



ANNUAL REPORT FY2021-2022



THE UNIVERSITY
OF BRITISH COLUMBIA



LAND ACKNOWLEDGEMENT

UBC BioProducts Institute is located on the traditional, ancestral, and unceded territory of the Coast Salish Peoples, including the territories of the xwməθkwəyəm (Musqueam), Skwxwú7mesh (Squamish), Stó:lō and Səlílwətaʔ/Selilwitulh (Tsleil- Waututh) Nations.

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UNLOCKING NATURE FOR A SUSTAINABLE FUTURE

MISSION

Bringing together state of the art research and resources in a unique innovative ecosystem, our aim is to unlock the power of nature to make a positive impact on all sectors from transportation to building to healthcare

“The BioProducts Institute is changing the way our society collaborates with nature for a sustainable and renewable future.”



MESSAGE FROM THE DIRECTOR

Acknowledging the unprecedented recent challenges, coinciding with BioProducts Institute's first two years, I am pleased to report on the resilience and dedication of our researchers, staff and faculty in continuing their activities. The current times reinforce the importance of reducing CO2 emissions to combat climate change.

At BPI, we continue to focus on unlocking the full potential of nature-based, regenerative sources of materials. The use of waste streams to create bio-products will not only preserve the lifetime of these materials but also provide a renewable way to replace plastics.

The past year brought a re-emergence of research collaboration and knowledge mobilization activities. Along with FinnCERES Flagship, Aalto University and VTT we celebrated the formation of the Boreal Alliance with the release of *Fibre and Beyond*, our co-produced documentary on some of our most intriguing research. Additional partners Treearch, the Swiss Federal Laboratories for Materials Science and Technology (EMPA), and the Finnish UNITE Flagship, and the University of Oulu soon joined us. Additionally, BPI signed statements of cooperation with all the partners to accelerate innovations in bio-based solutions through co-supervised research, exchange programs, and other collaborative opportunities. This led to the arrival of the first 6-month exchange students under the Boreal Alliance, doctoral candidate Rubina Ajdary and postdoctoral researcher Joice Kaschuk from Finland. We also welcomed our first visiting researcher since the beginning of the pandemic, Dr. Junling Guo from Sichuan University in China. Visits from several more Canadian and international scientists are planned. BPI hosted weekly seminars and activities, with nationally and internationally renowned speakers. We were able to host in-person activities such as an open house and a special tour of the recently renovated Pulp and Paper Centre with Hon. Ravi Kahlon, Minister of Jobs, Economic Recovery and Innovation.

I am pleased to note that BPI has established a committee to work on equity, diversity, inclusion, and Indigeneity (EDI.I). The Committee will be an intentional place for members to support policy reviews, initiate educational programming, implement proactive strategies regarding human rights and discrimination; as well as demonstrating an authentic commitment to Truth and Reconciliation and valuing traditional ways of knowing. The committee has already organized two workshops on the topic of EDI.I in research, sustainability and STEM, and is planning additional activities.

The excellence of BPI researchers was recognized through several awards, including appointment as a member of the Selection Committee of the Marcus Wallenberg Prize (Orlando Rojas); 2021 Best Publication Award in Natural Resources from The Institute for Operations Research and the Management Sciences (INFORMS) Energy, Natural Resources & The Environment section (ENRE) (Taraneh Sowlati); Kingfa Young Investigator Award from the American Chemical Society's CELLulose and Renewable Materials Division (Feng Jiang); 2021 Researcher Award from the BC Bioenergy Network (Jack Saddler); 2021 E.W.R. Steacie Memorial Fellowship by the Natural Sciences and Engineering Research Council of Canada (NSERC) (Emily Cranston); Canada's Top 40 under 40 (Vikram Yadav); American Association for the Advancement of Science (AAAS) Fellow (Shawn Mansfield). Additional research highlights include BPI investigators receiving \$3.5 million in Government of Canada support through PacifiCan and over \$1.5 million in new funding from NSERC. Completing renovations to third floor laboratory spaces in the Pulp and Paper Centre also provided much needed upgrades and refurbishment that will support BPI's world-class research capabilities in bio-based material innovations. With fresh opportunities now possible, BPI will continue to expand its activities.



Orlando Rojas
Canada Excellence Research Chair
in Bioproducts Scientific Director
BioProducts Institute

BPI HISTORY

2016

BioProducts Institute established under the leadership of Dr. James Olson

The cluster of UBC faculty and researchers in biomaterials research groups was formed to leverage shared infrastructure and resources under the name of Bio-Economy Research Innovation & Education (BERIE) which is renamed as BioProducts Institute in 2016

2017

MARCH
Dr. Mark Martinez appointed as BPI Scientific Director

NOVEMBER
BC BioProducts Alliance is established
An industry led consortium with BPI & FPInnovations. The \$2.7M industry funding accelerates the development of new bioproduct solutions

2018

JANUARY
GCRC awarded \$150K for building operational support structure

JULY
CFI awarded \$11.6M with BiMat for novel biomaterials research from forest biomass

2019

JANUARY
Dr. Emily Cranston joins BPI as President's Excellence Chair (PEC)
with \$2.3M awarded for sustainable nanomaterial development

MARCH
Dr. Scott Rennekar appointed as BPI Interim Director

APRIL
BC BioAlliance awarded WED Grant \$2.38M for research spearheaded by BPI in reducing BC's carbon footprint through utilizing forest residues

Dr. Orlando Rojas accepts CERC in forest bioproducts

DECEMBER
Dr. Orlando Rojas appointed as BPI Scientific Director

2020

APRIL
UBC awards GREx Designation to BPI Launched:
recognizing the institution at its highest level of Global Research Excellence Institute

JUNE
NRCan Grant \$1.1M awarded from Clean Growth Program for renewable energy product development from forest residues

AUGUST
BPI Internship
1st cohort of 5 interns hired for business intelligence projects

NOVEMBER
PPC renovation began
Ministry of Forests awarded research grants to BPI for investigation of

DECEMBER
WED Grant \$3.5M awarded to provide pre-pilot equipment to accelerate the commercialize pathway of BC forestry based bioproducts

2021

MARCH
Boreal Alliance Launched:
MOU is signed with FinnCERES of Finland for research & operational collaborations

Supply Chain Grant
\$150K awarded for developing sustainable bioproducts supply chain

SEPTEMBER
Boreal Alliance Young Scholar Exchange
1 PhD student and 1 postdoc from Aalto joined BPI for a 6 month exchange program

NOVEMBER
PPC Open House :
The newly renovated Bioproducts Lab at PPC showcased its state-of-the-art research capabilities to 150+ guests

2022

JANUARY
Boreal Alliance Expanded:
Treearch, EMPA, LUKE, & United Flagship joined the Alliance network

MARCH
BPI EDI.I Committee Launched:
14 committee members inaugurated to help improve diversity and inclusion

INNOVATING FOR
A GREENER TOMORROW

BY THE NUMBERS



PRINCIPAL INVESTIGATORS **62**

GRADUATE STUDENTS **350⁺**

RESEARCHERS & POSTDOCTORAL FELLOWS **150⁺**



CANADA RESEARCH CHAIRS **9**

RESEARCH GROUPS **24**

PUBLICATIONS IN 2021 **456**



BUILDINGS ON UBC CAMPUS **13**

RESEARCH INSTRUMENTS **260⁺**



\$14.7M

TOTAL EXTERNAL FUNDING RECEIVED BY BPI MEMBERS IN FY2021-2022

RESEARCH THEMES

1 BIOCATALYTIC TRANSFORMATION & ENGINEERING OF BIOMASS



The theme encompasses the biosynthesis and biological degradation of biomass as well as the engineering of these processes to extract and valorize the different biomass components. Fundamental research is aimed at understanding how genes and their products function in the context of complex biological systems to synthesize, assemble and degrade biomass. Applied research includes using protein engineering and synthetic biology to design “biomass crops” and biocatalysts. These applications include developing new biocatalytic routes to valorize biomass, to reduce energy requirements and waste production, as well as to functionalize biomass for novel uses in chemical and materials manufacturing.

Theme Lead: Dr. Lindsay Eltis

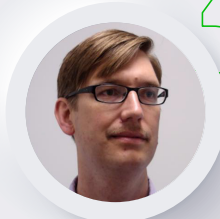
2 BIO-NANOPARTICLE ENABLED MATERIALS



This theme examines the parameters that dictate assembly into supramolecular structures as well as the fundamental interactions between bio-based nanoparticles and surrounding liquids, and other components in composite and hybrid materials. The studies aim to elucidate the effects of nanoparticle production parameters, post-production modification routes, and material processing on physicochemical properties to optimize performance and impart unique structural, conductive, thermal, optical, dispersibility, biocompatibility, and diagnostic abilities.

Theme Lead: Dr. Emily Cranston

3 BIO-BASED POLYMERS & CARBON MATERIALS



Bio-based polymers have unique functionality and variability unavailable in synthetic materials. Researchers in this theme have interest in identifying structural attributes of these polymers and establishing structure-property relationships to understand the impact of structures on their thermo-physical and rheological properties as well as processing (including 3-D printing). Research in this theme will seek a fundamental understanding of the materials and their potential transformation into advanced bioproducts.

