

Advanced Papermaking Initiative

Annual Report

April 1, 2017 to March 31, 2018



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DIRECTOR'S NOTE

The Advanced Papermaking Initiative (API) 20th Annual Report provides an insight to the activities of the API-funded faculty for the reporting period of April 1, 2017 to March 31, 2018.

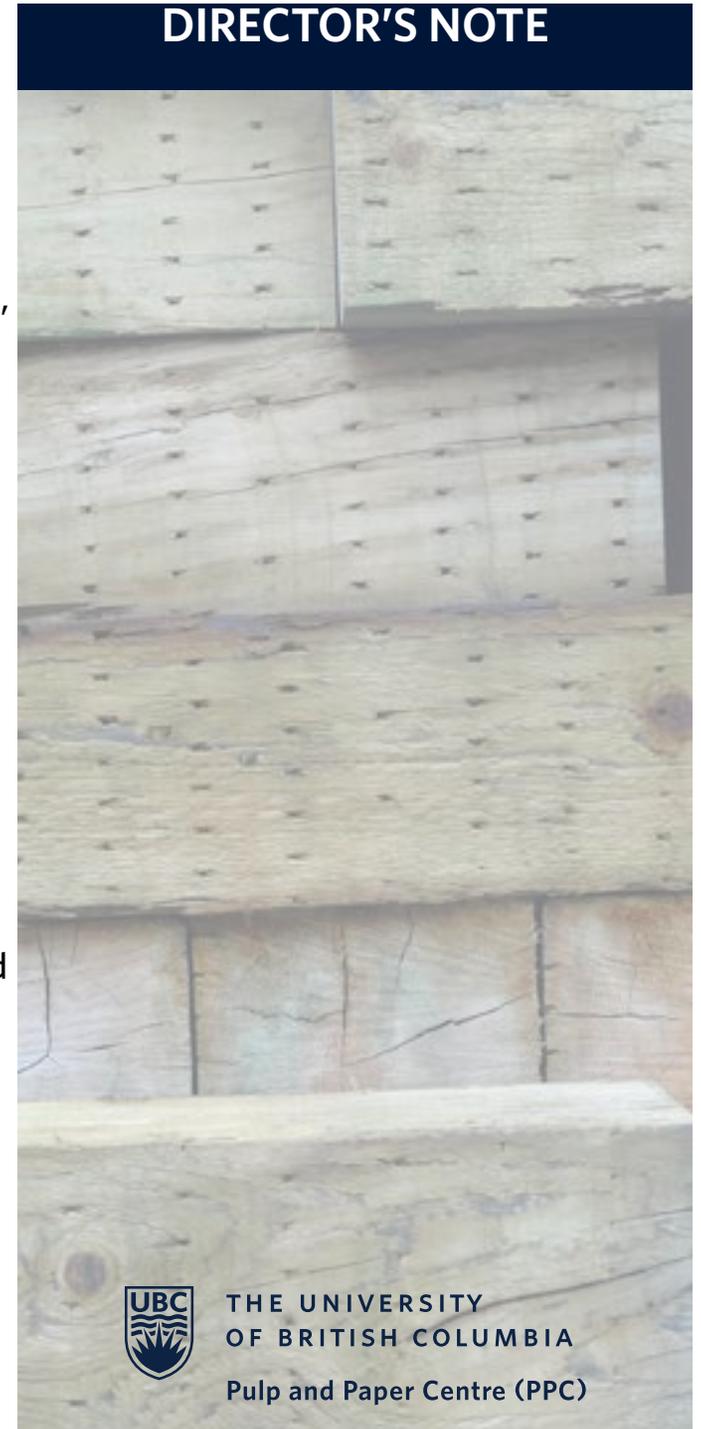
Research carried out at UBC's Pulp and Paper Centre (PPC) is industry relevant, and focuses on efficient processes that advance research and partnerships of the Advanced Papermaking Initiative, Energy Reduction in Mechanical Pulping program and the BioProducts Institute.

API's Research Steering Committee held its annual general meeting on August 30, 2017 to review progress made, plan for the year ahead, and to approve the financial statements and budget. The information on finance contained herein supersedes those of the previous reporting period (April 1, 2016 to March 31, 2017).

The 20th Annual Report introduces the scope and strides of our BioProducts Institute. The report also touches on our community outreach through volunteers, research interests of our graduate students supervised by API-funded faculty, and the staff who keep the establishment running smoothly and effectively.

My thanks to PPC's Steering Group, faculty members, staff and researchers for making our research community vibrant.

Mark D. Martinez, PhD, P.Eng, FCAE
Director, Advanced Papermaking Initiative
Director, Pulp and Paper Centre
Director, BioProducts Institute



THE UNIVERSITY
OF BRITISH COLUMBIA
Pulp and Paper Centre (PPC)

Advanced Papermaking initiative

The mission of the Advanced Papermaking Initiative (API) is to enhance post secondary education and research for the pulp and paper industry of British Columbia.

API supported the creation of:

- Two faculty positions at UBC — Professors James A. Olson in Mechanical Engineering and Mark Martinez in Chemical and Biological Engineering, and
- One faculty position at BCIT — Dr. Rodger P. Beatson.

