GreenSolRes

GreenSolRes demonstrates the conversion of lignocellulosic biomass to levulinic acid (LVA) and further downstream to γ-valerolactone (GVL), 1-methyl-1,4-butanediol (MeBDO) & 2-methyltetrahydrofuran (2-MTHF). The products can be applied as solvents in the pharmaceutical sector or as building blocks formulating bio-based adhesives.

The project started on 1st September 2016 and completed its first reporting period by February 2018.

Further information: www.greensolres.eu

Consortium

GFBiochemicals Europe, Geleen (Coordinator)

Henkel AG & Co. KGaA, Düsseldorf

RWTH University, Aachen

Leibniz Institute for Catalysis, Rostock

SYNCOM GmbH, Ganderkesee

Hybrid Catalysis, Eindhoven

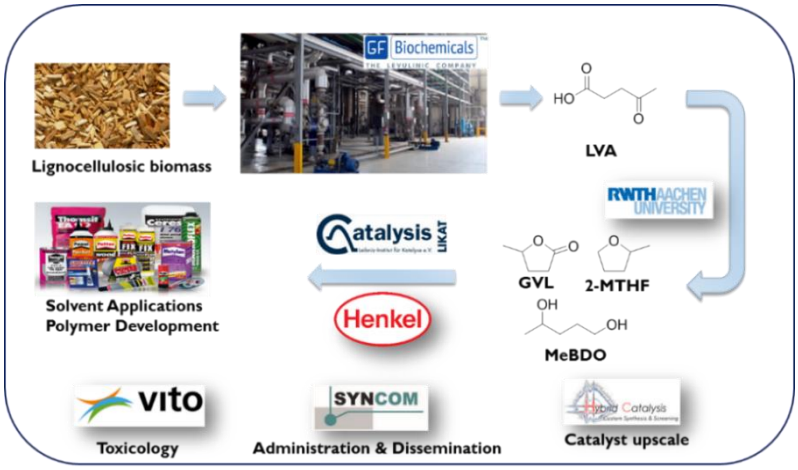
Flemish Institute for Technological Research, Mol

This project has received funding of € 7.45 Million from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 720695.

Call topic BBI.VC1.D1-2015

Bio-based Industries Consortium
BIO-BASED INDUSTRIES Public-Private Partnership
Horizon 2020 European Union Funding for Research & Innovation

Realizing the vision of bio-based economy

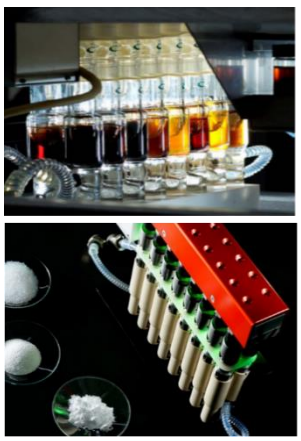


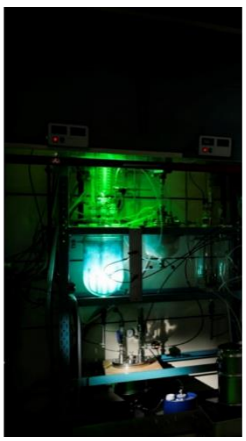
First milestone: Tailor made catalysts

Within the first project year, the group of Prof. Klankermayer at the Institute of Technical and Macromolecular Chemistry of RWTH Aachen tailored a molecular catalyst providing the envisaged activity, selectivity and stability for the consecutive hydrogenation of LVA to GVL and MeBDO. In a comprehensive scientific approach, a collection of potential catalyst structures was established and selected organometallic compounds have been synthesized. First results:

- The Ruthenium based catalyst achieved the envisaged properties regarding selectivity and turnover number under laboratory conditions. Further optimization is needed to enable its application in an enlarged hydrogenation demo plant.
- Hybrid Catalysis developed a 3-step reaction for upscaling of the catalyst to kg scale with an overall yield of 54%. Green solvents were employed in most of the reactions.

Next step is the upscaling of the optimized catalyst for application in the hydrogenation demonstration plant.

