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IAWS Bulletin

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Please send correspondence by email to the editor,

Lloyd Donaldson

Message from the President

Our Academy fortunately continues to carry out the scheduled tasks without much hindrance, yet the COVID-19 pandemic is still affecting aspects of our business. Web-based networking is now a norm for communication. Election of new Academy fellows will be finalized before Christmas, but the voting rate has been disappointingly poor. Active participation of our Fellows in the business of IAWS voting should be a priority and is highly encouraged. If you did not receive email reminders about the voting we may not have your correct details, please contact the secretary to update or check.

It's my pleasure to inform you that since July, Prof. Katarina Čufar (Dept. Wood Science & Technology, University of Ljubljana, Slovenia) has taken over the responsibilities of the Chair of the Academy Board from Prof. Siqun Wang, and we give our grateful thanks to Prof. Siqun Wang for his devotion and commitment as the Chair. In addition, four fellows were elected as new Academy Board Members for a six-year term: Dr. Voichita BUCUR (School of Science, Melbourne, Australia), Dr. Keiko KURODA (Kobe University, Japan), Dr. Galina GORBACHEVA (Bauman Moscow State Tech University, Russia) and Dr. Timothy YOUNG (University of Tennessee, USA). I extend my sincere thanks to the fellows who have completed their term as Academy Board members.

Under the leadership of Dr. Katarina Čufar as the Chair of the IAWS Board, three IAWS Ph.D. awardees were selected in 2022. Dr. Adefemi Alade (Stellenbosch University, South Africa) has the honor of achieving first place. Second and third places were given to Drs. Lu Yu (University of Tennessee, USA) and Ondrej Dvoracek (Graz University of Technology, Austria), respectively. Their works are to be read in the current issue of the Bulletin.

It is with great sadness to inform that Robert Youngs passed away in April 2020 at age 96. May his soul rest in peace.

The IAWS website's accessibility has been greatly enhanced owing to Lloyd Donaldson's painstaking work, and the financial position of the Academy is very sound attributable to the extraordinary management by Howard Rosen. Early next year we will elect a new Vice President to work energetically with Prof. Stavros Avramidis who will take over as President in June to progress the activities of the IAWS. We face critical challenges to adapt to external changes and internal pressure, and therefore we have to continue to strengthen processes to ensure that the recognition of the IAWS as an elite international organization is maintained at a time of exponential growth of knowledge and information. The Executive Committee once raised the point whether the IAWS has to proceed the same way as before (Bulletin 2016-2). To remain relevant in an age of mega trends in action, the Academy cannot remain as a club in its operation and spirit. Silo mentality that inhibits collaborations between the best and the brightest has to be overcome. Your candid critics, suggestions and initiatives are highly appreciated to meet the challenges IAWS faces.

While the year 2022 is about to end, I would like to wish you all a safe and healthy holiday period and bright and fulfilling times ahead. A thousand thanks to all the fellows, Academy Board, and Executive members for their enthusiastic participation and immense contributions, ensuring that the goals of the Academy are satisfactorily achieved. May the wind be always at your back !

Have a Merry Christmas and a Happy New Year!

Yoon Soo KIM

Election of New Fellows 2022

Five new fellows were elected from the 2022 election. We welcome to the academy the following new fellows:

Prof. Pavlo Bekhta - Head of Department of Wood-Based Composites, Cellulose & Paper, Ukrainian National Forestry University, Ukraine.

Dr Rowland Burdon - Emeritus Scientist, Scion, New Zealand.

Prof. Laurent Matuana - Professor and Associate Director, School of Packaging, Michigan State University, East Lansing. Michigan, USA.

Dr Nicole Stark - Supervisory Research Chemical Engineer, USDA Forest Service, Forest Products Laboratory, Madison, WI, USA.

Prof. Yan Xiao - Distinguished Chair Professor, Program Director for Energy, Environment and Sustainable Systems Sciences, Zhejiang University, ZJU-University of Illinois Joint Institute (ZJUI), China.

Detailed biographies will be published in the next bulletin in March/April 2023.

PhD Award 2022

The International Academy of Wood Science (IAWS) wishes to provide recognition to outstanding thesis/dissertation research at the PhD level by students throughout the world. This years awardees are:

First place: Dr Adefemi Alade
Department of Forest and Wood Science, Stellenbosch University, South Africa

Second place: Dr Lu Yu
Center for Renewable Carbon, The University of Tennessee, 2506 Jacob Dr. Knoxville, TN 37996, USA

Third place: Dr Ondrej Dvoracek
Graz University of Technology, Graz, Austria

Details of the winners projects can be found on the following pages. Congratulations to the three winners.

PhD Award 2022

Dr Adefemi Adebisi Alade

An investigation into the effect of durability treatment on adhesive bonding of *Eucalyptus grandis* wood

Forest and Wood Science Department, Stellenbosch University, Stellenbosch, South Africa

Supervisors: Prof. C. B. Wessels & Prof. L. Tyhoda

The use of hardwoods in structural laminated solid wood composites is still nascent. *Eucalyptus* is the most cultivated plantation hardwood genus worldwide, and *Eucalyptus grandis* is emerging as a candidate hardwood species for structural composite applications. However, the low durability and refractory nature of *E. grandis* pose serious threats to its emerging use and potential in solid wood applications. Notably, wood biodeterioration concerns, particularly in tropical and subtropical environments, limit the implementation of wood products in building and construction applications thus posing a major barrier to the global adoption of contemporary wood products like glued-laminated and cross-laminated timbers. Hence, there is a need to integrate wood durability treatment into mass timber technology to address biodeterioration concerns. Unfortunately, preservative impregnation often adversely affects wood adhesion [1]–[4]. Furthermore, adequate knowledge of hardwood bonding is still lacking [5] and is currently without standardization. It is therefore pertinent to establish process(es) that mitigate(s) the adverse effects of preservative treatment on adhesive bonding. Wang et al. [6] emphasized the need for a simple environmentally friendly bonding process for manufacturing preservative-treated solid wood composites. Thus, the focus of this study was to investigate the adhesive bonding of preservative-treated *E. grandis* wood for the manufacture of durable solid hardwood composite. The specific objectives of the study were to: (1) establish the treatability of *E. grandis* with water-borne copper azole (CA) and disodium octaborate tetrahydrate (DOT) wood preservatives, (2) characterize the surface physicochemical adhesion properties of *E. grandis* post-impregnation with CA and DOT as precursory investigations to bonding process improvement for better adhesive-bond performance, and (3) establish the compatibility of preservative treatments with adhesive systems, and suitable process pathways including a more environment-friendly process for the manufacture of CA and DOT-impregnated *E. grandis* laminates with satisfactory adhesive-bond strength and durability. Within the scope of the above objectives, this study was developed to answer the following research questions: (1) What is the influence of the sapwood and heartwood of *E. grandis* on its treatability towards achieving satisfactory retention levels? (2) What bonding process variables predominantly influence the adhesive-bond performance in CA and DOT-treated *E. grandis* laminates, and how do variations in the conditions of such variables affect the adhesive-bond strength and durability? (3) What are the modifications in the surface physicochemical adhesion properties of *E. grandis* post-CA and DOT impregnations? (4) How does the bond performance in CA and DOT-treated *E. grandis* laminates compare under different adhesive systems?

(5) To what extent can process adaptation and adhesive compatibility improve the adhesive-bond strength and durability in CA and DOT-treated *E. grandis* laminates? and (6) Can satisfactory adhesive bonding of CA and DOT-treated *E. grandis* wood be achieved without the traditional mechanical pre-bonding treatment (surface planing) to deliver a greener process route?

The treatability of the sapwood and heartwood of sawn *E. grandis*, at varied wood densities, in terms of CA and DOT retentions was investigated using a linear mixed-effects model. Preservative impregnation was performed according to the empty-cell process at 640 kPa for 1 h. Adhesive bonding of the treated woods consisted of a series of investigations that jointly addressed the goals of the study. Sensitivity analysis to determine the influence of 8 factors viz preservative impregnation, wood density, adhesive spread rate, mechanical pre-treatment, open and close assembly times, bonding pressure, and press duration on adhesive-bond performance was carried out using Taguchi L18 orthogonal design. Considering that adhesion is a surface physicochemical phenomenon, characterization study via scanning electron microscopy integrated with energy-dispersive X-ray, and Fourier-transformed infrared spectroscopies, pH, buffer capacity, wettability via three-point air-liquid-solid contact angles with water and diiodomethane as probe liquids using the sessile drop method, and surface free energy based on Owens-Wendt-Rabel -Kaelble (OWRK) model was employed to determine the effect of the preservative impregnations on the surface physicochemical properties of the *E. grandis* wood. Thereafter, the compatibility of different adhesive systems that include melamine-urea formaldehyde (MUF), polyurethane (PUR), and phenol-resorcinol formaldehyde (PRF) with the preservative systems was investigated via different pathways based on the outcome of the preliminary screening of bonding process routes. Consequently, new process pathways were developed and investigated to achieve improved adhesive-bond performance and greener process routes. Bond performances were determined as a function of the shear strength, wood failure, and delamination according to ASTM D905-08 [7], ASTM D5226-99 [8] and Alade et al. [9], and ASTM D 2559-12 [10], respectively. In the absence of standardization for hardwood bonding, EN 14080:2013 [11] the standard for softwood was adopted for evaluation of the bond performances.

The treatability study showed that at 12 ±1% moisture content, high CA (4.61 kg/m3) and DOT (7.98 kg/m3) retentions were recorded in the sapwood whereas limited CA (2.10 kg/m3) and DOT (3.52 kg/m3) retentions were recorded in the heartwood indicating *E. grandis* impregnation could be controlled by the sapwood-heartwood content. The sensitivity analysis revealed that the shear strength of *E. grandis* laminate was predominantly affected by preservative concentration and bonding pressure whereas wood failure and bond delamination were mainly affected by wood density, preservative concentration, and mechanical pre-treatment. 12 Out of the 18 process routes initially investigated involved treated *E. grandis* samples with none providing satisfactory bond performance. However, promising process pathways were identified for probable optimization of *E. grandis* durability treatment and adhesive bonding. The characterization study revealed that the elemental O/C ratio increased post-preservative impregnations (Figure 1a) implying treatments do not affect wood adhesion via reduced surface O/C ratio. The surface acidity and buffer capacity of both sapwood and heartwood of *E. grandis* were also significantly modified by preservative impregnations (Figure 1b). Polar (oxygen-containing) functional groups declined while C1/C2 ratio increased on both sapwood (Figure 2a) and heartwood (Figure 2b) surfaces post-preservative impregnations implying reduced hydrophilicity and adhesion opportunity via chemical (hydrogen) bonding. Overall, *E. grandis* sapwood was more affected than heartwood suggesting a lesser amount of sapwood would favour adhesive chemical bonding in *E. grandis* laminates.

