2014 TAPPI INTERNATIONAL CONFERENCE ON NANOTECHNOLOGY FOR RENEWABLE MATERIALS

23-26 JUNE 2014

TAPPI

FAIRMONT HOTEL VANCOUVER • VANCOUVER, BRITISH COLUMBIA, CANADA

Unlock the Potential of Nature's Building Blocks

- Renewable
- Sustainable
- Versatile

- Learn about the latest technical advances and applications
- Meet technical experts and business leaders from around the globe
- Join the conversation

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TAPPI International NANOtechnology Division

The leading global forum to:

- Advance the use of nanotechnology within the forest products industry
- Support the development, production and use of renewable or sustainable nanomaterials for all industries.

Bringing You Knowledge:

- TAPPI Annual Nanotechnology Conference
- Nano360°
- Division sponsored publications

Expanding Your Network:

- Link up with global experts on the LinkedIn Nanotechnology Division Group

Join one of the three Division Teams to work on projects like these:

- Promote the potential of renewable nanomaterials
  - Guide the development of materials to promote the Division and the use of renewable nanomaterials
  - Engage and educate the forest products and other industries on the value of renewable nanomaterials
- Share Technical Advancements
  - Developing technical programs for conferences and symposiums
  - Guiding the development of webinars, courses, and other resources

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NANO360°

TAPPI International Nanotechnology Division

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Nanotechnology Now

2014 TAPPI INTERNATIONAL CONFERENCE

On Nanotechnology For Renewable Materials • 23-26 June 2014

Wadood Y. Hamad
FPInnovations (Canada)

Akira Isogai
Univ. of Tokyo (Japan)

Orlando Rojas
NCSU (USA) and
Aalto University (Finland)

Dear Colleagues,

Welcome to Vancouver and to TAPPI's 2014 International Conference on Nanotechnology for Renewable Materials! We would like to thank you for joining us in beautiful Vancouver for the next three days to learn about the latest scientific breakthroughs and applications of nanomaterials from sustainable sources.

We would also like to thank the Theme Leaders for this year's conference who diligently worked to develop the excellent technical program and to TAPPI for their excellent organization of the entire conference. We also extend our appreciation to this year's sponsors, as well as AMPEL and TRIUMF for opening their doors to the conference attendees.

This year's program highlights the many new technological advances for analyzing and developing functional products through the use of renewable nanomaterials. The conference includes two keynote presentations, a dinner cruise with a view of Vancouver's majestic cityscape, as well as over 85 technical presentations including a session featuring 50 posters and the annual Student Poster Competition sponsored by Verso Corp. We have introduced a new important feature this year, namely, a panel discussion by leading industrialists and academics on the state of commercialization of cellulose nanomaterials. Indeed, there is much to see and learn about during your time at the conference, and we very much hope you take advantage of the networking opportunities during breaks, the poster session and reception.

The co-chairs welcome your comments on the evolution of this conference, as we endeavor to keep astride of the rapidly advancing field of nanotechnology and renewable materials.

We hope you will relish in all that Vancouver offers, and find the technical program useful and compelling.

2014 Conference Co-Chairs,

Wadood Y. Hamad
Akira Isogai
Orlando Rojas

THEME LEADERS

Yaman Boluk University of Alberta	**Emily Cranston** McMaster University	**Hamdy Khalil** Woodbridge Foam Corporation	**Andriy Kovalenko** National Institute for Nanotechnology	**Robert Moon** USDA-FPL
Kim Nelson American Process Inc.	**Brian O'Connor** FPInnovations	**David Plackett** University of British Columbia	**Alan Rudie** USDA-FPL	**John Simonsen** Oregon State University

CONFERENCE HIGHLIGHTS

Monday, 23 June 2014

NIST Workshop – Metrology Needs for Cellulose Nanomaterials

8:00 – 16:30

Additional $175 Registration Required.

NIST The U. S. National Institute of Standards and Technology is hosting a special workshop to focus on the most important metrology needs facing the cellulosic nanomaterials community. The agenda will begin with presentations from invited manufacturers who will share their metrology needs and efforts. Additional invited researchers and product development stakeholders will discuss their unique needs. Breakout sessions will task participants with developing prioritized lists of the different metrology needs of the various stakeholders. A workshop report authored by the co-organizers will be published following the meeting.

Tour Two State of the Art Facilities

The Advanced Materials and Process Engineering Laboratory (AMPEL) at the University of British Columbia

9:00 and 11:00

Space is limited and pre-registration is required.

Buses to depart hotel at 8:30 and 10:30. Meet in the Fairmont Hotel lobby 15 minutes before scheduled bus departure time.

AMPEL brings together over 20 faculty members from across the UBC campus to focus on leading edge research of materials, devices and processing sciences. Tour participants will hear an overview of AMPEL, and then visit the Flexible Electronics and Energy Lab (FEEL), the Interface Analysis Lab, the Mechatronics Lab, the Biomaterials Lab, the Composite Lab, the Nanofibres Lab, and the Advanced Fibrous Materials Lab.

TRIUMF

14:00-16:00

Space is limited to 50 participants and pre-registration is required.

Buses to depart hotel at 13:30. Meet in the Fairmont Hotel lobby 15 minutes before scheduled bus departure time.

TRIUMF is one of the world's leading subatomic physics laboratories, and Canada's national laboratory for nuclear and particle physics research and related sciences. It is a Canadian success story located on the campus of the University of British Columbia in Vancouver. TRIUMF has research programs in accelerator physics, nuclear medicine, detector development, molecular and materials science, particle physics, and rare isotope beams.

Tuesday, 24 June 2014

High Impact Keynote

Allan (Al) Ward
Chief Operating Officer
Alberta-Pacific Forest Industries Inc.

Al Ward is President and COO of Alberta-Pacific Forest Industries Inc. (Al-Pac), the newest, largest single line kraft pulp mill in North America, with production starting in 1993. Mr. Ward has a Masters Degree in Business Administration from the University of Alberta and over 30 years of experience in the forest industry in various production, technical and senior management positions. The company utilizes some of the latest advances in chemical pulping technology and annually produces approximately 650,000 tonnes of northern bleached hardwood and softwood kraft pulp. Al-Pac is known as an environmental leader, practices sustainable forest management and was third party FSC certified in 2005 and SFI dual certified in 2013. The company employs 450 full time employees and approximately 1,000 contractors and has been voted one of Canada's "Top 100 Employers for 2014" and one of "Alberta's Top 60 Employers for 2013" for seven years running.

