

Floreon technology, redefining polylactic acid

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13 August 2024

Dr Andrew Gill, CTO, and Dr Sandrine Garnier, CEO of Floreon Technology Ltd., explain how the company is redefining Polylactic Acid, starting with who they are and what they offer

Floreon Technology is an innovative company that emerged from a successful KTP (Knowledge Transfer Partnership) with the University of Sheffield in the UK. Floreon's technical team has developed expertise in using Polylactic Acid (PLA) to produce a highly robust line of biopolymers for engineering purposes.

Unlike typical PLA, which is often used for disposable items, Floreon's technology converts it into an exceptionally durable, high-performance material suitable for a wide range of applications. These include automotive, rail, marine, and aviation components, electrical and electronic parts, building and construction, and medical and sporting equipment.

Floreon® biopolymers are intended as a sustainable substitute for fossil-based styrenic polymers such as ABS, PC-ABS, or HIPS. They offer up to a seven-times lower carbon footprint while maintaining and even in some cases exceeding, the physical and mechanical performance of their fossil-based counterparts.

The science behind Floreon® biopolymers

PLA is well established as a leading plant-based and recyclable plastic with an excellent eco-profile. It also has generally favourable mechanical properties, including high tensile strength and modulus. Despite these positive characteristics, the application of PLA in critical fire-resistant (FR) applications as an alternative to engineered polymers has been hindered by its flammability.

Therefore, there is a crucial need for a PLA-based material that offers enhanced flame resistance while maintaining recyclability and the necessary physical and mechanical properties required for substituting carbon-intensive styrene polymers in demanding applications.

Floreon has developed a groundbreaking PLA-based compound that incorporates a halogen-free flame-retardant additive, maintaining its mechanical integrity while enhancing resistance to burning. This innovative material utilises environmentally friendly flame retardants that do not emit harmful substances upon combustion. Our innovative PLA-based solution effectively preserves the valuable benefits of PLA, including recyclability and a reduced carbon footprint, while proactively meeting the stringent safety requirements for transportation, construction, electronics, and other high-risk applications.

The development process involved extensive research and testing to identify the most favourable flame-retardant additive, impact modifier and nucleating agent and their optimal concentrations for synergistic effects. The result is a patent pending material that not only performs well in fire safety tests – Floreon® Therma-Tech is the first halogen-free PLA compound to be rated UL94V-0 – but also maintains the desirable characteristics of PLA, including high tensile strength, modulus, and ease of processing. Benefits also include a significant reduction in Scope 3 and Scope 2 emissions due to its low carbon footprint and energy savings in manufacturing.

More on Floreon® Therma-Tech

Furthermore, Floreon® Therma-Tech can be mechanically recycled, but its potential for chemical recycling has also been demonstrated. Floreon recovered 100% of the lactic acid feedstock, filtering out the flame retardant and allowing the regeneration of virgin polymer without downcycling.

Floreon® Therma-Tech is versatile and can be used in injection moulding, profile and sheet extrusion, 3D print filament manufacturing, films and fibres, thermo/vacuum forming, and even foaming applications.

The first commercial application for Floreon® Therma-Tech is a sustainable and circular, modular construction system manufactured by [Morph Bricks Ltd.](#) Still, many more applications are being explored. Industrial trials are running, for example, on casings for TV remotes, enclosures for power supplies, battery housings, smoke and CO2 detectors, automotive parts, household appliances, insulating panels for building and construction applications, enclosures for medical equipment, natural fibre laminated composites, and decorative panels for marine interiors.

In parallel, Floreon® Therma-Tech is one of the grades being tested under the EU-funded €6 million [VITAL project](#), which aims to validate commercial value chains for biobased materials in a number of durable applications.

The business case for flame-retardant ABS

As per the recent publication from [Business Research Insights](#), the global market size for flame-retardant ABS was \$7 billion in 2022. It is expected to reach just under \$10 billion by 2031, showing a compound annual growth rate (CAGR) of 3.6% during the forecast period.

Halogen-based flame-retardant additives have been widely used in FR ABS for many years. However, they are now being phased out due to legislative initiatives such as the EU Ecodesign Directive or voluntarily by manufacturers due to their environmental persistence and toxicity.

The current options for disposing of products treated with halogenated flame retardants at the end of their life are also problematic. This presents a strong case for transitioning to more environmentally friendly and sustainable alternatives.

Floreon® Therma-Tech is a groundbreaking product because it is not only halogen-free but also plant-based, with over 75% renewable content. It is recyclable both mechanically and chemically. It can be used as a drop-in substitute for FR ABS and FR PC-ABS and requires no CAPEX investment. This patented, world's first innovation offers up to seven times lower carbon footprint and energy savings due to its lower processing temperature while maintaining, and in some cases exceeding, the physical and mechanical performance of their fossil-based counterparts.

The next chapter in the sustainable materials industry

Floreon has recently secured a substantial £2.25 million investment from prominent private equity firms Northern Gritstone and CPI. This significant financial backing marks a pivotal moment in Floreon's journey, enabling the acceleration of the commercialisation of its unique portfolio of PLA-based compounds.

In tandem with this financial boost, Floreon is also expanding its team, bringing in top talent across various disciplines to support its ambitious growth and innovation strategies. This strategic expansion aims to fortify the company's research and development capabilities, ensuring a continuous pipeline of groundbreaking products.

One of the exciting frontiers Floreon is exploring is the development of home compostable formulations. These formulations are designed to degrade safely and efficiently in home composting environments, offering a sustainable alternative to traditional plastics and aligning with the growing consumer demand for environmentally responsible products.

As Floreon embarks on this next chapter, the company is committed to leveraging this investment to solidify its position as a leader in the sustainable materials industry. The focus will be on accelerating product development cycles, expanding market reach, and driving innovation. Through these efforts, Floreon aims to position itself as a viable substitute for fossil-based plastics.

Please Note: This is a Commercial Profile



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