

## 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 1 2023 to June 30 2023

The last quarter of the project was devoted to writing a technological instruction “Down-stream processing of pre-treated lignocellulose pyrolysis liquids” during WP4 “Development of a universal scheme for the sequential separation of valuable products from pyrolysis condensates according to biorefinery principles”. The instruction provided guidelines for the separation of pyrolysis products to obtain high purity levoglucosan, as well as a phenol fraction, and a mixture of hydrolysable sugar derivatives, applicable as a substrate for fermentation. Furthermore, several mobility activities were carried out during the last quarter, disseminating the scientific results of the project, popularising the Latvian State Institute of Wood Chemistry, and ensuring contact for future cooperation, for example, in *Horizon Europe*, projects. In the last month of the project, the scientific results were presented at several conferences, throughout the project the results have been published in five peer-reviewed papers<sup>i, ii, iii, iv, v</sup>, and another manuscript<sup>vi</sup> has been submitted for publication in the follow-up period.

**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)

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**Report prepared:** 30.06.2023.

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<sup>i</sup> Meile, K., Jermolajeva, A., Volkova, E., Zhurinsh, A. Solid-Phase Extraction of the Aromatic By-Products Obtained by Fast Pyrolysis of Pretreated Lignocellulose, *Chemical Engineering and Technology*, 2023, 46(6), pp. 1212–1217 <https://doi.org/10.1002/ceat.202200512>

<sup>ii</sup> Meile, K., Dobele, G., Iljina, N., Zhurinsh, A., Jurkjaņe, V. Lignocellulose pyrolysis by-products as an underestimated source of chemicals: separation and characterisation, *Biomass Conversion and Biorefinery*, 2023, 13(7), pp. 5709–5720 <https://doi.org/10.1007/s13399-021-01540-8>

<sup>iii</sup> Meile, K., Syrpas, M., Basinskiene, L., Zhurinsh, A. Discrimination of levoglucosan and its structural isomer in biomass pyrolysis products by iodometry, liquid chromatography, mass spectrometry, *Journal of Analytical and Applied Pyrolysis*, 2022, 166, 105602 <https://doi.org/10.1016/j.jaap.2022.105602>

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<sup>iv</sup> Marrot, L., Meile, K., Zouari, M., Sandak, A., Herrera, R. Characterization of the Compounds Released in the Gaseous Waste Stream during the Slow Pyrolysis of Hemp (*Cannabis sativa* L.), *Molecules*, 2022, 27(9), 2794 <https://doi.org/10.3390/molecules27092794>

<sup>v</sup> Meile, K., Volkova, E., Jermolajeva, A., Zhurinsh, A. Antioxidant Activity of Lignocellulose Pyrolysis By-Products after Levoglucosan Separation, *Key Engineering Materials*, 2022, 933, pp. 169–175 <https://doi.org/10.4028/p-sfqrru>

<sup>vi</sup> Meile, K., Godina, D., Hindle, N., Zhurinsh, A. Characterization and separation of value-added products from birch wood pyrolysis liquids: anhydrosugars and phenols, submitted to *Biomass Conversion and Biorefinery*