

Request for Knowledge Partners (3 May 2022)

Project title: Treatment of plastic waste by innovative Extrusion technology for the removal of halogens for Chemical recycling

Acronym: TECH

| Project ID | |
|-----------------------------|--|
| Type | ICON |
| Period | 2 years |
| Starting date | TBD |
| Total project budget | TBD |
| Subsidy percentage | according to SBO and O&O regulations |
| Current industrial partners | confidential |
| Catalisti contact(s) | Wannes Libbrecht (wlibbrecht@catalisti.be) Stef Koelewijn (skoelewijn@catalisti.be) |

Project description

Introduction

To increase the recycling rate of numerous plastic waste streams, chemical recycling, among others, will become an enabling technology. Currently, less than 20% of the plastics are collected for recycling. EU legislation has set targets that have been implemented by the member states to increase the use of recycled plastics. In Flanders the (Vlarema 8) legislation will push towards a more circular use of plastics as well. While these plastic waste streams hold an enormous recycling potential, currently, only a minor fraction of plastic waste is valorised by mechanical recycling due to its inherent characteristics (degradation, product quality). The remainder is being sent to landfill and incineration. Chemical recycling technologies can complement existing recycling technologies to further close the loop. However, the quality of the produced product is crucial for the next step in the value chain.

The quality of the input plastic waste determines the quality of the products in all recycling technologies. Innovations that allow to broaden the input specifications will assure larger, more economic, availability of waste feedstock, and are therefore crucial in establishing widely applicable recycling technologies. A contaminant within plastic waste streams which often hinders recycling is the presence of halogens (chlorine or bromine). Via innovative extrusion technologies, this consortium will look into the potential to efficiently remove these contaminants, study its behaviour during processing, and evaluate the resulting improved streams for chemical recycling.

Goals

In a first part, an innovative extrusion technology will need to be developed that is capable of removing halogens from mainly polyethylene and polypropylene waste streams. The current state of the art tolerates only minor levels of halogens to be present in the plastic waste feedstock. The consortium will develop a twin-screw extruder with degassing ports capable of handling and removing large(r) fractions of halogens.

To promote migration of halogens within a viscous media, an understanding of the physical and chemical phenomena occurring with said halogens will need to be developed as well. Both physical parameters, such as extruder design or physical shape of the waste materials, as the parameters which influence migration, such as temperature, will need to be investigated. Since numerous additives are typically applied in halogen-rich waste streams, their effect on the extrusion as well as the chemical recycling process will need to be characterized. In addition, the consortium will explore whether catalysis or binder technology can be developed to aid with the halogen removal.

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In a second part, the transport of plastic melt, which is often a challenging process due to the high viscosity, will need to be developed. Again, both physical and chemical phenomena will need to be characterized since it might negatively affect product quality. The consortium aims to develop solutions to overcome this problem.

A third part is dedicated to the feedstock. Plastic waste feedstock is variable and heterogenous in nature. The consortium will investigate which type of feedstock is most suitable for recycling. The latter concerns investigation of the best physical preparation as well as characterization of elements present in the feed stream which might affect extruder or the chemical recycling technology performance. Testing real-life plastic waste streams in collaboration with a recycling company to evaluate the effectiveness of the developed technologies in removing halogens from said waste streams will be executed as well.

The consortium aims to progress the research trajectory from TRL 2-3 up until TRL 6 at the end of the project.

Request

With this Request for Partners, we would like to invite universities/knowledge institutes that have expertise, technology or knowledge relevant to the project to respond to this request. **To reach the project goals, the consortium is particularly searching for the following (non-limitative) expertise:**

- Expertise in the field of pre-treatment technologies (e.g. identification, sorting, separation) for halogen-contaminated plastic (waste) streams, which might further facilitate and improve the extrusion and/or chemical recycling process. Analytical capabilities for characterization, analysis and modelling of said technologies.
- Expertise in the field of treatment and/or valorization of halogen-rich gaseous (waste) streams that are produced while applying the extrusion process on halogen-contaminated plastic (waste) streams. Contributions focusing on closing the halogen-loop are strongly encouraged.
- Expertise in the field of catalysts and/or additives for selective dehalogenation.

How to reply to this request

Please send your **proposal by email** before **Deadline May 17 (16h00)** to Catalisti, **exclusively via your association representative** (see contact list below). An application (2-3 pages without attachments) should contain at least the following items:

1. Organisation and research group
2. Name and contact details of person submitting the proposal
3. Name and contact details of person(s) who will perform the actual tasks (if different from submitting person)
4. A proposal of your role in the project: for which expertise/assignments described above do you apply?

Provide a concrete proposal on:

- how you want to contribute to the required expertise/assignments and how you want to solve the (research) problem described above
- how this fits in the (long-term) ambition of the research group/knowledge institute

If you consider your contribution to fit within fundamental basic research (SBO), please provide argumentation.

5. A description of your expertise/track record/experience in the specific topic of this RfP, for which you are applying (at the 3 organisational levels as mentioned above, i.e. for the organisation and/or research group, for the person submitting the proposal, as well as for the executing person(s)) (preferably give the resumes of submitting and executing persons attached)
6. A list of relevant funded projects (Catalisti, VLAIO, EU, ...) where you were a coordinator or partner
7. A commitment to prepare a full project proposal by June 2022 together with the other project partners.

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Please contact your association representative for more details on how to write your application.

Contact List

- KU Leuven: Bert Lagrain (bert.lagrain@kuleuven.be);
- UAntwerpen: Ann Aerts (annfb.aerts@uantwerpen.be);
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- IMEC: Kris Van De Voorde (kris.vandevoorde@imec.be);
- VKI: Peter Simkens (peter.simkens@vki.ac.be).

Evaluation

The industrial partners, together with Catalisti, will review all proposals obtained before the deadline mentioned above. The industrial partners will make a selection of the best proposals based on the following criteria:

- your expertise in the requested expertise domain (5pt)
- your experience in carrying out similar assignments (3pt)
- your experience in other relevant funded projects as a coordinator or partner (3pt)
- complementarity with the other executing project partners (4pt)

After submission of your proposal, you can be contacted by telephone or invited to an online or live meeting (if this is deemed necessary by the industrial partners) to further elaborate your offer. *Please note that the selection will be made primarily based on your written proposal, so be complete and thorough, without anticipating on a further elaboration of your proposal.*

The final decision will be communicated typically within 2 weeks after the deadline mentioned above, but could take longer depending on the number of proposals and selection of a balanced project consortium.

Contact

Please contact Wannes Libbrecht (wlibbrecht@catalisti.be, +32 499 31 56 04) or Stef Koelewijn (skoelewijn@catalisti.be, +32 487 67 20 77) if you have any questions concerning this RfP or the Catalisti procedures in general.

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