C-PlaNeT
CIRCULAR PLASTICS NETWORK FOR TRAINING

FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG
FACULTY OF SCIENCES

ESR 15
Recycling of Polymers from Collected Beach/Ocean Plastics

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***Partner University*: University of Ghent, Belgium**

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Motivation

"By 2050, there would be more plastic than fish in our oceans"
The Ellen McArthur Foundation

- 8 million tons of plastic debris enter the oceans each year
- Plastics are the biggest pollutant of water bodies
- Impact of marine plastics affects several industries
- Under-developed research on recycling of marine plastics
- UN SDGs related to marine litter solutions stress on recycling
- The 2025 Targets for Solutions on Marine Plastics Litter

  (International Union for the Conservation of Nature)

Objective

- Recovery of high-quality polymers from marine plastics using innovative recycling technologies – Solvent-based recycling
- Identification of suitable collection systems
- In-depth characterization of the bulk as well as recycled plastics; Physical/mechanical properties, presence of potentially hazardous contaminants in the recycled material
- Chemical recycling opportunities for non-target polymers

Challenges

- Difficult sampling, collection and sorting
- Mixed feed containing different types of polymers
- Environmental conditions cause fractioning and degradation of plastic debris
- Contamination (from marine biota and/or plastic additives / chemical stabilizers / POPs)
- Availability of marine waste samples

Road Map

Characterization of Marine Plastics Waste (PP & PE)

- Molecular weight distribution
- Chemical composition
- Melt Flow Index
- Mechanical Properties
- Degradation processes

Lab-scale Solvent-based recycling CreaSolv® Technology

- Characterization of recyclates
- Assessment of the recycling technology efficiency in contaminant removal

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Fraunhofer IVV

Scale-up of CreaSolv® process (100kg waste input feed)

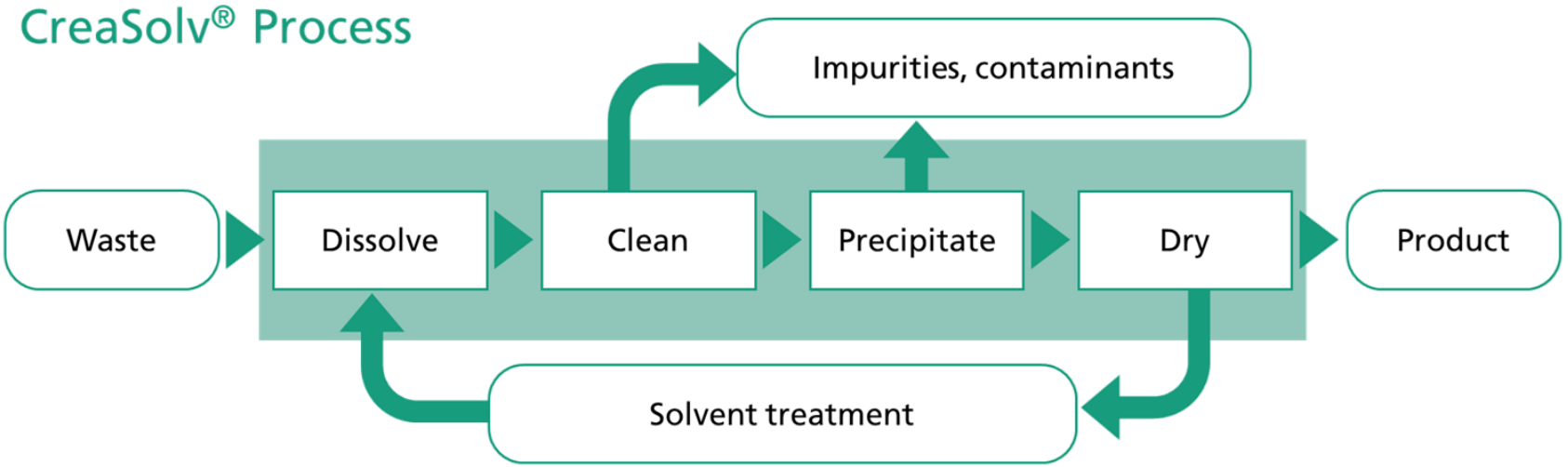
- Scale-up feasibility
- Potential application for recycled material

GHENT UNIVERSITY

Chemical Recycling for non-target polymers – Steam Cracking

- Thermochemical recovery of monomers from non-target polymers

The CreaSolv Technology



Source: https://www.ivv.fraunhofer.de/en/recycling-environment/recycling-plastics.html

Expected Outcome

- Identification of target polymers
- Recovery of target polymers by innovative recycling techniques
- Physico-chemical material characterization – bulk feed and recyclate feed
- Investigating chemical recycling opportunities for non-target polymers
- Investigation, improvement and identification of cleaning and upgrade potential of the applied recycling technologies with respect to hazardous contaminants and physical/mechanical properties

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Thank You For Your Attention

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