



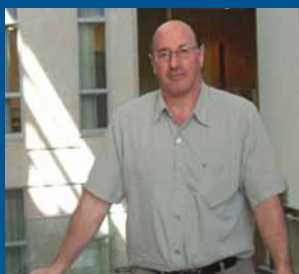
First BRI EAB Meeting

The BRI was excited to host the first meeting of the newly established External Advisory Board (EAB) on September 29, 2016. The EAB consists of the following members:

- Regis Benech, Chief Scientist and Head of R&D, Green Field Specialty Alcohols Inc. (GFSA)
- Michel Jean, Director, Research & Development, Domtar
- Richard Kalertas, Director of New Business Development & Special Projects, Resolute Forest Products (RFP)
- Jamie Lim, Chief Executive Officer, Ontario Forest Industries Association (OFIA)
- David Lindsay, President and CEO, Council of Ontario Universities (COU)
- Kirsten Maki, Manager, Bioeconomy Technology Centre, FPIInnovations
- Sandy Marshall, Executive Director, Bioindustrial Innovation Canada (BIC)
- Yvon Pelletier, Chief Executive Officer, Fortress Paper Ltd.
- Jack Saddler, Professor & Director, IEA, University of British Columbia (UBC)
- Theo van de Ven, Professor & Director, FIBRE, McGill University
- Scott Wiebe, Chief Executive Officer, Centre for Research and Innovation in the Bio-Economy (CRIBE)



The Advisory Board calls upon each member's area of expertise to provide feedback for BRI projects. The diverse group offers a current and relevant perspective as the BRI looks forward to establishing strong industry, government and academic partnerships that can advance the BRI agenda. This initial meeting was an introductory opportunity for the EAB members to become familiar with the scope of the Board. The meeting was a success and the members plan to meet once again at the International Forest Biorefining Conference (IFBC) in Thunder Bay, May 9-11, 2017.



BRI Seminar Series Guest Speaker

Dr. David Levin from the Biosystems Engineering at University of Manitoba was a BRI Seminar Series guest speaker. His lecture on *Cellulose hydrolysis and metabolism in the mesophilic, cellulolytic bacterium Clostridium termitidis CT1112* was presented to faculty and students on October 21, 2017. Dr. Levin holds a Bachelors of Environmental Studies from the University of

Waterloo and a Masters of Science at the University of Guelph. He obtained his PhD at McGill University in 1987 in Molecular Virology, and was a professor in the Department of Biology at the University of Victoria from 1991 to 2006, when he moved to the University of Manitoba, Department of Biosystems Engineering, to set up a new program in "bioengineering for biofuels and bioproducts". Dr. Levin holds an NSERC Discovery grant focused on the "Genomics of cellulose fermentation for process optimization". He currently serves as a Faculty Advisor for the University of Manitoba Space Applications and Technology Society (UMSATS), a student driven research group focused on sending a micro-satellite containing a mini-ecosystem into low earth orbit. In 2015, he has been nominated for a Tier 1 Canada Research Chair, and for the Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering.

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Electrochemical and Biocomposite Research Initiatives

Dr. Rakshit's BRI lab

The developments in Dr. Rakshit's BRI lab in the past few months include the following. A project which aims to integrate a biomass electrochemical reactor for upgrading biorefinery waste to industrial Chemicals and Hydrogen was initiated. This is supported by the US Department of Energy (DoE) and is led by Ohio University. This project will attempt to demonstrate generation of bio-based phenol substitutes from both neat lignin solutions and biorefinery waste. It will optimize electro-catalysis methods for lignin oxidation. This will be followed by development of a flow reactor for scaling up the process. An industry partner will be primarily responsible for guiding production of target chemicals and product distribution. They will develop phenol-formaldehyde (PF) resins using the lignin oxidation products. Dr. Rakshit's role in the project will be to integrate the results of such processes into an existing cellulose to hydro-carbon designed plant. The aim is to reduce overall biorefinery operating costs in such integrated plants.



Another project that has just been initiated is entitled, "Innovation and commercialization of bio-carbon from advanced bio-refinery for green composites applications". In this CFI-ORF funded project led by Prof Amar Mohanty of the University of Guelph, bio-based plastics from renewable biomass instead of fossil based carbon sources will be developed. This will reduce the overall carbon footprint of such processes. Improved bio-carbon production will be carried out in a collaborative manner using a variety of pyrolysis technologies available at three universities and ten industry partners. Activated carbon and hybrid bio-black produced will be used as master batch substances for different composite systems. Formulating and optimizing new matrices with desired engineering performance and bio-carbon based composite fabrication for some applications will be then carried out.

