

SOLDD

Publieke samenvatting / Public summary

Aanleiding

Carbohydrate-derived levulinic acid and furfural are regarded as key building blocks that can be obtained through biorefinery processes, which convert biomass into value-added products.

Levulinic acid (LA) and furfural (FF) are dedicated bio-based chemical that can be produced from non-edible biomass and agricultural residues. LA has significant potential as a platform chemical for the industry and is currently being developed by the Dutch company GFBiochemicals. FF is commercially produced by extracting and processing C5 sugars from lignocellulosic biomass. Furfural is ranked among the top 30 high-value and marketable building blocks by the National Renewable Energy Laboratory. The global furfural market reached USD 520 million in 2021 and is expected to grow by around 5.6% annually from 2022 to 2030. However, fully realizing the potential of levulinic acid and furfural requires further technological and market development. Polyesters derived from levulinic acid and furfural represent a compelling area of research towards bio-based and sustainable polymer development.

Doelstelling

The SOLDD project aims to advance the goals of the EKKO Industry mission and particularly to the polyester industries by exploring and developing a promising alternative bio-based production platform for sebacic acid and 1,10-decanediol. The project will focus on creating a technoeconomically viable platform to reach a technology readiness level of TRL 5. Furthermore, SOLDD envisions the creation of new value chains for Dutch chemical industries by

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Stichting Wageningen Research

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connecting biomass feedstock suppliers, process developers, and chemical industry. As such, SOLDD aims to develop scalable and robust technologies for converting bio-refinery streams into value-added chemicals using innovative chemo-catalytic approaches backed by scientific excellence.

Korte omschrijving

The partners in the project cover the full value chain. The feedstock provider is GFBiochemicals, which aims to produce levulinic acid on a large scale of 100,000 tons per year at prices close to €1/kg, enabling its use as a feedstock for bulk chemical production. To achieve this, the market for levulinic acid-based applications and products has to grow. SOLDD will contribute to this by developing and exploring the application potential of levulinic acid-based products. The knowledge partners, including Wageningen Food and Biobased Research, HANZE, and RUG, will work to develop and upscale the process. As the end user, BASF has a notable interest in sebacic acid, particularly in developing bio-based polyesters and polyamide 6.10. While BASF is involved in producing sebacic acid and its derivatives, 1,10-decanediol and 1-decanol also represent valuable development opportunities for the company.

Resultaat

Upon completion, SOLDD will have delivered 7 key results: 1. Validated technologies for producing levulinic acid/esters from agricultural biomass residues, leveraging the proprietary technology owned by GFBiochemicals. Supply multi-kilograms of levulinate samples to process developers 2. An optimized chemical process at TRL 5 for the selective condensation of levulinic acid with furfural to produce intermediate oxo-derivatives. 3. Representative amounts of intermediate oxo-derivative samples for further conversion. (1kg scale) 4. An optimized heterogeneous-catalytic process for the selective reduction/hydrodeoxygenation of dioxo-sebacic acid derivative to sebacic acid (=95% % yield from the dioxo-sebacic acid) under mild reaction conditions. Upscaled production of sebacic acid at TRL 5 5. An

optimized heterogeneous-catalytic process for the selective reduction/hydrodeoxygenation of dioxo-sebacic acid/sebacic acid to 1,10-decanediol(=90%yield) at TRL 5. 6. Assessments of the technoeconomic and sustainability aspects of the value chains through technoeconomic/life-cycle analysis. 7. Effective communication, dissemination, and exploitation of the research outcomes.

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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