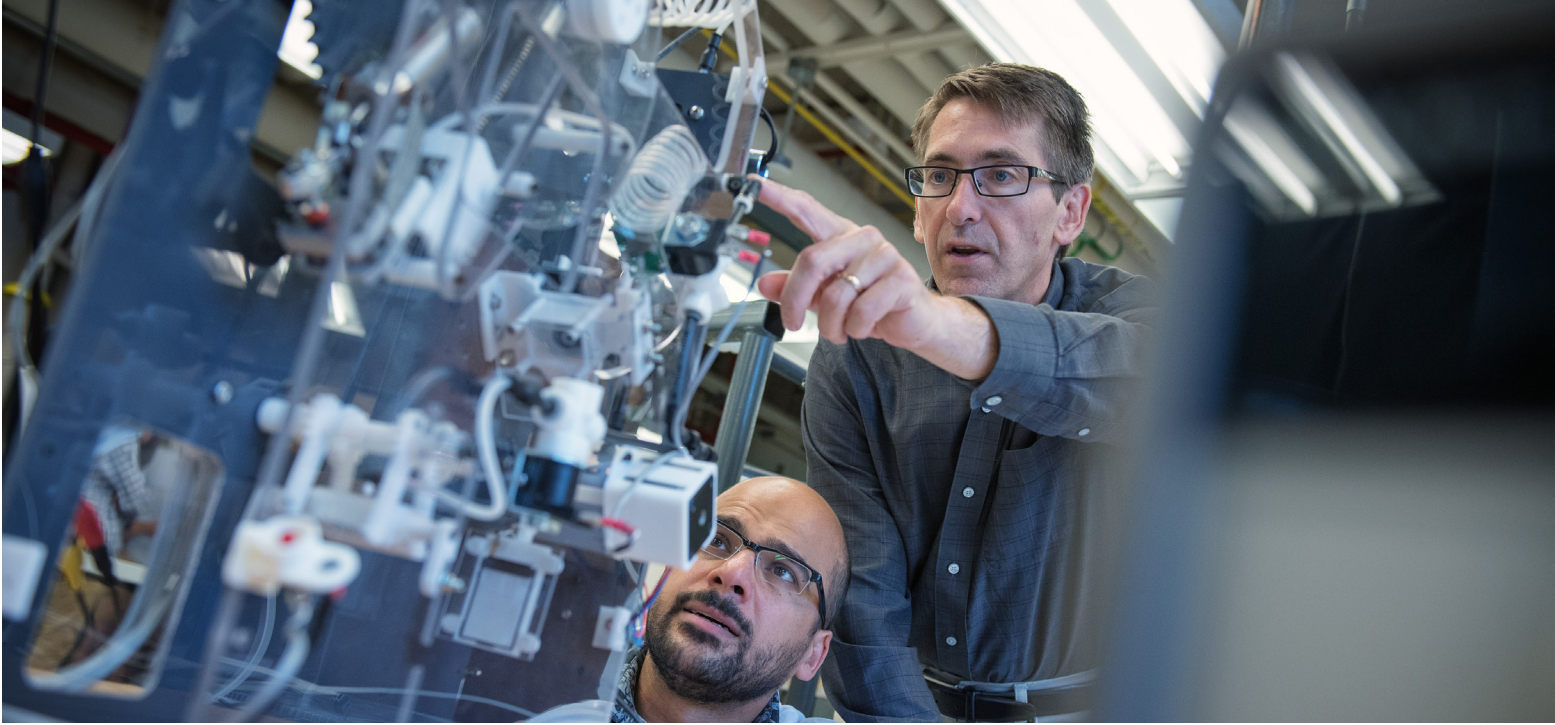


Pulp Digest

Q3 2016



ADVANCING APPLIED SCIENCE RESEARCH

Established through decades of equal parts inspiration and perspiration, Applied Science's research strengths — clean energy, advanced manufacturing, digital technologies, forest bio-economy, health, mining, transportation, urban systems and water — came to fruition with the right combination of people and place.

Within the context of the Faculty's strategic plan, ENGAGE 2020, and under the leadership of James Olson (BASc '91 ENPH, PhD'96 MECH), P.Eng., associate dean for research and industrial partnerships, Applied Science's research enterprise is taking a new focused approach.

"The Faculty is committed to honing our research strengths, assuming global leadership, expanding the boundaries of professional practice and accelerating knowledge mobilization to benefit society," says Olson. "We have a bona fide strength of faculty across disciplines who demonstrate a

lifetime commitment to their chosen fields and are dedicated to making a positive difference for society."

Olson's own career speaks to this point. With a childhood immersed in British Columbia's breathtaking natural beauty, the forest occupies a special place in his past. Through his research, it is set to play a vital role in a more sustainable future for us all.

Olson, a professor in the Department of Mechanical Engineering, is a member of the Forest Bio-Products Institute at UBC. The Institute brings together a multidisciplinary research team, working collaboratively with a single goal in mind: to advance the world's bio-economy, an economy based on renewable biological resources.

