

Pulp Digest

June & July 2014



PACWEST Conference



Pulp and Paper Centre, BCIT, and UBC-Okanagan students, researchers, staff and faculty at the 2014 PACWEST Conference

The PACWEST Technical Conference symbolizes the interdependence of those who develop technology in the pulp and paper industry and the many suppliers of related materials and equipment. It provides an opportunity to network with peers, industry leaders and technical experts while enhancing professional development. Through the numerous sessions, short courses, roundtable discussions and the popular trade fair, participants learn about new technologies, process improvement and the latest challenges and successes of the industry. This year's theme was *Improving Mill Results - Keys for Success* and the Pulp and Paper Centre had a large presence with over 20 delegates attending the events in Jasper, AB on May 27-31, 2014.



A. Nikbakht, M. Shanb Ghazani, E. Zaman, Kyle Wells (Session Chair), T. Mithruth, Y. Sharma.
Not pictured: R. Khan.
Photo: Anna Jamroz

already, elevate technologies and applications in the pulp and paper sector? With 20 minutes to present followed by a Q&A, the session was chaired by Kyle Wells of West Fraser.

In an inaugural *UBC Student Presentation Session*, six students and researchers presented their technical papers and presentations to a large audience on the morning of May 30th. Who better to showcase innovative research than the young scholars that will, if haven't

Dr. Ruhul Khan, Visiting Scientist at the Pulp and Paper Centre was first to present his research in hopes of preventing more than 1.3 billion tonnes/yr of food produced for human consumption that is currently going to waste. With a focus on the 2nd largest sector in business, that is, the packaging industry with a \$500B world-wide market, he took the audience through applications of biodegradable packaging material and the direct effects it can have not only on the industry, but also on disease, food poisoning and increasing shelf life.

[ABSTRACT.](#)



Troy Mithruth recently received his Masters in Mechanical Engineering at UBC and presented his cutting edge research. To date, not much is known about what goes on inside the refiner, so the focus of Troy's research will improve the understanding of fluid flow inside LC refiners. With his work, it is the first time that we are able to quantify and visualize the flow of particles in the refiner and establish at least five common particle behaviours. [ABSTRACT.](#)



Abbas Nikbakht is currently a PhD candidate in Mechanical Engineering at UBC with interests in pulp suspension flow, rheology of pulp and micro fibres, turbulent drag reduction and producing micro fibres using the LC refiner. His talk focused on the flow characteristics of wood pulp suspensions in a pipe and the various applications of this important work including the Trans-Alaska pipeline and the flow system of fire-hoses. [ABSTRACT.](#)



PACWEST Conference Cont.



Mohammad Shanb Ghazani is a Graduate Research Assistant at the Pulp and Paper Centre working on a PhD project to make and analyze a continuous particle fractionator device. His talk reviewed the two industrial methods to fractionate particles and fibers: pressure screen and hydrocyclone. However, the continuous device that Mohammad is working on will apply an external force to the particle which is flowing in fluid, and it will then be possible to sort particles based on physical properties. [ABSTRACT](#).



Yash Sharma joined us from UBC Okanagan and presented a very entertaining talk not only due to the topic, but the various video's and 3D images of his work. Yash is a MASc candidate in Mechanical Engineering working on imaging and 3D image analysis of NBSK based paper products. In order to study the effect of the LC refining process on the microstructure and strength of paper, he divided his work into two parts: Imaging and 3D modelling. With his novel technique, he is now able to calculate many properties like bulk, paper diversity, length of fibres, coarseness and fibre contact area, to name just a few. [ABSTRACT](#).



Ehsan Zaman was the session's final presenter. He is currently a PhD candidate in Mechanical Engineering focusing on CFD modelling of flow field and particle separation in hydrocyclones as well as numerical simulation of dewatering process using the Eulerian-Eulerian approach. His objectives are to determine the optimal operation and design parameters for separation of vessel elements and to determine if concentrated vessel element fractions are appropriate feed material for NCC production. He is working on developing a CFD model using single phase Newtonian fluid and studies the motion of spherical particles in the solved flow field. [ABSTRACT](#).



