

Some of the most frequently used words in the scientific and political world of the new millennium are sustainability, new renewable energy sources, emissions of products and cascade utilization of bio-resources. A large number of studies and research work aim to develop, to adapt, to improve and to reinterpret materials in order to reduce the direct use of natural ones and their impact on the environment.

The 97 papers, posters and keynotes presented during the 3rd PTF BPI 2014 Conference represent studies and research that constitute an important reference for the major industrial companies and players in this field to take into consideration and perhaps use as starting points for further innovative projects.

In this way we would like to thank all the contributors to this conference, speakers and all participants that gathered at this alpine location for ensuring that this event was successful.

Alexander Petutschnigg
Marius C. Barbu

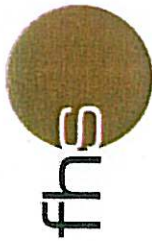
BOOK OF ABSTRACTS

Processing Technologies for the Forest and Biobased Products Industries

PTF BPI 2014. Salzburg University of Applied Sciences
Kuchl/Austria



Hosts & Organizer

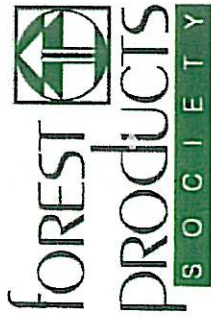


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Foreword

The aim of the 3rd Conference on Processing Technologies for the Forest and Biobased Products Industries (PTF BPI) is to facilitate interaction between scientists, researchers and experts from companies, who gathered in Kuchl from 24th to 26th of September 2014 to share their new studies and the results of scientific activities.

This edition of the conference is hosted and organized by the Salzburg University of Applied Sciences at Campus Kuchl and scientifically supported by Cost Action „Bringing new functions to wood through surface modification“ (FP1006), Forest Products Society (FPS), International Union of Forest Research Organizations (IUFRO), University of Tennessee in Knoxville (UT), University of Natural Resources and Life Sciences, Campus Tulln (BOKU), and Transylvania University of Brasov (UTBv).

The conference builds upon the previous successful editions held in St. Simons Island, Georgia, USA (PTF BPI 2012) and Kuchl/Salzburg, Austria (PTF BPI 2010). The following topics are covered in 11 parallel and 3 plenary sessions:

- Raw Materials for the Wood Industry
- Bio-refinery and Energy from Wood
- Modern Wood Constructions
- Wood Drying Technologies
- Wood Modification Processes
- Wood-based Composites
- Finishing Technologies
- Emissions of Wood Products
- Service Life and User expectations

This conference book of abstracts contains 97 works written by 319 authors from 30 different countries, whereby each paper was subject to an identical full review procedure. The book of abstracts was compiled under the supervision of FH-Prof DI(FH) Dr. Alexander Petutschnigg, FH-Prof Univ.-Prof. Dr.-eng. Dr. Marius C. Barbu and Eng. Eugenia Tudor. This intensive review process, carried out for a total of 156 papers in a period of four months, could not have been accomplished without the assistance of the members of the Scientific Committee and the reviewers listed below.

For the 3rd Edition, PTF BPI introduced a new concept of special keynote sessions held by specialists from industry, who will present the latest technologies and know-how to participants. Experts from top quality and successful companies are ready to impart their state-of-the-art knowledge during their keynotes planned every conference day.

The high quality of the papers represents the knowledge and experience of scientists and experts from universities, research institutes and companies from the field of forest products, wood-based composites, wood chemistry and renewable energies from wood. This book will provide scientific groups the world over with an excellent reference and should help to open up new avenues for research and provide scientists, researchers and industry experts with original ideas to help them improve their activity and research. The conference organizers have put together excellent scientific and social programs that encompass both the latest research in the fields mentioned above and provide an opportunity to renew old friendships and make new acquaintances.

The editors and reviewers deserve special thanks for their outstanding efforts in preparing the manuscripts for publication. The reviewing process was not only critical, the suggestions the improvement or development of some sections in the papers led to the high quality of the final manuscripts.

Finally, we would like to thank all presenters for their willingness to share their latest research and ideas. Without all this effort, this conference would not have been possible.