Dr. Rakshit's role in the project will be to determine the carbon footprint of the slow pyrolysis based processes using Life Cycle Assessment (LCA) methodology. He and his research partners will assess the impact of such processes on the environment, the economics of the new processes and the influence of such new products on society. Life Cycle Impact Analysis (LCIA) will be carried out based on a variety of products that will be developed in the project and will be quantified in terms of functional units that the new products will substitute.

Dr. Rakshit has been awarded the Contribution to Teaching Award 2016 at Lakehead University recently. In July he delivered a lecture entitled, "Transition to a Sustainable Bio-economy: Global Perspectives" as part of the Asian Institute of Technology (AIT) Distinguished Adjunct Faculty (DAF) Seminar series held in Bangkok, Thailand.



W.A.E. McBryde Medal of the Canadian Society for Chemistry

Dr. Aicheng Chen, Professor of Chemistry and Canada Research Chair in Materials and Environmental Chemistry, has been recognized with the W.A.E. McBryde Medal of the Canadian Society for Chemistry (CSC) for his outstanding contributions to the design of advanced nanomaterials-based electrochemical sensors and biosensors for medical diagnosis, pharmaceutical analysis and environmental monitoring. He received the medal in Halifax and delivered an award lecture at the 99th Canadian Chemistry Conference and Exhibition held in June 2016.



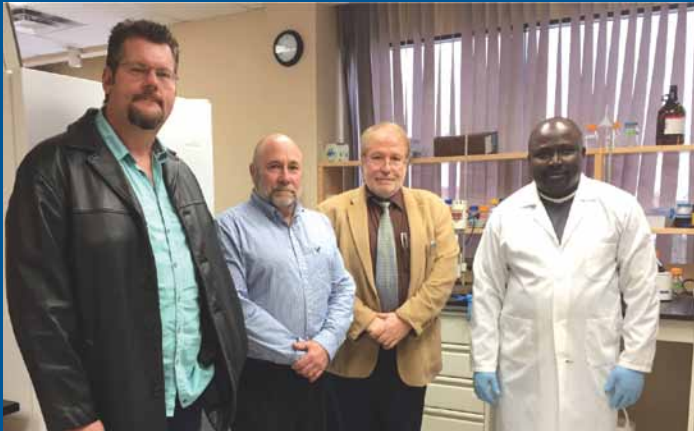
Enzo Monte Canedo, a visiting PhD student from the Federal University of São Carlos, Brazil, who spent six months at the BRI, won the 3rd prize in the poster competition of the 14th International Symposium on Bioplastics, Biocomposites and Biorefining (ISBBB), held in Guelph, ON, May 31 - June 3, 2016. The title of his presentation was "Lipid production by *Mucorales* strains using low-cost carbon sources."



9th Iberoamerican Congress on Pulp and Paper Research

Dr. Lew Christopher delivered an invited keynote lecture on "Valorization of Pulp and Paper Mill Waste Streams at the Forest Biorefinery" at the "9th Iberoamerican Congress on Pulp and Paper Research" held in Espoo, Finland, September 5-8, 2016 under the theme "Building Bridges in Research and Innovation for the Sustainable Bioeconomy".

Visits to the BRI



Dan Munshaw (second from left), Manager, Supply Management at City of Thunder Bay, visited the BRI on Nov 25, 2017.



Richard Kalertas, Director of New Business Development & Special Projects at Resolute Forest Products (RFP), visited the BRI on Nov 23, 2017. He was given a tour of facilities and an update of research progress at the BRI. Richard is the RFP representative on the BRI External Advisory Board.



Thunder Bay's Community Economic Development Commission (CEDC) headed by Doug Murray, CEDC CEO (third from left), paid a visit to the BRI on Oct 21, 2016.

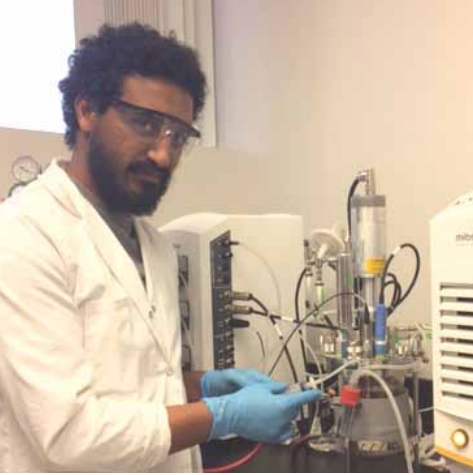


Trevor Stuthridge, the Executive Vice-President of FPInnovations met with BRI researchers on Aug 24, 2016 to learn more about on-going projects at the BRI. FPInnovations and Resolute Forest Products have joined forces to establish a fully functioning Biorefinery plant in Thunder Bay. The new TMP-Bio plant is a pilot project that will produce biochemicals derived from wood, resulting in renewable, biodegradable and cost-effective alternatives to petroleum-based products for use in the construction, automotive, mining, oil and other sectors.

