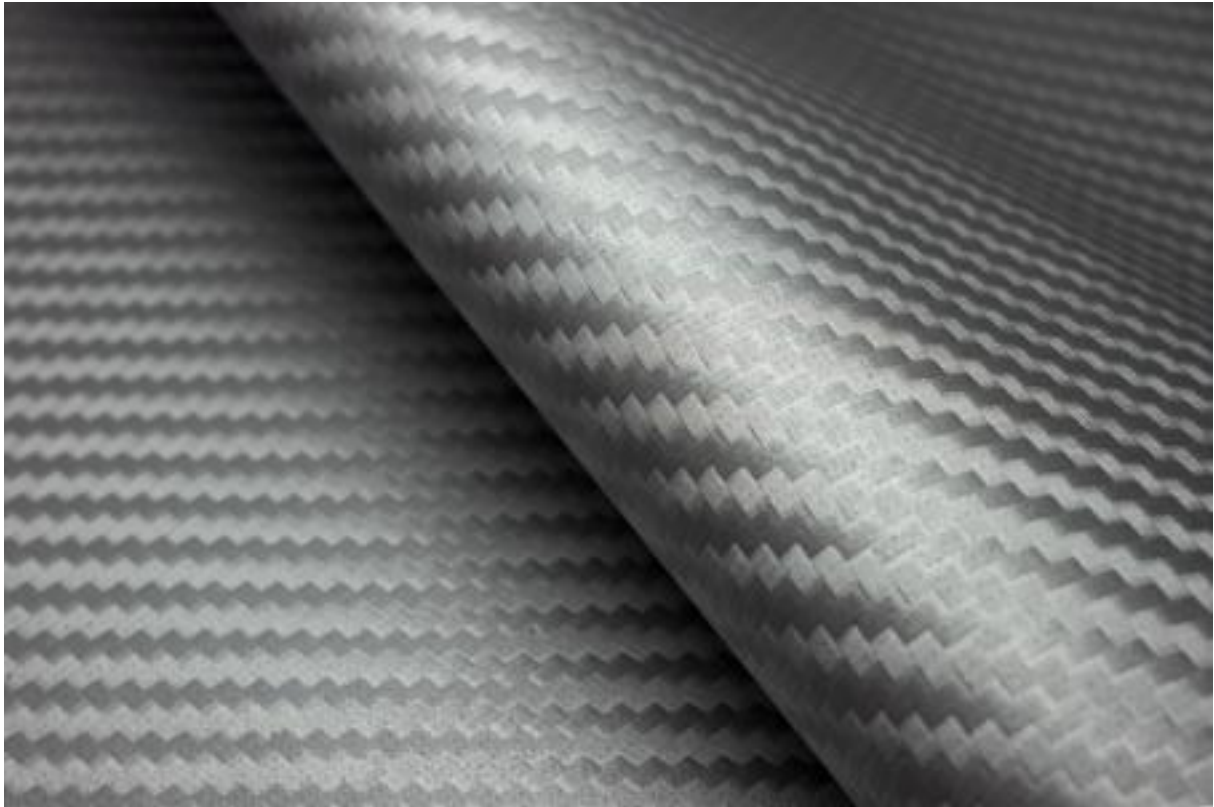


Recycling carbon fibre-reinforced plastics: closed material cycle with solvolysis

About this project



EDISON-rCF

Recycling carbon fibre-reinforced plastics: closed material cycle with solvolysis

Markets:



Material:

Carbon fibres, Thermoset plastics, Yarns, rovings, Nonwovens, mats, Carbon-fiber reinforced plastics (CFRP)

This project is funded by the Technology Transfer Programme Leichtbau (TTP LB) of the Federal Ministry of Economics and Energy.

