

# Cellulose and Renewable Materials Division Newsletter



A Division of the American Chemical Society

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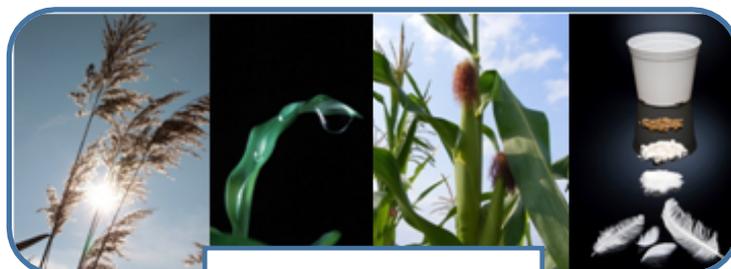
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Falk Liebner

Maria Soledad Peresin



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## Letter from the Chair-Elect

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### Chair-Elect (2017 – 2018): Gordon Selling



CELL Division Chair-Elect: Gordon Selling

I have been active in the Cellulose & Renewable Materials Division since the 2005 meeting in San Diego. Over the years, our Division has experienced great growth, in terms of the number of posters, presentations and members. This is due to the leadership of many volunteers. I will make every attempt to continue this pattern during my tenure as Division Chair which will start in 2018. In order to achieve this goal, I will need the continued help and support from the many current and future volunteers. All of these people bring their talents, experience and viewpoints to ensure that the Mission of the Cell Division is met. I encourage all members to become more active. If you have an idea for a ½ day, full day, or multi-day symposia, communicate that to the Division Program Chair – there is no

better way to ensure that you will be able to learn about the latest advancements in your area of research and build relationships with other researchers to advance your career and personal research. If asked to serve the Division in a leadership position, please strongly consider answering “YES!” You will find that the connections that you make with the other Division leaders will be rewarding both personally and professionally. I look forward to meeting you and working with you at future CELL events.

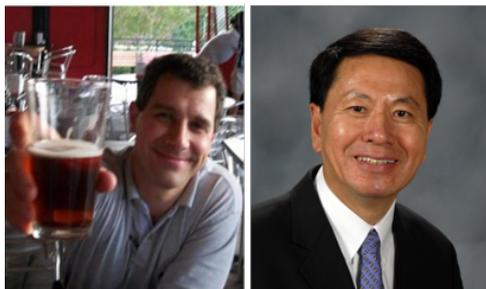
## Division Awards

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### *2017 Anselme Payen Award*



The 2017 Anselme Payen Award winner is Dr. Junji Sugiyama, Professor in the Research Institute for Sustainable Humanosphere at Kyoto University. Dr. Sugiyama’s research interests include structure, biogenesis, biochemistry, and biophysics of cellulose microfibrils with particular emphasis of the state-of-the-art techniques for electron microscopy and crystallography. His pioneering visualization of cellulose crystal lattices by high-resolution electron microscopy clearly eliminated previous current concepts of “chain folding” and the “universal elementary fibril”. His seminal definition of the two lattices of I $\alpha$  and I $\beta$  is the basis for current crystallographic models of cellulose allomorphs. Moreover, his determination of molecular directionality of a given microfibril allowed an exploration of how cellulose and related polysaccharides are generated and degraded by the corresponding enzymes. Dr. Sugiyama will be presented with the award at the ACS Division Cellulose and Renewable Materials Awards Banquet following a symposium in his honor during the 2018 ACS Spring National Meeting in New Orleans, LA.

2017 ACS Fellow Award

2017 ACS Fellows: Lucian Lucia (left) & James Wang (right)

Two members of the CELL Division have won the 2017 ACS Fellow Award. They are Dr Lucian Lucia (North Carolina State University and Qilu University of Technology) and Dr James Wang (Sinopec Shanghai Research Institute of Petrochemical Technology). Lucian is recognized for his contributions on the improved effectiveness of Kraft pulping technology via the manipulation of liquor usage to insightful communications of nanocellulose as a biomaterial. James is recognized for his achievements in the

invention and development of various types of polymeric materials, including functional and sustainable polymers, micro- and nano-structured polymer systems and greener polymer modification processes.

Congratulations to both of them!

Changes to the Anselme Payan award nomination package

The nomination package for upcoming Anselme Payan Award should consist of:

- Nomination form (can be downloaded from the CELL Division website), which now has a maximum 5-page limit;
- 2 support letters.

The nomination package should be compiled into one pdf and send to the Division's awards chair. If you have submitted a nomination package for Anselme Payan Award previously, modifications to the nomination package will be needed for 2018 Anselme Payan Award's nomination.