The Institute couldn't have been formed at a more critical time. As the world's population booms and the middle class in countries such as China and India rapidly expands, our

Continued on page 8 "APSC Research"



New Faces

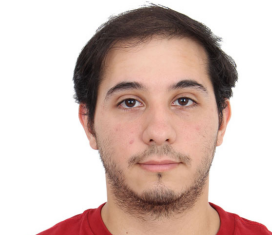
Please join us in welcoming some new faces to the Pulp and Paper Centre:



Vahid Dehghan is a research engineer working for the next 4 months under the supervision of Dr. James Olson and will be completing experiments in relation to pulp rheology. Vahid received his MSc in 2012 from Khaje Nasir Toosi University, and his bachelor's degree in Mechanical Engineering from the University of Tehran, Iran.



Farzin Golkhosh is a PhD student who joins us from the School of Engineering at UBC Okanagan and will now complete his studies at the PPC with Dr. Mark Martinez as co-supervisor. Farzin's research interests include X-ray tomography, 3D Materials Science, Image Analysis and Image processing, Paper deformation and failure. While at the Centre he will be working on the data that has been acquired by synchrotron X-ray tomography of in-situ tensile test of paper samples to characterize deformation and failure mechanisms of paper using image analysis and Digital Volume Correlation.



Miguel Villalba received his bachelor's degree in Mechanical Engineering at Penn State University, USA. Miguel is currently pursuing a MSc degree in Mechanical Engineering under the supervision of Dr. James Olson. His research interests are in the area of Thermofluids. Miguel also joins the "Energy Reduction in Mechanical Pulping" research program where he will focus on the compression of wood chips in the production of pulp and paper.

Awards



The Faculty of Applied Science **Dean's Medal of Distinction** serves to recognize individuals who have brought high honour to the Faculty and/or who have made long standing and significant contributions to advance its vision, mission and mandate. In 2016, this medal was bestowed upon 100 distinguished individuals during the Faculty of Applied Science Centennial Celebrations, held at the Robert H. Lee Alumni Centre on April 14, 2016.

Among the recipients was **Richard Kerekes**, Founding PPC Director (1983-2005) and Professor Emeritus in Chemical and Biological Engineering, along with **Eric Hall**, PPC Faculty Associate and Civil Engineering Professor.

For a complete listing of recipients, visit: 100.apsc.ubc.ca/deans-medal-recipients

Publications

Journal

Nuwan Sella Kapu, Zhaoyang Yuan, Xue Feng Chang, Rodger Beatson, D. Mark Martinez, Heather L. Trajano "Insight into the Evolution of the Proton Concentration During Auto- and Dilute Acid Hydrolysis of Hemicellulose", accepted for publication in *Biotechnology for Biofuels*

Abstract: During pretreatment, hemicellulose is removed from biomass via proton-catalyzed hydrolysis to produce soluble poly- and monosaccharides. Many kinetic models have been proposed but the dependence of rate on proton concentration is not well-defined; autohydrolysis and dilute acid hydrolysis models apply very different treatments despite having similar chemistries. In this work, evolution of proton concentration is examined during both auto- and dilute-acid hydrolysis of hemicellulose from green bamboo. An approximate mathematical model, or "toy model", to describe proton concentration based upon conservation of mass and charge during deacetylation and ash neutralization coupled with a number of competing equilibria, was derived. The model was qualitatively compared to experiments where pH was measured as a function of time, temperature, and initial acid level. Proton evolution was also examined at room temperature to decouple the effect of ash neutralization from deacetylation.

Zhaoyang Yuan, Nuwan S. Kapu, Rodger Beatson, Xue Feng Chang, and D. Mark Martinez. "Effect of alkaline pre-extraction of hemicelluloses and silica on kraft pulping of bamboo (*Neosinocalamus affinis* Keng)." *Industrial Crops and Products* 91 (2016): 66-75

Abstract: Commercial bamboo chips were pre-treated with sodium hydroxide (NaOH) solutions to completely extract silica and partially extract hemicelluloses prior to kraft pulping. Reaction temperatures of 80-100°C, times of 1-5 h, and NaOH charges of 6-18% were explored. With increasing pre-extraction severity, all silica and up to 50% of hemicelluloses in raw chips could be extracted without degrading cellulose and lignin. The chips from select extractions were cooked using the kraft process with varying effective alkali (EA) charges. Pre-extraction resulted in significant improvement in the delignification of chips during subsequent kraft pulping, offering an option to reduce the EA charge or the H-factor. The pulp yield was similar to the control while the drainage resistance of pulp from pre-extracted chips was slightly improved. Physical strength properties of pulps made from pre-extracted chips showed lower tensile index and higher tear index as compared with the control runs. Moreover, silica was no more a problem for chemical recovery and production of high-grade pulp. Extracted silica and hemicelluloses in the alkaline extraction liquor (AEL) can be used as a potential raw material for value-added products.

Mirvakili, M., Hatzikiriakos, S. G., Englezos, P. (2016), "Effect of Fibre Size on Wettability and Barrier Performance of Hydrophobic Cellulosic Papers", *Journal of Science and Technology for Forest Products and Processes (J-FOR)*, 5 (4), 38-44 (Special issue in honour of Theo van de Ven).