Student Poster Competition

VERSO

Each year the Student Poster competition draws multiple submissions. Winners are announced at the conference, and cash prizes and certificates are awarded to first and second place team members. This year's Student Poster Competition is sponsored by Verso Paper.

Wednesday, 25 June 2014

High Impact Keynote

Per Svending
Commercial Director
Imerys FiberLean™

Per has worked 35 years for the paper industry. After chemical engineering studies in Gothenburg Sweden he joined Eka Chemicals (today AkzoNobel) in 1979 and was part of the team that developed the first nano-particle based retention aid system, Compozil. His work at Eka Chemicals gradually progressed from R&D to wet end application and into commercial roles via a period in product management. In 1989 he joined Stora Papyrus Mölndal for a role as technical manager, coated papers. The combination of wet end and coating experience facilitated a move to English China Clays in 1994. The career in what has now become Imerys started as sales director for Scandinavia and has moved through various key account manager roles to product management and global marketing to the current role in the FiberLean™ team. Per was one of the inventors of the FiberLean™ process and is now heading up the commercialisation effort for this breakthrough technology. Off-duty, his favourite activities are motorcycling, skiing, kayaking and cooking.

Conference Gala On Board The Corporate Yacht

18:30 – 22:00 Buses to depart hotel at 18:30. Meet in the Fairmont Hotel lobby 15 minutes before scheduled bus departure time.

Additional $75 Registration Required. Includes drinks, dinner, dessert and beautiful views of Vancouver.

Join us on board The Corporate Yacht as we follow the sunset and view Vancouver's glimmering shoreline. After initial boarding, the yacht will cruise out of Coal Harbour past the spectacular Vancouver cityscape, Convention Centre, and famous Pan Pacific Sails. We then will cross over to North Vancouver and cruise past the scenic shoreline, under the Lions Gate Bridge and past Stanley Park's spectacular forests. The yacht will then make its way past the Jericho/Kitsilano beaches and into the Granville Island waterway, before turning us around for our journey back to the Coal Harbour marina at ScienceWorld.

TECHNICAL PROGRAM

Subject to Change.

Monday – 23 June 2014

Registration: 8:00 – 19:30 *British Columbia Ballroom Foyer*

Facility Tours*:
The Advanced Materials and Process Engineering Laboratory (AMPEL) at the University of British Columbia
9:00-11:00
Bus leaves at 8:30. Please meet in Fairmont Hotel Lobby 15 minutes prior to bus departure.
11:00-13:00
Bus leaves at 10:30. Please meet in Fairmont Hotel Lobby 15 minutes prior to bus departure.

TRIUMF
14:00-16:00
Bus leaves at 13:30. Please meet in Fairmont Hotel Lobby 15 minutes prior to bus departure.

*Additional Registration required

NIST Workshop*
Columbia Ballroom
8:00 – 16:30
The U. S. National Institute of Standards and Technology is hosting a special workshop to focus on the most important metrology needs facing the cellulosic nanomaterials community.

*Additional Registration required

Welcome Reception – 18:30 -19:00 *British Ballroom*

Tuesday – 24 June 2014

Registration: 7:00 – 19:30 *British Columbia Ballroom Foyer*

Session 1: Conference Welcome & Keynote Presentation
Columbia Ballroom
Session Chair: *Wadood Hamad, FP Innovations*
8:00 - 8:50
Al Ward – President and Chief Operating Officer, Alberta-Pacific Forest Industries Inc., *The Nano Puzzle – Putting the Pieces Together*

Session 2: CNC Processing
Vancouver Ballroom
Session Chair: *Raj Venugopal, GAW Technologies GmbH*
Session co-chair: *Junyong Zhu, US Forest Products Laboratory*
9:00-10:30

Session 3: Aerogels, Hydrogels and Foams I
Columbia Ballroom
Session Chair: *John Simonsen, Oregon State University*
9:00-10:30

• "Blue Goose Biorefineries Inc. Method for Cellulose Nanocrystals Production" - **Sean McAlpine**, *Blue Goose Biorefineries, Inc.* • "Kinetics of Acid Hydrolysis of Bleached Eucalyptus Pulp for the Production of Cellulose Nanocrystals (CNCs)" - **Junyong Zhu,** *US Forest Products Laboratory* • "Low Cost Co-Production of Cellulose Nanofibrils and/or Cellulose Nanocrystals with Biofuels Using American Process Inc.'s AVAP® Biorefinery Technology" - **Kimberly L. Nelson**, *American Process Inc.* • "Isolation of a Novel, Crystalline Cellulose Material from the Spent Liquor of Cellulose Nanocrystals (CNCs)" - **Thomas Q. Hu**, *FPInnovations*	• "Applications of Nano Crystalline Cellulose Foams in Composites and Construction" - **Shaul Lapidot**, *Melodea Ltd.* • "Ultralight carbon aerogel from microfibril cellulose as highly selective oil absorption materials" - **Yujie Meng**, *University of Tennessee* • "Injectable Hydrogels and Low Density Aerogels Crosslinked with Hydrazone Bonds" - **Emily Cranston**, *McMaster University* • "Nano-cellulose as a template for functional materials production" - **Ahu Gumrah Dumanli Parry**, *University of Cambridge*
Networking Break – 10:30 -11:00 *British Ballroom*	
Session 4: CNF Processing *Vancouver Ballroom* **Session Chair:** *Sean Ireland, Verso Paper Corp.* **11:00 - 12:30**	**Session 5: Aerogels, Hydrogels and Foams II** *Columbia Ballroom* **Session Chair:** *Kim Nelson, American Process* **11:00 - 12:30**
• "Fibrillated Cellulose Production – Chemically Assisted Disintegration of the Fiber Cell Wall" - **Thaddeus Maloney**, *Aalto University* • "Commercial System to Produce Cellulose Nanofibrils" - **Marc Gerrer**, *GL&V* • "Avoiding Aggregation During the Drying and Rehydration Phases of Nanocellulose Production" - **Evelyn Fairman**, *University of Maine* • "Unique properties of TEMPO-oxidized cellulose nanofibers prepared from various plant holocelluloses" - **Akira Isogai**, *University of Tokyo*	• "The structure and properties of cellulose nanocrystal aerogels" - **Christian Buesch**, *Oregon State University* • "Cellulose Nanofibril Networks: Formation and Applications towards Composites and Hydrogels" **Hong Dong**, *U.S. Army Research Laboratory* • "Highly translucent and tough bulky aerogels prepared from liquid-crystalline nanocellulose dispersions" - **Tsuguyuki Saito**, *The University of Tokyo* • "Cellulose nanofibrils in composite, aerogel, and carbon material applications" - **Junyong Zhu**, *USDA Forest Service Forest Products Lab*
Lunch – 12:45 - 13:45 *(on your own)*	
Session 6: Alternative Sources for Cellulose *Vancouver Ballroom* **Session Chair:** *Gilberto Siqueira, EMPA* **14:00 - 15:30**	**Session 7: Composites I** *Columbia Ballroom* **Session Chair:** *John Simonsen, Oregon State University* **14:00 - 15:30**
• "Cellulose nanofibers as an opportunity for Pulp & Paper Industries, Biorefineries, and low value cellulosic materials" - **Gilberto Siqueira,** *EMPA* • "Unusually high aspect ratio, easily deconstructed cellulose nanofibers from Australian spinifex (Triodia pungens)" - **Darren Martin**, *University of Queensland* • Reinforcement of PLA nanocomposite with nanoclay and nanocellulose extracted from sisal - **Jon Guzman Trifol**, *Danish Polymer Centre*	• "Surface Modification of Nanocellulose of Polypropylene and Polyethylene" - **Hiroyuki Yano**, *Kyoto University* • "Processing-Structure-Property Relationships in Cellulose Nanocrystal/Waterborne Epoxy Composites" - **Meisha Shofner**, *Georgia Institute of Technology* • "Supramolecular EcoBioNanocomposites Incorporating Stereocomplexation" - **John R. Dorgan**, *Colorado School of Mines* • "Solid-state shear pulverization as effective treatment for dispersing lignocellulose nanofibers in polypropylene composites" - **Shinichiro Iwamoto**, *National Institute of Advanced Industrial Science and Technology*

