The Fibril Angle

The Newsletter of the Cellulose and Renewable Materials Division

Spring 2022 Edition

Letter from the Chair

Scott Rennecker

As we know, cellulose is found in nature in fibrillar form, difficult to break apart into individual sugars. Our CELL Division can be viewed in a similar light, as a self-assembled, tight-knit network of international scientists and engineers working in the broad field of renewable and sustainable materials. The pandemic has tested our bonds, creating significant challenges to strengthening our network. We are missing interactions at in-person events such as national meetings and our Divisional Dinner and Awards Banquet. Yet, our recent online and hybrid programming for the past meetings in 2021 has allowed us to continue to communicate our research.

Even though we have come to accept this new-normal of virtual conferences, it takes a lot of effort by our divisional volunteers. I would like to highlight the dedication of our program chair (Glenn Larkin) and vice-chair (Falk Liebner) and all the symposium organizers that have made programming magically appear without a hitch. Our upcoming Spring meeting in San Diego will be a hybrid format. There is a slate of outstanding symposia providing opportunities for our CELL membership to participate in forms that are accessible and at their comfort level given the various travel restrictions and health concerns.

With planning for the meeting, we struggled with the uncertainty of the pandemic that caused us to postpone our in-person celebration and networking event at our CELL Divisional Dinner and Awards Banquet along with our 100th Anniversary Celebration. Both the postponement and the difficulty for student participation continues to frustrate me, as we want to be able to celebrate, in-person, the great achievements by our award winners. The good news is that new ideas and opportunities are being developed through Innovative Project Grants. Further, we have a brand-new committee in our Division for Diversity, Equity, Inclusion, and Respect; the committee will assist the Division in implementing the Society's core values of diversity, equity, inclusion, and respect and target broader participation in our CELL's activities. I hope to see many of you in San Diego and I look forward to when we are all in-person again.

Letter from the immediate past Chair

Hello to all. These have been difficult times for us all, for some people it has been much more so. It is my deepest hope that these people are comforted. The volunteers of the Executive Committee of your Cellulose and Renewable Materials Division (CELL) are continuing to provide you with the best environment to interact with others and advance your research. It is amazing that the researchers of the world have persevered in this pandemic environment.


Gordon Selling

As we all know, cellulose is the most studied biomaterial globally. When you look at the number of publications per year, you see an interesting phenomenon that has continued for 20+ years. Since 2000, the number of publications with cellulose in the title, abstract or keyword, has grown exponentially – R2 of 0.99. In 2019, 12100 'cellulose' manuscripts were published, in 2020 there were 13500 and in 2021 14400 were published. We will see if this trend continues, but this is clear evidence that global researchers are striving to create knowledge and communicate their results. The best place to communicate such results is within CELL.

When CELL sessions at the annual meetings are announced for a field that interests you, please strongly consider submitting an abstract and presenting a poster or oral presentation. I am confident that you will find an engaged audience that is very willing to learn from you, interact with you and teach you new techniques to help your research. All CELL sessions are led by ACS or CELL members. If there is an area that you are very interested in, contact our CELL Programming Chair and ask to organize/lead a session. Similarly, CELL Leadership is always changing. If you have an interest in serving to make CELL even better, please contact our Division Chair and volunteer. We are always looking for new ideas.

2022 CELL Division Officials

Chair: Scott Renneckar

Chair-Elect: Wim Thielemans

Immediate Past Chair: Gordon Selling

Secretary: Tatiana Budtova

Treasurer: Michael Bortner

Councilors: Sheila Murphy, Lucian Lucia & Kevin Edgar

Alternate Councilors: Soledad Peresin, Maren Roman & Nicole Labbe

Members-at-Large: Feng Jiang, Yu Ogawa & Silvia Vignollini

Program Chair: Glenn Larkin

Vice Program Chair: Falk Liebner

Awards Chair: Alexander Bismarck

Membership Chair: Tik Sathitsuksanoh

Events Chair: Maria Auad

Publicity Chair: Koon-Yang Lee

What does CELL Division provide its Members?

- An avenue to present your research and network with possible collaborators. CELL organizes and sponsors programming at ACS National Meetings and Exposition, including special symposia, award symposia, and poster sessions. On occasion, we participate in joint symposia with other divisions, including recent and popular joint symposia with CARB, POLY, PMSE. Please continue to submit abstracts for ACS CELL programming!
- Organize and sponsor symposia at international meetings dedicated to cellulose and renewable materials, such as the International Cellulose Conference (ICC) in Japan, International Carbohydrate Symposia, EPNOE (European Polysaccharide Network of Excellence);
- Support other ACS symposia relevant to cellulose chemistry and materials glycoscience, including those (co-)organized with the ACS Division of Professional Relations and symposia in ACS Regional Meetings;
- Provide opportunities for early career researchers, and undergraduate chemists, for example, travel awards and poster awards;
- Organize and support award programs, including the Anselme Payen Award, the KINGFA award, the Division Fellow Award, Graduate Student Award, Poster Awards, Student Travel Award.

