

**Sabancı University's Potential Contribution to "Increasing the circularity in plastics value chains - HORIZON-CL6-2024-CircBio-02-2-two-stage"**

Sabancı University offers broad expertise and advanced infrastructure on the recycling of complex, multi-component or laminated plastic waste from various sources for the recovery of polymers in thermoplastic nature.

The core competence of Sabancı University researchers having both academic and industrial backgrounds includes:

- i) Structure-property-process-performance relationships in polymeric materials and composites*
- ii) Advanced purification of polymers*
- iii) Depolymerization and re-polymerization of condensation polymers*
- iv) Advanced characterization of monomers, oligomers and polymers*

Sabancı University's state-of-the-art laboratory facilities include:

- i) Custom design, tailorable, lab-scale, dissolution and purification system with 100 ml capacity and 500 ml capacity*
- ii) Lab-scale pressurized Nutsche type filter with 5 lt capacity*
- iii) Custom design, tailorable, semi-pilot scale solvent-based recycling system with 40 lt capacity (TRL 6)*
- iv) Lab-scale depolymerization, purification and re-polymerization systems for condensation polymers*
- v) 50 L and 100 L chemical synthesis, recycling and polymerization reactors*
- vi) 12 mm mini twin screw extruder*
- vii) Mini single screw extruder, film blower, filament extruder*
- viii) Mini injection molding equipment*
- ix) 18 mm pilot scale twin screw extruder*
- x) Laboratory scale high shear melt mixer*



**Custom design, tailorable, semi-pilot scale solvent-based recycling system with 40 lt capacity (TRL 6)**

Sabancı University can contribute to the following expected outcomes of the call “Increasing the circularity in plastics value chains - HORIZON-CL6-2024-CircBio-02-2-two-stage” as given below:

- **“Emergence of new value chains using upcycled and/or recycled resources, e.g. through industrial symbiosis”**: In order to ensure industrial symbiosis, Sabancı University can take a role in purifying plastic waste from selected industries to a level that can be used in other industries. By purifying the target plastic, we can eliminate the obstacles that arise regarding the reuse of waste in in the same industry or as well as in another industry.
- **“Increased upcycling and recycling rates for the targeted material streams”**: The biggest obstacle to increased upcycling and recycling rates is the decrease in material quality during the recycling process. Mechanical recycling remains insufficient to ensure material quality most of the times. Processes such as depolymerization or pyrolysis are also very costly in terms of energy and operation. However solvent-based recycling systems can purify targeted plastics, and so can increase both their recycling and upcycling potential. Here, a new solvent platform can be proposed by Sabancı University or the solvent suggested by another partner can be studied.
- **“Increased uptake of recycled material and upcycling to new higher-value products”**: Sabancı University can perform detailed testing and characterization of targeted products.

Sabancı University’s possible contributions to the scope of the call are given below:

- **“Proposals should demonstrate and deploy at large scale innovative solutions and designs for increased quality, non-toxicity and durability of secondary materials and increased share of secondary materials in new products”**: A higher quality product is obtained with the solvent-based recycling method compared to classical and mechanical recycling. In addition, non-toxicity can be achieved depending on the nature of the solvent used or the ability of the solvent to be removed from the polymer matrix. In addition, the solvent-based selective dissolution methodology can separate several materials from each other and secondary materials can be recovered and used repeatedly.
- **“Proposals should demonstrate increased recovery, recycling and upcycling rates and a higher uptake of secondary materials for high value applications. Special attention should be given to the increased circularity of critical raw materials”**: The previous explanations also apply to this call scope.
- **“Activities are expected to achieve TRL 6-8 by the end of the project”**: We can already move the studies to TRL6 and we have the ability to increase them to TRL8 if there is an appropriate source.

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