Theme Lead: Dr. Scott Rennecker

4 BIOREFINERY SYSTEMS



To achieve an effective reduction in the carbon intensity footprint of our global society will require a multi-prong approach. British Columbia is endowed with plentiful “green” (hydro) electricity, innovative policies such as the low carbon fuels standard, and an innovative forest sector. For example, decarbonizing long distance (planes, ships, trains and trucks) transport will require some form of biofuels. This theme looks at how we move from a hydrocarbon to a carbohydrate society: forest/agricultural residues will be transformed through a biorefinery into chemicals and fuels that are functionally equivalent or superior to the products we now make from oil. In addition to the technical aspects of biorefining the economic, sustainability and policy metrics required to transform our current oil-based society to a more sustainable world will be researched.

Theme Lead: Dr. Heather Trajano

5 BIOPRODUCTS ECOSYSTEM ANALYSIS



The core mission of this theme is to ensure that the innovative technology developments at BPI also entail a sustainable utilization of the resources and environment. Researchers in this theme work closely with other UBC researchers as well as external collaborators to gather the critical information needed for analyzing the sustainability of the novel technologies through simulation, statistical analysis and other industrial ecology methods. This theme also serves as a versatile platform to facilitate communications and collaborations among different stakeholders and governing bodies (e.g., provincial governments, First Nations) involved in forestry, bioenergy, biofuels and bioproduct sectors. These multidisciplinary engagements will lead to a shared vision and values around creating a forest-based bioeconomy that is both socially and environmentally sustainable.

Theme Lead: Dr. Qingshi Tu

RESEARCH IMPACTS

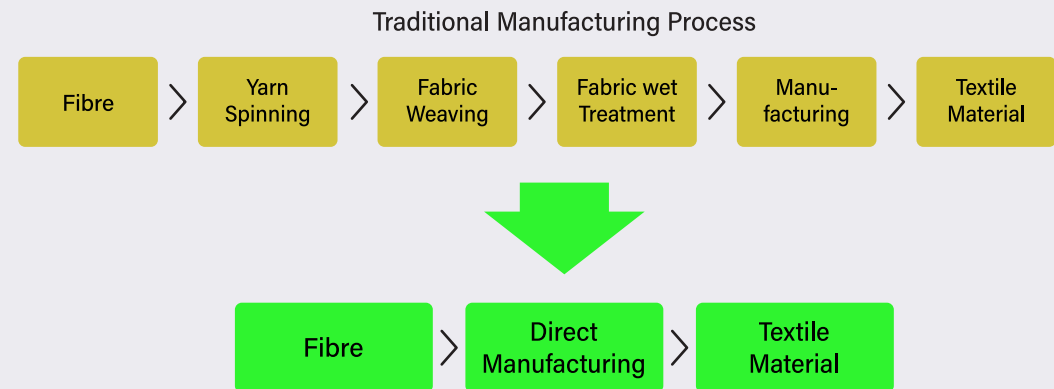


Wood fiber-based shoe top by Simplifyber

SUSTAINABLE APPAREL & FOOTWEAR

The apparel industry is a significant contributor to carbon emissions, water pollution, and textile waste. The industry is responsible for around 8-10% of global carbon emissions, over 15 million tons of textile waste annually, and roughly 20% of water pollution. The traditional multi-step subtractive manufacturing process is often inefficient, which adds to the negative environmental impact such as excessive waste and harmful chemicals.

To address this issue, BPI assisted a start-up, Simplifyber Inc., in developing a new simple process. The technology has been used to create shoe-tops using a one-step process that converts wood fibers into a leather-like material. The manufacturing process uses 3D-printed molds, which eliminate inefficiencies and reduce waste. The resulting material is waterproof, washable, and as strong as natural leather.



The start-up has secured \$3.5 million USD in seed funding to scale up the process in North Carolina, USA. This innovative technology has the potential to revolutionize the apparel industry by reducing its environmental impact and improving sustainability. By developing and implementing sustainable solutions like this, we can help to reduce the apparel industry's impact on the environment and contribute to a more sustainable future.



3D Printer in Bioproducts Lab

FIGHTING THE PANDEMIC

DR. ZIELS' TEAM SHOWS WASTEWATER GENOMIC TESTING TRACKS COVID-19 VARIANTS IN REGION

Research led by Dr. Ryan Ziels has shown that wastewater testing can effectively and quickly identify levels of COVID-19 infections, including the rise of variants of concern, in the community. By analyzing sewage samples from five wastewater plants in the Metro Vancouver region, the researchers found that viral concentrations in wastewater closely corresponded with clinical case numbers in the area. Additionally, they discovered that the frequency of mutations associated with variants of concern in wastewater strongly correlated with trends in clinically diagnosed cases in the community.

Ziels and his team applied a sequencing technique using handheld DNA sequencers to detect coronavirus genome fragments in wastewater samples, which could provide additional information for public health strategies. The findings could supplement other epidemiology testing methods and are particularly useful when clinical testing is difficult or unavailable at the municipal level. Rapid sequencing of viral information can provide fast turnaround times, with reports provided to health officers within three to four days of sample collection.



DR. RYAN ZIELS

Source: <https://news.ubc.ca/2021/07/12/ubc-research-shows-wastewater-genomic-testing-can-effectively-track-covid-19-variants-of-concern-within-a-region/>

STUDY AUTHOR XUAN LIN, A PHD STUDENT IN CIVIL ENGINEERING IS HOLDING A FROZEN WASTEWATER RNA SAMPLE THAT IS USED FOR SEQUENCING. PHOTO CREDIT: PAUL JOSEPH



DR. HUDSON'S TEAM FINDS A WAY TO KEEP HEALTH CARE PROVIDERS SAFE DURING A PANDEMIC

In response to the COVID-19 pandemic, researchers from UBC and Vancouver General Hospital developed a portable enclosure to protect healthcare workers during aerosol-generating medical procedures which are common in emergency departments around the globe.

Led by Dr. Zachary Hudson, the team designed a modular enclosure that could be easily placed over the patient's head and torso, with inlets above for healthcare workers' arms and instruments. The transparent enclosure was then covered with a plastic tarp, with negative pressure applied to draw any harmful aerosols away. The team later collaborated with another UBC group of researchers led by Dr. Curtis Berlinguette who developed a simpler design suitable for mass production. The two teams made their designs available on the web and open-access journal repositories, and their concepts have been tested by healthcare workers globally.

Source: <https://pwias.ubc.ca/ideas/wall-stories/ubc-researchers-partner-with-vancouver-general-hospital-to-develop-portable-enclosures-to-contain-infectious-aerosols/>

FACE MASKS FROM WOOD FIBERS

The BPI team made headlines by being the first to introduce the concept of using wood fibers in face masks as a means of combating the COVID-19 pandemic. This innovation, known as "Can-Mask", garnered widespread media coverage with over 70 articles published on the topic. The team's hard work led to a meeting with Prime Minister Trudeau and the foundation of a \$3.2M grant from PacifiCan. Currently, a global PPE producer located in the province of Quebec is working on scaling up the technology to bring it to market.

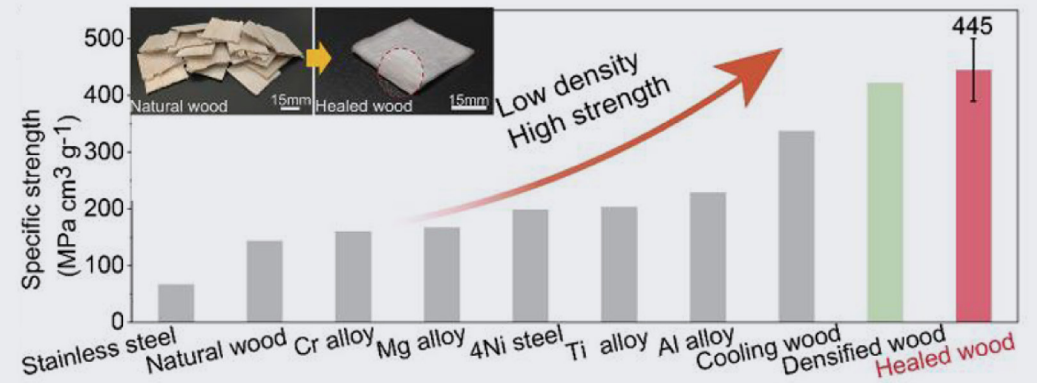


SAVING THE PLANET

WOOD FOR RECYCLING CAN NOW BE TURNED INTO A SUBSTANCE STRONGER THAN STEEL UROSE/GETTY IMAGES

HEALED WOOD - WOOD RECYCLING

Wood durability and properties after long-term use, as a residue or as a "waste", challenges recycling and repurposing. Municipal waste wood accounted for 18.2 million tons in the US in 2018, with only 17% of waste wood being recycled. Thus, recovery and reuse of waste wood is essential to achieve environmental sustainability, especially in the context of urban areas. In 2022, BPI Team introduced a new and fully scalable process to convert residual low-value wood into "new" healed wood that outperforms typical construction materials, including laminated wood, stainless steel and metal alloys.



