



**Project title:** Biobased self-functionalised self-reinforced composite materials based on high performance nanofibrillar PLA fibres — BIO4SELF

**Partners:** ITA, CTB, DTU, ICT, UM, NTT, MAIER, ARCELIK, COMFIL, TECNARO, FIBROCHEM, MIRTEC, IBA, R-Tech, OSM

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### Mission Statement

The worldwide demand for replacing fossil-based raw materials for the production of polymers leads to a significant growth of bioplastics in terms of technological developments. However, there still exist drawbacks that prevent the wider use and commercialisation of biobased material. Two important ones are:

- **Lower mechanical performance:** although PLA can already replace conventional materials (like polyester) for quite some applications, its limited mechanical strength is still hampering commercial application.
- **Limited durability:** for application with long lifetime, PLA is not optimal yet due to its limited hydrolytic stability.

Enhancement of these properties remains an important challenge for biobased polymers. There is a need to develop biobased, sustainable polymeric materials with high stiffness, high impact and high durability without impairing recyclability.

### Approach

The BIO4SELF project will tackle these drawbacks and aims for unprecedented stiffness by combining PLA (the largest used biopolymer) with a bio-LCP (Liquid Crystalline Polymer) to create an extra reinforcement level. Furthermore, the temperature resistance of PLA and its durability will be improved. The latter via adding well-chosen anti-hydrolysis agents. Further, inherent self-functionalization via photocatalytic polymers (self-cleaning properties), tailored microcapsules (self-healing) and deformation detection fibres (self-sensing) will be added.

The potential of the biobased materials will be proven in advanced prototypes for automotive and home appliances. Cost-efficient production of fully biobased composites meeting the demand for high technical performances and sustainability will be pursued by investigating the performances of new biobased materials in plastic manufacturing.

The ITA will contribute to the project with lab and industrial scale experiments. ITA is WP 3 leader and in charge of the development of composite intermediates. In doing so, ITA will develop a commingling process for the various filament yarns as well as a weaving process for these yarns. Composite test specimens will be produced using hot pressing to evaluate the yarns and woven fabrics.

The BIO4SELF consortium is strongly industry driven, including 5 large enterprises and 5 SMEs. These are completed with 3 universities and 3 research centres. This way BIO4SELF covers all required expertise and infrastructure from academic, applied research and industry from 10 different EU countries.

#### Acknowledgement

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More information on the project website: [www.bio4self.eu](http://www.bio4self.eu)