



UNIVERSITÀ
DEGLI STUDI
FIRENZE
DAGRI
DEPARTMENT OF
AGRICULTURE, FOOD
ENVIRONMENT AND FORESTRY



Consiglio Nazionale delle Ricerche
CNR - Istituto per la BioEconomia



IUFRO
Interconnecting
Forests, Science and People

15.04.24 | 16.04.24 • FLORENCE, IT

AUDITORIUM SANT'APOLLONIA
VIA SAN GALLO 25

ECWM11

The 11th European Conference
on Wood Modification
15/16 April 2024 Florence, ITA



Incomac
Future Drying Systems



Partner **CATAS**
Testing Certification Research

acimall
FEDERAZIONE ASSOCIATI

Start-up supporting the Conference



Villa
Bardini
FONDAZIONE
CR FIRENZE



MONDAY 15TH APRIL 2024

- 08:15 Registration and welcome coffee
- 08:50 Welcome from Organizing and Scientific Committee
- 09:10 **Session 1 INDUSTRIAL**
Chair: *Julia Carmo*
- 09:10 1,01 What we know and what we still don't know about industrial TM plants producers in Italy
Ottaviano Allegretti
- 09:30 1,02 Certification of thermally modified timber – the experience and view of an industrialist **Bror Moldrup**
- 09:40 1,03 The thermally treated wood in the world with termo vuoto method
Alessio Lucarelli, Umberto Pagnozzi
- 09:50 1,04 Testing and approval of modified wood within NTR labelling system
Ramunas Digaitis, Niels Morsing, Jonas Stenbæk, Fredrik Westin
- 10:00 1,05 STYL+WOOD® system for the thermal modification of wood
Michele Bigon, Sonia Marchiori
- 10:10 1,06 Commercial wood products achieved by industrial thermal treatment process
Paola Cetera, Alessandro Porcu
- 10:20 Coffee
- 11:20 **Session 2 MODIFICATION WITH CHEMICALS**
Chair: *Philippe Gerardin*
- 11:20 2,01 Studying the impact of a silicone oil treatment on the elasto-mechanical properties of wood *Lukas Emmerich, Kilian Erdelen, Holger Militz*
- 11:30 2,02 Modifying wood with a bio-based thermosetting resin – different approaches to curing and drying **Christoph Hötte, Holger Militz**
- 11:40 2,03 Hydrophobisation of beech wood scantlings with radiation-curing epoxidised vegetable oils for use as dimensionally stable components in exterior applications
Christiane Swaboda, Roger Scheffler
- 11:50 2,04 Dimensional stability of Scots pine sapwood modified by tannin-based formulas
Sheikh Ali Ahmed, Gianluca Tondi, Filippo Rizzo, Reeta-Maria Stöd, Reza Hosseinpourpia
- 12:00 2,05 Improving fire resistance of wood through a combined chemical and thermo-mechanical treatment
Črt Svajger, Alexander Scharf, Chia-feng Lin, Olov Karlsson, Dennis Jones, Miha Humar, Dick Sandberg
- 12:10 2,06 Development of novel guitar fretboards by thermal modification and impregnation with PF-resin of beech (*Fagus sylvatica*) and maple (*Acer* spp.) wood
Christina Zwanger, Marcus Müller
- 12:20 2,07 A study of the influence of the curing conditions on Scots pine treated with SorCA coupled with catalysts
Adèle Chabert, Katarzyna Kurkowiak, Holger Militz