<https://www.nature.com/articles/s41893-022-00887-8>

UPCYCLING AGROINDUSTRY WASTE

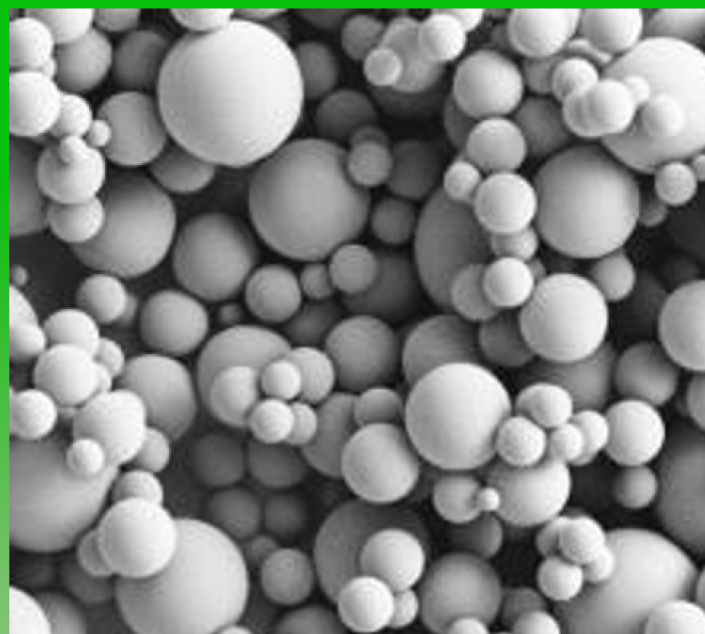
Dr. Orlando Rojas and his team developed a way to turn blueberry pruning waste into value-added products, including lignocellulose filaments comparable in performance to rayon fibers and shown to have reliable performance in marine environments.





SINGLE USE PLASTICS

BPI introduced a new approach to develop fully biobased single-use materials based on residual biomass. Objects of tailorable geometries, including drinking straws and conventional tabletop utensils were produced. They were demonstrated for their recyclability and biodegradability in natural environments.



CARBON CAPTURE

SPECIALTY MOLECULES FROM LIGNIN

BPI members were the first to describe the bacterial catabolism of key lignin breakdown products, including speciality compounds 4-propylguaiacol and acetovanillone. These advances are relevant for wide-ranging industrial applications of rhodococci, including upgrading of lignocellulose biomass.

CARBON CAPTURE

Multiscale carbon particles were synthesized for the first time by using soft-templating lignin microbeads bound with cellulose fibrils. The system was found to perform as a CO₂ capture platform (77 mg CO₂·g⁻¹), while presenting a relatively low pressure drop.

SCALING UP SUSTAINABLE TECHNOLOGIES

COMPOSTABLE BIO-PLASTIC BIOFORM

Dr. Mark Martinez and his team took a significant part in founding a start-up called Bioform with seed funding of approximately \$3.1M that is working on bringing a completely compostable bioplastic to the market. The patented technology uses a multilayered 3D extrusion printer for plant-based hydrogels that are highly-functional and 100% biodegradable.



Source: <https://vancouversun.com/news/local-news/ubc-ventures-plastic-pollution>



DR. YADAV'S BIOREMEDIATION STARTUP ACQUIRED BY A COMPANY SUPPORTED BY BILL GATES

Metabolik Technologies, co-founded by Dr. Vikramaditya Yadav, has been acquired by Allonnia, a U.S.-based company supported by Bill Gates' Cascade Investment. Vancouver's clean-tech venture capital firm, Evok Innovations, has announced their investment of \$20 million in Allonnia. Metabolik has developed a genetic engineering approach to boost the natural bacteria that consume toxic compounds in oil sands tailings ponds, particularly naphthenic acids. Dr. Yadav and his team will continue collaborating with Allonnia, now focusing on bioremediation solutions for cleaning up toxic metals in mine waste such as selenium, arsenic, and acid rock drainage.

Source: <https://biv.com/article/2021/04/ubc-startup-acquired-bill-gates-backed-company>

REACHING OUT TO COMMUNITY

DR. MOHSENI'S TEAM BRINGS CLEAN WATER TO A REMOTE INDIGENOUS COMMUNITY

A remote Lhoosk'uz Dené community, located 200 km west of Quesnel, BC on Kluskus Lake, finally has access to clean drinking water thanks to a new treatment plant tailored to their unique needs. Dr. Madjid Mohseni and his team employed a community-driven approach called Community Circle to develop the treatment system which primarily uses ultraviolet light and chlorine disinfection, and ensures clean drinking water that is free of harmful microbes. The setup is easy to operate, maintain, and repair without relying on specialist skills or pricey components. The success of the collaboration between UBC and the Lhoosk'uz Dené community has built trust and inspired future cooperation, providing hope for other remote communities searching for solutions to their long-term challenges.



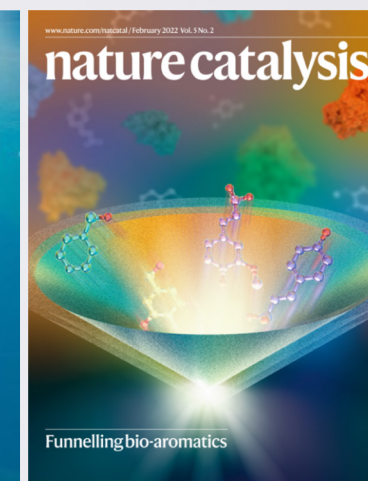
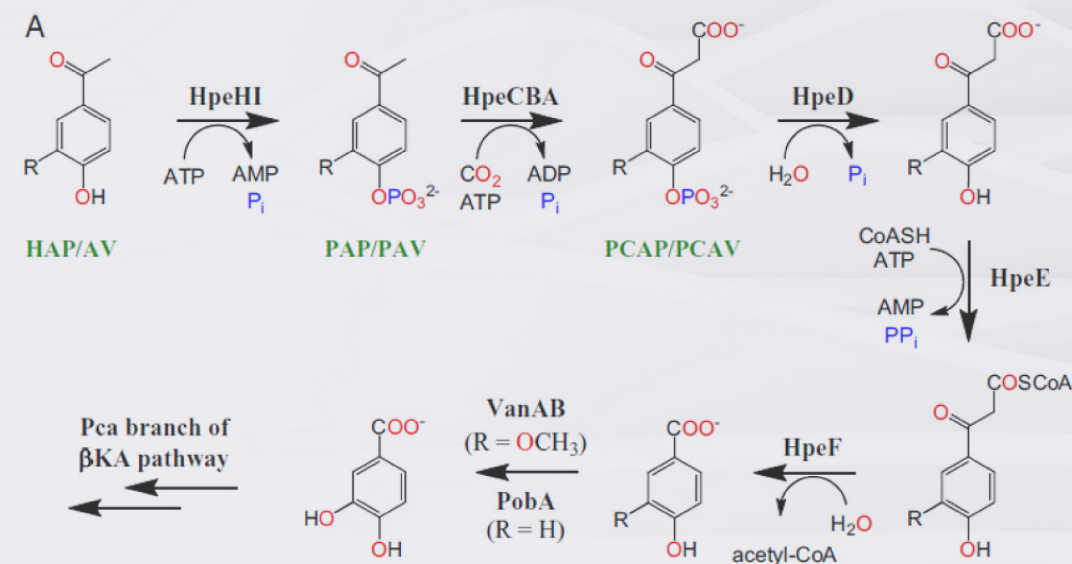
Source: <https://news.ubc.ca/2021/07/13/lhooskuz-dene-village-taps-into-clean-water-after-a-20-year-wait/>

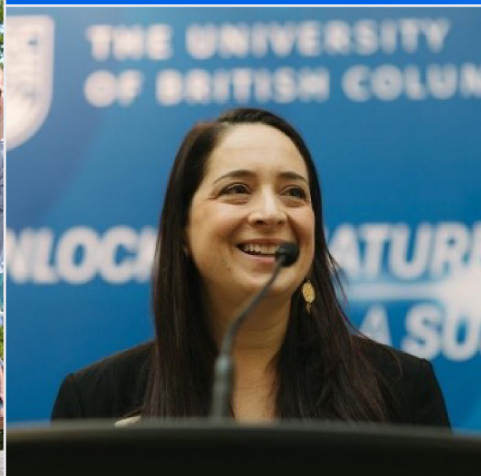
RESEARCH GROUP HIGHLIGHTS

MICROBIAL CATABOLISM & BIOCATALYSIS RESEARCH GROUP

Dr. Lindsay Eltis and his team's research is aimed at understanding how bacteria degrade lignin-derived aromatic compounds and engineering bacteria to convert lignin to high-value products, such as commodity chemicals. Upgrading lignin, an underutilized component of biomass, is essential for the sustainability of biorefineries.

