



TAPPI Nano  
Student Committee  
NANO 360°  
Volume No. 4



## WELCOME

A message from your  
Student Committee

*Hello! It's been awhile!*

Welcome new and old readers alike ☺ Confession-time, it has been *a year* for your TAPPI NanoDivision Student Committee. There have been a number of graduations and new jobs. Nevertheless, we are all looking forward to returning to the things we love and have missed...LIKE CONFERANCES!

Since the TAPPI Nano Conference in Helsinki is coming up FAST we decided it was about time we put out a “**Newsletter of Hype**” as we’re calling it. Let’s get excited for this great event!

Within this newsletter, we will highlight what you can expect as a student attending the TAPPI Nano conference. We will also highlight *more outreach events* in the works and it wouldn’t be us if we didn’t geek about some recent advances in nanocellulose research!

We hope you enjoy!

## STUDENT UPDATES

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

FINISH READING ON PG. 2

## OP-ED

Megan Roberts, your emeritus co-chair reflects on her experience in-person at TAPPI Nano 2019 in Chiba, the community and the excitement around emerging research.

FINISH READING ON PG. 4

## ADVANCES IN NANOCELLULOSE RESEARCH

How can we reach the United Nations Sustainable Development Goals by 2030, your emeritus co-vice-chairs discuss these exciting prospects

FINISH READING ON PG. 5

# Student Committee Updates



**Sara Velasquez**  
Chair  
Graduate Student  
University of Strathclyde



**Megan Roberts**  
Co-Chair Emerita  
Assistant Professor  
Mount Allison University



**Diego Gomez-Maldonado**  
Co Vice-Chair Emeritus  
Postdoctoral Fellow  
Auburn University



**Maria Celeste Iglesias**  
Co Vice-Chair Emerita  
Graduate Student  
Auburn University

## 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.

## Division Activities

First and foremost, the [annual TAPPI Nano Conference](#) is being held this year from June 13<sup>th</sup> to 17<sup>th</sup>, 2022 in Helsinki, Finland. Be sure and visit our [student booth next to registration](#) when you arrive to say hello and get psyched for all the student events!

Here's what you can look forward to:

**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.

**Our 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 serve 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 also enter their poster in the competition. Posters are judged by conference attendees and the top-ranking posters are eligible for prizes.

# Even More Division Activities

In June 2020, we initiated **Mentorship Coffee Breaks** and we have been so lucky to host scientists across many different industries so far and there is more coming!

## Save the date

Our next coffee break will take place on Wednesday April 27<sup>th</sup> at 1 pm EST where you will hear from two more professionals about career paths and what inspired them towards the work they are doing now with nanocellulose. Our guests for this event are Marco Beaumont and Gilberto Siqueira ([check out their bios!!](#)).

Join us on Zoom for this exciting event by clicking [here!](#)

There are also some very interesting Nanotechnology Division Webinars coming up. We've highlighted them for you below.

April 26<sup>th</sup>, 2022 at 9 am EST Eero Konturri will present **HCl Gas: A Versatile Catalyst for Retrieving Nanocellulose and Sugars from Biomass**

While acid hydrolysis can be seen as an outdated or, at best, traditional means of degrading cellulose into nanocrystals or sugars, the use of HCl gas has demonstrated viable, modern pathways to added value products from biomass. This webinar summarizes the application of HCl gas on diverse cellulosic substrates, including various cellulose polymorphs, solid wood, bacterial cellulose, holocellulose, and agricultural residues. Processes leading directly into high yields of nanocrystals are presented.

Registration [link](#)

July 25<sup>th</sup>, 2022 at 9am EST Marc Foulger and David Cowles will present **Production and application of micro-fibrillated cellulose for paper and board**

A refiner-based technology for the production of Micro-fibrillated Cellulose (MFC) has been developed and is now fully commercialized. This production process combines advanced refiner and plate technology with an innovative control system that maximizes production efficiency and flexibility through either a batch or continuous refining process, utilizing both disk and conical refining technology. It can produce MFC from a wide variety of fiber types including bleached or unbleached hard wood, soft wood kraft, bleached eucalyptus, and OCC.

There are two strategies for applying MFC in paper and board production. First, internal addition to the sheet, primarily for strength, and secondly application to the surface of the paper.

Surface application of MFC can greatly enhance surface properties and provide a superior surface for coating and printability applications, while porosity can be very significantly reduced, providing barrier properties. This gives the papermaker many options to create new grades or enhance existing grades. A new Applicator has been developed that can apply MFC directly on the sheet at the wet end of the machine.

Registration [link](#)

## Getting Excited for a Conference Again: Reflecting on My Experience at TAPPI Nano in 2019



### OP-ED

by Megan Roberts

In 2021 she received her PhD from University of Toronto and is currently lecturing Organic Chemistry at Mount Allison University in Canada. The picture shows her modeling a sweet freebie from the NanoDivision Student Committee booth at TAPPI Nano 2019 in Chiba.

It was Christmastime in 2018 and I was a stressed out, third-year graduate student facing my oral comprehensive exams. During that lull-time home between Christmas and New Year's, I picked up a review paper by Foster et al. "Current characterization methods for cellulose nanomaterials." I had been really struggling to quantify the number of alkyne groups installed on the surface of my CNC-based nanomedicines and thought this paper may help...it did, but that's not all I gleaned during that read-through!

