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Newsletter 03/2023

Welcome to the seventh issue of the BIO-PLASTICS EUROPE Newsletter!

This issue of the newsletter focuses on the advances BIO-PLASTICS EUROPE made in the material development. We want to show the process of the development of new materials and share the products we have been working on.

Enjoy reading about our collaboration with the Glaukos project, our upcoming summer school in July 2023, how a design thinking approach supported the team in developing new materials and more.

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01 Successful 2nd EU Review Meeting in December 2022

By Friederike Gölitzer (HAW Hamburg, Germany)

BIO-PLASTICS EUROPE's Work package leaders and representatives from the project companies Arctic Biomaterials and NaturePlast met in December in Hamburg to meet the project officer from the European Research Executive Agency, Cristina Paducea and two external experts, Karvin Molenveld, a chemical engineer who has been working in the field of bio-based and bio-degradable polymers for over 25 years, and Elena Moreno, an industrial engineer and CEO of a Spanish company which is a pioneer in manufacturing biodegradable substitutes for plastic, for the 2nd review meeting. The BPE team had the opportunity to talk about the progress that has been made, for example, the agricultural mulch film that was developed within the project and the fruitful European Bioplastics Research Network 7th Virtual Event. On the other hand, the project officer and the two external experts provided valuable feedback that will lead to improvement within the project.



On the first day of the 2nd EU Review Meeting, the project consortium presented the project achievements from the last reporting period and discussed progress, such as the development of degradable glass fiber reinforced composite and further steps with the EU representative and the external experts. In the first reporting period, 30 deliverables were submitted and approved and during the second period, additional 15 deliverables were submitted. The day ended with several work package leaders presenting policy recommendations, followed by a fruitful discussion about various policies.

The project officer, the two external experts and the BPE team agreed that there should be a clearer framework within the EU for bio-degradable and bio-based plastics. The BPE team is working on policy recommendations, which will hopefully lead to a white paper in the end, forming such a framework. During the entire day, the BIO-PLASTICS EUROPE team received valuable feedback about the work done so far and advice about the progress that will be made in the last reporting period. The second day of the review meeting was spent at the labs of the HAW Hamburg, where examples of the practical work and experiments in the labs were shown to the EU reviewers and the work package leaders.

The 2nd review meeting was successful and very valuable for the project. The project is starting into the 3rd and last reporting period, and we are looking forward to making progress on researching sustainable strategies and solutions for bio-based products to support the EU Plastics Strategy and a Circular Economy.

02 Projects2Policy: Aligning outcomes from EU projects with the EU policy for bio-based and biodegradable plastics

By Dr. Jelena Barbir (HAW Hamburg, Germany)

In June 2022, BIO-PLASTICS EUROPE organized a workshop with 10 Horizon Europe projects and 9 EU policy officers in the field of bio-based and biodegradable plastics to discuss policy recommendations. From the results of this workshop, a shared online document was produced posing and answering important policy and research questions from the projects as well as the policy officers. Simultaneously in June, the Glaukos project, which is developing biobased textile fibres and textile coatings, organized the Glaukos Stakeholder Lab workshop “Tackling microplastics pollution: can biodegradable textile and coating be a solution?”.

The BPE team and the team from the Glaukos project met through those workshops and a collaboration between the two projects was established, leading to the organisation of one workshop followed by an online event on policy. The first workshop took place online on 3rd November under the title, “Unlock the potential of bio-based and biodegradable plastics: challenges to be addressed”. After a short introduction of the Glaukos and BIO-PLASTICS EUROPE projects, a discussion round with 4 topics with 4 questions each was opened, to collect the participants’ inputs on relevant bio-based plastics and policy topics. The main topics were LCA of bio-based vs conventional plastics, end-of-life options, raising awareness, stakeholder engagement, collaboration and coordination and projects’ contribution to EU policies. In total, over 70 participants took part in the workshop, representing 49 relevant EU projects.



