

PlastiCycle 4.0

Publieke samenvatting / Public summary

Aanleiding

In the current operation of mechanical recycling of plastics there is still a lack of understanding how to come from (sorted) waste plastics to recycled plastics with a quality the market can use and is willing to pay for, especially related to more demanding and functional applications. This results in a supply and demand inconsistency and a growing pile of unsold recycled plastics. Moreover, in their pledge to offer quick results for the recycling of plastics, large material and end-product producers tend to move away from mechanical recycling of plastics, favouring (thermo-)chemical recycling as the preferred and quick route. While complementary recycling pathways have to be explored, mechanical recycling of plastics should be further exploited for quality materials. To help resolve this contra-productive inverted Ladder-of-Lansink approach, PlastiCycle 4.0 aims to explore the new potential of quality-based recycling via leading edge technologies in analytics, physical processing, chemical interaction and stability and digitalization.

Doelstelling

PlastiCycle 4.0 will unlock the potential of quality-focused plastic recycling via sensing, processing and digital technologies to improve plastic circularity for Dutch industries. More specifically: - Deliver concrete ways to predict and assess specific quality parameters which are relevant for the functionality of the recycled plastics for the various use-cases - Deliver a new approach for assessing the quality of recycled plastics for mechanical recycling - Delivering an increase in in-depth know-

Projectinformatie / Project information

Projectnummer / Project number

TKITOETKI2023PlastiCycle

Subsidiebedrag / Grant amount

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Algemene informatie / General information

Penvoerder / Secretariat

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how to produce high-quality recycled plastic products, supporting building up high-quality human capital which is essential for the material transition

Korte omschrijving

This project combines plastic sensing, processing, and digital technologies. The universities will develop the scientific procedure of the project and implement and validate the approach together with the industrial partners in the specific use-cases. The department of circular chemical engineering provides scientific expertise in polymer processing, characterization, and digital modelling. The department of chemometrics and analytical chemistry offers rapid sensing technologies, analytical models, and industrial computational strategies. Technology providers and/or industrial partners provide advanced characterization technology, as well as infrastructure for processing. The following activities are foreseen: 1. Assessment of the sensing and characterization technologies related to the chosen plastics and applications in the use-cases, providing an overview of characterization and sensing options. 2. Develop and validate the smart production formulation model for mechanical recycling based on the interactions assessed from sensing and material interaction. 3. Assess the environmental and economic impact on the plastic value chain using the validated model.

Resultaat

The project will deliver the following results: 1. A balanced and validated set of sensors and analytical technology (e.g. chemical, rheological, morphological) to understand novel plastic additives (reactive plastic modifier, advanced compatibilizer) in the formulation of recycling industrially relevant recyclate (including diverse types of waste PP and/or PE) streams. 2. New and validated AI models to further understand the potential of such novel plastic additives in a predictive manner for industrial conditions. Thereby reducing uncertainty around development and application of such additives. 3. A (combined) methodology to rapidly assess the feasibility of recycling unique plastic waste streams

(e.g. cross-linked expanded PE) and/or specialized recycled product applications (e.g. post-consumer recycled PP for specialized injection moulded products). 4. Newly developed and validated sensors and analytical techniques as part of the total methodology (focusing on energy, chemical fingerprints, etc.), together with a smart product formulation model and a value chain model which will provide insights into new value chain reintegration opportunities.

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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