Abstract: Cellulosic handsheets prepared by unrefined and highly refined Kraft and thermomechanical pulps were rendered hydrophobic by a chemical deposition technique. A wide range of fibre sizes (177-927 μm for Kraft and 139-520 μm for TMP) were employed and the effect of treatment on wettability and gas permeability of the handsheets was investigated. The contact angles on handsheets prepared with unrefined fibres are significantly higher than those of refined ones after treatment due to their higher surface roughness. However, on highly refined samples, although the treatments resulted in a hydrophobic surface, the water droplets absorbed to the handsheets over time. The highly refined fibres resulted in handsheets with significantly lower gas permeability. On average the water vapour transmission rate (WVTR) for Kraft and TMP handsheets decreased by about 34% \pm 14% and 47% \pm 12% respectively due to hydrophobization. It is also shown that at certain fibre size (561 μm) the water vapour transmission rate reaches its minimum value (34 g.m⁻².day⁻¹) and further refining of fibres did not significantly affect its value.

Mirvakili, M., Bui, H. V., Van Ommen, J. R., Hatzikiriakos, S. G., Englezos, P. (2016), "Enhanced Barrier Performance of Engineered Paper by Atomic Layer Deposited Al₂O₃ Thin Films", *ACS Applied Materials & Interfaces*, 8 (21), 13590-13600.

Abstract: Surface modification of cellulosic paper was demonstrated by employing plasma assisted atomic layer deposition. Al₂O₃ thin films were deposited on paper substrates, prepared with different fiber sizes, to improve their barrier properties. Thus, a hydrophobic paper was created with low gas permeability by combining the control of fiber size (and structure) with atomic layer deposition of Al₂O₃ films. Papers were prepared using Kraft softwood pulp and thermomechanical pulp. The cellulosic wood fibers were refined to obtain fibers with smaller length and diameter. Films of Al₂O₃, 10, 25, and 45 nm in thickness, were deposited on the paper surface. The work demonstrates that coating of papers prepared with long fibers efficiently reduces wettability with slight enhancement in gas permeability, while on shorter fibers, it results in significantly lower gas permeability. Wettability studies on Al₂O₃ deposited paper substrates, have shown water wicking and absorption over time only in papers prepared with highly refined fibers. It is also shown that there is a certain fiber size at which the gas permeability assumes its minimum value, and further decrease in fiber size will reverse the effect on gas permeability.

Conference Proceedings

Representatives of the UBC Pulp and Paper Centre recently attended the **2016 International Mechanical Pulping Conference (IMPC)**, held in Jacksonville, Florida from September 25 to 28. Harry Chang (BCIT), Reza Harirforoush (University of Victoria), Meaghan Miller (UBC), and Yu Sun (UBC/BCIT) each gave a presentation on Tues Sept 27, in the sessions *Alternative Mechanical Pulping Treatments* (Yu and Harry), and *HC/LC refining* (Reza and Meaghan). *See page 5-6 for presentation titles and abstracts. Dr. James Olson, P.Eng. (UBC) and Dr. Rodger Beatson (BCIT) also attended the conference.

The IMPC is a relatively small conference (fewer than 100 attendees), with a single session at any one time, rather than multiple overlapping sessions. This made it possible to attend all of the interesting presentations in the field of mechanical pulping research and making it even easier to meet and network with the other attendees.

After an opening reception on Sunday Sept 25, Monday sessions began with keynote speaker Paul G. Boynton from Rayonier Advanced Materials, who discussed 90 years of connecting nature and science. As IMPC conference chair, Dr. Robert Lanouette of Universite de Quebec a Trois Rivieres (UQTR) then began the IMPC sessions. There was a strong representation from Canada, the US, Sweden, Finland, France, and New Zealand, among others, and subjects ranged from mill trial results to lab testing procedures and sample characterization, to research into new types of materials from mechanical pulps.

Presentation and paper topics included proper pulp sampling and sample characterization; chemical treatments including alkaline peroxide treatment, peroxide bleaching, oxygenated compound bleaching, and dithionite based additives; alternative mechanical pulp uses including paper reinforcement, production of enzymatic sugar for biofuels, and nanocellulose production; enzyme use in reducing energy consumption and improving pulp properties; HC/LC refining topics including bar force sensing, mill trials of refining systems, and fractionation followed by LC refining; and sensor and control technologies including optical analysis and on-line measurement of pulp bale properties.

On Wed Sept 28, Reza was awarded the **Keith Kirkpatrick award for best paper** presented by a young researcher presenting for the first time at an international conference, which came with a \$1500 cash award. Congratulations Reza, as well as his co-authors Dr. Peter Wild (UVic) and Dr. Olson!

The next IMPC will take place in Trondheim, Norway in May/June 2018.

Conference Proceedings

Xue Feng Chang, Meaghan Miller, Yu Sun, James Olson and Rodger Beatson, "A Pilot Scale Comparison of the Effects of Chemical Treatments of Wood Chips on the Properties of High Freeness TMP", *International Mechanical Pulping Conference (IMPC)*, Sept. 26-28, 2016, Jacksonville, Florida.

