Pulp and Paper Centre's

# Pulp Digest

September 2014

## UBC 2014-15

On Tuesday, September 2nd, UBC will welcome our new and returning UBC students to campus. Over 7,500 new undergraduate students will join our community during *Imagine UBC*, a one-day orientation linked to transition programming that continues throughout first year.

Several thousand students have already arrived on campus to start their UBC experience. The first to join us on August 12 and 13 were over 1,300 international and Aboriginal students, as well as approximately 200 Vantage College students, to participate in *Jump Start. Jump Start* supports students with their academic, social and cultural transition to UBC. On August 30, Student Housing and Hospitality Services welcomed a further 4,000 students to UBC residences.

All staff, faculty and current students play an important role in welcoming incoming students and creating a memorable orientation experience. Get involved in various activities on campus and serve as a resource to our new students!

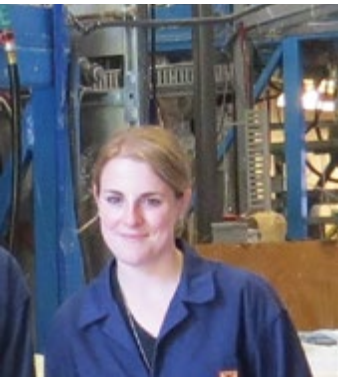
Visit UBC Events and Student Services to see how you can get involved and to find out about upcoming events.

And finally – save the date for Homecoming Weekend, which is on September 12-13 and will feature the 2nd annual Great Thunderbird Trek, a street party and an exciting football game at the legendary UBC Thunderbird Stadium. All UBC students, faculty, staff and alumni are invited to attend.

**Wishing you a succesfull 2014-15 school year!**

# New Faces

**Please join us in welcoming Meaghan Miller to the Pulp and Paper Centre**



Meaghan

Meaghan joins the Energy Reduction in Mechanical Pulping research program as the new Research Engineer and Project Manager. Meaghan received her B.Eng in Mechanical Engineering (Carleton) and an M.Sc. in Sustainable Energy Engineering from the Royal Institute of Technology (KTH) in Stockholm, Sweden. Her thesis was titled Review and Experimental Investigation of PEM Fuel Cell Stack Testing, in collaboration with the University of Toronto. In addition to having research experience in fuel cells, she has spent the last two years working in energy consulting, performing detailed energy efficiency studies of commercial buildings and liaising with clients and utilities.

Meaghan will now manage the NSERC-CRD research program and will be responsible for coordinating the various research projects and working with the programs industrial partners. She will also oversee the experimental program, including both mill and pilot scale experimental trials.

To learn more about the Energy Reduction in Mechanical Pulping program, please visit:
http://EnergyReduction.ppc.ubc.ca

# LC Refining Recirculation Project

In a recent inaugural trial, researchers at the Pulp and Paper Centre utilized the newly installed loop, the latest addition to the Low Consistency Refining facility already in place at the Centre. Low consistency refining is the primary industrial method of improving chemical pulp quality and provides significant energy savings in mechanical pulp production.

Francisco Fernandez, Research Engineer (now at *Howe Sound Pulp and Paper*), along with Professor Mark Martinez and his research group came up with a new recirculation concept. With drawings in hand and a pipe routing plan in place, technicians have spent the last several months installing the new equipment at the facility. The main benefits of the new loop include accuracy and capability. Researchers are now able to perform small batch recirculation trials since there is no minimum volume required. Just as in a typical mill, they can now reproduce refining with recirculation with continuous feeding and bleeding. The new system also permits the pulp to be more homogeneous since it is not left stagnant in 4000L tanks. This can lead to better accuracy of energy estimates as well as the refining distribution on the pulp.

# Innovate 2014

**Join UBC Applied Science at Innovate 2014. Build new partnerships to generate impact**

Join the UBC Faculty of Applied Science for Innovate 2014, an evening of dialogue at UBC Robson Square, Monday September 29 from 5:30-8:00pm. Discover pathways to partnering in an evening of thought-provoking, seven-minute presentations by engineering and architecture faculty. Learn why they are passionate about their research and the impact research has in the community.

"Innovate 2014 is about showcasing the impact of applied research in the community, providing access to leading researchers and enabling dialogue for meaningful connections," says Applied Science Dean Marc Parlange. "The key message is that we are open to partnering with industry."

In this inaugural dialogue series, Professor James Olson will be among the speakers. His research focuses on transforming the BC forest sector into a vibrant bio-products industry. His work developing new materials and products provides a glimpse into the future role of forests in a sustainable world. Another notable speaker is Naoko Ellis, Professor in Chemical and Biological Engineering. Ellis has a deep passion for sustainability which drives her research in biomass gasification, bio-oil upgrading, biodiesel production and bio-char utilization.