The observed changes in the surface chemical characteristics attributable to the effect of CA vs. DOT impregnations indicated that adhesive compatibility is important to ensure adequate bonding of the laminates via chemical interactions at molecular levels. Similarly, both CA and DOT impregnations adversely affected the wettability and surface free energy properties of *E. grandis* wood (Table 1). The implication thereof is limited wetting and adhesion on the preservative-impregnated *E. grandis* wood surfaces compared to the untreated wood surface. Therefore, adaptations of process parameters such as open and close assembly times, bonding pressure, and choice of the adhesive system were required to mitigate the adverse effect of changes in the surface thermodynamic behaviour on adhesive bond strength and durability in CA and DOT-impregnated *E. grandis* laminates. The compatibility study showed that the CA and DOT-impregnated *E. grandis* laminates failed to meet either one or both shear strength and delamination requirements according to EN 14080:2013 for all of the adhesives studied. The sapwood-heartwood effect was significant ($p < 0.05$) on shear strength whereas the effect was not statistically significant ($p > 0.05$) on the delamination of the laminates. There are indications (promising shear strength results and adhesive type) that further process adaptations could deliver improved adhesive bond performance in the treated *E. grandis* laminates. Thus, new process pathways taking into consideration the outcomes from preceding investigations were proposed and investigated. Significant improvements in shear strength (Figure 3a) and delamination resistance (Figure 3b) of *E. grandis* laminates that meet the EN 14080:2013 requirements were achieved at varied process conditions wherein PUR and MUF offered better performances than PRF. This study established processes for the utilization of preservative-treated *E. grandis* laminates as structural composite for building and construction applications in tropical and subtropical regions. Satisfactory greener process pathways that exclude pre-bonding planing were also achieved. These process pathways could be readily adopted industrially to promote hardwood bonding and wood utilization in structural applications.

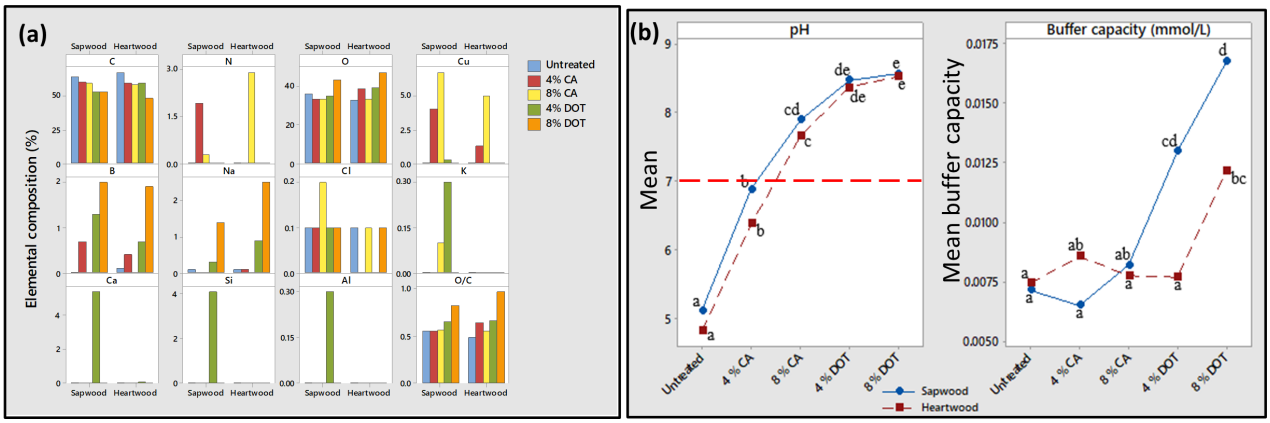

Figure 1: Elemental composition (a), pH and buffer capacity (b) of untreated and preservative-treated *E. grandis* sapwood and heartwood

Table 1: Contact angles with probe liquids and surface free energy components for untreated and preservative-treated *E. grandis.*

Treatment	Contact angle (°)		Surface free energy (mN/m)		
	Water	Diiodomethane	Polar	Dispersive	Total
Untreated	75.02	32.61	4.72	43.04	47.76
CA	91.59	33.34	0.47	42.72	43.19
DOT	84.78	41.81	2.95	38.65	41.60

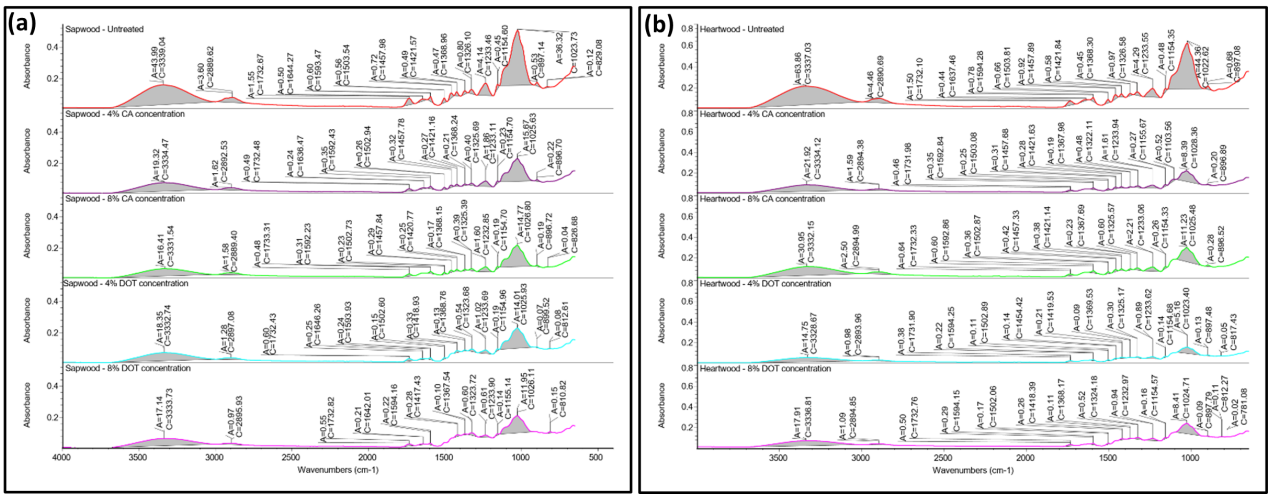

Figure 2: FTIR spectra for untreated and preservative-treated *E. grandis* sapwood (a) and heartwood (b) showing band area (A) and peak center ©.

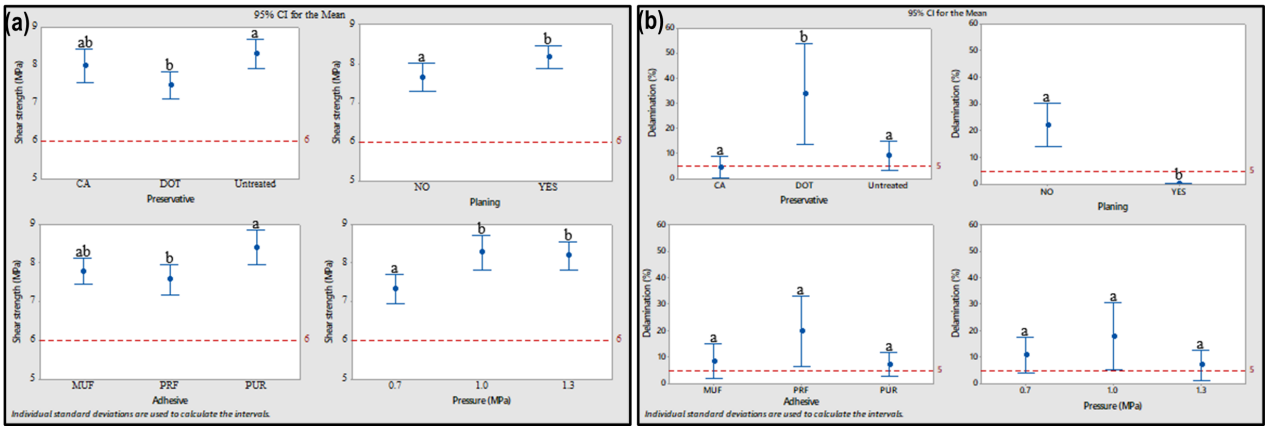

Figure 3: Interval plots for the main effect of preservative treatment, pre-bonding planing, adhesive, and bonding pressure on shear strength and delamination of *E. grandis* laminates.

Publication outputs from the study

Publications in peer-reviewed journals

Alade, A.A., Naghizadeh, Z., Wessels, C.B. (2022) 'A review of the effects of wood preservative impregnation on adhesive bonding and joint performance', *Journal of Adhesion Science and Technology,* 36 (15), 1593 – 1617, DOI: 10.1080/01694243.2021.1981651

Alade, A.A., Naghizadeh, Z., Wessels, C.B., Stolze, H., Militz, H. (2022) 'Adhesion performance of melamine-urea-formaldehyde joints of copper azole-treated *Eucalyptus grandis* at varied bonding process conditions', *Journal of Construction and Building Materials*, 314 (Part A), 3 January 2022, 125682. DOI: 10.1016/j.conbuildmat.2021.125682.

Alade, A.A., Naghizadeh, Z., Wessels, C.B., Stolze, H., Militz, H. (2022) 'Characterizing surface adhesion-related chemical properties of copper azole and disodium octaborate tetrahydrate-impregnated *Eucalyptus grandis* wood', *Journal of Adhesion Science and Technology,* DOI: 10.1080/01694243.2022.2125208

Alade, A.A., Naghizadeh, Z., Wessels, C.B., Stolze, H., Militz, H. (2022) 'Compatibility of preservative with adhesive in *Eucalyptus grandis* laminates', *International Wood Products Journal*, 13 (1), pp. 57–69. DOI: 10.1080/20426445.2021.2018101.

Alade, A.A., Wessels, C.B., Stolze, H., Militz, H. (2022) 'Improved adhesive-bond performance in copper azole and disodium octaborate tetrahydrate-treated *Eucalyptus grandis* laminates', *International Wood Products Journal*, 13 (3), pp. 139 – 147. DOI: 10.1080/20426445.2022.2058277

Alade, A.A., Naghizadeh, Z., Wessels, C.B. (2022) 'A new method for estimating wood failure percentage in adhesive-bonded shear specimens', *International Journal of Adhesion and Adhesives*, 112, January 2022, p. 103028. doi: 10.1016/j.ijadhadh.2021.103028.

Article in conference proceedings

Alade, A.A., Naghizadeh, Z., Wessels, C. B. (2021) 'Treatability of South African-grown *Eucalyptus grandis* with water-borne copper azole and disodium octaborate tetrahydrate wood preservatives', *In 52nd Annual Meeting of the International Research Group on Wood Protection*, November 1 – 2, IRG52 webinar. Document No. 21-40920.

Acknowledgements

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References

[1] C. R. Frihart, "Interaction of copper wood preservatives and adhesives," in 26th Annual Meeting of the Adhesion Society, Inc.: Adhesion Fundamentals: from Molecules to Mechanisms and Modeling, 2003, pp. 244–245, [Online]. Available: https://www.fpl.fs.fed.us/documents/pdf2003/friha03a.pdf.
[2] H. Lim, S. Tripathi, and J. D. Tang, "Bonding performance of adhesive systems for cross-laminated timber treated with micronized copper azole type C (MCA-C)," Constr. Build. Mater., vol. 232, p. 117208, 2020, DOI: 10.1016/j.conbuildmat.2019.117208.
[3] J. E. Winandy and J. J. Morrell, "Improving the utility, performance, and durability of wood- and bio-based composites," Ann. For. Sci., vol. 74, no. 1, pp. 1–11, 2017, DOI: 10.1007/s13595-017-0625-2.
[4] A. Temiz, S. Akbas, I. Aydin, and C. Demirkir, "The effect of plasma treatment on mechanical properties, surface roughness and durability of plywood treated with copper-based wood preservatives," Wood Sci. Technol., vol. 50, no. 1, pp. 179–191, 2016, DOI: 10.1007/s00226-015-0773-1.
[5] S. Bockel et al., "The role of wood extractives in structural hardwood bonding and their influence on different adhesive systems," Int. J. Adhes. Adhes., vol. 91, no. March, pp. 43–53, 2019, DOI: 10.1016/j.ijadhadh.2019.03.001.
[6] J. Y. Wang et al., "Durability of mass timber structures: A review of the biological risks," Wood Fiber Sci., vol. 50, no. Special Issue, pp. 110–127, 2018, DOI: 10.22382/wfs-2018-045.
[7] ASTM D905 - 08, "Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading." West Conshohocken, PA, p. 5, 2008, DOI: 10.1520/D0905-08E01.
[8] ASTM D5266 - 99 (Reapproved 2005), "Standard Practice for Estimating the Percentage of Wood Failure in Adhesive Bonded Joints." ASTM International, West Conshohocken, PA, p. 4, 2005, DOI: 10.1520/D5266-99R05.
[9] A. A. Alade, Z. Naghizadeh, and B. C. Wessels, "A new method for estimating wood failure percentage in adhesive-bonded shear specimens," Int. J. Adhes. Adhes., vol. 112, p. 103028, 2021, DOI: 10.1016/j.ijadhadh.2021.103028.
[10] ASTM D2559 - 12a (Reapproved 2018), "Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions." ASTM International, West Conshohocken, PA, p. 14, 2018, DOI: 10.1520/D2559-12AR18.
[11] EN 14080:2013, "Timber structures — Glued laminated timber and glued solid timber — Requirements," BSI Stand. Publ., no. June, pp. 1–110, 2014.

