a place of mind

FACULTY OF
APPLIED SCIENCE

ADVANCED PAPERMAKING INITIATIVE (API)

ANNUAL REPORT

for the period April 1, 2013 - March 31, 2014

Prepared for API
Dr. Mark Martinez, Director
Professor in Chemical and Biological Engineering
Director of the Pulp and Paper Centre

Your support continues to make a vast difference to our students, faculty and community.

Thank you.

For more information, please contact:
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Contents

Introduction

The mission of the Advanced Papermaking Initiative (API) is to enhance postsecondary education and research for the paper industry of British Columbia. The Initiative supported the creation of two faculty positions at UBC (Professors James Olson in Mechanical Engineering and Mark Martinez in Chemical and Biological Engineering) and one at BCIT (Dr. Rodger Beatson). Professor Peter Englezos, a faculty member and Head of the Department of Chemical and Biological Engineering at UBC, is also a member of the API.

This 16th Annual Report describes the activities of the API-funded faculty as well as the Director's for the period 1 April 2013 to 31 March 2014. Leading edge and industrially relevant research is carried out at UBC's Pulp and Paper Centre. I invite you to contact Professors Beatson, Englezos, Martinez and Olson directly to learn more about their exciting research projects.

We have organized many activities this year that you can read about in the Community Outreach section. In addition, the Energy Reduction in Mechanical Pulping consortium has been extended to now include 15 companies both nationally and internationally to develop and demonstrate new energy saving technologies and processes. Following the news release in September 2013 of the additional $2.7 million grant, the story was picked up by several media outlets including Pulp and Paper Canada, BC Business, UBC Applied Science News, UBC Engineering News, SPARC Connect, The Ubyssey and UBC News: The Next Big Thing 2014. Recent efforts of the program have concentrated on strategic recruitment of the best and brightest students and researchers to add to the research team. They have begun work on specific projects in their field with supervising faculty members. The team has also begun to visit both market pulp and paper grade mills that work with different chip supply to narrow the involvement and goals of each member in the program.

This year also marked the 100th anniversary of the PAPTAC annual conference of the Canadian pulp and paper industry, PaperWeek 2014. The event, held in Montreal in February 3-6, 2014, brought together key players from pulp and paper mills and head officers, equipment and service suppliers, government, research institutes, universities, consulting firms, utility service providers, and allied industries. Five students attended the conference and participated in the student poster session. Ehsan Zaman won first place for his poster "Numerical Study of Hydrocyclone Flow Field: Effect of Geometrical and Flow Parameters". Xue Feng Chang with API faculty members James Olson and Rodger Beatson, presented a technical paper "Optimization of Alkaline Peroxide Treatments on Primary Refined TMP prior and subsequent to low consistency refining".

API Structure

Mark Martinez
Director, API

The Initiative is led by a Director, appointed by the Dean, and advised by a Management Committee consisting of API faculty. An industrial Advisory Group provides advice to the Director and Dean on the API's activitites in meeting its mandate.

The key personnel are:

Dean, pro tem, *Applied Science*:	Eric Hall
Dean, *Applied Science*:	Marc Parlange
Director of API:	Mark Martinez

Management Committee:

This committee consists of the faculty associate with the API

Rodger Beatson

Peter Englezos

Mark Martinez

James Olson

Advisory Group:

Ms. Gail Sherson, *FPInnovations*

Prof. Peter Wild, *University of Victoria*

Mr. Jeff Bennett, *Canfor Pulp Ltd.*

API Faculty - Biographies

Rodger Beatson Rodger Beatson holds a B.Sc. Honours (1968) in Chemistry from the University of Exeter, Devon, England. He obtained his Ph.D. (1975) in Organic Chemistry from the University of Western Ontario, London, ON. In 1976 he joined Consolidated-Bathurst subsequently becoming Group Leader Product Development in the Packaging Division. Rodger joined Paprican in 1979 holding research positions in mechanical pulping and fibre and paper physics. He also served as the Director of the Papricourse. Rodger joined Canadian Forest Products as a Senior Research Scientist in 1990 before joining the API in 1999 as a Faculty member at BCIT. Rodger served as the Chairman of the PAPTAC Research committee in 1994 and has been an Adjunct Professor in the Faculty of Forestry at UBC since 1995. Beatson's current research interests are dissolving pulp production, the use chemicals to reduce energy consumption in refining, recovery of hemicellulose from mill residues and their use to enhance paper strength and the identification of the genes that control fibre morphology and lignin content.

