2013 TAPPI INTERNATIONAL CONFERENCE

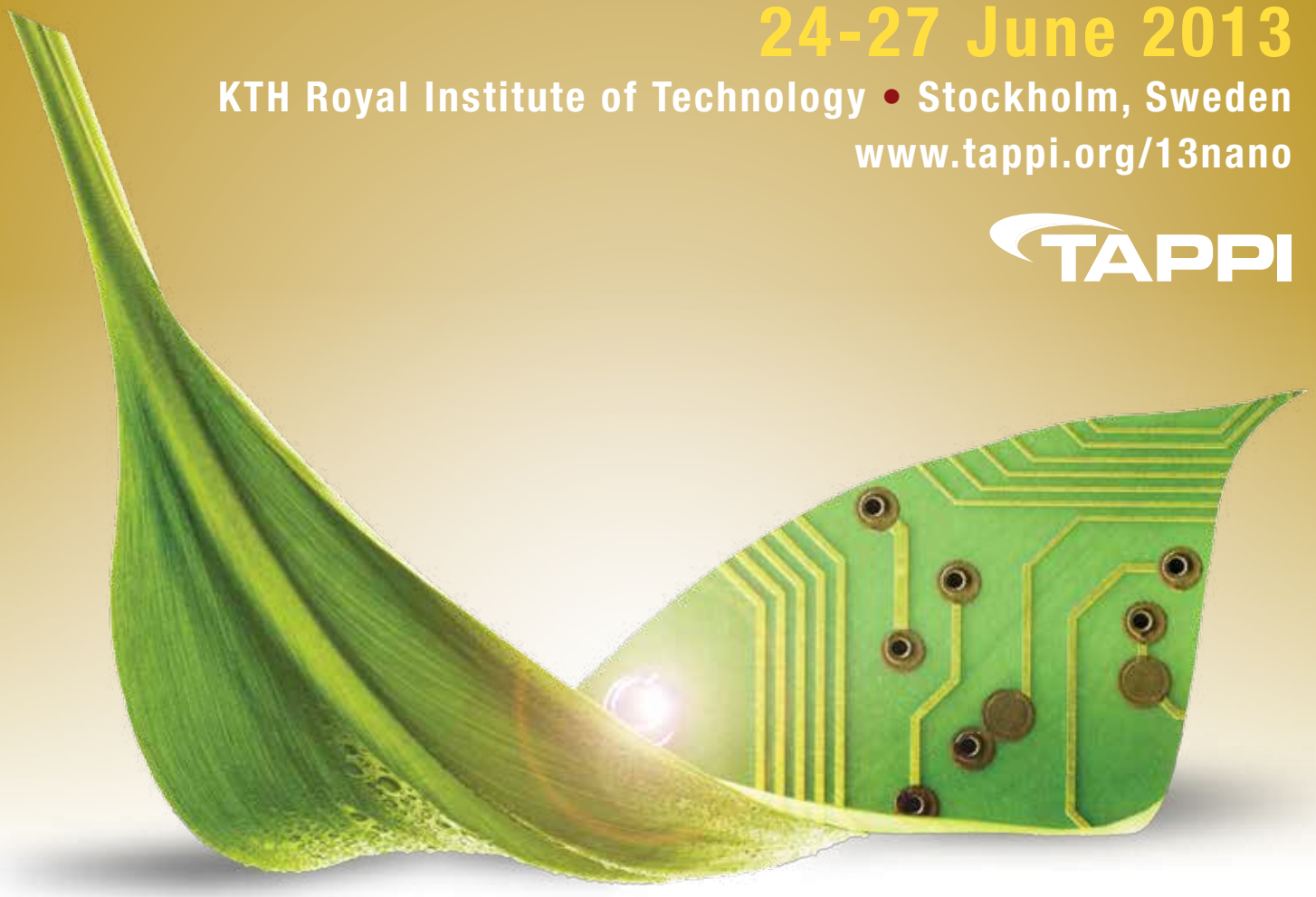
On Nanotechnology for Renewable Materials

24-27 June 2013

KTH Royal Institute of Technology • Stockholm, Sweden

www.tappi.org/13nano

TAPPI



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TAPPI International NANOtechnology Division

CONTENTS

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American Elements is the world leader in commercializing developments in materials science. Expertise in ultra high purity renewable materials, nanoparticles, nanopowder, nanotubes, nanofluid, nanowires and ultra-fine submicron powders allows us to meet the needs of a wide variety of industry groups, including energy, aerospace , optics, automotive, military and pharma/cosmetics. www.americanelements.com

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The Institute of Paper Science and Technology (IPST)

The Institute of Paper Science and Technology (IPST) at Georgia Tech enables forest biomaterials business growth through innovation. It provides solutions to strategic, economic, scientific, and technical challenges facing the forest products industries. Its three strategic initiatives are new products (chemicals and nanomaterials) from forest biomass; bio-refining; and operational excellence including new pulp and paper products.

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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Dear Colleagues,

Welcome to Stockholm and to TAPPI's 2013 International Conference on Nanotechnology for Renewable Materials! We would like to thank you for joining us on the campus of the Royal Institute of Technology over 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 worked so diligently to develop the excellent program. We also extend our appreciation to this year's sponsors, and Innventia, the Wallenberg Wood Science Center, and the Fiber and Polymer Department at KTH for opening their doors to attendees to see their facilities.

The theme for this year's program – **Sustainable Solutions for Tomorrow's Bioeconomy** – was selected to highlight the many new products emerging through the use of renewable nanomaterials. With five keynote presentations and an address by this year's winner of the Marcus Wallenberg Prize at the conference dinner in the Vasa Museum, over 80 technical presentations, a session featuring 50 posters including the annual Student Poster Competition sponsored by Verso Corp., there is much to see and learn about during your time at the conference.

We hope that you take advantage of the many networking opportunities during breaks, the poster session, and receptions. The co-chairs welcome your comments on the evolution of this conference which endeavors to keep stride with the rapidly evolving field of nanotechnology and renewable materials.

This is the time of year when Swedes celebrate the arrival of summer in all its glory, and we hope you will enjoy the ambiance in Scandinavia's cultural capital as well as the riveting program!