Networking Break – 15:30 - 16:00 *British Ballroom*

Session 8: Cellulose Nanoparticle Characterization
Vancouver Ballroom
Session Chair: *Stephanie Beck, FP Innovations*
16:00 - 17:30

- "On the Cellulose Supramolecular Structure in Various Cellulose-I CNCs" - **Umesh P. Agarwal**, *US Forest Products Laboratory*
- "CNC Characterization: An Essential Step towards Profiling Physicochemical Properties" - **Christophe Danumah**, *Alberta Innovates - Technology Futures*
- "A rapid, reliable method for quantifying cellulose nanocrystal sulfate half-esters by conductometric titration" - **Stephanie Beck**, *FPInnovations*
- "Recent developments in nano-ligno-cellulose production and the crill characterization technique" - **Sinke Henshaw Osong**, *Mid Sweden University*

Session 9: Composites & Coatings
Columbia Ballroom
Session Chair: *Johan Foster, University of Fribourg*
16:00 - 17:30

- "Structural Nanocellulose Composites" - **Jeffrey P. Youngblood**, *Purdue University*
- "Nano-reinforcement effects of polyacrylamide for nanocellulose films" - **Takanori Kurihara**, *Harima Chemicals, Inc.*
- "Improvements in Mechanical Response and Liquid Barrier Properties of Cellulosic Substrates with Blended Polysaccharide Coatings" - **Adam R. Plucinsk**i, *Pennsylvania State University*
- Chemical surface analysis and classification of hydrophobic nanoparticle coatings on paper by principal component analysis – **Pieter Samyn**, *University of Freiburg*

Session 10: Poster Session & Student Poster Composition Sponsored By Verso Paper Corp.
British Ballroom
Session Chair: *Robert, Moon, US Forest Service*
Posters listed on page 12-13.

Wednesday – 25 June 2014

Registration: 7:00 – 17:30 *British Columbia Ballroom Foyer*

Session 11: Keynote Presentation:
Columbia Ballroom
Session Chair: *Phil Jones, Imerys*
8:00 – 8:45

Per Svending - Commercial Director, Imerys FiberLean™ **,** ***Commercial Break-Through in MFC Processing***

Session 12: Markets for Cellulose Nanomaterials
Columbia Ballroom
Session Chair: *Alan Rudie, US Forest Products Laboratory*
9:00 – 10:30

- "CelluForce: Progress Towards Commercialization" – **Richard M. Berry**, *CelluForce*
- "Pre-commercial plant of Cellulose Nano Fiber in Nippon Paper Industries" - **Haruo Konno**, *Nippon Paper Industries Co. Ltd.*
- "Market Projections for Nanocellulose-enabled Products" - **Jo Anne Shatkin,** *Vireo Advisors*
- "Nanocellulose Markets" - **Jack Miller**, Market-*Intell LLC*

Session 13: Hybrid Materials
Vancouver Ballroom
Session Chair: *Orlando Rojas, North Carolina State University*
9:00 – 10:30

- "Synthesis and Heterogeneous Catalysis of Metal Nanocatalysts on TEMPO-oxidized Cellulose Matrix" - **Takuya Kitaoka,** Kyushu University
- Biorenewable blends exhibiting crystallization induced phase separation – **John Dorgan**, *Colorado School of Mines*
- "Electrospun Chitosan-Polyethylene Oxide Nanofibres for Adsorption of Copper Ions from Aqueous Solutions" - **Ichrak Lakhdhar**, *UQTR*
- "Magnetic Microbeads and Capsules Stabilized by Cellulose Nanocrystals" - **Orlando J. Rojas**, *NCSU*

Networking Break – 10:30 -11:00 *British Ballroom*

Session 14: Applications *Columbia Ballroom* **Session Chair:** *Alan Rudie, US Forest Products Laboratory* **11:00 – 12:30**	**Session 15: Rheology I** *Vancouver Ballroom* **Session Chair:** *Yaman Boluk, University of Alberta* **11:00 – 12:30**
• "Nanocellulose-based Renewable Materials of Interest in Food Packaging Applications" **- Jose Maria Lagaron**, *Instituto De Agroquimica Y Tecnologia De Alimentos IATA-CSIC* • "Energy and Electronics Devices Based on Cellulose Nanostructures" **- Liangbing Hu**, *Univeristy of Maryland-College Park* • "Mitigating Shrinkage in Concrete Structures through Cellulose Nanomaterials" - **Vivek Bindiganavile**, *University of Alberta*	• "Rheological studies on the interactions between cellulose nanocrystals and polymers" - **Liyan Zhao**, *Alberta Innovates Technology Futures* • "The Blade Coating of Cellulose Nanofibers Suspensions on Paper" - **Mike Bilodeau,** *University of Maine* • "Tuning Cellulose Nanocrystal Gels and Emulsions using Polymers and Surfactants" - **Emily Cranston**, *McMaster University* • "Change in rheological properties of nanofibrillated cellulose suspension with additives" - **Kyujeong Sim,** *Seoul National University*

