
The Fibril Angle

The Newsletter of the Cellulose and Renewable Materials
Division

Fall 2022 Edition

Letter from the Chair



Scott Rennecker

Being Chair over the pandemic has been difficult for a Division that has thrived upon in person connections. While virtual and hybrid approaches at meetings have allowed much of our excellent programming to continue without missing a beat, and lessened our travel footprint (!), I wonder what we have missed? At our past spring meeting in San Diego, we had several members attend in person. It was a good experience for us that could travel, and the hybrid approach worked really well at the conference venue (it has been noted there were frustrations for virtual attendees). However, the CELL Divisional Dinner and Awards Banquet for the celebration of our awardees at the meeting was cut due to high risk of cancellation and potential low turnout.

Also, we had limited participation from students and post-docs at the conference overall. My own personal favorite event, our poster session, only had three CELL posters due to the numerous limitations of travel. Not surprisingly, there were a handful of people that discovered they were sick after they returned back, so participation was not without risk. I bring these items up to prepare for the spring meeting in 2023. As much as I have hoped that we would be past the pandemic, I have amended my expectations of what I think will happen next. In the near future, submissions for abstracts at our spring meeting will be open, and many of our volunteers will be planning (and fundraising) for the CELL Divisional Dinner and Awards Banquet. I have no idea what to expect Spring of 2023, but I do know our members, and I know our talks in the Spring will be outstanding. Because of this, I look forward to participating in some format and will be wishing for the pandemic to be at a point to allow for full participation.

Letter from the Chair-Elect

Greetings from Belgium! I hope everyone has been able to take a break over the summer and recharge their batteries. Our Chair, Scott, has done a magnificent job guiding our Division through the difficult Covid pandemic period. It will be a difficult feat to walk in his footsteps when I take over next year, but also a great challenge and opportunity. The world has become a lot less predictable over the past years, but our Division, a thriving community and a beacon of collaborative and collegial interactions, is a great support network to be part of and to be able to rely on. Now more than ever do we have to make sure to be there for each other. In particular, for our younger members to make sure they reach their full potential.



Wim Thielemans

I therefore want to include more PhD students, postdocs, and early career academics in the running of the Division. We already have some opportunities for them, such as standing for officer positions or organization of symposia, but anyone with new ideas, big or small, please contact me (wim.thielemans@kuleuven.be). Also, any ideas you may have to increase interactions with and support members who cannot travel to attend meetings will be very welcome. I would love to hear your ideas and work with you to make them reality.

Let's hope we can all meet in Indianapolis this coming Spring!

2022 CELL Division Officials

Chair: Scott Rennecker

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.

2022 Anselme Payen Award

The 2022 Anselme Payen Award goes to Professor Christoph Weder from the Adolphe Merkle Institute (AMI) at the University of Fribourg (Switzerland). He is the Chair of Polymer Chemistry and Materials and also serves as the Director of the institute. Professor Weder received his first degrees from ETH Zürich, where he studied chemistry and in 1994 earned a doctorate degree in polymer science under the guidance of Professor Ueli Suter. After a post-doctoral fellowship at Massachusetts Institute of Technology with Professor Mark Wrighton and another five-year appointment at ETH, where he completed his habilitation, Professor Weder joined the Department of Macromolecular Science and Engineering at Case Western Reserve University, where he eventually became the F. Alex Nason Professorship of Engineering. In 2009, Professor Weder joined the University of Fribourg to assume his current position.



Professor Weder is known as an imaginative scientist whose research is situated at the interface of chemistry and materials science and engineering. His main research interests are the design, synthesis and investigation of novel functional polymers, in particular stimuli-responsive polymers, bio-inspired materials, supramolecular systems, and polymer nanocomposites. Cellulose nanocrystals constitute one of the most important building blocks that his group uses to create such materials. Professor Weder is the co-author of more than 300 peer-reviewed scientific articles and 18 book chapters. He has mentored over hundred graduate students and postdoctoral researchers. More than 20 patents, several commercialized technologies, and continuous collaborations with industry document his interest to translate research findings into new technologies.