Over the past year, the team worked with Prof. Bill Mohn to discover and characterize the first described microbial pathway responsible for catabolizing acetovanillone, a major component of industrial lignin streams (Navas et al., 2021; Dexter et al., 2022). This pathway enables bacteria to grow on lignin produced by oxidative catalytic fractionation, for example, and facilitates the engineering of biocatalysts to upgrade lignin. Their work on enzymes involved in degrading lignin-derived aromatic compounds has led to invited reviews in *Curr Opin Biotech* and *Nature Catalysis*. They have also expanded the genetic tools to engineer bacteria to create industrially viable biocatalysts (Round et al., 2021). These tools are integrative, modular expression vectors, which they are using to expand the catabolic capabilities of *Rhodococcus*, a major class of soil bacteria that degrade a wide range of aromatic compounds and that are used world-wide in biocatalytic applications.





SUSTAINABLE NANO BIOCOMPOSITES

RESEARCH GROUP

Dr. Emily Cranston and her team came out of the depths of the pandemic refreshed like renewable resources in 2021! New publications, collaborations, researchers, funding, and awards uplifted us all. Importantly, we took our first in-person (non-Zoom) group photo again and delighted in group activities including skiing, an outdoor escape room, BBQ/pizza/birthday parties, hiking, and our annual holiday party (complete with tacky-gift exchange). Dr. Cranston was awarded the E.W.R. Steacie Memorial Fellowship from the Natural Science and Engineering Research Council of Canada (NSERC) - awarded to the top 6 early stage academic researchers across Canada in the natural sciences and engineering. This recognition led to an opportunity to share her research during a roundtable discussion with Dr. Mona Nemer (scientific advisor

to the prime minister) and Prof. Alejandro Adem (NSERC president); they seemed very interested in nanocellulose and Canada's role in advancing the science and technology of sustainable materials.

Other major awards included the 2021 TAPPI NanoDivision Technical Award and FiberLean® Technologies Prize to Dr. Cranston and the 2021 TAPPI Nano Student Award to PhD student, Gwendoline Delepierre. The 2021 LeSueur Memorial Award from SCI Canada was also awarded to Dr. Cranston; all of these awards were presented at virtual ceremonies but we look forward to in-person celebrations and conference banquets in coming years.

In 2021, the Cranston group continued to advance our understanding surrounding antiracism and EDI.I issues through reading, discussions, and actions. This included participating in the "Make it Awkward" workshop facilitated by Dr. Siara Isaac where we got to practice new strategies to speak up when something is prejudiced (and what to do when we mess up); an abridged version of Dr. Moore's 21-day Racial Equity Habit Building Challenge; and the American Chemical Society's Diversity Beyond Lip Service Program by La'Wana Harris.

Research highlights included the cover of *Langmuir* with our "Benchmarking Cellulose Nanocrystals (Part II)" work making us the only group worldwide to have extensively and systematically characterized all commercially available cellulose nanocrystals; our new precipitation-driven surface functionalization route for cellulose nanocrystals (that can be performed during industrial nanoparticle production); and two review papers (in *Green Chemistry* and *Journal of Materials Science*). The latter, entitled "Current International Research into Cellulose as a Functional Nanomaterial for Advanced Applications" was a true international effort with 10 countries represented.





CLEAN ENERGY RESEARCH GROUP

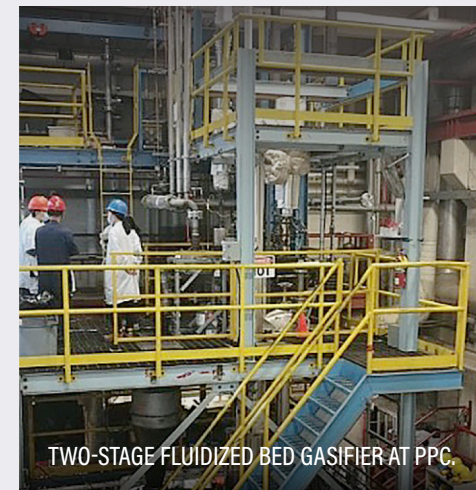
Dr. Xiaotao Bi and his team successfully organized the 13th International Conference on Fluidized Bed Technology in May 2021. This is one of the two most prestigious international fluidization conference series. Dr. Bi served as the conference chair and was elected the chair/convenor of the advisory board of the conference series.

The team commissioned a pilot two-stage fluidized bed reactor for steam-oxygen gasification of forest residues to syngas for lime kiln applications, displacing natural gas, and for upgrading to renewable natural gas at the Pulp and Paper Centre. This project was supported by Bioalliance program, with Dr. Kevin Smith, Dr. Naoko Ellis, Dr. Wenli Duo (FPInnovations), Dr. Robert Legros (Polytech Montreal) and Dr. Jim Lim as the co-PIs. The pilot unit is under extensive tests to support the pulp and paper industry to decarbonize its operation and to convert biomass residues to renewable natural gas to support BC government's 2030 target of 15% renewable content of natural gas.

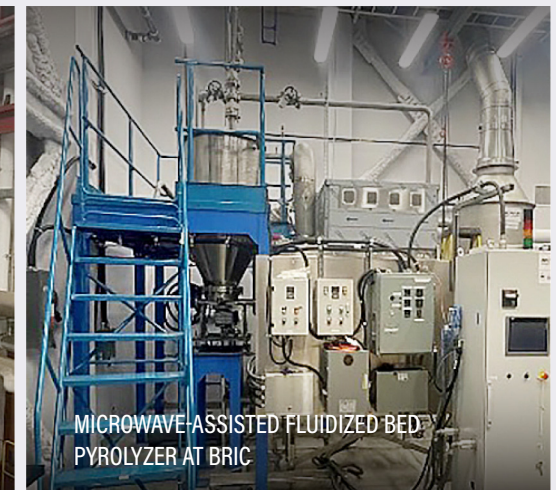
The construction of the new \$6 million Biorefining Research and Innovation Centre (BRIC) was completed and opened in January 2022. The pilot facility was funded by CFI, BCKDF, PacifiCan and APSC, and will host research of 9 PIs on biomass conversion to biofuels and bioenergy using novel microwave-assisted catalytic pyrolysis, carbon-supported iron catalyst for tar removal from gasification syngas, catalytic upgrading of bio-oil to liquid biofuels, combustion performance of biofuels in engines, and bio-extractives and biochar upgrading and applications.

A white paper was developed on BC clean energy roadmaps and strategies to meet its 2030/2050 GHG reduction targets. It reveals that significant increase in the supply of both renewable clean electricity and biomass residue-derived bioenergy/biofuels is required to support the electrification and shift to renewable energy.

The team published 21 journal papers, one conference book (co-edited) and one book chapter. 1 PhD student, 1 Master student, 4 visiting PhD students and 3 postdoctoral fellows completed their training.



TWO-STAGE FLUIDIZED BED GASIFIER AT PPC.



MICROWAVE-ASSISTED FLUIDIZED BED PYROLYZER AT BRIC

SUSTAINABLE BIOECONOMY RESEARCH GROUP

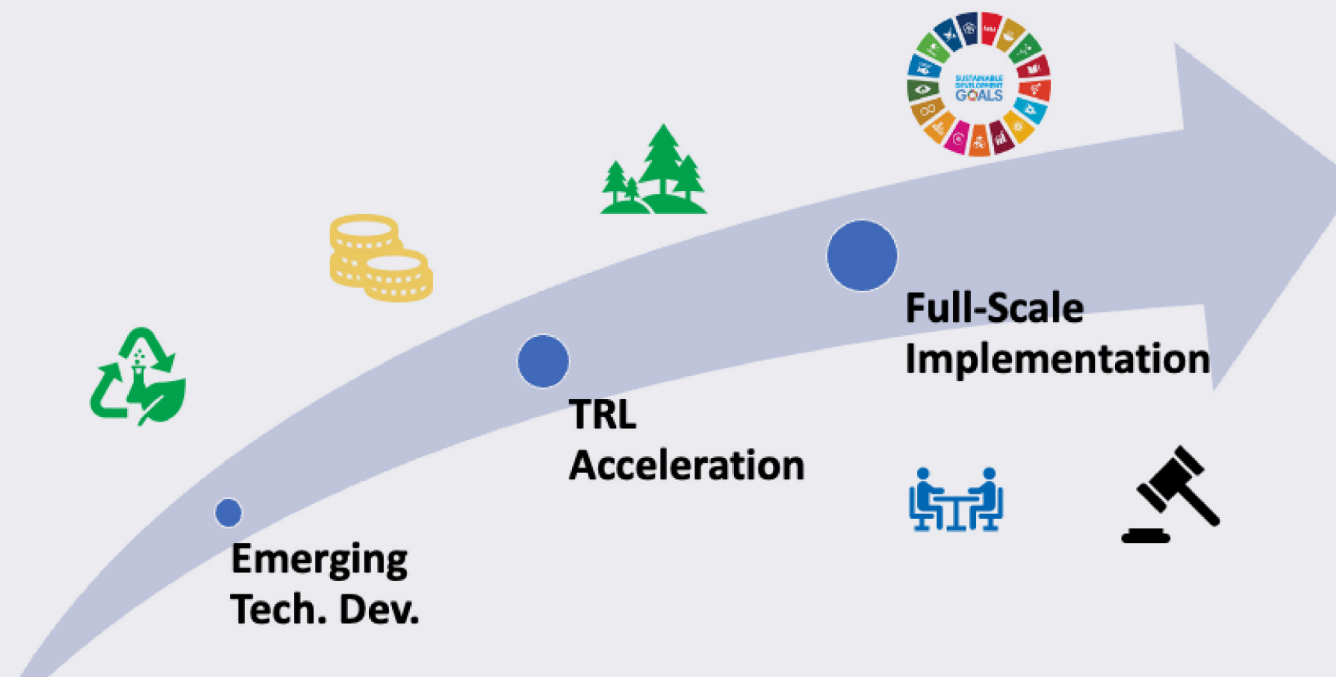
Dr. Tu's Sustainable Bioeconomy Research Group investigates the environmental and economic implications of multiple bioproducts at early design stages. Such analyses help the technology development teams to identify the "hotspot" (e.g., most significant source of GHG emissions, largest capital investment) of the product life cycle, and hence guide the sustainable design of these emerging technologies. In particular, Dr. Tu's group has published several peer-reviewed articles revealing the critical need to reduce the carbon intensity of chemical solvents that are widely used in bioproducts synthesis.