Lunch – 12:45 - 13:45 *(on your own)*

Session 16: Paper & Paperboard Applications *Columbia Ballroom* **Session Chair:** *Katariina Torvinen, VTT* **14:00 – 15:30**	**Session 17: Rheology II** *Vancouver Ballroom* **Session Chair:** *Warren J. Batchelor, Monash University* **14:00 – 15:30**
• "The Addition of CNF to Papermaking Furnish" - **Donna A. Johnson**, *University of Maine* • "Impact on paper properties of z-direction structuring by the layered addition of Micro-Nano-Fibrillated Cellulose (MNFC)" - **Mohamed A. Charfeddine**, *UQTR* • "Binding fillers for high filler content papers by using MFC" - **Katariina Torvinen**, *VTT Technical Research Centre of Finland* • Development of microfibrillated cellulose composite web forming method – **Juuso Rantanen,** *Aalto University*	• "Control of colloidal structure using polyelectrolytes to improve filtration and sheet porosity" - **Warren J. Batchelor**, *Monash University* • "Stability and Rheology of Cellulose Nanocrystal Solutions in Adsorbing and non-adsorbiing Polymers Solutions" - **Hale Oguzlu**, *University of Alberta* • "Dispersion of Micro-Nano Fibrillated Cellulose (MNFC) by Carboxy Methyl Cellulose (CMC) and its characterization" - **Fabrice Roussiere**, *UQTR/CRML* • "Rheology and Consolidated Structure of MFC/NFC-containing Coating Colours: structure–liquid interactions" - **Katarina Dimic-Misic**, *Aalto University*

Networking Break – 15:30 - 16:00 *British Ballroom*

Session 18: Medical I: Biomedical Scaffolds from Cellulose *Vancouver Ballroom* **Session Chair:** *Yuvraj Singh Negi, IIT Roorkee* **16:00 – 17:30**	**Session 19: CNC Self Assembly** *Columbia Ballroom* **Session Chair:** *Emily Cranston, McMaster University* **16:00 – 17:30**
• "Design and fabrication of nanocellulose-based 3D scaffolds as alternative orthopedic biomaterials" - **Vanja Kokol**, *University of Maribor* • "Tissue Engineering Scaffolds from Electrospun All-Cellulose Nanocomposite Nanofibers Reinforced with Cellulose Nanocrystals" - **Wei Zhang**, *Sichuan University* • "Biofunctional Micropatterning of Glyco-decorated Scaffolds Affects Myoblast Cell Alignment" - **Pornthida Poosala**, *Kyushu University* • "Morphological, Structural, Mechanical Performance and in vitro Bioactivity of Cellulose Nanocrystals Reinforced Biocomposite Scaffolds for Bone Tissue Engineering" - **Yuvraj Singh Negi**, *IIT Roorkee*	• "Celluose Nanocrystal Self-Assembly into Flexible Films of Tunable Photonic" - **Wadood Hamad**, *FPInnovations* • "Cellulose Nanocrystal Self-Assembly and Liquid Crystal Behaviour During Storage" - **Stephanie Beck**, *FPInnovations* • "Cellulose Biomimetic: a new prospective for smart materials" - **Silvia Vignolini**, *University of Cambridge* • "Responsive Photonic Hydrogels Templated by the Self-Assembly of Cellulose Nanocrystals" - **Joel A. Kelly**, *BC Research Inc.*
Conference Gala Dinner – 18:30 – 22:00 Buses to depart hotel at 18:30. Meet in the Fairmont Hotel lobby 15 minutes before scheduled bus departure time. Separate registration required	
Thursday – 26 June 2014	
Registration: 7:00 – 12:00 *British Columbia Ballroom Foyer*	
Session 20: Medical II: Drug Delivery *Vancouver Ballroom* **Session Chair:** *David Plackett, University of British Columbia* **8:00-9:30**	**Session 21: Surface Functionalization** *British Ballroom* **Session Chair:** *Emily Cranston, McMaster University* **8:00-9:30**
• "Nanocelluloses and drug delivery – a concise review" - **David Plackett**, *University of British Columbia* • "Nanofibrillar Cellulose in Controlled Drug Release" **Timo Laaksonen**, *University of Helsinki* • "Prep and characterization of cellulose nanofibril based hydrogels for drug release systems" - **Byung-Dae Park**, *Kyungpook National University* • "Formulation and evaluation of capecitabine loaded nanoparticles for cancer therapy" - **Santhanam Ramesh**, *Nehru College of Pharmacy*	• "Functionalized Nanocellulose as a Reinforcement and pH Detector on PVA films" - **Claudia Ponce**, *IPN* • "(Bio)chemical approaches to (bio)functional cellulose: Application of carbohydrate enzymology and cell wall biomimetics to cellulose surface modification" - **Harry Brumer**, *University of British Columbia* • "Thermally stable cellulose nanocrystals: From form to smart functionality" - **Johan Foster**, *University of Fribourg* • "Silver nanoparticles on paperboard for surface-enhanced Raman scattering (SERS) sensing" - **Jarkko J. Saarinen**, *Abo Akademi University*
Networking Break – 10:30 -11:00 *British Ballroom*	

Session 22: Medical III: Antimicrobial & Antibacterial Functionality *Vancouver Ballroom* **Session Chair:** *David Plackett, University of British Colombia* **10:00 - 11:30**	**Session 23: Modeling** *British Ballroom* **Session Chair:** *Andriy Kovalenko, National Institute for Nanotechnology* **10:00 - 11:30**
• "Synthesis, Characterization and antimicrobial activity assessment of surface modified Microfibrillated cellulose" - **Seema Saini**, *Grenoble INP Pagora* • "Elaboration of a new antibacterial bio-nano-material for food-packaging by synergistic action of cyclodextrin and microfibrillated cellulose" **- Julien Bras**, *Grenoble INP Pagora* • "Antimicrobial Propolis Containing Biocellulose Membranes for Skin Wound Healing" - **Hernane Barud**, *Universidade Estadual Paulista (UNESP)*	• "Interaction forces between cellulose nanocrystal particles in aqueous solutions" - **Yaman Boluk**, *University of Alberta* • "Mechanical characterisation of Nano Fibrillar Cellulose foams using X-ray tomography and numerical simulations" - **Prashanth Srinivasa**, *KTH Royal Institute* • "The strength of microfibrillated cellulose sheet materials," - **Warren J. Batchelor**, *Monash University* • "Plant Biomass Recalcitrance: Molecular Theory of Solvation Revleals Nanoscale Forces that Control Cell Wall Strength" - **Andriy Kovalenko**, *National Institute for Nanotechnology*
Lunch – 11:30 - 12:30 *(on your own)*	
Session 24: Environmental, Health & Safety **Session Chair:** *Brian O'Connor, FPInnovations* *Vancouver Ballroom* **12:30 – 14:00**	**Session 25: Standardization Workshop** *British Ballroom* **12:30 – 14:00**
• "Effect of polymeric nanoparticles on the stability of a biomimetic model of the lung surfactant" **- Patrick Lai**, *University of Calgary* • "Nanocellulose's low toxicity as measured by zebafish assays" – **Alicea Clendaniel**, *Oregon State University* • "Regulatory Approaches to Industrial Nanomaterials in Canada" – **Brad Fisher,** *Science and Technology Branch, Environment Canada*	This workshop provides a forum for international communication and collaboration in developing standards for cellulose nanomaterials. Updates on standards in development, plus working groups to advance the research needed to support standards development are a part of this workshop. No additional fee required.

