# Book of Abstracts

## COST Action FP1407
Final Conference

# LIVING WITH MODIFIED WOOD

**Belgrade, Serbia**
12-13 December 2018

University of Belgrade – Faculty of Forestry

**COST Action FP1407**

Understanding wood modification through an integrated scientific and environmental impact approach (ModWoodLife)

# Living with modified wood

Final COST Action FP1407 International Conference

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# Book of Abstracts

**Editors:** Goran Milić, Nebojša Todorović, Tanja Palija, Andreja Kutnar

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## Local organiser preface

It is both a pleasure and a privilege for the Department of Technologies, Management and Design of Furniture and Wood Products, Faculty of Forestry to host the final conference of COST Action FP1407. This honour has given us an opportunity to establish a more visible position within the European network of wood related institutions.

Wording of the title - “Living with modified wood” - signifies that the time in which we live has provided us with technologies of wood modification that will ensure that never again will this material be regarded as a lesser material with a short life-span. Wood, as one of the rare living materials, is experiencing a worldwide renaissance, one that could not have been considered possible just a generation ago. For these very reasons, the primary goal of this conference is to foster, forge and encourage the cooperation and exchange of ideas between wood modification researchers and experts in related fields and, hopefully, help them grow.

Belgrade, as a city with a long and rather eventful history, is an environment where sparse moments of peace and prosperity have instilled a way of thinking that appreciates the little things in life. This setting emphasises even more the pressing need of the modern age to live more organically, ethically and above all, ecologically – and what better way than living with an organic material such as wood.

Success of this event would not have been possible without the effort of the entire team of my colleagues. I would like to thank them and to express my deepest gratitude to Andreja Kutnar, Chair of COST FP1407, for leading this fantastic Action, and for her continuous help in organising this Final Conference.

Last but not least I would like to thank all of the participants and contributors of the Final COST FP1407 Conference. I wish you to have a memorable time in Belgrade.

So let us look forward to an exciting conference!

Goran Milić

## Preface

Welcome to the fourth and final international conference of COST Action FP1407 "Understanding wood modification through an integrated scientific and environmental impact approach" (ModWoodLife). This conference, "Living with modified wood", held in Belgrade, Serbia December 12 and 13, 2018 brings researchers and professionals together to share and disseminate their work. Their research contributes significantly to our Action's objectives. It is especially rewarding too see contributions that have resulted from collaborations developed and strengthened through this network. Since the beginning of the Action in 2015, we have delivered new knowledge in the field of wood modification and environmental impact assessment. We can all be proud that during our Action, the European Union recognized the need to strategically approach activities, research, and policy to reduce climate change. Among the key strategies that were accepted in the past three years are the Circular Economy (2015), the Paris Agreement (2016), the Research and Innovation Roadmap 2050 – A Sustainable and Competitive Future for European Raw Materials (2018), as well as the recently renewed Bioeconomy strategy. Although our Action did not directly contribute to these documents, I am convinced that the activities of our network and its participants accelerated their adoption. At the same time, it is clear that our collaboration must continue after the Action ends on March 9, 2019. Going forward we should jointly contribute to "closing the loop" of product lifecycles through greater recycling and re-use and bring benefits for both the environment and the economy.

I would like to thank you for your great collaboration. Besides the new knowledge we created, our new friendships will continue for many years more!

Wishing you a successful and memorable conference in Belgrade.

Andreja Kutnar
Chair, COST FP1407

# Durability of modified wood and bio-based materials under outdoor conditions

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Recent advances in the biomaterials modifications processes have delivered several innovative solutions for the building sector. However, in order to increase confidence for their use, a deep understanding of the material properties, structure, assembly, formulation and its performance along the service life is indispensable. This research was conducted in collaboration with BIO4ever, where the performance of 120 selected façade materials provided by over 30 industrial and academic partners was evaluated during an experimental campaign of natural weathering. Natural weathering was conducted in 2 different locations: Tallinn (Estonia) and San Michele (Italy). Additionally, durability field tests according to EN 252 standard were carried out in Oleron Island (France), Guadeloupe (France) and San Michele (Italy). The experimental samples were classified in seven categories, according to the type of material and treatment applied: natural wood (or other bio-based material), composites, chemically modified, thermally modified, impregnated, coated and/or surface treatment and hybrid modified materials. The last one included a combination of at least two different treatments.

This abstract presents a part of the natural weathering experiment conducted in Tallinn according to standard EN 927-3. Samples were exposed on the racks, inclined at an angle of 45° to the horizontal level and facing the southern direction. Evaluation protocol was similar as proposed by Round Robin Test conducted within COST Action FP1303. The materials performance was evaluated by measurement of the color change, visual assessment and the evaluation of cracks formation during outdoor exposure. High resolution photos were taken every month in order to document appearance changes during the test.

The performance of investigated samples after 12 months of exposure was varying depending on materials class and treatment process. The color measurement results indicated

that the most durable test-specimens were the coated materials (belonging to the class of surface treatments). The cracks occurred on 45 specimens among 120 tested façade materials. Natural wood of different species, as well as thermally modified wood, were among specimens changing appearance in the most apparent way. This included changes of the color parameters as well as cracks presence. Impregnated samples (e.g. furfurylated wood) and some of the hybrid modifications of samples (e.g., thermally modified + colored wood with ferrous sulphate) became patchy. The appearance of selected material (in this case belonging to composite class) is presented in Fig.1. As it can be seen, that this particleboard lost its bamboo coating entirely. Outdoor exposure tests for wood-based materials are still on-going and will be confronted with the natural weathering results from San Michele (Italy).

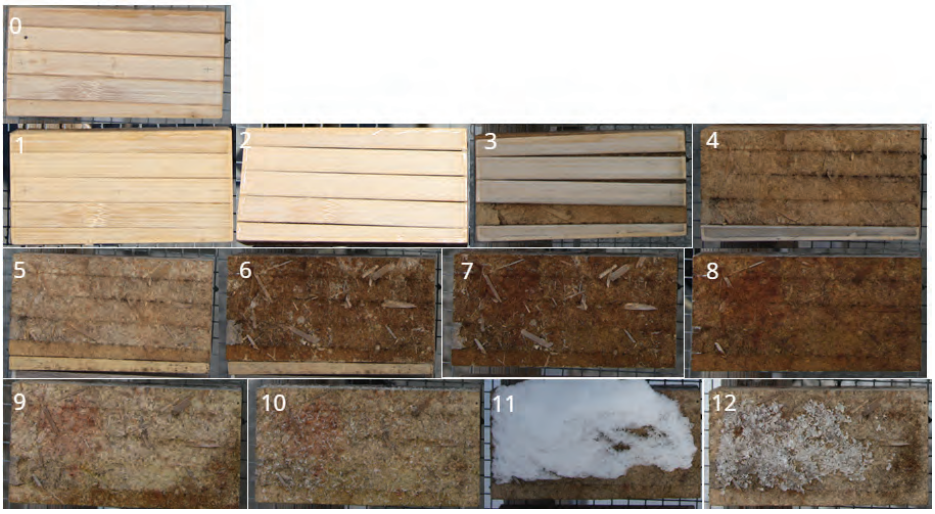


Figure 1: Change of appearance of particleboard with bamboo cladding during 12 months of exposure.

**References**

EN 252 (2014). "Field test method for determining the relative protective effectiveness of a wood preservative in ground contact," European standard

EN 927-3 (2012). "Paints and varnishes - Coating materials and coating systems for exterior wood - Part 3: Natural weathering test," European standard

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