Dr. Tu's group also investigates the gaps in current methodology for sustainable assessment. One recent publication draws insights from existing methods for addressing data gaps in life cycle assessment (LCA). The collection of missing data can be cost-prohibitive and infeasible in many circumstances when conducting LCA studies. Dr. Tu's research systematically describes the features, scope of application and underlying assumptions of the major methods to address this issue in the current literature, as well as offering actionable recommendations for mitigating the limitations of these methods. Besides technology development under the guidance of LCA, switching to a sustainable bioeconomy also requires the effort from policy and socioeconomic aspects to collectively drive the change. System dynamics (SD) modelling is well poised to investigate such complex systems and reveal the changes in key performance indicators (e.g., the market size of a certain bioproduct) that originate from market dynamics and policy intervention. Another publication from Dr. Tu's group identifies the need for creating modeling mechanisms to explicitly incorporate the environmental and feedback loops into the casual relationships of a SD model.

The resulting framework can significantly improve our capacity to understanding the potential sustainability impacts, implementation constraints, and the specific needs for policy design to promote investment in different technologies and markets of a bioeconomy.

Dr. Tu's group has also established collaborations with industrial partners to apply their analytical methods to evaluate the environmental benefits of substituting fossil-based energy and products with bio-based alternatives. The range of topics include harvested wood products, energy, biochemicals and pulp.

The members of Dr. Tu's group have been recognized by multiple UBC internal and external awards for their innovative research. As a prominent example, PhD student Shiva Zargar Ershadi was awarded the prestigious Vanier Canada Graduate Scholarship for her research on creating an integrated analytical framework for sustainable biorefinery. The members of Dr Tu's group are also actively engaged in knowledge dissemination and educational outreach (e.g., through "Let's Talk Science").



SUSTAINABLE FUNCTIONAL BIOMATERIALS LAB

RESEARCH GROUP

Dr. Feng Jiang, an Assistant Professor in the Faculty of Forestry and Canada Research Chair (Tier II) in Sustainable Functional Biomaterials, has led the development of several packaging solutions using natural biomass residual fibres to address the alarming plastic crisis. As an example, they invented a translucent all-cellulose plastic alternative using an innovative cold alkaline pretreatment. The cellulose film demonstrates mechanical properties comparable to or even superior to the plastic counterparts, while it can fully degrade within three weeks in a soil burial experiment. The cellulose film is expected to find applications in packaging such as coffee or snack bags, or pouches for cereal or protective wrap such as envelopes.

Dr. Jiang's team has also established a meaningful collaboration with Wet'suwet'en First Nation in the development of lightweight foam materials using forest residues in that First Nations community. The new bio-based foam has similar characteristics to the expanded polystyrene foam currently used as packaging material, and is expected to be used as packaging or cushioning material. Other than producing biodegradable and sustainable foam materials to replace the synthetic foam that is widely used as packaging and insulation materials, this collaboration between UBC and Wet'suwe t'en First Nation also brings about several benefits. It can potentially help to remove forest residues out of the forest to prevent wildfires and combat climate change. It also helps to build strong connections between UBC and the First Nations community, to integrate with Indigenous wisdom in research and development as well as to promote bioeconomy in the communities.



THE UBC-WFN TEAM HOLDING THE BIOFOAM PRODUCED USING FOREST RESIDUAL FIBRES (FROM LEFT TO RIGHT: FENG JIANG, JOE WONG, REG OGEN, AND YELING ZHU)



PDF DR. PENGHUI ZHU HOLDING A PIECE OF TRANSLUCENT CELLULOSE FILM (PHOTO CREDIT: PAULO RAMOS, UBC FACULTY OF FORESTRY)

BIOBASED COLLOIDS & MATERIALS (BiCMat) RESEARCH GROUP



Dr. Orlando Rojas and his team applied nanocelluloses, especially cellulose nanofibrils and nanocrystals, as functional ingredients in emulsions for food and consumer products. This opens opportunities for sustainable and economic sources rooted in natural plant-based systems. They were demonstrated to alter the physicochemical, sensory, and other properties as nanocelluloses adsorb to air-water or oil-water interfaces and stabilize foams, emulsions or self-assemble in aqueous solutions to form gel networks.

Scientific advancements have been achieved in topics related to bioproducts critical to the circular bio-economy. The latter include exciting progress in the field of wearables and nonwovens for personal protection equipment applications.

Dr. Rojas and the group championed the formation of the Boreal Alliance network for research collaborations with leading peer institutions in Sweden, Finland and Switzerland. They also hosted a number of researcher exchanges and visiting professors from Finland, China, Brazil, France, Canada and Costa Rica.

During this period, BiCMat was very active in publishing high impact peer-reviewed papers, including 20 in the following high impact (IF>10) venues: Chemical Reviews (1), JACS (1), Nature Comm (1), Advanced Materials (3), Materials Today (1), Materials Horizons (1), Science

Advances (1), Advanced Functional Materials (2), ACS Nano (2), Chemical Engineering Journal (5), ACS Applied Materials & Interfaces (2). The sustained impact of the work is reflected in the list of "The World's Top 2% Scientists" in the area of "Polymers". We also continue leading the list of most prolific authors in the combined area of "cellulose nanocrystals and cellulose nanofibers". New developments were reported in connection with lignin, tannins, chitin (nanochitins) and other structured renewable polymers.

Our group was joined by 15 international visiting scholars (including 3 professors on sabbatical, and 4 visiting professors). Three PhD students defended successfully their theses and 3 obtained MS degrees. A significant effort was invested in the integration of the Bioproducts Institute, which includes 12 fully engaged staff members (including 4 interns). Besides BPI expected operations, which included daily team meetings and organizational activities, we initiated a number of efforts related to market intelligence that is guiding our BPI research directions.

Dr. Rojas served as evaluator of five professor academic promotions and appointments in Canada and USA, eight Graduate Student Committees and acted as Nordic Opponent of three PhD theses (Sweden and Finland). Besides directing the BPI and all the activities that this implies, Dr. Rojas has been involved in the Wallenberg Prize committee, The CHBE Awards committee, promotion and reappointment committee, the Anselme Payen Committee, Scientific Advisory Board Universidad de Santiago de Compostela and in roles as Associated editor of Biomacromolecules, among others.



INFRASTRUCTURE

WORLD-CLASS RESEARCH HUB FOR BIO-BASED INNOVATIONS

The BioProducts Institute boasts of state-of-the-art research facilities spread among numerous departments and buildings on the UBC Vancouver campus. These world class facilities are home to over five hundred affiliated researchers from various disciplines, who are empowered to drive innovative research in biobased materials development.

1. PULP & PAPER CENTRE (PPC)

The PPC is an inter-disciplinary, cross-faculty research centre with specialized laboratories and high-head piloting facility for those who conduct research for the benefit of the current and future pulp and paper industry. The centre serves to bring together faculty and student researchers to work collaboratively with the manufacturing industry, utilities, supplier industry, consultants and government agencies.

2. FOREST SCIENCE CENTRE (FSC)

FSC is the home of the UBC Faculty of Forestry, boasting modern amenities such as state-of-the-art labs, a roomy atrium that offers flexible learning spaces, and multiple classrooms for diverse educational experiences.

3. CHEMICAL & BIOLOGICAL ENGINEERING BUILDING (CHBE)

The facility serves as the home of the CHBE faculty, boasting modern amenities such as a spacious atrium that provides flexible learning spaces, and multiple classrooms that cater to diverse educational experiences.

4. LAND & FOOD SYSTEM (LFS)

The Faculty of Land and Food Systems offers a range of advanced research facilities, including a farm, a food processing pilot plant, and labs for analyzing food quality and safety, to support innovative research in the areas of agriculture, food, and environment.

