Call for abstracts for **TAPPI Nano 2023**!

TAPPI Nano Student Committee

NANO 360°

Subscribe for the 24th January **Coffee Break**!

WELCOME

A message from your Student Committee

Welcome new and old readers alike.

Since, the **TAPPI Nano Conference** in Vancouver is coming up, we decided it was about time to introduce the new Student Committee team, highlight more **outreach events** and share some exciting recent advances in nanocellulose research.

We hope you enjoy

STUDENT UPDATES

The TAPPI Student Committee is dedicated to connecting students and young professionals around the world. Check out what we are up to!

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STUDENT OP-ED

Javier Rodriguez and Robyn Hill tell us their experience in the International Conference on Nanotechnology for Renewable Nano materials, Helsinki June 2022

PG. 3

ADVANCES IN NANOCELLULOSE RESEARCH

Learn more about the research areas of the student committee members

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Student Committee Updates

Mission and Vision

The Nano Division Student Committee is dedicated to providing a global network that connects students and young professionals around the world, facilitating knowledge exchange, providing useful tools, advice, and encouragement, so that students pursue careers that advance the use of renewable and sustainable nanomaterials.

Emilien Fréville
Co-Chair

Robyn Hill
Co-Chair

Eupídio Scopel
Vice Co-Chair

Yufei Nan
Vice Co-Chair

Gili Bar
Engagement Co-Chair

Julia Pescheux-Sergienko
Engagement Co-Chair

Javier Rodriguez
Secretary

Anderson Veiga
Secretary

Ariane Fernandes
Member at Large

Xia Sun
Member at large

Yuhang Ye
Member at large

DIVISION ACTIVITIES

The annual **TAPPI Nano Conference** is being held on 12-16 June, 2023 in Westin Bayshore, Vancouver BC, Canada.
Visit the **student booth next to registration** when you arrive to get updated for all the student events.

Abstract Submission Deadline is January 8th, 2023. You can come with a poster and/or an oral presentation.

CALL FOR ABSTRACTS 8TH JANUARY
(Click here to submit!)

Student Committee Events

Student Committee Lunch is the first event of the conference! The lunch is organized and led by the Student Committee. The committee leadership provides an overview of the student activities and serves as the primary place for the mentors and mentees to connect.

The Mentor-Mentee Program is the cornerstone of the committee's dedication to improve networking and career development of nanotechnology students. The program is meant to provide students with a mentor in the industry/academia/government that can help them make the most of their time at the conference and sever as an advisor throughout their studies/career. **Sign up when you register**!!

Student Poster Session offers students the opportunity to display their research work in poster format. The session provides conference attendees an opportunity to view your work in an informal and conversational setting. Students are present to discuss their work. Students may enter also enter their posters in the competition. Posters are judged by conference attendees and the top-ranking posters are eligible for prizes.

The Career Panel allows students and young professionals to learn from professionals in the industries. The speakers give a short presentation on their professional development and are available to answer questions from the audience.

MORE DIVISION ACTIVITIES

Mentorship Coffee Breaks meant to provide open doors for professional development and mentorship opportunities. This hour-long online session allows the students and young professionals participating to gain insight into the diversity of career paths available to them after graduation. The coffee break speakers speak about their career paths and what inspired them toward the work they are doing with nanocellulose. This session we will welcome Pr. Julien Bras (Uni. Grenoble Alpes, France) and Pr. NeilLeveridge (Univ. British Columbia, Canada) with a supplementary focus on "How to held a successful presentation". Participation is free and open for every student and young professional.

Join us on Zoom for this exciting event on January 24th (17:30 UTC+1).
Subscribe to the event now and receive the latest updates here!

Student OP-ED

Our Experience at TAPPI NANO 2022, Helsinki

Javier Rodriguez and Robyn Hill, PhD students at the University of Birmingham in collaboration with FiberLean Technologies, tell us their experience in the International Conference on Nanotechnology for Renewable Nano materials, Helsinki June 2022

TAPPI Nano 2022 in Helsinki was our first international in person conference. We presented a poster of our research and a three minute presentation on our posters. After two online TAPPI conferences we were really looking forward to travelling to Helsinki and meeting everyone at the conference.

What student activities did you join?

When registering, there were different student activities programmed so we thought "Why not join all of them?". And we did. It was a good decision to make, as we had the opportunity to make the most of the conference. As well as our poster and presentations and attending the other talks, we attended a lunch for new students, joined a mentoring program for students and attended a Young Professionals mixer in the Town Hall.