Session 26: Panel Discussion
Session Chair: *Wadood Hamad, FP Innovations and Orlando Rojas, North Carolina State University*
Vancouver Ballroom
14:00 - 15:30

Panel discussion on the Manufacture, Commercialization and Markets for Nanocellulosic Materials
Panelists:
Richard Berry, *CelluForce—****Bruce Lyne,*** *KTH – ****Paris Kyriacopoulos,*** *Imerys—****Antti Laukkanen,*** *Betulium OY*

There have been significant scientific advances in the development of renewable forestry-based nanomaterials for a variety of industrial applications. Pilot and demonstration plants have been constructed to produce cellulose nanocrystals (CNCs) and cellulose nanofibrils (CNFs), and an appreciable upsurge in R&D activities, as well as release of patents and patent applications, have occurred over the past decade. The panelists, esteemed technical and business leaders, will discuss current commercialization efforts for CNCs and CNFs and the scope for novel product development and process enhancement. The panelists will also offer their perspectives on how these renewable, sustainable nanomaterials are expected to impact, for instance, consumer, engineering and medical products. Specific cases of current commercialization will be discussed, and interactive engagement with the audience through a generous Q&A session will take place.

POSTERS ON DISPLAY AT THE POSTER SESSION • TUESDAY, 17:30-19:30

1. *Investigation of Near-Field and Far-Field Properties of Gold Spiky Nanoparticle Dimers for High Performance Sensing* **Anran Li,** Nanyang Technological University *Cellulose Nanocrystals Mediate Silver Nanoparticles Formation by Controlling Nucleation* **Arcot R. Lokanathan,** Aalto University
2. *Oxidized Celluloseelation with Alcohols and Sodium Dodecyl Sulafte* **Duygu Celebi,** Universit of Bath
3. *Carboxylated Cellulose Nanocrystals with Different Rates of Carboxylate Surface Moieties* **Fanny Hoeng,** Grenoble INP Pagora-LGP2
4. *Nanofibrillated Cellulose for Exterior Wood Coatings – A Feasibility Study* **Srinivasa Rao Yearla**, University of Hyderabad, **Franziska Grueneberger,** Empa, Swiss Federal Laboratories for Materials Science and Technology
5. *Glyco-Decorated Biointerface Directly Stimulates the Intracellular Signaling of Cultured Cells* **Fumi Uemura,** Kyushu University
6. *Flocculation Behavior of Nanofibrillated Cellulose with Addition of Salt* **Hye Jung Youn,** Seoul National University
7. *Dewatering of Nanofibrillar Cellulose Suspension with Additives* **Hye Jung Youn,** Seoul National University
8. *Study of Cellulose Acetate and Lignin Based Nanofibers Produced by the Electrospinning Technique* **Joao Vinicios Wirbitzki Silveira,** Federal University of Jequitinhonha and Mucuri Valleys
9. *Study of cellulose reinforced poly (lactic acid) biocomposites modified by organosilane treatments, and its application for food packaging* **Sofiya Shopova,** Itene
10. *Preparation and characterization of cellulose nanocrystals: Effects of Alkalization* **Masoumeh Hassanzadeh,** KTH University
11. *Cellulose Nanofibril Enhanced Microfiltration Membranes* **Judith Margaret Winglee,** Duke University
12. *PMMA-Grafted CNCs for Use in PMMA Nanocomposites* **Lexa Graham,** McMaster University
13. *Controlling Mechanical and Viscoelastic Properties of Hydrogels by Crosslinking Cellulose Nanofibrils* **Ellinor Bævre Heggset,** Paper and Fibre Research Institute, NTNU
14. *Thermal and mechanical properties of surface-modified cellulose nanofibrils/poly(L-lactide) composite films* **Shuji Fujisawa, Ph.D,** Forestry and Forest Products Research Institute
15. *Asymmetric Heterogeneous Hydrogenation Using Palladium Nanoparticles Supported on Cellulose Nanocrystals (CNC): Role of CNCs in Chiral Induction* **Madhu Kaushik,** McGill University
16. *Imaging Cellulose Nanocrystals by Transmission Electron Spectroscopy* **Madhu Kaushik,** McGill University
17. *Novel Nano Cellulose Materials* **Marcus Ruda, C**elluTech AB
18. *CNF and CNF Aerogel Production for Valorization of Residual Empty Palm Fruit Bunch Fibers (EPFBF) by Microfluidization* **Mariko Ago,** Tokushima Bunri University
19. *Whey Protein Polymerization and Its Applications in Environmentally Safe Adhesives* **Mingruo Guo,** The University of Vermont
20. *Flow Instabilities During Rheological Measurements of Nanofibrillated Cellulose Aqueous Suspensions* **Oleksandr Nechyporchuk,** Laboratoire De Genie Des Procedes Papetiers(LPG2)
21. *Carbonization of microfibril cellulose aerogel: surface, structural and absorption properties* **Yujie Meng,** University of Tennessee
22. *Organic Solvent-Free Processing of High Performance Polyurethane Nanocomposites Reinforced with Cellulose Nanocrystals* **Pratheep Kumar Annamalai,** Australian Institute for Bioeng. and Nanotech (AIBN)
23. *Resilin-Nano Crystalline Cellulose Epoxy (RNCCE) Composite; A Novel Elastic, Resilient Adhesive* **Prof. Oded Shoseyov,** The Hebrew University of Jerusalem Israel

POSTER SESSIONS CONTINUED

24. *Structural Colored Films from Nanocrystalline Cellulose: Influence of Electrolytes on the Chiral-Nematic Organization* **Raphael Bardet,** LGP2 - Laboratory of Pulp & Paper Science