Conference Co-Chairs:

Ulla Forsstrom
Principal Scientist
VTT Technical Research Centre of Finland

Phil Jones
Director New Ventures, and Disruptive Technologies
Imerys

Professor Bruce Lyne
Royal Institute of Technology

Keynote Speakers

Tuesday, 25 June, 8:00 am

David Lazarevic, is a researcher at the Division of Environmental Strategies Research and the Division of Industrial Ecology at the Royal Institute of Technology (KTH) in Stockholm, Sweden. He holds a PhD in Industrial Ecology from the Royal Institute of Technology (KTH), and a PhD in Sustainable Development from the University of Technology of Troyes. His main areas of research focus on the legitimacy of processes in order to increase the efficiency of social coordination, and the use of environmental systems analysis tools, such as Life Cycle Assessment, in environmental controversies. He has recently completed a study on the environmental aspects of nanomaterials in a life cycle perspective as part of a Swedish Governmental Commission to develop a *National action plan for the safe use and handling of nanomaterials.*

Tuesday, 25 June 2013, 12:45 pm

Dr. Arthur Carty, is the Executive Director of the Waterloo Institute for Nanotechnology at the University of Waterloo, Special Advisor to the President on international science and technology collaboration and Research Professor in the Department of Chemistry. From 2004-2008, he served as Canada's first National Science Advisor to the Prime Minister and to the Government of Canada.Prior to his appointment as National Science Advisor, he was President of the National Research Council Canada (NRC), Canada's National Laboratory, for ten years (1994-2004). Dr. Carty has a PhD in inorganic chemistry from the University of Nottingham. Before joining NRC in 1994, he spent two years at Memorial University and then 27 years at the University of Waterloo where he was successively Professor of Chemistry, Director of the Guelph-Waterloo Centre for Graduate Work in Chemistry, a pioneering joint graduate program, Chair of the Department of Chemistry for two terms and Dean of Research.

Wednesday, 26 June, 8:00 am

Katja Salmenkivi is Principal, Head of Chemicals and Bio-based materials for Poyry Management Consulting. Her areas of specialty cover chemicals, bio-based materials (e.g. polymers, nanocellulose), pulp and paper, new technology and business development, Salmenkivi has significa nt experiences in advising in new technology, market analysis, strategic planning and techno-economic feasibility analysis. She holds a MSc from Åbo Akademi University, in Chemical engineering.

Wednesday, 26 June,12:45 pm

Martha Marrapese joined Keller and Heckman in 1992. Ms. Marrapese focuses on emerging technologies in the industrial chemicals, alternative energy, antimicrobial pesticides, and food packaging sectors. Ms. Marrapese facilitates the registration of new technologies in the global economy with a particular emphasis on biotechnology and nanotechnology applications. Ms. Marrapese has an expertise in the Toxic Substances Control Act (TSCA) and its counterparts in Canada, the European Union, and China. She provides legal counsel related to EPA, FDA, and associated regulatory needs for production organisms and additives in emerging alternative energy applications, including yeast, algae and bacteria platforms.

Thursday, 22 June, 8:00 am

Dr Jukka Heikki Ahtiainen is a senior research scientist at the Finnish Safety and Chemicals Agency (Tukes) which is the main Competent Authority for Chemicals Safety covering REACH and CLP, biocides, and pesticides. He is a specialist in (eco) toxicology and environmental fate of chemicals and has been National Coordinator of the OECD test guidelines for chemicals and EU Test Method Regulation since 1995. He has been an external expert for developing the opinion on nanomaterial safety 2009 in EU Commission's Scientific Committee of Emerging and Newly Identified Health Risks (SCENIHR). He is also Head of delegation to the OECD WPMN on nanomaterial safety, and there a member of SG3, SG4 (the section lead on environmental fate) and SG6 for risk assessment. He is participating in EU competent authority group for REACH and CLP (CARACAL) subgroup nano and in the ECHA WG on nanomaterials and currently acting as National Coordinator in EU NANoREG research project.

TECHNICAL PROGRAM

(Subject to Change. To view the most current program schedule go www.tappi.org/13nano)

Monday, 24 June 2013

18:00 – 18:30 Sing-Sing, Lindstedtsvägen 30, KTH Campus
Session a: Speaker/Session Chair Meeting Reception

18:30 – 19:30 Sing-Sing, Lindstedtsvägen 30, KTH Campus
Session b: Welcome Reception

Tuesday, 25 June 2013

F1/F2 Conference Rooms, Lindstedtsvägen 22, KTH Campus

8:00 – 8:45

Session 1: Welcome & Keynote Presentation

- Welcome & Introductions: Conference Chairs
- Keynote Speaker: **David Lazarevic,** *Division of Environmental Strategies Research and the Division of Industrial Ecology, KTH,* **"Life Cycle Considerations of Nanomaterials: Possibilities for Evaluating the Environmental Impact Renewable Nanomaterials"**

Session Chair: **Bruce Lyne,** Royal Institute of Technology

9:00 – 10:30 F1

Session 2: CN Processing

Session Chair: Alan Rudie, US Forest Products Laboratory

- High CNC Yield with Zero Cellulose Loss: Recovering Cellulosic Solid Residue (CSR) from CNC Production Waste Stream to Produce Strong and Optically Transparent Film, ***Junyong Zhu,*** US Forest Products Laboratory
- Energy Efficient Manufacture of Microfibrillated Cellulose by Attachment of Carboxymethyl Cellulose, ***Mikael Ankerfors,*** Innventia AB
- Correlations Between Pulp Composition and Efficiency of M/NFC Production, ***Sandra Tapin-Lingua,*** FCBA
- Water Redispersable Dried Nanofibrillated Cellulose, ***Julien Bras,*** *Grenoble INP Pagora - LGP2 (FSCN)*

9:00 – 10:30 F2

Session 3: Self and Directed Assembly of Nanocellulose

Session Chair: Eero Konturri, Aalto University

- Tailoring of Supramolecular Iinteractions in Nanocellulose Systems for New Functions, ***Olli Ikkala,*** *Aalto University*
- Nanoparticles and Nanostructures from Direct- and Self-Assembly of Components Cleaved from Fiber Cell Walls, ***Orlando Rojas,*** *North Carolina State & Aalto University*
- Pattern Production in Iridescent Cellulose Nanocrystal Films, ***Stephanie Beck,*** *FPInnovations*
- 2-Dimensional Nanoscale Structures from Cellulosic Materials, ***Eero Kontturi,*** *Aalto University*

10:30 – 11:00 BREAK

11:00 – 12:30 F1

Session 4: CNC Composite Processing

Session Chair: Hamdy Kahlil, Woodbridge Group

- Fabrication of Polyolefin / Nanocrystalline Cellulose Composites by Conventional Extrusion and by Water-Assisted Extrusion, ***Karen Stoeffler***, *National Research Council Canada*
- Synthesis and Characterization of NCC-Reinforced Polyacrylamide Nanocomposite Hydrogels, ***Wadood Hamad***, *CelluForce*
- Cellulose Nanocrystal Reinforced Cementitious Materials- ***Jeffrey P. Youngblood***, *Purdue University*
- Nano Crystalline Cellulose Composite Foams From Renewable Resources, ***Shaul Lapidot***, *Melodea Ltd.*