Abstract: Surface modification of cellulosic paper was demonstrated by employing plasma assisted atomic layer deposition. Al₂O₃ thin films were deposited on paper substrates, prepared with different fiber sizes, to improve their barrier properties. Thus, a hydrophobic paper was created with low gas permeability by combining the control of fiber size (and structure) with atomic layer deposition of Al₂O₃ films. Papers were prepared using Kraft softwood pulp and thermomechanical pulp. The cellulosic wood fibers were refined to obtain fibers with smaller length and diameter. Films of Al₂O₃, 10, 25, and 45 nm in thickness, were deposited on the paper surface. The work demonstrates that coating of papers prepared with long fibers efficiently reduces wettability with slight enhancement in gas permeability, while on shorter fibers, it results in significantly lower gas permeability. Wettability studies on Al₂O₃ deposited paper substrates, have shown water wicking and absorption over time only in papers prepared with highly refined fibers. It is also shown that there is a certain fiber size at which the gas permeability assumes its minimum value, and further decrease in fiber size will reverse the effect on gas permeability.

R. Harirforoush, P. Wild, J. Olson "Measurement of Forces on Refiner Bars for In-Process Detection of Fiber Cutting in Low Consistency Refining", *International Mechanical Pulping Conference (IMPC)*, Sept. 26-28, 2016, Jacksonville, Florida.

Abstract: Low consistency (LC) refining of mechanical pulp is more energy efficient than conventional high consistency (HC) refining. However, the degradation of mechanical properties due to fiber cutting at high refining energies has limited the widespread adoption of LC refining. Conventional strategies to avoid fiber cutting are based on post-refining measurement of pulp properties and, typically, this does not enable rapid adjustment of refiner operation in response to the onset of fiber cutting. The objective of this study is to detect the onset of fiber cutting by using custom-designed piezoelectric force sensors that measure shear and normal forces applied to pulp fibers by the refiner bars. Trials are performed in an AIKA-WA/Advanced Fiber Technologies Inc. 16" single-disc LC refiner. The trials are run using mechanical softwood SPF pulp with 378 ml CSF at 2.5% and 3.5% consistency at rotational speeds of 800 rpm, 1000 rpm and 1200 rpm. Distributions of the peak normal and shear forces are determined for each operating condition and a two-parameter Weibull function is fit to each of these distributions. The scale parameter, which is one of three key parameters of the Weibull function, is calculated and length-weighted fiber length is plotted as a function of this parameter. The results show that the onset of fiber cutting consistently corresponds to a distinct transition in the plot of length-weighted fiber length versus scale parameter. This transition is believed to be caused by a fundamental transition in the fiber-bar interaction. This result suggests that these sensors have potential to be used for in-process detection of the onset of fiber cutting.

Meaghan Miller, Antti Luukkonen, James Olson, "Fractionation and LC Refining for High Bulk Low Energy Mechanical Pulp", *International Mechanical Pulping Conference (IMPC)*, Sept. 26-28, 2016, Jacksonville, Florida.

Abstract: This pilot scale study evaluates the benefits of fibre fractionation by pressure screening prior to low consistency (LC) refining. The fractionation objective was to separate the long and coarse fibre fraction in order to apply the LC refining only to that fraction, with the hypothesis that this coarser fraction could be LC refined at higher intensity without excessive detrimental fibre length reduction. The study was conducted at the Andritz R&D Center with primary HC refined pulp (a mixture of spruce, pine and fir). Four different screen basket designs were evaluated (0.8 mm, 1.0 mm and 1.5 mm hole and 0.15 mm slot), and screen fractionation was carried out under conditions that resulted in a reject consistency of 4% to enable LC refining without additional thickening or dilution stages. The coarse screen reject pulp underwent subsequent LC refining at low and high intensity (0.25 J/m and 0.5 J/m, respectively). LC refined reject fractions at different freeness levels were combined with the screen accept pulp, and the final pulp qualities were compared with the unfractionated LC refined pulps refined at the same intensities, as well as with atmospheric high consistency (HC) refined pulps. (Continued on pg. 6)

Conference Proceedings Cont.

(Cont. from pg. 5) The study showed LC refining provides an energy reduction of 60-70% over HC refining at equivalent tensile or freeness. High intensity LC refining was shown to significantly increase fibre cutting over low intensity LC refining. The fractionated LC refined pulps (as well as the low intensity LC refined pulp) showed less fibre length and bulk reduction than that obtained at high intensity LC refining when compared at the same specific energy. Overall, fractionation plus high-intensity LC refining provided similar pulp qualities as low intensity LC refining. Fractionation thus enabled the use of higher intensity LC refining, allowing LC refiners to operate at higher power and thus higher specific energy with a reduced number of stages.

Yu Sun, Meaghan Miller, Xue Feng Chang, James Olson, and Rodger Beatson, "A Pilot Scale Comparison of the Effects of Chemical Pre-treatments of Wood Chips on the Properties of Low Consistency Refined TMP", International Mechanical Pulping Conference (IMPC), Sept. 26-28, 2016, Jacksonville, Florida.

