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IAWS Bulletin

Academy Board

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End of terms: 1 June

Please send correspondence by email to the editor,

Lloyd Donaldson:

lloyd.donaldson@scionresearch.com

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Message from the President

It is my honor to be presented with an opportunity to follow in the footsteps of former Presidents of the Academy. My predecessors established the prestige of our Academy and contributed to widening the horizon of wood science for the past 50 years. First of all, I would like to thank the immediate past President Robert Evans. I would like to express my deep gratitude for his successful organization of Plenary Meetings over the past three years in Bali, Guadalajara, and Moscow. He also contributed to an increase in the number of Affiliate Members and to tackling the imbalance of gender and geography among Fellows. I am grateful for Robert remaining on the EC as the past President and expect him to play an important role in the next three years. I would also like to thank past President Uwe Schmitt, who now leaves the EC after serving as secretary, vice president, and president for 18 years. We have benefited enormously from his knowledge and enthusiasm. We pay tribute to Robert and Uwe's commitment to the progress of the Academy.

The unprecedented outbreak of the COVID-19 pandemic is also affecting the business of the Academy. Recently an EC meeting was held last June 18th via Zoom, pretty late as planned (later than the scheduled date in March). We welcomed Stavros Avramidis, newly elected Vice President as a new EC member. Some academy business is behind schedule due to the pandemic. Though belated, we have to elect Board members to replace the four fellows Roni Aloni, Aldo Ballerini, Todd Shupe, and Keiji Takabe. I extend my thanks to those fellows who have completed their term as board members. Robert is now chairing the nomination committee for the recommendation of candidates for Board Member with Roberta Farrell and Pieter Baas. The academy board under the chair of Siqun Wang successfully selected three PhD awardees. This year's plenary meeting was to be held in concomitant with Biocom 2020 in Korea but was canceled due to the pandemic. Instead, we are planning a half-day plenary meeting via teleconference at the end of this year.

The coronavirus pandemic has caused significant changes in our daily life. I am very much concerned about this pandemic and wonder when we can fully return to the 'old normal'. Even if the pandemic would be under control, the anxiety will linger for a long time. And for the time being, large gatherings and travel are likely to remain tightly restricted. Under such a situation, the academy has to prepare for a new journey. I seek to harness the Bulletin as a new source of communication. Lloyd as bulletin editor and all EC members are trying to do their best to activate the Bulletin as a platform of communication, not just for our Fellows but also for all those concerned. I hope that the bulletin will serve as a portal for exchanging information and ideas, sharing comments on the recent achievements in R&D, activities in universities or institutes. Many institutes are going through radical restructuring. However, we are not aware of the realities in those restructures. Education in wood science is also an interesting topic. Changes in curricula to keep a balance between the responsibility of education and the accountability of research is an interesting topic that draws our attention.

Last but not least, COVID-19 would be a stress test of our solidarity. Regardless of gender and biogeography, our Fellows so far have been showing strong solidarities for the progress of knowledge in wood science.

I sincerely hope that the academy will continue to overcome the “self-centered” mindset and to rekindle the cooperative souls beyond the limits of the established value system. We need new lenses to see something that would remain invisible so far. To stay open to new encounters is our destiny as scientists, although it would a painful task. I would like to remind fellows of Martin Buber’s saying “All real living is encountering”. Virtues of clear-sightedness, stimulation, and tolerance are our assets in the Academy. I look forward to meeting you again anytime and anywhere. Until then, I wish all the Fellows good health and peace.

Prof. Yoon Soo Kim
Gwangju, Korea

In this issue

Message from the Retiring President

It has been a great honor to have served as President of the IAWS, representing our Academy in many countries and institutions since 2017. Most of all, I have enjoyed the privilege of interacting with many Fellows, their colleagues and their students at meetings enriched by local culture. It is especially encouraging to witness the talent and dedication of young scientists everywhere. On June 2, 2020, the Presidency of the IAWS passed to Fellow Yoon-Soo Kim but I will remain on the Executive Committee for a further three years as Past President. We are very pleased to welcome Fellow Stavros Avramidis (Professor and Head of the Department of Wood Science, UBC, Canada) as our new Vice-President.

I would like to pay tribute to my fellow EC members. After a remarkable 18 years of service (2002-2020) on the Executive Committee, Fellow Uwe Schmitt completed his term as Past President in June. I am most grateful to have followed in his footsteps as Secretary, Vice-President , President and now Past-President, benefiting greatly from his guidance and generous advice. His Presidential term included our memorable 50th Anniversary meeting in Paris, 2016, and the creation of our website. Fellow Yoon-Soo Kim has already contributed much to the Academy since 2014 as Secretary and Vice President with his insightful presentations based on many years of experience in academic leadership. Secretary Lloyd Donaldson has modernised the Bulletin and supported the EC with excellent organisational skills, as well as demonstrating his exceptional skills in wood microscopy at our meetings. He is also Editor of the IAWA Journal. Fellow Howard Rosen has been on the EC for 15 years as Treasurer, taking great care of our finances and putting us in a very sound position to fund initiatives currently under discussion. Fellow Rosen is also Chair of the Board of the World Wood Day Foundation which sponsors World Wood Day, an important annual event held on March 21 to raise public awareness and understanding of the importance of wood in society. The previous six celebrations were in Tanzania, China, Turkey, Nepal, USA and Austria. Unfortunately the seventh World Wood Day could not be celebrated in Tokyo this year due to the pandemic. Fellow Rosen is supported by Past Secretary/Treasurer/President Frank Beall who continues to contribute to the Academy by auditing our financial report. The Chair of the IAWS Board also has a seat on the EC. Fellow Pieter Baas represented the Board for the first year of my Presidency and has been inspirational. As most of you know, Pieter is a great ambassador for both the IAWA and the IAWS. He continues to transform the IAWS in his role on the Scouting Committee (see below). Since 2018, Fellow Siqun Wang has been Board Chair and carries out his crucial role of liaison between the Board and the EC with great efficiency. I have greatly valued Siqun's judgement on many issues over the last two years. Thank you, fellow EC members for your hard work and support during my Presidency.

New Academy Board Members:
Four new Board Members were elected in 2018 for their six-year term: Katarina Čufar, University of Ljubljana, Slovenia; Byung-Dae Park, Kyungpook National University, South Korea; Guanben Du, Southwest Forestry University, China; Laurence Schimleck, Oregon State University, USA. Four more will be elected this year and I thank the outgoing Fellows Aloni, Ballerini, Shupe and Takabe for their valuable service to the Academy. The Board is responsible for upholding the Academy Constitution and approving the recommendations of the EC (such as Academy Lectureships and Distinguished Service Awards) and for judging the PhD Awards competition.

Message from the Retiring President

Plenary Meetings:
We are fortunate to have a very close relationship with the IAWA and I thank Secretary (and IAWS Fellow) Yafang Yin of the Chinese Academy of Forestry for our continued partnership in joint Plenary Meetings. More recently, we joined with the Wood Culture Society in the World Wood Day celebrations in Austria last year. It is unfortunate that we could not do the same in Tokyo this year but we look forward to a long and close relationship. The three Plenary Meetings of my Presidency were in Denpasar Indonesia, September 2017; Guadalajara Mexico, October 2018 and Stübing/Graz Austria, March 2019. The meeting planned for Seoul South Korea, October 2020 was, unfortunately, cancelled because of the pandemic. President Yoon-Soo Kim and the EC are now investigating the possibilities for on-line meetings while the crisis lasts.

Executive Committee Meetings:
EC Meetings are important for planning and for closely connecting with local institutions around the world. The most recent meetings were in Rotorua, New Zealand, February 2017, Corvallis, USA, May 2018 and Moscow, Russia, December 2019. The meeting planned for Tokyo, Japan, March 2020 was cancelled because of the pandemic. These meetings are organised by local Fellows and are generally associated with a workshop or other conference, tours and exposure to local culture essential to a better understanding of the environment in which wood science is practiced. The EC is very grateful for the commitment and generosity of these organisers and their institutions.

In addition to these meetings, I was privileged to represent the IAWS at the 2018 Marcus Wallenberg Prize ceremonies in Stockholm and at the 60th Anniversary of the Chinese Academy of Forestry celebrations in Beijing, 2019. On both occasions I was delighted to meet many young, talented researchers with great potential for leadership in wood science. Thanks again to the CAF, Fellow Yafang Yin and his students for their kind support in China.