11:00 – 12:30 F2

Session 5: Surface Modification and Responsive Materials

Session Chair: Ted Wegner, US Forest Products Laboratory

- Surface Assembly of Chemically Reactive Polysaccharides on Nanocellulose, ***Janne Laine,*** Aalto University
- Surface Modified Cellulose Nanocrystals for Use as in Durable Good Applications, ***Dylan Boday,*** IBM Materials Engineering
- Responsive Cellulose Nanocrystals: A One-Step, Water-Based Polymerization Method, ***Emily Cranston,*** McMaster University
- Towards a Green Chemistry for Surface Functionalization of Cellulose Nanocrystals: the Case of Aroma Grafting Compounds, ***Etzael Espino Perez,*** Grenoble INP Pagora-PGP2 (FSCN)

12:45 – 13:45 Lunch in Student Union (kårhuset)

Session 6: Keynote Presentation

Keynote Speaker: **Arthur Carty,** *Executive Director & Research Professor in the Department of Chemistry, Waterloo Institute for Nanotechnology, University of Waterloo, and Special Advisor to the President on International. Science and Technology Collaboration,* **"Small World, Large Impact: Driving a Materials Revolution through Nanotechnology"**

Session Chair: **Robert Moon,** US Forest Products Laboratory

14:00 – 15:30 F1

Session 7: CNF Composite Processing
Session Chair: Alain Dufresne, Grenoble Institute of Technology

- Membranes from Renewable Resources for Water-Purification, ***Andreas Mautner,*** Imperial College London
- Super-Strong Soy Protein/Nanocellulose Composite Aerogels, ***Julio Arboleda***, North Carolina State University
- Hemicellulose Acetates as Matrix/Binder for Nanofibrillated Cellulose Reinforced Composites, ***Agnes Stepan,*** Chalmers University of Technology
- Hydrophobic Nanofibrillated Cellulose-Based Nanopaper Through a Mild Chemical Functionalization Approach, ***Houssine Sehaqui,*** *EMPA*

14:00 – 15:30 F2

Session 8: Nanocellulose-Organic/Inorganic Hybrids
Session Chair: Orlando Rojas, University of Freiburg

- Magnetic Cellulose Nanocrystal Hybrid, ***Tiina Nypelö***, *North Carolina State University*
- ZnO-Bacterial Cellulose Nanocrystal Composite and its Potential as Energy Harvesting Material, ***Levente Csoka***, *University of West Hungary*
- Atomic Layer Deposition on Cellulose Nanocrystal Aerogels, ***John Simonsen***, *Oregon State University*
- Self-Assembly of Cellulose Fibrils/SiO2 Nanoparticles During Synthesis by Gluconacetobacter Bacteria- ***Cristina Isabel Castro Herazo***, *Pontificia Bolivariana University*

15:30 – 16:00 BREAK

16:00 – 17:30 F1

Session 9: CN Composite Interfaces
Session Chair: Wadood Hamad, CelluForce

- Interface/Interphase Measurements of Cellulose Nanofiber-Based Nanocomposites, ***Jeffrey Gilman,*** *NIST*
- Structure Properties and Interface in Polystyrene Nanocomposites Based on Cellulose Nanocrystals with Physical and Chemical Modifications from Non-Covalent and Covalent PEG Compatibilization, ***Ning Lin,*** *Grenoble Institute of Technology (Grenoble INP)-Pagora*
- Development of Pigmented Composites on the Basis of Nano- and Micro-Fibrillate d Cellulose, ***Michel Schenker,*** *Omya Development AG*
- Utilising the Potential of Bacterial Cellulose in Composite Materials, ***Koon-Yang Lee,*** *Imperial College London*

16:00 – 17:30 F2

Session 10: Assembly in Suspension and Rheology
Session Chair: Yaman Boluk, University of Alberta

- The Rheological Properties Nanofibrillated Cellulose at Moderate Solids, ***Douglas Bousfield,*** *University of Maine*
- Nanofibrillar Cellulose - The link Between Rheology and Stabilising Effect, ***Antti Laukkanen,*** *UPM Corporation*
- Rheological Properties of Suspensions of Nanocrystalline Cellulose in Polymer Solutions, ***Liyan Zhao,*** *Alberta Innovates Technology Futures*
- Hybrid Polymer-Nanocrystalline Cellulose (NCC) Suspensions as Smart Materials-***Yaman Boluk,*** *University of Alberta*

17:30 – 19:30 Sing-Sing, Lindstedtsvägen 30, KTH Campus
Session 11: Conference Reception, Poster Session and Exhibitor Displays
Session chair: Martti Toivakka, Abo Alkademi University
Over 40 posters will be presented at the Conference. Please see full listing on page 13

Wednesday, 26 June 2013
F1/F2 Conference Rooms, Lindstedtsvägen 22, KTH Campus

8:00 – 8:45 F1
Session 12: Keynote Presentation
Keynote Speaker: **Katja Salmenkivi,** *Pöyry Management Consulting,*
"Towards High-Value Applications of Nanocellulose: A Player and Patent Landscape Approach"
Session Chair: Ulla Forsstrom, VTT Technical Research Centre of Finland

9:00 – 10:30 F1
Session 13: CNF Processing for Paper Webs
Session Chair: Jouni Paltakari, Aalto University
- Processability of Nanocelluloses, ***Ari Jäsberg,*** *VTT Technical Research Centre of Finland*
- Potential of Micro Fibrillar Cellulose in Water-Laid and Foam-Laid Papers, ***Jani Lehmonen,*** *VTT Technical Research Centre of Finland*
- Structural Change in Nanofibrillated Cellulose Mat by Grinding, Dewatering, and Drying Conditions, ***Kyujeong Sim,*** *Seoul National University*
- Production of fibrillar cellulose membranes and films with a continuous process, ***Marko Bessonoff***, *Aalto University*