PhD Award 2022

Dr. Lu Yu

Lignin Derived Carbon Materials for Energy Storage and Environmental Applications

Department of Materials Science and Engineering, the University of Tennessee, Knoxville, United States

Supervisors: Prof. David Harper and David Keffer

As the most abundant aromatic polymer in nature, there are about millions of tons of lignin produced as the byproduct of paper and pulp industry every year. Numerous attempts have been made to explore and valorize lignin, it remains challenging due to its complex and irregular structure. However, lignin has excellent potential to be developed for high-value products due to its high carbon content and unique aromatic structure. This work elucidates the process-structure-property-performance relationships between lignin and the resulting high-value carbon materials and explores their potential to be used for energy storage and environmental applications. During my Ph.D. study, my research focused on biomass derived renewable carbons for electrochemical energy storage. I conducted and optimized physical and chemical activation process for developing highly porous activated carbons (ACs) and applied as electrodes for supercapacitors [1-3] and developed carbon composites as anodes for high-capacity lithium-ion batteries. Based on my knowledge accumulated in my master research, [5-9] I also utilized the unique properties of lignin and produced lignin-derived carbon dots with multi-color emission.[10] In addition, I also expanded the applications of produced activated carbons for dyes removal. To improve the regeneration efficiency, I developed a simple route to synthesize magnetic activated carbons in a one-step process. The reusability test demonstrated that magnetic activated carbons could be easily collected via an external magnetic bar and exhibited excellent reusability.[11]

The brief research summary is as below:

Lignin derived highly porous activated carbons for supercapacitors.
I conducted and optimized physical and chemical activation process and established efficient activation methods for preparing activated carbons from lignin with enhanced properties and pore structures (e.g. surface accessibility and functionality). As for the physical activated carbons (surface area < 1000 m2 g-1), I introduced the hydrophilic carbon dots on the surface of activated carbons (Figure 1) at optimized ratio to improve the accessibility and wettability of the electrodes in aqueous medium, and more than two-fold higher capacitance was achieved compared to undecorated activated carbon electrodes.

As for various lignin precursors, I applied softwood and switchgrass lignin as precursors (Figure 2) and developed the process-structure-property-performance relationship between lignin and activated carbons by materials characterization, process control, and electrochemical performance tests. To explore the commercialized potential of the lignin-based activated carbons, I collaboratively conducted economic analysis of lignin-derived activated carbons as commercial candidates for supercapacitors that enables bio-jet fuel at $3/GGE.

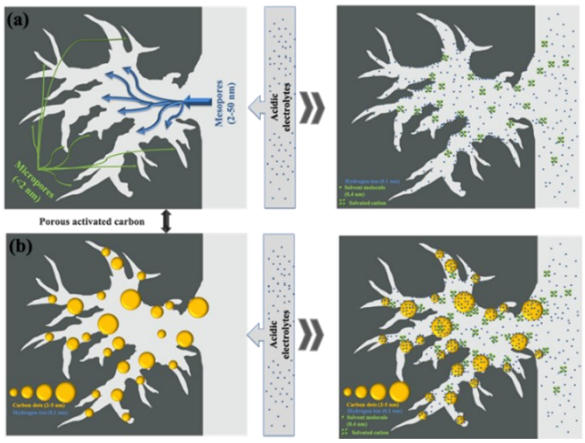

Figure 1 Schematic illustrations of the charging process in (a) AC and (b) CD@AC-11 electrodes.[1]

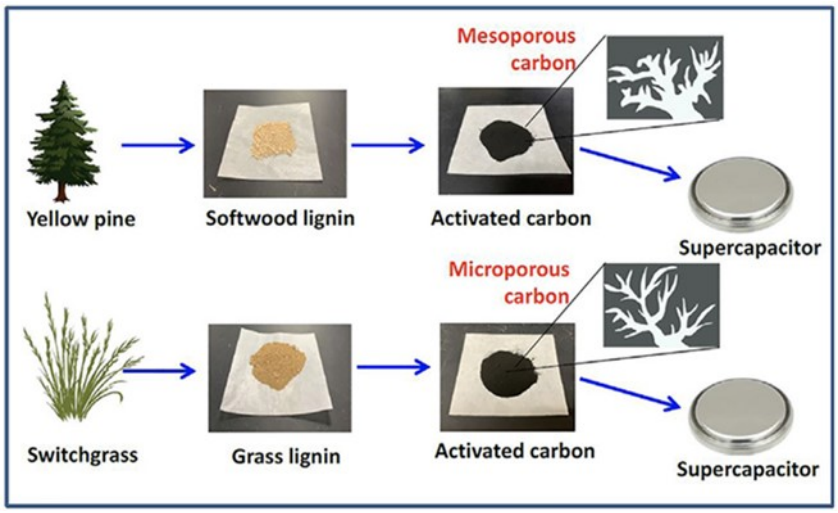

Figure 2 Schematic diagram for illustrating the flowchart of supercapacitor using two kinds of electrode materials, where activated carbons were derived from different raw materials and lignin precursors.[2]

In addition, to further increase the surface area of lignin derived ACs, I explored and optimized the efficient one step-chemical activation process and the produced lignin based ACs achieved surface area > 3000 m2 g-1 and mesopore ratio of ~80%. The highly mesoporous carbons were applied as the electrodes for high performance supercapacitors as well as adsorbents for dye adsorption. Economic analysis was also conducted to evaluate its economic feasibility.[3]

Carbon composites produced by different types of lignin precursors for Li-ion and Na-ion batteries.
I developed carbon composites from various lignins which are from different parent materials (hardwood, softwood and switchgrass), and applied to Li-ions and Na-ions batteries. To conduct better characterization of the lignin and derived disordered carbons, I took the SAXS Course and National School on Neutron and X-ray Scattering neutron which was organized by Argonne national lab and Oak ridge national lab (ORNL), and applied total neutron scattering diffraction on the NOMAD beamline at the Spallation Neutron Source at ORNL to collect pair distribution functions (PDFs) of produced carbon composites to elucidate structures of disordered carbons as a function of lignin precursors. I also combined Fourier Transform Ion Cyclotron Resonance mass spectrometry (FT-ICR MS) and Nuclear Magnetic Resonance (NMR) analysis to obtain an unambiguous understanding of the structures and properties of various types of lignin precursors.[4]

Lignin-derived carbon dots with targeted structures.
I synthesized multiple color-emitting carbon dots from lignin via hydrothermal methods. To better exploit the unique properties of lignin and characterize the fluorescent and structural properties of the produced carbon dots, I draft the proposal for nanoscience research program at the Center for Nanophase Materials Science (CNMS) at ORNL. This proposal was successfully approved, and the fundamental research on fluorescence and structure characterization of lignin produced carbon dots were conducted at CNMS.[10]

Magnetic activated carbons derived from lignin for dyes adsorption.
In addition to using activated carbons in supercapacitors, I also applied the activated carbons as adsorbent for dyes removal. During the experiments, I found the carbon powders were hard to collect which led to the inconvenience in practical application. To increase the regeneration efficiency and adsorption performance, I developed a simple route to synthesize magnetic activated carbons in a one-step process. The reusability test demonstrated that magnetic activated carbons could be easily collected via an external magnetic bar and exhibited excellent reusability (Figure 3). [11]

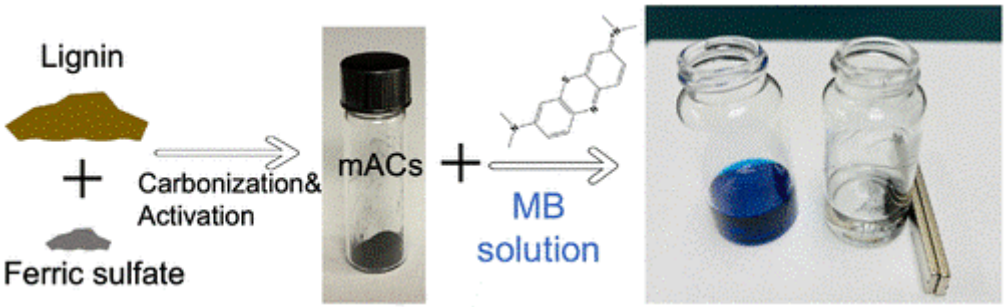

Figure 3. Lignin-based activated carbon with magnetic nanoparticles can readily absorb cationic MB, is easily separated from water, and can be regenerated multiple times with loss in sorption.[11]

References

[1] L. Yu, C-T. Hsieh, D.J. Keffer, H. Chen, G. A. Goenaga, S. Dai, T.A. Zawodzinski, D. P. Harper, "Hierarchical Lignin-Based Carbon Matrix and Carbon Dot Composite Electrodes for High-Performance Supercapacitors", ACS Omega, 6, 7851–7861 (2021).
[2] L. Yu, K. Seabright, I.Bajaj, D.J. Keffer, D.M. Alonso, C-T. Hsieh, H. Chen, M. Li, S. Dai, D. P. Harper, "Performance and Economic Analysis of Organosolv Softwood and Herbaceous Lignins to Activated Carbons as Electrode Materials in Supercapacitors", Front. Energy Res. 10 (2022).
[3] L. Yu, I.Bajaj, D. J. Keffer, H. Chen, S. Dai, D. P. Harper, "Tailored Porous Structures of Lignin-based Activated Carbons with Multiple Applications." (In preparation).
[4] L. Yu, D. J. Keffer, J. Li, D. P. Harper, "Elucidating Processing-Structure-Property-Performance Relationships of Lignin and Produced Carbon Composites for Li-ions Batteries." (In preparation)
[5] L. Yu, C. Li, Q. Li, F. Wang, J. Lin, J. Liu, S. Hu, H. Zheng, Z. Tan, "Performance Improvement of Conventional and Inverted Polymer Solar Cells with Hydrophobic Fluoropolymer as Nonvolatile Processing Addictive", Organic Electronics, 23, 99-104 (2015).
[6] L. Yu, Q. Li, Z. Shi, Y. Wang, H. Liu, F. Wang, B. Zhang, S. Dai, J. Lin, Z. Tan, "Optimization of the Energy Level Alignment between the Photoactive Layer and the Cathode Contact Utilizing Solution-processed Hafnium Acetylacetonate as Buffer Layer for Efficient Polymer Solar Cells", ACS Appl. Mater. Interfaces, 8 (1), 432-441 (2016)
[7] X. Hou, Q. Li, T. Cheng, L. Yu, F. Wang, J. Lin, S. Dai, Y. Li, Z. Tan, "Improvement of the Power Conversion Efficiency and Long Term Stability of Polymer Solar Cells by Incorporation of Amphiphilic Nafion-doped PEDOT-PSS as Hole-Extraction Layer", J. Mater. Chem. A, 3(36): 18727- 18734 (2015).
[8] F. Wang, B. Zhang, Q. Li, Z. Shi, L. Yu, H. Liu, Y. Wang, S. Dai, Z. Tan, Y. Li, "Management of the Light Distribution within the Photoactive layer for High Performance Conventional and Inverted Polymer Solar Cells", J. Mater. Chem. A, 4(5), 1915-1922 (2016).
[9] Z. Tan, L. Li, C. Li, L.Yan, F. Wang, J. Xu, L. Yu, B. Song, J. Hou, Y. Li, "Trapping Light with a Nanostructured CeOx/Al Back Electrode for High-Performance Polymer Solar Cells", Advanced Materials Interfaces, 1-8 (2014).
[10] L. Yu, D. J. Keffer, I. N. Ivanov, D. P. Harper, "Full-Color Light-Emitting Carbon Dots synthesized from Lignin Biomass." (In preparation).