IAWS awards:
PhD Awards are for the most outstanding dissertations by candidates who gained their degrees in countries other than their own. The 2017 PhD award winner was Dr Marco Beaumont (supported in Austria). Second place was won by Dr Lu Wang (USA) and third place by Dr Rebecca Ringman (Germany). These awards were presented in 2018. In 2019, first place went to Dr Jinze Dou (Finland). Second place was awarded to Dr. Qiliang Fu (Sweden). The 2020 First Place goes to Dr Mahdi Muhbarok (France), Second Place to Dr Subir Kumar Biswas (Japan) and Third Place to Dr. Muhammad Adly Rahandi Lubis (Republic of Korea). The Gold Medal winners are financially supported to present their work at a major conference and I have been impressed not only by the high standard of the research produced by these young scientists but by their ability to present their work with such great professionalism and confidence in front of international audiences.

Distinguished Service Awards:
Distinguished Service Awards are given to those who have made outstanding contributions to wood science and the Academy. I have presented on behalf of the Board three of these awards to Fellows I admire very much: Frank Beall (2017), Gerd Wegener (2019) and Xavier Deglise (2019).

Our highest award is the Academy Lecture and I have presented this award on behalf of the Board to Fellows Arno Frühwald (Denpasar 2017), Ian de la Roche (Vancouver 2017), Rubén A. Ananias (Guadalajara 2018), Alfred Teischinger (Stübing 2019), Victor Sanaev (Moscow 2019).

New Fellows:
The Scouting Committee, Chaired by Pieter Baas and including Fellows Roberta Farrell, Barbara Lachenbruch and Rubén Ananias was established in 2018 to improve the diversity of our Fellowship. Fellow Baas continues in his role and any support from Fellows in recommending new candidates to balance the Academy would be greatly appreciated. Last year, 21 new Fellows were elected, including 14 women. Although the effort continues under the guidance of Fellow Baas, all Fellows must keep in mind the need to redress the inequities built into our Academy (a legacy common to most professional technical organisations). Preparations for the 2020 Fellows' election are now underway, and President Kim is gathering the nominations.

Message from the Retiring President

Fellows deceased:
Sadly, we have lost 11 Fellows since 2017 but they will be remembered as friends and colleagues, and through their great contributions to wood science upon which our own careers have been built. Every EC meeting begins with a moment of quiet remembrance of past Fellows and the names of all Fellows past and present are listed on our website.

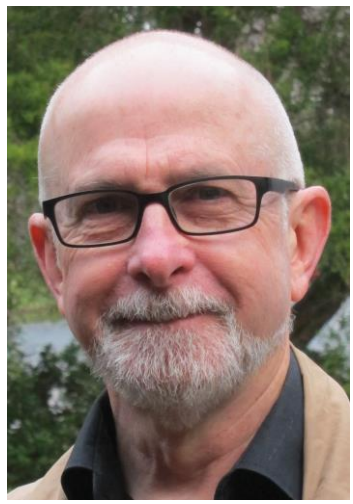
Affiliate Members:
The International Wood Culture Society, USA and the UBC Department of Wood Science, Canada, were elected as Affiliate Members in 2017, bringing the number of supporting institutions to 26. Interaction with the Affiliate Members is primarily through one or more Fellows associated with those institutions. We appreciate their support and we are looking at new ways to add value to our relationships with these Members.

IAWS Website:
Fellow Uwe Schmitt and his colleague Thomas Schwarz in Hamburg, Germany, pioneered the development of our website and have transformed the way we vote and disseminate Academy information. As Fellow Schmitt has completed his terms on the EC, we have decided to transfer the website to Rotorua, New Zealand under the guidance of our Secretary and Bulletin Editor Fellow Lloyd Donaldson.

Wood Science and Technology:
I greatly appreciate the efforts of the WST management in supporting our Academy over the years. Fellow Klaus Richter is an excellent Editor and has maintained very high standards in our official Academy Journal. I thank Andrea Berger-James for keeping me on track with the IAWS News, although circumstances have kept me from my duties (and most other things) since March.

The term of our new President, Yoon-Soo Kim, begins in difficult circumstances and global restrictions on travel so we must look for new ways to further the aims of the Academy. I have no doubt that Fellow Kim will provide the leadership we need for these unusual times. I urge you all to keep safe, as the median age of the Academy Fellowship is about 65 years. Here in Australia, we have suffered drought, fires, floods and the pandemic in quick succession but there have been so many acts of kindness by individuals that I remain optimistic. At the end of 2019 I wished you all a happy and healthy 2020. I would like to reinforce that sentiment and I am reminded by Fellow Roberta Farrell to add ‘be kind” as we negotiate a future unimagined only five months ago.

Robert Evans
President June 2017 – June 2020



Vice-President election

The recent election for vice-president of the academy was held with 120 fellows casting their vote. Fellow Stavros Avramidis was elected as the new vice-president.

Stavros received a combined B.S./M.S. degree in Forestry from the Aristotle University, Thessaloniki, Greece in 1981. He then went to Syracuse, NY and received an M.S. in Wood Composites (1983) and a Ph.D. in Wood Physics (1986) from the State University of New York, College of Environmental Science and Forestry. In late 1986 he joined the Department of Wood Science of the Faculty of Forestry at University of British Columbia as a Research Associate and in 1987 he was appointed a tenure-track Assistant Professor of Wood Physics. Since 1997 he is holding the position of full Professor in Wood Physics and Drying. He is also serving as the Department Head since January 2016.

At UBC, Stavros has taught on a regular basis undergraduate courses related to wood physics, wood drying, sawmilling and advanced mathematics for wood products processing majors. At the post-graduate level (MSc and PhD) he occasionally teaches courses concerning advanced wood physics and wood-water relations. Over the last 33 years at UBC, Stavros has been the teacher and mentor of many undergraduate, masters and doctorate students, post-doctoral fellows and visiting researchers - a service to education, training and human development that he immensely enjoys.

Stavros has completed more than fifty competitive research projects funded by various provincial and federal sources in the areas of wood-water relationships, wood physics, fundamental and applied conventional and dielectric drying research and non-destructive evaluation and process optimization work. Research on revealing and modelling the sorption and diffusion characteristics of water in wood by using fractal theories and artificial neural networks, the development and advancement of conventional and novel drying methods to improve quality and performance of lumber, the development and understanding of dielectric/vacuum drying of various wood species (softwoods and hardwoods), the modelling of heat/mass transfer and of stresses during timber drying have been some of his research foci. In the physics area, Stavros has recently been exploring the nanopores of the wood cell wall and their relationship to water sorption through molecular modelling and the application of complexity and scale-up theories.

This fundamental work has been expanded into the practical mill production realm by exploring non-destructive methods that will swiftly identify defects and other attributes that contribute to quality processing and final product manufacturing. Since the late 80s, Stavros has also been working closely with the local forest products industry on developing methods to improve commercial drying processes for timbers, developing non-destructive identification methods for wet-pockets in hemlock, for species identification and non-destructive assessment, as well as using dielectric heating to pasteurize wet wood for export markets. He has been instrumental in the development and commercialization of RFV drying of wood. Curiosity driven research along with applied service to the industry are Stavros' driving forces for innovation and knowledge creation.

All this knowledge is useless unless it is passed to the user, thus extension is also a major activity. Technology transfer to the industry through joint projects and proof-of-concept endeavours with the national and international producers and users has been a continuous practice.

Stavros is a Fellow of the International Academy of Wood Science, a Fellow of the Institute of Materials, Metals and Minerals, a member of many international professional organizations, and a participant of numerous national and international R&D and policy committees. He has been a member through the years of more than ten scientific journal editorial boards. He has served as research project reviewer and monitor for the European Union, USDA, US-NSF, Canada-NSERC, Swiss Science Foundation, Chilean Science Foundations, Japan Science Foundation and many others since the early 90s. A standing reviewer for over thirty scientific journals and book publishers. Stavros has been elected twice as UBC senator (3-year tour each time), served on numerous University/Faculty/Departmental committees, has been a member since 2000 of the Hellenic University Evaluation Committee, and has reviewed numerous cases for tenure and promotion of faculty members throughout the world.

Lastly, Stavros has been the author and co-author of over 250 journal and conference proceedings publications, three book chapters and numerous unpublished reports to the industry and national/international organizations.