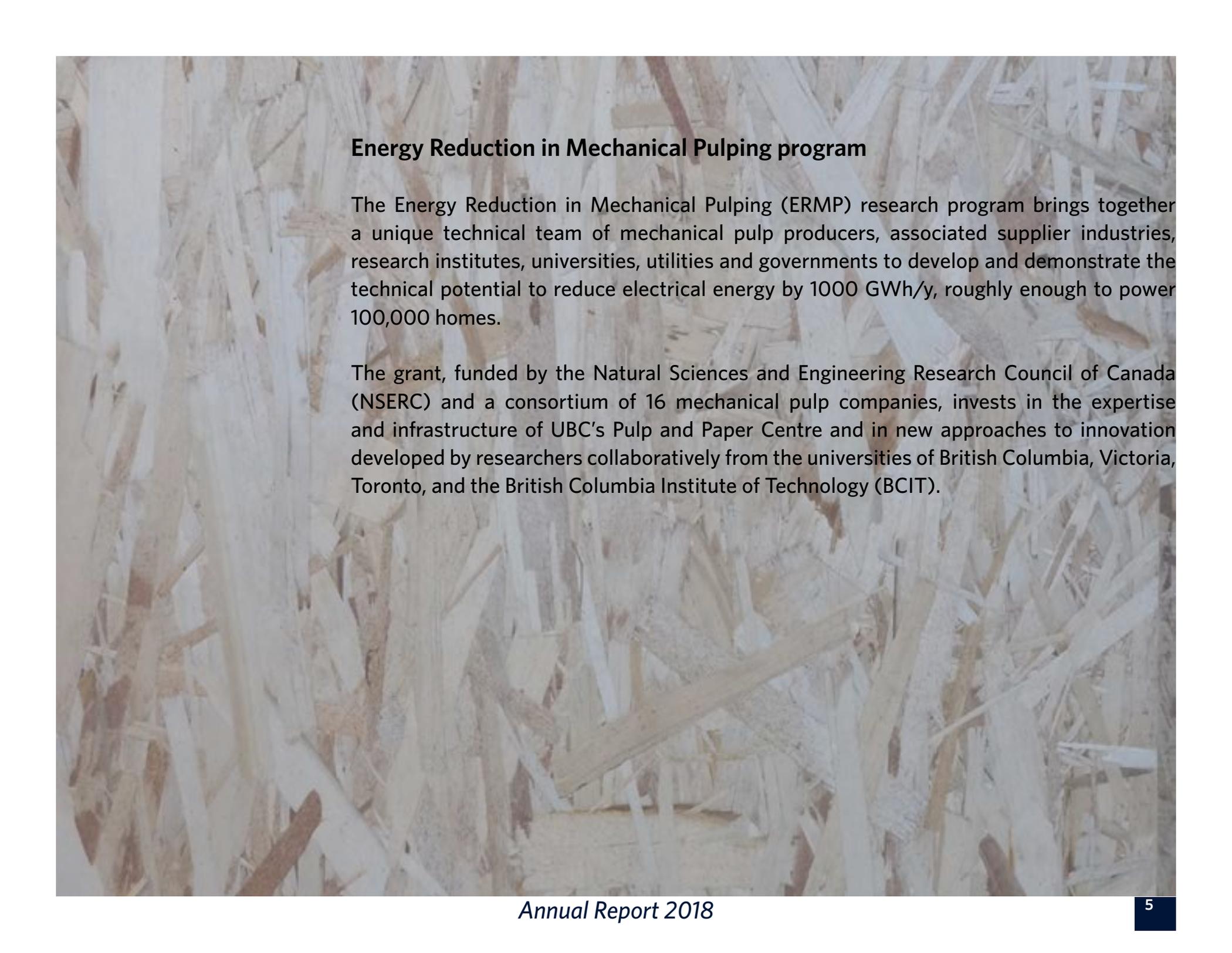
Professor Peter Englezos, a faculty member and Head of the Department of Chemical and Biological Engineering at UBC, is also a faculty member of the API.

BioProducts Institute

The BioProducts Institute (BPI) is an international research organization that brings together academia, industry and governments to:

- Transform Canada's sustainable bio-based resources from forestry and agriculture.
- Address critical technical and social licence barriers to bioeconomy success.
- Foster bioeconomy leadership through leading-edge educational programs for HQPs.
- De-risk innovative and impactful bioproduct processes, outputs and markets.

BPI's 60+ researchers pave the way for a rich and diverse bioeconomy by connecting end users and fundamental and applied science expertise and resources. Their expertise covers a broad range of disciplines such as plant genetics, biocatalysis, advanced materials engineering, and social sciences from four faculties — Land and Food Systems, Applied Science, Forestry, and Science.

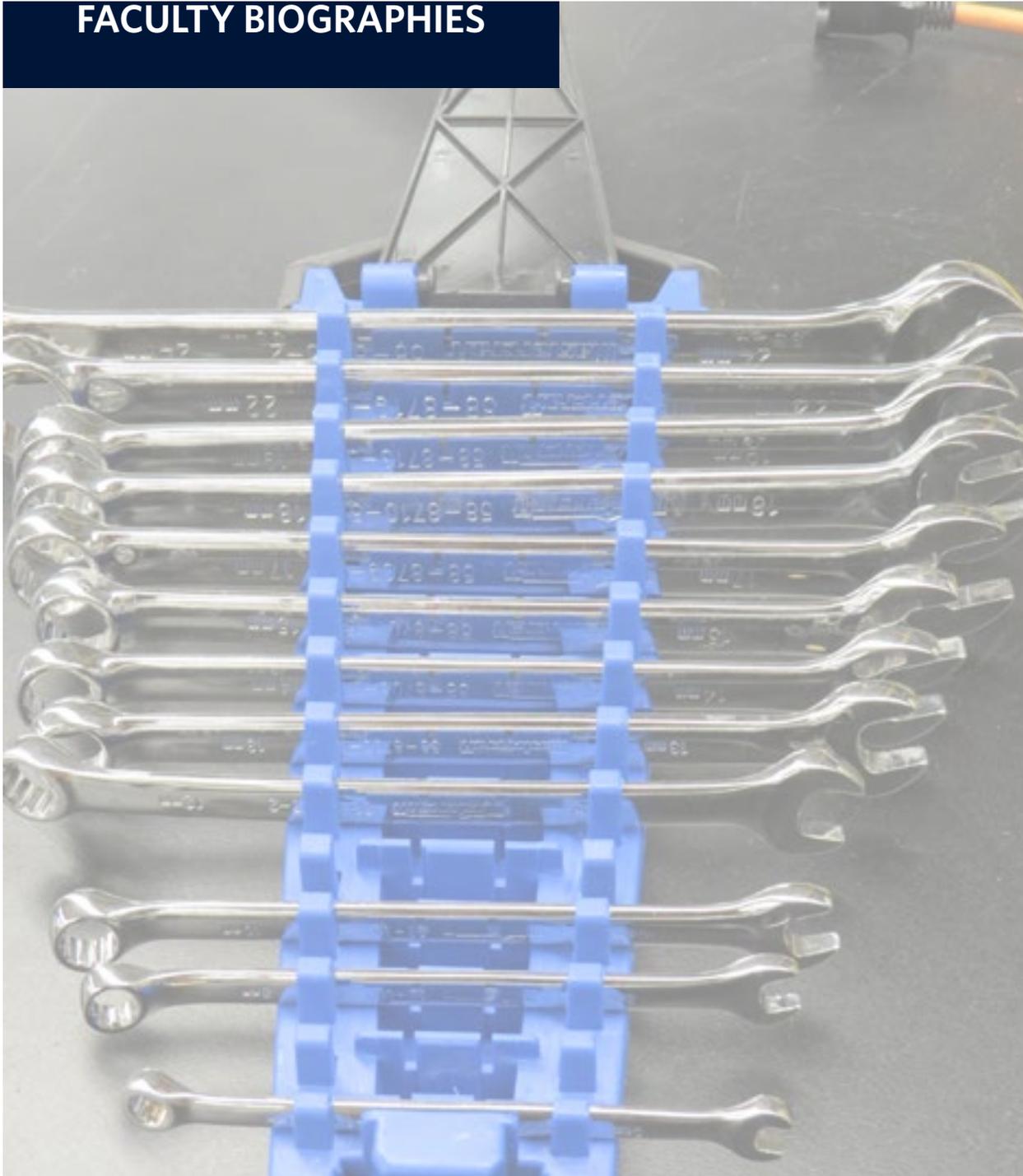
The background of the slide is a close-up photograph of wood chips, showing various sizes and orientations of light-colored wood shavings. The text is overlaid on this image.