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Development of a novel device for analysis of high-speed linear cutting of wood and elaboration of a cutting force prediction model

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Supervisors Prof. Franz Haas[b] & Dr. Stephan Frybort[a]

Personal Profile
I am a researcher and engineer currently based in Vienna. It is an honour to receive 3rd place in the PhD Award and Medal of The International Academy of Wood Science. My recent research interests include wood machining and the

mechanics of heterogeneous materials. I am passionate about machine prototyping, measurement technologies and data analysis. When I need a rest from research, I like to spend time hiking and climbing in nature.
Currently, I work as a Senior Researcher in the Team Mechanical Disintegration of Competence Centre for Wood Composites and Wood Chemistry, Austria. I am an active member of the Engineering Mechanics Institute (EMI) of the American Society of Civil Engineers (ASCE) and the Society of Wood Science and Technology. (SWST).
I received my PhD in Mechanical Engineering Sciences at the Graz University of Technology, Austria, at the Institute of Production Engineering. During my PhD studies, I also acquired knowledge about wood and wood-based products at the University of Natural Resources and Life Sciences, Vienna, Austria, at the Institute of Wood Technology and Renewable Materials. Before that, I finished my Bachelor's and Master's degrees at the Brno University of Technology, Czech Republic, in Mechanical Engineering Design.

Introduction
The woodworking-associated industries currently undergo changes. Hardwoods are gradually replacing majorly used softwoods. It motivates the cutting tool and machine manufacturers to start developing innovative solutions for hardwood processing. Nevertheless, the lack of knowledge about force prediction and mechanisms taking place during hardwood cutting is observed. Furthermore, the investigations of high-speed cutting processes have not considered the dynamic behaviour of the test rigs commonly excited by the natural wood phenomenon. Past methods utilized to deliver knowledge about hardwood disintegration rarely considered a higher number of processing parameters and material properties. My research deals with two key topics nowadays discussed in the wood research community regarding bio-based materials disintegration: the methodology of cutting force measurement and cutting force

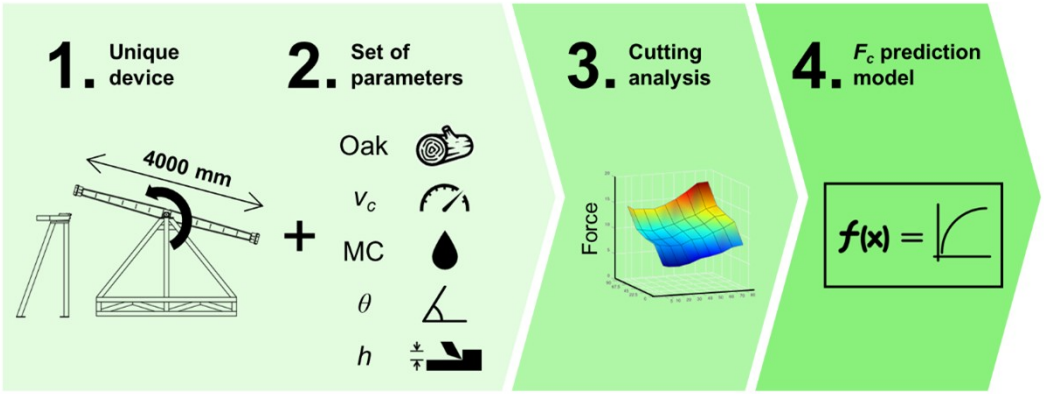


Figure 1. To perform described research, it was necessary to involve these four steps.

prediction (Fig. 1).

Experimental Setup

The novel device (Fig 2. left) simplifying the complexity of wood process observation is developed to enable the detailed analysis of wood cutting. The unique worldwide device works on the principle of a rotor arm with a diameter of 4 m. Therefore, the movement of its end can be considered linear. Additionally, the rotor arm reaches an angular speed of up to 442 RPM. That corresponds to the tangential cutting velocity of 93 $m \cdot s^{-1}$. The measurement cut is stand -alone – a single cut per examination is conducted (Fig. 2 right). It eliminates the influence of the previous cut. The combination of mentioned test parameters opens the unique possibility of investigating wood cutting. The stand-alone cut at this speed has never been performed before. Furthermore, the linearity approximation enables better insight into the process.

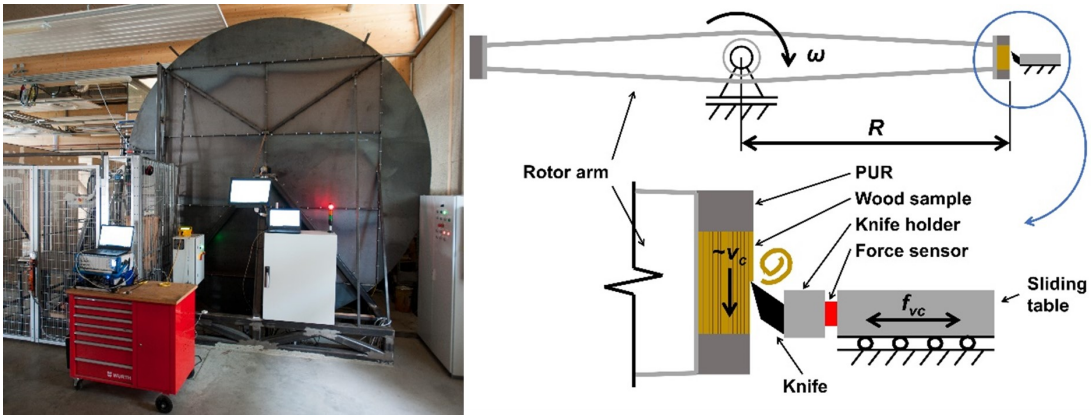


Figure 2. Left, you can see the test device. Right, you can see the principle of the device.

Materials and Methods

My thesis presents the developed test rig and further proves its accuracy by means of various examinations. Due to the stiffness of the setup, the natural frequency of the system is increased. Demanding dynamic calibration of the measurement chain is implemented to reduce a signal convolution that may occur. The precise 3D quartz force sensor is used. The safety of the device is secured by a series of sensors, control systems and safety zones. The

cutting force data are corrected according to real uncut chip thickness measured. Cutting of the beech (*Fagus sylvatica*) under a wide range of parameters is examined to test the correction method. The cutting forces are influenced non-linearly by cutting velocity. The lowest cutting force is measured at 20 m·s-1. The main set of tests is performed on oak (*Quercus robur*). Oak samples are climatized to six different moisture content levels, from 0 % (completely dry) to >32 % (oversaturated). They are examined at cutting velocities ranging from 5 to 80 m·s-1, at five different cutting fibre angles from along (0°) to across the wood grain (90°), and at different uncut chip thicknesses from 0 mm (touching the surface without splitting) to 0.5 mm.

Results

Some tests are observed by high-speed cameras at a frame rate of 200 000 fps. Insight into wood cutting shows that cutting velocity is the key parameter that greatly non-linearly influences cutting force. The evaluation based on measured uncut chip thickness shows the friction force component of cutting force that strongly influences the process. The observed regression shows that the surface "ploughing" generating friction force remains present when cutting thin chips. Furthermore, chip formation creates a significant share in force components when cutting thick chips. More immense forces are observed during cutting perpendicular to fibre orientation than cutting parallel to fibres (Fig.3). All obtained data serves as input for a mathematical model established for cutting force prediction. The model involves a higher number of variables (e.g., cutting fibre angle, cutting velocity, moisture content, and uncut chip thickness). Finally, the prediction model is tested by an independent set of data. Results of the model testing show statistically significant sameness of the model and test data set.

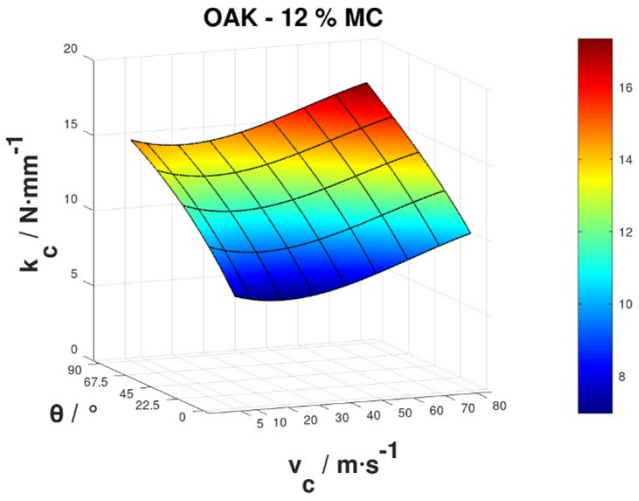


Figure 3. Part of the model for prediction of cutting force (valid for oak at 12 % moisture content). It shows the dependency of specific force k_c on cutting fibre angle θ and cutting velocity v_c.

A closer look at the research is shown in the video: https://youtu.be/siJprPjMY0g or publications listed in the LinkedIn profile: https://www.linkedin.com/in/ondrejdvoracek.

Acknowledgements

I am very thankful for the funding I received from the European Regional Development Fund and Interreg V-A ATCZ as well as from the Office of the Provincial Government of Lower Austria, Abteilung Wissenschaft und Forschung within two projects (1) HARDIS – "Mechanical disintegration of hardwood" ATCZ21 (www.at-cz.eu/hardis) and (2) ROTCUT – " From Linear to Rotary Cutting of Hardwood " ATCZ276 (www.at-cz.eu/rotcut)

New Academy Board Chair

Prof. Dr. Katarina Čufar completed her Bachelor's, Master's and PhD studies at the University of Ljubljana, Biotechnical Faculty, Department of Wood Science and Technology, where she worked as a researcher, assistant professor and, since 2008, as a full professor. Between 1999 and 2021, she headed the Chair of wood science.

Dr. Čufar teaches courses on wood anatomy, wood structure, and wood biology. She has (co-)supervised more than 100 graduation theses, including five doctoral dissertations. She has supervised numerous outgoing and incoming students and postdoctoral fellows from around the world. She has been a visiting lecturer, researcher, co-supervisor and committee member at the Universities of Alicante and Zaragoza (Spain), Hamburg (Germany), Vienna and Innsbruck (Austria), Prague and Brno (Czech Republic), Zagreb (Croatia), Viterbo, Napoli and Padova (Italy), Montpellier (France), Wageningen (Netherlands) and Tervuren (Belgium).