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. This years awardees are:

First place: **Dr Mahdi Mubarak**, (Indonesia)

Université de Lorraine, INRAE, LERMAB, F-54000, Nancy, France
Wood Biology and Wood Product, Faculty of Forestry, Göttingen University, Germany
Forest Products Science and Technology, Faculty of Forestry, IPB University, Bogor, Indonesia

Second place: **Dr Subir Kumar Biswas**, (Bangladesh)

Kyoto University, Japan

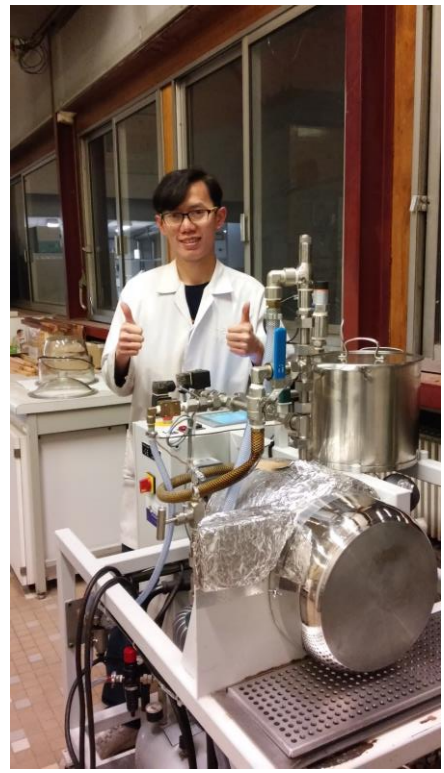
Third place: **Dr Muhammad Adly Rahandi Lubis**, (Indonesia)

Kyungpook National University, Korea

PhD award – First place

VALORIZATION OF BEECH WOOD THROUGH DEVELOPMENT OF INNOVATIVE AND ENVIRONMENTALLY FRIENDLY CHEMICAL MODIFICATION TREATMENTS

Mahdi Mubarok[1,2,3], Holger Militz[2], Stéphane Dumarcay[1], Philippe Gerardin[1]
[1] Université de Lorraine, INRAE, LERMAB, F-54000, Nancy, France
[2] Wood Biology and Wood Product, Faculty of Forestry, Göttingen University, Germany
[3] Forest Products Science and Technology, Faculty of Forestry, IPB University, Bogor, Indonesia



Aside from its renewable and biodegradability properties, wood is a unique and versatile material, being used for various applications. However, the term "renewable" would still be reasonable if the rate of its exploitation is the same or lower than the rate of its growth. Besides afforestation and plantation activities, some technologies are needed to slow down the rate of its exploitation, such as an implementation of recycling technologies for the used wood-based products. Other techniques, including an expansion of its service time during utilization, are needed through improvements of its properties, particularly its biological durability, corresponding to its destined applications.

European beech (*Fagus sylvatica*) is one of the most important hardwood species in Europe. Its acceptable mechanical properties and ease in workability have led to it being used for many applications, especially for interior destinations. However, its low dimensional stability and poor biological durability are the main drawbacks limiting its utilization for exterior purposes, especially in hazard class 3 (exterior above ground) and hazard class 4 (exterior in the ground and/or contact with fresh water). Commonly, improvement of wood biological durability can be performed through various techniques, including the utilization of wood preservatives. However, due to the rising environmental issues since the last decade, some of these wood preservatives are limited or even restricted due to their negative effect on the environment or human health. As alternatives for these issues, wood modification techniques, such as wood thermal treatment and wood chemical modification still get much interest in the future.

The wood thermal treatment has been investigated for decades. However, a preferred improvement in biological durability of this thermally modified wood is not enough to protect the wood against termites. On the other hand, wood chemical modification is believed to improve almost all wood properties, particularly physical and biological durability properties. However, a meaningful change in wood properties sometimes needs a higher quantity of the chemicals or chemicals with high reactivity, resulting in higher investment in chemicals and/or handling during modification. Based on these reasons, this study aimed to improve European beech properties through different environmentally friendly wood modification techniques.

In general, wood modification in this research was performed through a polyesterification-based bulk impregnation modification technique. In the first section, a low concentration of the aqueous additive solution (10% or 20% w/w) made from vinylic derivatives of polyglycerol or glycerol was used in this study (**Fig. 1** below). Wood impregnation followed with different curing conditions in an open or in a closed system was demonstrated. Through various evaluated characterizations during and after modification, certain modified woods presented better dimensional stability and excellent biological durability properties against white-rot, brown-rot, soft-rot, and subterranean termites in a tropical field (grave-yard test) for one-year duration compared to untreated wood (**Fig. 1** below). However, due to the acidic property of the additives, certain wood mechanical properties decreased considerably.

Figure 1 General principle of wood modification in the first section of the study (left) and appearances of certain modified woods after one-year duration of grave-yard test in a tropical country, Indonesia (right).

In the second section of the study, wood modification was performed through an in-situ polyesterification of sorbitol and citric acid (Fig. 2 left), the well-known renewable chemicals commonly used in the food and beverage industries. Impregnation of the aqueous solution of sorbitol-citric acid at different concentrations (10, 20, 30, 55% w/w) into the wood followed with drying and different curing conditions at 140 or 160°C was conducted (Fig. 2 right). Through various parameter analysis investigated during and after modification, the sorbitol-citric acid solution at 30% w/w was considered as the optimum concentration for the beech wood modification. The modified wood has better dimensional stability and was classified as very durable against white-rot, brown-rot, and soft-rot. In addition, a thermogravimetric study evidenced that the modified wood possibly has a fire-retardant property. However, certain wood mechanical properties were also found to decrease due to treatment.

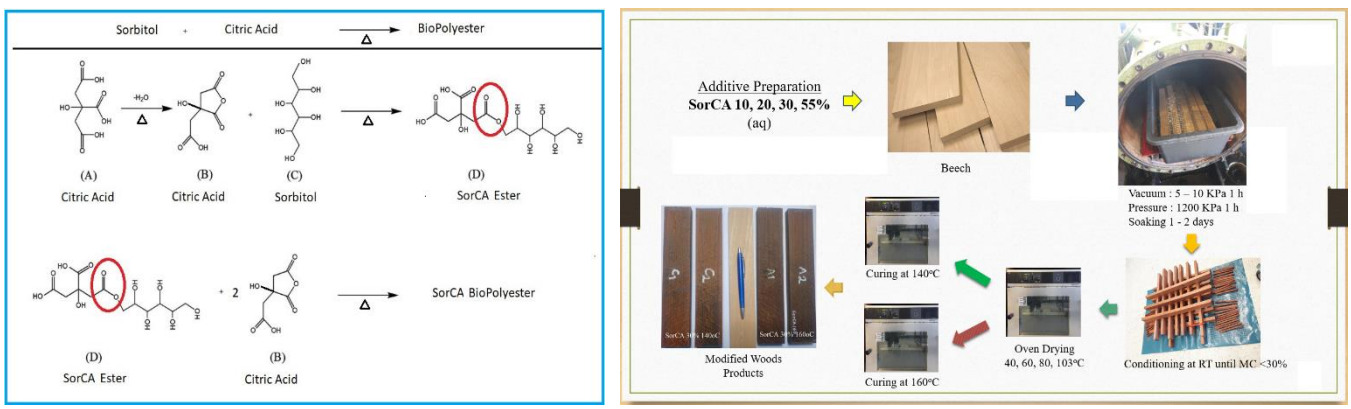


Figure 2 Polyesterification of sorbitol-citric acid (left) and wood modification process conducted in the second section of the study (right).

Overall, this study has provided various wood modification techniques that can improve beech wood characteristics, especially its physical and biological durability properties. Moreover, these techniques can also be implemented on an industrial scale for certain considerable applications, promoting other alternatives for environmentally friendly wood modification treatment.

Keywords: Biological durability, citric acid, *Fagus sylvatica*, field test, glycerol, mechanical properties, polyesterification, polyglycerol, sorbitol, thermal modification.