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 an Assistant Professor. He was awarded a UBC Izaak Walton Killam Memorial Faculty Research Fellowship for the period 1997-98. In 1999, he was named Fellow of the Tokyo Electric Power Company Endowed Chair at the Faculty of Science and Technology of Keio University in Japan. He served as Coordinator of the non-thesis Pulp and Paper Master of Engineering Program for the period 1992-1999. Peter served as the Director of the Advanced Papermaking Initiative between January 2006 and August 2011. On December 1, 2007 he became the inaugural holder of the Advanced Papermaking Professorship. In July 2009 Peter was appointed Head of the Department of Chemical and Biological Engineering. He is a registered Professional Engineer in British Columbia and a member of the Canadian Academy of Engineering (2009). His current research interests are in the fields of papermaking chemistry, natural gas hydrates, thermodynamics, and carbon dioxide capture.

Mark Martinez holds a Ph.D. in Chemical Engineering from The University of British Columbia (1995) and a Docent in Paper Technology from the Royal Institute of Technology (1999). He joined the Chemical Engineering Department at UBC in 1999 after four years at the Swedish Pulp and Paper Research Institute, where he was group manager for the paper technology group. Mark was appointed Director of the UBC Pulp and Paper Centre as of January 1, 2014, and has been the Director of the Advanced Papermaking Initiative since 2011. His research focuses on the fluid mechanics of fibre suspensions, and has been awarded numerous awards including the 2009 BCIC Lieutenant Governors Award for Innovation. He is a registered Professional Engineer in BC.

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 from 1995 to 1999 to lead a research project on fibre fractionation and contaminant control. He joined the Mechanical Engineering Department in July 1999 as an Assistant Professor. James was appointed as the Director of the UBC Pulp and Paper Centre from 2011 to the end of 2013 and has been newly appointed as the Associate Dean of Research for Applied Science. 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 currently leads a $4M research program to reduce electrical energy in mechanical pulping. In recognition of his of research he has been awarded two NSERC Synergy awards for industry collaboration, 2 I.H. Weldon awards for best papers, the Van den Akker medal from the Fundamental Research Committee, and the 2009 BCIC Lieutenant Governors Award for Innovation, as well as several best paper awards. He is a registered Professional Engineer in BC.

API Faculty - Teaching

The API presents a number of courses at three different post-secondary institutes in BC. At both UBC and UVic, Professors Olson and Martinez deliver 2 fourth-year elective courses to Mechanical and Chemical Engineering students. At UBC they co-teach CHBE 401 and at UVic, Mech 450. In total, Olson and Martinez delivered 72 hours of lectures to 52 final year students.

This year Professor Englezos delivered two 2-hour lectures on Laboratory Data Analysis and Model Parameter Etimation to approximately 100 students enrolled in CHBE 364, 365 and 366. He also delivered a 1.5 hour lecture to PhD and Masters students on Parameter Estimation in Chemical Engineering Models to approximately 30 students enrolled in CHBE 597.

Professor Beatson delivered three BCIT diploma courses in the past year:
Paper and Chemicals from Renewable Resources: 90 hours of lectures and labs to 18 students. Covered the production of pulp, paper, extractives, dissolving pulps, biopolymers and ethanol from wood.
Research Projects: 60 hours with 17 students. Student groups were guided in a laboratory based research projects. The group conducts a literature search and develops a program of experimentation, in consultation with the instructor and the industry sponsor when applicable.
Process Simulation: 60 hours of tutorials to 18 students. In this course, students worked with computer simulations of chemical processes (CADSim) to develop an understanding of the impact of manipulating process variables on the products from the process. Processes studied were:

API Faculty - Research

The research contributions of the API faculty members are quite broad. API faculty members currently conduct research in the following areas:

- Mechanical pulping
- Stock preparation
- Papermaking and papermaking chemistry
- Chemical pulping
- Novel materials

Over this year, API members have supervised a combination of over 20 graduate students, research assistants and postdoctoral research fellows. They published 17 scientific journals, and participated in 9 onference proceedings.

