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Study of microplastics formation from wood plastic composites and evaluation of prevention possibilities (MicroWPC)

Project funder – **Latvian Council of Science**

Project name – **LZP FLPP 2022/1**

Project No. **lzp-2022/1-0639**

Project's progress report for the period 01.01.2025. – 30.06.2025.

During the reporting period, weathering tests of experimental wood-plastic composites (WPCs) with various compositions were completed. These compositions included different types of wood, plastic, and additives. Final analyses are being conducted to characterize the microplastics released and collected during the tests. Weathering experiments are ongoing with commercial products, including three different decking boards and one flower pot. Additionally, standard weathering cycles are being studied and compared with the developed methodology. The results obtained regarding the amounts of microplastics released and collected from experimental wood-plastic composites (WPCs) show that the composition (additives, wood type, and plastic type) has a significant impact on this process. The presence of wood particles was found to promote the separation of microplastics, a phenomenon that was not as pronounced in the case of pure plastic (without wood particles). Using thermally modified wood particles, polyethylene, and a UV stabilizer and absorber provides the greatest protection. Data collection and preparation of a publication on the developed process design are ongoing. The publication will include details about the process design and explain how it allows one to assess the risk of microplastic formation from various products, such as building materials and household products, during weathering. It also enables the acquisition of "real" microplastics for further research. During the reporting period, two abstracts were submitted to conferences (MICROPLASTICdays 2025 and Polymer Meeting 16), and two theses were defended: a master's thesis at the University of Latvia and a bachelor's thesis at Riga Technical University. Active participation in events organized by COST CA20101 continued, and training schools (e.g., Workshop for Young Researchers) and webinars were attended. Approval was obtained to participate in the working groups of the new COST action CA23131 "ISO compatible, efficient and reproducible protocols/equipment for mICro-nanoPLASTIC detection through machine-learning (ICPLASTIC)".

Publicity and training:

- PhD Edgars Kuka participated in the conference MICROPLASTICdays 2025 with a poster presentation "Novel process design for quantifying secondary microplastics formed during accelerated weathering of plastic-based materials" from 25th to 27th of March in Ljubljana, Slovenia (Figure 1). The book of abstracts is available HERE.

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Figure 1. Group photo of MICROPLASTICdays 2025 conference participants.

- Students Mg. Lotārs Olivers Vasiļjevs and Bc. Eva Guļevska (Figure 2) participated in the Student Conference organized by the Latvian State Institute of Wood Chemistry on May 8th in Riga, presenting their research: "Comparison of wood-plastic composites aged under natural and artificial weather conditions" and "Evaluation of surface changes in wood-plastic composites caused by the aging process". Both students on these topics wrote their final theses, which they successfully defended in June, obtaining the relevant academic degrees.

Figure 2. Student Conference in Riga organized by the Latvian State Institute of Wood Chemistry.

- PhD Edgars Kuka participated in the training schools "Current and future metrology and chemometrics in microplastic research" and "Chemometrics for microplastics detection and monitoring" (Figure 3) both organized by the COST action CA20101 (PRIORITY), which took place on March 25th in Ljubljana, Slovenia and from June 16th to 18th in Brescia, Italy, respectively. During the training schools, the basics of chemometrics (PCA, LDA, PLS, HIS, etc.) were learned and knowledge was strengthened by performing practical work in chemometrics softwares: CAT and PolyBrush.

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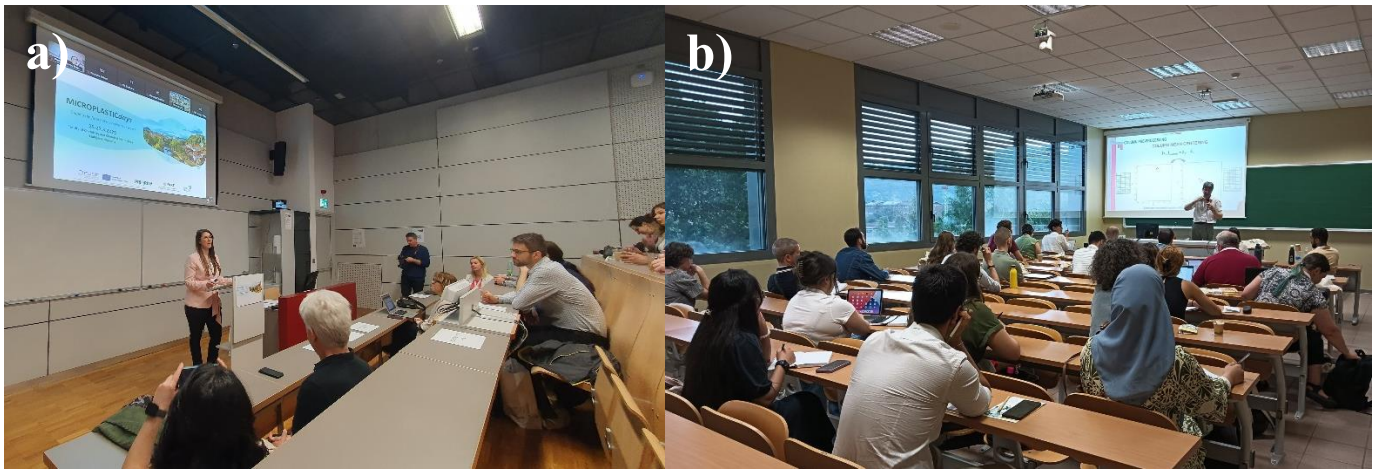

Figure 3. Participation in COST Action CA20101 training schools in a) Ljubljana and b) Brescia

Project implementer: **Latvian State Institute of Wood Chemistry**
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Project implementation period: **02.01.2023. – 30.12.2025.**
Lead participant: **PhD Edgars Kuka**
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Report prepared: **30.12.2024.**