

## A biorefinery approach to the separation and application of the products of lignocellulose pyrolysis

Project contract No. 1.1.1.2/16/I/001

Project number: 1.1.1.2/VIAA/3/19/388

Operational Programme “Growth and Employment”

Activity 1.1.1.2 “Post-doctoral Research Aid”

### Project progress over-view from April 1st 2021 to June 30th 2021

Implementation of WP1 continues: Comprehensive analysis of pyrolysis condensates obtained from lignocellulose.

Implementation of WP2 continues: Fractionation of pyrolysis condensates.

In accordance with the project plan in the 4<sup>th</sup> quarter the 1<sup>st</sup> work package is carried out at the Latvian State Institute of Wood Chemistry. The validation results for the determination of levoglucosan and cellobiosan by HPLC (ligand exchange column, refractive index detector) and UHPLC (HILIC column, evaporative light scattering detector) have been summed up to achieve the result D.1.1. (Validation protocol). A study about the separation of levoglucosan and its isomer 1,6-anhydro- $\beta$ -D-glucofuranose has been started with different HPLC methods, and also selective detection with mass spectrometry. A sample containing the isomers of anhydroglucose has been sent to the cooperation partner at Kaunas University of Technology to broaden the number of applied and compared analytical methods.

Within the project’s 2<sup>nd</sup> work package sufficient amount of anhydrosugar fractions has been collected to perform further experiments. Hydrolysis of levoglucosan and other anhydrosugars has been carried out with sulfuric acid or sulfonated carbon as catalyst, obtaining 80% glucose yield. It was observed that the sulfonated carbon acted not only as a catalyst for hydrolysis, but also as a furan adsorbent, thus at least partly purifying the produced glucose. It was determined that 1,6-anhydro- $\beta$ -D-glucofuranose is more easily hydrolysed than levoglucosan. The hydrolysis results will be linked to the planned cooperation with the Kaunas University of Technology regarding fermentation of sugars obtained in pyrolysis.

**Leading partner** – Latvian State Institute of Wood Chemistry

**Cooperation partner** – Kaunas University of Technology, the Department of Food Science and Technology

**Project duration:** 36 months.

**Project implementer:** *Dr.chem.* Kristīne Meile (kristine.meile@kki.lv)

**Scientific consultant:** *Dr.sc.ing.* Aivars Žūriņš

**Project leader:** *Dr.sc.ing.* Uģis Cābulis (ugis.cabulis@kki.lv).

**Project beginning:** 01.05.2020.

**Report prepared:** 30.06.2021.