9:00 – 10:30 F2
Session 14: CN Composites
Session Chair: Johan Foster, University of Fribourg
- Thermal Behavior of Cellulose Nanocrystal Films, ***Jeffrey Youngblood,*** *Purdue University*
- Effect of Temperature and Humidity on Mechanical Properties of Cellulose Nano-Crystals Films, ***Siqun Wang,*** *University of Tennessee*
- Thermo-Sensitive Ultrathin Nanocomposite Films Manufactured with Cellulose Nanowhiskers and Maleic Anhydride Plasma Polymerization, ***Michel Brioude,*** *University of Freiburg*
- Biomimetic Nanocomposites Through Self-Assembly of Nanofibrillated Cellulose and Water-Soluble Polysaccharides, ***Monika Österberg,*** *Aalto University*

10:30 – 11:00 BREAK

11:00 – 12:30 F1
Session 15: CNF & Fillers
Session Chair: Sean Ireland, Verso Paper Corp.
- MFC Labelling, Retention and Distribution in Paper, ***Juha Salmela,*** *VTT Technical Research Centre of Finland*
- The Effects of Nanocelluloses on Flocculation and Retention of Papermaking Fillers, ***Markus Korhonen,*** *Aalto University*
- Pre-Flocculation of GCC and Clay onto Nano-/ Microfibrillated Cellulose as Compound to Improve the Strength Properties of Highly Filled Graphical Papers, ***Tiemo Arndt,*** *Papiertechnische Stiftung (Heidenau)*
- Binding Fillers for Paper Applications Using Nanoscale Calcium Silicate Hydrate Coating and Nanofibrillated Cellulose, ***Katariina Torvinen,*** *VTT Technical Research Centre of Finland*

11:00 – 12:30 F2
Session 16: CNF Barrier and Surface Functionalization
Session Chair: Julien Bras, *Grenoble INP Pagora - LGP2 (FSCN)*
- Use of cellulose Microfibrils in the Development of Barrier Materials – Benefits and Challenges, ***Céline Guézénnec,*** *Centre Technique du Papier*
- Green Barrier Coating and Film of Microfibrillated Cellulose (MFC) and Its Composites, ***Yulin Deng,*** *Georgia Institute of Technology*
- Nanocellulose Films and Coatings with Tunable Oxygen and Water Vapor Permeability for Use in Renewable Packaging Solutions, ***Christian Aulin,*** *Innventia AB*
- Surface and Total Charge Density of Functionalized Nanofibrillar Cellulose Dispersions-***Karoliina Junka***, *Aalto University*

12:45 – 13:45 Lunch in Student Union (kårhuset)

Session 17: Keynote Presentation

Keynote Speaker: **Martha Marrapese,** *Keller and Heckman, USA,* **"Key Considerations for Successful Technology Transfer of Nanocellulose"**

Session Chair: World Nieh, US Forest Service

14:00 – 15:30 F1

Session 18: Packaging

Session Chair: Tamal Ghosh, Pepsico Advanced Research

- Nanofibrillated Cellulose/ Layered Silicates Composite Films for Barrier Applications, ***Tanja Zimmermann,*** *EMPA*
- Fungal Chitin – Promising Renewable Nanomaterial for Future, ***Wan Mohd Fazli Wan Nawawi***, *Polymer and Composite Group, Imperial College London*
- Improving THE Barrier Properties of Poly(Lactic Acid) Bottle by APPLYing LbL-technique, ***Katalin Halasz***, *University of West Hungary*
- Cellulose Nano/ microfibrils in packaging board - Based on results from EU SUNPAP project, ***Ulla Forsstrom***, *VTT Technical Research Centre of Finland*

14:00 – 15:30 F2

Session 19: Safety 1

Session Chair: JoAnne Shatkin, Vireo Advisors

- Environmental Health and Safety Studies Associated with the Demonstration Scale Production of NanoCrystalline Cellulose (NCCTM) at the CelluForce plant in Windsor, Quebec, ***Brian O'Connor,*** *FPInnovations*
- Amount, Characteristics and Toxicity of Nano-Scale Cellulose Fibrils, ***Heli Kangas,*** *VTT Technical Research Centre of Finland*
- Verifying the Biocompatibility of Cellulose Nanofibril Structures as a First Step to Develop Filters for Air-Borne Nano-Particles, ***Kristin Syverud,*** *Paper and Fibre Research Institute*
- Biodistribution of Poly (Lactic-Co-Glycolic) Acid (PLGA) and PLGA/Chitosan Nanoparticles in F344 Rats Orally Exposed to Nanoparticles for Seven Days, ***Cristina Sabliov,*** *Louisiana State University and LSU AgCenter*

15:30 – 16:00 BREAK

16:00 – 17:30 F1

Session 20: CN Modeling

Session Co-Chairs: Stan Stoyanov and Andriy Kovalenka, National Institute of Nanotechnology

- Molecular Mechanisms of the Axial Stiffness of Cellulose Nanocrystals, ***Malin Wohlert,*** *Wallenberg Wood Science Center*
- Multiscale Modeling for Rational Design of Nanocrystalline Cellulose Based Nanocomposites, Foams, Drug Carriers, and Security Inks, ***Andriy Kovalenko,*** *National Institute for Nanotechnology*
- Multiscale Modeling of Solvation Structure and Thermodynamics of Cellulose Nanocrystals in Solution: Dispersion, Functionalization, ***Sergey Gusarov,*** *National Institute for Nanotechnology*
- Micro-Rheology of Nanocellulose Suspensions with Smoothed Particle Hydrodynamics Simulation, ***Jukka Ketoja,*** *VTT Technical Research Centre of Finland*

16:00 – 17:30 F2

Session 21: Safety 2

Session Chair: Brian O´Connor, FPInnovations

- Consumer, Health and Safety perspectives: Recent results related to nanofibrillar cellulose, ***Juulia Rouhiainen,*** *Poyry Management Consulting Oy*
- Different products – common concerns? Negotiating nanosafety, ***Petrus Kautto,*** *Finnish Environment Institute*
- Sustainability Assessment of Nanocellulose and Its Applications: A Critical Review and a Proposal of an Integrated Methodology, ***Marco Cinelli,*** *University of Warwick*
- Incorporating Life Cycle Thinking into Risk Assessment for Nanoscale Materials: Case Study of Nanocellulose, ***Jo Anne Shatkin,*** *Vireo Advisors*

18:30 – 22:00

Session 22: Conference Dinner at the Vasa Museum, Special Guest Speaker, Professor Derek Gray of McGill University, Montreal Canada and 2013 Marcus Wallenberg Prize Winner

Thursday, 27 June 2013

F1/F2 Conference Rooms, Lindstedtsvägen 22, KTH Campus

8:00 – 8:45 F1

Session 23: Keynote Presentation

Keynote Speaker: **Jukka Ahtiainen**, *Turvallisuus- ja kemikaalivirasto (TUKES),* **Regulatory tools to ensure safety of nanomaterials**
Session Chair: ***Juulia Rouhiainen***, Poyry Management Consulting Oy

