Thomas Koehler ✎   Mar 31, 2021   2 min read

AlgaeTex - Extended project info revealed

Development of algae-derived biopolymers for the application of textiles in the sporting goods industry
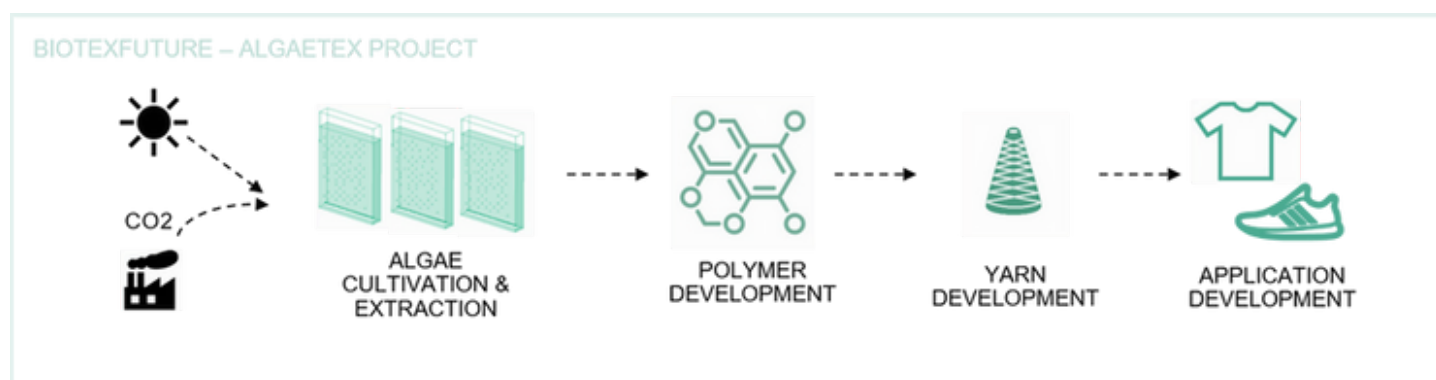
Duration
15.11.2020 – 14.11.2023

Motivation
Algae has immense potential as a bio-feedstock to replace crude oil for manmade textiles: it grows quickly and can take in carbon dioxide more efficiently compared to other bio-feedstocks based on land-crops. Further, its cultivation uses less/un-farmable land and avoids pesticides. Using algae as a renewable resource for producing biopolymers and textiles circumvents the challenges of competing with low fuel prices by creating higher-value applications. In this way, the German textile industry can act as a catalyst to shift away from fossil-fuels – towards a bioeconomy where algae are a major source of biomass.

Aim
The aim of the AlgaeTex project is to demonstrate the technical feasibility of producing thermoplastic biopolymers from algae for textile applications. Within the project timeline, various polymer synthesis pathways will be explored that utilize the highest possible proportion of algae-based raw materials. These novel biopolymers will be melt-spun and converted into high-quality textile demonstrators relevant to the sporting goods industry, such as knitted shoe uppers or T-shirts. The goal is to achieve a Technical Readiness Level (TRL) from 2 to 4 (lab-scale proof-of-concept), whereby algae cultivation and extraction is aimed at being demonstrated in relevant/operational environment (TRL 4-5).

BIOTEXFUTURE – ALGAETEX PROJECT

CO2 → ALGAE CULTIVATION & EXTRACTION → POLYMER DEVELOPMENT → YARN DEVELOPMENT → APPLICATION DEVELOPMENT

Approach
Beginning with algae cultivation, the biomass productivity and lipid content of a particular strain will be optimized using different growth methods and parameters. The resulting algal fatty acid mix is extracted and used to synthesize a biopolymer, with target properties being similar to polyamides or polyesters commonly used in the textile industry. The biopolymer(s) will be evaluated through typical downstream processing: yarn spinning, texturizing, knitting, etc. Once the resulting yarns and textiles meet certain benchmark mechanical properties and requirements, product demonstrators will be produced and tested.

Lifecycle assessments and techno-economic analyses will be conducted throughout the entire processing value chain. Different scenarios for scaling will be considered, in addition to the primary data that will be gathered based on the actual equipment and processes used at lab-scale. Finally, the project aims at evaluating possible commercialization opportunities once the technical concept and ecological benefits are proven.

Partner

adidas AG

Fraunhofer-Institut für Grenzflächen- und Bioverfahrenstechnik (IGB)

Fraunhofer-Zentrum für Chemisch-Biotechnologische Prozesse (CBP)

Institut für Textiltechnik of RWTH Aachen University (ITA)

Universität Bayreuth Lehrstuhl für Makromolekulare Chemie II

Acknowledgement

Contact

Andrew Yip, M.Sc.

andrew.yip@adidas.com

+49 151 1058 7615

Christoph Peiner, M.Sc.

Christoph.Peiner@ita.rwth-aachen.de

+49 241 80 23460