

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 **02.01.2023. – 30.06.2023.**

During this period, the implementation of the project has started based on the established plan. More specifically work is being done to complete the tasks in the first two work packages WP1 and WP2. In WP1 (*Develop a process design for evaluation of MPs formation from WPCs*) the necessary materials have been obtained (sieves of different sizes and a container) to adjust the accelerated weathering chamber for capturing and separating microplastics. The sieves have been integrated in the weathering chamber's wastewater system, and the conceptual functionality of the adjusted system has been tested. Further tasks will involve more detailed testing for ensuring appropriate and precise functionality of the system: efficient accumulation of microplastics, detection and mitigation of potential pollutants/artefacts and good repeatability of the results. In WP2 (*Determine the effect of WPC composition on MPs formation and characteristics*) all the necessary raw materials have been acquired (recycled low and high density polyethylene and recycled polypropylene, pine and birch sawdust) including several additives (coupling agent, pigment, UV absorber, UV light stabilizer and antioxidant) that will be used for production of wood plastic composites with different compositions. The production of the wood plastic composites has already started, in addition to that also the sheet type specimens are being prepared. To make this process possible a specially designed steel mould was made and all the required materials for the production of the sheets were acquired. Investigations concerning recycled plastics degradation caused by UV radiation are also underway, where the mass loss, chemical changes (ATR-FTIR, FTIR transmission mode, element analysis), physical and thermal properties (HT-GPC, DSC, TG) and the changes in surface morphology (SEM, optical microscope) are analysed. All of the previously mentioned methods allow us to characterize the various processes that occur in the material, which cause microcracking and eventually lead to formation of microplastics. The heavy metal (Pb, Co, Cd, Cu etc.) content in recycled plastics was also characterized by using ICP-MS and AAS.

Publicity:

- The obtained results were presented to pupils during "**Shadow day**" by Dr.sc.ing. Dace Cīrule and PhD Edgars Kuka on April 5th 2023 (Figure 1a).
- Lotārs Oliveris Vasiļjevs wrote and on June 7th 2023 he defended his **bachelor thesis** "Effects of UV radiation on recycled plastics" (supervisor PhD Edgars Kuka) about the MicroWPC project's topic.
- PhD Edgars Kuka participated in an international scientific conference **5th World Congress of Latvian Scientists "Research Latvia"** (Riga, Latvia, 29.06.2023) with an oral presentation titled "Microplastic formation via photodegradation process" (Figure 1b). The project's results concerning formation of microplastics from plastic and wood plastic composites due to photodegradation were shared with rest of the audience.

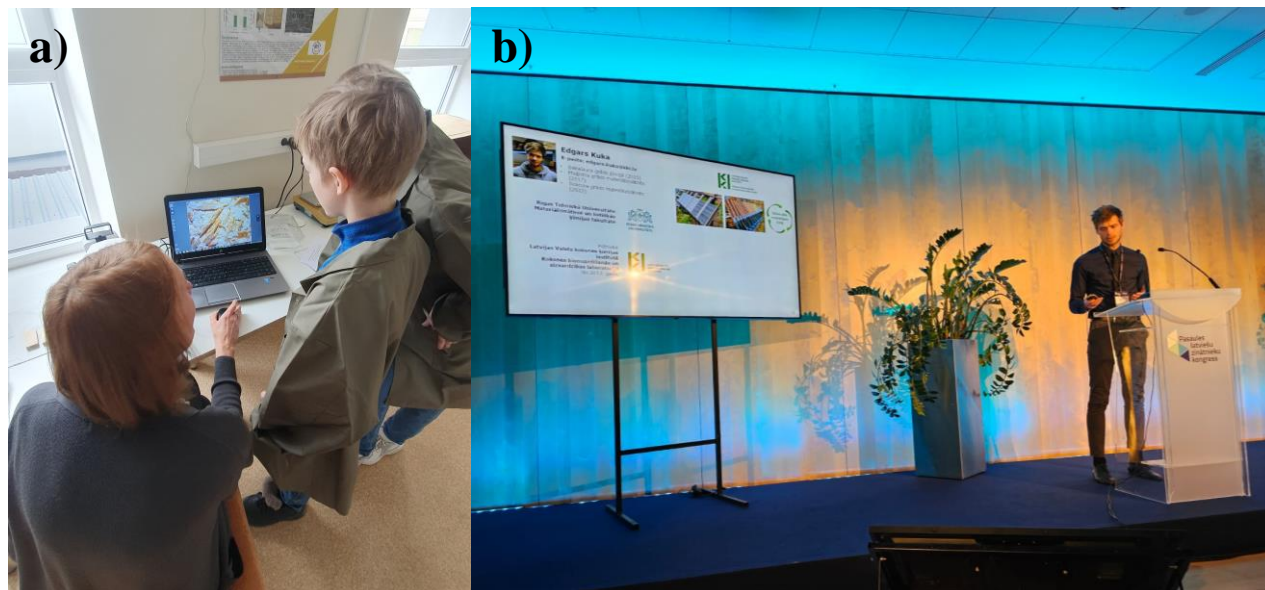


Figure 1. Publicity of the project's results in a) social event "Shadow day" and b) international scientific conference 5th World Congress of Latvian Scientists "Research Latvia"

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