Abstract: After decades of research and development, the technology of thermomechanical pulping (TMP) has dramatically improved, resulting in higher pulp quality, especially strength. However, the TMP industry is still faced with the challenge of continually increasing energy costs. One approach to reducing the energy costs is to replace the second-stage high consistency (HC) refiner with several low consistency (LC) refiners since LC refining is more energy efficient. The limitation of LC refining is loss of paper strength due to the high frequency of fibre cutting especially at high refining intensity. Chemical treatment combined with LC refining provides opportunity for even further energy savings. The chemical treatment could improve pulp properties allowing for further energy reduction in the HC refining stage or reduced intensity during LC refining resulting in less fibre cutting. Indeed, it is also possible that the chemical treatment itself will improve the resistance of the fibre to the cutting during LC refining.

In this pilot mill (ANDRITZ Springfield R&D Center) research work, the effects of impregnating softwood chips with different chemicals on the properties of the pulp obtained through single-stage HC refining followed by multiple stages of LC refining have been evaluated. SPF (Spruce, Pine & Fir) chips were treated with sulphite, alkali (NaOH) and alkaline peroxide (NaOH+H₂O₂) and then HC with energy input in the range of 647 to 735 kWh/ODT. These HC refined pulp were shipped to the UBC Pulp and Paper Centre in Vancouver where they were LC refined in multiple stages over a wide energy range to produce a wide range of freeness levels. The effects of the treatments on total energy consumption, freeness, pulp properties and fibre morphology were evaluated.

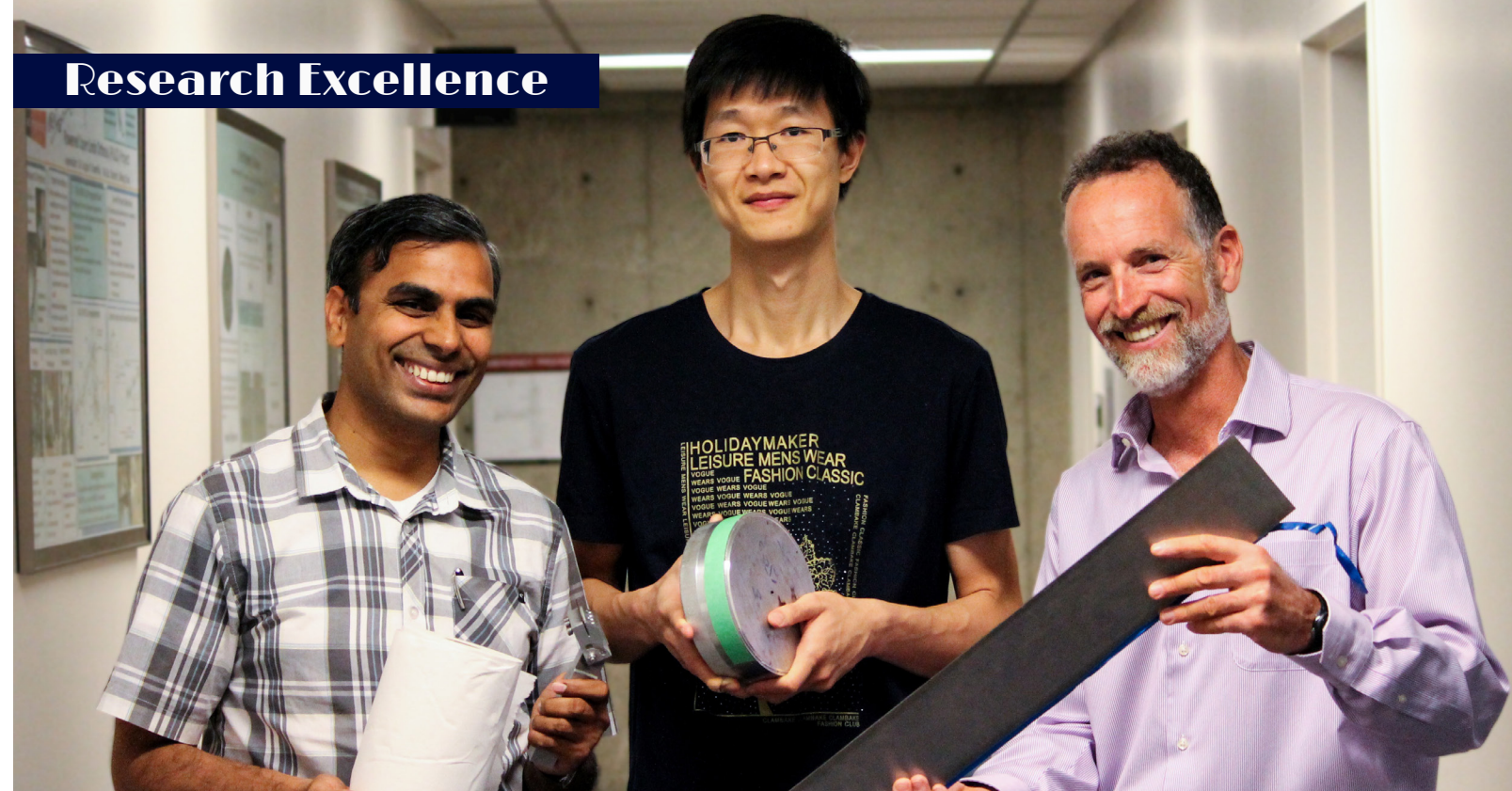
The alkaline peroxide pre-treatment significantly reduced the energy required, during the entire refining process (HCR + LCR), to produce a pulp at a given tensile index compared with the other chemical treatments and the control pulp. For the alkali treatment, less total energy was required to attain a given tensile compared to control pulp, but more energy was consumed in order to reach a desired freeness. An interesting observation is that the alkali treatment produced pulps with higher fibre length, at the same energy input, compared to all the other three trials. The sulfite treatment provided modest energy saving, to a given tensile.

