

Universitatea  
Transilvania  
din Braşov

Appendix 4

#### EVALUATION REPORT OF THE HABILITATION COMMITTEE

Date: 05.02.2021

Candidate's last name (in capitals) and first name: **SCHNABEL Thomas**.  
Title of the habilitation thesis: **Valorisation of bio-based resources for innovative materials, products and applications**.  
Field of doctoral studies: **Forestry Engineering**.  
Name of the Organizing Institution of Doctoral University Studies (IOSUD) where the public defense of the habilitation thesis took place: **Transilvania University of Braşov**.

#### Strengths of the habilitation thesis:

- In the habilitation thesis is presented a cross-section of the candidate's scientific research activities. The thesis pays attention to three main topics: (1) the use of ligno cellulose materials for the production of insulation boards, (2) up-cycling of residuals for leather-wood composite materials, and (3) utilization of bio-based resources for high added-value products and applications. The habilitation thesis is written as a monograph and is based primarily on results already published in professional journals. In this work, the habilitant candidate presents his most important outputs that have been achieved at his home workplace. From the overview of projects (Chapter 5 Experience in scientific activities) it is evident that the habilitant has long been engaged in project activities not only at the national but also at the international level. The research is very important for the development of the field of material engineering of wood.
- The author of the thesis, in addition to completing up to date, European-level research, being member of several scientific committees, being an internationally recognized researcher and director of multiple national and international research projects, and having multiple vivid international scientific relationships, which provide a basis for future collaboration in funded or non-funded projects, as well as ongoing opportunities for publication in international cooperation. So beside all of this, has a five times higher score of the scientific performance than the required minimum standard for habilitation. Based on the aspects of the scientific work-of-art described above, the candidate has a scientific attitude - so "habitus" to be appreciated.

- The general topic of the dissertation: valorisation of bio-based resources, which is of increasingly importance and relevance nowadays in the international research.
- The manner to address this topic, with a focus on the valorisation of three types of secondary bio-resources / wastes: cereals straws, leather residues, wood extractives recoverable from condensates resulting in different wood processing technologies (e.g. wood steaming), wood bark and other lesser used wood residues, developing three distinct research directions.
- Integration of the general topic and the three research directions into the modern concepts of bio-economy and circular economy.
- Potential of development of sustainable products and innovative technologies as well as new research directions.
- The topic was addressed within a significant number of national and international research projects and the results were disseminated in journal articles and conference papers; the relevant references are presented in the habilitation thesis.
- Challenging goals within the three topics were addressed by interdisciplinary research and modern investigation techniques and advanced methods of data processing were successfully employed.
- Integration of applicative research with fundamental research resulting in new knowledge and proposed mechanisms explaining practical aspects (e.g. high resistance of wet-white leather to heating and burning and the effect of UV ageing on the anti-microbial properties of larch wood).
- The demonstrated capability of the author to plan, manage and run research projects, involving national and international cooperation, with active actors from research institutes, universities and industry.

Weaknesses of the habilitation thesis: **None.**

Questions asked by the Committee and the candidate's answers/ The Committee's observations / The result of the voting:

**Prof.Dr.Eng. GRYC Vladimir**

1. What is your opinion on the use of extractive substances, e.g. from bark, to protect wood from biological attack?

Answer: We used some components of wood to improve some properties, but there is no possibility to improve to a high extent. No industrial applications were done yet.

2. The big disadvantage of composite materials is the low resistance to moisture and the overall swelling of the materials. What properties does the composite material you develop have?

Answer: We combined wood fibers and leather. The leather component increases the swelling compared to fiberboards because it absorbs more water. No chemical connection was created, this is very difficult. The extractives were only prepared as water solutions.

3. The mechanical properties of composite materials are also significantly affected by the density profile. Was this parameter also measured for the developed composite materials?

Answer: No. We studied the density of the boards, but the density variation over the thickness was not taken into consideration.

4. Did you study LCA in your products?

Answer: This is a very important topic to be analysed within future research.

**Assoc.Prof.Dr.habil.Eng. CSIHA Csilla**

1. What kind of glue was used for the production of the leather-wood fibreboards?

Answer: It was standard industrial UF glue, but other glues can be used as well.

2. What is the reason of the good fire resistance of these boards?

Answer: We attribute this effect to the leather component. And its structure. When fire reaches the board surface, the structure begins to be destroyed and new molecules are created. Water, CO and CO2 are eliminated and a layer is generated at the surface of the board, which obturates the access of fire.

Prof.Dr. TIMAR Maria Cristina

1. You found increased antimicrobial properties of larch wood after short time (20 h) UV exposure due to the increased hydrophilic properties of irradiated surfaces and the formation of a higher amount of water soluble phenolic extractives with antibiotic properties. Do you think that this effect will apply also against mould fungi?