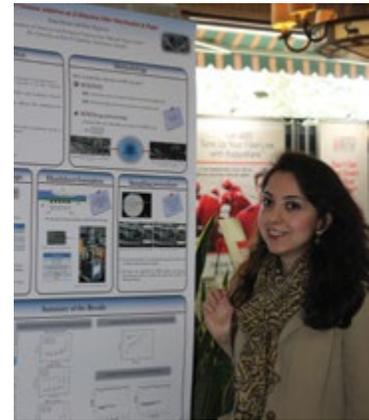
Left: Delegates of the conference were treated to a feature luncheon and keynote speech by Jim Bottomley, Management Consultant. Jim provided insight into future success strategies, how social, economic and demographic trends are shaping the years ahead, and says we are entering a whole new economy - the Age of Innovation.

Along with the six presenters, PPC had an additional three researchers showcase their posters throughout the week.

"Surface distribution of fines in paper" by **Fatehjith Singh**

"Effect of Chemical Additives on Z - Direction Filler Distribution in Paper" by **Sima Motiee**

"Prototype Automated Converter for Creating Complex 3D paper folds (origami)" by **Ata Sina**



Pictured: Sima Motiee
Photo: Anna Jamroz

We invite you to review the [official news coverage](#) of the conference provided by PAPTAC and Paper Advance.

Prior to the start of the conference, the Energy Reduction in Mechanical Pulping program held its Steering Committee meeting. The program is now in its 8th year with funding from Natural Sciences and Engineering Research Council of Canada (NSERC) along with a consortium of 16 industrial partners and a collaboration with four universities (UBC, BCIT, UVic and UofT). The program's goal is to reduce energy and greenhouse gas emissions of one of BC's largest industries by 50 per cent before 2020. Seven principal investigators provided updates on the current status of their projects that are supported by the program, along with various presentations from the industrial partners and post-doctoral research fellow, Yu Sun, on her PhD work "Specific energy reduction of TMP by interstage Ozone treatment combined with selective refining". It was a very successful day full of innovative research and ideas that will surely help the program achieve its goal.

To find out how you can get involved in the program, please contact Professor James Olson at james.olson@ubc.ca

Right: Mechanical Engineering Professor James Olson, Faculty of Applied Science Associate Dean, Research & Industrial Partnerships, provides an update on "Advanced Fractionation and low consistency refining" to the industrial partners of the Energy Reduction in Mechanical Pulping program in Jasper, AB.



The 2nd FIBRE Conference, May 12-15, 2014, kicked off with a *Big Bang* on a sunny morning on the UBC Vancouver campus. More than 120 forest industry students attended the **Student Workshop** where they were asked which character they most identify with on the hit TV show the *Big Bang Theory*. It was an interesting exercise that prompted students to realize that who they are now, will likely change in the next five years and that they must be flexible as their career paths change. The *Where are the Jobs?* session included eight talks from varying perspectives including from the public realm (Cascades), private corporations (NORAM), a start-up (Lignol Innovations), academic positions (PPC's James Olson talks on becoming a Professor at UBC), patent law (Smart & Biggar), knowledge translation (Carex Canada) and research (FPInnovations). Each speaker offered information and tips that will help students accelerate their careers after graduation.



Later in the workshop students also received tips on networking from Judy Thomson and Gayle Hallgren-Rezac from the Shepa Learning Company, how to present yourself both in person and in presentations from Emily Cranston, Assistant Professor from McMaster University, and heard from recently hired graduates who conquered the job market. Day one wrapped up at the *Welcoming Reception* organized by the FIBRE Networks and sponsored by FPAC.