The improvements in tensile index obtained through the chemical treatments was accompanied by a loss in light scattering coefficient especially for the alkali and alkaline peroxide trials. Among the three chemicals, only sulphite offered some improvement in bulk at a given tensile, whereas alkali gave the lowest bulk value at a given tensile. Sulphite treatment resulted in a small increase in tear index at a given tensile compared with control pulp, whereas both alkali and alkaline peroxide gave the highest tear at a given tensile index.



Pulp and Paper Centre representatives and presenters at the 2016 IMPC: Yu Sun, Meaghan Miller, Reza Harirforoush and Harry Chang.

Research Excellence



UBC RESEARCHERS PLUMB THE SECRETS OF TISSUE PAPER

Media Release | August 24, 2016

Canada's tissue manufacturers are now much closer to producing the perfect paper, thanks to new UBC research.

A team working with UBC mechanical engineering professors Sheldon Green and Srikanth Phani have created what is likely the first complete mathematical model of creping, the crinkling process that helps make tissue paper soft and resilient.

"The new model provides a significantly better understanding of the dynamics of the creping process, allowing manufacturers to tailor the process to a greater degree than before," said Green. "It's the most accurate model of creping to date."

During tissue manufacture, pulp is dried on a chemical-coated rotating drum until it's 95 per cent dry. It's then pushed off at very high speeds by a sharp creping blade, creating hundreds of microscopic folds that give tissue its softness, flexibility, tearing resistance and strength.

"With our model, manufacturers can better manipulate the different elements—the chemicals, the pulp, the creping

blade angle, the paper speed and so on—to produce the exact product grade they want, from standard grade toilet paper to ultra-premium bathroom rolls," said Green.

"Previous simulation models were static and didn't consider the velocity and impact of the dryer," said Kui Pan, the PhD student who led the mathematical analysis.

The search for the ideal tissue paper is a top concern for the paper industry. Pan's supervisor, Srikanth Phani, believes their discovery can help paper firms in this quest.

"Canada is a strong player in the billion-dollar global market for tissue products including bathroom rolls, facial tissues, and hygiene products. This new research can contribute to the growth of that industry," added Phani.

The UBC team worked with scientists from Canadian research organization FPInnovations. The project has received support from the Natural Sciences and Engineering Research Council (NSERC) and, more recently, from Kruger Products, Canada's leading tissue manufacturer, and creping chemicals manufacturer Solenis.

The research was presented at the 24th International Congress of Theoretical and Applied Mechanics in Montreal on August 21-26.

Visit YouTube to see a creping experiment, surface view shown in extreme slow motion. The sheet is bonded on the rotating shaft, and as the sheet hits the blade, a series of folds are formed. These folds can significantly increase the tissue paper's softness, bulk and stretch!
View at: <https://www.youtube.com/watch?v=HWCCe32PaM>

PPC Researcher Kui Pan (centre), PPC Faculty Associate Sheldon Green (right) and Mechanical engineering researcher Srikanth Phani (left)

Continued from page 1:

consumption of nonrenewable resources is skyrocketing — causing irreversible damage to our planet.

The Institute, however, is maximizing British Columbia's natural resource advantage to lead the bio-revolution: extracting high-value products from bio-mass, an abundant material sourced primarily from residual and waste products from BC's forest industry, to create alternative and sustainable materials, energy and chemicals.

Olson calls the Institute's researchers the "superhero team" who have already spurred innovation in the bio-economy. Professor Paul Watkinson, P.Eng., of UBC's Chemical and Biological Engineering (CHBE) Department and his team, for example, are working on developing and testing high-quality synthetic gas, or "syngas," derived from biomass, using cutting-edge technology at the UBC Pulp and Paper Centre. This renewable source of power has the potential to replace natural gas and run our future fuel cells.

Assistant Professor Heather Trajano, also of CHBE, is performing research that supports the Forest Products Association of Canada's assessment that pulp, paper and saw mills could produce new, high-value bioenergy, biochemical and biomaterials — and its challenge to generate an additional \$20 billion in economic activity by 2020. The goal of her research is to make large-scale bio-refineries a reality.

Olson has long been driving innovation in the bioeconomy and beyond. Following revolutionary energy saving developments in pulp and paper industry technology, Olson currently works with Pulp and Paper Centre Director & CHBE Professor Mark Martinez, P.Eng., to formulate a lightweight, low-density cellulose material from micro- and nanofibres — part of a new class of "bio-materials." And Institute scientist Professor Frank Ko, of Materials Engineering, is developing new materials of this kind.

Bio-materials have the potential to replace fossil fuel materials and have a wide and exciting range of applications, from soundproofing and insulation to advanced cosmetics and high-strength turbine blades, and even to bio-compatible scaffolds for 3-D printing of human tissue.

These are a few of the projects being initiated by the Forest Bio-Products Institute researchers — and add to those programs such as the new Master of Engineering Leadership in Green Bio-Products to train and educate the next generation of bio-economy innovators.

