GreenSolRes

Deliverable 1.11

Report on optimized levulinic acid and ester route via Furfural

Demonstration of solvent and resin production from lignocellulosic biomass via the platform chemical levulinic acid

This project has received funding from the Bio-based Industries Joint Undertaking (JU) under the European Union's Horizon 2020 research and innovation programme under grant agreement No 720695. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio-based Industries Consortium.

BBI JU

Bio-based Industries Consortium

Horizon 2020
European Union Funding
for Research & Innovation

About GreenSolRes

The need to establish economic and sustainable large-scale operations for the conversion of renewable resources to chemical building blocks is becoming increasingly urgent in the context of climate change and depleting fossil fuel reservoirs. Pathways for manufacturing of bio-based fuels and chemicals have been developed but most of them rely on sugar and starch crops for feedstock. GreenSolRes aims at a sustainable and competitive industrial production of the platform chemical levulinic acid (LVA) from non-food lignocellulosic biomass. Further, the conversion of LVA and LVA esters into industry relevant building blocks γ-valerolactone (GVL), 1-methyl-1,4-butanediol (MeBDO) and 2-methyltetrahydrofuran (2-MTHF) will take place by new catalytic methods developed during the course of this project. Finally, these chemicals will be upgraded to solvents and resin monomers for the production of high added value adhesives and consumer products. This project was started in September 2016.

Project Coordinator

Project Office

Consortium

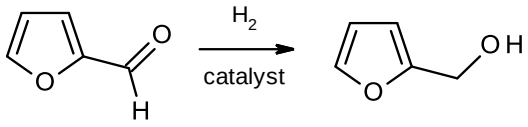
About this document

Deliverable №:	1.11	
Title	Report on optimized levulinic acid and ester route via Furfural	
Workpackage:	1	
Responsible beneficiary:	BASF	
Author:	Steffen Mader, Sven Reining, Christoph Stock, Dorothea Starck	
Reviewers:	Robert Bischof, LENZING	
Version:	1	
Due date of deliverable:	31.12.2021	
Version date:	14.12.2021	
Contact:	Dorothea Starck	
Nature:	Report	
Review status	WP leader accepted	16/12/2021
	Reviewer accepted	14/12/2021
	SC accepted	21/12/2021
	Coordinator submitted	21/12/2021

Dissemination Level		
PU	Public	
CO	Confidential, only for members of the consortium (including the Commission Services)	X

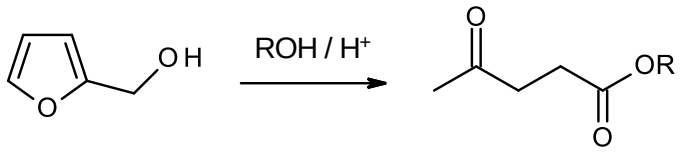
Publishable Summary

The present report describes the work on the route from furfural via furfuryl alcohol to levulinic acid and alkyl levulinate respectively.
According to market reports, both furfural and furfuryl alcohol are existing commodities on an industrial scale of several 100 kilotons per year. An in-depth literature survey was conducted to assess the current state of the art for the reaction of furfural to furfuryl alcohol. Experimental confirmation was achieved using commercially available catalysts and furfural from European and Asian sources.



Furfural Furfuryl Alcohol

The transformation of furfuryl alcohol to levulinic acid and alkyl levulinate has been examined in more detail in discontinuous as well as continuous mode. It could be demonstrated that variation of reaction parameters like solvent, acid type, concentration and temperature have significant influence on the extent of side-product formation. With beneficial combination of parameters very high product selectivity was achieved. Results from batch experiments were successfully transferred to continuous process mode.



Furfuryl Alcohol

Levulinic Acid (R = H)
Alkyl Levulinate (R = Alkyl)