PolyBioSkin aims to develop and validate pilot processes for producing prototypes of three globally significant, high performance, skin-contact products: femcare sanitary pads, diapers, beauty masks and wound dressings.
Introducing PolyBioSkin

PolyBioSkin is a 3-year Research & Innovation Action funded by the BBI. The project aims to develop bio-based and compostable skin-contact applications in the absorbent hygiene products (AHP), cosmetics, and biomedical sectors.

Specifically, PolyBioSkin will deliver a bio-based and compostable diaper and femcare sanitary pad, each consisting of an antimicrobial topsheet beneficial for the skin and a superabsorbent layer; novel facial beauty masks based on textiles or films made from bio-based and compostable polymers and impregnated with molecules beneficial for the skin; and nano-structured, highly skin-compatible non-woven textiles for wound dressings that are bio-based and compostable.

The project harnesses the advanced biocompatibility of biopolymers such as PLA and various kinds of PHAs, as well as their and other selected biomaterials’ antimicrobial, anti-inflammatory, and antioxidant properties.

In PolyBioSkin, not only the materials themselves will be optimised but also process-driven structuring will be employed to obtain films, fibres, and nonwoven textiles with properties tailored to each of the PolyBioSkin target applications. Indeed, a nanofibrous morphology is known to result in a much faster liquidity absorption than the regular bulk properties of the same polymer, leading to optimal resource efficiency.

PolyBioSkin aims at developing high quality products by utilising the most advanced polymer conversion techniques, such as electrospinning and the latest developments in nanotechnology.

An important part of the project is the ecological and economic assessment of the PolyBioSkin target applications. The aim is to achieve 90% bio-based carbon content according to ASTM D6866. The products developed shall be biodegradable in industrial composting conditions, which can be certified in line with the standards EN 13432 and/or EN 14995.

LCA and LCCA assessments will be performed to establish and contextualise the enhanced sustainability aspects of the bio-based and compostable PolyBioSkin applications. The target products’ economic potential will be analysed and business models for their commercialisation will be proposed, in addition to policy recommendations that would improve the economic feasibility of a transformation from fossil to bio-based products.

The overall target of PolyBioSkin is to create more sustainable price-competitive and performance-improved products that are bio-based and suitable for additional end-of-life scenarios such as industrial composting, anaerobic digestion, and chemical recycling.

To read up on the details of the project and stay updated please go to http://polybioskin.eu.

EMBRACED: Closing the Loop for AHP Wastes

The BBI-JU-funded EMBRACED project on post-consumer Absorbent Hygiene Products (AHPs, e.g. baby nappies, femcare, and adult incontinence products) waste recovery and recycling is an innovative solution for diverting post-consumer AHP waste, which on estimates adds up to 2-4% of all municipal solid waste (MSW) in Europe, from incineration or, worse, landfilling to more sustainable end-of-life routes.

The 5-year project intends to demonstrate in a relevant industrial environment an integrated biorefinery based on the valorisation of post-consumer AHP waste into bio-based products and secondary raw materials. It will build feedstock from the plastic, super absorbent polymer (SAP), and cellulose fractions, and will convert cellulose into bio-based building blocks, polymers, and fertilizers. In practice, just some of the ambitious goals of EMBRACED are to:

- Recover highly purified fractions of cellulose, plastic, and super absorbent polymer (SAP);
- Obtain fermentable sugars from waste cellulose and convert them into bio-based building blocks;
- Produce packaging for absorbent products from bio-based polyesters on the basis of waste cellulose-derived building blocks;
- Convert syngas derived from AHP cellulose waste into polyhydroxybutyrate (PHB) for use in bio-based biodegradable biomedical applications at a greatly reduced production cost (up to 50%) while also dramatically reducing CO₂ emission, water and land use of PHB production;
- Turn deactivated cells from the PHB fermentation process into organic fertilisers;
- Recycle the SAP waste fraction into absorbent underpads and the PE and PP plastic fraction into caps for bleach bottles and plastic bins for AHP collection;
- Design a system for recovery of phosphate, ammonium, potassium, and urea contained in wastewater from the AHP pre-treatment process;
- Reduce significantly CO₂ emissions of AHP waste treatment in comparison to incineration and landfilling;
- And overcome legislative barriers at EU level towards the utilization of AHP waste fractions as secondary raw materials.

It is with circular solutions as the ones proposed by EMBRACED that we will be able to implement circular and bioeconomy thinking in product segments that currently have to be considered among the most unrecyclable. As PolyBioSkin aspires to engineer AHP products with additional chemical recovery and organic recycling options, innovative holistic solutions such as the EMBRACED integrated biorefinery are pointing the way towards greatly enhanced sustainability.

