

BeFORE improves packaging design for recycling

21 February 2023, 12:08

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The new project BeFORE - Barrier for recycling - in which Sirris is involved, focuses on recyclable material innovations for 'contact sensitive' plastic and paper packaging with high quality barrier properties. Its main goal is to improve design for recycling of primary packaging. This by studying the implementation potential of promising flexible packaging materials with alternative barrier materials. The project will focus on the food, pet food and cosmetics industry. Interested in partaking? Join us!

Multilayer plastic and paper packaging play a key role in protecting sensitive products during shelf life. However, high-barrier packaging materials as complex multi-material structures are excluded from the mechanical recycling path and/or may hinder the recycling of other materials in waste streams. Sorting and mechanical recycling are primary processes to valorise used packaging. While chemical recycling is evolving quickly and will become increasingly important in coming years, it is currently not economical and is not widely accepted.

Changing paradigm

With the European demand to have all packaging reusable or recyclable by 2030, material selection is focused on mono-materials. Recommendations on refusing or limiting metal and polymer barrier layers are critical to qualify packaging as single-material, sortable and recyclable

with available technologies. These assumptions lead to the supply of quality secondary materials for circular applications. Limiting the use of these essential barrier materials in packaging puts pressure on the functionality of the barrier, creating a need for other high-quality barrier materials that are regaining interest and newly developed, to comply with current recycling guidelines. This allows to change the paradigm of multi-layer packaging with a barrier layer inside the structure and **evolve towards packaging with thin functional coatings fulfilling barrier requirements.**

"Barrier" is an umbrella term, in which multiple factors are included: gas (oxygen, carbon dioxide, volatile compounds such as aroma or fragrance, or other gases), moisture, liquid (water, oil, acid) and light/UV transmission. Other barrier coated materials, such as AlOx-based, PEN, LCP or organic-inorganic hybrid barrier structures could serve as a solution. Also new materials are being developed and show promising first results. However, optimizing and validating these materials for packaging concepts is needed in the sectors of food, petfood and cosmetics, which are the main users of multilayer packaging.

Innovation target

The main goal of the project BeFORE, in which Sirris is involved is to **improve design for recycling of primary packaging** by studying the implementation potential of promising flexible packaging materials with alternative barrier materials. The creation of well-performing plastic and paper packaging, considered as mono-material, is encouraged to ensure good mechanical recycling. In this context, pre-treatments that can be implemented in mechanical recycling will be taken into account, such as de-inking and washing. Groups of key parameters have been selected to measure technical aspects of product protection and packaging recyclability: static and dynamic mechanical properties, barrier properties and the sensory quality of the product, sealability, compatibility with automatic packaging systems and recyclability in existing streams.

Three categories of products were selected for research: food, pet food and cosmetics. Each category includes dry and moist products with different water-fat content and different storage characteristics. The physical and chemical structure of the product will constitute the test selection criteria.

Project goals

To reach the innovation target, following sub-goals will be targeted:

- Alternative barrier materials are inventoried in the beginning and during the project. Compliance is assessed with European legislation and new developments, with respect to paper packaging and single-use plastics.
- Promising flexible packaging with alternative barrier materials will be screened and benchmarked against existing solutions.
- Five generic (3 plastic and 2 paper) packaging case studies (e.g. coffee, tea, dry pet food, chocolate, meat, wet wipes, liquid soaps, …) will be defined in cooperation with the guidance group companies, where multilayer packaging is replaced with a promising alternative barrier packaging
- Promising barrier materials are applied on lab-scale plastic and paper packaging to assess relevant properties linked with the cases: barrier properties, mechanical properties, chemical surface properties.
- For these case studies, the functional packaging properties are assessed

- Mechanical recyclability is tested according to the most recent recycling guidelines for which Sirris has invested in a new state-of-the-art paper recycling line.
- Assess how to be compliant with legislation on paper packaging and single-use plastics on the European market
- Strategic dissemination and communication are focussed on the companies in the value chain for accelerated uptake of project results; dissemination of results through scientific, peer-reviewed publications and presentation of research results for business.

Focus on food, pet food and cosmetics industry

The project will focus on the food, pet food and cosmetics industry. Companies in the guidance group for the value chain for coated packaging consists of **material supplier, converter, packaging producer and food manufacturer**, as the packaging demands are defined by the food manufacturer based on the demands from the retailers, customers and legislation.

Join us!

Why join this project? The members of the guidance group will be invited to regular progress meetings and get first insights into the developments within the project. They will also be consulted for defining the generic case studies.

Interested to know more on the CORNET-TETRA project BeFORE or to be part of the BeFORE guidance group? Read the following document, fill in the letter of intent and send it to Patrick.cosemans@sirris.be.

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