PhD award – Second place

OPTICALLY TRANSPARENT NANOCELLULOSE-REINFORCED COMPOSITES VIA PICKERING EMULSIFICATION

Subir Kumar Biswas, Research Institute for Sustainable Humanosphere, Kyoto University, Japan
(Thesis defended on June 20, 2019)

Wood nanotechnology is perhaps the most attractive part of wood science nowadays. Wood now is not only a raw material for traditional products such as timber, particleboards, fiberboards, and paper, but also a raw material for the next-generation sustainable and functional nanomaterials. The core of wood nanotechnology is cellulose nanofibers (CNFs), ~3–50-nm-wide semi-crystalline long fibers of extended cellulose chains [1], that are one of the marvelous natural materials produced in cell walls. CNFs are lightweight (density only ~1.6 g cm-3) but are stronger than steel. They have high thermal stability (from –200 to +200 °C), an elastic modulus of 100–130 GPa yet high flexibility, and a thermal expansion of about 1/50th that of glass [1–3]. Also, CNFs do not scatter light in a transparent matrix due to their width less than 1/10th of the visible wavelength [4]. Therefore, CNFs have received great attention as a "green" filler for mechanical and thermal improvement of transparent resins for application in flexible optoelectronic devices, such as displays and solar cells, as a substitute for brittle glass substrates. However, CNFs are naturally hydrophilic and extracted in water. Hence, they do not disperse well in hydrophobic resins (most resins are hydrophobic), which is a hindrance for obtaining nanocomposites with good optical, mechanical and thermal properties. Thus, CNFs often require costly and environmentally unfriendly chemical modification or intervention.

In this study, a simple water-based method was developed based on the concept of emulsification of oil and water to uniformly disperse the naturally hydrophilic CNFs into the hydrophobic transparent resin monomer. Notably, this method did not require any chemical modification or intervention to the CNFs. In this emulsification method, numerous micro-sized resin droplets (1–2 µm diameter) were individually encapsulated by the CNF-network in water (Fig. 1a). When CNF-encapsulated resin droplets were collected on a filter membrane, dried, hot-pressed, and subsequently polymerized, they produced an interconnecting hierarchical network by hydrogen bonding of the CNFs (Fig. 1b). Therefore, the transparent nanocomposites prepared by the emulsification method had a self-assembled hierarchical structure (Fig. 1b), with a high load-bearing capability and toughness (Fig. 2). A comparison between the mechanical properties of the nanocomposites prepared by the emulsification method and by the impregnation method (nanocomposites were prepared by impregnating the same resin into a dried CNF nanopaper) is shown in Fig. 2. Furthermore, the nanocomposites prepared by the emulsification method are precisely moldable in macro- and micro-scale with high optical transparency (Fig. 3).

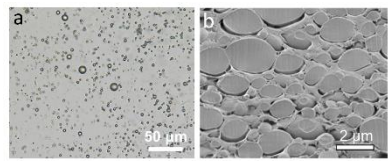


Fig. 1. (a) Microscopic image of the emulsion, and (b) hierarchical structure of the nanocomposite.

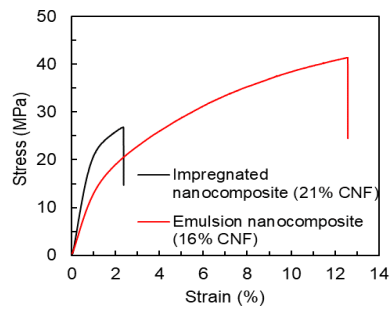


Fig. 2. Tensile stress-strain curve of the nanocomposites.

Subsequently, cellulose nanocrystals (CNCs) instead of CNFs have been used in the emulsion system. CNCs were obtained by acid hydrolysis of semi-crystalline CNFs. It is known that CNCs are more mechanically robust than CNFs, and have a linear coefficient of thermal expansion (CTE) of only 0.1 ppm K-1 [3]. Due to the combined effect from the hierarchical structure obtained using the emulsification method and the incredibly low thermal expansion of CNCs, the transparent nanocomposites achieved a record low CTE of only 3.4 ppm K-1 (one half

that of glass) at only 10 wt% CNC content. This incredibly low CTE of a transparent flexible film is highly desirable in the optoelectronic industry in order to deposit functional materials such as conductive materials and silicon crystals on the film at high temperatures without causing any damage.

Geared from the above result, a highly thermally resilient transparent electrode was prepared by depositing silver nanowires (AgNWs) on the surface of the nanocomposite. The electrical conductivity of the nanocomposite electrode remained almost stable even after repeated heating and cooling between 150 °C and –196 °C (Fig. 4). This was owing to the high thermal dimensional stability (3.4 ppm K-1) of the nanocomposites. Therefore, no thermomechanical damage occurred to the conducting AgNWs (Fig. 5). In comparison, the electrical conductivity of the AgNW electrode on the neat resin film was drastically reduced because of the breaking of the AgNWs due to the high shrinkage and expansion during repeated cooling and heating, respectively.

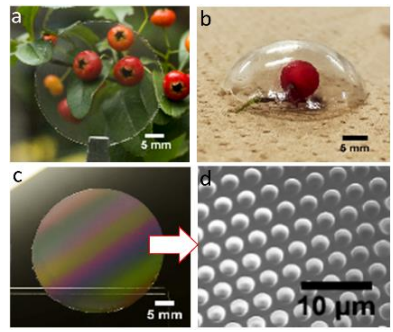


Fig. 3. Various transparent materials reinforced with CNFs are achievable via emulsification method.

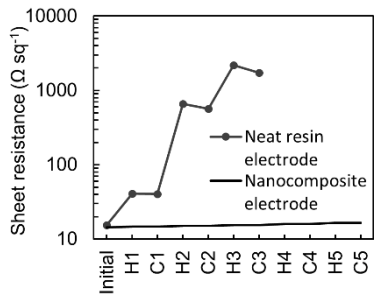


Fig. 4. Electrode performance under cyclic heating (H) and cooling (C).

This study, therefore, provides significant insights to fabricate unique transparent nanocomposites reinforced with "native" nanocelluloses by using a facile emulsification technique for the application in next-gen advanced optical materials. Examples of the potential application may include a substrate for microelectronic contact lens devices, a substrate for curved and flexible displays, data storage devices, microlens arrays for high-resolution 3D-imaging, high-efficiency organic light-emitting diodes, or anti-reflection substrates for improved light-trapping in a thin-film solar cell.

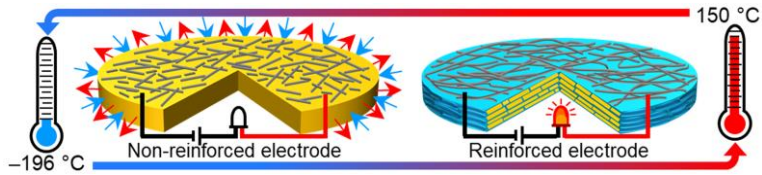


Fig. 5. High thermal stability of the AgNW electrode prepared using the nanocellulose-reinforced nanocomposite substrate.

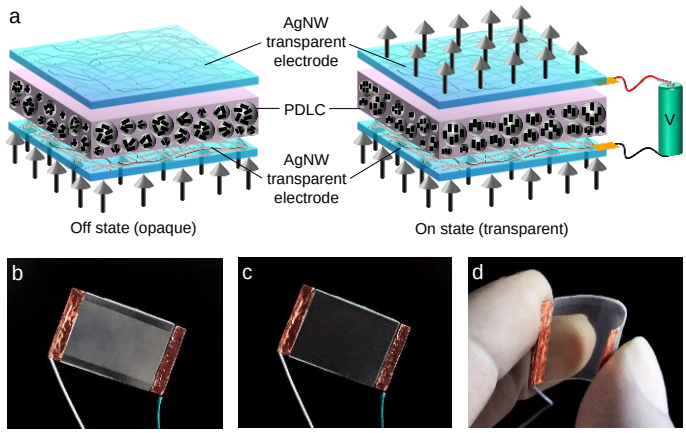


Fig. 6. A flexible transparency-modulating liquid-crystal device prepared using the electrodes based on the super thermally stable nanocomposite substrates. (a) The device structure and the working principle. PDLC= polymer dispersed liquid crystals. (b-d). The device in off-state (opaque) and on-state (transparent) operating under bending.