9:00 – 10:30 F1

Session 24: Nanotech Coatings 1

Session Chair: Pia Qvintas, VTT

- Functional Thin Coatings for Paper by Foam Coating, ***Karita Kinnunen,*** *VTT Tech University of Centre Finland*
- Roll-to-Roll Atomic Layer Deposition for Flexible Substrates, ***Kimmo Lahtinen,*** *Lappeenranta University of Technology*
- The Properties of Paper Coating Layers That Contain Nanofibrillated Cellulose, ***Douglas Bousfield,*** *University of Maine*
- Meeting the Challenge of Replacing High Cost White Top Liner: Designing the High Bright Nanotechnology Solution, ***Catherine Ridgway,*** *Omya Development AG*

9:00 – 10:30 F2

Session 25: Novel Medical Applications

Session Chair: Orlando Rojas, North Caroline State University & Aalto University

- Surface Functionalized Nanofibrillar Cellulose (NFC) Film as a Platform for Immunoassays and Diagnostics, ***Ilari Filpponen,*** *Aalto University*
- Influence of chemical grafting of NFC on antibacterial activity – ***Seema Saini,*** *Grenoble INP Pagora*
- Nanocellulose and its potential use in pharmaceutical applications – ***David Plackett,*** *Faculty of Pharmaceutical Sciences The University of British Columbia*
- Nanofibrillated Cellulose as Carrier for Short Peptides Assemblies for Human IgG Detection and Affinity Separation, ***Orlando Rojas,*** *North Carolina State University*

10:30 – 11:00 BREAK

11:00 – 12:30 F1

Session 26: Nanotech Coatings 2

Session Chair: Doug Bousfield, University of Maine

- Multifunctional Nanoparticle Coatings on Cellulose Based Substrates Using Liquid Flame Spray (LFS) Technique, ***Mikko Tuominen,*** *Tampere University of Technology*
- Wear Resistance of LFS-Nanoparticle Coated Paper, ***Milena Stepien,*** *Abo Akademi University*
- Cellulose Nanofibers: A Suitable Additive to Improve the Performance of Wood Coatings? ***Stefan Veigel,*** *University of Natural Resources and Life Sciences*
- TBA

11:00 – 12:30 F2

Session 27: Standards Characterization

Session Chair: Emily Cranston, McMaster University

- Viscosity Measurement – A Valuable Tool for Routine Quality Control of Fibril Cellulose, ***Asko Sneck,*** *VTT Technical Research Centre of Finland*
- Fractional Analysis and Characterization of Microfibrillated Cellulose, ***Ossi Laitinen,*** *University of Oulu*
- Surface Ionic Charge on Cellulose Nanocrystals, ***Derek Gray,*** *McGill University, Department of Chemistry*
- Surface Modification of Cellulose Nanowhiskers, ***Wim Thielemans,*** *University of Nottingham*

12:45 – 13:45 Lunch On Own

14:00 – 16:00 F2

Session 28: INSCC Meeting & Working Groups

TAPPI's International Nanotechnology Standards Coordination Committee (INSCC) mission is to establish a suite of nanocellulose international standards through a coordinated effort by stakeholders and standards-developing organizations nationally and internationally.

<table>
<tr><td>14:00-14:05</td><td colspan="2">Welcome, Meeting Goals
INSCC Co-Chairs: Dave Ensor, RTI; World Nieh, US Forest Service</td></tr>
<tr><td>14:05-14:15</td><td colspan="2">Roadmap Update
INSCC Co-Chair: World Nieh, US Forest Service</td></tr>
<tr><td>14:15-15:45</td><td>Terminology & Characterization Working Group
Session Lead: Joe Cunningham, Natural Resources Canada

Updates on ISO, TAPPI, and CSA Activities
World Nieh, US Forest Service, Jean Bouchard, FPInnovations, and Clive Willis, CWIC

Strategic Discussions – Facilitating Standards Development
Session Lead: Dave Ensor, RTI</td><td>Environment, Health, & Safety Working Group
Session Lead: Jo Anne Shatkin, Vireo Advisors</td></tr>
<tr><td>15:45-16:00</td><td colspan="2">Roadmap Update & Next Steps
INSCC Co-Chairs: Dave Ensor, RTI; World Nieh, US Forest Service</td></tr>
</table>

14:00 – 16:00 F2

Session 29: Standardization Workshop

Session Chair: **World Nieh,** US Forest Service

16:00 – ADJOURN

16:00 – 17:00 Post-Meeting Steering Committee Meeting

• Review/Critique of 2013 Conference and Planning for 2014–Steering Committee

Thank you to the volunteers for all of your hard work in putting the conference technical program together. We look forward to seeing you at the 2013 TAPPI Nanotechnology Conference!

Conference Co-Chairs:
Ulla Forsström VTT Technical Research Centre of Finland
Bruce Lyne, Royal Institute of Technology
Phil Jones, IMERYS

Theme Leaders:
Robert Moon, USDA Forest Service
Orlando Rojas, North Carolina State & Aalto University
Ulla Forsström, VTT Technical Research Centre of Finland
Martti Toivakka, Abo Akademi University
Juulia Rouhiainen, Poyry Management Consulting Oy
World Nieh, USDA Forest Service

POSTERS

1) Production of Oxygen Scavenging Board Containing Enzymes Coupled to Nanoparticles- ***Kristin Johansson,*** *Karlstad University*

2) Size and Flow Properties Control of Nanofirillated Cellulose from Date Palm Tree by Control TEMPO- Mediated Oxidation Time-***Karima Ben Hamou,*** *International School of Paper, Print Media and Biomaterials*

3) Use of Different Quality of MFC for Producing Controlled Release Films-***Virginie Bigand,*** *Grenoble INP Pagora - LGP2*

4) Current Understanding and Critical Gaps in Environmental, Health and Safety Issues for Nanomaterials- ***Juulia Rouhiainen,*** *Poyry Management Consulting Oy*

5) Reinforcing Nanocellulose Isolated from Banana Rachis and Corn Husk- ***Cristina Isabel Castro Herazo,*** *Pontificia Bolivariana University*

6) AFM Imaging and Analysis of CNF Reinforced Films Under Strain- ***Stefan Pinkl,*** *BOKU Vienna*

7) Comparative Study of Obtaining Cellulose Nanofibers from Curaua Fibers by Enzymatic and Acid Hydrolysis- ***Anand Sanadi,*** *Embrapa Instrumentation*