Her research is devoted to wood science, dendrochronology, and the general study of wood, from its origin in the tree (wood and phloem formation), through its selection and processing in industry, to its use as a natural, renewable material also in cultural heritage and archaeology. She helped set up the laboratories, introduced new methods and their application for research and applied work. She actively collaborates with research teams from all over the world.

She has led or participated in more than 20 projects, (co-) authored more than 125 articles in peer-reviewed scientific journals (Scopus), and reviewed for more than 30 journals. She is Editor-in-Chief of Les/Wood and a member of the editorial boards of Tree-Ring Research and Drvna Industrija.

Dr. Čufar is a member of international associations such as IAWA, TRS, ATR and has received awards such as the Honorary Award of the Faculty of Forestry and Wood Technology of Mendel University Brno, Czech Republic, the Zois Award of the Republic of Slovenia, the Golden Plaque of the University of Ljubljana, the Jesenko Life Achievement Award and two awards for the best teacher of the year in the Department of Wood Sciences of the Faculty of Biotechnology (Šernek & Petrič, 2020; Petrič & Šernek, 2021).

References

Petrič, M., Šernek, M. (2021). Prof. Dr. Katarina Čufar received the Jesenko lifetime achievement award. Les/Wood 70, 1, 87-93 DOI: 10.26614/les-wood.2021.v70n01a10

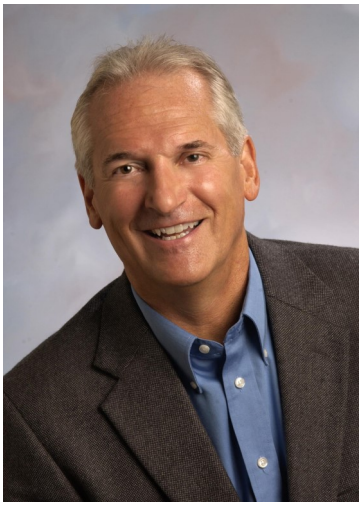
Šernek, M., Petrič, M. (2020). Prof. dr. Katarina Čufar received the Zois prize for important achievements and the Golden plaque of the University of Ljubljana. Les/Wood 69, 2, 117-124, DOI: 10.26614/les-wood.2020.v69n02a10

New Board Members 2022

Voichita BUCUR, Adjunct Professor RMIT University, Melbourne, Australia.

Galina GORBACHEVA, Professor, Department of Wood Science and Technology, Mytishchi Branch of Bauman Moscow State Technical University, Russia.

Keiko KURODA, Professor Emeritus, Kobe University, Kobe, Hyogo, Japan.



Tim YOUNG, Professor and Data Scientist, The University of Tennessee (Center for Renewable Carbon) and UTK/ORNL Bredesen Center, USA.

Seeking a new IAWS Secretary

The executive committee is seeking applications for IAWS secretary with the impending retirement of Lloyd Donaldson from June 2023 after serving a 6 year term.

Obligations for this position include:

- Attending EC meetings and recording the minutes (currently most meetings are via Zoom but some travel may be involved if/when we resume physical meetings). Some limited financial support may be available to assist with travel costs.
- Maintaining the database of fellows (Excel database).
- Maintaining the IAWS website. The website is a modern implementation with an easy to use editing interface. No coding or web experience required.
- Editing the twice yearly news bulletin, expertise in Microsoft Publisher would be an advantage.
- Organising the fellows election each year.

This position would typically require 1-2 days per month but may be busier at certain times of year, especially in March and December (news Bulletin) and August (fellows election).

For more detailed information or to apply contact lloyd.donaldson@scionresearch.com

Financial Report

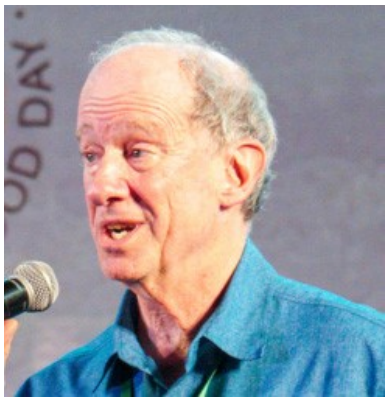
Treasurer's Report (as of October 28, 2022)

This is an update so far for calendar year 2022. The dues notices were late this year because I had lost my computer capabilities and email where I had managed IAWS accounts for many years. I had to transfer everything to my personal computer, so dues notices did not go out until the end of May rather than February. After the second request for dues this year, we have 20 of 31 Affiliate Members, 18 of 22 Retired Members, and 47 of 89 Active Members current in their dues. Except for Retired Members, the number that is not current in their dues compared to previous years is significantly higher. Our funds include:

CD at Sandy Springs Bank	$37,178
PayPal Account	$11,976
Checking at Capital One Bank	$57,846
Vanguard Mutual Fund	$102,71
	$209,71

The total funds are about $9,500 less than 2021 at the end of the year because of a large drop in the value of Vanguard Mutual Fund.

Howard Rosen



Postdoc Opportunities

- Molecular modelling of cellulose derivatives

A postdoctoral position is immediately available in using molecular modeling to develop sustainable materials by exploring the characteristics of cellulose derivatives and identifying more environmentally-friendly plasticizers. The position is in the laboratory of Professor Melissa Pasquinelli at NC State University in Raleigh, NC, and involves close collaborations with experimental labs in academia and industry.

A Ph.D. in polymer science, chemistry, materials science, physics, chemical engineering, or related fields is required. Experience in molecular modeling is also required, and experience with modeling of (bio)polymer materials is preferred. Experience in using the LAMMPS software program and/or GPUs for high performance computing is preferred. Other expectations include publishing a series of high quality papers and articles; interacting regularly with industrial and academic collaborators; serving as a lab manager; mentoring and training other lab members; assisting in writing grant proposals; producing and delivering presentations; and upholding research integrity.

Interested candidates should send an updated CV and a brief description of their suitability for the role to mpasqui@ncsu.edu. Screening of applications is ongoing and will continue until the position is filled.

- Polyester polymerisation

An industrial postdoctoral fellowship is available in the very near future at North Carolina State University in the Departments of Forest Biomaterials & Chemistry. We are looking for a skilled polymer chemist whose range spans conducting polycondensation syntheses, spectral and chromatographic characterization, and physical testing. The ideal candidate will have conducted polyester polymerization and be conversant with various polymerization schemes while having a working knowledge of Schlenk lines. Please contact Professor Lucian Lucia at lalucia@ncsu.edu for more information on the position.

NC State is located in the heart of Raleigh, North Carolina, which U.S. News and World Report named as the second best U.S. city to live in. NC State has world-class library facilities, a lake with a fishing pier and an 18-hole golf course, its own High Performance Computing Center, and a wide variety of professional development activities for postdoctoral scholars through its Graduate School. NC State is a leading land-grant public research university and is recognized as one of the best employers in the state.
The laboratory is housed within the Department of Forest Biomaterials, a full-service ecosystem advancing the future of biomaterials from educating future leaders to supporting industry and government research. It is part of the College of Natural Resources, where “the planet is our classroom,” and is also affiliated with the College of Engineering. CNR is a tight-knit community of passionate and caring people dedicated to improving the environments and communities in which we live, work, learn, and play. It is on the Central Campus of NC State, which is within walking distance to the Carmichael Gymnasium and Talley Student Union, as well as a variety of eateries, shops, and the WRAL Azalea Gardens.
AA/EOE. In addition, NC State welcomes all persons without regard to sexual orientation or genetic information. Persons with disabilities requiring accommodations in the application and interview process please call (919) 515-3148.

Marcus Wallenberg Prize 2022

Professor **Ilkka Kilpeläinen** and Professor **Herbert Sixta** receive the 2022 Marcus Wallenberg Prize

Sustainable concept for wood-based textile fibres

The 2022 Marcus Wallenberg Prize of SEK 2 million is awarded to Professor Ilkka Kilpeläinen and Professor Herbert Sixta for the development and use of novel ionic liquids to process wood biomass into high-performance textile fibres. King Carl XVI Gustaf presented the prize on Monday 10 October in Stockholm.

The future demand for textile fibres is growing due to global population growth. Production of cotton, the predominantly used cellulose fibre for textiles, is not expected to keep up with the demand. Therefore, man-made cellulose fibres is an excellent complement for cotton as these fibres have similar properties.

The main processes to produce man-made cellulose textile fibres are the viscose process, where cellulose is solubilized using alkali and carbon disulphide and the Lyocell process, where N-methylmorpholine-N-oxide (NMMO) is used to dissolve cellulose. The viscose process has, however, become environmentally controversial due to the use of toxic carbon disulphide as the main reagent. The Lyocell process on the other hand is hampered by the instability of the NMMO.

These challenges have led to extensive research on different solvent systems for cellulose to produce regenerated cellulose fibres. Ionic liquids have gained interest as green alternatives for organic solvents in different processes. Ionic liquids are salts that can be melted below 100^{o}C and have unique properties including low vapour pressure, high thermal stability, and high dissolving capability of different organic and inorganic substances.

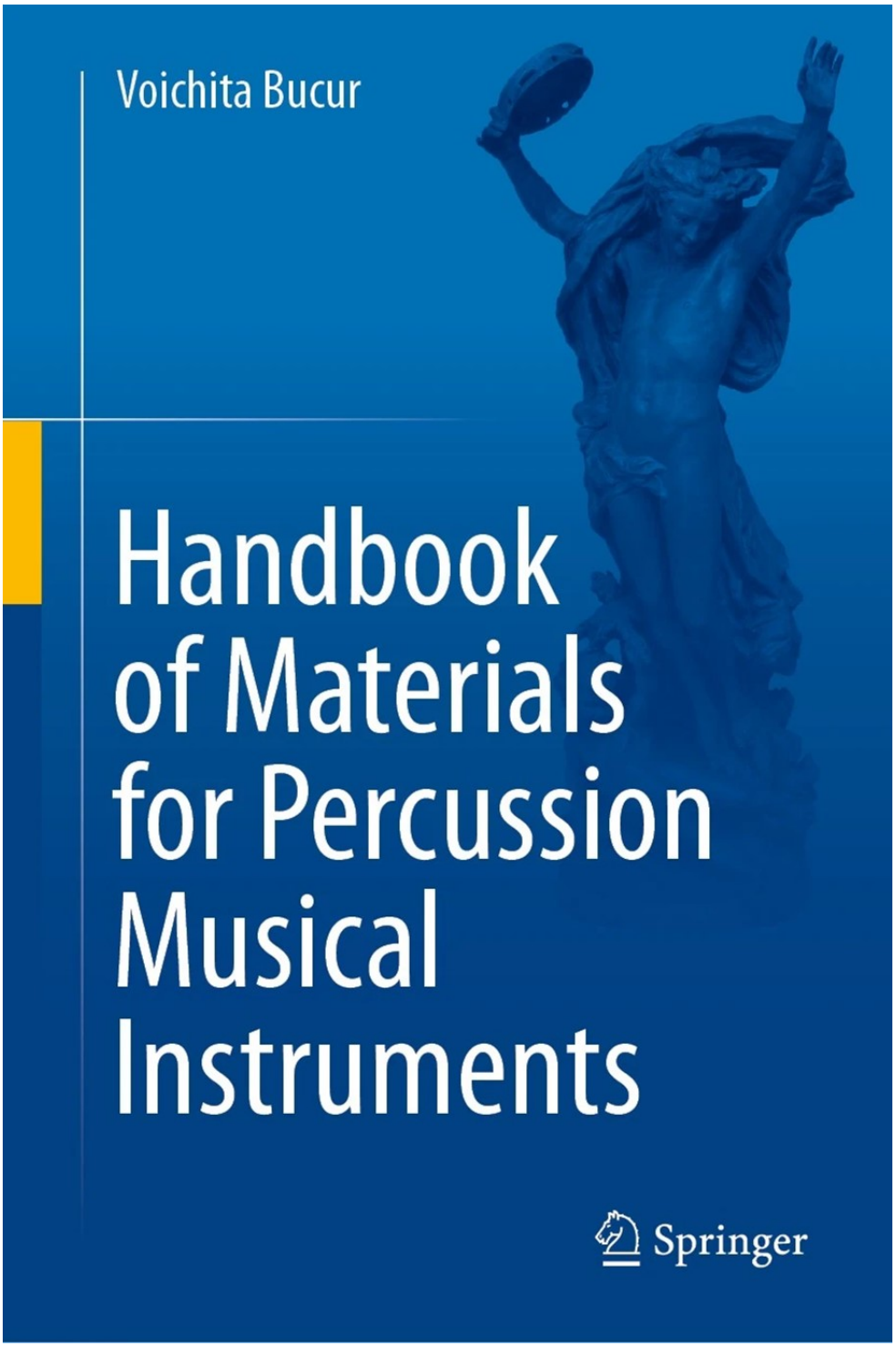
Man-made cellulose fibres from wood with high technical quality have been developed by two research teams in Finland, at the University of Helsinki and at the Aalto University. In this concept, the design and use of novel superbase ionic liquids to process wood pulp into high-performance textile fibres was developed and currently tested for scaling-up. The team led by Prof. Kilpeläinen at the University of Helsinki developed superbase ionic liquid solvents for dissolution of wood biomass e.g. bleached or unbleached pulp or recycled cellulose pulp. Prof. Sixta and his team, at the Aalto University, developed the ionic liquid-based fibre shaping process based on dry-jet wet spinning.