The evening promises to inspire engagement for industry with sectors ranging from mining to information technology to biomedical engineering to forestry. Engineering and architecture faculty will share their research on the future of mining, bio-fuels, clean energy, computer systems, artificial muscles, forest bio-economy, new materials, clean water, financial investment dynamics reshaping cities, and earthquake engineering.

A reception will follow the talks to facilitate networking and inspire dialogue. For more information or to RSVP, please visit innovate.apsc.ubc.ca

# CHBE Research Day, 2014

Mark your calendars - Research Day 2014 is being hosted on October 1st. This is a graduate student-driven initiative hosted by the CHBE Graduate Students Club with support from the Department of Chemical and Biological Engineering at UBC. With this year's theme "*Gearing for a Sustainable Future*", this full day event will feature two keynote speeches, technical presentations, a poster session, networking opportunities and a panel discussion on "Job Search Strategies for Grad Students". For detailed information on keynote speakers and panelists, to register (*deadline Sept. 8*), or to find out how you can sponsor the event, please visit researchday2014.ca

Introducing the

## SUSTAINABILITY COLUMN

by Chrissy Saville
PPC Sustainability Coordinator

Our sustainability efforts don't just have to be contained to our labs, why not extend our efforts to our lunch room? Your kitchen? Or the restaurants you choose? According to the FAO, 80% of fish stocks are over-exploited and on the verge of collapse, and 90% of the stocks of large predatory fish are already gone. Overfishing and fish farms are some of the biggest threats to our oceans. If our oceans are not fished responsibly, we could be on the verge of an environmental disaster and we could be at risk of losing a valuable food source. By selecting fish and fish products with the Ocean Wise symbol you could be making a huge positive impact on the way our oceans are fished!

The Ocean Wise program was created by our very own Vancouver Aquarium. The program guarantees that any fish stamped with the Ocean Wise symbol comes from sustainable sources backed by the most current scientific information. Look for the Ocean Wise symbol at your local grocery store and before you go out for dinner check to see if your favourite restaurant supports Ocean Wise.

If you're looking for a fun night out that's easy on your conscience, check out *Chefs for Oceans Final Event* in Vancouver at the Four Seasons Hotel on Friday, September 12th. The evening will feature sustainable seafood tastings created by our very own celebrated, Chef Ned Bell. See you there!

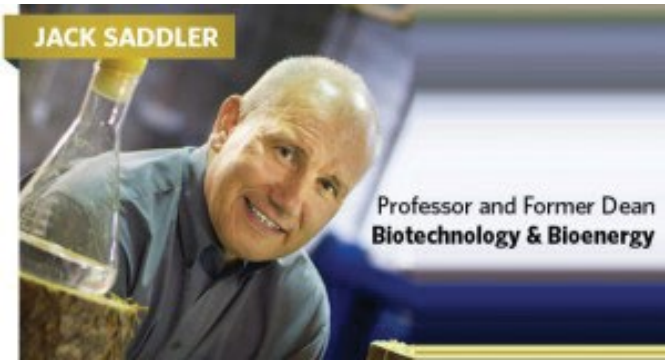
For more information on the program visit: www.oceanwise.ca

# IEA Bioenergy

Jack Saddler, PPC Faculty Associate and Professor in Forest Products Biotechnology in the Forestry Faculty, is also Task Leader of IEA Bioenergy Task 39. International Energy Agency (IEA) Bioenergy brings together national experts from research, government, industry and other stakeholders to advance the state of bioenergy research, policy and implementation. Task 39 specifically is a group of international experts from 15 countries working on Commercializing Conventional and Advanced Liquid Biofuels from Biomass.

It was noted in a recent news release that IEA Bioenergy Task 39 recently issued a report entitled "The potential and challenges of drop-in biofuels" with the goal of providing a background on the topic, an assessment of the various technical approaches being developed and an overview of anticipated challenges that might be encountered in the large scale commercialization of so called "drop-in" biofuels.