25. *Toxicity Studies of Nanofibrillar Cellulose in Human Bronchial Epithelial Cells and Macrophages in Vitro* **Saila Pesonen**, *Finnish Institute of Occupational Health*

26. *All Bio-Composites Composed of Polyamide 11 and Cellulose Nano-Fiber* **Takeshi Semba**, *Kyoto Municipal Inst. of Ind. Tech. and Culture*

27. *Transparent NFC Films for Sensing Applications* **Vinay Kumar**, *Abo Akademi University*

28. *MFC Films as Controlled Release Systems: Influence of the Chemical Composition* **Virginie Bigand**, *Grenoble INP Pagora*

29. *Nanofibrillation of Lignocellulosic Biomass and Their Reinforcing Potential* **William Tze,** *University of Minnesota*

30. *Preparation Process Optimization and Characterization of Nano-Crystalline Cellulose from Bamboo Dissolving Pulp* **Zhifei Zhuo**, *Institute of Chemical Industry of Forestry Products*

31. *In-situ fibrillation and hydrophobic surface modification of microfibrillated cellulose : production and characteristics* **Pieter Samyn,** *University of Freiburg*

32. *Study of dynamics at a cellulose nanocomposite interphase as a result of applied stress using FRET* **Jeremiah W. Woodcock**, *National Institute of Standards and Technology*

33. Comparison of the properties of cellulose nanocrystals and cellulose nanofibrils isolated from bacteria, tunicate, and wood processed using acid, enzymatic, mechanical, and oxidative methods **Iulia A. Sacui,** *National Institute of Standards and Technology*

INTERNATIONAL NANOTECHNOLOGY DIVISION TECHNICAL AWARD AND IMERYS FIBERLEAN™ PRIZE

The Nanotechnology Division is pleased to announce the recipient of its first Technical Award.

This year's award will be presented to **Richard Berry, Ph.D.,** on Tuesday, 24 June 2014, at 8:00 during the opening session.

Richard is leader of the nanotechnology initiative at FPInnovations until moving to CelluForce in 2011, Dr. Berry has numerous scientific accomplishments and a long experience of overseeing the industrial application of his numerous inventions. He received the 2009 Nano-industry award from NanoQuébec for his exceptional contribution to the development of cellulose nanocrystals. He is the winner of the 2012 Purvis Memorial Award and most recently become one of Canada's Clean 50 honourees. The initiatives Dr. Berry has spearheaded in recent years have allowed Canada to position itself as a world leader in the development of this new nanotechnology industry which was recognised through the 2012 NSERC Synergy award for innovation given to McGill University, FPInnovations, ArboraNano, and CelluForce and culminated in the awarding of the 2013 Marcus Wallenberg prize to Derek Gray of McGill University for his pioneering work on this material.

Dr. Berry has taught numerous courses for TAPPI and PAPTAC, and chaired the 2000 International Pulp Bleaching Conference. He has received many pulp and paper Industry awards and is a TAPPI Fellow. Berry also holds seventeen patents, and his work has been published in more than ninety articles and two monographs. Berry received a Bachelor of Arts Degree in Chemistry and Geology from Keele University in Staffordshire, England in 1975. In 1980 he earned a Ph.D. in Chemistry from McGill University in Montreal, Canada.

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Alberta Innovates-Technology Futures (AITF) collaborates with industry, academia, researchers, entrepreneurs and government to develop potential commercial applications for Cellulose Nanocrystals (CNC) in Alberta and across Western Canada. Its talented, experienced and industrious team operates Alberta's one-of-a-kind CNC pilot plant, which can produce up to 100 Kgs of material a week.

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CelluForce

CelluForce is the world leader in the commercial development of NanoCrystalline Cellulose (NCCTM). The company is a joint venture of Domtar Corporation and FPInnovations and was created to manufacture NCCTM in the world's first plant of its kind, located in Windsor, Québec.

FPInnovations

FPInnovations is a world leader that performs research and development, innovates and delivers creative solutions in support of the Canadian forest sector's global competitiveness, for every area of the sector's value chain, - from forest operations to consumer and industrial products. FPInnovations employs a workforce of 550. Its facilities are located across Canada.

Masuko Sangyo

Masuko Sangyo's Supermasscolloider is the ultra-fine friction grinding machine that has two ceramic non-porous grinding stones, and clearance between these two stones can be adjusted freely. The Supermasscolloider can grind cellulose fiber into nano-fibrillated cellulose.

USDA Forest Service

USDA Forest Service is investing in and carrying out a program of research and development on lignocellulosics nanomaterials derived from wood. Lignocellulose is among the world's most abundant renewable materials. Commercially-important nanomaterials produced from wood offer a sustainable source of high-performance, large-volume, and cost-competitive nanomaterials for an array of applications. www.fpl.fs.fed.us.

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2. **Fall Protection** - Provides information on how to reduce fall hazards in the work place.
3. **Defensive Driving** - Driving techniques to keep drivers safe while on the road.
4. **Scaffolding** - Provides trainees with guidelines for safe scaffold erection, from the foundation to the top guardrail.
5. **Hazard Communication** - A comprehensive look at OSHA's Hazard Communication Standard.
6. **Electrical Safe Work Practices** - Provides workers awareness training that will assist them in working safely around energized electrical currents.
7. **Confined Space (Awareness)** - Gives trainees a basic understanding of confined space hazards.
8. **Respiratory Protection** - General requirements of OSHA's Respiratory Protection Standard.
9. **Lockout/Tagout** - Identifies safe work practices that are required for all employers in General Industry.
10. **Fire Extinguisher Basics** - Course provides information on how to select the most appropriate type of portable fire extinguisher.
11. **Back Safety** - Course provides training on back safety alternatives to lifting, carry and placing load and how to maintain a healthy back.
12. **Personal Protective Equipment** - OSHA's standards regarding Personal Protective Equipment.
13. **Fire Safety** - Basic information about how fires start and how to prevent and extinguish various types of fires.
14. **Bloodborne Pathogens** - Provides information on OSHA's Bloodborne Pathogen Standard.
15. **Hydrogen Sulfide** - Provides basic information about the characteristics and hazards of Hydrogen Sulfide and how to work safely around Hydrogen Sulfide.
16. **Forklift Safety** - Safety Awareness Fundamentals.
17. **Ergonomics** - Provides information on Ergonomics, work-related musculoskeletal problems and work-related musculoskeletal disorders.
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19. **Hand and Power Tools** - Provides training on General Tool Safety.
20. **Slips, trips, and Falls** - Provides general safety information to help prevent the occurrences of slips, trips, and falls in the workplace.