Pictured: PPC researchers at the FIBRE Welcoming Reception
Photo: PaperAdvance

The second day started with a welcome address by Theo van de Ven, Chair of FIBRE. He reminds us that FIBRE remains one of the largest university-led forestry research networks in the world, and that this collaborative dynamic between university, industry and decision makers is what makes it a success. The keynote speaker of the day was Elizabeth Dowdeswell, President and CEO of the Council of Canadian Academies on "Finding Common Ground: Enlightened Leadership for Global and Local Challenges". The Council of Canadian Academies is an independent, not-for-profit organization that supports independent, authoritative, and evidence-based expert assessments that inform public policy developments. Ms. Dowdeswell emphasized the need for an understanding of building close linkages between scientific and technological development and decision makers from the public and private sectors. She says "we must decide how we harness science and technology for the betterment of society".



Pictured: Keynote Speaker Elizabeth Dowdeswell
Photo: PaperAdvance

Ms. Dowdeswell presented her organizations' suggestions regarding the position of industrial research & development in Canada: forestry related industrial research, although not considered to be one of the country's strength, is undoubtedly an economic one. The morning session concluded with a riveting panel discussion on the "Importance of FIBRE in the Innovation System - looking back and looking forward". Whereas the afternoon session focused on the numerous FIBRE success stories and highlighted many milestones.

Another highlight of the FIBRE Conference was Professor Derek G. Gray's talk on "Evolution and Potential Uses of Nanocrystalline Cellulose". Dr. Gray, McGill University, is the recipient of the 2013 Marcus Wallenberg Prize. The prize is awarded to recognize, encourage and stimulate path-breaking scientific achievements in the field of forestry. He delivered his [Laureate speech](#) that he delivered in 2013 in Sweden when he received his award.



Pictured: Professor Derek Gray, recipient of the 2013 Marcus Wallenberg Prize.
Photo: MWP

Five students from Canadian Universities were invited to attend the 2013 festivities, including Pulp and Paper Centre's Ata Sina, also member of the Green Fibre Network. The five students presented an overview of their experience - it was a very entertaining session which perfectly segued to the 2014 Marcus Wallenberg Competition. This year, eleven students and post-doctoral fellows from various universities (six from UBC) were competing for the chance to automatically be invited to represent FIBRE at the Marcus Wallenberg Awards in September 2014 in Stockholm, Sweden. David McDonald, Senior Advisor for the Marcus Wallenberg Prize and Session Chair says "these highly qualified personnel are the core of FIBRE" and that the competition offers them a great opportunity to learn. In the two-day competition, delegates heard talks ranging from Flame Retardants for Wood Products to Timber Building Limits. In the end, ballots were counted and five clear winners emerged.

(cont. on next page)

FIBRE Conference Cont.



Pictured: 2014 Marcus Wallenberg Competition Winners
Photo: PaperAdvance

Congratulations to the 2014 Marcus Wallenberg Competition winners:

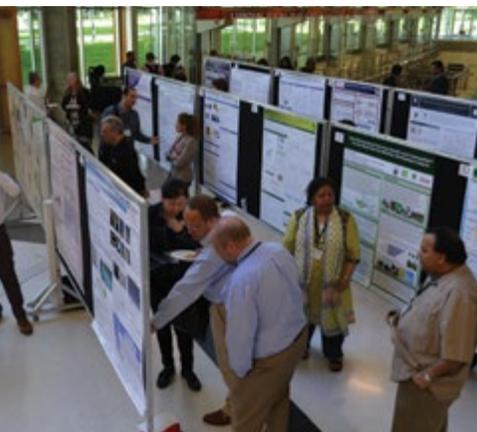
Laure Kayser, Department of Chemistry, McGill University, Lignoworks Network, "Metal-Free Synthesis of Conjugated Polymers from Lignin-Based Vanillin"

Richard Chandra, University of British Columbia, NSERC Bioconversion Network, "Enzymatic Modification of Conventional Kraft Pulps for Conversion to Specialty Grade Cellulose"

