Multilayers for Circular Packaging; Design of circular materials and processes.

Publieke samenvatting / Public summary

Aanleiding

A major challenge is the transition to a circular economy for plastics. 40% of plastics is used for packaging. One of the major issues in plastic packaging recycling are the multilayer films composed of various materials. These films usually consist of sealing polyolefins like LDPE or PP in combination with other polymers like PET, PA or EVOH that have other properties like rigidity, oxygen barrier or protection against puncturing. Unfortunately, these films are not developed taking also recycling properties into account and after use they are incinerated. In addition these films are difficult to sort in packaging recycling lines which results in contamination of the various sorted fractions mono-material plastics, such as LDPE, PP and PET, and lowering the efficiency of these operations. To improve recyclability of multilayer films, polymer and film manufacturers are considering all poly-olefin multilayer films as an alternative. Combinations of different polyolefin layers will have to take over the functions of the non-polyolefin layers.

Doelstelling

The aim of MUCIPACK is to create new polyolefin based multilayer structures that protect good, end up in a monostream sorting fraction and are easy recyclable. These new designed multilayer structures will replace multilayer films structures containing more than 1 type of material, for instance a 3 layer film with PE and PP at the outside and PET, EVOH or PA6 in the middle. The

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Algemene informatie / General information

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recyclability of these polyolefins will be proven by sorting and mechanical recycling. In addition, a chemical recycling technology will be developed to remove components that hamper a high quality output of mechanical recycled materials such as odor, adhesives and color. Results of the project will be summarized in guidelines to inform stakeholders. MUCIPACK fits well within the program line 'Circulaire grondstoffen, processen en producten'. The results of this development lead to a significant contribution to the circular economy. MUCIPACK aims a reduction up to more than 100 kton CO2 eq per year.

Korte omschrijving

MUCIPACK start with the design of materials and multilayers films for recycling. First 3 different cases will be selected, i.e. structures that currently consist of different materials like PET, PA, EVOH and polyolefins and/or different coatings. We will define and produce the new structures serving the same final application (SABIC) and test them at production scale (Flexoplast). Next, sorting (HVC) and mechanical recycling (BMC) will be performed to show the recyclability. In addition a chemical recycling technology will be developed for the removal of components that influence the recyclability by mechanical recycling such as odor, color and adhesives (TNO). An environmental and economic assessment is performed to determine the impact (TNO). Results of the environmental assessments will support technical choices, system optimization and the direction of the research and development process. Finally, guidelines for the production of all-polyolefines multilayer films are described (SABIC/BMC). Results are disseminated to stakeholders using our excellent network (all). Project management is carried out by TNO.

Resultaat

The following main deliverables will be generated during the project: - Guidelines how to re-design packaging products based on polyolefins; - At least 3 alternative monomaterial multilayer designs that will end in the correct monostream sorting fraction (TRL 6-7); - Recyclability of multilayer polyolefin

films shown in at least 3 post-recycling applications. The applications have added value for the market, such as shrink film or form retaining materials for packaging. - A method to remove odor, adhesives and color from the plastic (TRL 3-4).

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
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