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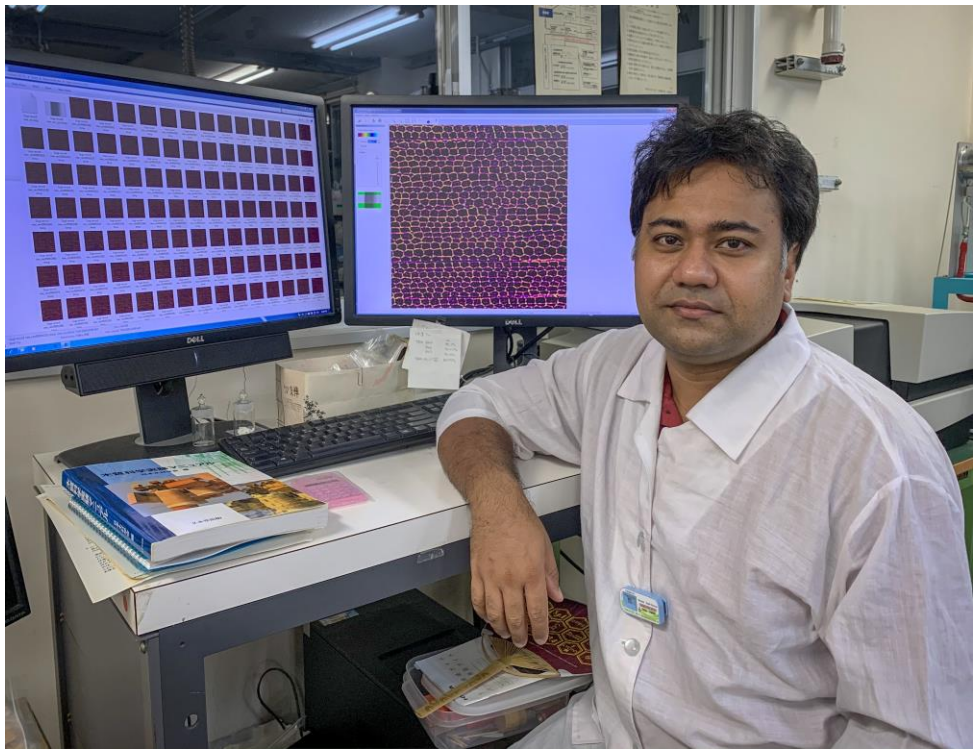
1. (a) A. Dufresne, Mater. Today 2013, 16, 220; (b) R. J. Moon, et al., Chem. Soc. Rev. 2011, 40, 3941.
2. J. Wohlert, et al., Cellulose 2012, 19, 1821.
3. T. Nishino, et al., Macromolecules 2004, 37, 7683.
4. H. Yano, et al., Adv. Mater. 2005, 17, 153.



Thesis outcomes

Original articles:
1. S. K. Biswas, H. Sano, M. I. Shams, and H. Yano. Three-Dimensional-Moldable Nanofiber-Reinforced Transparent Composites with a Hierarchically Self-Assembled “Reverse” Nacre-like Architecture. ACS Applied Materials and Interfaces, 9 (35), 30177−30184, 2017.
2. S. K. Biswas, S. Tanpichai, S. Witayakran, X. Yang, M. I. Shams, and H. Yano. Thermally Superstable Cellulosic-Nanorod-Reinforced Transparent Substrates Featuring Microscale Surface Patterns. ACS Nano, 13 (2), 2015−2023, 2019.
3. S. K. Biswas, H. Sano, X. Yang, S. Tanpichai, M. I. Shams, and H. Yano. Highly Thermal-Resilient AgNW Transparent Electrode and Optical Device on Thermomechanically Superstable Cellulose Nanorod-Reinforced Nanocomposites. Advanced Optical Materials, 7 (15), 1900532, 2019.
4. S. Tanpichai,* S. K. Biswas,* S. Witayakran, and H. Yano. Optically Transparent Tough Nanocomposites with a Hierarchical Structure of Cellulose Nanofiber Networks Prepared by the Pickering Emulsion Method. Composites Part A, 132, 105811, 2020. [*= Co-first author]

Review article:
5. X. Yang,* S. K. Biswas,* J. Han, S. Tanpichai, M.-C. Li, C. Chen, S. Zhu, A. K. Das, and H. Yano. Surface and Interface Engineering for Nanocellulosic Advanced Materials. Advanced Materials, 2002264, DOI: 10.1002/adma.202002264, 2020 (in press). [*= Co-first author]

PhD award - Third place

Muhammad Adly Rahandi Lubis recieved his Ph.D. in Wood Science and Technology from Kyungpook National University, Daegu, Republic of Korea, in August 2019. Dr. Lubis defended his thesis on June 24, 2019, and obtained his PhD on August 23, 2019 by completing an integrated Master and PhD program for four and half years, which was an excellent achievement.

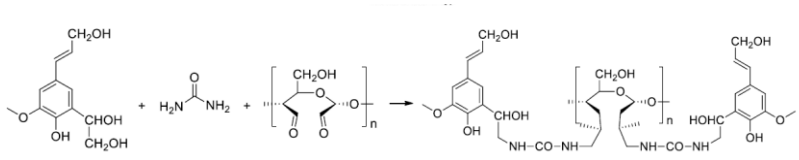
His thesis focused on the removal of urea-formaldehyde (UF) resin adhesives used to bond wood fibers through hydrolysis by using water, alkaline and acidic additives, which provided a fundamental research outcome published in Holzforschung. His thesis also concentrated to develop a new adhesive system for an easy recycling of wMDF's by combining oxidized starch (OS) with proper cross-linkers to provide facile disintegration of wMDF and proper adhesion strength with OS adhesives.

His PhD thesis work resulted in nine papers (six as the first author and two as a co-author) and one patent. In addition, this research was awarded a third winner of the student poster competition at the International Conference on Wood Adhesives, October 28-30, Georgia, United States of America. He was also awarded two poster competition wins at meetings in Korea.

Natural rubber latex (NRL) based adhesive is one of his main research interests. The wood adhesive is developed by incorporating NRL as a base resin, polyvinyl alcohol as adhesion promotor, and isocyanate as cross-linker as displayed in Figure 1. This research was conducted at the Research Centre for Biomaterials, Indonesian Institutes of Sciences (LIPI), Indonesia. This adhesive is suitable for small industry that uses cold-pressing as the main production stage to manufacture the wood-based panels. Non-isocyanate polyurethane resins derived from lignin and tannin is another cold-setting wood adhesive that is being developed. This project is supported by The Ministry of Research and Technology of Republic of Indonesia from 2020 until 2024. This adhesive is produced by reacting a non-isocyanate pre-polymer of lignin and tannin with hexamethylene diamine to form non-isocyanate polyurethane resins.

Beside the R&D activity on bio-based wood adhesives, a collaboration project with the Indonesian plywood industry is going on this year. The project focuses on coloring of UF resins adhesive for decorative plywood panels and recycling of industrial adhesives wastes.

Figure 1. Possible reaction of urea-aldehyde resins.

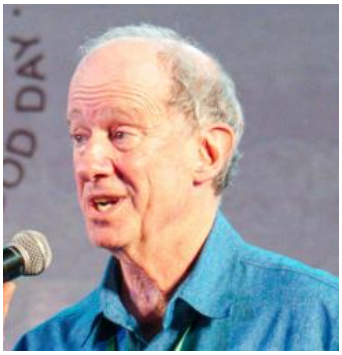


Treasurers Report

Following is the audited Treasurer's Report for the calendar year 2019, dated January 28, 2020. The dues have been broken down into categories and the E is for "extra" year's payment. The net change for 2019 was $28,425. At the end of 2019, 112 of the 132 (85%) Active and Retired fellows and 25 out of 26 of the Affiliate Members were current in their dues. Our CD's and mutual fund totals $118,964 and have been invested in less secure and longer-term investments to obtain higher rates of return. Our difference between 2019 and 2018 was $28,425; mostly due to a significant increase in our indexed mutual fund and lower meeting costs.

So far as of June 2020, we have approximately $40,400 in Capital One Bank and $11,000 in our PayPal account. Added to our $117,000 in investments, we have a total of approximately $168,400 in assets. So far, 12 of our 26 Affiliate Members have paid 2020 dues and 55% of our Active and Retired members have paid this year. I think dues payments are a little slower this year because of the coronavirus pandemic. We continually need funds to support our website, the PhD Thesis/Dissertation Award, the Distinguished Service Award, and technical conferences. Our finances continue to be on a sound footing.

Howard Rosen - Treasurer



IAWS Expenses and Revenues--Calendar Year 2019

Revenues (E – extra years paid by a member)

Retired dues (26 + 12E)	760.00
Active dues (74 + 3E)	3,850.00
Lifetime dues (3)	1,790.00
Affiliate member dues (21 + 2E)	4,567.06
Donations (4)	110.00
Total	***$11,077.06***

I have examined the books of the IAWS Treasury Account for 2019 and have found all the details in satisfactory order.