The BC forest is intimately woven into the fabric of our province, and Olson is optimistic about its potential — a potential that the Institute is harnessing to bring about a greener future. "It's an exciting time to be part of the bio-revolution," he says, "and to be part of the forest industry."

More information about the Forest Bio-Products Institute is available at www.fbp.ubc.ca

Re-printed from Ingenuity, Faculty of Applied Science News, issue 36

BCIC New Ventures Competition



The BC Innovation Council's (BCIC) New Ventures Competition is one of North America's largest technology business idea competitions which attract BC entrepreneurs from a wide range of industries. This year's top prize was awarded to **Microdermics Inc.**, a Vancouver based start-up and UBC spin-off co-founded by Mechanical Engineering **Professor Boris Stoeber** (PPC Faculty Associate). Microdermics developed a hollow metal micro-needle injection system, a painless alternative for delivering vaccinations and therapeutics, and monitoring drugs in the bloodstream. It is a great solution for people who fear needles but who need to test their blood multiple times a day, or require medications and vaccinations. Their product could one day replace costly, invasive hypodermic needles and improve patient comfort.

For more information about Microdermics, please visit: www.microdermics.com

Free MATLAB

UBC IT will now extend the campus academic licensing for MATLAB to students for their learning and research work. Beginning Thursday, September 15, 2016, all active UBC students now have access to MATLAB licenses for their personal device at no cost.

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. This is a powerful and popular software package that is used widely within the Applied Science engineering departments with many cross-disciplinary uses.

More information can found via <http://students.engineering.ubc.ca/success/software/>. Additional information regarding Matlab is provided in the UBCIT service catalog <https://it.ubc.ca/services/desktop-print-services/software-licensing/matlab>.

If you have any questions about this service, please contact Shirley Tanoto, Senior Manager Client Services at UBC IT: Shirley.Tanoto@ubc.ca

Judges wanted

A great opportunity for graduate students (or our Alumni!) to help judge a **UBC Engineering Competition** on October 15, 2016. Judging is open to anyone with relevant experience. Depending on the competition, there will be three to five judges. Judges will evaluate the competitions with a predetermined marking scheme and have the opportunity to meet the competitors. The time commitment required is about 3.5 hours on the event day depending on the judging period of their respective competition. There are seven competitions, each with their own unique challenge, deliverables, and competition times. They include: Junior Design, Senior Design, Consulting Engineering, Re-Engineering Design, Engineering Communications, Innovative Design, and Impromptu Debate.

If you are interested in judging, please contact the UBC Engineering Competition planning team at ubcec@ubcengineers.ca

PaperWeek 2017

PaperWeek Canada is the premier platform for pulp and paper and forest products advancement in Canada. Mark your calendars: February 13-17, 2017 at the Sheraton Centre in Montreal (Quebec, Canada). The 2017 theme is "Staying Ahead of the Curve" and will feature an incomparable learning and networking opportunity, bringing together experts from around the world on topics of the highest relevance, as well as an impressive contingent of mill personnel.

Call for Papers DEADLINE:

The deadline to submit your abstract is Friday, October 7th. Send your abstract to paperweek@paptac.ca. More details: www.paperweekcanada.ca

Following a successful inaugural edition in 2016, the highly anticipated **BIOFOR International Conference returns** to Montreal in 2017. Dedicated to the emerging forest bioeconomy, BIOFOR International will run parallel to PaperWeek.

Call for papers! "Forest Bioeconomy Advancement" Please send your abstract to: biofor@paptac.ca. Further details: www.bioforinternational.com

Community Outreach

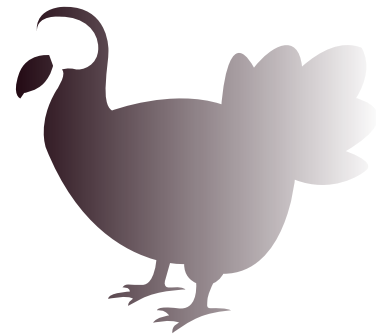
Papermaking at Ronald McDonald House - volunteer opportunity

Ronald McDonald House has invited Pulp and Paper Centre students and faculty to teach kids a monthly workshop on papermaking - these kids could really use a fun activity!

Workshops will start in November on the first Thursday of every month (Nov. 3, Dec. 1, Jan 5, Feb 2, March 2, April 6), they will be 1-hour long from 5:00-6:00 pm and will be held at the RMH near Oak St & 33rd. You can sign up for one month, or multiple months as your schedule permits. All supplies will be provided by the Pulp and Paper Centre.