How was the experience presenting a poster?

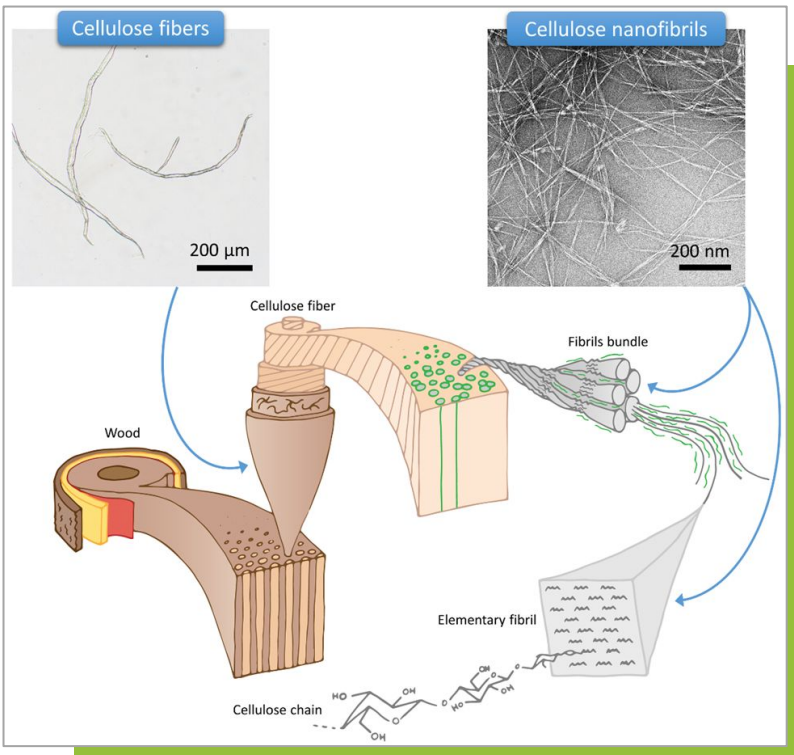
Presenting a poster gave us a good opportunity to practise presenting our research to a small audience. It was a good experience and helped us to build confidence with presenting so we can challenge ourselves to do a full presentation on our research at future conferences. We also had the opportunity to obtain views from different backgrounds, getting new ideas and perspectives to overcome our challenges.

What advice would you give for preparing for a conference?

It can be overwhelming at a conference because there are a lot of talks. We recommend doing your homework - be aware of the different sessions beforehand, so you know more or less what to expect in the day. The key thing is to find the talk that really interests you, not only the one that matches your project. We found some talks really interesting to attend even though they were not fully related to our research.
We also recommend to join as much students activities as you can! This provide different ways of networking and meeting people you can get to know better during the conference.

Did you have time to enjoy Helsinki?

The fact that the conference was in a country we had never visited before, led us to some enjoyable moments: a dinner in one of the surrounding islands, walks to discover the city, and lots of fun meeting new people. We highly recommend exploring the conference city during breaks or at the weekend if you can stay an extra day.



Schematic representation of the wood structure [1]

ADVANCED IN NANO-CELLULOSE RESEARCH

Learn more about the some currently on going research in the nanocellulose science through the brief presentations of Gili Bar, Emilien Fréville, Eupídio Sopel, Yufei Nan, Julia Pescheux-Sergienko and Javier Rodriguez research topics.

Nano and microcelluloses have received even more attention recently due to their interesting physical and chemical properties, including high aspect ratio, biodegradability, and biocompatibility. These compelling properties allow these materials to be applied to produce different materials, such as films, aerogels, and microparticles, to cite a few. As a result, these nanocellulose-based materials are promising to be applied in several research areas and industrial sectors, from packaging to biomedical, replacing the current oil-based products. However, with plenty of opportunities, several bottlenecks still need to be overcome to use the maximum potential of nano and microcelluloses – and this is an important part of our research work.

In the last newsletter of 2022, we would like to screen different possibilities and challenges related to micro and nanocellulose production and their application in packaging, cosmetics, and water remediation areas. So check it out and stay tuned for the next steps in studying these outstanding materials!