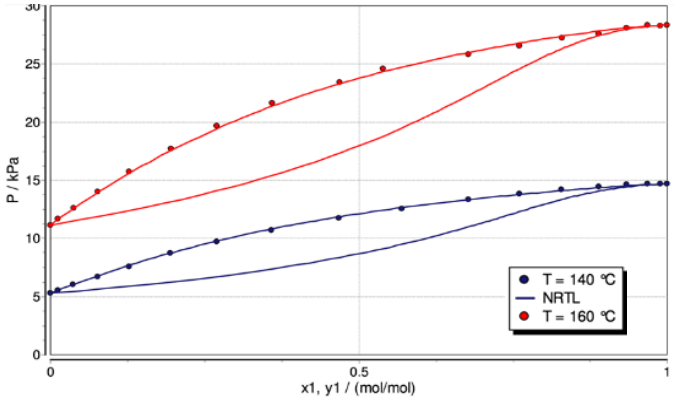




GF Biochemicals THE LEVULINIC COMPANY · Henkel · RWTH AACHEN UNIVERSITY · catalysis LIKAT · SYNCOM · Hybrid Catalysis Custom Synthesis & Screening · vito

Basic engineering of hydrogenation demo plant

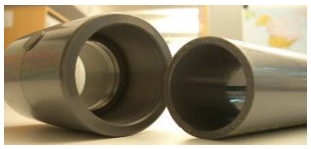
RWTH and GFB engineers designed a LVA hydrogenation plant with a capacity of 10 kta to produce GVL, MeBDO and 2-MTHF. The basic engineering package consists of a process design and compilation of 300 parameters. Data gaps were identified and key data like vapor liquid equilibrium of the product mixtures were determined. Details of process description were shared with vendors to receive quotations for the construction of the demo plant.



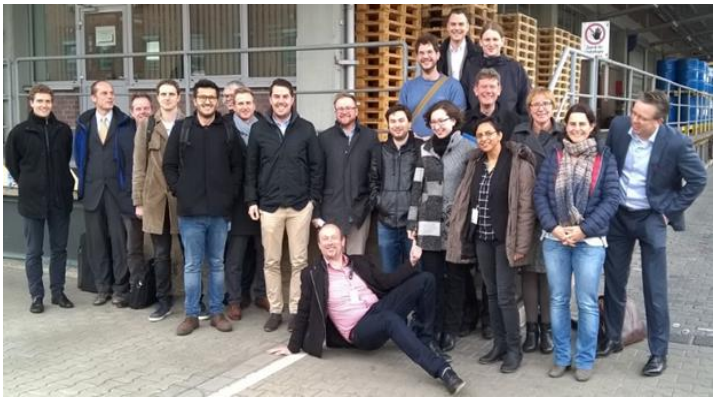
Bio-based polymers for adhesives

The Leibniz Institute for Catalysis in Rostock focused on the production of polymers from LVA hydrogenation products. These polymers are delivered to Henkel for techno/economic analysis. Preliminary investigations show:

2-MTHF is a suitable solvent for pipe adhesives. It might have better safety characteristics than the fossil-based THF. Further work will focus on the promising toxicological aspects of the bio-based components and the formulation of industrial standard adhesives.



Consortium meetings



The project begin was marked with a kick off meeting at Aachen on 22nd September 2016 attended by all partners and officers of BBI and BIC. Further plenary and steering committee meetings in 2017 took place at Henkel in Düsseldorf on 22nd to 23rd March and at RWTH Aachen on 4th to 5th September. The consortium members presented and exchanged their project results and new developments followed by fruitful discussions. The next consortium review meeting is scheduled in Brussels on 23rd to 24th May 2018.

GreenSolRes goes International

Dr. Bart Engendahl, the project coordinator during the first year, presented GreenSolRes at the 21st Green Chemistry & Engineering Conference in Reston, (USA) on 13th to 15th June 2017 with a talk on "Hydrogenation of levulinic acid: From fundamental science to demo plant application". Around 50 people attended the presentation with a lively exchange during the podium discussion. Likewise, Prof. Walter Leitner director of ITMC at RWTH presented the state of the art of GreenSolRes at the 5th International Conference Tailor-Made Fuels - From Production to Propulsion in Aachen from 20th to 22nd June 2017.

At BBI-JU Stakeholder Forum 2017

Rudy Parton, GFB's Chief Scientific Officer participated in the first BBI-JU's Stakeholder Forum and Exhibition in Brussels on 6th to 7th December 2017 together with GFB's founding member- the football star Mathieu Flamini. Two posters focusing on project progress and networking with the stakeholders were presented as well. About 500 delegates attended this forum.

Upcoming Events

26th European Biomass Conference and Exhibition at Copenhagen from 14th to 18th May 2018.

11th International Conference on Bio-based Materials at Cologne on 15th to 16th May 2018.

22nd Annual Green Chemistry and Engineering Conference hosted by ACS at Portland, Oregon on 18th to 20th June 2018.