Energy Reduction in Mechanical Pulping program

The Energy Reduction in Mechanical Pulping (ERMP) research program brings together a unique technical team of mechanical pulp producers, associated supplier industries, research institutes, universities, utilities and governments to develop and demonstrate the technical potential to reduce electrical energy by 1000 GWh/y, roughly enough to power 100,000 homes.

The grant, funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) and a consortium of 16 mechanical pulp companies, invests in the expertise and infrastructure of UBC's Pulp and Paper Centre and in new approaches to innovation developed by researchers collaboratively from the universities of British Columbia, Victoria, Toronto, and the British Columbia Institute of Technology (BCIT).

FACULTY BIOGRAPHIES



- **Prof. Rodger P. Beatson**
- **Prof. Peter Englezos**
- **Prof. Mark D. Martinez**
- **Prof. James A. Olson**
- **Prof. Nuwan Sella Kapu**
- **Prof. Barbara Dalpke**

Rodger P. Beatson holds a B.Sc. Honours (1968) in Chemistry from the University of Exeter, Devon, England. He obtained his Ph.D. in Organic Chemistry from the University of Western Ontario, London, Ontario in 1975. The following year, he joined Consolidated-Bathurst, subsequently becoming Group Leader Product Development in the Packaging Division. Rodger joined Paprican in 1979 and held research positions in mechanical pulping and fibre and paper physics. He also served as Director of the Papricourse in the 1980s. Rodger joined Canadian Forest Products as a Senior Research Scientist in 1990. He began working for the API in 1999 as faculty member at BCIT. Rodger served as the Chairman of the PAPTAC Research committee in 1994, and has been Adjunct Professor in the Faculty of Forestry since 1995. Dr. Beatson's current research interests are dissolving pulp production, the use chemicals to reduce energy consumption in refining and the recovery of hemicellulose from mill residues for use in improving beatability and enhancing paper strength.



Peter Englezos holds a Ph.D. in Chemical Engineering from the University of Calgary (1990). During his Ph.D. studies, Peter was the recipient of an Izaak Walton Killam Memorial Scholarship. In September 1990, he joined the Department of Chemical Engineering at UBC as Assistant Professor. He was awarded a UBC Izaak Walton Killam Memorial Faculty Research Fellowship for 1997-98. He was named Fellow of the Tokyo Electric Power Company Endowed Chair at the Faculty of Science and Technology of Keio University, Japan in 1999. He served as Coordinator of the Master of Engineering, non-thesis Pulp and Paper Program during 1992-99. Peter served as the Director of the Advanced Papermaking Initiative between July 2005 and August 2011. He became the inaugural holder of the Advanced Papermaking Professorship in December 2007. Peter was appointed Head of the Department of Chemical and Biological Engineering in July 2009. He is a registered Professional Engineer in British Columbia and a member of the Canadian Academy of Engineering. His current research interests span engineering wood fibres for novel product development, novel gas separation technologies for hydrogen production and carbon dioxide capture, water desalination and natural gas hydrates.





Mark D. Martinez holds a Ph.D. in Chemical Engineering from The University of British Columbia (1995) and a Docent in Paper Technology (1999) from the Royal Institute of Technology, Sweden. He joined the Chemical Engineering Department at UBC in 1999 after four years at the Swedish Pulp and Paper Research Institute, Stockholm, as Senior Research Associate for the paper technology group. Mark was appointed Director of the UBC Pulp and Paper Centre at the start of 2014, and has been the Director of the Advanced Papermaking Initiative since 2011. His research focuses on the fluid mechanics of fibre suspensions. Recognition of Mark's research comes from numerous awards including the 2009 BCIC Lieutenant Governor's Award for Innovation. Mark is a registered Professional Engineer in British Columbia.

James A. Olson holds a B.A.Sc. in Engineering Physics (1991) and a Ph.D. in Chemical Engineering from the University of British Columbia (1996). He worked at the Pulp and Paper Research Institute of Canada in Ottawa from 1995 to 1999 to lead a research project on fibre fractionation and contaminant control. He joined the Mechanical Engineering Department at UBC in July 1999 as Assistant Professor. James was appointed Director of the UBC Pulp and Paper Centre in 2011 and served as Associate Dean of Research and Partnerships at the Faculty of Applied Science in 2014. In June 2017, James took over as Interim Dean, and was welcomed as Dean in March 2018.

His research is in the areas of advanced pulp processing, screening, LC refining, fibre and paper properties, and the fluid mechanics of fibre suspensions. He leads a \$4 million research program to reduce electrical energy in mechanical pulping and another research group on the development of novel biomaterials. In recognition of his research he received two NSERC Synergy awards for industry collaboration, two I.H. Weldon awards for best papers, the Van den Akker medal from the Fundamental Research Committee UK and the 2009 BCIC Lieutenant Governor's Award for Innovation as well as several best paper awards. James is a registered Professional Engineer in British Columbia. He was elected Fellow of the Pulp and Paper Technical Association (PAPTAC) recently in 2017.



Nuwan Sella Kapu has more than fifteen years of experience in the plant sciences and biomass processing. He obtained his Ph.D. in Plant Biology specializing in cell wall biology and biochemistry from the Pennsylvania State University, University Park. In 2007, he joined Expansyn Technologies, Inc. a start-up company, as Principal Scientist to spearhead research and development programs to commercialize plant cell wall proteins to produce biofuels. For a short period, he served as a Scientist in the Chemical Pulping-Process Engineering group at FPIInnovations working on mill-targeted applied research programs in kraft pulping. His current research at UBC is focused on developing technologies for bio-products and biorefineries using diverse feedstocks including bamboo.