Mechanical processes to produce micro and nanofibrillated cellulose

Cellulose nano and microfibrils (NFC and MFC) can be produced from cellulose pulps by a mechanical process, such as homogenization, grinding, or microfluidizer. Despite some differences between these methods, they all break cellulose fibers, which allows their separation into a three-dimensional network of MFC[2], which can be even more separated into NFC. A significant bottleneck of these processes is to reduce energy expenses and to ensure cost-effective methods to reach maximum sustainability in the process and product.[3] Recent studies have considered using cellulases as a pre-treatment, which revealed a reduction in the mechanical energy required.[4]

Javier Rodriguez, PhD at Birmingham University, UK

Nanocellulose application into packaging

Single-use plastics need to disappear. For this, these types of materials might be replaced by cellulosic packaging. However, this transition is expected to reach a high level of recyclability of single-use packaging without losing the specific properties of the material. The cellulosic material is the only credible alternative for packaging solutions without plastic compounds.

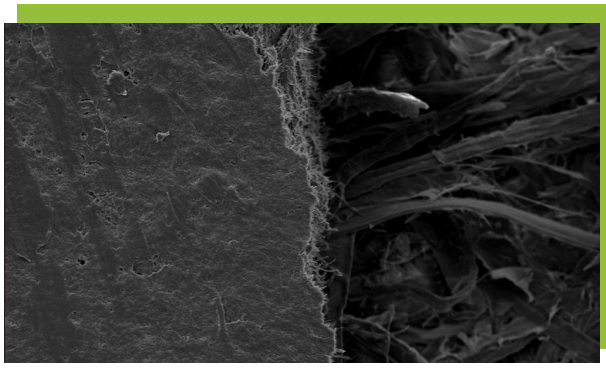
Cellulose barrier properties

Different solutions and orientations are studied to confirm that cellulose is tomorrow's material. For that, the coating of the cellulosic substrate with a cellulose-based material is an interesting orientation.

One of the major issues that must be further developed is the barrier properties [5] that this sort of material can withstand. With the development of micro and nanocellulose, it has been proven that cellulose is able to exhibit gas and grease barriers.[6] However, the water resistance and especially the water vapor barrier are the most challenging to obtain since the withstand. With the development of micro and nanocellulose, it has been proven that cellulose is able to exhibit gas and grease barriers.[6] However, the water resistance and especially the water vapor barrier are the most challenging to obtain since the molecule is highly hydrophilic. One of the ways to enhance these features is the chemical modification of the cellulose. The challenge is that the modification can prevent this natural fiber from being considered one. The question remains: how to make cellulose resistant to water without damaging its biosourced features, especially recyclability and biodegradation? The molecule is highly hydrophilic. One of the ways to enhance these features is the chemical modification of the cellulose. The challenge is that the modification can prevent this natural fiber from being considered one. The question remains: how to make cellulose resistant to water without damaging its biosourced features, especially recyclability and biodegradation?

Another significant issue is coating onto 3D product.[7] For many materials nowadays, the 3D shape is a habit (for example, food trays and yogurt packaging) but industrially, there is still a lack of processes and understanding to answer the necessary yields in production. Therefore, how to bring barriers to an already shaped material without overconsumption of the deposited material and by offering the best coating quality is an issue to investigate.

Julia Pescheux-Sergienko, PhD at University Grenoble Alpes, France



Thermocompression of cellulose

One of the solutions to produce advanced materials is to create those single-use packaging using the cellulose molded fiber process, but the aesthetic and shape diversities are restricted. More recently, thermocompressed cellulose molded fibers made complex shapes with as many details as possible.[8] However, this process requires a low concentration of fibers (0,5-3%), which is barely adaptable with nanofibrillated cellulose because of their low drainability.

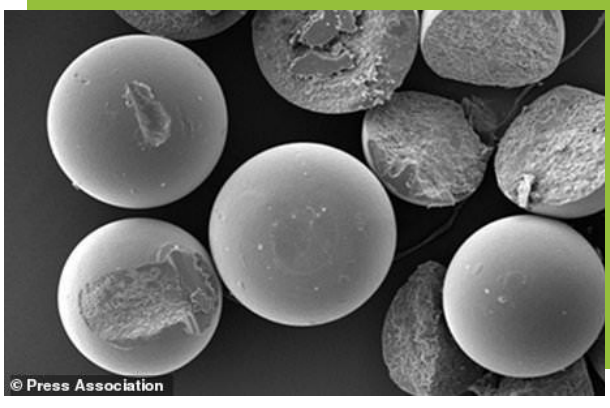
Moreover, a coating or a lamination with an oil-sourced polymer is often required to keep specific properties, compromising recyclability. In the Twilight project, microfibrillated cellulose is produced at a high concentration (around 20%) via a twin-screw extruder [9] to decrease the energy requested by the nanofibrillation and the drying. In the twin-screw extruder, and so during the nanofibrillation, some biopolymers, additives, or cellulose derivatives can be added to confer specific properties to the future material.

