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Algae powered flight: Bringing the desert to Bavaria

Experts predict an annual increase in international aviation by 5%. Simultaneously, the European Commission intends to reduce the emission of the greenhouse gas CO2 by 50% compared to 1990. According to IATA analysis, both targets can only be accomplished by combining jet engine improvements and the use of biogenic drop-in jet fuels. A promising route to biogenic jet fuels is the chemical hydrogenation of fatty acids. To prevent socioeconomic and ethical negative impacts, fatty acids should be sourced from single cell oils and not oleaginous plants. To this end, our research group has developed a high throughput method to identify highly oil producing, extremophile microalgae cells. The microalgae strains can naturally cope with environmental stress factors, such as temperature fluctuations, during cultivation. Our laboratory results can be scaled in our unique AlgaeTech Center, which allows realistic sun-light and climate simulations based on GIS data sets. This facility provides for parallel testing of microalgae growth under different, global climate scenarios. Global light simulations can be accomplished by substituting natural light with a high power LED system. Furthermore, the simulation scenarios are supported by sophisticated air conditioning systems creating climate conditions that include desert or semi-desert areas as well as humid sub- and tropical regions. Hence, the AlgaeTech Center transposes desert climate to Germany, where new technology for production and conversion of algae biomass to drop-in kerosene are developed.

Biography

Daniel Garbe studied Chemistry in Marburg (Germany) and Edinburgh (UK) and completed his PhD at the Universities of Marburg and Dortmund (Germany). His thesis dealt with "Protein engineering of semi-synthetic proteins applying protein trans-splicing". Since 2009, he is employed at the Technische Universität München as a Project Manager for Biocatalysis. He was the Chair of Chemistry of Biogenic Resources and later moved in 2011 to the novel Division of Industrial Biocatalysis. He is in charge of several projects dealing with the biotechnological conversion of biogenic waste streams and phototrophic microorganisms into chemicals, pharmaceuticals or biofuels.

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