Barbara Dalpke graduated in 1997 with a degree in Pulp and Paper Engineering from the Technical University in Darmstadt, Germany. She then joined the PhD program in Mechanical Engineering at UBC and upon graduation in 2002 transferred to the Chemical Engineering department as a Postdoctoral Fellow. In 2005 she started working as a Research Scientist at Paprican (now FPInnovations) until 2012. Currently Barbara is employed as a sessional lecturer at UBC and teaches Pulp and Paper Technology to undergraduate students at the University of Victoria.





Rodger Beatson instructed 54 students for 3 [courses](#) in Chemical and Environmental Technology (CENV) — #3346, 4400 and 4403 — at BCIT covering Paper and Chemicals from Renewable Resources, Research Projects and Process Simulation. His scheduled lectures and labs logged 210 hours. Rodger was the principal supervisor of a research associate, a PhD student and two co-op students. Rodger co-supervised two graduate students in their research.

Peter Englezos was in charge of the Chemistry and Biological Engineering (CHBE) Thesis course 491, 493, 494, 496 with eight students. He gave guest lectures in CHBE 364/365/366 to cover 115 students and 2 hours, the CHBE course 243 to 120 students of one-hour duration.

Mark Martinez conducted the course CHBE 251, Transport Phenomena 1 on Fluid Mechanics with 39 hours of instruction provided to 150 students. Mark supervised the research work of 8 doctoral students and co-supervised two graduate students.

UBC Instructor **Dr. Barbara Dalpke** delivered 37.5 hours of instruction over 14 weeks for the 3-credit course, MECH 450, Pulp and Paper Technology to 11 (ten 4th year and one graduate) students of the University of Victoria. The course is taught by video link to students at University of Victoria.



Nuwan Sella Kapu developed the curricula and taught courses in the Chemical and Biological Engineering undergraduate program and the MEL Green Bio-Products (MEL-GBPR) professional program. He delivered 42 hours of CHBE 402/GBPR 501, Biomass Fractionation Technology and Biomass Conversion Chemistry to 17 students (10 undergraduate and 7 graduate students). Dr. Sella Kapu also taught GBPR 500: Building Blocks of Forest Biomass for 84 hours to 3 students. In winter term I of 2017, Dr. Kapu developed a laboratory course and guided the MEL-GBPR students in the laboratory component of GBPR 503. In addition, he established a partnership with FPIInnovations for an industry practicum for a MEL-GBPR student to fulfill a 3-credit technical elective requirement.

James A. Olson is involved in developing new undergraduate technical elective courses aimed at a wide range of undergraduate engineering students. James delivered the keynote address and lecture at our API course, Introduction to Pulp and Paper Technology to 26 participants for 3 hours on April 26, 2017. James took on the role of Interim Dean, Faculty of Applied Science in June 2017 and the UBC President's Board welcomed him as Dean in March 2018. James continues to support the Energy Reduction in Mechanical Pulping program as well as supervise doctoral students in their research and theses defence and evaluations.



RESEARCH

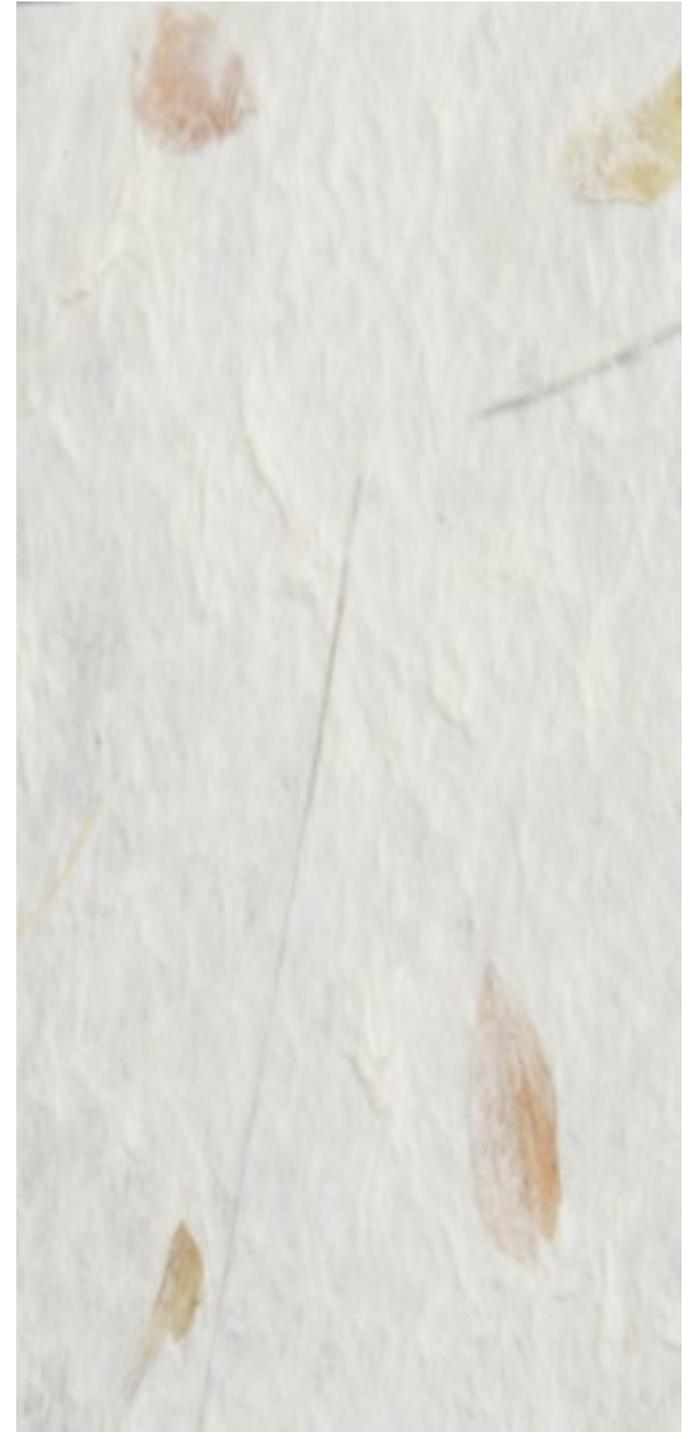
Research contributions of API faculty members span diverse fields of applications useful to the pulp and paper industry, the forestry industry as well as the oil and gas sector. Under the faculty's stewardship, a number of large proposals were championed on behalf of the industry. These included proposals to Canadian Foundation for Innovation (CFI), President's Excellence Research Chair in Forest Bioproducts, Canada Excellence Research Chair (CERC), and National Centres for Excellence grants aimed at bringing world-class infrastructure and researchers to UBC.