5. LIFE SCIENCE CENTRE (LSC)

LSC is dedicated to support translational research that makes a global impact on human health and the environment. Their interdisciplinary science changes healthcare practices and encourages sustainable resource harvesting to reduce environmental costs.

6. CHEMISTRY BUILDING (CHEM)

The Department of Chemistry features world-class research facilities, such as NMR and MS centers, clean rooms, and a high-throughput screening lab, to enable cutting-edge research in chemistry, materials science, and more.

7. MICHAEL SMITH LABORATORIES (MSL)

MSL facilitates internationally recognized research programs in the areas of medical and animal molecular genetics/ biology, plant and forest molecular genetics/biology, bioprocess engineering, chemical biology, proteomics, micro-fluidics, bioinformatics and statistical genomics.

8. ADVANCED MATERIALS & PROCESS ENGINEERING LABORATORY (AMPEL)

AMPEL is a vibrant place for research in Advanced Materials and Process Engineering with cutting edge research that coalesces from the theoretical nanofibre physical properties to the production of advanced composites.

9. CLEAN ENERGY RESEARCH CENTRE (CERC)

CERC provides state-of-the-art research facilities in a recently-completed building for the investigation of clean energy problems with focus on energy demand, energy supply, conservation and efficiency.

10. BIOREFINERY RESEARCH & INNOVATION CENTRE (BRIC)

BRIC aims to reduce the barriers and risks of technology scale-up to market new biofuels and bioproducts which have been identified by industry as the largest challenges to developing successful bioproducts.

11. BIOENERGY RESEARCH & DEMONSTRATION FACILITY (BRDF)

The BRDF system, fueled by biomass, creates synthesis (syn) gas that is then burned, in raw form, to produce steam or conditioned to create ultra clean syn gas that is injected into an internal combustion engine used to generate electricity.

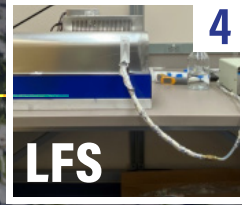
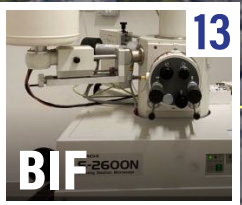
12. CENTRE FOR ADVANCED WOOD PROCESSING (CAWP)

CAWP was created to address the need for advanced technical and managerial training for the value-added wood products manufacturing sector.

13. BIOIMAGING FACILITY AT BIOLOGICAL SCIENCES BUILDING (BIF)

Services and equipment include optical microscopes and electron microscopes, sample and image processing equipment, training sessions and equipment booking services, TEM, SEM and sample preparation techniques.

UBC - VANCOUVER CAMPUS





BIOPRODUCTS LAB RELAUNCHED

The Bioproducts Lab, situated in the Pulp and Paper Centre, underwent a \$5 million renovation funded by UBC, which was completed in August 2021. An additional 3.5 million was provided by CFI and PacifiCan to better support the development, scale-up, and production of sustainable bioproducts, including filters, adhesives, lightweight materials, and personal protective equipment.

Over 80 researchers work in the 414 m² lab, which is equipped with 68 lab benches, 6 fume hoods, and more than 50 advanced research instruments. The lab has facilitated training in state-of-the-art methods and instrumentation for processes such as additive manufacturing, biofabrication, spectroscopy and surface analyses, colloidal behavior, thermal and mechanical analysis, structural chemistry, rheology, (bio)sensing, microscopy, among others.

The lab focuses on discovering competitive alternatives to fossil materials by developing bio-based materials of different scales, mainly fibers (micro/nanofibers), fiber networks, particles, and colloidal systems. Researchers work closely with forest industries to study surface modification strategies and tune the properties of cellulosic fibers, fibrils, nanocrystals, and other renewable particles.

The lab has created collaborations and partnerships with over 100 internal and external research groups, supporting global sustainable development through research on the fundamental and utilization aspects of renewable resources. The Bioproducts Lab aims to be a hub for clean technology development, advanced manufacturing, and natural resources value-added processing, contributing to the circular and renewable economy and the growth of BC's bio-innovation ecosystem.



PARTNERSHIPS

BC PULP & PAPER BIOALLIANCE

BC Pulp and Paper BioAlliance is a consortium representing all BC Pulp and Paper companies, FPInnovations and UBC BPI. The Alliance's 4 major themes continue to make excellent progress related to Syngas/Renewable Natural Gas, Lignin platform technologies, Pulp based bioproducts and Ash by-product valorization. Highlights include pilot trials of the syngas/RNG facility with sponsorship with PacifiCan and NRCAN, development of new intellectual property related to utilization of lignin and the development of new advanced filtration material. Representatives from BioAlliance and UBC BPI have also been an active participant in supporting the development of the BC Bioproducts Strategy with the BC Ministry of Forests



BC Pulp & Paper
BIO-ALLIANCE



BOREAL ALLIANCE

GROWING TRANSNATIONAL RESEARCH NETWORK



BOREAL ALLIANCE STEERING COMMITTEE LAUNCHED

On January 19, 2022, the Boreal Alliance Steering Committee convened virtually to mark the official launch of its activities and welcome new members to the network. Representatives from FinnCERES, BioProducts Institute, Treesearch, EMPA, LUKE, UNITE Flagship, and the University of Oulu came together to discuss their shared vision of advancing sustainability through collaborative initiatives in bio-based material innovations.



The Committee agreed to pool their expertise and resources to develop and facilitate collaborative platforms for joint research activities within the network and beyond. In 2022, the BioProducts Institute is appointed to serve as the host organization for coordinating activities and communications. The Alliance will continue to transform the grand collaborative vision into actions and to make a global impact in accelerating bio-based material innovations utilizing boreal forest resources.

BOREAL ALLIANCE JOINT WEBINAR

On May 26, 2021, BPI, FinnCERES, and Treesearch collaborated to host a webinar titled "Shaping the Future Bio-Economy" on Gatherly, a virtual conference platform. The webinar commenced with welcome speeches from Daniel Soderberg of Treesearch, Dr. Orlando Rojas of BPI, and Dr. Tekla Tammelin of FinnCERES. The keynote presentations featured experts such as Dr. Lauri Sikanen, Dr. Werner Kurz, Dr. Mikael Hannus, and Dr. Jack Saddler, who shared their insights on the bioeconomy. The event also featured scientific presentations from 24 young researchers representing the three organizations, covering various topics related to biobased materials development. Over 150 researchers participated in the webinar who enjoyed exploring the virtual space as avatars and engaged in instant video chats with other attendees. This event marked the first joint activity by the Boreal Alliance members and opened up opportunities for young researchers to build networks for future collaborations.



EQUITY, DIVERSITY, INCLUSION & INDIGENEITY

BPI EDI.I COMMITTEE LAUNCHED

The BPI's Equity, Diversity, Inclusion & Indigeneity (EDI.I) Committee was launched in March 2022, comprising members from all levels of the organization. The 14 inaugural members brought diverse backgrounds and lived experiences with a shared objective of advancing inclusion in all aspects of BPI's research and operations.

During the first committee meeting, members discussed the committee's vision and structure and how they could best implement actions to create a more diverse workforce. In line with UBC's Inclusion Action Plan and the Indigenous Strategic Plan, the committee aims to foster a culture of respect, wellness, equity, empowerment, inclusion, and diversity

within BPI, where everyone has an essential role in creating a better future for the Institute and university.

Committee member Daniela Figueroa emphasized the importance of communities and fostering a culture where everyone feels valued and heard. Prof. Qingshi Tu expressed excitement at the opportunities to exchange ideas, learn from peers, and create an environment where EDI.I awareness is naturally integrated into research and education activities. The committee looks forward to developing engaging activities to fulfill its mission.

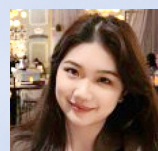
BPI EDI.I COMMITTEE MEMBERS



Daniela Figueroa
ERMP Research
Program Manager



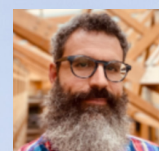
Akash Gondaliya
PhD Candidate
CHBE



Yalan Liang
Undergrad Student
Forestry



Kelley Oh
BPI Engagement &
EDI.I Facilitator



Gregory Paradis
Assistant Professor
Forestry



Orlando Rojas
Professor
BPI Scientific Director



Anderson Veiga
PhD Student
Wood Science



Adriana Manso
Associate Professor
Dentistry



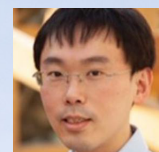
Marina Mehling
PhD Candidate
CHBE



Titichai Navessin
BPI Director of Operations



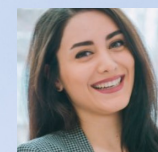
Sumi Siddiqua
Associate Professor
UBCO Engineering