On page 2 of this 71-page review read the following author's note:

*"The authors started this review through conversations that started at the 2016 International Conference on Nanotechnology for Renewable Materials, American Chemical Society Cellulose Division meetings and discussions at the Forest Products Laboratory. This diverse group represents several continents, many different universities, and many different backgrounds."*

And I remember thinking, "that's the place I need to be"!

I was late though and had missed the abstract deadline for the 2019 conference. But, I applied for some funding from my university and got to go anyways (I packed a poster – just in case!!). I immediately met the student who was co-chairing the student committee at that time who welcomed me with open arms! On the first full conference day, there was a mentor-mentee lunch, there I got paired with a professional mentor who met with me each day thereafter – checking in to make sure I was getting the most out of the conference experience. On day 2, I co-chaired a session on automotive processing and learned so much about what it takes to guide a session of professional speakers.

Oh! That poster I packed, well a kind researcher had two abstracts accepted for two projects one for an oral presentation and one for a poster and offered me their poster spot. To this day, I am so grateful to them since during that poster session, I was asked thoughtful questions and received helpful feedback that guided me through some very sticky points in my experimental design.

Interestingly though, the memory that sticks out the most is singing karaoke after the banquet on the last night – it led into the very early morning hours. Funny how Britney Spears can facilitate connection and form friendships that support you forever after :P

As my community has started moving towards a new normal, I am attending more events. But more than anything, they make me excited to return to a TAPPI conference. I am so happy to get attend TAPPI Nano in June as a young professional. If you see me there – say hello!! I'll do my best to help you have the best experience possible...just like I did 3 years ago :D

# Can we achieve the United Nations Sustainable Development Goals by 2030?

by Diego Gomez-Maldonado and Maria Celeste Iglesias

We are now in the midst of 2022, leaving us with less than 8 years to achieve the targets set by the United Nations (U.N.) General Assembly comprised of the seventeen Sustainable Development Goals (SDGs).<sup>[1]</sup> However, the impact from the COVID19 epidemic, increasing income inequality within countries,<sup>[2]</sup> failure of signing co-countries to effectively lower their carbon emissions,<sup>[3]</sup> and 58 ongoing armed conflicts worldwide,<sup>[4]</sup> are challenging the prospect of accomplishing such goals.

Still, the Biorefinery global market and technologies are growing steadily, with a compound annual growth rate (CAGR) of 9.8% estimated for 2026.<sup>[5]</sup> This trend is also being pushed up by extra funding opportunities in the U.S., with the second “Scale Up” Funding Opportunity Announcement from the FAO<sup>[6]</sup> and similar policies in other regions. This growth feeds nicely into the assessments made, where by 2030, 90% of petroleum goods could be generated by renewable resources. <sup>[6.7.8]</sup> The evolution of these industries will not only increase the world’s capacity for generating clean-burning transportation, but also cultivate millions of dollars in revenue from its construction and related jobs. For example, the latest BioEnergy Advanced Biorefinery in Bon Wier, Texas, is estimated to bear \$877 million in direct revenue during construction and \$1.2 billion in gross area production.<sup>[9]</sup>

This type of industry will help lower the total greenhouse gasses (GHG) emissions and boost the decreasing net farm income, which was 4.5% lower relative to last year.<sup>[10]</sup> Following a similar trend, fields related to bio-based materials, such as sustainability and packaging, are showing a higher enrollment and graduation rate of female students, up to 58.8% on average.<sup>[11]</sup> This significantly exceeds other engineering-related majors, and shows how this transition to a green economy is linked to a Diverse, Equitable, and Inclusive (DEI) work task force. All these trends and projections align organically with the SDGs, propelling countries where biorefineries and bio-based economies exist to be steps closer to fulfilling the targets aimed.

Even though developing countries have a lower gap to decrease GHG emissions being less industrialized of nations investing in the biorefinery concept and other bio-based technologies can help them increase their production of goods and services on a sustainable platform. Biorefinery-based development allows for the utilization of local resources and byproducts, which lower transportation costs and help farmers gain a side stream income of the previously low-value byproducts. In addition, seashores and coastal countries could even implement seaweed and kelp farming in parallel to other sea fruit products, seizing the protective cover these crops would bring to them if grown synchronously. Furthermore, the utilization of algae oils for biofuels would allow the utilization of polysaccharides and proteins as a base material for new bioplastics and products that could substitute synthetic polymers, helping to decrease the growing microplastic pollution and supplementing circular economies.

The transition to this green economy is occurring slowly, but the examples available show the remarkable possibilities that come with it. The biorefinery concept targets the need to decrease GHG emissions, opens opportunities for new markets and products, and has shown a clear path to achieving DEI targets. All these are closely linked to the SDGs, and with the correct regulations and societal push, we believe that fulfilling some of the U.N. targets for 2030 is possible. The TAPPI Nano Division is committed to help achieve these goals, interacting with diverse industrial partners, academics, and students. Let us keep pushing forward on more inclusive and sustainable solutions for the global problems so that we may achieve these SDGs in the coming 90 months. There is still work to be done.