The following projects are just a sample of the research that API faculty have been involved in over the past year:

The Energy Reduction in Mechanical Pulping Program, headed by Professor James Olson, has focused on recruitment and has now assigned newly hired students and researchers to work on projects including: Fibre separation through low energy processes; optimization of chemical charge distribution; advanced fractionation and low consistency refining; optimization and control of integrated HC and LC refining; LC refiner bar force sensor based control strategies; advanced pump performance monitoring system.

Professors Olson, Martinez and Beatson continue their collaboration with Lee & Man Paper to develop bamboo dissolving pulp. Olson also continues to work with Canfor Pulp Limited Partnership on Optimal Low Consistency Refining of Northern Softwood Kraft Fibre.

Dr. Rodger Beatson has focused his efforts on three distinct research projects. They include:
Application of Chemical and Enzymatic Treatments in Low Consistency Refining which is part of the collaborative effort of the Energy Reduction in Mechanical Pulping program.
Genetic Control of Fibre Length and Lignin Content. The objective of this project is to use the natural variation in fibre length and lignin content in ecotypes of the small plant Arabidopsis to identify the genes or genetic loci that are controlling the particular characteristics.
Recovery of hemicellulose from mill residues and their use to enhance paper strength. This project, sponsored by Canfor, is in the initial stages and an application to NSERC for additional funds has been submitted. Beatson will work with Chemical and Biological Engineering Assistant Professor Heather Trajano on this project.

API Faculty - Research

Professor Peter Englezos is the PI of two major projects:
Superhydrophobic Fibre Networks Loaded with Functionalized Fillers. A NSERC Strategic Network funded project with Professor Hatzikiriakos of the Chemical and Biological Engineering department.
Retention Analysis of Kraft Pulp. Englezos partnered with Canfor to work on this research.

On January 9th, Greg Rickford, Minister of State for Science and Technology, along with UBC President Stephen Toope, Vice President Research and International John Hepbrun and NSERC Chief Operation officer Janet Walden announced recipients of the latest NSERC grants. Among the recipients is Mark Martinez, Director of API. Martinez and his colleagues, Professors Olson, Frigaard and Bamforth will seek to develop a production pathway to manufacture microfibrillated cellulose (MFC) from wood pulp. MFC is a green, sustainable material and the proposed research aims at developing the understanding to manufacturing this sustainably, inexpensively and in large quantities. Since MFC has the potential to displace a number of fossil-fuel derived consumer products that are not environmentally friendly, the team hopes to ensure that Canada leads the inevitable 'green' bio-economy revolution with a transformative technology applied to the Canadian pulp and paper industry. The team will combine scientists and engineers, in conjunction with local Canadian industrial sponsors.

API Faculty - Selected Publications

A. Capron, Xue Feng Chang, Chun Shi, R.P. Beatson and Thomas Berleth, "Lz-0 x Berkeley: a new Arabidopsis recombinant inbred line population for the mapping of complex traits" Molecular Genetics and Genomics DOI 10.1007/s00438-014-0829-x, published on-line February 15, 2014.

J. McKenzie, D.M. Martinez, & J.A. Olson," A Quantitative analysis of turbulent drag reduction in a hydrocyclone" accepted Can J Chem Eng DOI: 10.1002/cjce.21989 (2014)

A. Madani, S. Zeinoddini, S. Varahmi, H. Turnbull, A.B. Phillion, J.A. Olson & D.M. Martinez, "Ultralightweight paper foams: processing and products" accepted Cellulose DOI 10.1007/s10570-014-0197-3 (2014)

Moradi, S., P. Englezos, and S.G. Hatzikiriakos, "Contact Angle Hysteresis of non-Flattened Top Micro/Nano-Structures", Langmuir, accepted March 3, 2014

H. Salem, R.W. Gooding, J.A. Olson & D.M. Martinez," Some fundamental aspects of pulp screen capacity", accepted Can J Chem Eng Can J Chem Eng (2014)

H. Salem, R.W. Gooding, J.A. Olson & D.M. Martinez, "Experimental StudySome fundamental aspects of pulp screen capacity", Nordic J Pulp Pap Res 29(2) (2014)

Elahimehr A. J.A. Olson, D.M. Martinez D.M. and Heymer, J. "Understanding LC refining: The effect of plate pattern and refiner operation", NPPRJ Vol 28, No.3 2013