System perspective: LCA of Bio-based vs conventional plastics

- Assessment of bio-based plastics vs conventional ones
- Ensure feedstock sustainability for bio-based plastics
- Compostable and biodegradable plastics vs. conventional ones
- Impacts on society (e.g. health) and environment along the life cycle



Projects' contribution to EU policies

- Limit the use of biodegradable plastics in the open environment to specific applications for which reduction, reuse, and recycling are not feasible. Projects' point of view.
- What role for biobased and biodegradable plastics in reaching the 2030 targets of the EU Zero Pollution Action Plan
- Recommendations and research data from projects to support EU policies
- How to shorten the gap between projects' outcomes and policies?



End-of-Life options (biodegradability, ecotoxicity, recyclability, leakage, etc.)

- Complexity of the biodegradation processes in open environment (e.g. marine environment)
- Measurements, metrics and standards for the biodegradation in the open environment
- Safety / toxicity issues (including use of additives in biodegradable plastics)
- Recyclability of bio-based plastics (e.g. creation of value chain, market volumes)



Raising awareness, stakeholder engagement, collaboration and coordination

- Scientific knowledge transfer to relevant actors (policymakers, industry and society)
- Connect initiatives at local, national, and EU level
- Mobilize citizens and society for the scale-up of solutions (from niche to norm)
- End-users' behaviour and impacts of bio-based and biodegradable plastics (e.g. awareness, acceptance, unintentional and mismanaged disposal)

By Glaukos/FVA - New Media Research

The results from the workshop have been further used as a basis for an open discussion with the EU policy officers who joined for the upcoming 7th EBRN online event on 23rd November, attended by more than 50 participants, 12 of which were EU policy officers. The four topics covered were LCA of bio-based vs conventional plastics, End-Of-Life Options Raising Awareness and Stakeholder Engagement and Projects contributions to EU Policies.

The workshop sparked some lively discussions between policy officers and projects on how to shorten the gap between projects and policies and how to increase opportunities for mutual learning and exchange. The policy officers expressed a general need for clear scientific facts to form based policy decisions. The need for a mutual language was expressed by both sides.

Overall, the workshop proved to be a starting point for continued collaboration for projects and policy officers to optimize policy recommendations in the field of bio-based and biodegradable plastics. Also, the collaboration between BIO-PLASTICS EUROPE and GLAUKOS strengthened the joint goal to facilitate communication between research and policy. The next policy workshop in collaboration between the two projects is planned for June 2023.

03 Innovative product development in BIO-PLASTICS EUROPE with "Design Thinking" approach for new bio-based and bio-degradable materials

By ABM, ACIB, Fraunhofer LBF, NaturePlast and TICASS

One of the most important questions in the development of plastic materials today is how sustainable the material is. Packaging is often light and can easily be spilt - if the products made from these materials are used outside, they can be lost or intentionally left behind. Ideally, they would degrade then. Biodegradable polymer types are known for decades, and that fillers and additives can influence their degradation. So, how does the degradation work and can be optimized under controlled conditions, and what is the situation out in the soil, in seawater or in limnic water? And last but not least, ecotoxicity must also be taken into account.

A "Design Thinking" approach for the development of plastic materials

AGENDA

MODIFICATION OF COMPOUNDS ●⁴

BIODEGRADATION ⁽¹¹⁾

- Soil ▲²
- Sea ▲²
- River ▲¹
- Composting ▲³
- Laboratory Tests ▲³

ECOTOXICITY ⁽⁴⁾

- Biota ◆⁴

CONTROLLED CONDITIONS ⁽⁷⁾

- Structure ■³
- Stability ■²
- Recyclability ■²



To answer these questions, the BIOPLASTICS EUROPE consortium is taking a design-thinking approach. In this iterative process, our research team improves all materials for their planned application by integrating feedback loops and bringing their trans-European perspectives to meet different market needs.

In the first round of experiments, bio-based polyesters were compounded and characterized for different applications:

- PLA-based re-usable outdoor cutlery
- PLA-based mulch films for agricultural applications
- PLA-based containers for cosmetics and foods (rigid packaging)
- PBS-based soft food packaging
- PHBV-based beach toys

For 16 months, our research teams from Fraunhofer LBF, ACIB, NaturePlast, Arctic Biomaterials and WP5 partners[1] (responsible for pre-normative research and field tests) made prototype formulations, ran pilot-scale production tests and tested samples. Materials were characterized for their targeted use and the partners established standards for testing protocols and performed basic characterization on recycling, biodegradation and ecotoxicity.

