

Transforming residual streams into high grade lactic acid using mixed cultures

Publieke samenvatting / Public summary

Aanleiding

Dutch biochemical industries are challenged by using non-food feedstocks for production of chemicals not used for food, legislatively through the EU taxonomy regulation and on a policy basis through the MMIP6 vision. Lactic acid is a biochemical used in cleaning, bioplastics and as a solvent. Current lactic acid production uses food feedstocks (crystal sugar) and emits significant CO₂ by using refined sugar. Using residual streams (2nd generation, or 2G feedstocks) tackles these problems, as the sugar inside is not refined and the feedstocks are not used for food production. So far, pure cultures have not been able to ferment residual streams effectively to lactic acid. Mixed cultures can solve this problem, as they are resilient to contaminants and can convert all the sugars present in the feedstock. Current lactic acid producers are actively looking for fermentation technologies that can effectively convert residual streams.

Doelstelling

In order to enable the use of mixed culture fermentation for lactic acid production, six feedstocks are chosen that have in common that they (1) can be available at large scale (more than 50 kton of carbohydrate within 300 km) and (2) can be cost competitive to using crystal sugar used now in the industry (<300 €/ton of carbohydrate). Six feedstocks will be evaluated (1) Glucose from cellulose, (2) C5 sugars from wood waste, (3) Grey scratch from potato processing (4) Delactosed whey

Projectinformatie / Project information

Projectnummer / Project number
TIND24-03693428

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€ 377.438,00

Algemene informatie / General information

Penvoerder / Secretariat
Nature's Principles B.V.

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permeate (5) Brewers spent grain (6) Sugar beet pulp. The goal is to evaluate the sustainability, technical and economical performance of fermenting these feedstocks into lactic acid that can be used for cleaning and potentially, other markets. The process developed in the production is expected to lead to less CO₂ emissions and less use of primary resources, which will accelerate the transition to a climate neutral and circular Dutch industry integrated into the energy system.

Korte omschrijving

The activities that will be performed in this study are: 1. A literature study on the production of lactic acid using six feedstocks through fermentation will be executed by Nature's Principles 2. Developing a cost effective additives for stimulating the lactic acid production executed by Nature's Principles and supported by Swinkels 3. Develop a lab-scale screening method for feedstock performance testing using the 6 feedstocks executed by Nature's Principles hosted by WFBR (see section 3) and Planet B.io. 4. Make a techno economic assessment (TEA) for production of lactic acid to evaluate different feedstocks used at 10-50 kton scale performed by Transition Hero and supported by Nature's Principles 5. Develop a cost effective method to liberate sugars from 2G feedstocks performed by WFBR 6. Supply on spec 2nd generation glucose from cellulose and simultaneous saccharification and fermentation performed by Recell. 7. Life cycle analysis of using the 2G feedstocks for lactic acid production performed by a competent partner and supported by Nature's Principles. 8. Reporting and evaluation

Resultaat

The project will result in the following 1. An overview of the current status of upstream and fermentation technology to produce lactic acid from 6 feedstocks 2. A cost effective nutrient developed at cost of <50 €/ton lactate 3. 1 lab fermentation achieving 0.8 g/g yield of lactate on sugar and 1 g/L/h rate lactic acid productivity 4. An estimation of OPEX (+/- 10%) and CAPEX (+/- 30%) at 10-50 kton scale 5. A cost effective pre treatment of 2G

feedstocks to reach <300 €/ton sugar feedstock 6. A cellulose based feedstock that can be fermented to high amount of lactate at <300 €/ton sugar feedstock 7. A LCA including a carbon footprint, water consumption and arable land estimation 8. A confidential report evaluating the reached results and how to continue the work Nature's Principles will take care that deadlines are met and risks are mitigated.

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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Voor meer informatie over de TSE / Energie-Innovatie regelingen die RVO aanbiedt, ga naar www.rvo.nl/tse.