Book of Abstracts

LIVING WITH MODIFIED WOOD

COST Action FP1407

Final Conference

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

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Edited by ■ 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

Assessment of lignocellulosic-substrate fungi-based materials

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Introduction

Nowadays the population is facing the effects of an excessive and reckless consumption of limited resources and energies. Global warming, the Great Pacific Garbage Patch, and air pollution are critical warning indicators for the need to develop more sustainable alternatives to our current lifestyle. Using renewable resources to produce materials is a partial solution to lower our impact on the environment. The specificity of the fungi mechanisms of growth makes them attractive as bioconversion agents (Dashtban *et al*. 2009) and potential advanced materials (Haneef *et al*. 2017). The present study investigates the properties of lignocellulosic-substrate fungi-based materials. Fungi secrete enzymes that decay lignocellulosic materials to convert them into glucose, which will provide the energy for the fungi to grow. Fungi grow by creating a net of hyphae (Fig. 1a) as they decompose organic substances. If stopped before the complete degradation of the substrate, these intra lignocellulosic hyphae threads form an interesting composite structure (Fig. 1b).

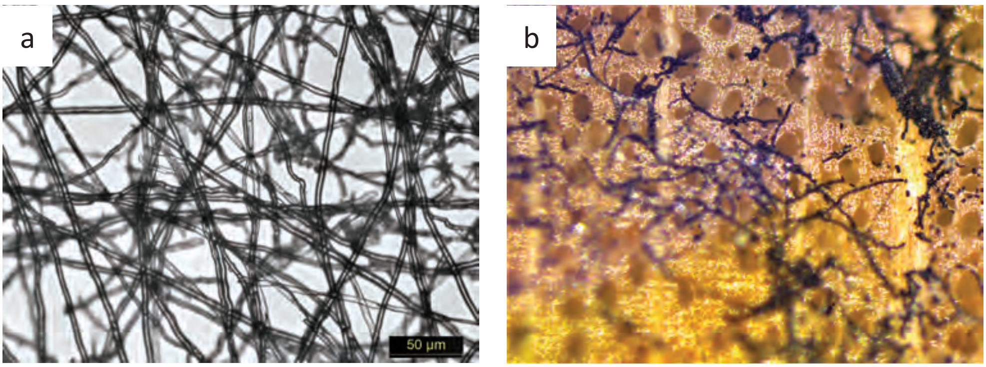

Figure 1: Microscopical observation of a) Net of hyphae, b) Hyphae on a wood substrate.

Materials

Ganoderma Lucidum fungi was inoculated in four different substrates (Table 1). Beech wood and hemp were milled at a particle size ranging between 5 and 15 mm. The composition and particle size of the substrate, and the amount of water, are crucial parameters for the growth of the fungi.

Table 1: Description of the substrates

Specimen	Substrate Composition	Water intake [%m]
1	100% Beech wood	70
2[a]	100% Beech wood	126
3[b]	50% Beech wood + 50% Beech dust	70
4	100% Hemp (shivs + fibres)	68

[a] Influence of the water content (x2 vs specimen 1), [b]Influence of the particle size vs specimen 1

The resulting lignocellulosic-substrate fungi-based materials are presented in Fig.2.

Figure 2: Lignocellulosic-substrate fungi-based materials.

Results and perspectives

The characteristics of the lignocellulosic-substrate fungi-based materials will be assessed. The physical and mechanical properties (density, thermal conductivity, moisture absorption, UV resistance, mechanical strength), the environmental and health impact, and the safety of use will be considered. Based on the results of the analysis, the most suitable applications (insulation, packaging, building, substitute for single use plastic materials) will be defined for every formulation (substrate/fungi couple).

References

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