Gao J., Bennington C.P.J., D.M. Martinez, J.A. Olson "Latency removal of mechanical pulps: Phenomenological observations", NPPRJ28(2) 198-202 2013

J. MacKenzie, D.M. Martinez, J.A. Olson, A Quantitative Analysis of Turbulent Drag Reduction in a Hydrocyclone, Accepted CJChE October 2013

A. Madani, D.M. Martinez, I.A. Frigaard & J.A. Olson, " The stability of spiral Poiseuille flows of Newtonian and Bingham fluids in an annular gap", J. Non-Newtonian Fluid Mech,193:3-10 (2013)

Mirvakili, M.N., S.G. Hatzikiriakos and P. Englezos, "Superhydrophobic Lignocellulosic Wood Fiber/Mineral Networks", ACS Appl. Mater. Interfaces, 5 (18), pp 9057–9066, 2013

Moradi, S., S.G. Hatzikiriakos, and P. Englezos, "Femtosecond laser irradiation of metallic surfaces: effects of laser parameters on superhydrophobicity", Nanotechnology, 24 (2013) 415302

API Faculty - Selected Publications

A. Nikbakht, A. Madani, J.A. Olson & D.M. Martinez, "Observation of turbulent transition of a papermaking fibre suspension in Hagen-Poiseuille flow", Pulp and Paper Fundamental Research Symposium, Cambridge (2013)

A. Oko, D.M. Martinez, & A. Swerin, "Infitltration and dimensional scaling of inject droplets oin thick isotropic porous media", Microfluidics& Nanofluidics DOI 10.1007/s10404-013-1313-7 (2013)

N. Rajabinisab, J.A. Olson, J. Heymer, D.M. Martinez "Understanding of No-load Power in Low Consistency Refiners" CJChE, 93(3):524-535, 2013

N. Rajabinisab, T. Mithrush, J.A. Olson, & D.M. Martinez, "Turbulent Couette flow between corrugated walls: The case of motion of one wall perpendicular to the corrugation grooves", Can. J Chem Eng, (2013)

Towfighi, S., Romilly, D. P., J.A. Olson, "Elevated Temperature Material Characteristics of AISI 304L Stainless Steel" Journal of Materials at High Temperatures, 30(2) 2013 pg 1-6

API Faculty - Conference Proceedings

Xue Feng Chang, J.A. Olson, and R.P. Beatson "Optimization of alkaline peroxide treatments on primary refined TMP prior and subsequent to low consistency refining". In the proceeding of the Annual Meeting of the Pulp and Paper Technical Association of Canada, February 3-6, 2014, Montreal, Quebec, Canada

Englezos, P, Mirvakili, M, Hatzikiriakos, S.G.,. (Feb. 2014), FIBRE Western Canada Workshop, Vancouver, BC, Canada.

J.A. Olson (Feb 2014) FIBRE Western Canada Workshop, Vancouver, BC, Canada.

Mirvakili, M, Hatzikiriakos, S.G., Englezos, P., (Oct. 2013), 63rd Canadian Society Chemical Engineering conference. Feredericton, BC, Canada

Englezos, P, Mirvakili, M, Hatzikiriakos, S.G., (Oct. 2013), Innovative Green Wood Fibre Product Network Conference. Feredericton, BC, Canada.

J.A. Olson 'Novel products from low energy mechanical pulps', SPCI, Stockholm 2013

Rajabinisab, D.M. Martinez and J.A. Olson "Insights into the flow file of LC refiners: The relationship to the Beating Effect" Fundamental Mechanical Pulping Research Symposium 2013, Are Sweden

D. Gorski and J.A. Olson "Quality development of different fibre fractions in HC and LC refining" Fundamental Mechanical Pulping Research Symposium 2013, Are Sweden

Mirvakili, M, Hatzikiriakos, S.G., Englezos, P. (May 2013), Innovative Green Wood Fibre Products Network Conference, Cornwall, Montreal, Canada.

Community Outreach

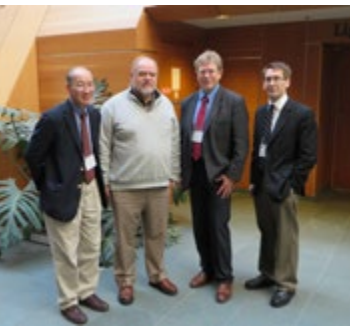
API organized round table discussions on June 12, 2013 at the Sun Peaks Resort, BC, within the 2013 PacWest Conference. Approximately 20 guests were in attendance.

