

Vacancy for postdoctoral researcher: Heterogeneously catalyzed chemical recycling of mixed plastic waste

Aim

Evaluate the role of heterogenous catalysts and impurities in plastic waste on the obtained products from thermochemical conversion processes such as pyrolysis. The research will entail using advanced experimentation and model feeds in an integrated team of researchers. For catalyst screening, a micropyrolysis-GC technique can be employed and the stability of promising catalyst formulations can be studied using a small bench-scale fluid bed system.

Justification

Plastics are a key material within the circular economy. Their broad diversity in terms of composition and processing techniques allows them to be used in a great variety of efficient applications. However, it is exactly this diversity that makes them challenging at end-of-life. The most common approach towards reprocessing plastic is mechanical recycling in which thermoplastics are recycled towards other plastic applications. Complex input materials such as mixed and contaminated plastics, however, typically result in downcycling towards 'lower grade' products. For many additives and auxiliary materials or residual fractions (e.g. PVC) from other pretreatment steps, no 'easy' separation technology is available. Chemical recycling using thermochemical conversion and catalysis has the potential for closing the loop for mixed end-of-life plastic waste.

Responsibilities

A number of tasks will be executed in this research project:

1. Detailed characterisation of the feedstock and overview of impurities
2. Prioritisation of impurities to be tested
3. Catalyst preparation and testing for heterogeneously catalysed chemical recycling of mixed plastic waste to olefins
4. Characterization of freshly prepared and spent catalysts to study deactivation phenomena

Supervisor(s): Prof. Kevin. M. Van Geem

FUNDING: VLAIO-SBO Watch

Requirements

Essential:

The successful candidate will be expected to arrive with substantial experience in several materials characterization techniques, communication of the significance of new data, and laboratory safety. Emphasis is placed on:

- Design and synthesis of heterogeneous catalysts with control over key features
- Familiarity with materials characterization techniques (chemisorption, physisorption, XRD, electron microscopy, TGA etc.)
- Reaction engineering including the design of experiments to determine structure-function relationships
- Presentation of findings in high-impact journals and conferences
- Development of new concepts and ideas for controlling materials properties across multiple length scales
- Troubleshooting and problem-solving skills; attention to detail; dedication to a safe and clean work environment
- Ability to conduct laboratory experiments, with minimal supervision

Desirable:

- Familiarity with gas chromatography hyphenated with different detectors (TCD, FID, MS)
- First expertise with thermochemical conversion processes, in particular pyrolysis