- 12:30 2.08 Wood modification by different chestnuts tannin – furfuryl alcohol resins and effect on conferred wood durability
Christine Gerardin Charbonnier, Joao Vitor Dorini, Pedro Gonzales de Cademartori, Philippe Gerardin
- 12:40 LUNCH
- 14:00 **Session 3 POSTERS 1**
Chair: Joris van Acker
- 14:00 3.01 Heat treatment of *Cryptomeria japonica* from Azores
Yurlet Mercado, Lina Nunes, **Bruno Esteves**, Luísa Paula Cruz Lopes
- 14:03 3.02 Effects of QUV accelerated weathering on surface hardness of thermally modified woods (*Fagus Sylvatica* L. and *Pinus nigra*)
Holta Cota, Entela Lato, Leonidha Peri, **Hektor Thoma**, Doklea Quku, Dritan Ajdinaj, Erald Kola, Marco Togni, Giacomo Goli, Ottaviano Allegretti
- 14:06 3.03 Effect of thermal post-treatment on the properties of densified *Ceiba pentrandia* Wood
Larissa Mesquita do Vale, **Claudio Del Menezzi**
- 14:09 3.04 Analysis of thermally modified Norway spruce shingles after eight years of use
Boštjan Lesar, Davor Kržišnik, Miha Humar
- 14:12 3.05 Physical properties of thermally modified *Gmelina arborea* wood modified under different process conditions
Samuel Olaniran, **Holger Militz**
- 14:15 3.06 Effect of thermal treatment on the interaction of wood with liquid water
Dace Cirule, **Edgars Kuka**, Ingeborga Andersone, Bruno Andersons
- 14:18 3.07 Direct evaluation of the effect of thermal treatment on the parallel compression strength of wood
Rossana Rosa, Isabella de Sá, Bento Viana, Paula Dornelles, Lucia Garcia, **Claudio Del Menezzi**, Annie Cavalcante
- 14:21 3.08 Increasing opportunities for Maillard-type reactions in wood through the addition of glucose and citric acid to bicine and tricine modification
Domen Borko, Alexander Scharf, Chia-feng Lin, Olov Karlsson, Dennis Jones, Miha Humar, Dick Sandberg
- 14:24 3.09 Thermally modified wood in wood-PLA composites for 3D printing
Daša Krapež Tomec, Mirko Kariž, Manja Kitek Kuzman
- 14:27 3.10 Plywood panels made of alternate layers of thermally densified and non-densified alder and birch veneers
Pavlo Bekhta, Tomáš Pipiška, Vladimír Gryc, Pavel Král, Jozef Ráhel', Jan Vaněrek, Ján Sedliačik
- 14:30 3.11 Improving the commercial value of some Canadian West Coast species through thermal modification
Yaohui Liu, **Gregory Smith**, Philip D. Evans, and Stavros Avramidis
- 14:33 3.12 Durability of thermal modified wood of *Pinus pinaster*, *Pinus radiata* and *Pinus sylvestris* from Galicia, Spain
David Lorenzo
- 14:36 3.13 Effect of thermal modification on the color of *Hymenaea* spp. and *Ficus* sp. wood
Kamilyly da Silva Pereira, Anna Clara Oliveira Rupf, Paulo Henrique dos Santos Silveiras, Djeison Batista, Victor Fassina Brocco, Saulo Lima
- 14:39 3.14 The main challenges in bonding heat-treated wood
Milan Sernek
- 14:42 3.15 Surface properties of thermally modified beech wood after radio-frequency discharge plasma treatment
Ján Sedliačik, Pavlo Bekhta, Igor Novák, Angela Kleinová, Ján Matyašovský, Peter Jurkovič
- 14:45 3.16 Effect of paraffin-thermal modification on water absorption and dimensional stability of Louro-preto wood (*Nectandra dioica*)
Saulo Lima, Anna Clara Oliveira Rupf, Kamilyly da Silva Pereira, Paulo Silveiras, Djeison Batista, Fernando Andrade
- 14:48 3.17 Study of the machinability of thermally and chemically modified wood for art objects
Leila Rostom, Jérémie Damay, Philippe Gerardin, Michael Jousserand
- 14:51 3.18 Moisture diffusion characteristics of thermally modified beech wood
Aleš Straže, Primož Tomec, Zeljko Gorisek, Jure Žigon
- 14:54 3.19 Exploring the mechano-sorptive behavior of thermally modified wood
Claude Feldman Pambou Nziengui, **Giacomo Goli**, Rostand Moutou Pitti
- 14:57 3.20 Temperature and moisture content effects on wood compressive properties
Hussein Daher, Sabine Caré, Gilles Forêt, Loïc Payet
- 15:00 3.21 Moisture content distribution of densified wood and the impact of various heat post-treatments on Brinell hardness and set recovery
Elena Jäger, **Guillaume Andre**, Thomas Volkmer
- 15:03 3.22 Correlation between color and biodeterioration of short-rotation thermally modified teak wood
Anna Clara Oliveira Rupf, Kamilyly da Silva Pereira, Saulo José da Costa Lima, Paulo Henrique dos Santos Silveiras, Jessica Sabrina da Silva Ferreira, Jaqueline Rocha de Medeiros, Adriano Ribeiro de Mendonça, Juarez Benigno Paes, Djeison Batista
- 15:15 COFFEE
- 16:15 **Session 4 MODIFICATION WITH CHEMICALS**
Chair: Holger Militz
- 16:15 4.01 Acetylation of European hornbeam wood (*Carpinus betulus* L.) – An 8-year-long study
Robert Nemeth, Fanni Fodor
- 16:25 4.02 Solvent-exchange acetylation of simulated green Scots pine wood
Mikko Valkonen, Md Tipu Sultan, Lauri Rautkari
- 16:35 4.03 Mechanical properties and biological durability of wood modified with PEG and various carboxylic acids
Melissa Christ, Nicole Flaig, Marcus Müller
- 16:45 4.04 Novel wood modification through the use of heterocyclic organic compounds
Alexander Scharf, Henric Dernegård, Johan Oja, Dick Sandberg, Dennis Jones
- 16:55 4.05 Combining kraft lignin-glyoxal and organic phase-change materials for a modified wood with thermal-energy storage capacity
Chia-feng Lin, **Olov Karlsson**, Dennis Jones, Dick Sandberg
- 17:05 4.06 Compatibility of lignocellulosic materials to form thermoplastic film by a single esterification reaction: wood and natural fibers
Prabu Satria Sejati, Laura Roche, Jennifer Afrim, Vincent Mariani, Frédéric Fradet, Philippe Gerardin, Firmin Obounou Akong, Firmin Obounou Akong