Rodger Beatson

Energy Reduction in Mechanical Pulping

Application of Chemical and Enzymatic Treatments in Low Consistency Refining
Dr. R.P. Beatson (BCIT), Post-Doctoral Fellow Yu Sun, Research Associate Harry Chang. This is part of the collaborative effort on energy reduction in refining, Phase II, headed by James Olson.

Reducing electrical energy consumption in mechanical pulping is strategically important for cost reduction and the sustainability of the pulp and paper industry. In Phase I of the program we demonstrated energy savings of 1000 kWh/t through the treatment of primary stage pulp with of alkaline peroxide prior to low consistency refining. One of the goals of Phase II is to determine the best position to apply various chemical treatments in the mechanical pulping process to obtain the desired pulp properties at the lowest energy. The latest work explored two-stage alkaline peroxide treatment as an approach to maximize strength gains, brightness and energy savings. It was found that by reducing the alkali charge in the first stage of the alkaline peroxide treatment and following this by an alkali soak at lower temperature, good tensile gains could be achieved while maintaining higher brightness. New investigations



have focussed on the treatment of high-freeness thermomechanical pulp with chlorine dioxide. When the chlorine dioxide treatment is followed by an alkali soak, enhanced tensile strength was observed. The chlorine dioxide treatments lowered brightness but brightness could be readily recovered by a subsequent peroxide bleach.

Recovery of hemicellulose from mill residues and their use to enhance paper strength

Dr. R.P. Beatson (BCIT), Prof. H. Trajano (UBC)

Mill residues such as hog fuel are generally burnt in boilers to provide a source of heat and steam. These residues contain high-value chemicals such as extractives and hemicelluloses. If the hemicelluloses could be successfully extracted from hog fuel their addition to pulp might promote pulp strength and beatability. This project is funded by a NSERC Collaborative Research and Development Grant with Canfor as the industrial partner. During the past year a model was developed that describes the effect of concentration, pulp consistency, temperature and time on the absorption of hemicellulose by bleached kraft pulp. It was found that absorption was favoured by a high hemicellulose oligomer to pulp ratio, low consistency and low temperature. Working with locust bean gum as a model hemicellulose, it was shown that oligomers with a molar mass of 600 kDa were most effective at increasing tensile strength.

Production of Dissolving Pulp from Bamboo

Dr. R.P. Beatson (BCIT), Prof. M. Martinez (UBC)

As a fast-growing species, bamboo has been widely used for industrial applications, and recently has been demonstrated to be an attractive alternative feedstock for dissolving pulp. However, the high silica content in bamboo is a major obstacle in using bamboo as a raw material. In pulping applications,



silica precipitation causes scaling problems in multiple effect evaporators. In addition, residual silica in pulp deteriorates viscose filterability and interferes with the spinning process. Previously we have shown the feasibility of reducing silica content entering the digester by chip treatment with water and alkali allowing the production of high-grade dissolving pulp. Recently, this process has been developed into a biorefinery process for the production of high-grade dissolving pulp and ethanol from bamboo. The technology has also been shown to be suitable for processing wheat straw, which, like bamboo also contains high amounts of silica.

Peter Englezos

Clathrate or gas hydrates are non-stoichiometric crystalline inclusion compounds formed by water and a number of other molecules at suitable temperature and pressure conditions. Our work provides data and advances understanding of this multiphase crystallization process. Moreover, we identify ways to manipulate and control the behaviour of the relevant systems in ways that lead to technological innovations. Our work contributes to the development of laboratory tools to assess the behaviour of environmentally compatible chemicals added to oil and gas hydrate forming systems in the field to mitigate the risk from gas hydrate formation. Another line of work relates to the effort to extract the methane (natural gas) from the earth's gas hydrates. We aim to understand the governing processes of depressurization and steam thermal stimulation through experimentation and molecular simulation.

Carbon dioxide capture and storage: Geological storage of CO₂ in depleted oil and gas reservoirs is a strategy with significant potential to mitigate climate change concerns arising from the emission of CO₂ from the combustion of fossil fuels. Because at storage conditions CO₂ may form solid gas hydrates





Mark Martinez

Flow visualization with special interest in dense opaque papermaking suspensions. Over the last number of years we have created a laboratory to visualize the motion of flowing fluids. For single phase optically clear fluids we have both Laser Doppler and Particle Image Velocimetry, and optical coherence tomography. Of special interest is flow visualization in optically dense fluids and suspensions. In this case we have an ultrasound Doppler anemometer, developed a novel use of positron emission tomography (PET), used magnetic resonance imaging (MRI), and a number of index of refraction matching techniques.

Fluid Physics with special interest in Non-Newtonian Fluids and Papermaking suspensions

- (i) understanding the transition to turbulence in viscoplastic fluids
- (ii) understanding the behaviour of yield stress fluids near their yield point, and
- (iii) flocculation behaviour of rigid, non Brownian, fibre suspensions. In these works we have used both computational and experimental methods to elucidate the mechanism under question. Our research and work has had applications in both the pulp and paper sector and oil and gas industries.



James Olson

James continues his fundamental research to develop an understanding of the behaviour of turbulent fibre suspensions and has published his research in several peer-reviewed journals. James has a long standing collaboration with Advanced Fibre Technologies Inc. to conduct student-based research and development. One success of this collaboration is the development of two new pulp screen rotor designs. The new rotor design was shown to decrease electrical power consumption by 52% over conventional technology. The technology is now deployed through much of the Canadian and world industry with more than 100 mills adopting the new rotors. If implemented through Canada, this technology has the potential to lower electrical energy consumption by more than 200 GWh/yr or save 20 Million dollars per year based on a \$50 MW/h.

James significantly contributed to the understanding and industrial application of fibre separation technology in the pulp and paper industry, BC's largest industry and Canada's largest net export industry. He has detailed the mechanism of fibre separation in industrial screening equipment and developed simulation and optimization tools to enable mill engineers and technology supplier companies, such as Advanced Fibre Technologies Inc. to improve their separation processes.