Keith Gourlay, Forest Products Biotechnology and Bioenergy Group, Department of Wood Science, Faculty of Forestry, University of British Columbia, NSERC Bioconversion Network, "CBM Adsorption as a Tool for Quantifying the Surface Morphology of Cellulosic Fibers"

Claudia Cambero, Department of Wood Science, University of British Columbia, Value Chain Optimization Network, "Strategic Optimization of Forest Biomass Value Chains with Economic, Environmental and Social Considerations"

Kevin Conley, Department of Chemistry, McGill University, Innovative Green Wood Fibre Products Network, "The Crystalloid Twist Structure of Cellulose and its Implications"



Pictured: Otto Maass Poster Competition.
Photo: PaperAdvance

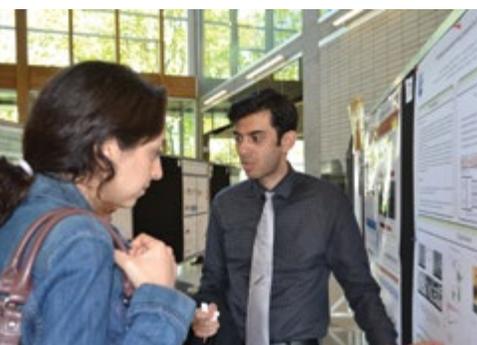
Along with the 2014 MWC, students from all eight FIBRE networks presented a total of 93 posters. Winning students shared \$3000 in awards made possible through the Otto Maass Endowment Fund in the support of studies in pulp and paper. The Pulp and Paper Centre was well represented by four students, all members of the Green Fibre Network, who presented their posters:

"Novel Foam-Formed Cellulose-Based Products Using MFC and NFC" by **Pouyan Jahangiri**

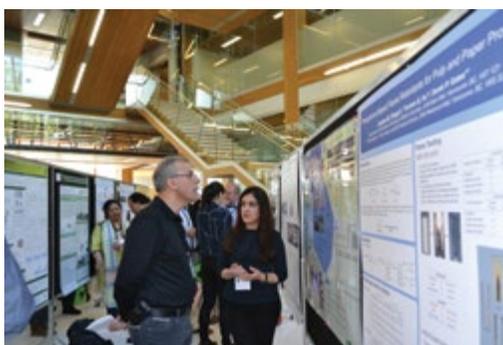
"Origami Engineering: Advanced Converting for Novel Products" by **Ata Sina**

"Effect of Fiber Size on Water Vapor Permeability and Hydrophobicity of Cellulosic Paper" by **Negar Mirvakili**

"Production of Cellulose-Mycelia Foam Material" by **Reza Korehei**



Pictured: Pouyan Jahangiri
Photo: PaperAdvance



Pictured: Negar Mirvakili
Photo: PaperAdvance



Pictured: Ata Sina talks to Richard Kerekes, PPC's former Director.
Photo: PaperAdvance

To find out more about the FIBRE networks and how to get involved, visit: <http://www.fibrenetwork.org/>

Intl Fluid-Particle Systems Workshop

The International Fluid-Particle Systems Workshop took place from June 26-27, 2014. It was organized by the Fluidization Research Center at the Department of Chemical and Biological Engineering, UBC, and was dedicated to **Professor John R. Grace** to celebrate his contribution to this field. The workshop provided an opportunity for discussion of recent advances in both fundamentals and applications of fluidization, fluid-particle systems, multiphase heat/mass transfer and reactor design, and to identify emerging research areas, applications and future research needs. The workshop was intended to strengthen communication, cooperation and collaboration among all attendees. The program included invited keynote lectures, oral and poster presentations. Numerous Pulp and Paper Centre researchers attended the workshop, and two presented their research at the poster session. Farzaneh Jalalinejad and Subhashini Vashisth are both postdoctoral research fellows working at the Centre, below are the abstracts of their posters.