- 17:15 4,07 Furfurylated wood : using Pyrolysis-GC/MS to characterize polymer-wood bonds existence
*David Hentges, Philippe Gerardin, **Stephane Dumarcay***
- 17:25 4,08 Mould growth, fungal growth and strength of wood treated with maleic anhydride combined with sodium hypophosphite
*Injeong Kim, Lone Ross, Gry Alfredsen, Olov Karlsson, **Dennis Jones**, George I. Mantanis, Dick Sandberg*
- 17:35 4,09 Effect of lactic acid impregnation on some physical properties of wood
Miklós Bak, Robert Nemeth, Mátyás Báder
- 17:45 4,10 Relevant bonding aspects of acetylated beech (*Fagus sylvatica* L.) LVL for load-bearing construction in exterior use
Maik Slabohm, Jan-Oliver Haase, Holger Militz
- 17:55 End of day 1
- 20:00 **CONFERENCE BANQUET at Palazzo Budini Gattai**
P.za della SS. Annunziata, 1, 50122 Firenze FI



TUESDAY 16TH APRIL 2024

- 08:15 *Arrival and welcome coffee*
- 09:00 **Session 5 ANALYSIS**
Chair: Marina van der Zee
- 09:00 5,01 VOCs emission from thermally treated poplar solid wood and plywood
*Corrado Cremonini, **Francesco Negro**, Roberto Zanuttini*
- 09:10 5,02 Physical, mechanical and biological tests of solid wood and bio-composites with bioPCM and thermal characteristics of small-scale models in three European countries
Sabrina Palanti, Giovanni Aminti, Andrea Atena, Paolo Burato, Michele Brunetti, Gaye Köse Demirel, Özge Nur Erdeyer, Fabio De Francesco, Mohamed Jebrane, Meysam Nazari, Michela Nocetti, Güliz Öztürk, Benedetto Pizzo, Thomas Schnabel, Federico Stefani, Ali Temiz, Nasko Terziev, Jakub Grzybek
- 09:20 5,03 Comprehensive multi-scale investigation of heat treated wood at room or elevated temperature: summary of our decade's researches
Siqun Wang, Dong Xing, Xinzhou Wang, Deliang Xu, Yujie Meng, Jian Li, Timothy Young
- 09:30 5,04 Resistance of thermally and chemically modified timber against soft rot and findings to improve the lab test
Wolfram Scheiding, Kordula Jacobs, Christian Brischke, Susanne Bollmus
- 09:40 5,05 The chemical interactions between phenolic resin and wood studied by liquid-state NMR spectroscopy
Carlo Kupfernagel, Daniel Yelle, Morwenna Spear, Graham Ormondroyd, Andrew Pitman
- 09:50 5,06 Decay and termite resistance on sapwood, transition wood, and heartwood of short rotation teak wood by chemical and thermal modification
Resa Martha, Beatrice George, Istie Sekartining Rahayu, Philippe Gerardin, Wayan Darmawan
- 10:00 5,07 The Influence of moisture content and thermal modification on the non-linearity in mode I fracture of spruce wood
*Miran Merhar, **Rostand Moutou Pitti***
- 10:10 **COFFEE**
- 11:00 **Session 6 THERMAL MODIFICATION**
Chair: Giacomo Goli
- 11:00 6,01 Influence of thermal modification on fatigue life of Norway spruce wood
Miha Humar, Boštjan Lesar, Davor Kržišnik, Gorazd Fajdiga
- 11:10 6,02 Detection of the aromatic profile of different thermally modified wood species
Valentina Lo Giudice, Angelo Rita, Luigi Todaro
- 11:20 6,03 Wood modification methods and fire resistance of façades/cladding
Joris Van Acker, Liselotte De Ligne, Bogdan Parakhonskiy, Andre Skirtach, Jan Van den Bulcke, Marcy Durimel
- 11:30 6,04 Comparison of major wood heat treatment technologies paves the way for a generalized mass loss kinetic model
Bertrand Marcon, Giacomo Goli
- 11:40 6,05 Natural weathering of thermally modified wood cladding treated with fire retardants at different exposure levels
Inge Wuijtens, Imke De Windt, Kurt De Proft, Lieven De Boever