PUBLICATIONS

Papers Published in Peer-reviewed Journals

- Massah, M., D. Sun, H. Sharifi and P. Englezos. 2018. "Demonstration of Gas-Hydrate Assisted Carbon Dioxide Sequestration through Horizontal Injection in Lab-Scale Reservoir". *Journal of Chemical Thermodynamics*. 117:106-112.
- Yuan Z, Y. Wen, and N.S. Kapu. 2018. "Ethanol production from bamboo using mild alkaline pre-extraction followed by alkaline hydrogen peroxide pretreatment". *Bioresource Technology*. 247:242-249.
- Yuan Z, Y. Wen, N.S. Kapu, and R. Beatson. 2018. "Evaluation of an organo-based biorefinery process to fractionate wheat straw into ethanol and co-products". *Industrial Crops and Products*. 121:294-302.
- Yuan, Zhaoyang, Yangbing Wen, Nuwan Sella Kapu, Rodger Beatson and D. Mark Martinez. 2017. "A biorefinery scheme to fractionate bamboo into high grade dissolving pulp and ethanol." *Biotechnology for Biofuels*. 10(38). doi.org/10.1186/s13068-017-0723-2.
- Imbibition with swelling: Capillary rise in thin deformable porous media. 2017. Kvik, Mathias, D. Mark Martinez, Duncan R. Hewitt, and Neil J. Balmforth. *Physical Review Fluids*. Doi:10.1103/PhysRevFluids.2.074001.
- Meaghan Miller, Antti Luukkonen and James A. Olson. 2017. "Effect of LC refining intensity on fractionated and unfractionated mechanical pulp." *Nordic Pulp and Paper Research Journal*. 32(3):386-94.

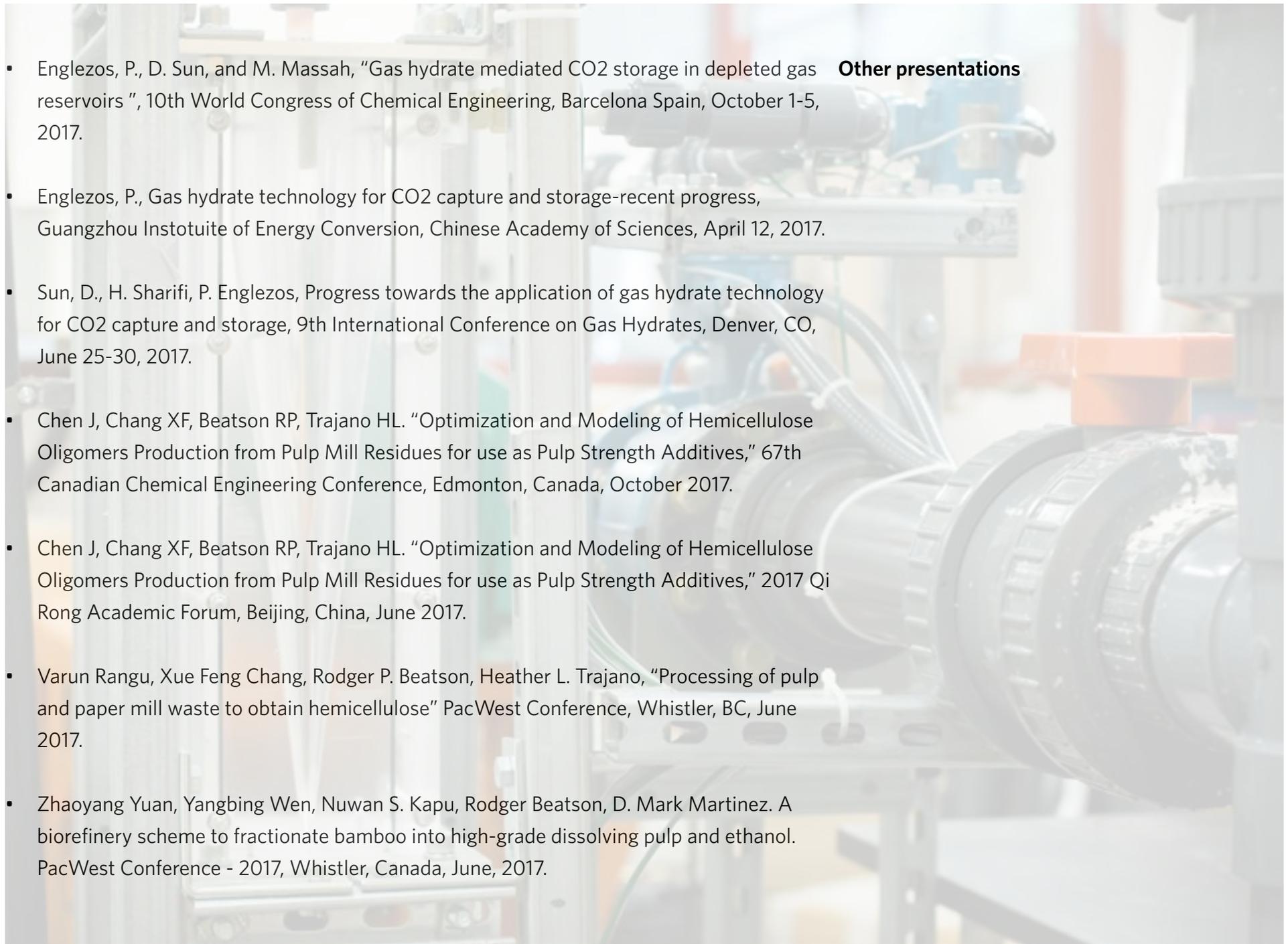
Invited Presentations

- Kapu N.S. Bamboo: A fast growing feedstock for a biorefinery. Biofuels 2017: 7th International Congress on Biofuels and Bioenergy 2017, October 3, 2017.
- Englezos, P., "CO2 capture and storage", National Tsing Hua University, Hsinchu, Taiwan, November 23, 2017.
- Englezos, P., "Energy recovery from gas hydrates", National Taiwan University of Science and Technology, Taipei, Taiwan, November 22, 2017.
- Englezos, P., "Gas hydrate technology for CO2 capture and storage-recent progress", Plenary Speaker, Workshop on Natural Gas Hydrates, Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, April 10, 2017.
- Englezos, P., "Hydrate Based Gas Separation Technologies", 2018 Natural Gas Hydrate Systems Gordon Research Conference, Galveston, TX, February 25 - March 2, 2018.

Other presentations

- Englezos, P., "Gas recovery through the injection of carbon dioxide or concentrated flue gas in a natural gas hydrate reservoir", OTC Asia, Kuala Lumpur, March 20-23, 2018.
- Osadetz, K.G, D. C. Lawton, P. Englezos and A. Saeedfar, "Athabasca region shallow CO2 gas hydrate storage potential: identifying the key uncertainties for storage capacity", SPARK 2017 Conference, November 6-8, 2017, Edmonton, AB.



