MULTI-2-MONO

Transition from unrecyclable multi-layered materials to recyclable mono-materials

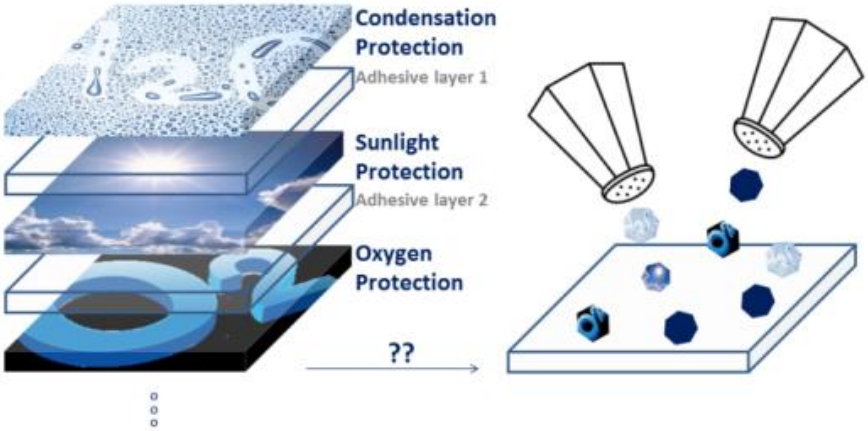
Multi-layer packaging foils

Plastic packaging materials are omnipresent. They preserve and protect the quality of the product and extend the shelf life of packaged goods. Seemingly 'simple' foils for the packaging of a broad range of (food) products are often made of multiple layers of different polymers, all of them adding their own functionality to the overall packaging foil (e.g. PET/PE for topweb sealing, PET/EVOH/PE for modified atmosphere packaging,…). Trays for cheese and meat, ready-to-eat meals or frozen-food packaging are everyday examples. Multi-layer films constitute (according to an estimate of FostPlus-Belgium) 20% of all flexible films that are put on the market. The different layers are physically attached to one another, meaning that separation into mono-materials is not possible and further inhibits any straightforward mechanical recycling. The latter implies re-melting of the mixed plastic waste streams as a blend, which adversely affects the mechanical properties as well as the processability, thus making an efficient mechanical recycling pathway very challenging. Currently, the only valorisation route of these multi-layer packaging foils includes energy recovery. With the new European objectives in terms of recyclability of food packaging, the search for full alternatives has started.

In addition to multi-layered plastics, consisting of various types of plastic materials, combinations with non-plastics such as aluminium foil and paper, are also very common. In any case (only plastics or combinations with non-plastics), recycling still remains very difficult.

MULTI-2-MONO project

The Multi-2-Mono project aims to explore the possibilities of recyclable mono-layered and mono-material foils, as a replacement for relevant difficult-to-recycle multi-layered materials. The focus will be on market relevant material combinations including PET, PE, PA, EVOH, aluminium, paper,… depending on the industrial needs.



The research approach itself will consist of two important segments:

1) ***A knowledge segment***: an overview will be given of:
   - the relation between used polymers and obtained properties in the end-product
   - the most common problems related to (recycling of) multi-layered materials
   - the currently existing recycling possibilities of multi-layered products
2) ***A research segment*** which will focus on selected cases and will tackle the following topics:
   - With respect to the existing multi-layer combinations: evaluation of composition-related issues: which contamination content still enables recycling?
   - With respect to future foil compositions:
     - Transition to mono-layer foils: evaluation of the properties with respect to the applications (adaptation in thicknesses, processing,…) and identification of the limitations of mono-layered materials.
     - Transition to mono-material systems: evaluation of mono-material use to achieve and mimic the multi-layered product properties.

The ultimate goal includes the establishment of generic guidelines to take into account when considering the transition to mono-layered products.

The objective of this project is to explore the (development) possibilities of mono-layered and mono-material foils as a replacement for multi-layered products, based on a thorough state-of-the art and experimental investigation. The output of this study should facilitate decisions regarding the design of future packaging and other currently used multi-layered materials.

Project consortium

The project consortium combines unique and complementary competences in material characterization, functionalisation, packaging properties, mechanical recycling of polymers and advanced processing techniques. The existing scientific knowledge of the partners will fasten the step towards industrial relevant, industry based case studies.

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