

## Research partners



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**Improved sizings for recycled carbon fibres to optimize adhesion with polymer matrices and to improve processing behaviour for composite manufacturing (297 EBR)**

### 30<sup>th</sup> CORNET Call

Project Start Date: 01.10.2021

Project Duration: 24 months

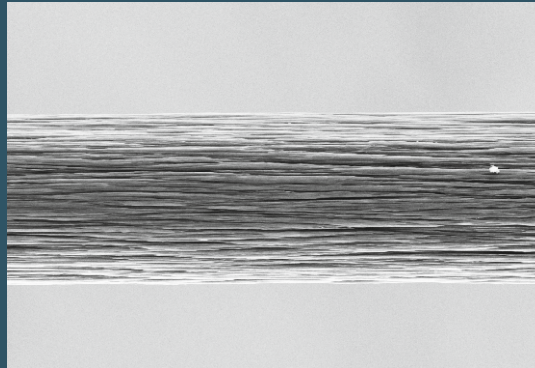


## Background

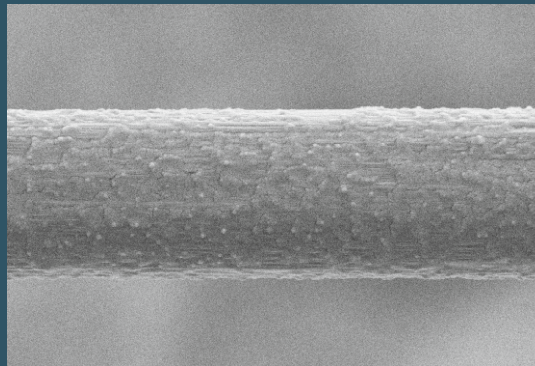
The increasing amount of carbon fibres (CF) used in carbon fibre reinforced plastics (CFRP) for instance in aerospace, transportation and automotive sectors requires recycling strategies that allow a second life, preferably a cascade usage of CF. The market of recycled carbon fibres (rCF) is forecasted to a growth of 12.0 % until 2025 according to current studies which indicates the urgent need of new strategies to develop process routes for rCF-based composites. Current recycling technologies for CFRP, e.g. pyrolysis or solvolysis, remove the polymeric matrices but also the sizings from the CF. During these processes the CF filament surfaces are often damaged. This is one of the limiting factors for the re-usage of rCF as reinforcing structures to increase the mechanical properties in composite materials.

## Goal

The main objective of the project is to develop a concept for the re-sizing of recycled carbon fibres and the adaptation of the sizings for selected thermoset (EP, PUR) and thermoplastic matrices (PA6, PPS). The rCF equipped with chemically compatible and process-adapted sizings are processed into nonwovens, from which, in combination with the matrices, lightweight components with improved mechanical properties compared to unsized rCF are produced. The starting material is rCF obtained from pyrolysis and solvolysis processes. Besides the aspect of fibre-matrix interaction, the project also considers the issue of sizing application.



Unsized carbon fibre



Sized carbon fibre



Sizing agents

Photos: IPF

## Research Method

The research approach is divided in three main fields: 1) development of sizings and sizing formulations, 2) elaboration of suitable sizing application techniques and 3) development and production of nonwovens with unsized and resized CF and their further processing to composites. All three fields will be accompanied by testing and evaluation procedures to see the impact of the developed sizings on mechanical properties of the composites and for benchmarking with State-of-the-Art (SoA) products.

## Project Results

Targeted results of the project are:

- Adapted sizings in combination with suitable matrix materials for improved mechanical properties of rCF reinforced composites;
- Application of adapted sizings for rCF on an industrial scale;
- Increasing the market acceptance of rCF among manufacturers of composite materials to expand the range of applications;
- Increasing the competitiveness of rCF compared to primary CF;
- Cost-effective production of carbon fibre reinforced composites and improvement of resource efficiency and sustainability.