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- Other presentations**
- Englezos, P., D. Sun, and M. Massah, "Gas hydrate mediated CO₂ storage in depleted gas reservoirs ", 10th World Congress of Chemical Engineering, Barcelona Spain, October 1-5, 2017.
 - Englezos, P., Gas hydrate technology for CO₂ capture and storage-recent progress, Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, April 12, 2017.
 - Sun, D., H. Sharifi, P. Englezos, Progress towards the application of gas hydrate technology for CO₂ capture and storage, 9th International Conference on Gas Hydrates, Denver, CO, June 25-30, 2017.
 - Chen J, Chang XF, Beatson RP, Trajano HL. "Optimization and Modeling of Hemicellulose Oligomers Production from Pulp Mill Residues for use as Pulp Strength Additives," 67th Canadian Chemical Engineering Conference, Edmonton, Canada, October 2017.
 - Chen J, Chang XF, Beatson RP, Trajano HL. "Optimization and Modeling of Hemicellulose Oligomers Production from Pulp Mill Residues for use as Pulp Strength Additives," 2017 Qi Rong Academic Forum, Beijing, China, June 2017.
 - Varun Rangu, Xue Feng Chang, Rodger P. Beatson, Heather L. Trajano, "Processing of pulp and paper mill waste to obtain hemicellulose" PacWest Conference, Whistler, BC, June 2017.
 - Zhaoyang Yuan, Yangbing Wen, Nuwan S. Kapu, Rodger Beatson, D. Mark Martinez. A biorefinery scheme to fractionate bamboo into high-grade dissolving pulp and ethanol. PacWest Conference - 2017, Whistler, Canada, June, 2017.

Profs. James A. Olson, Mark D. Martinez, Rodger Beatson and Peter Englezos supervised or co-supervised the research of these graduate students.

Daniel Paterson

“Dewatering of pulp suspensions is a fundamental unit process in the production of pulp and paper products. My research focuses on developing a model of dewatering over a range of concentrations, geometries, and rates appropriate to optimize equipment in industry. ”



Ehsan Zaman

“The main focus of my Ph.D. research was on numerical modelling of the hydrocyclone flow field with application to the fractionation of pulp fibres and removal of unwanted constituents from the pulp slurry. I introduced a novel criterion to categorize turbulent swirling flow fields. This criterion helps perform the numerical modelling of such flows more economically and efficiently.”



Farzin Golkosh

“My research involves the application of Synchrotron tomographic 4D imaging (3D + time) of different paper samples to investigate their deformation and failure mechanisms.”



Jinyi Tian

“I work on enhanced-separation hydrocyclone technologies, developed by optimizing operating parameters and conditions.”



Jordan Mackenzie

"My work focuses mainly on the hydrodynamic stability of reacting, co-current flows. Using this technique, we are interested in producing novel, bio-based materials for variety of applications."



Jorge Enrique Rubiano Berna

"My research focuses on broadening the understanding of the mechanisms of Low Consistency Refining of Mechanical Pulps. I am about to defend my PhD thesis this summer."



Masoud Daneshi

"My particular focus is with the flow of viscoplastic fluid around obstacles placed in a Hele-Shaw cell, which is the simplest possible idealization of how spatial non-uniformity in a slender conduit can block flow."



Mehr Negar Mirvakili

"My research interests include the design and fabrication of cellulose based functional materials for biomedical application, lab on chip diagnostics, sensors, and energy storage devices."

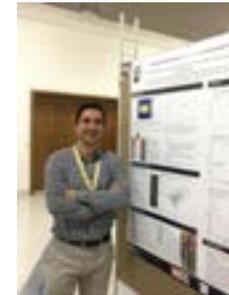
Miguel Villalba

“My research focuses on understanding the effect of operating conditions of screw feeders on the compression of wood chips. We also aim to determine how compression affects the cellulose accessibility of wood chips to enzyme treatment.”



Mohammad ShanbGhazani

“My research takes me to my designed laboratory-scale continuous device that tests the possibility of fractionation of particles through use of visco plastic fluids in a continuous method. Our results point to the possibility of reducing energy significantly in the production of microfibrillated cellulose.”



Nicholas McIntosh

“My work focuses on characterizing the solid or fluid interactions occurring in particle settling systems. An overall goal of my work is to improve the design process for particulate-laden fluid flow systems.”



Sudipta Kumar Mitra

“My PhD extends researching ultrasound refining of fibre suspensions and the effect of fibre morphology on mixing and refining of mixtures of softwood and hardwoods.”



RESEARCH STEERING GROUP

The API Research Steering Group met on August 30, 2017 at its Annual General Meeting. Members of the PPC research steering group comprise researchers and faculty members from universities (CRD-UBC-Valmet-UTQR) across Canada, and senior leaders from industry worldwide. This meeting is an important annual feature in PPC's calendar of events, and the day's agenda had a full day of discussion, lab tours and presentations.

Members present at the meeting met the quorum required.

From Valmet (Canada, USA and Sweden)

Jean-Pierre Bousquet, Angelo DiGirolamo and Patrik Petterson

From the Université du Québec à Trois-Rivières, Quebec

Eric Loranger, Bouchaib El Idrissi and Robert Lanuette

From the University of British Columbia, Vancouver

Nicholas McIntosh, Daniel Paterson, Tom Eaves, Neil Balmforth, Mona Rahmani and Mark Martinez

Mark Martinez, PPC Director chaired the meeting and led the discussions. Guest invitees and observers included PPC staff, George Soong, Meaghan Miller, Reanna Seifert and meeting organizer, Chitra Arcot.

Doctoral researchers Daniel Paterson, Tom Eaves and Bouchaib El-Idrissi presented their research findings and fielded questions at the end of their session.

- Daniel - "Material characterization and twin roll press"
- Tom - "Simplifying the screw press"
- Bouchaib - "Dewatering parameters in a screw press"





PPC STAFF

Chitra Arcot

Chitra's role oversees communication strategy and its implementation, as well as organization of PPC's events to enhance capacity-building opportunities for the university. Chitra holds a Master degree in Publishing from Oxford Brookes University, UK. She brings a rich portfolio of experiences gained from a diverse suite of organizations in corporate affairs, non-profits and a federal public affairs division. She is a certified project management professional.



Emilia Jahangir

Emilia received her B.Sc. in Chemistry from UBC. She joined the Pulp and Paper Centre in 2013 and was working with the low consistency refining team on various projects. Appointed as a research assistant-technician, Emilia managed and operated the low consistency refining facility at the PPC and contributed to different stages of pulp and paper quality testing. Emilia supervised a team of students, trained team members and researchers on testing, and provided maintenance of laboratory equipment. Emilia relocated to the US in August 2017.



Meaghan Miller

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, in collaboration with the University of Toronto. Meaghan manages the research program and is responsible for coordinating the various research projects and working with the programs industrial partners. She also oversees the experimental program, including both mill and pilot scale experimental trials. Meaghan took time off on parental leave in March 2018.