“This unique collaboration has resulted in novel sustainable concept of textile fibre production from wood. The innovation is expected to result in a large range of new product and business opportunities for the forest industry”, says Johanna Buchert, Chairperson of the Marcus Wallenberg Prize Selection Committee.

For more information: The 2022 Marcus Wallenberg Prize - MWP

New Book by Walter Liese

New Book by Voichita Bucur



New Book by Voichita Bucur

Hardcover ISBN978-3-030-98649-0

eBook ISBN978-3-030-98650-6

Voichita BUCUR (2022)

HANDBOOK OF MATERIALS FOR PERCUSSION MUSICAL INSTUMENTS

This book addresses in twenty chapters key questions about the materials for percussion musical instruments of symphony orchestra such as: timpani, other drums, tambourine, marimba, xylophone, vibraphone, glockenspiel, gong, tam-tam, cymbal, chimes, triangle, plate, castanets, woodblocks, celesta and new percussion instruments. One chapter is devoted to the bells. The content of the book is structured into the following parts

PART 1 Percussion instruments, their classification and their sound, is structured in four chapters and deals with the organology of percussion instruments, with the sound of the percussion instruments and with the experimental methodology for the determination of acoustical properties of the percussion instruments

PART 2 Structural parts of the instruments is presented in nine chapters in which are shown the following instruments : the membranophones - timpani, drums, tambourine , the Idiophones made of wood played with mallets – marimba, xylophone, the metallic idiophones played with mallets- vibraphone, glockenspiel , the struck idiophones played with mallets -gong, tam-tam, cymbal, chimes, triangle, plate, the idiophones with keyboard – celesta, the concussion Idiophones - castanets, woodblocks and the new percussion instruments. A chapter is devoted to the bells - the church bells and the carillon

PART 3 Properties of materials describes the properties of the following materials: wood, metallic alloy, leather and new materials for percussion musical instruments of the symphony orchestra

PART 4 Maintenance and conservation of percussion instruments addresses two main aspects related to the care and the maintenance of the percussion instruments and the conservation of the percussion instrument. The last chapter deals with the patents for percussion instruments:

BOOK REVIEW: WOOD IN SPORTS - A DURABLE MARRIAGE?

Reprinted from the International Journal of Wood Culture (2022) 1-3. DOI: 10.1163/27723194-BJA10005.

Francesco Negro (ed.), Wood in Sport Equipment — Heritage, Present, Perspective. DISAFA, University of Turin, Turin, 2022. 221 pp. Illustrated. ISBN: 978-88-998108-26-7. DOI: 10.22382/book-2022–01. Free e-book, available online at http://www.swst.org/wp/wp-content/uploads/2022/05/Wood-in-sport-equipment_Heritage-present-perspective.pdf.

This free access e-book written by multiple authors has an original theme: the role of wood in Olympic and other sports. It describes and discusses the changing uses of wood as a material for sport items such as bats, boats, bows and arrows, etc. but also of wood in sport facilities such as sporting halls, basketball courts, cycling tracks, and horse stables. The book is the main outcome of a project on wood in sport equipment co-funded in 2021 by the World Wood Day Foundation (WWDF), and it is befitting that the editor starts the book with an account of the mission and achievements of this foundation established in 2010, as an offshoot of the International Wood Culture Society, which has as its motto “wood is good”.

There are 35 chapters by 39 authors, most of them from the network in and around Turin, Italy, of Francesco Negro — who doubles as editor and chief author — but also by authors from other countries such as Austria, Chile, Madagascar, Norway, Poland, and the USA, thus guaranteeing good international coverage.

The first 13 chapters include general themes such as the role of wood for humankind, sports in ethics and philosophy, sport as a symbolic universe, sports facilities and design in wood, and wood species commonly used in sport items and sport facilities (with nice macrophotos of endgrain and flat or quarter sawn surfaces). Two chapters deal with environmental aspects of the

use of wood in sports in an ideal, sustainable world with a circular economy. Innovations and research leading to new sophisticated materials are subject of a separate chapter, with detailed examples of how modern skis and tennis

2 book review
INTERNATIONAL JOURNAL OF W OOD CULTURE (2022) 1–3

rackets evolved from wooden precursors. In the introduction the editor recognizes four potential fates of wood in sports: (1) obsolete, (2) residual, (3) well established, (4) material of choice. The role of wood in golf (chapter 12) now belongs to the obsolete category. Wooden clubs from olden times have long been replaced by metal and synthetic ones. Chapter 13 is entitled “A good fourth place: the wooden medal”. It deals with the frustrations and mixed blessings of just falling short of a bronze metal in Olympic sports. This metaphorical wood use of is purely for entertainment, but the chapter also describes the use of wood in some historical and modern sport trophies.

The remaining chapters each deal with one type of sport: archery, gymnastics, baseball, basketball, canoeing, kayak and rowing, cycling, equestrian sports, ice hockey, shooting, skateboarding, skiing, climbing, surfing, table tennis, Taekwondo (derived from a Korean martial art, and recently turned into an Olympic sport), and track cycling as well as the paralympic sports boccia and club throwing. The non-Olympic sports: billiards, bowling, chess and wooden bowls with weights are extras, the cherries on the cake so to speak.

The last game of wooden bowls with weights described in chapter 35 is in fact an ancient game that originated around the Mediterranean in the Stone Age, 7000 BC, with globular stones, then evolved into a game with wooden spheres injected with lead on one side for asymmetrical density distribution, to end up as a regional game in Tuscany, where it was last played around 1990.

The entertaining examples of obsolete wood uses in a flourishing game (golf, chapter 13) or in a game that in itself became obsolete (chapter 35, discussed above) are exceptional. Most other sports show a recurring pattern:

The entertaining examples of obsolete wood uses in a flourishing game (golf, chapter 13) or in a game that in itself became obsolete (chapter 35, discussed above) are exceptional. Most other sports show a recurring pattern: the origin of many of them was utilitarian, for instance in transport (rowing, skiing, cycling, horse riding), hunting and or warfare (archery, club throwing and shooting) before giving rise to competitive sports. The role of wood often follows the pattern of early beginnings with solid wooden sports items and facilities, succeeded by laminated wood products, composites of laminated wood, modified wood, fibre glass, carbon fibres, and other synthetic materials, and light metals. In many sports wood use has all but disappeared (e.g. tennis, skiing) but in others there is a slow comeback. Not in the least because wooden items and facilities fit a sustainable and circular economy better than metals or synthetic materials, and because in this respect "only wood can give the sensations needed for emotional functionality" to cite Alessandro Perissinotto, the author of chapter 4.

The authors have cast a very wide net when discussing the role of wood in different sports. For instance when one thinks that in equestrian sports the role of wood is limited to wooden obstacles in the steeplechase, the authors point out that horse jumping and racing use wooden fences, wooden judging boxes, and wooden stables with timber boards to facilitate the absorption of the energy of a kicking horse. And if that does not convince you of the importance of wood, please consider the use of wood shavings for bedding of horses that are allergic to straw!

Each of the short chapters is a treasure trove of information covering the history and modern rules of the sport, specifications for materials — wood or non-wood to be used in competitions, and a wood science section discussing the physico-mechanical properties (bending and compression strength, elasticity, dimensional stability, hardness, etc) and aesthetic demands on the sports items and hence on the timber species employed. In this respect there is a good deal of variation among the chapters in the amount of detail and scientific depth: some are very good on the different timber species used (e.g.

chapter 14 on bows and arrows in Archery); others excel in analyses of material properties (e.g. chapters on skis and tennis rackets); yet others provide stimulating examples of recycling and sustainability in sports items, up to their value in the sports memorabilia market.

One does not have to be a sports fanatic to find much of interest in this original book. It is well-edited and illustrated, and since access is free it should quickly become a classic on sports, wood culture and wood science. Congratulations to the editor, authors and the WWD Foundation!