Frank C. Beall

Frank C. Beall, Fellow, IAWS
Professor Emeritus, UC Berkeley

Date Jan 28, 2020

Expenses

Supplies	10.00
Web Site Revision/Managing	1425.02
Awards	0.00
Meetings	1,130.73
Wire fees Capital One	55.00
PayPal Fees	308.56
Total	***$2,929.31***

Income = $**11,077** - $**2,929** = ***$8,148***

Capital One Account

Beginning balance January 1, 2019	36,541.52
Deposits by H. Rosen	1,125.00
Incoming bank wires	3,207.06
Transfers from PayPal	0.00
Interest	18.78
Withdrawal – Fees	-295.00
– Wires	-697.59
– Checks	-1,130.73
End Balance December 31, 2019	***$39,009.04***

PayPal Account

Beginning balance January 1, 2019	757.97
Deposits (65 active, 34 retired, 1 life, 12 Affiliate)	6,930.00
Transfers	-0.00
Payments	-727.43
Fees	-308.56
End Balance December 31, 2019	***$6,651.98***

Total Assets

- CD Bank Sandy Spring Bank **$35,447.27**
  -renewed 10/12/18 at 2.75% for 35 months
  -interest is accumulated
- Vanguard Dividend Appreciations Index Fund **$83,516.95**
  -opened 5/23/13
  -dividends are reinvested

Checking + PayPal Accounts = **$45,661.02** Total Assets = **$164,625 (2019)**
$136,200 (2018)

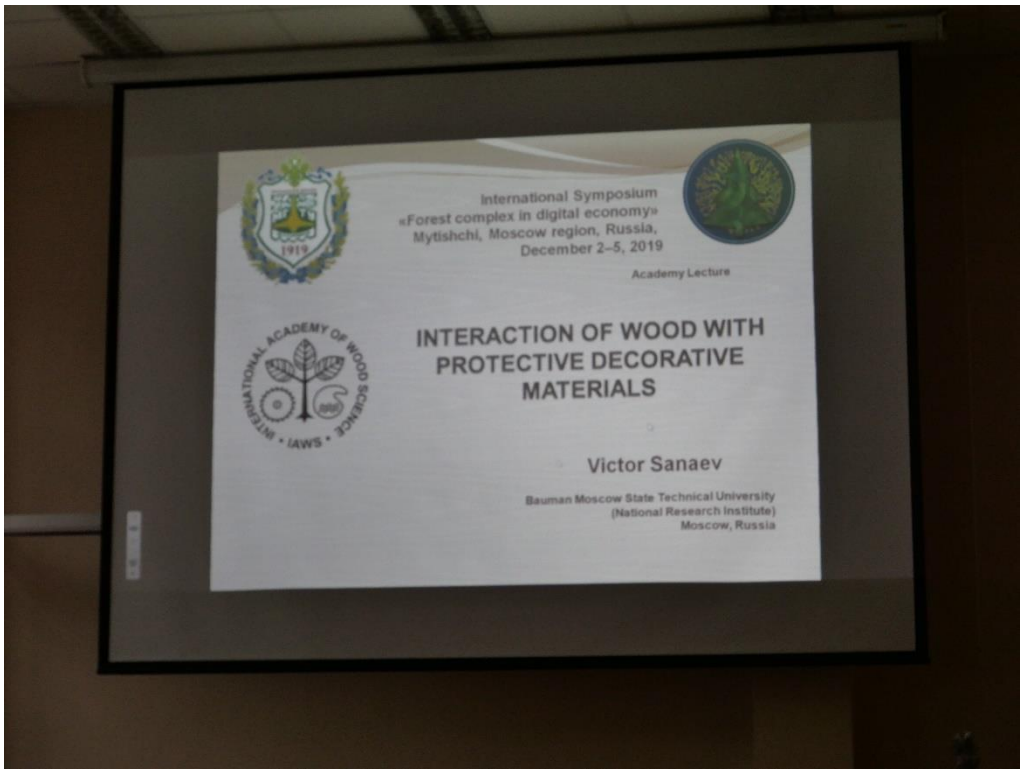
Net change **2019 – 2018** **$28,425**

Plenary Meeting, Moscow

An IAWS plenary meeting was held in Moscow in December 2019 in association with events to celebrate the 100th anniversary of the Mytischi Branch of Bauman Moscow State Technical University. The international symposium was organized by fellow Prof. Galina Gorbacheva and was attended by fellows and other colleagues from Russian Federation, Finland, Romania, Hungary, Germany, France, Australia, New Zealand, USA and Korea.

Highlights included:

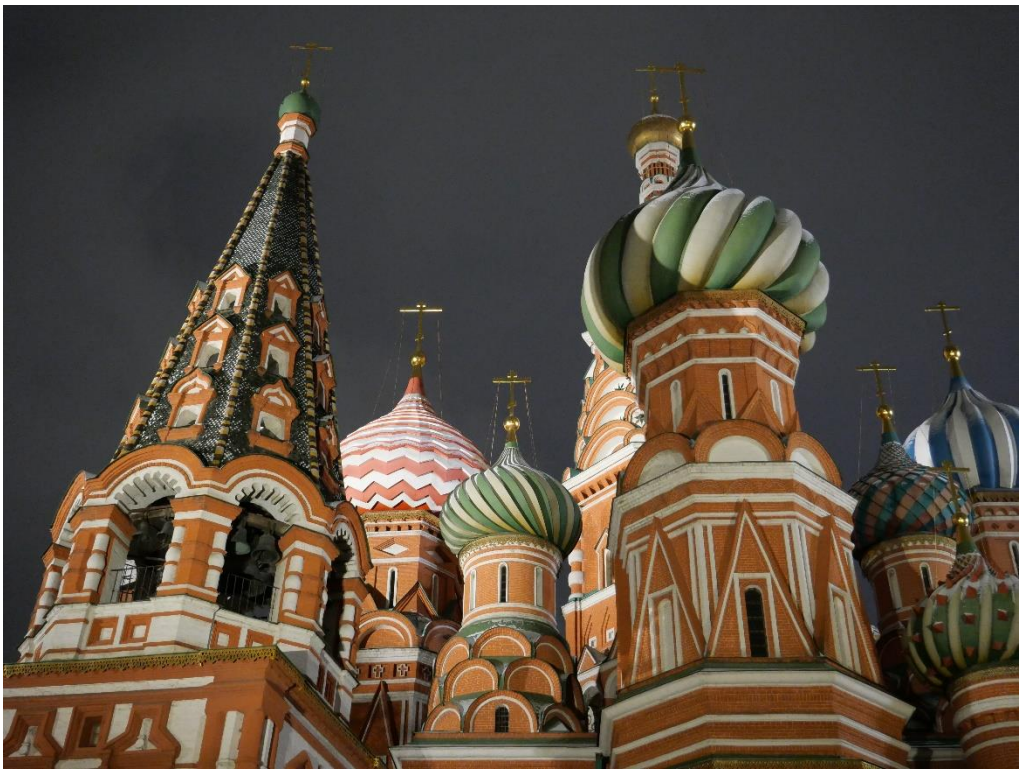
- Symposium sessions in English and Russian
- An academy lecture by fellow Prof. Victor Sanaev entitled “Interaction of wood with protective decorative materials”.
- A presentation of the academy medal to fellow Xavier Deglise for lifetime achievement.
- A visit to the Bolshoi Theatre.
- A tour of Moscow complete with beautiful Christmas decorations.
- A tour of Bauman Moscow State Technical University.
- A concert to celebrate the 100th Anniversary event.
- A banquet at a local restaurant.
- A post-conference tour to St Petersberg.



