

Project title: AlgaeTex

Partner: adidas AG,
University of Bayreuth, Macromolecular Chemistry II,
Fraunhofer Institut for Interfacial Engineering and Biotechnology (IGB),
Fraunhofer Center for Chemical-Biotechnological Processes (CBP),
Institut für Textiltechnik of RWTH Aachen University (ITA)

Duration: 12/2020 - 11/2023

Funding Agency: Innovation space BioTexFuture funded by Federal Ministry of Education and Research (BMBF)

Univ.-Prof. Prof. h.c. (MGU) Dr.-Ing. Dipl.-Wirt. Ing. Thomas Gries
Director

Christoph Peiner, Amrei Becker, Henning Löcken, Mathias Schmitz
Scientific Researchers

CP/AB/HL/MS
22.02.2021

Mission Statement

In the BioTexFuture innovation space, the transformation of the textile industry from petroleum-based to bio-based is being researched. In the AlgaeTex sub-project, the development of microalgae as a raw material basis for plastic filaments to produce sustainable textile products is being researched. This development will make an essential contribution to sustainability and the German textile industry's future viability.

Specifically, in three project years, various monomers and polymers will be developed with the highest possible proportion of algae-based raw materials. The polymers produced will be melt spun and converted into high-quality textile demonstrators.

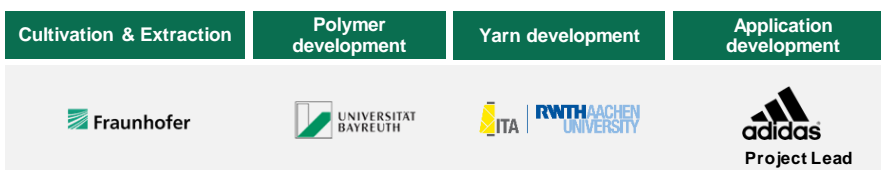
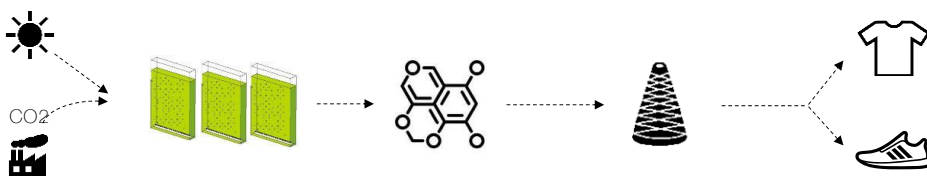


Fig. 1: AlgaeTex Mission Statement

In particular, the AlgaeTex project aims to demonstrate the applicability of algae-based multifilament fibres for textiles in the sports industry, such as knitted shoe uppers or T-shirts. The sustainability of the process chain for the production of the demonstrators is examined holistically and in detail. In cooperation with experts, the socio-economic and legal aspects are also included in the investigations.

Solution

In order to achieve the goals of the AlgaeTex sub-project, algae cultivation will first be optimised to produce chemical base materials for polymer production. The aim is to produce purified fatty acid methyl esters (FAME). To this end, findings from bio-based fuels research are being taken up. Plastics relevant to the textile industry, such as polyamide and polyester, are produced from chemical base products (FAME). The plastics produced are qualified for the textile value chain in spinning and knitting trials and finally converted into a textile demonstrator of the highest possible quality for the sports goods industry.

The results obtained in the individual work steps show good scientific-technological as well as economic prospects of success. In particular, it is critically examined in each project phase whether a corresponding scaling up to more considerable raw material and plastic volumes seems to be possible, so that an industrial utilisation of the project results is also given. In summary, the following goals are being pursued:

1. Extraction of fatty acids from microalgae
2. Scalability of production scenarios of fatty acid-rich microalgae in artificially illuminated photobioreactors
3. Fatty acid accumulation and fatty acid profile as a function of light intensity and light spectrum
4. Derivatization of fatty acids to monomers and corresponding polymers
5. Qualification of the produced polymers for the textile process chain
6. Production of high-performance textile demonstrators for the sporting goods industry

Acknowledgements

We want to thank the Federal Ministry of Education and Research (BMBF) for funding the innovation space BioTexFuture and this research project.



Contacts ITA

Christoph Peiner, M.Sc.
Head of Department
Fabric Production
ITA – Institut für Textiltechnik of
RWTH Aachen University
Otto-Blumenthal-Str. 1
52074 Aachen
christoph.peiner@ita.rwth-aachen.de

Amrei Becker, M.Sc.
Scientific Researcher
Multifilament Technologies
ITA – Institut für Textiltechnik of
RWTH Aachen University
Otto-Blumenthal-Str. 1
52074 Aachen
amrei.becker@ita.rwth-aachen.de

Henning Löcken, M.Sc.
Scientific Researcher
Fabric Production - Knitting
ITA – Institut für Textiltechnik of
RWTH Aachen University
Otto-Blumenthal-Str. 1
52074 Aachen
henning.loecken@ita.rwth-aachen.de

Mathias Schmitz, M.Sc.
Scientific Researcher
Multifilament Technologies
ITA – Institut für Textiltechnik of
RWTH Aachen University
Otto-Blumenthal-Str. 1
52074 Aachen
mathias.schmitz@ita.rwth-aachen.de

Contacts Partner

Andrew Yip
Senior Manager
Technology Innovation
Adidas AG
Adi-Dassler-Straße 1
91074 Herzogenaurach
andrew.yip@adidas.com

Dr. Ulrike Schmid-Staiger
Fraunhofer Institut for Interfacial Engi-
neering and Biotechnology IGB
Head of Algae Biotechnology Group
Nobelstr. 12
70569 Stuttgart
ulrike.schmid-staiger@igb.fraunhofer.de

Gordon Brinitzer
Fraunhofer Center for Chemical-Bio-
technological Processes CBP
Am Haupttor, Bau 1251
06237 Leuna
gordon.brinitzer@cbp.fraunhofer.de

Prof. Dr. Andreas Greiner
Macromolecular Chemistry II
University of Bayreuth
Universitätsstr. 30
95447 Bayreuth
greiner@uni-bayreuth.de