

08/31/2021

Press release: CIRCULAR FoodPack



EU funded project CIRCULAR FoodPack to develop a system for circularity of packaging for direct food contact applications

Freising, Germany – CIRCULAR FoodPack aims to facilitate the circular use of plastic packaging addressing the most sensitive product category: Food. The food packaging sector constitutes of 87%¹ of all European flexible plastic multilayer-composites. Such composites are used to fulfil the high requirements for food preservation and safety. Since such material combinations are inseparable, the multi-layer composites cannot be recycled into high-quality materials by state of the art recycling technologies, which counteracts the intentions of a circular use. Instead, most multi-material composites go to landfill or energy recovery. Furthermore, the reuse of recyclates in food packaging applications is clearly restricted by EU legislation². The potential presence of undesired substances in the recyclates hence requires appropriate methods of decontaminations. Therefore, CIRCULAR FoodPack will further develop the Tracer-Based-Sorting systems to separate food from non-food packaging, enhance mechanical and physical recycling processes and eco-design innovative mono-material food and personal care packaging that will be easy to sort and to recycle. A thorough social and environmental impact analysis, as well as a market and consumer needs assessment will accompany the developments to set up a competitive business model. The CIRCULAR FoodPack project started in June 2021 and will run until November 2024 with about 5.4 million Euros of EU funding from Horizon 2020 the European Framework Programme for Research and Innovation. The project will be implemented by fourteen companies and research institutes from six European countries and is coordinated by the Fraunhofer Institute for Process Engineering and Packaging IVV in Freising.

Flexible plastic packaging is indispensable for food and personal care because of its excellent ability to meet the manifold requirements for safety and hygiene. Depending on the requirements of the packaged goods, seven or more layers are combined in a single film. However, such multi-layered film structures cannot be reliably sorted and efficiently recycled by state of the art processes. Thus, the recycling of 14.3 million tons of post-consumer flexible plastic packaging waste³ is hampered by two million tonnes of multilayer-composites from food packaging annually¹ due to their composition and untraceable origin. This targeted material stream is significant and the expected impact of the project developments is substantial.

EU legislation strictly defines the type of input materials allowed for recyclates that may be re-used in direct contact with food, but to date the waste streams of non-food and food packaging are not separated and hence their recyclates do not meet the EU requirements. This causes the loss of valuable resources, since this un-sortable waste from flexible packaging has to be incinerated or landfilled. Thus, there is a crucial need for innovative, sustainable recycling technologies and packaging solutions within the European Union to achieve EU Green Deal targets towards a zero emission society by 2050.

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This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 101003806

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High performance sorting and recycling of post-consumer food packaging waste

In Europe, the total estimated market for household flexible packaging is about 3.9 Mio tonnes per year, of which around 70% (3 Mio tonnes) is made of polyethylene (PE), polypropylene (PP), or combinations of both⁴. As the principal ability to mechanically recycle such materials at industrial scale has been proven for post-industrial waste⁵⁶⁷, there is great potential market for recycled packaging material. However, the suitable processes and infrastructure for collection, efficient sorting and recycling of post-consumer flexible packaging are not yet widely established and need to be developed further. Subsequently, the quality of the recyclates is not yet sufficient for their implementation in flexible food or premium quality personal care packaging. Contaminants, discoloration, odour and lower mechanical performance compared to new material hinder their circular use.

In order to establish a circular value chain for polyethylene-based food packaging, CIRCULAR FoodPack will further develop indispensable efficient sorting systems that allow the separation of non-food and food packaging waste for the first time. Tracer-Based-Sorting identifies packaging items containing unique printed, fluorescent tracers that emit a unambiguous signal once passing through laser light, issuing a material-specific sorting code.

CIRCULAR FoodPack intends to purify the recyclates in mechanical and physical solvent-based recycling process cascades that enable a sufficient reduction of contaminants, colour and smell. A promising deinking technology that can remove all types of inks and ensures deodorization will be scaled up in the existing mechanical treatment cascades. The cleaned material is then subjected to solvent-based recycling through the patented CreaSolv^{®8} Process for separation into different material components (e.g. fillers, additives and Polyethylene). "These new approaches of sorting, deodorization and deinking in combination with novel recycling process cascades will boost the current quality level of recycled polymers to a high-purity grade that is necessary for highly demanding and sensitive packaging applications", says project coordinator Dr. Esra Kucukpınar-Niarchos of Fraunhofer IVV.