To find out more, please go to https://www.embraced.eu.
Today, we introduce Dr. Maria Beatrice Coltelli, Assistant Professor at the University of Pisa’s Department of Civil and Industrial Engineering, which is a member of the Italian National Interuniversity Consortium of Materials Science and Technology (INSTM). Dr. Coltelli has 15 years of experience in materials characterisation and the study of the correlations between the molecular structure, the morphology, and the properties of polymers, biopolymers, blends, and composites, especially in relation to their interaction with the environment. She is the author or co-author of 50 publications in international journals and holds two patents.

Q: How does your research group’s expertise relate to the PolyBioSkin project?

A: PolyBioSkin combines the requirement for renewability and compostability with a requirement for specific functional properties that we are trying to achieve by exploiting nanotechnology using bioactive natural polymers. Hence, as PolyBioSkin integrates sustainability and advanced nano-structured materials science, it is perfectly in line with our research objectives. We also promote these themes on a European level involving other Materials Science centres, for example by participating in the activities of the ENMAT network, of which I currently am the pro-tempore president.

Q: What motivated you and your colleagues to come up with the PolyBioSkin project?

A: Besides our general research interest in this area, one specific reason was the visit that a cosmetics company (MAVI) and a producer of diaper top-sheets (TEXOL) paid to our research group because they are interested in exploiting nano-biopolymers for better compatibility of their products with the human skin. I thought it was the right occasion to come up with a project that promotes the use of bio-composites, effectively designing products that combine renewability with health and biocompatibility aspects as well as innovative and more sustainable end-of-life options.

Q: What is your main role in the project?

A: I am responsible for the unit at INSTM that manages the project from a technical point of view and my colleague Dr. Serena Danti of INSTM is the project’s Technical Manager. Research-wise, we study and develop formulations and laboratory prototyping films for top-sheets and beauty masks with the required target properties and also conduct cell compatibility and compostability tests of the developed materials and prototypes.

Q: What are, in your personal opinion, the key aims of the project?

A: Demonstrating, through close collaboration with our industry partners, that it is possible and economically viable to replace petrochemical materials with renewable ones in sectors where both health (improved biocompatibility and skin regeneration properties) and environmental and end-of-life aspects such as compostability are of great concern.

Q: What do you think are the biggest benefits and challenges of bio-based compostable AHPs, wound dressings, and cosmetic beauty masks?

A: The environmental benefits are potentially huge: because the post-consumer waste from these products is highly contaminated with organic substances, mechanical recycling is practically impossible, and huge amounts of waste end up in incineration or – worse – landfills. Organic recycling can be a really viable alternative here. Moreover, the skin compatibility of biopolymesters is reportedly better than that of polyolefins. A major challenge is the price, because currently bio-based materials are a little bit more expensive than petro-based counterparts. This is normal, because they are produced on a smaller scale. Also, the industrial processing is geared towards polyolefin-based products, so some industrial investments may be necessary.

Q: For all those companies and managers who generally embrace bio-based and, for selected applications, biodegradability, but don’t really know how to transform their product portfolio – what would you recommend to them?

A: Besides collaborating with universities and research centres, I would recommend to invest in personnel with knowledge and expertise so as to enable genuine research at your own company. That way you don’t just hold a new material in your hands, but also have the full knowledge up to the molecular level to control the processes and modulate product performances.
Events

March


April

BBI JU Info Day 2018, 17 April 2018, Brussels, Belgium: https://bbi-europe.eu/events/bbi-ju-info-day-2018


May


June


July


In Other News

The revised legislative package on waste acknowledges that bioplastics play a key role in achieving EU recycling goals.

The provisional agreements reached by the European Council and Parliament on the EU waste legislative package published by the Commission in 2015, recognise the benefits of bioplastics. The new legislation acknowledges that bio-based feedstock for plastic packaging as well as compostable plastics for separate bio-waste collection contribute to more efficient waste management and help to reduce the impacts of plastic packaging on the environment. The legislative package includes the revision of the Waste Framework Directive and the Packaging and Packaging Waste Directive.

To read the full press release by the industry association and consortium partner European Bioplastics, please go to https://www.european-bioplastics.org/eu-waste-legislation-recognises-benefits-of-bioplastics/

Unilever introduces PG biodegradable tea bags

Tea bags are for many of us not only a daily companion, but also one of those items where we think they are biodegradable and can therefore be disposed in the organic waste fraction, but are in fact not. Unilever’s PG tips brand of teas now introduces tea bags that are both fully bio-based and biodegradable, as opposed to conventional tea bags that commonly contain fossil-based non-biodegradable polypropylene.


Partners of PolyBioSkin

Coordinated by IRIS from Spain, the PolyBioSkin consortium unites 12 European organizations, including universities and research centers, SMEs and the European Bioplastics industry association.

Visit our project website and subscribe to the PolyBioSkin newsletter to receive latest information, insights into biopolymer research, an agenda of relevant events and conferences, and much more.

Share interesting news and updates on our project in your social networks using the hashtag #polybioskin