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

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Project progress over-view from April 1 2022 to June 30 2022

Implementation of WP2 "Fractionation of pyrolysis condensates", and WP3 "Analysis of the pyrolysis product fractions and purification of specific chemicals" continues.

In the 8th quarter investigation about the desorption of phenols from the anion exchange resin after anhydrosugar separation is continued. It has been found that the contact time between the sorbent and the solvent is crucial for effective recovery of the phenols, so batch desorption out side the column is preferable. Approximately 90% of total phenols are recovered with a mixture of methanol/water/acetic acid. Furthermore, consecutive changing of the desorption solvent allows to concentrate phenol carboxylic acids (vanillic acid and syringic acid) in the acetic acid containing fraction. These results have been summarised and presented at the "International Conference for Young Scientists on Biorefinery Technologies and Products BTechPro2022", and used to prepare a scientific paper "Antioxidant Activity of Lignocellulose Pyrolysis By-Products after Levoglucosan Separation" (accepted for publication in *Key Engineering Materials*).

During the mobility to the Kaunas Technology University in Lithuania various samples from LSIWC were taken for fermentation: 1) purified levoglucosan; 2) anhydrosugar side-stream as a residue after levoglucosan crystallisation; 3) anhydrosugar hydrolysis products, obtained with different procedures. A solid catalyst, prepared from bio-char (by-product of fast pyrolysis) with sulfuric acid treatment, was used for the anhydrosugar hydrolysis. For comparison, the hydrolysis was also carried out by the conventional method with addition of sulfuric acid. In case of the solid catalyst, the hydrolysis took longer (12-16 h), but the sulfonated bio-char can be used repeatedly, with sustained catalytic properties for at least 3-5 uses.

Leading partner – Latvian State Institute of Wood Chemistry
Cooperation partner – Kaunas University of Technology, the Department of Food Science and Technology
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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).
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