2017 ACS Fall Meeting – CELL Program

The 254<sup>th</sup> ACS National Meeting will be held in Washington, DC between August 20-24 2017. For the full program and presentation abstracts for symposia being organized and sponsored by the Division of Cellulose and Renewable Materials at the ACS National Meeting in Washington, DC, please visit <https://www.acs.org/content/acs/en/meetings/fall-2017.html>. We do look forward to seeing you in Washington.

Meeting-at-a-Glance of the 254<sup>th</sup> ACS Spring National Meeting, Washington, DC, August 20-24, 2017

|  |          |          |           |          |           |
|--|----------|----------|-----------|----------|-----------|
| <b>Division of Cellulose &amp; Renewable Materials</b> |          |          |           |          |           |
| <i>M. Roman, Program Chair</i>                         |          |          |           |          |           |
| <b>Grand Hyatt Washington</b>                          | <b>S</b> | <b>M</b> | <b>Tu</b> | <b>W</b> | <b>Th</b> |
| Recent Advances toward the Bioeconomy                  | D        |          |           |          |           |

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| General Posters  | E |   |   |   |   |
| Sustainable Design of Polymers from Xylochemicals  |   | A |   |   |   |
| Sci-Mix  |   | E |   |   |   |
| Green Polymer Chemistry: Biobased Materials & Biocatalysis (POLY)  | D | D | D | D | D |
| Carbohydrate-Based Vaccines & Adjuvants (CARB)   | D |   |   |   |   |
| Science Communications: The Art of Developing a Clear Message (PRES)                                     | P |   |   |   |   |
| Building a Safety Culture across the Chemistry Enterprise (PRES)   |   | D |   |   |   |
| Chemistry in an Evolving Political Climate: Research Priorities & Career Pathways in Public Policy (YCC) |   | D |   |   |   |
| Frontiers in Carbohydrate Synthesis (CARB)   |   | P |   |   |   |
| Advances in Glycan Structure & Dynamics (CARB)   |   |   | D | D |   |
| GSSPC: Standing on the Shoulders of Giants—Developing Chemistries for Improved Global Health (CHED)      |   |   | D |   |   |
| Understanding the Chemistry of Our Planet (PRES)   |   |   | D |   |   |
| Green Polymer Chemistry: Biobased Materials & Biocatalysis (POLY)  |   |   | E |   |   |
| Advances in Lignin: Chemicals, Polymers & Materials (POLY)   |   |   |   |   | A |

A = AM

E = EVE

D = AM/PM

P = PM

## 2018 ACS Spring Meeting

The 255<sup>th</sup> ACS National Spring Meeting will be held in New Orleans, LA, between March 18-22. The theme of this meeting is "Nexus of Food, Energy and Water". CELL Division will be organizing 16 symposiums:

- 4th International Bacterial NanoCellulose Symposium: "The Biotech Cellulose: Commercial Production and Applications, Latest Research State"
- ACS Sustainable Chemistry & Engineering Lectureship (Invited Papers Only)
- Assembly and Colloidal Interactions of Cellulose Nanocrystals
- Bio-Based Gels and Porous Materials
- Biobased Water Purification System Approaches
- Cellulose and Other Structural Biopolymers: Structure, Formation and Degradation: Anselme Payen Award Symposium in Honor of Junji Sugiyama (Invited Papers Only)
- Failed Brilliance in Nanocellulose Science and Technology
- Frontiers in Glycoscience: Bridging the Gap Between Carbohydrate and Polysaccharide Chemistries (Invited Papers Only)
- Functional Structures from Wood-Based Materials
- Lignin: From Fundamentals to New Materials and Applications
- New Horizons in Sustainable Materials (Invited Papers Only)

- Plant Heteropolysaccharides: Interactions within Lignocellulosics, New Modifications and Future Applications
- Polysaccharide Solutions and Their Processing
- Sustainable Production and Processing of Agricultural Crops: The Food, Energy, Water Nexus
- Valorization of Renewable Resources and Residuals into New Materials and Multiphase Systems
- Wood-Based Materials for Energy and Water

The details of each symposium can be found at the end of this newsletter. Abstracts will be accepted from August 21, – October 16, 2017. We do look forward to seeing you in New Orleans!

### **Special topic for our members: Top tips for securing a faculty position**

Making the transition from a postdoctoral research associate to a permanent academic post is becoming more difficult over the years. In this issue of The Fibril Angle, we have asked Professor Kevin Edgar Virginia Tech in the US and Professor Steve Eichhorn from the University of Exeter in the UK to share their top tips to help you increase your chances in securing a faculty position. Both of them have run numerous faculty selection and interview panels.