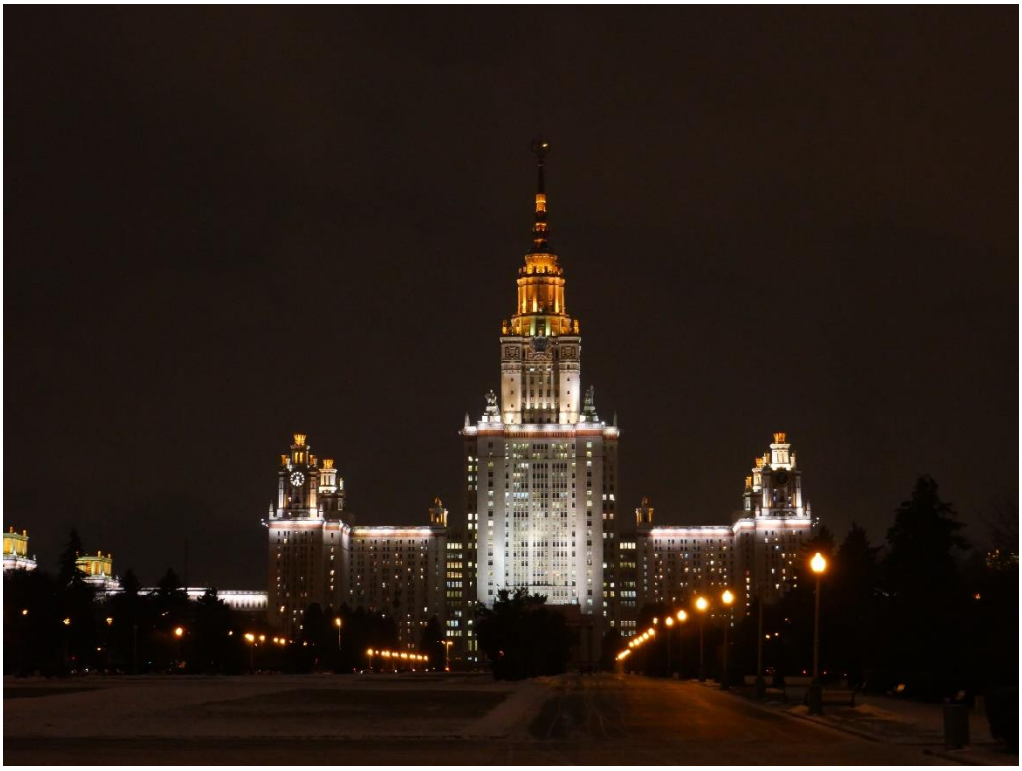
IAWS President Rob Evans presents the certificate to fellow Victor Sanaev after the academy lecture.

Downtown Moscow – Tsum department store decorated for Christmas.

Bolshoi theatre in the snow.

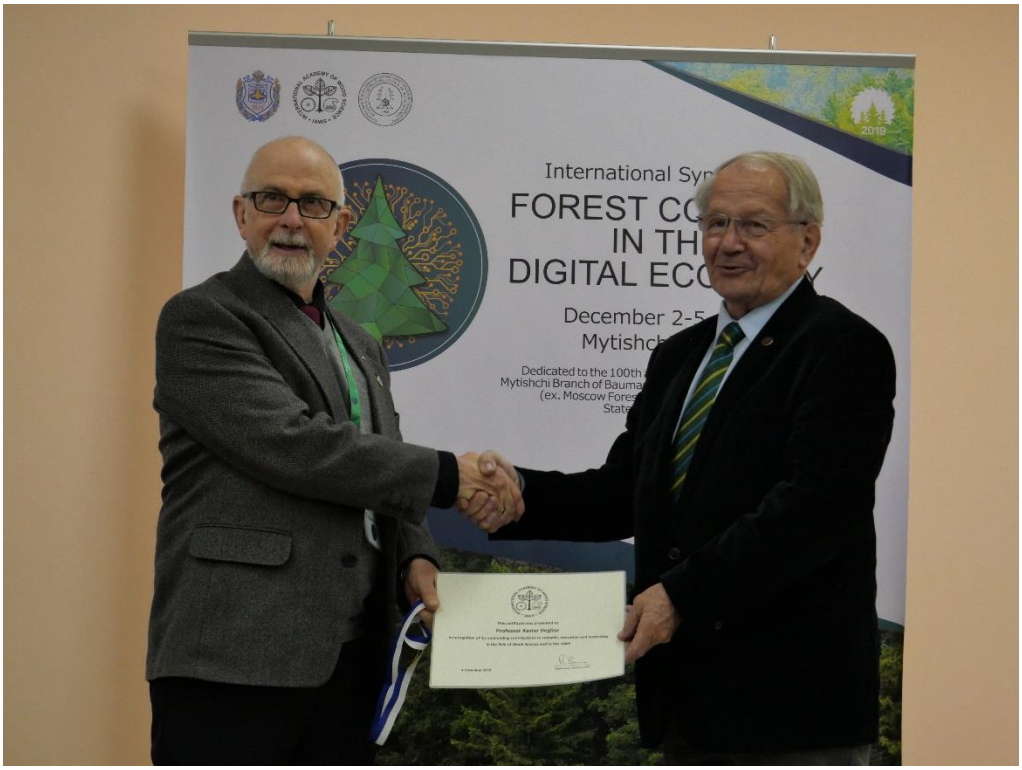


St Basils cathedral – Red Square.



Russian science academy.

President Rob Evans presenting the Academy medal to Fellow Xavier Deglise.



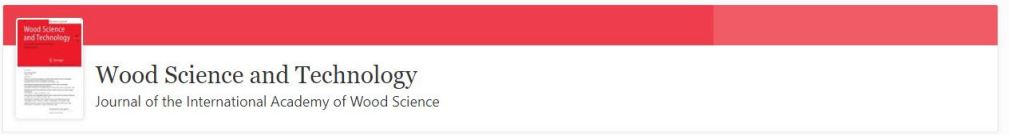
Presentation of the medal.

Fellow Deglise gives a speech.

Fine parquetry, Hermitage museum, St Petersberg.

Peter the Great's office, Peterhof Palace, St Petersberg.

Fine wooden desk, Catherine's palace, St Petersberg.



Wood Science and Technology publishes original scientific research results and review papers covering the entire field of wood material science, wood components and wood based products. Subjects are wood biology and wood quality, wood physics and physical technologies, wood chemistry and chemical technologies. Latest advances in areas such as cell wall and wood formation; structural and chemical composition of wood and wood composites and their property relations; physical, mechanical and chemical characterization and relevant methodological developments, and microbiological degradation of wood and wood based products are reported. Topics related to wood technology include machining, gluing, and finishing, composite technology, wood modification, wood mechanics, creep and rheology, and the conversion of wood into pulp and biorefinery products.

- Spans the entire field of wood and pulp
- Coverage includes the composition of wood, wood products technology and pulp processing
- 90% of authors who answered a survey reported that they would definitely publish or probably publish in the journal again

Editors-in-Chief
Klaus Richter, Jan-Willem van de Kuilen

2.109 (2019)
Impact factor

2.232 (2019)
Five year impact factor

50 days
Submission to first decision

202 days
Submission to acceptance

110,929 (2019)
Downloads

General News

- IAWS will hold a virtual plenary meeting towards the end of this year which will include invited speakers and a presentation from the PhD award winner. More details will be sent to fellows when available.

- IAWS is in the process of developing a new web site. We are looking for contributed images for the new site. Please send high resolution images of relevant material including forests, wood processing, and wooden architecture or any other relevant topic to the secretary – Lloyd Donaldson by the end of August 2020.

- The next issue of the bulletin will feature some highlights of Affiliated member organisations. We welcome contributions from Fellows who are associated with these organisations.

This year marks the 100th anniversary of the birth of Professor Cristofor Simionescu (former fellow of IAWS) the founder of the field of natural and synthetic polymers in Romania and the journal Cellulose Chemistry and Technology. On this occasion faculty of Chemical Engineering and Environmental Protection (Technical University of Iasi) organizes 5th International Conference on Chemical Engineering.

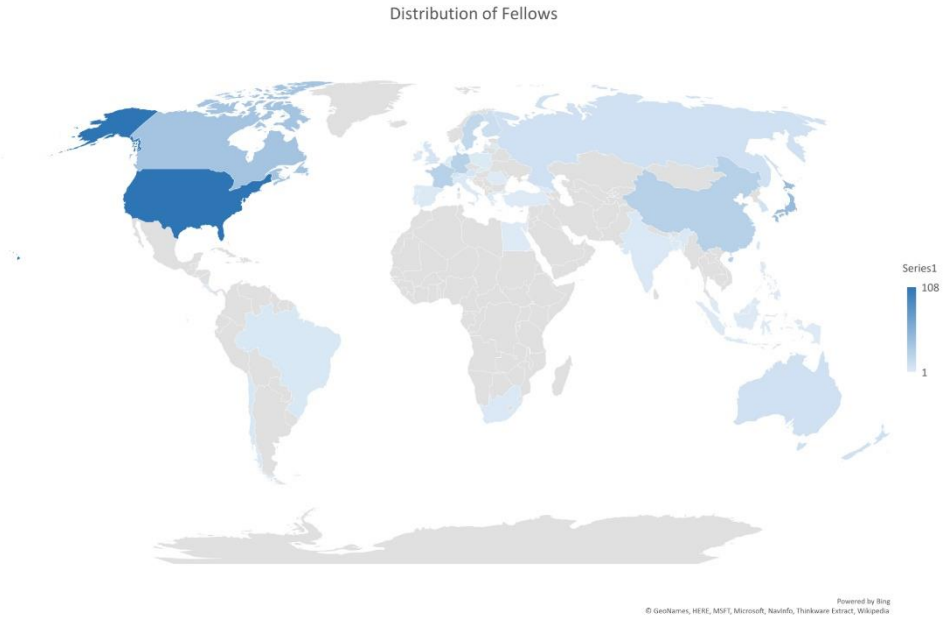
Information on the web page:
www.cercetare.icmp.tuiasi.ro/conferinte/ICCE2020/.

