

ThermoPHAck, a new solution for food packaging

The Biomac Open Innovation Test Bed (OITB) launched an open call in 2023 that selected a series of project proposal that will be upscale from lab stage to Industrial prototypes. In this factsheet, we are looking at the ThermoPHAck project by Helian Polymers BV.

Helian Polymers BV is a company with expertise in PHA, a family of polyesters produced by microorganisms. They have access to various types of PHA and experience in processing it into different applications, such as: blow molding, Injection molding, thermoforming, sheet/film extrusion



The value proposition

The European Union is pushing for a transition away from fossil fuel-based plastics towards more eco-friendly biopolymers. This shift is driven by a series of new regulations and creates opportunities for bio-based and biodegradable materials like PHA.

Despite the potential of PHA, there are challenges to overcome, especially for food packaging: Safety (approval for food contact), barrier properties, reusability/recyclability and home compostability.

By developing the ThermoPHAck Project, Helian Polymers aims to develop new bio-based and biodegradable PHA materials for thermoformable packaging that are: Heat-sealable, Reusable, Recyclable, and home compostable.

The project will explore ways to improve the barrier properties of PHA materials and their transformation into final products, such as:

- Extrusion of thermoformable sheets (300 mm wide, 100-500 μm thick) that can be multilayered or coated for improved barrier properties.
- Assembling these elements into a bio-based, barrier-property thermoformable food packaging that is also heat-sealable.

Helian will focus on improving PHA material performance, particularly barrier properties and thermoformability. To implement the Project, Helian will utilize the following Pilot Lines of the BIOMAC OITB:

- PL14 (by ITENE) for the production of sheets, which can be monolayer, multilayer, or coated.
- ITENE provided support for the thermoforming of the sheets.

The Final product

In conclusion, the ThermoPHAck project by Helian Polymers aims to develop a bio-based and biodegradable packaging made from PHA, with the goal of creating a sustainable alternative to plastic packaging derived from fossil fuels. The final product will be a thermoformable material with barrier properties that make it suitable for food packaging. Beyond the characteristics mentioned above, the ThermoPHAck will have good barrier properties against water vapor (WVTR) and oxygen (OTR), which are essential for food preservation. The goal is to achieve similar barrier performance as PHBV film with about 1-2% HV content, which is one of the high crystalline PHA and therefore higher barrier (OTR 2.20 cc.mm/m².d at 23 °C, 0% RH, and WVTR of 2.07 g.mm/m².d at 38 °C, 100% RH).

With the global food packaging market is expected to grow annually by 5.5% from 2022 to 2030, coupled with the progressive shift towards more sustainable and less pollutant alternatives, ThermoPHAck will be well-suited to face the market needs for the coming years.