Pictured: Warren Batchelor

Warren Batchelor, Senior Lecturer at the Australian Pulp and Paper Institute and Department of Chemical Engineering at Monash University was an invited guest speaker. Batchelor gave a talk on **"Refiner loadability, fibre length and paper mechanical properties".**

Abstract: In a low consistency refiner pulp fibres are trapped between the bar edges of the rotor and stator and worked into the narrow gap between rotor and stator. No refining occurs if the fibres are not trapped. Despite the importance of fibre trapping it is not considered in methods for characterising refiner action such as the widely used Specific Edge Load (SEL). Reduced fibre fibre trapping is believed to be a cause of the reduction in the efficiency of refining as bars wear and the edges lose their sharpness.
This paper discusses the use of refiner loadability measurements to estimate relative trapping efficiency, as a function of stock consistency and refiner rotational speed. The data showed that the thickness of the mat of trapped fibres was approximately independent of both rotational speed and stock consistency, but the fraction of the bar edge trapping fibres was approximately linearly related to stock consistency and somewhat dependent on rotation speed. A reduction in fibre trapping increases the effective intensity of fibre treatment in the refiner, even though the nominal intensity calculated by specific edge load does not change. An increase in effective refining intensity, due to a reduction in fibre trapping, is shown to increase fibre cutting.

API faculty were involved in organizing, presenting, and chairing sessions at the FIBRE Western Canada Workshop.



Pictured: Frank Ko , AFML Director, Theo van de Ven, Chair of FIBRE Networks, Dave Peterson, Chief Forester & Asistant Deputy Minister, and API facultyJames Olson

The "Western Canada Workshop", part of the FIBRE Cross-Country/Cross-Linking Workshops, was held on February 20th, 2014 at the University of British Columbia, in the Forest Sciences Centre.
The full-day workshop brought together over 110 regional members of FIBRE including Board, PI's, students, post docs, and industry partners from the networks to enhance FIBRE's mission to further develop synergies between networks.
Network PI's, including API Professors Peter Englezos and James Olson, were invited to present an overview of their research and engage members of FIBRE in discussion and analysis of their research or new ideas.
Peter Englezos: "Effects of Fiber Size on Water Vapor Permeability of Superhydrophobic Handsheets Made from TMP Fibers".
James Olson (Mark Martinez): "Origami Engineering: Advanced Converting for Novel Products" and "Production of Porous Biomorphic Ceramic Cellulose Foam Material", and "Novel Cellulose Based Foam- Formed Products; Application and Numerical Studies".
James Olson also served as Session Chair of the "Future Trend of Canadian Forest Industry" session.
Several researchers and students from the Pulp and Paper Centre also presented their research during the student poster session.

Community Outreach

Pictured: Group of students, staff and faculty enjoying a nature walk to celebrate International Day of Forests

The Pulp and Paper Centre organized a nature walk to celebrate the International Day of Forests on March 21st, 2014. A group of more than 25, including API's Director Mark Martinez, gathered on a sunny afternoon to learn about 9 distinct tree species, listen to folk stories, learn new facts, and learn about all the different uses of the various trees whether it was shelter, medicine or transportation. It was a successful event with positive feedback from participants and on social media.

Finances

The financial statement for Year XVI is given in the table below.

(1 April 2013 - 31 March 2014)

2013-2014 Budget	**$242,256.00**
Opening Balance (from 2012-2013)	**$35,113.63**
Available Budget 2013-2014	**$277,369.63**
TEACHING	
CHBE, MECH and BCIT API Faculty Appointments	$166,270.02
Scholarships	$3,000.00
	$169,270.02
RESEARCH	
Equipment, service & supplies	$2,000.00
UG Research Assistants	$10,000.00
	$12,000.00
COMMUNITY OUTREACH	
Travel (Conferences)	-
Travel (General Expenses)	$411.22
Distinguished Lecturer	$5,000.00
Misc. Charges	-
	$5,411.22
DEAN'S OFFICE	
API administration	**$20,000.00**
OFFICE EXPENSES	**$3,703.91**
TOTAL EXPENDITURES (2013-2014)	**$210,385.15**
Uncommitted Balance (2014-2015)	**$66,984.48**

What's Next

The API Advisory Group will welcome several new members commencing April 1, 2014. The mandate of the Advisory Group is to provide advice to the University regarding the program, its purposes and funds. It is comprised of up to ten individuals representing the stakeholders of the province and members will normally be appointed for three year terms.