Mark Martinez will host a papermaking volunteer training session on Wed. October 12th at 5:00 pm in the PPC papermaking lab and we invite you to join us! Please sign up for the training session with Anna at anna.jamroz@ubc.ca

To learn more about the Ronald McDonald House, visit rmhbc.ca



TURKEY 2K TROT

WED, OCT. 12TH
12 PM @ THE CAIRN

Join APSC's kickoff to the annual UBC United Way campaign

- Run, walk or trot 2km along Main Mall
- Prizes for **top finishers, best costume and more**
- **BBQ, bake sale and live band**
- Dean Parlange will match the donation of everyone who beats his time — the challenge is on!
- Suggested donation of \$2+ to enter



Details and Registration:
apsc.ubc.ca/turkey2K

MEL Updates

Dr. Richard Chandra, Instructor of Biomass Conversion Chemistry Course (GBPR 501) in the MEL Green Bio-Products program, gave a presentation at the Canadian BioFuelNet National Center of Excellence (Biofuel Network) **Advanced Biofuels Symposium** held in Vancouver from July 6-8, 2016. The conference is the annual meeting of researchers from Canadian universities, research institutes and industry that are working in the production of biofuels from Canada's abundant biomass resources. The main topics of the conference included the conversion of Canada's pulp mills to full-fledged biorefineries capable of producing fuels and the array of ancillary products that are currently obtained from an oil refiner and the production of renewable biomass derived fuels or "biojet" for the aviation industry. Richard's presentation entitled: "Keeping it all together: Can we retain hemicellulose while enhancing enzymatic hydrolysis of the cellulose and overall sugar recovery?" gave an overview of his research as part of the UBC Forest Products Biotechnology group with Dr. Jack Saddler on the utilization Richard's novel chemical treatments to repurpose newspaper (newsprint) pulps, which are currently experiencing a dwindling demand, for the production of sugars. These sugars can be subsequently converted to drop-in fuels that can integrate directly into the existing fossil fuel infrastructure.

Nathan Renaud, Poonam Patel and George Mikhael

The conference also included a BioFuelNet feature film on Richard's research and the Symposium that can be found at the following link:
<https://www.youtube.com/watch?v=nUrVsT3uzFw>

Adam Wu, Brandon Hsu, Michael Coulson and Ranbir Heer, all current students in the Green Bio-Products program also attended the Advanced Biofuels Symposium in Vancouver, BC. This is the largest Biofuels conference in Canada where the students had the opportunity to network and meet industry leaders in bioenergy.

On September 21, 2016, three students (Nathan Renaud, Poonam Patel, and George Mikhael) from various MEL programs attended the first-ever **Energy Storage Canada Conference** held in Toronto, ON. Leaders in the energy storage industry from all over the world gathered to discuss global energy issues, innovative research and technology and the future of energy storage.



MEL at CGEC

On Wednesday Sept. 28th, hundreds of students gathered in the Fred Kaiser Building for the Canadian Graduate Engineering Consortium (CGEC). Students and researchers interested in pursuing further graduate studies got to mingle with Canada's top engineering school representatives from UBC, McGill, University of Toronto, University of Waterloo and the University of Alberta. It was an opportunity to learn more about how a professional or research graduate degree in engineering can transform your career, and to help students explore their options.

Mark Martinez, Director of the Master of Engineering Leadership (MEL) in Green Bio-Products professional program was on hand to assist students interested in advancing their degree in a program that focuses on developing viable replacements for oil-based products and fuels. This professional master's degree is designed to develop highly qualified personnel with the specialized knowledge and practical experience to assume challenging roles in the rapidly evolving lignocellulosic biomass products sector.

The event was well received and the students were quite thrilled with hearing about the possibilities of furthering their education. Of particular interest was the Q&A period with current MEL students



Mark Martinez and Nuwan Sella-Kapu (MEL GRBP Instructor)

Upcoming Events

UBC United Way WEEK OF CARING

October 11-14, Across Campus

The UBC Community United Way Campaign kicks off with a week filled with fun events including the Great Pancake Race, Turkey 2k Trot, Arts Food Truck Festival and more! This year marks the 40th year of the United Way/UBC partnership, so we have set a goal of helping 40,000 people across the Lower Mainland. Please consider making a donation to the 2016 United Way Campaign. More information at <http://www.unitedway.ubc.ca>

UBC Engineering Competition

October 15

Registration now open until Oct. 9th. Choose from 7 competitions, find your teammates, and more info at: <https://ubcengineers.ca/events/conferences/ubcec/>

Generate 2016

Nov. 6-9, Vancouver

Clean Energy BC Conference on Nov. 6-9th in Vancouver, with a discounted rate for students of only \$100. This is an exciting opportunity for those interested in sustainability, clean energy, engineering and technology, as well as a great place for networking.

Please visit: <http://www.generate2016.ca> (Call for Award Nominations deadline Oct. 3)

Innovate 2016

December 6, The Vancouver Playhouse

Third annual UBC Applied Science dialogue series focusing on bringing applied research to the community and providing a pathway for industry to partner. Through several thought-provoking, seven minute presentations, learn why faculty are passionate about their work. Wine and hors d'oeuvres will be served after to facilitate networking.

More: <https://engineering.ubc.ca/event/2016/innovate-2016>

Flu Shots

UBC is offering free flu shots to students, faculty and staff from Oct. 26-Nov 10. This year, our day-long clinics are in bigger and more convenient locations across campus. Save the date here: <http://rms.ubc.ca/flu/>

Getting the vaccine is still the best way to avoid catching the flu and prevent passing it on*. The vaccine is safe; it contains killed influenza viruses that cannot cause the flu. Even if the vaccine doesn't match the strain of flu going around, it provides some protection.

(*UBC Risk Management Services)

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