World Bioenergy Congress and Expo



Dr. Lew Christopher chaired the "World Bioenergy Congress and Expo" held in Rome, Italy, June 13-14, 2016. The theme of the conference was "Bioenergy: A Step Towards Sustainable Future" with a focus on the usage of biomass as an alternative source for energy production.



Tewodros Jemberu Tilaye Graduate Intern from The Netherlands

My name is Tewodros Jemberu Tilaye and I am currently doing my Master's degree at Wageningen University, The Netherlands. I have joined Lakehead University (LU) with the support from the Wageningen University internship program

and am working under the supervision of Professor Sudip Rakshit. I arrived Thunder Bay on August 26, 2016 and I will be here until mid of January, 2016. I am originally a citizen of Ethiopia.

I am currently in my final year of master's degree study. My area of study is Biotechnology and with special focusing on Process Technology. I finished my master's degree thesis on "Thermodynamic modelling of protein extraction using Aqueous Two Phase Systems". Here at LU University I am working on modelling and simulation of an integrated biorefining process.

Many countries are trying to transit into bio-based sustainable economies. Integrated biorefinery processes which help production of energy and platform chemicals from biomass resources will play

a major role in these efforts. Specifically, I am working on integrating a hemicellulose to succinic acid production process into a lignocellulose to ethanol plant design.

I received a warm welcoming on my arrival here and the group in my lab made it easy for me to settle down quickly. I have observed that Professor Rakshit follows the progress of the graduate students under his supervision quite frequently. His group is made up of students from different academic backgrounds and working on different topics. The group meetings we have regularly, helps everyone take assistance and learn from each other.

My deepest and sincere gratitude goes to the Netherlands government for covering my study and living costs. I would like to thank everyone in my group in BRI for making my stay fruitful and for helping me to learn a lot. I would like to specially thank Professor Sudip for giving me the chance to work in his lab and for his continuous support. Last, not but least, I would like to thank my supervisor in Netherlands, Dr. Marian Verume, for her continuous support and encouragement.

I will go back with happy memories of my stay in Canada.

Recent News



New Renewable and Sustainable Technologies, Processes and Products

Dr. Nur Alam
Research Assistant Professor, BRI

One of the key aspects of the emerging Bioeconomy is the development of new, renewable and sustainable technologies, processes and products. Market surveys reveal that customers, and thus producers, prefer high-performance products that are biodegradable and sourced from low-cost renewable resources. These trends have opened up new possibilities for novel, high-value, cellulose-based biomaterials that could replace oil-based feedstocks and products. Currently, Dr. Alam is actively involved in the project of "Production and application of highly-reactive bio-based polymers with novel properties and unique functionalities." Cellulose is a very interesting material because of three hydroxyl reactive groups. We can easily modify these groups to produce highly reactive cellulose by introducing new functional groups with a different surface chemistry. The reactive cellulose can be made into a number of interesting products with potential applications, such as superabsorbent gels, transparent films, functional textiles, cellulose derivatives, and more. Our new process under development will present an exceptional opportunity to leverage established commercial technologies to produce bio-based materials from the Boreal Forest. Such products may bring about socio-economic and environmental benefits to the region of Northern Ontario, the Forest Sector, and Canada as a whole.

International Forest Biorefining Conference



May 9-11, 2017

Best Western NorWester Hotel & Conference Centre,
Thunder Bay, Ontario

Bioenergy • Biorefining • Bioeconomy

The Biorefining Research Institute (BRI) at Lakehead University is pleased to announce the first International Forest Biorefining Conference (IFBC) to be held in the heart of the Great Boreal Forest of Northern Ontario. Join us at the Best Western PLUS NorWester Hotel & Conference Center where you can enjoy Thunder Bay's gracious hospitality, exceptional amenities and breath-taking views while attending the conference. Visit www.bwplusnorwester.com for further information.

Abstracts Due: January 31, 2017

<https://conferences.lakeheadu.ca/ifbc>

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