Design of mono-material packaging containing post-consumer recyclates from flexible packaging

According to EU legislation (Regulation No 282/2008) recycled plastic materials can be incorporated in films behind a functional barrier layer, which ensures that migration of any contaminants will remain below the levels of concern during the lifetime of the packaged good. CIRCULAR FoodPack does not only work on sorting and cleaning procedures but also addresses recyclable functional barrier solutions. The project aims at developing packaging material designed for recycling containing at least 50% post-consumer recyclates.

CIRCULAR FoodPack technologies will be demonstrated in three use cases (dry food packaging, home care and personal care packaging) by designing packaging films that can be completely recycled and are suitable for reuse in highly demanding and sensitive packaging applications, such as food packaging. The project will therewith showcase the full recyclability, efficient sorting and deinking and the possible re-production of flexible packaging using post-consumer polyethylene recyclates produced by the newly developed recycling technologies/process cascades.

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Holistic assessment of all process steps and its impacts

All newly developed process steps and (by-)products will be subject to comprehensive sustainability assessments, systematically taking into account the entire life cycle, considering environmental, economic and social impacts. This will allow for evidence of the sustainability of the newly developed packaging in comparison to state-of-the-art multi-layer multi-material packaging. CIRCULAR FoodPack will identify suitable markets and material flows where the critical size for a market roll out can be easily reached and where the CIRCULAR FoodPack technologies create a benefit for business customers and consumers. The feasibility of the developed technologies in CIRCULAR FoodPack will be ensured by connecting technical and scientific excellence of the consortium partners who have access to large markets. The elaboration of business models for the exploitation of the new technologies will allow for a market roll out. A thorough study on consumer needs also concerning gender dimensions will accompany the business model development to complete CIRCULAR FoodPack's holistic approach and to enable its practical application on a large scale.

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- ¹ GVM Flexible Plastic Packaging Market in Germany and in Europe, 2016
 - ² EU Regulation No 282/2008
 - ³ Plastics – The Facts 2019, An Analysis of European plastics production, demand and waste data, Plastics Europe.
 - ⁴ CEFLEX Technical report, designing for a circular economy, June 2020
 - ⁵ Plastics Recyclers Europe, 2020. Flexible Films Market in Europe – State of Play.
 - ⁶ Research and Markets, 2020. Global Plastic Recycling Market Trends Report 2020. (Global-Plastic-Recycling-Market-Trends-Report-2020.html)
 - ⁷ MarketsandMarkets, 2018. Recycled Plastics Market. <https://www.marketsandmarkets.com/Market-Reports/recycled-plastic-market-115486722.html>
 - ⁸ CreaSolv® is a registered trademark of the CreaCycle GmbH, Grevenbroich.



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About CIRCULAR FoodPack

The project, which is funded by the European Commission under Grant Agreement Number 101003806, started in June 2021 and will receive about 5.37 million Euros of Horizon 2020, the European Framework Programme for Research and Innovation, until November 2024. Fourteen companies and research institutes from Belgium, France, Germany, Greece, Spain and Switzerland are part of the project. CIRCULAR FoodPack is coordinated by the Fraunhofer Institute for Process Engineering and Packaging IVV in Freising, Germany. Other German project partners are the Bavarian Research Alliance GmbH, Karlsruhe Institute of Technology, Kreyenborg GmbH & Co. KG, Polysecure GmbH, and Siegwirk Druckfarben AG & Co. KGaA. Two partners are based in Switzerland, Amcor Flexibles Kreuzlingen AG and Société des Produits Nestlé S.A. Further valuable expertise is contributed by the National Technical University of Athens from Greece, the SUEZ Groupe and ECOZEPT SARL from France, Amcor Flexibles Transpac and the University of Gent from Belgium and IRIS Technology Solutions from Spain.

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