Overall, the second and final round of testing, which began in May 2022, is still in progress and the results will be used to further improve our solutions that are tailored to be sustainable for their specific use case. The answer to the question of sustainability is always a compromise between the ability to degrade under certain conditions, to be recycled into new products and an adjusted lifetime to allow for durable products where necessary and to foster reuse.

Product development in BIO-PLASTICS EUROPE

The ultimate targets, based on the experience and measurements of the first generation of compounds in our “design thinking approach”, were used to plan a “targeted” second round of testing to evaluate material properties for end-user application, feasibility of expected end-of-life (EoL) scenarios, and potential ecotoxicological impacts. Material properties and EoL scenarios include general requirements such as resistance under conditions of use and performance, degradation in open natural environments (for those materials that may end up as litter in nature), recyclability through multiple extrusion, composting, and ecotoxicity assessments. Peculiar tests have also been planned for specific target applications, such as a migration test for food contact materials (FCMs) and dishwashing resistance for cutlery.

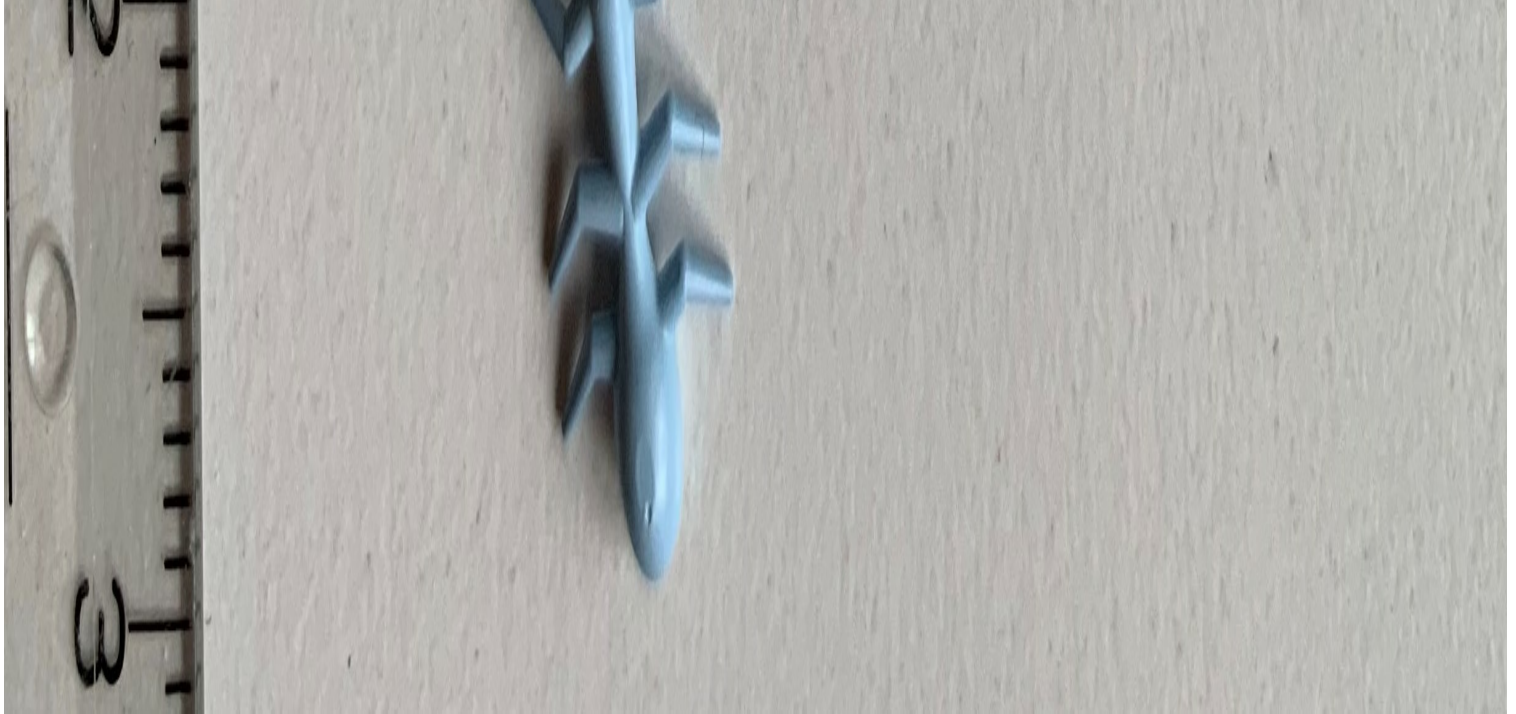
The degradable glass fiber reinforced composite from Arctic Biomaterials (ABM) has been designed for reusable cutlery applications. The results of this project indicate that the bio-based and biodegradable material tolerates heat and dishwashing very well. Spoons produced by an industrial partner show that the obtained results also translate into practice: they withstand hot drinks and soups and can be washed in a dishwasher at least 150 times. Importantly, the food contact-approved material matches industry standards in terms of handling and processing.