Reanna Seifert

Reanna holds a Bachelor of Science in Geology from UBC. Reanna was involved in numerous

projects ranging from gold to diamonds, pulverizing rocks to operating electron microprobes. Reanna has transferred her mineral processing skills to the world of pulp testing. As lab technician, she collaborates on low consistency refining trials and is responsible for all sample testing in the PPC pulp and paper testing lab. She also trains the ERMP Work Learn students and supervises their work.



George Soong

George holds dual Master degrees in forest bioproducts technology (UBC) and in pulp and paper science. He began working at UBC in 2006 and has been a key member of staff at PPC since 2007. For the past 8 years, George has served as safety and operations officer.



Alexandra Stuthridge

Having worked in the forestry science sector for more than 20 years, Alex brings a wealth of insights of the sector as well as strong program management skills. Amongst other initiatives, Alex is responsible for building the BioProducts Institute into a globally leading research cluster at UBC, and for preparing a number of grant proposals for NCE, CFI among others as technical business manager.



Vanessa Van Aert

Vanessa graduated from UBC in May 2017 with a Bachelor's degree in chemical engineering. Her work experiences during her student days included Quesnel River Pulp as technician for a low consistency refining project at the mill. Vanessa's role as research technician at PPC meant conducting refining trials for the ERMP program.



COMMUNITY OUTREACH

Gift of Giving

Volunteers from the Pulp and Paper Centre (PPC) bring the science of papermaking alive and vibrant to children and adults at Monthly papermaking events at Ronald McDonald House, interactive booths at the Vancouver Folk Music Festival and open doors on UBC's Imagine Day.

Students Volunteers

François Audard is a post-doctoral researcher investigating fluid mechanics, multiphase flows in refinery processes and multi-scale modelling. Marzieh Ebrahimi received her Ph.D from Chemical Engineering department of UBC. She found this volunteer experience amazing and worthwhile. Amir Farzad Forughi is a PhD candidate in Mechanical Engineering and researches flow visualization, porous media and experimental thermofluids. Albert Kong is a coop student who worked with Amir Farzad. Ehsan Zaman is a doctoral candidate at the Mechanical Engineering department. His main research area is computational fluid dynamics (CFD) in hydrocyclones. Other research areas of interest to him are turbulence and multiphase flows. Sudipta Mitra's Ph.D research extends ultrasound refining of fibre suspensions and the effect of fibre morphology on mixing and refining of mixtures of softwoods and hardwoods. Zhaoyang Yuan completed his Ph.D. at Department of Chemical and Biological Engineering in March and continued as a post-doctoral researcher. His Ph.D work focused on understanding silica and hemicellulose removal from bamboo for the production of kraft pulp or dissolving pulp. Mohammad Shanbghazani is working on his Ph.D as are fellow researchers, Daniel Paterson and Nicholas McIntosh. Justin Roberts, Ash Gautam and Ralohn Hunt are pursuing different programs at the Master degree level. Miguel Villalba is also an MASc student in Mechanical Engineering with a research interest in fluid mechanics and heat transfer.

Staff Volunteers

George Soong, Safety and Operations Officer



Volunteers in the craft room at Ronald McDonald House



Ehsan demonstrates papermaking at the Folk Music Festival

Reanna Seifert, Lab Research Technician

Chitra Arcot, Communications and Outreach Coordinator

Wendy Lock, Manager, Cooperative Education Engineering program

Volunteers from Faculty

Dr. Nuwan Sella Kapu is assistant director of MEL's Green Bio-Products program and a lecturer in Chemical and Biological Engineering in Applied Science.

Dr. Bhushan Gopaluni is the Associate Dean, Education and Professional Development in the Faculty of Applied Science.



Prof. Nuwan supervising papermaking at the Folk Music Festival

Staff at Ronald McDonald House (RMH) Vancouver are very appreciative of the activities we arrange for their residents—children undergoing treatments for cancer, and parents who stay with their children.

Professional Development for Graduate Students

“Best Techniques to get Published in Journals: An Insider’s View of Nature”

Chitra Arcot, PPC’s Communications Coordinator, with a rich portfolio of experiences in the publishing industry, proactively took the initiative to deliver seminars to help researchers strategize their scientific writing past elemental errors and publishing firewalls.



Photo courtesy of Ronald McDonald House, Vancouver

“PPC: Early Years”

Prof. Emeritus Richard J. Kerekes kept his promise to record his experiences as the founding director of PPC in his history of its early years. Richard’s narrative with pictures from his personal collection was published online (www.ppc.ubc.ca/about/ppc-early-years/) and as a limited edition in print. The print version was mailed to former employees of PPC and to its many collaborators, all of whom emailed Richard their pleasure in receiving an autographed copy.



Prof. Em. Richard Kerekes signed copies of his “PPC: Early Years”

FINANCES

For the Reporting Period of April 1, 2017 to March 31, 2018

	\$	\$
Transfer in from End Stab	0	-356,276.00
Subtotal	0	-356,276.00
Budget Balance Carry Forward	11,995.23	0
Budget pool - Expense	356,276.00	0
Total available	368,271.23	
Description	Period Total	PG YTD
TEACHING		
Salaries-Tenure Stream Faculty	6,000.00	6,000.00
Salaries-Faculty cost reduction	255,953.26	255,953.26
Salaries-Other Term Faculty	2,085.00	2,085.00
Salaries- Employee benefits - Main	327.53	327.53
Subtotal		264,365.79
COMMUNITY OUTREACH		
Field trips & Other - Public carr	766.73	766.73
Field trips & Other - Other transportation	298.29	298.29
Field trips & Other - Meals	61.05	61.05
Field trips & Other - Accommodation	352.59	352.59
Subtotal		1478.66
API COURSE AND MEETINGS		
Office (supplies, print orders, course manuals, creative services, gifts)	2,597.63	2,597.63
Food and Catering	4,340.93	4,340.93
Technical supplies and services	289.10	289.10
Subtotal		7,227.66

Continued on the next page

For the Reporting Period of April 1, 2017 to March 31, 2018 (concluded)		
RESEARCH AND PROFESSIONAL	\$	\$
Prof fees - corp/NR outside CAN	85,318.00	85,318.00
Subtotal		85,318.00
Subtotal	358,390.11	358,390.11
Total Expenses	358,390.11	358,390.11
	Balance Available	9,881.12



THE UNIVERSITY
OF BRITISH COLUMBIA
Pulp and Paper Centre (PPC)