

Fermentation Acceleration by Separation Technology: Expanded Scale Tests

Publieke samenvatting / Public summary

Aanleiding

Bio-based fermentative production of fuels and fine chemicals are often limited in product titre and overall productivity, while requiring significant downstream processing efforts. This leads to high capital and operational expenditures. Economic competition with petrochemicals and fossil fuels is difficult and replacement with bio-based alternatives is thus limited. Process- and reactor-innovations are needed if bio-based chemical and fuel production is to be enabled. DAB's Fermentation Acceleration by Separation [FAST] technology platform is an innovative process solution for fermentations. FAST enhances volumetric productivity, limits overall product toxicity of fermentation and pushes fermentation more towards continuous modes of operation. The FAST concept has been shown to be feasible by its first fermentation prototype pilot reactor at the Bioprocess Pilot Facility (BPF) in Delft and was part of the TKI project called AMBIC, and BBEG innovation project called Sunior. During these project butanol as jet fuel constituent was identified as high potential molecule for FAST (DAB, WFBR, SkyNRG).

Doelstelling

Our immediate goal within DEI+ is to pilot the FAST reactor concept for production of bio-based chemicals and fuel by fermentation and to validate its performance improvement. Two bio-based (bulk) chemicals are already selected to validate the FAST system. The program is setup to incorporate up to 3 other chemicals within the pilot program. By

Projectinformatie / Project information

Projectnummer / Project number
DEI2719024

Subsidiebedrag / Grant amount
€ 472.057,00

Algemene informatie / General information

Penvoerder / Secretariat
Delft Advanced Biofuels B.V.

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increasing overall reactor productivity, bio-based production of fuels and chemicals will be enabled. The FASTest project will lay a solid basis to help the aviation sector and the Netherlands with some of their key challenges, which are also part of the DEI+ program objectives. This project will: 1) contribute to the EU's targets for renewable energy (biofuel Flight path 2020) & EC and IATA CO2 reduction ambitions; 2) address the biggest climate challenge of an important European industry that doesn't have many significant alternatives at the moment; 3) reduce dependency on fossil kerosene, enhancing regional security of supply and price stability; 4) contribute to regional economic development (e.g. job creation, innovation).

Korte omschrijving

The activities in the FASTest project have been distributed into 4 work packages (WP) which are interconnected. This workflow leads to the qualification of the best performing strain that will be piloted in the improved pilot reactor. WP1) The conceptual design where 5 strains will be preliminary screened on the basis of design, detailed solvent selection and the outlook of the downstream processing. From the 5 strains, 5 conceptual designs will be developed. 2-3 candidates will be selected for lab validation in WP2. WP2) Strain selection during R&D development of solvent overlay experiments. 2 strains, from this WP, will be selected for FAST fermentations, assessing feasibility of large scale production using the FAST technology at pilot scale in WP3. WP3) Piloting a FAST100L. Validating WP2, process fermentations in the FAST 1.0 and/or FAST 2.0 WP4) will consist of engineering and pilot scale production of a FAST 2.0 operational pilot reactor.

Resultaat

At the end of 2020 and of the FASTest project: 1) 4-5 conceptual designs for bio-based fuel and chemicals with FAST technology will be performed with emphasis on solvent/overlay selection. The CO2 reduction potential of the new processes will be determined for these models. 2) Up to 5 designs will be validated on strain and solvent by lab

feasibility/assessment 3) the bio-based chemical production processes for two processes, most likely butanol and m-cresol or similar compounds, will be fully tested within FAST pilot system; 4) a FAST system will be in designed and placed to enable feasibility proof of the FAST concept for bio-based fuel and chemicals to allow a faster transition towards a bio-based circular economy;

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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