

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**

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Project's progress report for the period **02.01.2024. – 28.06.2024.**

During the reporting period, work continued on the implementation of work packages WP2 and WP3. The overall progress of the project is in line with the schedule. The process design developed in WP1 is actively applied to deliver results in other work packages, investigating the various influencing factors that lead to the formation of microplastics (MPs) from wood plastic composites (WPC). A detailed description of the developed process design has also been prepared. In WP2 (Determine the effect of WPC composition on MPs formation and characteristics), all compositions of WPCs have been obtained and samples have been prepared. The research continues on the characterization of the "real" MPs, which have formed and are captured in the sieve system during the experiments of the developed process design. The first results indicate both chemical and physical differences compared to artificially (cryogenic mill) obtained MPs. The results on the changes and the formation of microcracks of various recycled plastics (PP, LDPE, LLDPE, HDPE) under the influence of UV radiation have been summarized in a publication that has been submitted for evaluation in a scientific journal with a high impact factor. The review process is currently underway. The surface changes under the influence of weathering of WPCs with various compositions are analyzed within the framework of WP3 (Characterise the surface properties of WPC during weathering) using different methods (gravimetry, photo fixation, optical microscopy, SEM, contact angle measurements, surface roughness, ATR-FTIR, and spectrophotometry). Data is still being collected and the already obtained results are being analysed in parallel. The initial situation shows that there are significant differences in the color change, the degree of surface erosion, the surface chemistry and ultimately also in the amount of generated MPs between the different WPCs tested so far. The results show that the type of additives, wood and plastic significantly affects the rate of degradation and the formation of MPs. In addition to the already mentioned publication, another one is in the development process, which will include the data on the changes and MPs formation potential during weathering of WPCs. Work is currently underway to compile most of the results obtained so far, which are needed to prepare the mid-term report of the project. Students and scientists actively attend webinars on the topic of MPs (Polymer Dispersions for Architectural Coatings – Challenges and Opportunities approach; Microplastics as stratigraphic and anthropogenic pressure markers – yes or no; Additives as key elements for reliable application of polymers and their impact on sustainability). Active participation is also taken in the management committee and working group meetings of the COST action CA20101 PRIORITY (Plastics Monitoring Detection Remediation Recovery). During the reporting period, we participated in one conference and two students were approved and participated in training days organized by the COST Action CA20101 in Spain and Portugal.

Publicity and training:

- BSc. Lotārs Oliveris Vasiļjevs gave an oral presentation with the title "Changes in wood plastic composites properties after natural weathering" at the **International Conference for Young Scientists on Biorefinery Technologies and Products BTechPro!** (Riga, Latvia, 24-26.04.2024) (Figure 1.). The presentation explained both the potential risk of microplastics and how they can separate from wood-plastic composites during weathering process. The changes that occur in wood plastic composites were also analyzed.



Figure 1. Participation in the International Conference for Young Scientists on Biorefinery Technologies and Products BTechPro!2024 with an oral presentation in Riga, Latvia

- Eva Guļevska participated in the COST action CA20101 (PRIORITY) training program "Identification of microplastic composition and presence of additives through FTIR (and μ FTIR) and Pyrolysis-GC-MS", which took place at Laguna University, Tenerife, Spain (Figure 2.). During it, knowledge was gained about various microplastic analysis methods - FTIR, Raman, Pyr-GC-MS. Pollution control was also discussed in order to obtain the most reliable and high-quality results possible, and new contacts were established for further cooperation.



Figure 2. Participated in the COST action CA20101 training program at the Laguna University, Spain

- Roze Zabarovska participated in the COST action CA20101 (PRIORITY) training program "Training on micro- and nanoplastics in vitro toxicological assessment: unveiling the human health impacts", which took place at the University of Aveiro, Aveiro, Portugal (Figure 3.). During it, knowledge was gained about the in vitro testing and the effects of microplastics on human cells. New contacts for future cooperation were also made during the program.

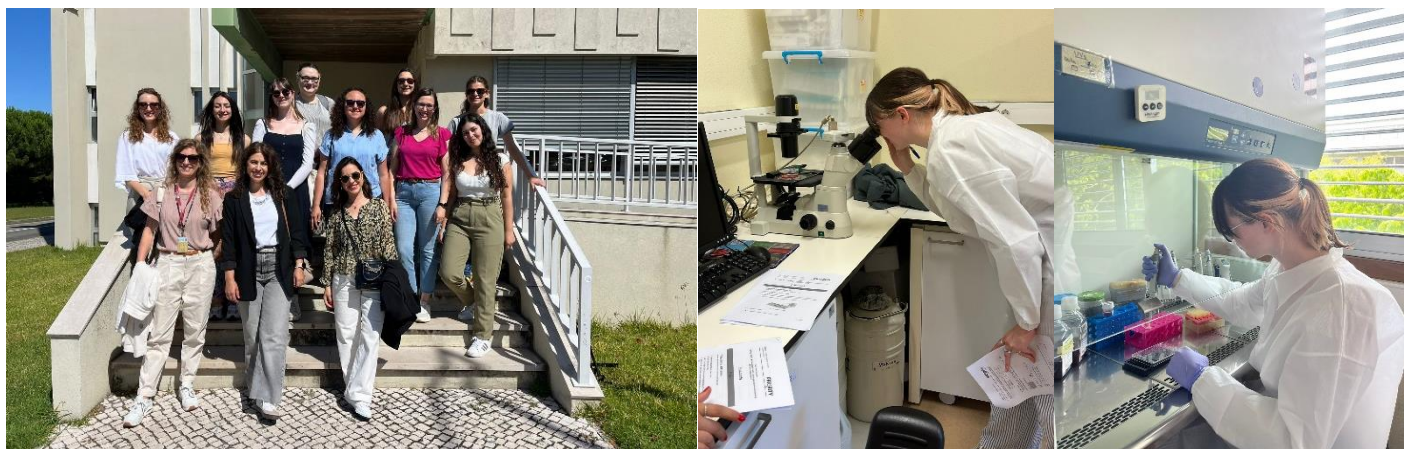


Figure 3. Participated in the COST action CA20101 training program at the University of Aveiro, Portugal

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