Special thanks to:

M.Sc. DI DI(FH) Anton Astner (University of Tennessee, Center for Renewable Carbon) - Bio-refinery and Energy from Wood
 Prof. Dr.-eng. Dr. Marius-Catalin Barbu (Salzburg University of Applied Sciences, Forest Products Technology and Timber Construction) – Wood-based composites
 Dr. Pannipa Chaowana (Walailak University, School of Engineering and Resources, Thailand) - Raw Materials for the Wood Industry
 DI Thomas Forte (Salzburg University of Applied Sciences, Forest Products Technology and Timber Construction) - Modern Wood Constructions
 M.Sc.DI(FH) Hermann Huber (Salzburg University of Applied Sciences, Forest Products Technology and Timber Construction) - Wood Drying Technologies
 Dr. Sergej Medved (University of Ljubljana, Biotechnical Faculty, Department of Wood Science and Technology) – Wood-based Composites
 Prof. Dr. Holger Militz (Georg-August Göttingen University) - Wood Modification Processes
 Chem. Electra Papadopoulou (Chimar Hellas) - Finishing Technologies
 Prof. Dr. Milan Šernek (University of Ljubljana, Biotechnical Faculty, Department of Wood Science and Technology) – Wood-based Composites (Adhesives)
 Dr. Jakub Sandak (Trees and Timber Institute CNR-IVALSA) - Service Life and User Expectations
 Ingrid Seidl (Salzburg University of Applied Sciences, Campus Kuchl)
 DI Dr. Martin Weigl (Holzforschung Austria) - Emissions of Wood Products
 DI(FH) Dr. Stefanie Wieland (Chair of COST FP1006 "Bringing new functions to wood through surface modification")

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INFLUENCE OF WOOD RAW-MATERIAL ON FORMALDEHYDE RELEASE FROM WOOD-BASED PANELS

João PEREIRA^{1,3}, R. LOPES², C. COELHO^{2,3}, J. MARTINS^{2,3}, L. CARVALHO^{2,3}

¹ ARCP-Association Competence Network in Polymers, Rua Júlio de Matos, 4200-465 Porto, PORTUGAL

² DEMad-Polytechnic Institute of Viseu, Campus Politécnico 3504-510 Viseu, PORTUGAL

³ LEPABE-Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, PORTUGAL

Key words: Formaldehyde emissions, Particleboard, Gas analysis method, Perforator method

Wood-based panels industry has progressed having as targets, not only an increase in the productivity and quality of its products, but also a constant improvement of processes and products sustainability, seeking for more eco-efficient solutions and less environmental impacts, through process optimization.

In 2006, the IARC - International Agency for Research on Cancer reclassified formaldehyde as carcinogenic to humans, leading some national regulation authorities, and in some situations the market itself, to imposed stricter limits on formaldehyde emissions from wood-based panels. Therefore, industry was impelled to introduce technological modifications in the processes in order to comply with the limits specified on the European standards or required by other countries to which they intend to export.

A great part of the resins used in the manufacture of wood-based panels are produced with formaldehyde, mostly due to their high reactivity and low cost. The modifications introduced in the synthesis of these resins have contributed to a substantial decrease on formaldehyde emissions, but not being sufficient by itself to achieve zero emissions of formaldehyde. Even new approaches and concepts such as the use formaldehyde scavengers could not achieve that target because wood itself emits formaldehyde.

On the other hand, due to the shortage of raw materials, several companies have been implementing strategies for the sustainable use of forest resources, through the use of other species, as well as the recycling of wood residues which in some situations are contaminated with formaldehyde based resins. This situation leads to an increase raw-material supply fluctuation, demanding a more rigorous control of the production processes in order to fulfill the specifications/properties of these products.

The main objective of this work was to study the impact of the fluctuations in raw-material mixes used in the production of particleboards on formaldehyde emission. Samples used for the face and core layers of particleboard were collected periodically in an industrial site. Characterization of the furnish was carried out (pH, moisture content), formaldehyde content was determined according to the standard EN 120 (perforator method) and formaldehyde emission analyzed according to EN 717-2 (gas analysis method). The effects of several factors, such as particle size, conditioning time, treatments were also studied. The collected raw-material samples were used to produce particleboard panels, which were analyzed with respect to formaldehyde content and emission.