Pieter Baas

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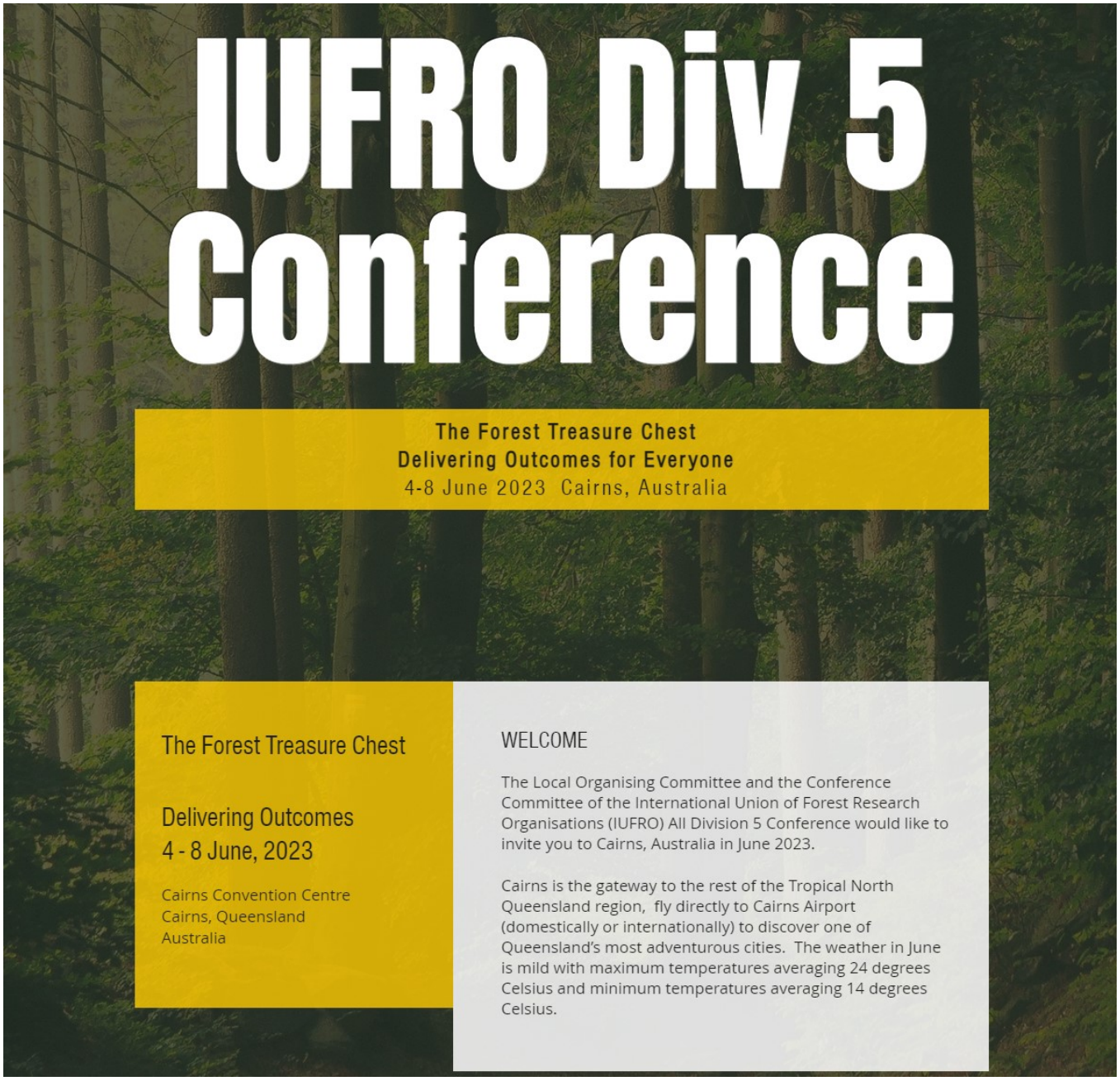
The Netherlands

pieter.baas@naturalis.nl



https://www.iufro-div5-2023.com/

Prof. Phil Evans, UBC, Canada will present the Academy Lecture during this meeting entitled "**Advances in the biomimicry of wood for development of novel additively manufactured materials**"

Meetings

The **International Symposium on Wood, Fiber and Pulping Chemistry** is the leading international scientific research event in the areas of wood, fiber and pulping chemistry, wood components, lignocellulosic materials, forest biotechnology and biorefinery. It gathers several hundreds of scientists, technologists, and experts from all over the world with the aim to exchange and disseminate new ideas and discoveries, and to promote collaborations.

ISWFPC 2023 is the 21 st of the series, the first after the event organized in Japan in 2019 (20 th ISWFPC) and the stop imposed by the pandemic.

Topics

- Analytical Methods related to wood, fiber, and pulp
- Biochemistry and biotechnology of wood and wood components
- Chemistry and technology of pulping and bleaching
- Paper science and technology
- Chemistry of wood and wood components: Cellulose, Hemicellulose, Lignin, Wood extractives
- Emerging Biorefineries and wood fractionation technologies
- Materials, Nanomaterials and products from lignocellulosics

https://www.iswfpc2023.org/

SWST 66TH INTERNATIONAL CONVENTION

JUNE 25-30, 2023

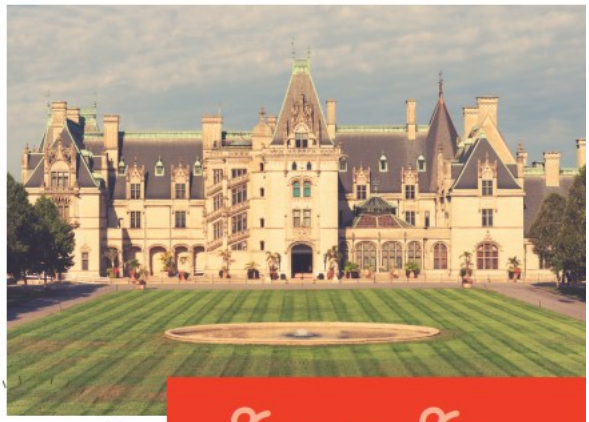
CROWNE PLAZA RESORT ASHEVILLE — **ASHEVILLE, NORTH CAROLINA, USA**

WOOD SCIENCES IN THE CARBON ECONOMY- RETURN TO THE BIRTHPLACE OF U.S. FORESTRY

WWW.SWST.ORG/WP/MEETING/2023-ANNUAL-CONVENTION-ASHEVILLE-NC-USA

SCHEDULE

Sunday, June 25 - Young Researcher/Mentor Activity, Welcome Reception, Highlight of Women Ambassadors Creating the Future of Wood Science Display
Monday, June 26 - Keynote, Early Stage Researcher Session, Technical Sessions, Student Trivia Night
Tuesday, June 27 - Technical Sessions, Poster Session
Wednesday, June 28 - Free day to explore Asheville, Smoky Mountains National Park, and more
Thursday, June 29 - Technical Sessions, Banquet
Friday, June 30 – Technical Sessions, SWST Business Meeting and Awards, Closing Ceremony



SESSIONS

- Biomass/Bioenergy - Meet the need while protecting the environment?
- Plantation Resources - Meet the global need in the future?
- Native Forests - Will they remain a usable resource?
- Certification - Expanding the global network and ensuring compliance
- Mass Timber - New materials, engineering properties, connections
- Hybrid Building Systems - Playing well together
- Circular Economy – Challenge for timber, design for recycling, regulatory aspects
- Supply Chain, Operations and Marketing of Wood Products
- Timber Durability/Wood Protection
- Composites - New opportunities
- Design for Durability
- Wood Properties
- Education Issues/Recruiting

SITES TO SEE

- Biltmore House
- Great Smoky Mountains National Park
- Grandfather Mountain State Park
- Nantahala Outdoor Center
- Asheville Zipline Canopy Adventures
- Great Smoky Mountains Railroad
- Blue Ridge Parkway
- Chimney Rock Park
- Cherokee Reservation
- New Belgium Brewing Company
- Fok Art Center
- Cradle of Forestry

CONTACT
Executive Director
execdir@swst.org
1-608-577-1342

SOCIETY OF WOOD SCIENCE & TECHNOLOGY

Journal Ranking—Wood Science & Technology (Google Scholar)

		h5-index	h5-median
1.	Cellulose	65	80
2.	BioResources	39	54
3.	Journal of Bioresources and Bioproducts	30	69
4.	Wood Science and Technology	28	35
5.	European Journal of Wood and Wood Products	27	32
6.	Holzforschung	26	31
7.	Journal of Wood Science	23	41
8.	Journal of Renewable Materials	23	30
9.	Wood Material Science & Engineering	21	25
10.	Maderas. Ciencia y Tecnología	19	28
11.	Journal of Wood Chemistry and Technology	19	27
12.	International Association of Wood Anatomists Journal	17	22
13.	Wood and Fiber Science	16	23
14.	Cellulose Chemistry and Technology	16	20
15.	Floresta e Ambiente	16	18
16.	Nordic Pulp & Paper Research Journal	14	20
17.	Wood Research (Bratislava)	14	19
18.	Forest Products Journal	14	18
19.	Journal of Forestry Engineering	14	18
20.	International Wood Products Journal	11	17

Wood Science & Technology

The editiorial board is composed of the following colleagues most of whom are IAWS fellows:

Journal Impact Factor (JIF)

Impact factor 2.898 (2021)

Five year impact factor 2.986 (2021)

Submission to first decision (Median) 17 days

IAWA Journal

The IAWA Journal is an international quarterly periodical publishing original papers and review articles on any subject related to the microscopic structure of wood and bark of stems and roots of woody plants (including palms and bamboo). Apart from anatomy per se, subjects at the interface of microstructure and developmental genetics, systematics, paleobotany, archaeology, tree biology, ecology, forestry, structure property relations of timber, biomechanics, and wood identification, are welcomed.

