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Program

	April 28, Radisson Blu Latvia, Elizabetes Street 55	
9:00	**Opening Ceremony**	
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9:50	**The research landscape of biorefinery: a scientometric overview.** Arnis Kokorevics (Latvian State Institute of Wood Chemistry)	
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13:40	**Study of a novel bio-refining method for obtaining 2-furaldehyde, acetic acid and pulp from birch wood.** M.Puke, D.Godina, P.Brazdausks, J.Rizikovs (Latvian State Institute of Wood Chemistry)	**The study of betulin particles containing hydrogels prepared by antisolvent precipitation.** A.Pāže, S.Vītoliņa, R.Bērziņš, J.Rižikovs, R.Makars, D.Godiņa, A.Tereško (Latvian State Institute of Wood Chemistry)
14:00	**New possibilities of using waste hemp biomass.** J.Frankowski, D.Sieracka, W.Czeszak (Institute of Natural Fibres & Medicinal Plants – National Research Institute)	**Optimization of betulin colloidal aqueous suspension pretreatment for determination of particle characteristics.** S.Vitolina, A.Paze, R.Berzins, J.Rizhikovs, R.Makars, D.Godina, A.Teresko (Latvian State Institute of Wood Chemistry)

14:20	**Flammability studies of a pine sawdust coated with multicomponent suspension.** N.Augaitis, S.Vaitkus, A.Kairytė, G.Balčiūnas, A.Kremensas, S.Vėjelis (Vilnius Gediminas Technical University)	**Synthesis of novel C(3)-linked betulin azole conjugates.** E.Jansons, J.Lugiņina, M.Turks (Institute of Organic Chemistry and Material science, Faculty of Materials Science and Applied Chemistry, Riga Technical University)
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16:10	**Study of catalysts for suberinic acid-based adhesive polymerization.** R.Makars, J.Rizikovs, A.Paze (Latvian State Institute of Wood Chemistry)	**PLA/lignin composites doped with Cu nanoparticles for food packaging applications.** E.S. Esakkimuthu, I.Pylypchuk, D.DeVallance, M.H.Sipponen (InnoRenew CoE)
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17:10	**Analysis of gas-liquid interaction and constraint handling in stirred tank bioreactors.** A.Buss, A.Suleiko, N.Jekabsons, J.Vanags, D.Loca (Rudolfs Cimdins Riga Biomaterials Innovations and Development Centre of RTU, Institute of General Chemical Engineering, Faculty of Materials Science and Applied Chemistry, Riga Technical University)	
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	April 29, Radisson Blu Latvia, Elizabetes Street 55		
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9:40	**Densified juniper wood for use in bone implants.** L.Andze, M.Andzs, M.Skulte, V.Nefjodov, R.Tupciauskas (Latvian State Institute of Wood Chemistry)	**Waste rapeseed cooking oil is perspective substrate for biosurfactant synthesis via yeast *Starmerella Bombicola*.** I.Berzina, L.K.Lukasa, J.Liepins (Institute of Microbiology and Biotechnology, University of Latvia)	**Determination of antioxidant activity in fractions of pyrolysis liquids.** E.Volkova, K.Meile, A.Zhurinsh (Latvian State Institute of Wood Chemistry)
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10:40	**Coffee Break**		
11:00	**The failure of success - are research assessments helping or hurting science?** Noémie Aubert Bonn (Hasselt University and Amsterdam UMC)		
11:40	**How to get in: the story of a young researcher reaching for the Horizon.** Laura Andže (Latvian State Institute of Wood Chemistry)		
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AN INSIGHT INTO CHALLENGES OF CONDUCTING AN LCA STUDY FOR A FOOD WASTE BIOREFINERY

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Biofuels, along with biomaterials and biochemicals can be produced from biomass instead of fossil resources using biotechnologies. A biomass biorefinery including biowaste is an upcoming strategy, and its growing popularity raises questions about its environmental impact [1]. Life Cycle Assessment (LCA) is the most common tool for the assessment of the environmental performance of a process or a product. Applications of LCA methods are very wide, but more often it is applied on technical manufacturing than biological processes like fermentation [2].

There is an ongoing study that develops biotechnology for producing a novel biosurfactant using waste cooking oil as the substrate and yeast as the producer (Waste2Surf project, No. 1.1.1.1/19/A/047). Aim of this abstract is to communicate the challenges identified while carrying comparative gate to gate LCA of biosurfactants with waste cooking oil and raw (refined but uncooked) vegetable oil as substrate alternatives. The application of the surfactant and clear niche in the market is not defined at this stage of the research. The production technology is characterized by low technological readiness level.

LCA is based on ISO 14040 series of standards, and they define main methodological phases, and the way results are processed [3]. The main challenges identified through the LCA study are organized that they follow those phases.

Goal and scope definition is the initial phase of LCA, in which the functional unit, scope and boundaries of the assessment are defined [3]. In our study, the main challenge in defining the functional unit is the lack of data and knowledge about the application of the end-product. Having that information would allow to compare the obtained waste-derived product with other bio-based or chemically synthesized alternatives. The selected solution is to define the functional unit based on the end-product's properties. Thus, the defined functional unit is defined as the concentration of the product that can reduce surface tension of relevant amount of the distilled water by 20%.

Life cycle inventory (LCI) analysis identifies and quantifies all physical input flows of materials, resources, products and output flows of emissions, waste, and the end-products of the system. The inventory analysis is supported by data collected on-site, from literature or in international databases [3]. For biorefinery and biotechnology studies, the availability of data is currently a problem in LCA. Incompletely described input flows of chemicals used in fermentation medium limits the accuracy and applicability of results. Most of the datasets are global scale therefore the results have high variation. Additionally, the commonly used databases lack quality data and well-described information of waste materials as substrates.

Life cycle impact assessment evaluates the potential environmental impacts by converting the LCI results into specific impact indicators [3]. The perception that bioproducts have a lower environmental impact can be misleading. Although the biomass itself has less negative environmental impacts than fossil-based resources, more energy, logistics and time are needed to convert it into a sustainable product. Therefore, impact categories must be selected, assigned, and calculated very carefully. The same principle applies also to **Life cycle interpretation** to avoid misconceptions and identify significant issues in the LCA results.

References. [1] G. Pagliano, V. Ventorino, A. Panico, O. Pepe, Biotechnol Biofuels, 10(1) (2017) 1–25. [2] S. Maranghi, C. Brondi Life Cycle Assessment in the Chemical Product Chain. Challenges, Methodological Approaches and Applications. Springer, Switzerland, 2020. [3] M. Z. Hauschild, Life Cycle Assessment. Theory and Practice. Springer, Switzerland, 2017.