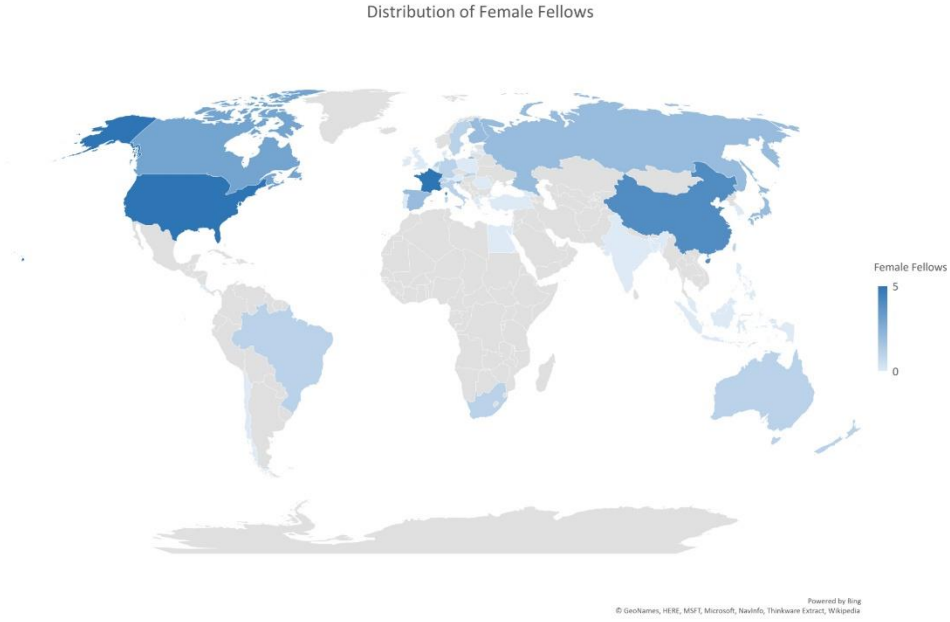
Valentin Popa,
Editor in chief of the Cellulose Chemistry and Technology journal

Fellow Keiji Takabe has retired from Kyoto University but his retirement ceremony has been delayed due to the pandemic. Fellow Junji Sugiyama will take over as Professor for the next five years. Fellow Akira Isogai also retired from Tokyo University.

IAWS Membership Report

Distribution of Fellows by Country: 42 Countries, 401 Fellows. 9% of fellows are female.





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

Affiliated Members elected in 2016
Vietnam Forestry University, Hanoi, Vietnam
Seoul National University, Seoul, Korea
International Center for Bamboo & Rattan, Beijing, China
Göttingen University, Göttingen, Germany

Fellows elected in 2019

Voichita Bucur, (Australia)
Bertrand Charrier, (France)
Jozica Gricar, (Slovenia)
Keiko Kuroda, (Japan)
Jean-Michel Leban, (France)
Roger Moya-Roque, (Costa Rica)
Shri Ramaswamy, (USA)
Sabine Rosner, (Austria)
Ute Sass-Klaassen, (Netherlands)
Rita Scheel-Ybert, (Brazil)
Tatjana Stevanovic Janezic, (Canada)
Maija Tenkanen, (Finland)
Teresa Terrazas, (Mexico)
Brenda Wingfield, (South Africa)
Tomoya Yokoyama (Japan)
Makoto Yoshida, (Japan)
Timothy Young, (USA)
Amy Zanne, (USA)
Meiyun Zhang, (China)
Xiaoyan Zhou, (China)
Tanya Zimmerman, (Switzerland)

Fellows elected in 2018
Alfredo Aguilera, (Chile)
Paul Gatenholm, (Sweden)
Galina A. Gorbacheva, (Russian Federation)
Chunde Jin, (China)
Nam Hun Kim, (Korea, South)
Per Tomas Larsson, (Sweden)
Seung-Hwan Lee, (Korea, South)
Alex C. Wiedenhoeft, (USA)
Yafang Yin, (China)
Joe R. H. Zhao, (Canada)

Fellows elected in 2017
Umesh Agarwal, (USA)
Junyou Shi, (China)
Alain Celzard, (France)
Nicolas Brosse, (France)
Youngcan Jin, (China)
Yuzou Sano, (Japan)
Andrey Pranovich, (Finland)

Chair of Academic Board elected in 2018
Siqun Wang, (USA)

Fellows deceased in 2020
Fritz SCHWEINGRUBER, (Switzerland)

Fellows deceased in 2019
Marian BABIAK, (Slovakia)
Robert KENNEDY, (Canada)
Dinggou ZHOU**,** (China)

Fellows deceased in 2018
Mikhail ZARUBIN, (Russian Federation)
Hikaru SASAKI, (Japan)
Wayne WILCOX, (USA)

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

Fellows deceased in 2016
Ants TEDER, (Sweden)
Emmanuel POPPEL, (Romania)
Josef SCHURZ, (Austria)
John David BARRETT (Canada)
Ramon ECHENIQUE-MANRIQUE, (Mexico)
Kunio HATA, (Japan)

Deceased Fellows (2012 - 2015)
Abraham FAHN (2012) Israel
Wolfgang KNIGGE (2012) Germany
Harold TARKOW (2012) USA
Anne-Marie CATESSON (2012) France
Eugene ZAVARIN (2012) USA
B.J. ZOBEL (2012) USA
Wilfred A. CÔTÉ (2012) USA
Horst H. NIMZ (2013) Germany
John D. BRAZIER (2013) United Kingdom
Fernand BARNOUD (2013) France
Gösta BRUNOW (2013) Sweden
Shigeo ISHIDA (2013) Japan
Thomas M. MALONEY (2014) USA
Sandor MOLNAR (2014) Hungary
Geza IFJU (2014) USA
John ERICKSON (2014) USA
Paul KIBBLEWHITE (2015) New Zealand
Börje K. STEENBERG (2015) Sweden
Boris N. UGOLEV (2015) Russia
Rolf BIRKELAND (2015) Norway

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
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
FP INNOVATIONS, Canada, www.fpinnovations.ca
FRAUNHOFER-INSTITUTE OF WOOD RESEARCH, Germany, www.wki.fraunhofer.de
HOLZFORSCHUNG MÜNCHEN, Germany, www.holz.wzw.tum.de
RISE - RESEARCH INSTITUTES OF SWEDEN, Sweden, www.ri.se/en
INTERNATIONAL CENTRE OF BAMBOO AND RATTAN, China, www.icbr.ac.cn/en
INTERNATIONAL WOOD CULTURE SOCIETY, USA, www.iwcs.com
KYOTO UNIVERSITY, Japan, www.rish.kyoto-u.ac.jp
MISSISSIPPI STATE UNIVERSITY, USA, www.cfr.msstate.edu/forestp
OREGON STATE UNIVERSITY, USA, www.woodscience.oregonstate.edu
SCION, New Zealand, www.scionresearch.com
SEOUL NATIONAL UNIVERSITY, Republic of Korea www.adhesion.org
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, Vietnam, www.vfu.edu.vn
WOOD TECHNOLOGY INSTITUTE, Poland, www.itd.poznan.pl

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
- Give due credit to the work of others in the field, not just summarize the author's work
- Contain important references to the literature for further reading
- Finish with a statement of future direction in the area

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 30 September.

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 November, 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 two 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.

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

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
kimys@jnu.ac.kr

A copy of this form is available from the secretary – lloyd.donaldson@scionresearch.com

Imprint
Editorial
International Academy of Wood Science
c/o University of British Columbia
Department of Wood Science 2926, 2424 Main Mall Vancouver,
BC V6T 1Z4 Canada

Responsible for contents
Dr. Yoon Soo Kim- President
Dr. Lloyd Donaldson – Secretary

IAWS

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