"Effect of electrostatics on bubbles in gas-solid fluidized beds"

Farzaneh Jalalinejad, Xiaotao Bi, John R. Grace
Fluidization Research Centre, Department of Chemical and Biological Engineering, UBC

The generation of electrical charges, reported in gas-solid fluidized beds, can cause serious problems like wall sheeting in polyolefin reactors, leading to costly shutdown, electrical shock hazards and even explosions. Understanding the associated phenomena plays an important role in learning, how to avoid these problems. In this study an attempt has been made to broaden the understanding of electrostatics in gas-solid fluidized beds by adopting computational fluid dynamics (CFD), using the Two-Fluid-Model in MFIX (open-source code originated by the U.S. Department of Energy). The Maxwell equations were incorporated in the MFIX code in this work. The resulting model is then used to understand how electrostatic charges modify bubbles for three different cases: (a) single bubbles, (b) bubble pairs in vertical and horizontal alignment, and (c) freely bubbling bed. An attempt was also made to test experimentally the single bubble simulation result. The results show that electrostatics can influence bubble shape, size and interaction.

The Fluidization Research Centre (FRC) was established at UBC in 1997 with funding provided by the Mitsubishi Chemical Corporation (MCC), the Natural Sciences and Engineering Research Council of Canada (NSERC) and a number of other government and industrial sponsors. FRC conducts fundamental and applied research on fluidized bed reactors, their modeling and/or applications. FRC's objective is to achieve better understanding of fluidization phenomena, develop generic fluidized bed reactor models, investigate new diagnostic methods and analysis techniques, and to improve understanding of fluidization behaviour to enable more reliable design and operation of industrial-scale fluidized bed reactors. Several Pulp and Paper Centre researchers are members of the FRC.



Pictured: PPC researchers and Faculty Associates surround Dr. John R. Grace at the International Fluid-Particle Systems Workshop.
Photo: Anna Jamroz

"Non-Uniform flow in identical parallel cyclones"

Subhashini Vashisth, John R. Grace
Department of Chemical and Biological Engineering, UBC
(*See Awards & Achievements on pg. 7)

Various industrial applications of fluidized beds are associated with the distribution of gassolid system among several parallel branches with inlet and outlet manifolds. When the flow is bifurcated or trifurcated or divides in multiple identical parallel hannels, disproportionate flow division may commonly occur (Grace et al., 2007; Grace, 2008). The possible consequences of lack of axial symmetry when operating fluidization equipment may lead to (a) measurement of erroneous results with respect to the entire column, (b) poor fluid-solid contacting, with gas bypassing and sub-optimal overall contacting and reactor performance, (c) gross circulation patterns and secondary flow features may develop, causing reduced bed expansion and greater axial dispersion, hence reducing reactor performance relative to beds showing more symmetrical flow distributions, (d) agglomeration, attrition, wear and/or fouling may be worse in some regions leading to premature shutdowns and the need for more frequent maintenance and repairs, (e) suboptimal and unbalanced heat transfer. Among these important questions is the lack of detailed and systematic study so as to account for the factors leading to such a behaviour. Numerical investigations were carried out in this work to understand the sources and implications of the radial and lateral asymmetries in the flow and temperature distribution in multiple cyclones.



As mentioned, the International Fluid-Particle Systems Workshop was dedicated to Professor John R. Grace to celebrate his contribution to this field. Professor Grace received his PhD in Chemical Engineering from Cambridge University, England, in 1968, with his thesis focusing on “Behaviour of baffled and unbaffled fluidized beds” under the supervision of Dr. David Harrison. After spending over a decade at McGill University, Dr. Grace joined UBC in 1979 as Head & Professor of Chemical Engineering (now Chemical and Biological Engineering). During his 10 year tenure as Head, Dr. Grace played a major role in establishing the Pulp and Paper M.Eng program and gained approval for and helped plan the Pulp and Paper Centre - we are forever indebted to Dr. Grace for his pioneering vision in creating the Centre.

Most recently Dr. Grace was invested as an Officer of the Order of Canada in a ceremony at Rideau Hall on May 7, 2014. The honour was bestowed by His Excellency the Right Honourable David Johnston, Governor General of Canada. Dr. Grace’s award recognized his contributions as a chemical engineer, notably to the development of cleaner technology for industrial processes and energy production.