8) Thermal Properties and Antioxidant Potential Evaluation of Dioxane Lignin Nanoparticles: Matrix Material for Controlled Release of Agrochemicals.- ***Srinivasa Rao Yearla,*** *University of Hyderabad*

9) Mechanical Properties of High Yield Pulp Handsheets, as Affected by Blends of Nano-Ligno Cellulose, ***Sinke Osong,*** *Mid Sweden University, Fibre Science and Communication Network (FSCN)*

10) Swelling Behavior of Wood Pulp Fibres in an Acidic Ionic Liquid (IL)/ Water Systems- ***Jia Mao,*** *University of Freiburg*

11) Optimization of the Production of Cellulose Nanowhiskers from Wood Pulp Fibers by Mean of an Ionic Liquid/ Water System- ***Jia Mao,*** *University of Freiburg*

12) Investigation of Different Post Treatments of Nanocrystalline Cellulose in Order to Obtain Narrowly Dispersed Rods- ***Raphael Bardet,*** *Grenoble INP Pagora - LGP2*

13) Influence of residual Lignin and Specific Surface Area of Nanocellulose Fillers on Urea-Formaldehyde Bonding of Wood- ***Heiko Winter,*** *University of Freiburg*

14) Novel Materials Based on Nanocellulose- ***Marcus Ruda,*** *Cellutech*

15) Organosolv Pulping of Norway Spruce for Nanocellulose Production: Kinetic and Mechanistic Study- ***Hatem Abushammala,*** *University of Freiburg*

16) Chitosan Derivatives Nanoparticles for Removal of Toxic Metal Ions from Industrial Wastewater- ***Julius Ratumo Toeri,*** *University of Freiburg*

17) Antifungal Properties of Copper-Carbon Core-Shell Nanoparticles against Forest Pathogens- ***Yadong Qi,*** *Southern University*

POSTERS

18) Mechanical Properties of NFC Suspension and Wet NFC Sheet-***Ryu Jaeho,*** *Seoul National University, South Korea*

19) Surface Modification of Nanocrystalline Cellulose (NCC) by a Quaternary Ammonium Salt-***Alireza Kaboorani,*** *Universite Laval*

20) Microwave-Assisted Upgrading of Bio-Oil Produced from Renewable Resources Using Nanostructured Zeolite Catalyst- ***Dorin Boldor,*** *LSU and LSU AgCenter*

21) Poly-Flavonoids Derivatives as Potential Sustainable bio-Based Building Blocks- ***Danny E. Garcia-Marrero,*** *University of Freiburg*

22) Rheology of Coating Suspensions and Possibilities for Predicting the Final Dry Structure of Coated Layers-***Yana Petkova,*** *Karlstad University*

23) Processing of Nanocomposites Containing Cellulose Nanocrystals- ***Johan Foster,*** *University of FribourgF*

24) Characteristics of Cellulose Nanocrystals and Their Reinforcement of Polyvinyl Alcohol-Based Nanocomposites-***Byung-Dae Park,*** *Kyungpook National University*

25) New Route for Preparation of Aerogels from Hemicelluloses-***Abdul Ghafar,*** *University of Helsinki*

26) Nanostructured Biocomposite Materials of poly-ε-caprolactone) and High Surface Area Nanopaper-***Assya Boujemaoui,*** *KTH Royal Institute of Technology*

27) Physical Tuning of Cellulose-Polymer Interactions Utilizing Cationic Block Copolymers Based on PCL and Quaternized PDMAEMA- ***Carl Bruce,*** *KTH Royal Institute of Technology*

28) Wood Hydrolysate - Montmorillonite Barriers for Food Packaging Applications Under High Humidity Conditions-***Anas Ibnyaich,*** *KTH Royal Institute of Technology*

29) Geaphene Oxide Loaded Regenerated Cellulose as Dye Adsorbent- ***Chin Hua Chia,*** *National University of Malaysia (UKM)*

30) TEMPO-Oxidized Nanocellulose Participating as Crosslinking Aid for Alginate-Based Sponges- ***Ning Lin, Alain Dufresne,*** *Grenoble Institute of Technology*

31) Supramolecular Hydrogels from in situ Host-Guest Inclusion between Chemically Modified Cellulose Nanocrystals and Cyclodextrin- ***Ning Lin, Alain Dufresne,*** *Grenoble Institute of Technology*

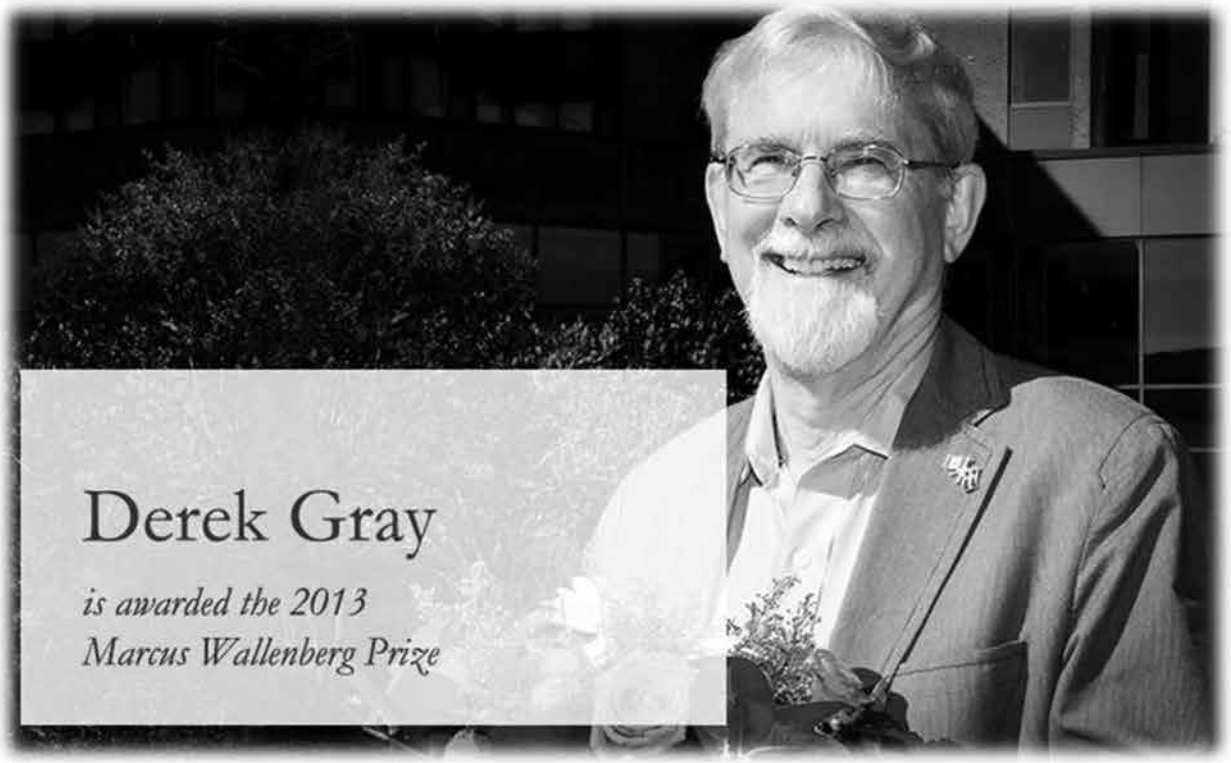
32) Role of Ligno-Hemicellulosic Matrix Composition in Plant Biomass Recalcitrance: Investigation by 3D- RISM-KH Molecular Theory of Solvation- ***Sergey Gusarov,*** *National Institute for Nanotechnology*