Qingshi Tu
Assistant Professor
Forestry



Heather Trajano
Associate Professor
CHBE



Shiva Zargar
PhD Candidate, Forestry



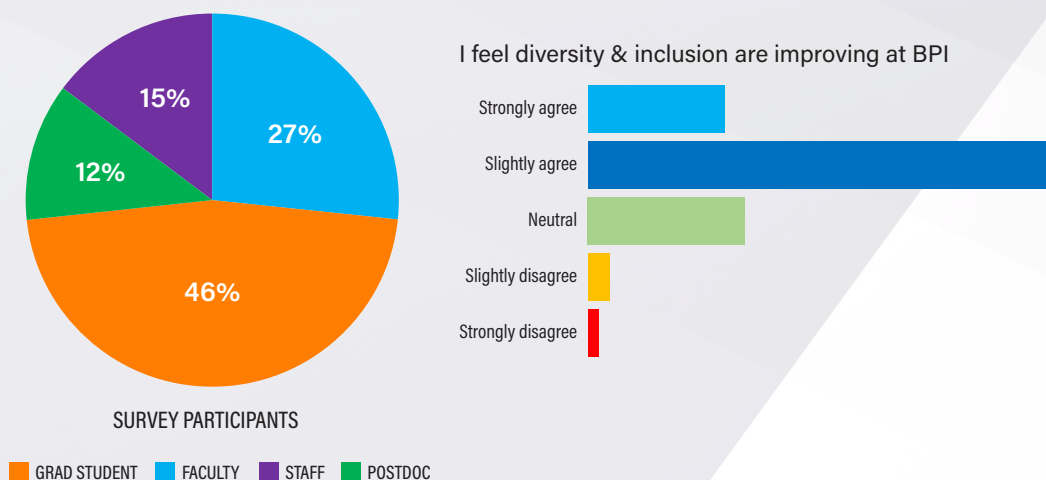
EDI.I EVENTS

EDI.I SURVEY 2021

In an effort to create a more inclusive workplace for everyone, BPI conducted an anonymous survey on equity, diversity, inclusion, and Indigeneity (EDI.I) from July 18th to August 30th 2021. The survey gathered 75 responses in total which is 17.5% of response rate.

It is encouraging that the result indicates overall positive experiences at BPI workplaces. The complete report is made available to view upon request. BPI thanks all participants and promises to incorporate their feedback in developing programs, policies and practices to improve equity, diversity, inclusion and Indigeneity in our community.

SNAPSHOTS OF EDI SURVEY RESPONSES



EDI.I IN RESEARCH

BPI hosted its first EDI.I workshop titled “Embedding Equity, Diversity, Inclusion and Indigeneity in the BPI Research Program” on December 2nd, 2021. In total, 52 people participated in a virtual one-hour session led by Sheryl Staub-French (Associate Dean, Equity, Diversity & Inclusion), Dana-Lyn Mackenzie (Senior Manager, EDI & Indigeneity), and Greg Lockwood (Partnership Strategist, Equity & Inclusion).

The three EDI.I veterans spoke on how to embed EDI.I in all facets of research – design, materials and tools, team and lab composition, and research and lab culture. The audience had an opportunity to reflect on their own identity, positionality and bias, apply EDI.I fundamentals to the STEM context, and learn to create a more inclusive research and lab environment during the session which has a mix of information and resource sharing and small group discussions.

HOW DIVERSITY & INCLUSION CAN HELP MOVE SUSTAINABILITY & STEM FORWARD

On the 2022 Valentine's day, Dr. Diego Gomez-Maldonado, a postdoctoral fellow from Auburn University, joined BPI online to share his personal story of dealing with his own challenges as a young researcher from unconventional backgrounds. He presented some relevant life examples and data on how EDI plays an important part in advancing sustainability in research and life in general.

Many young BPI researchers participated in this open dialogue about the social challenges they face as STEM researchers through the lens of equity, diversity, inclusion and indigeneity.



DR. DIEGO GOMEZ-MALDONADO

TRAINING YOUNG RESEARCHERS

FIRST BOREAL ALLIANCE EXCHANGE STUDENT RECEIVED HER PH.D

In September 2021, Rubina Ajdary, a doctoral candidate from Aalto University in Finland, joined UBC for a six-month exchange program under the Boreal Alliance initiative. Following the exchange program, Ajdary successfully defended her PhD thesis on biomedical solutions for Pelvic Organ Prolapse.

Ajdary's research focused on the potential applications of nanocelluloses as 3D functional materials in biomedicine to develop personalized solutions for patients suffering from Pelvic Organ Prolapse. By utilizing additive manufacturing techniques, her research aims to offer customized treatment options to cater to individual patients' needs.

Ajdary expressed her enthusiasm with the exchange program, highlighting the opportunities it provided for collaborating with researchers from diverse backgrounds and nationalities, leading to valuable multidisciplinary collaborations and fresh perspectives. Congratulations to Dr. Ajdary on her achievement and we wish her continued success in her future research endeavors.

BPI BUSINESS INTELLIGENCE TEAM COMPLETE THEIR TERM

The second cohort of BPI interns completed their six-month term at the end of March 2022. The four interns formed a working unit called the BPI Business Intelligence Team and provided excellent support to both research and business operations. Ani Markarian expressed her appreciation for the experience, stating that "working with BPI has been a very rewarding experience...I have undoubtedly gained a wealth of knowledge in sustainability."

The team's multidisciplinary skills allowed them to contribute to BPI's success in various ways. Riva Siddiqui shared how BPI provided an excellent avenue to explore her interests in sustainability, stating that she "got to work alongside an amazing team that made time fly!"

The team also hosted a successful webinar titled "Moving Towards Bio-based Housing in Remote British Columbia" that attracted researchers and industry professionals. Brayden Pelham highlighted the team's unique opportunity to explore the impacts of bioproducts on residential construction in BC.

Through this opportunity, the team developed important skills and knowledge that will benefit their future careers. Daichi Hirata said, "I definitely learned a lot more than I could have hoped for, and I'm very excited to carry these skills forward with me."



EVENT & ENGAGEMENTS

BPI had a bustling year, organizing many exciting activities and welcoming partners and collaborators to our labs. Our commitment to reaching out to communities to raise awareness about the significance of our research will remain unwavering, as we strive to engage a broader audience in creating together a more sustainable environment.

8 Scientific Seminars & Workshops

3 Events with Industry Partners

2 Boreal Alliance Events

3 EDI.I Events

1000+ Total Attendance at BPI Events During FY2021-2022

PPC OPEN HOUSE

BPI held an Open House on November 26, 2021, at the Pulp and Paper Centre, where they welcomed over 150 attendees, including industry and government partners, to showcase research activities and renovated facilities. This event was a major milestone for BPI as it upgraded its research capabilities to a world-class level, while also celebrating the remarkable progress made by the team during the pandemic.

Dean James Olson opened the event with a welcome address and the audience enjoyed the company of Dr. Richard Kerekes, the founder of PPC. BPI premiered its introductory video highlighting their mission, vision and values. Guests were then given a tour of the facilities, including lab demos, poster presentations, and interactive activities to win exciting prizes. Dr. Orlando Rojas expressed his gratitude towards those who contributed to turning PPC into a leading biobased innovation center. He also pledged to establish additional platforms for spreading BPI's mission and to foster collaborative environments to work towards a sustainable future.





BPI SEMINARS & WORKSHOPS

BPI organized exciting seminars, webinars and workshops that brought together prominent speakers, industry and government partners, and budding researchers in the biobased materials development sector. Through these events, the BPI community could expand their knowledge, acquire new skills, and establish connections with key figures in industry. The seminars and workshops included presentations and interactive sessions, allowing attendees to learn about the latest developments in bio-based materials research and development. Moreover, the events provided networking opportunities, enabling participants to establish relationships with critical stakeholders in the field. BPI's efforts to unite diverse experts in the biobased materials industry contributed significantly to the overall advancement of the sector.

BPI thanks all the wonderful speakers who visited us and shared their inspiring insights. Their contributions to our events were truly remarkable and left a lasting impact by enriching our knowledge and motivating us to pursue excellence.

KEYNOTE SPEAKERS INCLUDED



Dr. Harri Kiiskinen
VTT, Finland



Dr. Karita Kinnunen-Raudaskoski
Paptic, Finland



Dr. Gerald Fuller
Stanford University, USA



Dr. Richard Venditti
NCSU, USA



Dr. Trevor Treasure
Eastman Chemical, USA



Dr. Warren Mabee
Queens University, Canada



Dr. Kevin de France
Queen's University, Canada



Dr. Cigdem Eskicioglu
UBC Okanagan, Canada



BC MINISTER KAHLON VISITS BIOPRODUCTS LAB

On August 26, 2021, BPI welcomed Hon. Ravi Kahlon, Minister of Jobs, Economic Recovery and Innovation, for a tour of the Pulp and Paper Center. The minister observed four demonstrations showcasing BPI's world-class research capabilities in bio-based material innovations.

The demonstrations included bark samples and their applications by Dr. Heather Trajano's group, nanocellulose-based materials by Dr. Emily Cranston's group, lignin samples and cement by Dr. Johan Foster's group, and marine sourced biomaterials by Dr. Orlando Rojas's group. Minister Kahlon was given some of the samples to actually touch and feel while listening to how those materials can change the bioproducts market landscape and accelerate innovations of sustainable solutions. This was the first opening of the lab to external guests after its recent renovation funded by UBC and the BC government, which demonstrated UBC's commitment to support the creation of value-added sustainable bioproducts.