“John is an outstanding Canadian figure in chemical engineering and a world-renowned leader in the field of fluidization, chemical reaction engineering and clean energy. He has made remarkable contributions to the understanding and modelling of gas-solid fluidized beds through his roles as an educator, a researcher and an innovator. We are privileged and fortunate to have John as a colleague at UBC” says Peter Englezos, head of the department of Chemical and Biological Engineering.

Dr. Grace has always been involved in and an advocate for the sustainability movement long before it caught on in the mainstream. He co-chaired the University Sustainability Committee, hired John Robinson to head up the Sustainable Development Research Institute, now part of the Institute of Environment, Resources and Sustainability. He helped to form the Clean Energy Research Centre (CERC) where he also served as Acting Director, and also initiated the new program in Masters in Clean Energy Engineering which has a strong sustainability focus. Dr. Grace also holds a Tier I Canada Research Chair in Clean Energy and is a co-founder of Membrane Reactor Technologies Ltd., a company focused on efficient hydrogen generation and use. The John R. Grace Graduate Scholarship in CHBE has been endowed in honor of Dr. Grace by his wife, Dr. Sherrill E. Grace, for graduate students who demonstrate academic excellence and potential for service to society by performing research on energy, the environment, and/or multi-phase systems. Dr. Grace leaves behind quite a legacy as he forges ahead to retirement.

Dr. Grace is also a Fellow of the Royal Society of Canada, the Canadian Academy of Engineering, the Engineering Institute of Canada, and the Chemical Institute of Canada. He has also received a host of awards, including the Canadian Society for Chemical Engineering’s R.S. Jane Memorial Award, the Career Achievement Award of the Science Council of British Columbia, the American Institute of Chemical Engineers’ Thomas Baron Award and its Dupont Particle Technology Forum Award and the Meritorious Achievement Award of the Association of Professional Engineers & Geoscientists of BC.

From all of us at the Pulp and Paper Centre, we wish you a happy retirement, John! Although we don’t suspect it will slow you down much, we do hope it brings you more time to enjoy the things you love.

2014 Graduates



Pictured: Troy Mithrush and Pouyan Jahangiri

“Graduation could not have been on a better day”, says recent graduate Troy Mithrush. Convocation was held at UBC, Vancouver, on May 27th. Two PPC researchers received their Master of Applied Science degree in Mechanical Engineering on that sunny day. Both supervised by Prof. Mark Martinez and Prof. James Olson, Troy’s thesis title is “An experimental study of fluid flow in a low consistency refiner”, whereas Pouyan Jahangiri’s thesis focused on “Novel cellulose based foam-formed products: applications and numerical studies”. Jorge Rubiano, currently a PhD candidate at CHBE & RA at the PPC, had to travel a little further to receive his diploma. Jorge received his Master’s degree in Chemical Engineering for Energy and Environment on May 28th in Stockholm, Sweden, from the prestigious KTH - Royal Institute of Technology.

Congratulations grads! We wish you much success in your future endeavors.



Pictured: Jorge Rubiano

Awards & Achievements



APSC Rising Star Award

Ata Sina, MASc '14, Mechanical Engineering and a Pulp & Paper Centre researcher received the 2014 Applied Science Rising Star Award. The stars of UBC’s Applied Science “are people passionate about their chosen field and those that inspire others by making meaningful contributions to the betterment of society”. Being awarded this honour didn’t come without its share of hard work - Ata was most recently featured on the Globe & Mail’s web show *Globe Now* to talk about his innovative self-folding paper and its potential to replace polymers and plastics with paper as a green material. To read more on this story, visit www.ppc.ubc.ca/APSCRisingStars