Another pilot production are mini ants made via injection moulding in cooperation with a stakeholder company (NaKu, Vienna). The material is based on PHBV and filled even the smallest details of the ants reliably.







Another example is the compound BPE-AMF-PLA-02 which is particularly intended for use as an agricultural mulch film (Figure 3). It was developed by NaturePlast together with other partners. The material is quite complex to make durable enough for its use but also retains its degradability. It contains PLA, other bio-polyesters, and functional additives to meet the requirements. After a promising lab-scale film production, tests were conducted in a pilot plant of a large industrial company in Spain (Figure 1). Based on their feedback and analysis of the produced demo film, the team found aspects to improve the material further for industrial-scale application and is already back to work on it.

The application fields for bio-based materials are manifold and our tests and evaluations encourage to proceed!



04 Join our summer school - a unique experience in the field of bio-based plastics and circular bioeconomy.

The new plastics economy: circular business models and sustainability.

By Alma Mater Studiorum – University of Bologna

Are you passionate about sustainability and the future of plastics? Do you want to expand your knowledge and skills in this field? If yes, then don't miss this opportunity to join the Summer School The new plastics economy: circular business models and sustainability.

This summer school is organized by Alma Mater Studiorum Università di Bologna in collaboration with the Hamburg University of Applied Science, Kaunas University of Technology, and Turku University of Applied Sciences, and supported by various public and private organizations. It will be held in presence from 10th to 14th July 2023 in Bologna, hosted at the prestigious Bologna Business School and the historic university campus.

The summer school is designed for students, researchers, new graduates, young entrepreneurs, and professionals with different backgrounds and expertise. The program will focus on sustainable strategies and solutions for bio-based plastics to support the EU-Plastic Strategy and promote a New Plastics Economy.



The participants will learn about the latest developments in the production and processing of bio-based polymers, their properties and applications, as well as their potential to contribute to the circular economy and reduce environmental impacts.

The participants will have the opportunity to network with experts in the field, visit innovative firms, and engage in hands-on activities and projects. They will also gain a deeper understanding of the interconnectedness of different parts of the supply chain and how to promote circularity along value chains. The summer school will be taught entirely in English and will feature lectures, site visits, working sessions, mentoring, and tutoring sessions, and group-based activities.

To participate in the summer school, admission is limited to 30 participants who have accomplished the free and open-access Massive Online Open Course "The new plastics economy: circular business models and sustainability". The ideal candidate will have a strong interest in sustainability and the future of plastics, as well as a willingness to learn and work collaboratively with others. Selection will be an ongoing process, and priority will be given to those who have already completed the MOOC at the time of application submission.

The attendance certificate will be released at the end of the summer school. There are no fees to attend the summer school, and it will cover the insurance cost for participants. However, the participants will have to bear the costs of travel, board, and lodging.

For more information on the event schedule, admission criteria, and selection process, please visit the following website:

<https://site.unibo.it/the-new-plastics-economy-circular-business-models-and-sustainability/en/summer-school>

Please present your application by April 30th.



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