33) Cellullostic templates for functional metal oxide production- ***Ahu Gumrah Dumanli,*** *University of Cambridge*

TAPPI International NANOtechnology Division

Would like to congratulate Professor Derek Gray on being awarded the

2013 Marcus Wallenberg Prize



Photographer: Kevin Lamoureux

Professor Derek Gray of McGill University, Montreal, Canada, won for his pioneering study of nanocrystalline cellulose (NCC).

Marcus Wallenberg Prize

The purpose of the Prize is to recognize, encourage and stimulate pathbreaking scientific achievements which contribute significantly to broadening knowledge and to technical development within the fields of importance to forestry and forest industries.

Pre-Conference Tours

Your conference registration also includes a tour of either Innventia AB or the Wallenberg Wood Science Center beginning at 16:00 on Monday 24 June. The tour of the Wallenberg Wood Science Center includes a tour of the KTH Fiber and Polymer Science Department. Space is limited for both tours and pre-registration is required. Tours will end by 18:30 so you can attend the Welcome Reception.

Innventia AB

Innventia is a world-leading research institute that works with innovations based on forest raw materials. Space is limited to 40 participants.

Wallenberg Wood Science Center

Wallenberg Wood Science Center is a research center with a focus on new materials from trees. The mission is to create knowledge and build competence that can form the basis for an innovative future value creation from forest raw material. Space is limited to 40 participants.

Included in your registration, except for single day and student registrations, is an evening at the Vasa Museum. The Gala Dinner will be held on Wednesday, 26 June at 19:00-21:30. Transportation is provided. Buses will pick up outside of the Elite Hotel Arcadia (Körsbärsvägen 1, 114 23 Stockholm) at 18:30. Additional dinner tickets (US $165) are available at the registration desk."

Advance the Responsible and Sustainable Production and Use of Renewable Nanomaterials!

TAPPI's International Nanotechnology Division provides a global forum for the community of individuals, organizations, and institutions interested in:

Advancing Research – Offering forums, networks, and tools to share technical information and research needs to foster collaborations that advance the understanding and use of nanomaterials.

Promoting Nanomaterials – Promote the benefits and applications of renewable and sustainable nanomaterials both within and outside the forest products industry.

Supporting Commercialization – Work to facilitate the development of commercial opportunities by providing forums to discuss applications and the development of standards and other programs to facilitate international trade.

Technical Team: focuses on venues for sharing technical information, including the Annual Conference, Symposiums, courses, plus coordinates interfacing with other associations and societies.

Team Leaders: Robert Moon, USDA Forest Service and Yaman Boluk, University of Alberta

Marketing & Promotions Team: identifies marketing needs and opportunities, plus focuses on industry and campus outreach opportunities to promote the use of renewable and sustainable nanomaterials.

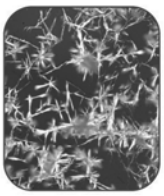
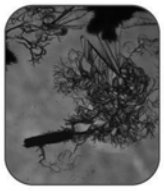
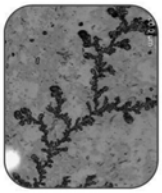
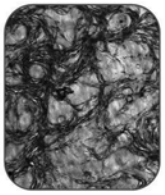
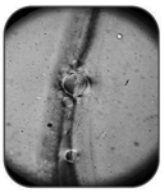
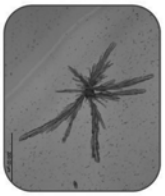
Team Leaders: John Cowie, Cowie & Company and Patrice Mangin, University of Quebec, Trois-Rivières

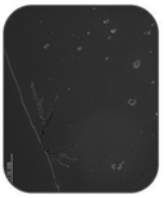
Product Resources & Development Team: identifies needed books and other educational material; coordinates standards development through the International Standards Coordination Committee (INSCC).

Team Leaders: Mike Bilodeau, University of Maine

To learn more or join the Nano Division or one of the Division Teams, email Mary Ann Cauthen, TAPPI Member Group Coordinator, at mcauthen@tappi.org.

USDA Forest Service Forest Products Laboratory's Nanotechnology Program

Wood is a renewable, sustainable, carbon-neutral resource. Innovations in wood-based nano-enabled products have the potential to displace part of America's petroleum-based economy with a more sustainable cellulose-based economy. This revolutionary nano-scale science could transform the forest products industry regarding production of raw materials, new applications for composite and paper products, and new generations of multifunctional wood-based (lignocellulosic) materials.

With interdisciplinary teams of chemists, materials scientists, engineers, and biologists using structural, chemical, and mechanical evaluation techniques, the Forest Products Laboratory (FPL) continues to expand its fundamental research in wood nanotechnology to further extend the nation's timber supply through the wise utilization of its forest resources.

Current Research

- Production of pilot-scale quantities of cellulose nanocrystals and cellulose nanofibrils to support research and development activities nationwide.
- Characterizing cellulose nanoparticles, optimizing cellulose nanocomposite processing, and developing predictive models.
- Development of submicron scale spatially resolved chemical analysis via synchrotron radiation and atomic force microscopy.
- Development of nanoindentation based mechanical spectroscopy to assess time, temperature and moisture dependent mechanical properties of heterogeneous materials.
- Multi-scale modeling of materials from the nanoscale to the macroscale.
- Developing science and technology for product applications and industrial collaborators.
- Developing national and international material and product standards for cellulose nanomaterials and nano-enabled products.