Indeed, in the second step, the pulp after extrusion would be distributed in a mold designed to enhance the water evacuation. Again, some additives or cellulose derivatives should help in the rheology of the distribution. Once the pre-forming is achieved, the material is thermocompressed to produce the final product. Once more, depending on biopolymers or additives added in the extrusion step, specific properties like water resistance or thermoscellability are expected.

Emilien Fréville, PhD at University Grenoble Alpes, France

Cellulose microbeads

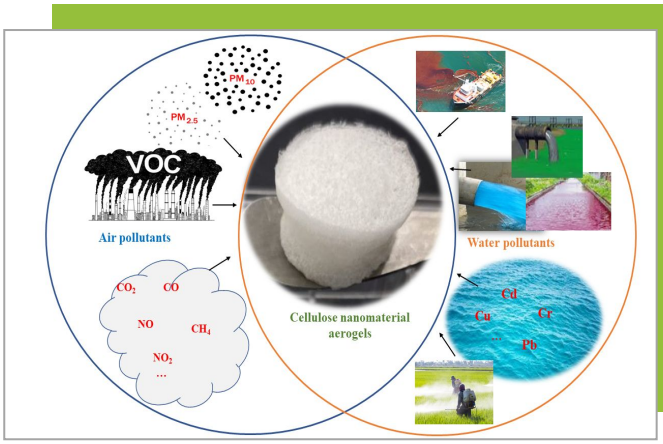
Scientific evidence regarding the destructive influence of non-degradable microbeads on aquatic systems and our health has led many countries to ban the sale of personal care and cosmetics products (PCCPs) that contain non-degradable microbeads.[10],[11] The microbeads typically act as exfoliants to help remove dry and dead cells from the skin. Hence, an environmental-friendly alternative is needed for microbeads in PCCPs.



Cellulose nanocrystals (CNCs) microbeads have the potential to be an alternative to non-degradable microbeads. CNCs are natural nanoparticles obtained from cellulose, have a high aspect ratio due to their whisker-like shape, and are rigid, which allows them to form open porous networks when crosslinked.[12],[13] Therefore, CNCs are attractive for various applications, including food and pharmaceutical products, and are the optimal choice for biodegradable microbeads.[14]

Gili Bar, MASc at University of British Columbia, Canada

Nanocellulose aerogels



Environmental pollution is increasingly becoming a serious global challenge due to various pollutants released into the environment by human activities and industrial processes. There are many air pollutants, such as particulate matter, gases (CO2, CO, NO2, NO, CH4), volatile organic compounds (VOCs), etc.[15] Meanwhile, severe water pollution caused by heavy metal ions, organic dyes, pesticides, and oil spills are widespread.

Cellulose nanomaterials (CNMs) based aerogels originated from green resources and sustainable processes are expected to have great potential in environmental applications due to their low density, nanoscale dimension, high porosity, high surface area, adjustable surface chemistry, biodegradability, and biocompatibility as well as renewable capability.[15],[16] Due to the latest advances in the synthesis of CNM-based aerogels, the feasibility of this porous material as an adsorption medium that removes a variety of environmental and human health pollutants has received much attention. Although the performance of aerogels in environmental sanitation is encouraging, some shortcomings of aerogels, such as complex drying processes, mechanically fragile structure, and processing costs, should be considered and addressed in future research.

Yufei Nan, PhD at Auburn University, USA

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Rcap information to not miss our future events

The next **TAPPI Nano Conference 2023** is taking place on **12-16 June**, in Westin Bayshore, Vancouver BC, Canada.

The due date for **Abstracts submission** is on **8th January, 2023**. You can present a poster and/or an oral presentation. We highly recommend attending the Student Committee Activities!
https://conference.tappinano.org/

The next **Mentorship Coffee Break** is taking place on **24th January, 2023**. You are welcome to come and learn from academia experts and ask them all the questions that you may have on the career path or any advice to succeed in an oral presentation.
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We hope to meet you soon!

but in the meantime, follow us on social media to get the latest information!

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