COMMUNICATIONS

BPI has demonstrated a strong commitment to building a robust communication network that has successfully engaged its audience. The institute's website has been generating a steady stream of traffic, with an average of over one thousand monthly visitors. In addition, the monthly newsletters have received an exceptional open rate of 44%, significantly higher than the industry average of 22%. BPI's social media channels have also been growing at an impressive rate, with an average of 30% engagement growth. These results showcase BPI's dedication to effective communication and its ability to connect with its audience.

1082

Website Avg Monthly Visitors

1008

Newsletter Avg Subscribers

35%

Newsletter Subscriber Growth Over The Year

44%

Newsletter Avg Open Rate
Industry Avg Rate: 22%

30%

Social Media Avg Growth Rate in Engagement
Twitter, LinkedIn, Instagram, Facebook

BPI INTRO VIDEOS RELEASED

BPI unveiled an official introduction video that showcases the institute's research activities and vision for bioproducts innovation. The video was released during the PPC Open House in Nov 2021 and provided an exclusive sneak peek into our labs, which are equipped with state-of-the-art research instruments.



<https://www.youtube.com/playlist?list=PL3yJbPYUwp1CT9Uy1VYZkt9MU4-Y0SU>

BPI has also launched a series of videos titled "Meet BPI Researchers" featuring the researchers and their labs. The videos explain scientific concepts in simple language to reach out to a broader audience and promote a greater understanding of bioproducts research. The videos are available on BPI's YouTube channel, providing an informative and engaging way to learn about their groundbreaking work.



<https://youtube.com/playlist?list=PL3yJbPYUwp2gSFtRbwenZbKGGKi7yf0HF>



AWARDS & RECOGNITIONS

The BPI researchers have demonstrated exceptional expertise across all domains of the bioproducts industry and received global recognition this year. Their innovative contributions have positioned them as true trailblazers, challenging the carbon-centric society to facilitate a net-zero future. We take immense pride in our researchers and their significant contributions to creating a better world for future generations. Congratulations to all!

MAY 2021

Dr. Orlando Rojas has been appointed as a new member of the Marcus Wallenberg Prize Selection Committee along with Dr. Paul Dupree from the University of Cambridge in England and Dr. Mike Wingfield from the University of Pretoria in South Africa. Since 1981, the Marcus Wallenberg Prize has been awarded to recognize, encourage and stimulate pathbreaking scientific achievements which contribute significantly to broadening knowledge and to technical development within the fields of importance to forestry and forest industries.

JUNE 2021

Dr. Johan Foster, Dr. Laurel Schafer, Dr. Sheldon Green, Dr. Qingshi Tu, Dr. Dana Gracov, and Dr. Steven Hallam have received funding from the Natural Science and Engineering Research Council (NSERC)'s Discovery Grants program and Research Tools and Instruments (RTI) program.

OCTOBER 2021

Dr. Jack Saddler has received the 2021 Researcher Award from the BC Bioenergy Network in recognition for his exceptional leadership contributions to advancing bioenergy research within the province of British Columbia.

Dr. Taraneh Sowlati has received the 2021 Best Natural Resources Publication Award in Natural Resources from The Institute for Operations Research and the Management Sciences (INFORMS) Energy, Natural Resources & The Environment section (ENRE). Sowlati's winning publication, Impact of carbon pricing policies on the cost and emission of the biomass supply chain: Optimization models and a case study, looks at the impact of carbon pricing policies on the optimum solutions of case-independent biomass supply chain models.

Dr. Feng Jiang has received the American Chemical Society's CELLulose and Renewable Materials Division (ACS CELL) KINGFA Young Investigator Award which is given to recognize young researchers who have made outstanding contributions to the science and chemical technology of cellulose and renewable materials.

NOVEMBER 2021

Dr. Emily Cranston has been awarded a 2021 E.W.R. Steacie Memorial Fellowship by NSERC which is given to recognize early-stage academic researchers in the natural sciences and engineering and to enhance their research capacity so that they can become leaders in their field and inspire others.

Dr. Vikram Yadav has been named one of Canada's Top 40 Under 40, a prestigious annual award from Caldwell Partners in recognition for his notable contributions to research, education, commercialization and regulation of synthetic biology.

JANUARY 2022

Dr. Shawn Mansfield has been elected to the newest class of Fellows of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society and publisher of the Science family of journals. He is recognized by AAAS for 'distinguished contributions to plant science spanning industrially relevant lignocellulosic processing to research on fundamental molecular mechanisms/genetics of cell wall deposition, carbohydrate allocation, and cellulose and lignin biosynthesis.'

OPERATIONS TEAM



Orlando Rojas
BPI Scientific Director



Richard Sones
Director, Partner Innovations



Titichai Navessin
Operations Director



Emil Gustafsson
Sr. Research Project Manager



Barb Conway
Grants Facilitator



Daisy Shen
Financial Coordinator



Kelley Oh
Engagement & EDII Facilitator



Cindy Wong
BPI Administrator



George Soong
Safety & Operations Officer



Ayako Takagi
Industrial Designer



Riva Siddiqui
Technical Business Analyst



Ani Markarian
Technical Business Analyst



Brayden Pelham
Technical Business Analyst



Daichi Hirata
Application Engineer

PRINCIPAL INVESTIGATORS



Yasmine Abdin
Assistant Professor
Materials Engineering



Mohammad Arjmand
Assistant Professor
& Canada Research Chair (Tier 2)
in Advanced Materials & Polymer Engineering



Susan A. Baldwin
Professor
Chemical & Biological Engineering



Xiaotao Bi
Professor
Chemical & Biological Engineering



Joerg Bohlmann
Professor
Botany



Nadine Borduas-Dedekind
Assistant Professor
Chemistry



Harry Brumer
Professor
Chemistry



Gary Q. Bull
Professor
Forest Resources Management



Emily Cranston
Associate Professor
& UBC President's Excellence Chair
in Forest Bioproducts



Joe Dahmen
Assistant Professor
School of Architecture
& Landscape Architecture



Chunping Dai
Associate Professor
Wood Science



Derek Dee
Assistant Professor
Food Safety Engineering



Naoko Ellis
Professor
Chemical & Biological Engineering



Lindsay Eltis
Professor
& Canada Research Chair
in Microbial Catabolism & Biocatalysis



Peter Englezos
Professor
Chemical & Biological Engineering



Johan Foster
NSERC Canfor Industrial Research Chair
in Advanced Bioproducts
Chemical & Biological Engineering



John Frostad
Assistant Professor
Chemical & Biological Engineering

PRINCIPAL INVESTIGATORS



Derek P. Gates
Professor
Chemistry



Bhushan Gopaluni
Professor & Associate Dean of Education
& Professional Development
Chemical & Biological Engineering



Dana Grecov
Associate Professor
Mechanical Engineering



Sheldon Green
Professor
Mechanical Engineering



Junling Guo
Visiting Professor
College of Biomass Science
& Engineering, Sichuan University



Steven Hallam
Professor
& Canada Research Chair
in Environmental Genomics



Savvas Hatzikiriakos
Professor
Chemical and Biological Engineering



Zachary Hudson
Associate Professor
Chemistry



Reinhard Jetter
Professor
Botany



Feng Jiang
Assistant Professor
Wood Science



Jaya Joshi
Assistant Professor
Wood Science



Patrick N. Kirchen
Assistant Professor
Mechanical Engineering



Frank Ko
Professor
& Canada Research Chair (Tier 1)
in Advanced Fibrous Materials



Robert Kozak
Professor
& Dean, Faculty of Forestry



Hongbin Li
Professor
Chemical & Biological Engineering



Mark MacLachlan
Professor
Chemistry



Shawn Mansfield
Professor
Wood Science / Botany

PRINCIPAL INVESTIGATORS



Adriana Manso
Associate Professor
Faculty of Dentistry



Mark Martinez
Professor
Chemical & Biological Engineering



Parisa Mehrkhodavandi
Associate Professor
Chemistry



Carl Michal
Associate Professor
Physics & Astronomy



William Mohn
Professor
Microbiology & Immunology



Madjid Mohseni
Professor
Chemical & Biological Engineering



Michael Murphy
Department Head
Microbiology & Immunology



William Nikolakis
Assistant Professor
Forest Resources Management



James Olson
Professor
& Dean, Faculty of Applied Science



Gregory Paradis
Assistant Professor
Forest Resources Management



Anubhav Pratap Singh
Assistant Professor
Food Safety Engineering



Scott Rennecker
Professor
& Canada Research Chair
in Advanced Renewable Materials



Dominik Roeser
Associate Professor
Forest Resources Management



Orlando Rojas
Professor
& Canada Excellence Research Chair
in Bioproducts



Jack Saddler
Professor
& NSERC Industrial Senior Chair
Wood Science



Lacey Samuels
Professor
Botany



Laurel L. Schafer
Professor
Chemistry

PRINCIPAL INVESTIGATORS



Peyman Servati
Professor
Electrical & Computer Engineering



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