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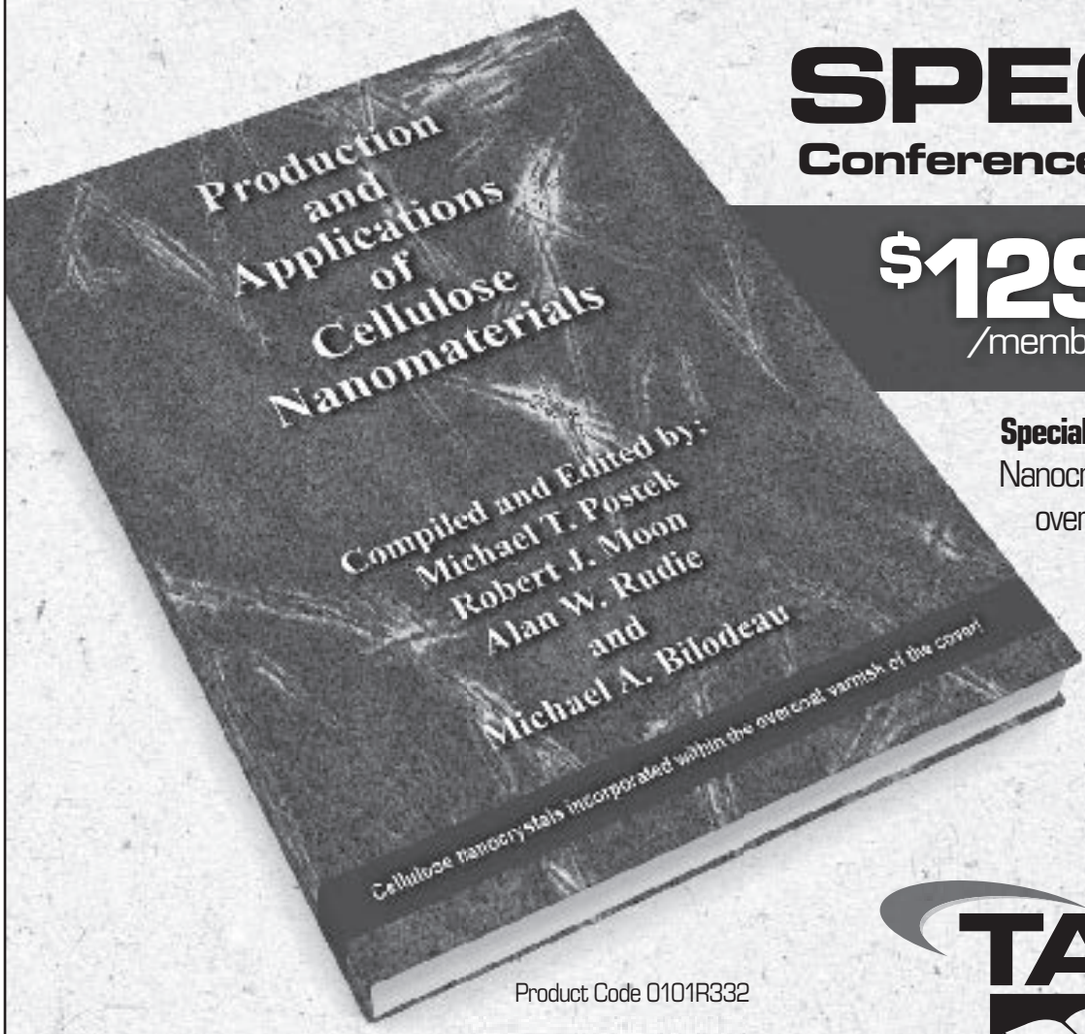

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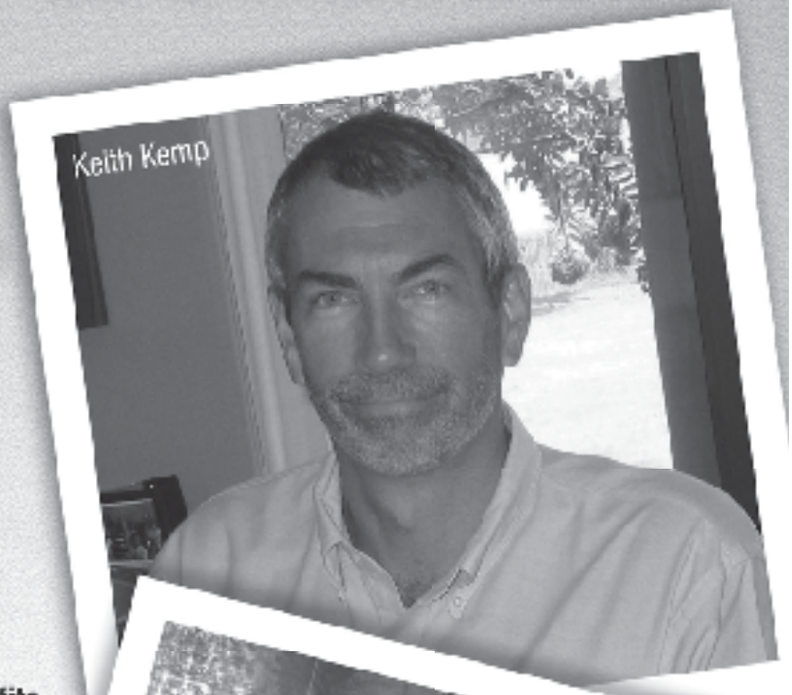

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TAPPI

About TAPPI

TAPPI is the leading association for the worldwide pulp, paper, packaging, and converting industries and co-publisher of Paper360°. Through information exchange, trusted content, and networking opportunities, TAPPI helps members elevate their performance by providing solutions that lead to better, faster, and more cost effective ways of doing business.

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… is to make a significant positive difference in the professional lives of our members.

Antitrust Policy Statement

TAPPI is a professional and scientific association organized to further the application of science, engineering, and technology in the pulp and paper, packaging and converting, and allied industries. Its aim is to promote research and education, and to arrange for the collection, dissemination and interchange of technical concepts and information in fields of interest to its members. TAPPI is not intended to, and may not, play any role in the competitive decisions of its members or their employers, or in any way restrict competition among companies.

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GENERAL INFORMATION

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Attendees with special needs are encouraged to contact the staff at the TAPPI Registration Desk so TAPPI can make your participation more enjoyable and meaningful.

Badges
It is important that the official badge supplied at the time of registration be worn at all times. This practice is a courtesy to your fellow registrants. It also indicates that you have completed registration and may participate in the events scheduled. Admission to technical sessions and workshops will be by badge only.