- 11:55 **Session 7 DENSIFICATION AND MINERALISATION**
Chair: Dennis Jones
- 11:55 7,01 Frictional behaviour of modified-in-surface hardwoods preliminary obtained through strong tribological transformation
Pierre-Henri Cornuault, Stani Carbillet, Luc Carpentier
- 12:05 7,02 Removal of non-cellulosic wood constituents and subsequent densification for improved mechanics of wood
Matthias Jakob, Ulrich Müller, **Wolfgang Gindl-Altmutter**
- 12:15 7,03 Bending performance of thermo-hydro-mechanically treated Scots pine (*Pinus sylvestris* L.) at elevated temperature
Lei Han, Dick Sandberg, **Andreja Kutnar**
- 12:25 7,04 Wood modification via geopolymer impregnation: Effects on decay, mechanical properties and fire retardancy
Aitor Barbero Lopez, Paivo Kinnunen, **Antti Haapala**
- 12:35 7,05 Wood modification by bio-inspired hydroxyapatite mineralization
Matic Šitar, Boštjan Lesar, **Andreja Pondelak**
- 12:45 7,06 An innovative process of mineralisation with magnesium compounds improves fire properties of wood
Andreja Pondelak, **Andrijana Sever Škapin**, **Nataša Knez**
- 13:00 **LUNCH**
- 14:00 **Session 8 POSTERS 2**
Chair: Callum Hill
- 14:00 8,01 Modification of wood by fast Pyrolysis Bio-Oil – results from the screening test
Anna Sandak, **Jakub Sandak**, **Faksawat Poohphajai**, **Rene Herrera Diaz**, **Ana Gubenšek**, **Karen Butina Ogorelec**, **Wojciech Pajerski**, **Lex Kiezebrink**, **Klaas Jan Swager**, **Hans Heeres**, **Bert van de Beld**
- 14:03 8,02 Anatomical variations between natural and delignified wood: a case of study of some Italian “minor” wood species
Francesco Bolognesi, **Alessandra Bianco**, **Francesca Romana Lamastra**, **Marco Togni**
- 14:06 8,03 Improving the energy storage properties of wood by using lauric acid
Ahmet Can
- 14:09 8,04 Evaluation of treatments for preventing resin exudation through coatings
Dennis Jones, **Aubin Vieillescazes**, **Micael Öhman**, **Olov Karlsson**, **Rostand Moutou Pitti**
- 14:12 8,05 Preliminary evaluation of wood impregnated with oak bark-derived residuals
Rene Herrera Diaz, **Mariem Zouari**, **Faksawat Poohphajai**, **Jakub Sandak**, **Anna Sandak**
- 14:15 8,06 Optical properties of spectrally irradiated wood
Hiroyuki Sugimoto, **Kai Maruyama**, **Masatoshi Sugimori**
- 14:18 8,07 Exploring the potential of carbon nanodots as an UV protection reagent for wood
Sarah Jue, **Chia-feng Lin**, **Alexander Scharf**, **Dennis Jones**, **Rostand Moutou Pitti**, **Dick Sandberg**
- 14:21 8,08 Identifying influential factors affecting wettability patterns on wood surfaces through multilevel analysis
Valentina Lo Giudice, **Petar Antov**, **Lubos Kristak**, **Nicola Moretti**, **Angelo Rita**, **Luigi Todaro**
- 14:24 8,09 Dimensional stability and sorption properties of acetylated and non-acetylated birch plywood as a function of the face veneer grain angle
Jure Žigon, **Yue Wang**, **Tianxiang Wang**, **Aleš Straže**, **Magnus Wållinder**
- 14:27 8,10 Upgrading sawdust from wood bark to produce new thermoplastic materials
Firmin Oboutou Akong, **Célia Pinto**, **Ania Belarbi**, **Prabu Sejati Satria**, **Philippe Gerardin**
- 14:30 8,11 Micromorphological and chemical changes of densified ash wood (*Fraxinus americana*)
Alexandra Guevara Castillo, **José Antonio Silva Guzmán**, **Francisco Javier Fuentes Talavera**, **Raúl Rodríguez Anda**
- 14:33 8,12 Development of innovative methods for assembling lignocellulosic materials for the manufacture of glasses
Adrien Magne, **Juliette De Nas De Tourris**, **Jennifer Afrim**, **Teldja Benzid**, **Prabu Satria Sejati**, **Firmin Obounou Akong**, **Robin Féron**, **Philippe Gerardin**