Bioethanol and biodiesel are the main biofuels commercially available today and together currently contribute about 2% by volume of global transportation fuel demand. However, these fuels are chemically and functionally quite different from traditional petroleum-derived fuels and to varying degrees are incompatible with the existing petroleum processing and distribution infrastructure. The driver for producing "drop-in" fuels is that it would be preferable if biofuels could be functionally equivalent to current petroleum-derived fuels such that they could be readily "dropped into " the existing petroleum refining, distribution and use infrastructure. In some cases, such as fuels for aviation, drop-in fuels offer the only renewable alternative to fossil fuels. While tremendous technical progress and commercialization activities have taken place over the past several years, only relatively small amounts of drop-in biofuels that are functionally equivalent to petroleum-derived transportation fuels are commercially available today. This report evaluates the main technological routes to produce drop-in fuels, dividing the approaches into oleochemical, thermochemical, biochemical and hybrid technology pathways or platforms. The strengths and challenges of each technology are assessed and discussed. The increased demand for hydrogen to deoxygenate biomass to produce drop-in fuels remains one of the key challenges and is expected to play a major role in future commercialization of drop-in biofuel platforms.




The main report (200+ pages), as well as a 20-page executive summary, is available for download from the Task 39 website .

**For further information, please contact:**
**Jack Saddler, Task Leader, IEA Bioenergy Task 39**
**Email: Jack.Saddler@ubc.ca**
**www.Task39.org**

# Teaching

In the spirit of getting excited for the upcoming school year, we'd like to bring your attention to the creative ways Professor Mark Martinez and his students approach academics.
UBC Engineering students enrolled in *CHBE 401: Mechanical Pulping and Papermaking,* had a friendly competition with their video project this past semester. Working in small groups, the teams had to choose a new bio-product that can be made from forest materials and then show the process of going from tree to bio-products, properties of the material, an estimated environmental impact and an economic review, all in a brief and creative video. Marks were awarded for interesting topic, artistic and entertainment value. The top 2 videos are showcased on the UBC Engineering YouTube channel.
Find them here: YouTube.com/UBCEngineering

Look for "**CHBE 401 - Aerogel**" and "**CHBE 401 - Production of Crude Oil from Thermal Deoxygenate**"

# Publications

## Journal

**A. Nikbakht**, A. Madani, J.A. Olson and D.M. Martinez, "Fibre suspensions in Hagen-Poiseuille flow: transition from laminar plug flow to turbulence", Journal of Non-Newtonian Fluid Mechanics, accepted for publication.

**Abstract:** The focus of the present work is an experimental study of the behavior of semidilute, opaque fibre suspensions during fully-developed pressure-driven flow in a cylindrical pipe. We measure the instantaneous velocity profiles across the radius $R$ of the pipe, using ultrasound Doppler velocimetry (UDV), as a function of the applied hydraulic pressure and concentration (0.75-1.75% (wt/wt)). In total 374 conditions were tested on three different flexible, non-Brownian fibre suspensions. The goal of the work was to gain insight into the role of the plug during transition to turbulence. From the UDV measurements, we estimated the radius of the plug $r_p$, the yield stress of the suspension $\tau_y$, through knowledge of the pressure drop, as well as the Reynolds stress $\rho u^2$. We find that the yield stress varied non-monotonically with flow rate for each suspension tested. At slow flow, i.e. when $r_p/R$ -> 1, we observe that plug densification, i.e. a contraction of the plug created by the growth of a lubricating film at the wall, caused the initial increase in yield stress. Yield stress was found to continue to increase with flowrate and its maximum was reached at $0.4 < r_p/R < 0.7$. With plug sizes smaller than $r_p/R < 0.4$, the yield stress of the plug diminished with increasing flowrate through what we believe to be an erosion-type mechanism. We estimate the critical Reynolds number $Re_c$ for the disappearance of the plug for all cases.

## Conference Proceedings

**M. Yousefi**, M. G. Forbes, R. B. Gopaluni, P. D. Loewen, G. A. Dumont, J. Backstrom, "Sensitivity of MIMO Controller Performance to Model-Plant Mismatch, with Applications to Paper Machine Control" accepted by Multio-Conference on Systems and Control (MSC), Antibes/Nice, 2014.

**Abstract:** Model-based controllers based on incorrect estimates of the true plant behavior can be expected to perform badly. This work quantifies the performance deterioration for a certain class of MIMO systems. Performance is measured using a Minimum Variance index and a closely related user-specified criterion. Under reasonable conditions, the performance of each output component in a MIMO system can be analyzed independently. We define a sensitivity measure that relates system performance to model-plant mismatch, and use it to explore this sensitivity for three realistic types of parametric modelling errors. Next, we suggest a quantitative method that compare a system's actual output to its desired response in a transient setting. The performance of the transient response is demonstrably more sensitive to the model-plant mismatch than the steady state performance. The results are illustrated on industrial paper machine data.

# UBC United Way

The UBC United Way Campaign is an annual workplace campaign that runs in the fall and creates a great opportunity for students, staff and faculty on campus to connect, network and raise funds for a great cause.