"Introduction to Pulp and Paper Technology", a 2-day, API sponsored course is scheduled to take place on April 10-11, 2014. The course will be taught by API faculty, along with Professor Robert Gooding, Adjunct Professor in Mechanical Engineering, and Nici Darychuk, Research Assistant at the Pulp and Paper Centre. This hands-on course will consist of lectures during the mornings, and lab excercises in the afternoon to re-emphasize material and enhance understanding of process.

API will have a strong precence at the 2014 PacWest Conference in Jasper, AB. A special session has been arranged for our researchers. A total of six presentations on their technical papers and on their current research will be highlighted. There will also be a full-day Steering Committee meeting for the Energy Reduction in Mechanical Pulping group which will consist of PI presentations, guest speakers, roundtable discussions, and break-out sessions.

The API is also exploring several other exciting initiatives including: opening the Pulp and Paper Centre's machine shop to the UBC community; starting a graduate student co-op program; offering a MEng program in Pulp and Paper.

Appendix A

Two API scholarships worth $1500 each are awarded annually to students at BCIT. The Dean elects winning recipients based on merit.

November, 2013 BCIT Pulp and Paper/Advanced Papermaking Initiative Fund CENV Program

Date: November 5th, 2013

To: Donor of the Pulp & Paper/Advanced Papermaking Initiative Fund

From: Sean McConnell

Program: Chemical and Environmental Technology

Dear Donor,

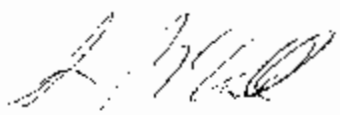
To introduce myself, my name is Sean McConnell and I recently received the BCIT Pulp and Paper/Advanced Papermaking Initiative Award. I cannot thank you enough for selecting me to receive this award.

I chose to come to BCIT to become an Applied Science Technologist. I have recently started a family and chose the Chemical and Environmental program in order to provide a better life for my wife and child while obtaining a career that I can be proud of. My wife and I are working while I complete my schooling and consequently, my daughter requires daycare. This $1500 dollar contribution to my education takes a huge weight off my shoulders and provides my family with some much needed financial breathing room. We all thank you profusely!

There are many career opportunities available for graduates of the Chemical/Environmental Technology Program. The courses range from Pulp and Papermaking to Chemical Engineering Basics. My current goal is to work in industrial or municipal wastewater treatment. I would love to be a part of a large, industrial scale process, and work with companies to minimize the effect on the surrounding environment. I thank you for helping me get closer to achieving this goal.

On behalf of myself and everyone else you have helped, thank you for your contribution to our program.

Sincerely,



Sean McConnell

October 25th, 2013

Ms. Shelley Grogan
BCIT Pulp & Paper/Advanced Papermaking Initiative Award
Awards Coordinator
BCIT Foundation
3700 Willingdon Avenue
Burnaby, BC, V5G 3H2

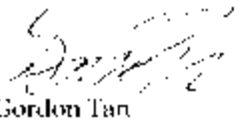
Dear Ms. Grogan,

I wish to thank you immensely for your generous $1500 BCIT Pulp & Paper/Advanced Papermaking Initiative scholarship. I was very ecstatic and appreciative to know that I was selected as the recipient of your scholarship.

I am in the Process Engineering option of the Chemical and Environmental Technology program. Prior to that, I was a Chemistry Major at the University of British Columbia. In my free time, I play in a local recreational ice hockey league with my friends. I plan to pursue a career as a process technologist upon graduating from BCIT. I am currently in second year carrying 25 credits, and plan to graduate in the spring of 2014.

By awarding me the BCIT Pulp and Paper/Advanced Papermaking Initiative scholarship, you have lightened my family's financial burden which allows me to focus on learning applicable skills in all walks of life. The instructors in my program have been superb and very informative, and your generosity has inspired me to help others and give back to the community. I hope to one day be able to reciprocate by helping students achieve their goals just as you have helped me.

Sincerely,



Gordon Tan
6277 Bruce St.
Vancouver, BC, V5P3M8