2021 Anselme Payen Award

The 2021 Anselme Payen Award winner is Dr Yoshiharu Nishiyama, senior scientist at the Centre de Recherche sur les Mactromolécules Végétales (CERMAV) of French National Center for Scientific Research (CNRS) and Université Grenoble Alpes. He received his PhD in 2000 from the University of Tokyo, Japan, under supervision of professor T. Okano and S. Kuga, and under supervision of Dr. H. Chanzy during his 15 months stay at CERMAV. After graduation, he served the University of Tokyo at the department of biomaterial sciences as assistant professor until 2004. He then moved to France and joined CERMAV, as junior scientist and promoted to senior scientist in 2018.

Dr. Nishiyama is a physical chemist, looking at many aspects of cellulosics, mainly in the solid state. His main lines of research can be defined as the following:

- The use of scattering (X-rays, electrons and neutrons) and spectroscopy (NMR, infrared) methods to get insights on the structure of cellulosics and other crystalline polysaccharides (amylose, chitin, chitosan, etc.)
- The study of the properties of cellulose suspensions
- The modeling of the physical properties of cellulose

His seminal thesis work on the crystal structure of the cellulose allomorphs stands as a major progress for the understanding of the ultrastructural details of the cellulose crystals. The atomic coordinates in cellulose crystals deduced from his work are universally used today by all those active in the field. So far, he has supervised more than a dozen of PhD students and several Post Docs and visiting scientists. He has authored and co-authored more than 100 scientific publications and been named as a co-inventor in 4 patents. Dr Nishiyama is an editorial board of "Cellulose" and "Scientific Reports". He is also member of scientific and technical advisory panel of the Forestry beamline at the MAX-IV, the Swedish synchrotron in Lund.

Congratulations to Dr Nishiyama!

2021 KINGFA Young Investigator Award

The 2021 KINGFA Young Investigator Award winner is Dr. Feng Jiang, an Assistant Professor in the Department of Wood Science at the University of British Columbia, and Canada Research Chair (Tier II) in Sustainable Functional Biomaterials. Dr. Jiang received his PhD in 2011 from Virginia Tech, under the supervision of Professor Maren Roman. Prior to joining UBC as an Assistant Professor in 2018, he received postdoctoral training from University of California Davis, under the supervision of Prof. You-Lo Hsieh, and University of Maryland College Park, under the supervision of Prof. Liangbing Hu. Dr. Jiang currently manages the Sustainable Functional Biomaterials (SFB) lab focusing on the valorization of forest and agricultural biomass using nanotechnology and advanced manufacturing techniques.

In his early research, Dr. Jiang has successfully developed two desulfation technologies that can effectively remove the negative sulfate group from cellulose nanocrystals. This seminal work has made significant contribution in later researches that try to understand the interaction between native crystalline cellulose and other biological molecules.

He is also actively pursuing novel and sustainable isolation methods using recyclable solvent to develop lignocellulosic nanomaterials from more recalcitrant substrate, such as thermomechanical pulp and wood powder, in order to reduce the carbon footprint during nanocellulose isolation.

His efforts on understanding the assembly of nanocellulose and the interaction between nanocellulose and water molecule have led to substantial development of various types of novel materials including continuous sub-micron fibers, super elastic and absorbent aerogel, hydrogel, 3D printed monolith, and superstrong and tough wood. He also focuses on exploring advanced applications of nanocellulose in emerging fields, including water treatment, thermal storage and management, energy conversion and storage, sensors, and electronics.

As the recipient of this award, Dr. Jiang will receive $1,500 and a plaque.

Congratulations to Dr jiang!

2022 Graduate Student Award

First place goes to Paul Jusner from University of Natural Resources and Life Sciences. Paul has studied processes imposing thermal stress on cellulose. Special emphasis was placed on structural changes of the cellulose, interactions with biomass processing agents, chemical reactions in theses systems and the elucidation of side reactions and byproducts. In the award-winning publication "On the chemical interactions of the biomass processing agents γ-valerolactone (GVL) and N-methylmorpholine-N-oxide (NMMO)" (Green Chemistry 2021, 23(16), 5832-5848) thermal runaway reactions and degradation processes in the title system are studied in detail. Currently, Paul is investigating how thermal stress affects the supramolecular arrangement and the molecular structure of cellulose. This work addresses fundamental analytical issues, but is at the same time important for manufacturing paper with higher thermal stability.