Mark your calendars for the UBC United Way Campaign Kick Off week on October 6-10. **The 2nd annual Applied Science Turkey 2k Trot is taking place October 8th at Noon**. Dean Parlange has challenged deans across campus to a 'participation race'. *What's that* you ask? Our APSC dean will donate $1 for each registrant from other faculties that exceed the number of participants from Applied Science, so come out and support your faculty!
More info here: unitedway.apsc.ubc.ca/turkey-2k-trot/

In addition to making a payroll pledge, there are lots of ways to get involved with the UBC United Way Campaign, whether you're faculty, staff or a UBC student. The Applied Science committee is currently looking for volunteers for the upcoming fall campaign. If you are interested in volunteering on the committee or at one of their fun events, please contact APSC United Way co-chair Anna Jamroz at anna.jamroz@ubc.ca

# PaperWeek 2015


**Join the World Leaders in Biorefinery on February 2-5, 2015 in Montreal, Quebec**

The 2015 edition of PaperWeek will feature the theme "Shaping the Future: People, Process and Innovation". PaperWeek Canada is the major annual event serving the pulp and paper industry where the sector's key players, experts and future talent converge to exchange on the latest technology, operation improvements, and research progress, and to meet peers and clients.
The Forest Biorefinery Summit is organized by an international committee in conjunction with PaperWeek Canada, hosted by PAPTAC.

**The Forest Biorefinery Summit will feature:**

- Oral presentations by eminent personalities;
- A panel on strategic reflection to facilitate the access to the market of forest-based bioproducts and biomaterials;
- Keynote presentations;
- A poster session as part of a networking event.

Key players from the forest, bio economy and chemical sectors will share their experience. Governments, academia and research institutes will also be represented.

**Submissions:**

Abstract submissions for oral and poster presentations will be accepted until **September 29, 2014.** Please send an abstract of 300 words maximum to Mariya Marinova at m.marinova@polymtl.ca.

Topics of interest for submission include:

- Biorefinery resources and supply chain
- Biorefining technologies
- Bioproducts and biomaterials – from forest to market
- Market perspectives
- Integrated forest biorefineries
- Sustainability of the forest biorefinery
- Building links between the forest and chemical industry
- Combining forest and agricultural biomass

The accepted abstracts will be selected according to level of quality and relevance.

www.paperweekcanada.ca

1915-2015 PAPTAC

# Upcoming Events

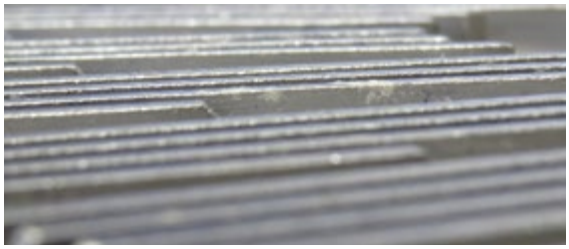
**PPC Annual General Meeting (AGM)**
**September 8, 1:00-2:00 pm, room 101**
Join us for the PPC AGM hosted by Professor Mark Martinez. Various subjects will be discussed including safety, introductions, Engineering Coop, among others. *Attendance mandatory for all PPC staff and students.*

**13th TAPPI Advanced Coating Fundamentals Symposium**
**October 7-9, Minneapolis, USA**
Bridge the gap between coating research and commercialization by hearing the latest research in advanced understanding of paper and board surface characterization; fundamental coating processes and structures; and more! Reserve your seat today at www.tappi.org/14acfs

# 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: One of the state-of-the-art FINERBAR® plates that are available at the Pulp and Paper Centre. These refiner plates enable researchers to perform refining trials tailored for specific pulp types. The plate patterns offer a variety of bar widths, groove widths, groove depths, and various angles.

*Photo c/o Anna Jamroz*

# Social Media

Follow us on Twitter **@ubcPPC**

Like us on Facebook **/ubcPPC**

Visit us online: www.ppc.ubc.ca

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

Natural Resources @NRCan 8 AUG
[VIDEO] Wood in toothpaste? Find out about surprising uses for #wood products in #Canada ow.lyzND1w

UBC Pulp & Paper Centre @ubcPPC 8 AUG
International Forest Biorefinery Summit now accepting abstracts until Sept. 29. More: ow.ly/A76wp @ubcengineering @ubcappscience

UBC Pulp & Paper Centre @ubcPPC 7 AUG
@ECEUBC Capstone Design Project course still looking for industry partners/projects to collaborate on. More info here http://ece.ubc.ca/CapstonePartners

# 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**