interior (rejilla altavoz) y una de exterior (soporte logo). Estos componentes fueron fabricados mediante inyección convencional y utilizando biomateriales obtenidos de la primera fase. A continuación, fueron sometidas a una batería de ensayos para verificar las propiedades. Los resultados de envejecimiento climático, realizados en las instalaciones de CTAG, mostraron que esos materiales presentan mayor sensibilidad a los ciclos de temperatura y de humedad en comparación con los plásticos tradicionales. Esta biodegradación temprana incide negativamente en la durabilidad requerida para la pieza.
Los resultados obtenidos durante los cuatro años de proyecto (2005-2009) sugieren que las futuras investigaciones sobre biomateriales para automoción se orienten hacia el desarrollo de soluciones que mejoren la estabilidad en el tiempo.

cvnaturplas.dnsalias.com



PROYECTO ECOPLAST

Este proyecto de investigación, liderado por CTAG, surge como una continuación del proyecto Naturplas. Su principal objetivo es responder a las cuestiones de selección y procesado de los biomateriales. Para alcanzarlo se han establecido cuatro bloques relacionados entre sí: selección y mejora de las matrices de bio-polímero; selección de refuerzos naturales (micro o nanométrico); interacción refuerzos-matriz; procesado de estos materiales.
En colaboración con distintos centros de investigación privados, CTAG constituye un puente entre la investigación y el desarrollo tecnológico, promoviendo la investigación fundamental a fin de dar respuesta a las demandas del sector de automoción respecto al uso de estos materiales y concretando el impacto que supondría su empleo en sus políticas económicas y medio ambientales (costes, volúmenes necesitados, exigencias del sector de la automoción, imagen de respeto del medio ambiente, regulaciones ecológicas).

www.ecoplastproject.com

El CTAG colabora con diferentes socios para desarrollar biomateriales. Su equipo software y tecnológico, así como su rica experiencia en el sector de la automoción, le permiten desarrollar proyectos innovadores, con una fuerte voluntad de producir aplicaciones de alto valor añadido.

GREENMOTION KNOWLEDGE TRANSFER PLATFORM

The need for research in the bio-material field has experienced important growth, thanks to developing concerns regarding environmental issues. Urged by European regulations promoting green and eco-friendly cars, and by the fact that the final customer is now more regarding about this subject, car manufacturers have included the development of bio-materials in their long-term environmental policies. The substitution of conventional plastic composites (representing 120kg in the average car) would lower the dependence on fossil fuel sources and simultaneously reduce the ecological footprint of the automotive sector.

To achieve these goals, CTAG is promoting and acting to develop biomaterials, in order to help them reach realistic industrial applicability and comply with automotive standards. To this purpose, the GreenMotion project coordinated by CTAG, with the support of the EU through funding by FEDER funds, aims to build a knowledge transfer platform, to help companies from the Galician-North of Portugal Eurorregion gain competitiveness on the bio-material market and take advantage of their forest resources.

CTAG partners in the framework of the GreenMotion project

Automotive OEM in this region may often have insufficient knowledge regarding bio-materials to see them as potentially innovative and competitive solutions. The GreenMotion platform objective is to address this lack of information.

This platform will contain a database providing information on bio-materials suitable for auto-motive applications, along with their adapted reinforcement fillers. Additionally, it will involve infor-mation on processing know-how. The platform, will exhibit current projects developing bio-materials and the companies involved in them.

A virtual demonstrator will present applications already existing on the automotive market. Companies can register freely and get into contact with potentials partners, suppliers or customers, and submit projects propositions.

www.greenmotionproject.com

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