Information Desk, Message Center and Employment Board
A bulletin board is available to post positions available and resumes. Notices of telephone calls, messages, special meetings or meeting time changes can also be posted.

Hosted Events not sponsored by TAPPI
All company hosted events (customer meetings, social events, etc.) that are not officially a part of TAPPI's program may not conduct group functions which compete with scheduled TAPPI activities, such as technical sessions, committee meetings, receptions, award ceremonies, group meals and trade fairs or exhibits.

If you are planning to host a group event, please check with the TAPPI Account Manager to avoid conflict.

TAPPI's Policy Regarding Equipment at Non-Exhibit Events
TAPPI prohibits the unauthorized physical display or demonstration of equipment in sessions, workshops, or committee meetings held during TAPPI seminars, short courses, conferences, or other meetings unless approved by the TAPPI Account Manager. This prohibition does not preclude the graphic non-commercial depiction of equipment via slides, pictures, or video tape. This prohibition is intended to preclude commercialism and to minimize attendee exposure to potentially dangerous equipment and to avoid conflicts with contractual and governmental requirements regarding the use of meeting facilities. All inquiries should be directed through the TAPPI Account Manager on-site.

Lost and Found
Articles which are found should be brought to the Registration Area. Please note the room in which the article was found for the purpose of tracing it to the appropriate owner.

Membership and Publication Information
TAPPI membership dues, membership applications (TAPPI and committee), and requests for TAPPI publications may be obtained at the registration.

Nonmembers of TAPPI
If you apply for membership in TAPPI while at this meeting, you will be able to register at the member rate. Take advantage of this opportunity to join TAPPI and save money.

Photographic Consent
Photographs may be taken during this meeting for TAPPI to use for publicity purposes. A registrant's presence at the meeting constitutes consent for TAPPI to use the photographs in which he or she may appear.

Registration is Open
Monday 23 June 08:00-19:30
Tuesday 24 June 07:00-19:30
Wednesday 25 June 07:00-17:30
Thursday 26 June 07:00-12:00

Ribbons
Association, technical division, and committee officers are requested to pick up their ribbons at the registration desk. Session chairmen and speaker ribbons will also be available at the registration desk.

Tax Deduction for Educational Expenses
U. S. Treasury regulation paragraph 1.162.5 permits an income tax deduction for educational expenses (registration fees and cost of travel, meals, and lodging) undertaken to: (1) maintain or improve skills required in one's employment or other trade or business, or (2) meet express requirements of an employer or a law imposed as condition to retention of employment, job status, or rate of compensation. Under the Tax Reform Act of 1993, however, non-reimbursed employment-related educational expenses are deductible only to the extent that they exceed 2% of adjusted gross income. In addition, the new tax law limits the deduction for otherwise allowable business meals and business entertainment to 50% of cost.

Use of Personal Video Recording Equipment at Technical Sessions
The use of personal recording equipment to record technical sessions at TAPPI conferences is strictly prohibited. Only TAPPI's official designee is authorized to video tape sessions. Should a company and/or individual seek to violate this prohibition, that company and individual will be barred from giving technical presentations at TAPPI sponsored events for a period of two years, that period starting from the date of infraction. TAPPI staff is authorized to have equipment in violation of this policy immediately removed upon detection and shipped to the owner's principle location at the owner's expense. Inquiries on this policy should be directed to the TAPPI Meetings Department, c/o TAPPI headquarters.

SAFETY INFORMATION

Fire Survival

When you reach your hotel room, ask yourself: Can I close my eyes, hold my breath, and go directly to the nearest fire exit WITHOUT LOOKING in 15 seconds?
You may have to do just that:

- Under emergency conditions
- In smoke
- In darkness
- At 3:00 a.m.

Because panic is the main problem in unfamiliar surroundings, you should prepare for emergencies when you travel. The following information is provided to help you prepare for a hotel fire emergency. Remember that by-products of fire (gases, smoke, etc.) kill more people than fire itself.

Survival Plans

- Familiarize yourself with your new surroundings by checking the emergency exit and escape routes.
- Ensure that doors are unlocked and exit routes are free of obstructions.
- Study the room you are staying in (do the windows open, what is the distance to the ground, etc.).
- Avoid elevators in emergency situations.
- Count the number of doors and walls between your room and the emergency exits. Smoke could obscure lighted signs.

Before and After Leaving the Room

- When an alarm sounds, slowly feel the surrounding walls and doors with the back of your hand. If the door is warm, stay as low as possible (to avoid smoke) and open it slowly. If the door and walls are not warm, proceed toward the emergency exit using the most direct route. If the smoke is too heavy, remain in the room.
- Take the key with you. You might find it safer to return to your room.
- If the smoke thickens as you go down the escape stairs, go up one flight and cross over to an alternate staircase.
- If access to the alternate staircase is blocked, proceed to your room and wait for assistance.
- Avoid breaking windows. Broken windows can allow fire and smoke into the room. If a window must be broken or opened, dangle a bed sheet from the window as a signal to firemen. Don't jump if the fall is more than two stories.

If You Cannot Leave the Room

- Place towels and bedclothes around the door areas. Keep them soaked with water.
- Fill the bathtub and use it as a reservoir for wetting down the entire room. Placing yourself in a filled tub will not offer protection.
- Hold a wet towel around your face to filter smoke.
- Dial the hotel emergency number (0) to tell rescue personnel where you are.

NOTE: After any emergency, contact your home and office so all can be assured of your safety.

GENERAL SAFETY TIPS

To make your conference experience a safe and enjoyable one, please keep the following safety tips in mind. While you are out of the hotel, please know that, like in all cities, awareness and caution are certain to help ensure your safety. A common crime is pick pocketing, with women's purses being the prime target. Some simple precautions you can take are:

- Never carry all of your valuables in the same place. Keep them secured in a safe deposit box.
- Never walk alone at night, especially to off property locations; there really is safety in numbers!
- Do not leave purses, briefcases or other personal property unattended in public locations. Use hotel services such as a coat check or luggage storage.
- Remove your name badge while out of the hotel. They identify you as an out-of-towner and easy target for crime.
- Women: carry your purse with the strap over your shoulder and across your chest, keeping it closed or latched with the bag portion in front of you. For added protection in crowds, you can rest your hand on top. Be particularly watchful of distractions in revolving doors, elevators or in the public.
- Men: Wrap a heavy rubber band around your wallet to prevent it from being easily slipped out of your pocket or carry it in your front pants pocket.
- If you find that you have become a victim, report the crime to the police.
- Report any suspicious persons or behavior in the hotel or convention center to the registration desk or any TAPPI staff.

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