Looking Into the Future

- National Nanotechnology Initiative (NNI)—To better coordinate Federal nanotechnology research and development, the NNI serves as a locus of collaboration under the Nanoscale Science, Engineering and Technology Subcommittee of the National Science and Technology Council. Cellulosic nanomaterials are part of the NNI-Sustainable Manufacturing Signature Initiative.
- Agenda 2020 Technology Alliance—This industry-led partnership with government and academia focuses on invigorating the forest products industry through innovation in processes, materials, and markets.
- Academic Partnerships Coast to Coast—This research coalition, led by the Agenda 2020 Technology Alliance and the USDA Forest Service Forest Products Laboratory, focuses on underlying science to advance nanotechnology in the forest products sector. Other partners include University of Tennessee–Knoxville, North Carolina State University, University of Maine, Pennsylvania State University, Georgia Institute of Technology, Oregon State University, and Purdue University.
- Purdue University–Birck Nanotechnology Center- This partnership builds upon the strengths of the nanotechnology infrastructure and expertise of Purdue University and the wood science expertise of the Forest Products Laboratory. FPL permanently relocated one scientist to the university. Researchers can leverage advances in science and engineering to create innovative programs in cellulose-based nanotechnology, sensor technology, and predictive modeling.

Visit www.fpl.fs.fed.us or follow FSWoodLab on Twitter for more recent FPL news

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- They have an average of 42 years experience.
- They are proven experts in their field.
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TCC
TAPPI CONSULTING COUNC

Learn more about the consulting talent available at
www.tappitcc.org

General Information

ADA Assistance
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 24 June	14:00 – 19:30
Tuesday 25 June	07:00 – 19:30
Wednesday 26 June	07:00 – 17:30
Thursday 27 June	07:00 – 16:00

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.

Important 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.

TAPPI Membership Value

"Share the Pride" in your profession, and in your association, by referring your peers and colleagues to join TAPPI — and you'll receive a free TAPPI PRESS book. Choose from a long list of titles made available for this special program, and take pride in supporting TAPPI's efforts to strengthen and educate our industry.

The Member Referral program is simple. When joining TAPPI online or via printed application, new members will have the option to list the person that referred them to TAPPI. If that person is YOU, we will contact you immediately to find out which free book you select. The book will be shipped to you at no charge.

By joining TAPPI, the person you refer gets the access to networks and access to knowledge that make TAPPI membership so valuable to thousands of industry professionals - and you will receive a special reward as well. So get the word out about joining TAPPI! Your colleagues gain the benefits of TAPPI Membership, and you get another volume for your library.

Visit **www.tappi.org**, go to 'Membership', and then 'Refer a Friend' for complete details.

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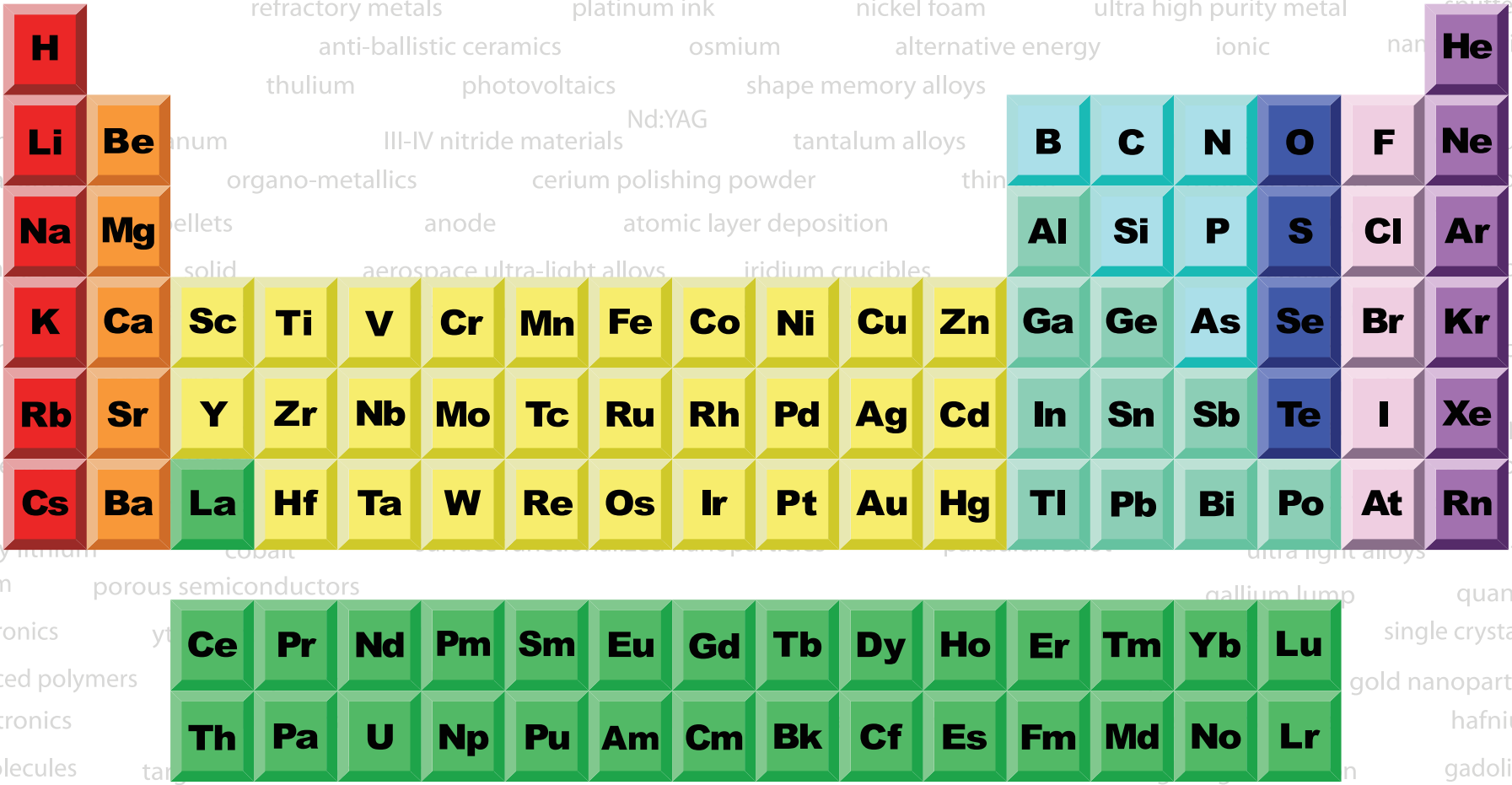

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