Answer: It would not really be expected to have similar effects, but no experiments were carried out.

2. What will happen in time if the phenolic extractives will be leached out by water?

Answer: There are two effects involved a passive and an active effect. Even if some leaching will happen, passive effects will remain.

The result of the voting:

The committee decided unanimously to **ACCEPT** the habilitation thesis.

CONCLUSION OF THE HABILITATION COMMITTEE:

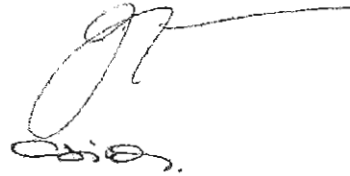
The habilitation committee fully agree on the acceptance of the thesis and to propose to the superior commission CNATDCU to award the candidate the habilitation title in the field of Forestry engineering.

HABILITATION COMMITTEE

Prof.Dr.Eng. GRYC Vladimir  
Mendel University in Brno, Czech  
Republic

Assoc.Prof.Dr.habil.Eng. CSIHA Csilla  
University of West Hungary, Sopron,  
Ungaria

Prof.Dr. TIMAR Maria Cristina  
Transilvania University of Braşov,  
Romania



**Transilvania University of Braşov**  
**Faculty of Furniture Design and Wood Engineering**

**MINUTES of the MEETING**

concluded on the occasion of the public defence of the habilitation thesis **written by FH-Prof.Dr. Thomas Schnabel, with a view to obtaining the habilitation certification, in the field of Forestry Engineering.**

The President of the Committee, Prof.Dr.Eng. Mihai ISPAS, opens the meeting, makes known its purpose and he presents the specialized Committee, consisting of:

- SPECIALIST: Prof. Dr. Eng. Vladimir GRYS, Mendel University Brno (Czech Republic)
- SPECIALIST: Assoc.Prof.Dr.habil.Eng. Csilla CSIHA, University of West Hungary, Sopron (Hungary)
- SPECIALIST: Prof.Dr. Maria Cristina TIMAR, Transilvania University of Brasov (Romania)

The floor is given to the candidate, Thomas Schnabel, who presents the synthesis of his habilitation thesis.

The floor is given, thereafter, to the specialists within the specialized Committee for the evaluation of the habilitation thesis.

The questions asked by the Committee members and by the audience, as well as the candidate's answers, are recorded hereinafter:

1. Prof. Gryc: What is your opinion on the use of extractive substances, e.g. from bark, to protect wood from biological attack?

Answer: We used some components of wood to improve some properties, but there is no possibility to improve to a high extend. No industrial applications were done yet.

2. Prof. Gryc: The big disadvantage of composite materials is the resistance to moisture and the overall swelling of the materials. What properties does the composite material you develop have?

Answer: We combined wood fibers and leather. The leather component increases the swelling compared to fiberboards because it absorbs more water. No chemical connection was created, this is very difficult. The extractives were only prepared as water solutions.

3. Prof. Gryc: The mechanical properties of composite materials are also significantly affected by the density profile. Was this parameter also measured for the developed composite materials?

Answer: No. We studied the density of the boards, but the density variation over the thickness was not taken into consideration.

4. Prof. Gryc: Did you study LCA in your products?

Answer: This is a very important topic to be analysed within future research.

5. Prof. Csiha: What kind of glue was used for the production of the leather-wood fibreboards?

Answer: It was standard industrial UF glue, but other glues can be used as well.

6. Prof. Csiha: What is the reason of the good fire resistance of these boards ?

Answer: We attribute this effect to the leather component. And its structure. When fire reaches the board surface, the structure begins to be destroyed and new molecules are created. Water, CO and CO<sub>2</sub> are eliminated and a layer is generated at the surface of the board, which obturates the access o fire.

7. Prof. Timar: You found increased antimicrobial properties of larch wood after short time (20 h) UV exposure due to the increased hydrophilic properties of irradiated surfaces and the formation of a higher amount of water soluble phenolic extractives with antibiotic properties. Do you think that this effect will apply also against mould fungi?

Answer: It would not really be expected to have similar effects, but no experiments were carried out.

Prof. Timar: What will happen in time if the phenolic extractives will be leached out by water?

Answer: There are two effects involved a passive and an active effect. Even if some leaching will happen, passive effects will remain.

In the end, after deliberations, the President of the Committee presents the result proposed by the specialized Committee. The committee decided unanimously to ACCEPT the habilitation thesis.

At the end of the meeting, the candidate gave a speech in which he thanked the committee, the representatives of the Transylvania University of Braşov and the colleagues who supported him.

President,  
Prof.Dr. Mihai Ispas



Secretary,  
Lect.Dr. Bogdan Bedeleian