Second place goes to Kudzanai Nyamayaro from University of British Columbia. Kudzanai's research focusses on advancing the use of bioderived and synthetic biodegradable polymers in advanced applications. Polymers have undoubtedly become an integral part of our everyday life and as we move towards sustainable practices, it becomes important to use biodegradable biopolymers in everyday products. The use of bioderived polymers to manufacture functional material is an attractive route to produce light, flexible, biocompatible and biodegradable electronics. Taking advantage of the intrinsic properties of cellulose nanocrystals, and combining them with hydrogel matrices, Kudzanai developed ionic diodes with exceptional rectification behavior. His award-winning paper is "Toward Biodegradable Electronics: Ionic Diodes Based on a Cellulose Nanocrystal–Agarose Hydrogel", published in ACS Applied Materials & Interfaces 2020, 12, 46, 52182–52191

Congratulations to both of them!

Meeting-at-a-glance: Symposia of CELL Division at the 2022 ACS Spring National Meeting & Exposition

This year's Spring ACS National Meeting will be held between March 20th - 24th 2022 and the CELL Division will be running 15 symposia, with more than 380 papers scheduled during this meeting The full schedule of the symposia organised by CELL Division can be found on the ACS Spring National Meeting & Exposition website.

- **UG student spotlight - Monday, March 21st, 2:00PM (Pacific time), Grand Ballroom C, Omni San Diego Hotel**

This symposium provides a platform for undergraduate students to showcase their research.

- **Anselme Payen Award Lecture - Monday, March 21th, 4:30PM (Pacific Time), Grand Ballroom A, Omni San Diego Hotel**

Dr Nishiyama's Anselme Payen Award lecture is titled "Structure and properties of cellulose crystals and their analogues: From model systems to practical issues".

- **Graduate student Awardee - New Horizons in Renewable materials - Monday, March 21st, 5:20PM (Pacific Time), Grand Ballroom B, Omni San Diego Hotel**

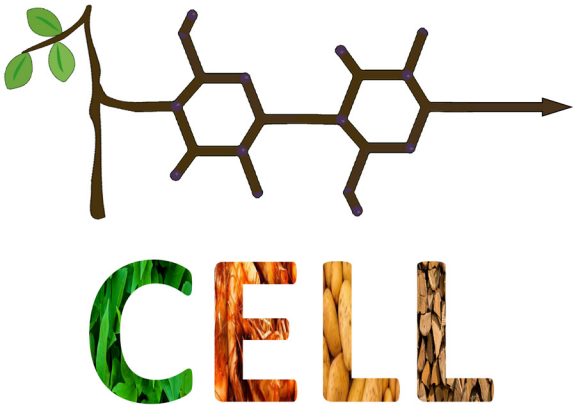
Our Graduate Student awardee, Paul Jusner, will be presenting the "In-depth characterization of structural changes in electrical insulation paper upon thermal stress" in this symposium.

- **KINGFA Young Investigator Award Lecture - Tuesday, March 22nd, 10:55AM (Pacific time), Grand Ballroom B, Omni San Diego Hotel**

Dr Feng Jiang, our KINGFA Young Investigaor Awardee, will be delivering his award lecture titled" Nanocellulose assembly, advanced structure design and applications".

- **Graduate student Awardee - Pitch in lignocellulosic materials for early career scientists - Wednesday, March 23rd, 11:25AM (Pacific Time), Grand Ballroom C, Omni San Diego Hotel**

Our other Graduate Student awardee, Kudzanai Nyamayaro, will be presenting the "Transforming biopolymers into biodegradable electronics: Development of cellulose nanocrystal based ionic diodes".



Anselme Payen Award

The Anselme Payen Award, which includes a bronze medal and an honorarium of $3,000, is given by the CELL Division of the ACS to honor and encourage outstanding professional contributions to the science and chemical technology of cellulose and its allied products.

KINGFA Young Investigator Award

Sponsored by Kingfa Scientific and Technology Co., the KINGFA Young Investigator Award recognizes outstanding contributions by young investigators to the science and chemical technology of cellulose and renewable materials. This is an annual award administered by the ACS CELL Division Awards Chair. The winner of the Award shall receive an invitation to give a presentation in recognition of the recipient at the ACS Annual meeting, $1,500 cash, a plaque, up to $500 in travel expenses and a complimentary Division Awards Banquet ticket.