Professor Weder serves as an associate editor of ACS Macro Letters and is an advisory board member of numerous journals and scientific centers. He is the recipient of several prestigious awards, including an ERC Advanced Grant, a National Science Foundation Special Creativity Award, the DuPont Young Professor and DuPont Aid to Education Awards, and the 3M Non-Tenured Faculty Award. He held numerous named lectureships in academia and industry, is a member of the Swiss Academy of Technical Sciences, and a Fellow of the American Chemical Society's Division of Polymer Chemistry.

Congratulations to Professor Weder!

2022 KINGFA Young Investigator Award



The 2022 KINGFA Young Investigator Award winner is Dr Koon-Yang Lee, Professor of Polymer Engineering at Imperial College London. Koon-Yang leads the Future Materials Group at Imperial College London, a group focussing on the development of chemical engineering-driven nanocellulose composite innovations. His work is highly multi-disciplinary, with an emphasis on the development and manufacturing of nanocellulose materials with a focus on tailoring the interface between two (or more) phases to bridge the gap between chemistry, chemical engineering, physics, materials science and engineering, underpinned by the core research principles of (i) simple design, (ii) manufacturability and (iii) radical effects.

The specific focus of his research group is to develop cellulose nanocomposite innovations that will target engineering applications that cannot be achieved by conventional polymers alone and could serve as alternative to traditional glass fibre-reinforced polymers. His research activities can be broadly classified into three categories:

- Cellulose nanopaper as building block for high performance advanced materials. The pre-requisite to producing high performance nanocellulose-reinforced polymer composites is to incorporate high loadings of nanocellulose (typically >30 vol%) into the polymer matrix. However, it is not possible to disperse such high loading fraction of nanocellulose in a polymer matrix. His group has pioneered the use of high-performance cellulose nanopaper as two-dimensional reinforcement for polymers. His research also showed that high performance cellulose nanopaper-reinforced polymer composites can be produced using a simple lamination process. This ultimately led to his research in the use of cellulose nanopaper for high value transparent armour applications.
- Understanding the mechanical behaviour of cellulose nanopaper. The formation of nanocellulose film is intensively researched but there is a significant knowledge gap in the mechanical behaviour of cellulose nanopaper. Koon-Yang's group has been unravelling the mechanical response of cellulose nanopaper to fill in this knowledge gap as part of our quest to engineer ever stronger nanocellulose materials. His group has conducted the first ever comprehensive study on the tensile testing of cellulose nanopapers, providing the nanocellulose community with a "best practice guide" in cellulose nanopaper testing. Koon-Yang's group also discovered that cellulose nanopaper displayed an anomalous tensile response at intermediate tensile strain rates. Instead of strain rate hardening behaviour like most common engineering materials, cellulose nanopaper does not exhibit any strain rate sensitivity and this is due to the high degree of hornification in cellulose nanopaper. This discovery has significant consequence in the use of cellulose nanopaper for packaging applications.
- Nanocellulose as binder. The main challenges in the commercialisation of nanocellulose for advanced engineering application is its high cost and its strong hornification effect. Koon-Yang's group has developed an elegant, intrinsically scalable and cost-effective technology for binding loose natural fibres together to create an in-plane non-woven fibre mat, utilising only low loading fraction (<10 wt.-%) of nanocellulose, with no extra chemical modification steps involved during the production, utilising only the strong hornification effect of nanocellulose. Such innovation can easily offset the high cost of nanocellulose due to the low loading fraction of nanocellulose used and create materials with dramatically improved mechanical performance that conventional materials cannot achieve. This contribution is a substantial step towards developing nanocellulose-enhanced products that can easily penetrate the mass market.

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

Congratulations to Koonyang!