[Technology Transfer Program Leichtbau](#)

Recycling carbon fibre-reinforced plastics: closed material cycle with solvolysis

About this project

Context

Carbon fibre-reinforced plastics (CFRP) play an important role in lightweight construction, for example in aviation and the construction industry, as they are both lightweight and extremely resilient. However, their recycling has posed a major challenge for the industry to date: every year, thousands of tonnes of CFRP waste are produced worldwide that can hardly be recycled for high-quality applications. Conventional processes such as pyrolysis, in which CFRP is heated to high temperatures in the absence of oxygen, damage the fibres, destroy important material properties and lead to a loss of up to 50 percent of the material mass. This is where the EDISON-rCF research project comes in.

Purpose

The scientists want to process recycled carbon fibres (rCF) so that they can be reused in sophisticated lightweight construction materials such as carbon concrete. They are developing new processes for the production of nonwovens and yarns that are to be used specifically as reinforcement in the construction industry. They are also standardising the quality of the products to ensure their industrial scalability.

The core of the project is an energy-efficient solvolysis process. Instead of destroying the matrix with heat, it dissolves the matrix with special liquids, leaving the fibres undamaged. This not only opens up new possibilities for recycled fibres, but also for the further use of the matrix in the chemical industry. The researchers are thus striving for a closed material cycle for CFRP that simultaneously protects the environment and reduces dependence on raw material imports. At the same time, they are developing a comprehensive life cycle assessment to evaluate the sustainability of the process.

Recycling carbon fibre-reinforced plastics: closed material cycle with solvolysis

About this project

Procedure

Firstly, the researchers prepare CFRP waste using sorting and shredding processes. Using the newly developed solvolysis process, they separate the fibres from the matrix without impairing their mechanical properties. The recycled fibres are then processed into high-quality semi-finished products such as nonwovens and yarns. To make this possible, the scientists develop and optimise specialised machines that ensure precise alignment and processing of the fibres in order to qualify the products for the requirements of the construction industry and other lightweight construction sectors.

The researchers carry out repeated tests and optimisations to guarantee consistently high quality. At the same time, they are comparing the new recycling process with existing recycling methods as part of a detailed life cycle assessment. They use these analyses to further increase energy efficiency and minimise the environmental impact. Finally, the team develops demonstrators that show how the recycled materials can be used in practice.

Funding duration:

Funding sign:

03LB3007

Funding amount:

EUR 1 million

Final report

Further websites

foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3007A - EDISONrCF in the federal funding catalogue

Recycling carbon fibre-reinforced plastics: closed material cycle with solvolysis

Project coordination

Contact:

Mr Dipl.-Ing. (FH) Marcel Zeisberg

+49 0157 80603-781

marcel.zeisberg@zeisberg-carbon.com

Organisation:

Zeisberg Carbon GmbH

Voltmerstr. 65
30165 Hannover
Lower Saxony
Germany

www.zeisberg-carbon.com



English (EN){ { Projektpartner } }



Lightweighting classification

Realisation

Offer

Products

Parts and components, Semi-finished parts,
Machines and plants, Materials



Services & consulting

Validation, Approval



Recycling carbon fibre-reinforced plastics: closed material cycle with solvolysis

Lightweighting classification	
	Realisation
Field of technology	
Design & layout Hybrid structures	✓
Functional integration	
Measuring and testing technology	
Modelling and simulation	
Plant construction & automation Plant construction	✓
Recycling technologies Material separation, Recycling	✓
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming	
Processing and separating	
Textile technology Fibre manufacturing, Nonwoven & mats production	✓

Recycling carbon fibre-reinforced plastics: closed material cycle with solvolysis

Lightweighting classification	
	Realisation
Material	
<i>Biogenic materials</i>	
<i>Cellular materials (foam materials)</i>	
Composites Carbon-fiber reinforced plastics (CFRP)	✓
Fibres Carbon fibres	✓
<i>Functional materials</i>	
<i>Metals</i>	
Plastics Thermoset plastics	✓
<i>Structural ceramics</i>	
(Technical) textiles Yarns, rovings, Nonwovens, mats	✓