- 14:36 8,13 Exploring the solid wood modification with preserved hierarchical structure via non-cellulosic substances removal
Yi Hien Chin, **Pascal Biwole**, **Joseph Gril**, **Christophe Vial**, **Rostand Moutou Pitti**, **Salah-Eddine Ouldboukhitine**, **Nicolas Labonne**, **Yoshiki Horikawa**
- 14:39 8,14 Malic acid/glycerol polyester treated beech boards: curing kinetics and density distribution
Emmanuel Fredon, **Romain Rémond**, **Adèle Chabert**
- 14:42 8,15 Implementing fire retardants into a biobased adhesive system for wood-based composites
Luka Kopač, **Alexander Scharf**, **Dennis Jones**, **Dick Sandberg**, **Sergej Medved**
- 14:45 8,16 Laser incising – a philosophical shift: from timber treatment to wood modification
Morwenna Spear, **Paul Mason**, **Geraint Williams**, **Graham Ormondroyd**
- 14:48 8,17 X-ray CT scanning as a method for quantifying mineralization in spruce and beech woodblock
Marcy Durimel, **Liselotte De Ligne**, **Bogdan Parakhonskiy**, **Jan Van den Bulcke**, **Andre Skirtach**, **Joris Van Acker**
- 14:51 8,18 Wood surface modification using metal and ceramics to make wood fire and termite resistant
Laurence Podgorski, **Alain Denoirjean**
- 14:54 8,19 Production and application of chemically modified cellulose nanofibrils
Primož Oven, **Ida Poljanšek**, **Vesna Žepič**, **Jaka Levanič**, **Urša Osolnik**, **Viljem Vek**
- 14:57 8,2 Effects of microwave treatment on the improvement in the retention of a preservative product in two Portuguese wood species
Fernando Mascarenhas, **André Dias**, **Alfredo Dias**, **André Christoforo**, **Rogério Simões**
- 15:00 8,21 Wood modification as an opportunity for local wood species in musical instrument making
Mario Zauer, **Tobias Dietrich**, **Herwig Hackenberg**, **André Wagenführ**
- 15:03 8,22 Maximum compressibility along the grain of different wood species
Mátyás Báder, **Miklós Szauer**, **Robert Nemeth**
- 15:06 8,23 Studies on the durability of the reaction to fire performance of melamine formaldehyde resin and phosphorus polyol treated wood
Muting Wu, **Lukas Emmerich**, **Holger Militz**
- 15:09 8,24 Effect of aspen face veneer thickness on the fire performance of post-manufacture fire-retardant treated birch plywood
Percy Festus Alao, **Anti Rohumaa**, **Karl Harold Dembovski**, **Jussi Ruponen**, **Jaan Kers**

15:15

COFFEE

16:15

Session 9 NEW TRENDS

Chair: *Ottaviano Allegretti*

16:15

Ultrafast self-propelling directionally water transporting wood via constructing multi-hierarchical structures on cell wall

Yanjun Xie

16:25

Delignified wood as substrate for nanostructured composites with extended range of functionalities

Lars Berglund

16:35

Optical Wood with switchable solar transmittance for all-round thermal management

Daxin Liang, Yanjun Xie

16:45

Functional transparent wood through incorporation of modified antimony-doped tin oxide nanoparticles

Zhe Qiu

16:55

Enhancing building energy efficiency: impregnation of wood with phase change materials

Jakub Grzybek, Thomas Schnabel

17:05

Optical smart transparent wood via based on phase-change copolymer

Yonggui Wang

17:15

Thermoplastic from wood: dream or reality?

Philippe Gerardin, Prabu Satria Sejati, Frédéric Fradet, Firmin Obounou Akong, Firmin Obounou Akong

17:30

CLOSING REMARKS

Announcement of ECWM12

Announcement of PhD best oral and best poster prize

18:00

CLOSE OF CONFERENCE





Tel: 055 494949
scaramuzzi@scaramuzziteam.com

www.scaramuzziteam.com