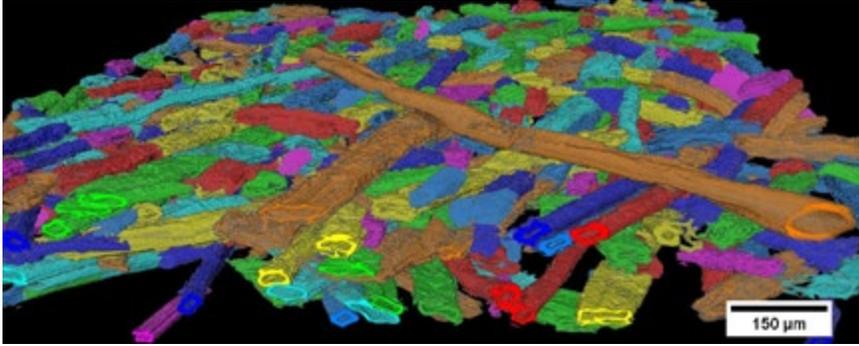


Best Poster Presentation

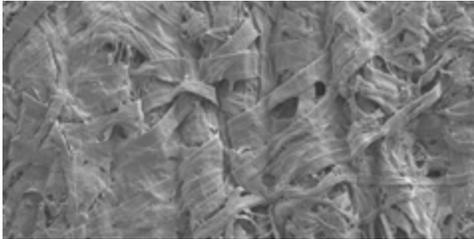
Postdoctoral Research Fellow Subhashini Vashisth received 2nd prize for the Best Poster Presentation competition at the International Fluid-Particle Systems Workshop (see pg. 5 for more on the workshop). Subhashini says “this award is very special to me and I take immense honor in receiving it because of the important and special occasion of Prof. Grace’s retirement, and also because I received an original, classic book from 1985, 2nd edition of ‘Fludization’ edited by Davidson, Clift and Harrison. The book was signed by Dr. Grace, Davidson and Clift, the three authors of the book. I couldn’t have asked more from the workshop”.

Guess the photo

Can you guess what the image below is? We will reveal the answer in next month's issue of *PPC's Pulp Digest*.



Last Month:



Left: Microscopic observation of **toilet paper** in a creping pattern which is what makes it feel soft & stretchy.
Photo c/o Prof. Mark Martinez

Safety Inspection & Orientation

A Lab Safety Inspection focusing on Chemical Inventory/MSDS update and completion of SOP's is scheduled for mid-July.

New PPC researchers are requested to attend the PPC Safety Orientation on July 3rd at 9:00 am

Social Media



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Visit us online: www.ppc.ubc.ca

Thanks for all your TWITTER support. Below we share a few of our recent tweets:

UBC Pulp & Paper Centre @ubcPPC 23 JUNE
Tour for #nanotechnology included Nano Fibre Separator, LC Refining Facility, Pulp Screening Facility and other PPC labs (photo)

UBC Pulp & Paper Centre @ubcPPC 10 JUNE
Great seminar by Dr. Sam Weaver, Founder & President of @ProtonPower-Inc on "Powering a Sustainable, Clean Tomorrow". It was a full house.

UBC Pulp & Paper Centre @ubcPPC 29 MAY
PPC has a large presence at the 2014 #PacWest Conference. #UBC session Friday at 8:30 am, 6 presentations #Jasper (photo)

UBC Pulp & Paper Centre @ubcPPC 28 MAY
#EnergyReduction in Mechanical Pulping Program meets our industrial partners in Jasper, AB. Presentations underway

UBC Pulp & Paper Centre @ubcPPC 23 MAY
Goodbye plastic, hello self-folding paper @globeandmail interview with PPC researcher @sustainUBC #innovation (video)

UBC Pulp & Paper Centre @ubcPPC 15 MAY
Panel Discussion: Opportunities for CDN/International University partnerships with Lindstrom, Turner & Pelton #fibre (photo)

Contact

To submit items to *PPC's Pulp Digest* or to join our mailing list, please contact Anna Jamroz, PPC Communications Coordinator at: anna.jamroz@ubc.ca