Journal Impact Factor

Impact Factor 2021: 2.987
5 Year Impact Factor: 3.983

Fellows Report

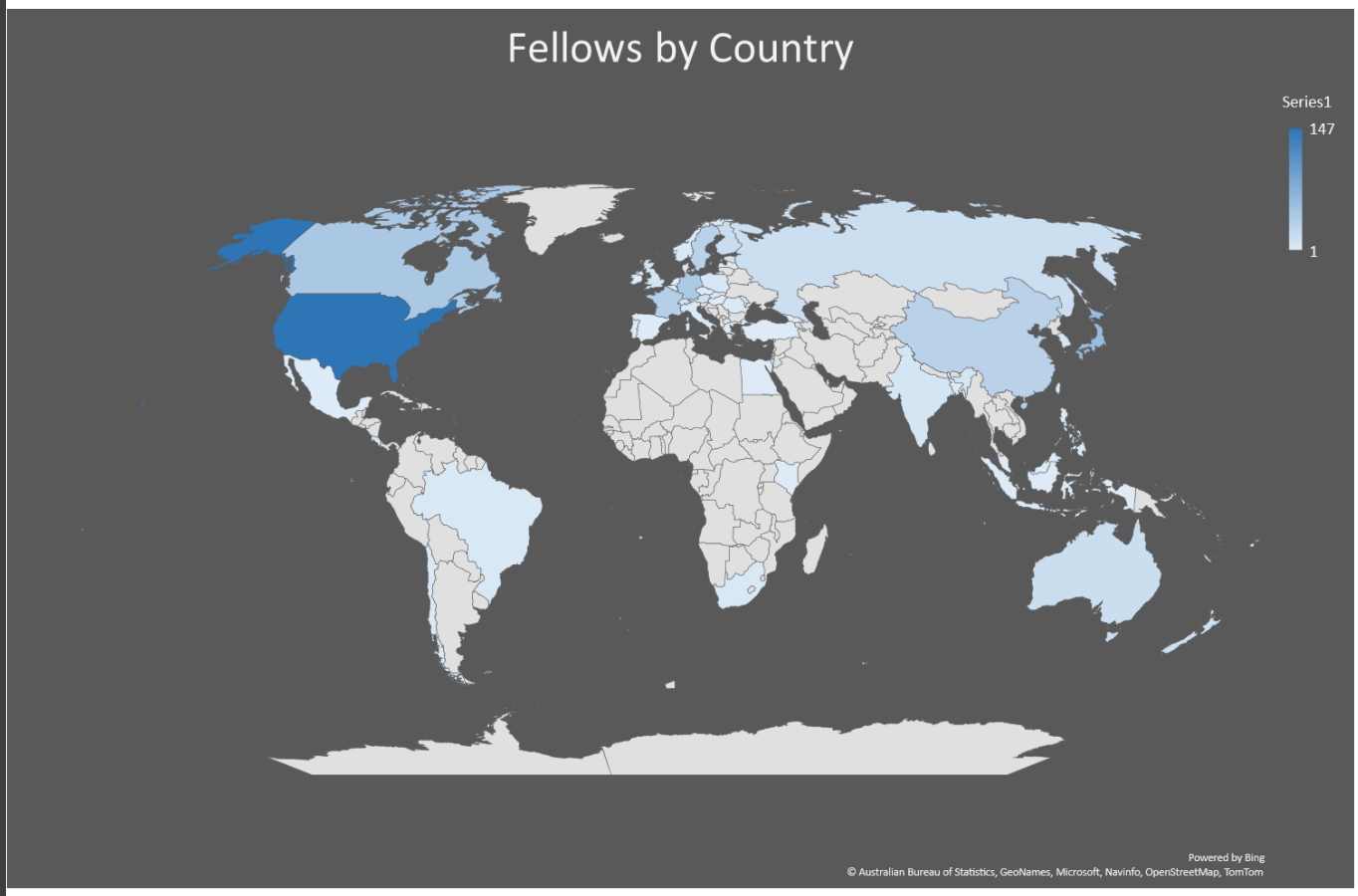
Distribution of Fellows by Country

Country	Fellows	Females
Australia	17	1
Austria	15	2
Bangladesh	1	0
Belgium	2	0
Brazil	5	1
Canada	44	5
Chile	4	0
China	32	5
Costa Rica	1	0
Czechia	2	0
Denmark	5	0
Egypt	1	0
Finland	18	3
France	36	7
Georgia	1	0
Germany	42	1
Greece	3	0
Hungary	1	0
India	9	0
Indonesia	1	0
Ireland	1	0
Israel	4	0
Italy	4	2
Japan	58	1
Kenya	1	1
Korea, South	8	0
Latvia	3	0
Malaysia	2	1
Mexico	2	1
Netherlands	2	1
New Zealand	14	1
Norway	4	0
Philippines	3	0
Poland	7	0
Portugal	1	0
Romania	4	0
Russia	16	2
Slovakia	3	0
Slovenia	3	3
South Africa	5	1
Spain	2	2
Sweden	32	2
Switzerland	13	2
Taiwan	5	1
Turkey	1	0
United Kingdom	9	0
USA	147	5
Total	594	51

Active fellows	126
Lifetime fellows	145
Retired fellows	271
Deceased fellows	172

Fellows Report

Distribution of Fellows by Country



Affiliated Members elected in 2021
BioProducts Institute, UBC
Zhejiang Agricultural & Forestry University

Affiliated Members elected in 2020
International Association of Wood Anatomists
Korean Society of Wood Science & Technology, Korea
South West Forestry University, China
National Institute of Forest Science, Korea

Affiliated Members elected in 2017
International Wood Culture Society, USA
Department of Wood Science – UBC, Canada

Fellows elected in 2021
Menandro ACDA Philippines
Henri BAILLERES, Australia
Mikhail BALAKSHIN, Finland
Warren GRIGSBY, New Zealand
Minjuan HE, China
George MANTANIS, Greece
Aji MATHEW, Sweden
Frédéric PICHELIN, Switzerland
Dick SANDBERG, Sweden
Rubin SHMULSKY, USA
Taraneh SOWLATI, Canada
Yuki TOBIMATSU, Japan
Aleksander VASILYEV, Russia
Ning YAN, Canada

Fellows elected in 2020
Benhua FEI, China
Aster GEBREKIRSTOS, Kenya
Mark IRLE, France
Andreja KUTNAR, Slovenia
Lu LIN, China
Chantong MEI, China
Veronica de MICCO, Italy
Rozi MOHAMED, Malaysia
Antje POTTHAST, Austria
Scott RENNECKAR, Canada
Jinquan WAN, China
Shuangfei WANG, China
Zhihui WU, China

Fellows deceased in 2022
Frank BEALL, USA
Günter SCHULTZE-DEWITZ, Germany

Fellows deceased in 2021
Edmone ROFFAEL, Germany
David GORING, Canada
Dieter ECKSTEIN, Germany
Chung-Yun HSE, USA
Dietrich FENGEL, Germany

Fellows deceased in 2020
Fritz SCHWEINGRUBER, (Switzerland)
Robert YOUNGS, (USA)

Fellows deceased in 2019
Marian BABIAK, Slovakia
Robert KENNEDY, Canada

Fellows deceased in 2018
Lothar GöTTSCHING, Germany
Hikaru SASAKI, Japan
Wayne WILCOX, USA
Mikhail ZARUBIN, Russian Federation

Fellows deceased in 2017
Peter ALBERSHEIM, USA
Kazumi FUKAZAWA, Japan
Takayoshi HIGUCHI, Japan
Peter F. NELSON, Australia
Derek H. PAGE, Canada.

Affiliate Members

Affiliate Members shall be educational, research, industrial, or governmental organizations and individuals, who are actively engaged in carrying out or promoting research in wood science or the enhanced utilization of wood on the basis of scientific or technological principles and practices. The importance of Affiliates to the Academy is two-fold:

• The Academy derives direct contact with organizations and individuals actively engaged in the utilization of wood and wood products.

• The Academy receives financial support for its activities from these members.

Contact details are available on the IAWS website.

AFFILIATE MEMBERS LIST

- BAUMAN MOSCOW STATE TECHNICAL UNIVERSITY/MYTISHCHI BRANCH , Russia, www.bmstu.ru/en
- BIOPRODUCTS INSTITUTE, UBC, Canada, https://bpi.ubc.ca/
- CHINESE ACADEMY of FORESTRY (CAF), China, www.caf.ac.cn
- CIRAD FORETS (French Agricultural Research Center for International Development), France, www.ur-bois-tropicaux.cirad.fr
- DEPARTMENT OF WOOD SCIENCE – UBC, Canada, www.wood.ubc.ca/
- ESB- ECOLE SUPÉRIEURE DU BOIS, France, www.ecoledubois.com
- FORESTRY & FOREST PRODUCTS RESEARCH INSTITUTE, Japan, www.ffpri.affrc.go.jp
- FRAUNHOFER-INSTITUTE OF WOOD RESEARCH, Germany, www.wki.fraunhofer.de
- HOLZFORSCHUNG MÜNCHEN, Germany, www.holz.wzw.tum.de
- INTERNATIONAL ASSOCIATION OF WOOD ANATOMISTS, www.iawa-website.org
- INTERNATIONAL CENTRE OF BAMBOO AND RATTAN, China, www.icbr.ac.cn/en
- INTERNATIONAL WOOD CULTURE SOCIETY, USA, www.iwcs.com
- KOREAN SOCIETY OF WOOD SCIENCE & TECHNOLOGY, Korea
- KYOTO UNIVERSITY, Japan, www.rish.kyoto-u.ac.jp
- MISSISSIPPI STATE UNIVERSITY, USA, www.cfr.msstate.edu/forestp
- NATIONAL INSTITUTE OF FOREST SCIENCE, Korea,
- OREGON STATE UNIVERSITY, USA, www.woodscience.oregonstate.edu
- RISE - RESEARCH INSTITUTES OF SWEDEN, Sweden, www.ri.se/en
- SCION, New Zealand, www.scionresearch.com
- SEOUL NATIONAL UNIVERSITY, Republic of Korea www.adhesion.org
- SOUTHWEST FORESTRY UNIVERSITY, China
- STATE UNIVERSITY OF NEW YORK, USA, www.fla.esf.edu
- TECHNICAL UNIVERSITY in ZVOLEN, Slovakia, www.tuzvo.sk/en
- THÜNEN INSTITUTE, Germany, https://www.thuenen.de/new/
- UNIVERSITE LAVAL, Canada, www.xylo.sbf.ulaval.ca
- UNIVERSITY OF GÖTTINGEN, Germany, www.holz.uni-goettingen.de
- UNIVERSITY OF MINNESOTA, USA, www.bbe.umn.edu
- US FOREST PRODUCTS LABORATORY, USA, www.fpl.fs.fed.us
- VIETNAM NATIONAL UNIVERSITY OF FORESTRY, HANOI, VIETNAM, Vietnam, www.vnuf.edu.vn
- WOOD TECHNOLOGY INSTITUTE, Poland, www.itd.poznan.pl
- ZHEJIANG AGRICULTURAL and FORESTRY UNIVERSITY , China, https://en.zafu.edu.cn/

Guidelines for Highlights

The purpose of the Highlights, published in the Bulletin, is to promote the integration of the fields of wood science. Fellows are encouraged to submit Highlights to any of the Officers.

Highlights should:

- Be free of jargon and highly technical language and (unexplained) acronyms, and be readily
- understood by wood scientists in other fields
- Be no more than 1000 words (roughly 4 pages in the Bulletin)
- Begin by providing a brief background or framework to put the report in perspective
- Contain important references to the literature for further reading
- Give due credit to the work of others in the field, not just summarize the author's work
- Finish with a statement of future direction in the area

Nominations for IAWS PhD Award

The International Academy of Wood Science (IAWS) wishes to provide recognition to outstanding thesis/dissertation research at the PhD level by students throughout the world. The IAWS PhD Dissertation Award for 2023 is open to receive nominations and/or applications. The deadline is **August 15, 2023**. Please consider to nominate your students. Nomination can be made by anyone and is not limited to IAWS Fellows.

Here are the detailed rules:

- The competition is limited to students receiving their degrees in other than their native country.
- The purpose is to foster and recognize cross-national interaction.
- The submission shall be no more than 2 pages of an extended abstract (in English) of the dissertation, a one-page CV of the student, and a recommendation letter from the student's advisor
- The submission can be by the student and/or the student's advisor.
- The thesis/dissertation must have been completed within one year prior to the yearly announcement.
- The documentation shall be sent by email to the Academy Board Chair - Katarina Čufar, Katarina.Cufar@bf.uni-lj.si

Nomination for Election of Fellows

The nomination process is relatively simple; all you need to do is fill in the Nomination form and send it to me. For those to be considered in the next election, the deadline for receipt of nominations is **15 August 2023**.

I then contact the nominee, confirm their willingness to stand for election, and then have them complete the more detailed application form. The Executive Committee reviews the nominees to determine if their applications are complete, and then, in early September submits the completed applications to the membership for ballot.

Typically, scientists who are nominated are either mid-career, showing great promise and accomplishments, or near the end of their career, when their peers feel that they have made major continuing contributions over their professional life.

There are several areas of Fellowship that are under-represented in IAWS. One is Fellows from developing countries, where the number of refereed scientific contributions, as viewed by the developing world, may be somewhat lacking because of the past or current inability to publish in the leading journals, and/or difficulty with the English language. The other area relates to the few numbers in certain scientific disciplines; if you are in one of those, you are aware of that. The Executive Committee is also interested in election of wood science managers who have had a major impact through their oversight of research activities, without necessarily having the expected number of refereed publications. The academy is also under represented by female researchers so we encourage nomination of female colleagues.

Please spend some time thinking about potential nominees, perhaps looking through the Directory and the listing of Fellows by countries. Since we do not “promote” ourselves to gain members, it is up to the Fellows in the Academy to provide the basis for this recognition.

Yoon Soo Kim

NOMINATION FORM [You can download this form from the "New Fellows" page on the website]

Nomination for Fellowship of the International Academy of Wood Science

Name of Candidate: Position of Candidate: Candidate Mailing Address:

Candidate email address (required!):
Candidate's Background (maximum 100 words):

Reasons for the candidate's nomination (outstanding in his/her field; substantial contributions to wood science; major results in management of research; etc):

Date:
Nominator name:
Email address:
Telephone:

Please return to: Yoon Soo Kim and Lloyd Donaldson before 15th August 2023

IAWS

www.iaws-web.org

President: Prof. Yoon Soo Kim
Vice President: Prof. Stavros Avramidis
Past President: Dr Robert Evans
Treasurer: Dr Howard Rosen
Board Chair: Prof. Katarina Čufar
Secretary: Dr Lloyd Donaldson