#### **Could you briefly explain the academic system and their job responsibility in your respective institution?**

*Kevin:* Having been both an industrial and academic chemist, in my view the academic position is most similar to that of an entrepreneur. In a major research university, you are responsible for creating your own teaching and research program, staffing it with great people (students), and for the results of those enterprises. You need to be innovative, diligent, a strong leader, good at selling yourself and your work, and able to multitask. So many tasks and opportunities come in “over the transom”, most of which are worthwhile and many of which are enjoyable; so you must also be able to manage your time, and sometimes say no. It is one of the most challenging jobs around, but also one of the very most rewarding.

*Steve:* In the UK, we appoint at all levels but typically the entry point for candidates is at lecturer level, if it is their first full-time academic position. A lecturer will typically undertake research, teaching and some administration. In my institution, we put candidates on a “ramp up”, so that they don’t get too much teaching at first which allows them to get their research started.

**What is the first thing you look for in a candidate's application package?**

*Kevin:* In this respect industry and academia are not so different. Productivity in one's graduate career and postdoctoral career is probably the most accurate predictor of productivity on the job, academic or not, so evidence of productivity is a must.

*Steve:* Quality is the main watchword. We look at strength of publications, teaching experience and also experience of grant applications. We also look at how candidates may have contributed in other ways to a department, maybe through supporting activities (recruitment, outreach etc.). This is especially important for the running of a department. We also look for evidence of career breaks, which is important for people who may have had to take such a break due to personal circumstances (e.g. maternity leave or other).

**What do you look for in a research statement?**

*Kevin:* Many research statements are simply not specific enough. We look for evidence of a real program, not just broad platitudes. Evidence of awareness of the state of the art is important, as is clear presentation of novelty and impact. The fundamental question is whether the proposed work is likely to be fundable, thus potentially forming the basis of an externally funded research program.

*Steve:* Novelty of ideas. Excitement. If an idea is well formed then it's half way to being a good grant application. If I lose interest after reading a paragraph or so then I'm less inclined to consider it to be a good research plan. It's important to engage the reader from the off.

**Not many PhD candidates or post-doctoral researchers have the chance of writing a grant. How important is grant writing experience in securing an assistant professorship/lectureship in academia?**

*Kevin:* I think writing a grant proposal as a grad student or post-doc is great experience and a special opportunity to get instruction about a key skill for a young assistant professor, from your graduate or post-doc mentor. Mentors should encourage such proposal writing, and grad students with aspirations for an academic career should search for such opportunities. And of course, a successful proposal is a big plus in an academic job application.

*Steve:* I would say it sets you apart from your peers. I wrote my own grant to support my first postdoc position, and several grants during my postdoc. The best experience that gave me was failure. Most grants, given success rates in all countries, will likely fail, so you have to get used to that at least. Obviously not everyone is going to have this experience but it's worth asking your advisor if you can write a grant. I'm sure they'd appreciate you taking some of the work off them!

**How important is teaching experience in a candidate's application package?**

*Kevin:* Anyone who wants to be a professor should push to get the opportunity to teach as a student, even if it is only a lecture or two. Not only will it enhance a resume, and provide

experience that will be important to your future performance on the job, but it might help you decide whether such a job is really what you want!

*Steve:* Sometimes less important than it should be. In all honesty people do tend to focus on the research aspects of someone's application. However, I would take it very seriously. In the UK, some institutions now assess people's ability to teach, by asking them to deliver a lecture on a core part of a course to students and staff. It is such an important part of the job that it should be taken as seriously as research.

**Working in academia is not only about research and teaching. Able to contribute to the running of the Department is equally important. Would you be expecting the applicants to provide details on how they will contribute administratively to the Department in their applications?**

*Kevin:* No. Most departments, especially at research-focused universities, try to protect assistant professors from heavy administrative duties so they can focus on the research, grant-writing, and teaching that are crucial to getting tenure. With that said, if you have leadership skills, the hiring committee will be pleased to perceive them during an interview.

*Steve:* Absolutely. We are looking for "good citizens" who will give their time to activities that support the department. It's good experience to present to the panel and I would encourage people to give the information during interview if it is not picked up from their application.

**Why do some assistant professorship/lectureship advertisements target only at a certain research topic?**

*Kevin:* Probably because the department feels that it is weak in that key area. In chemistry for example, it is an accredited degree, so it is important to offer all of the courses necessary for an accreditation. Candidates should pay attention to the contents of such announcements and provide what is asked for; being able to follow directions is an important skill! However, never hesitate to pick up the phone or send an e-mail to a member of the hiring committee if you are uncertain about whether your expertise would be a fit. It never hurts to show interest and curiosity.

*Steve:* Perhaps there is a specific need in the department; either a gap in the teaching or research programme. Maybe it could be a strategic appointment tied to a specific piece of funding.

**Publication track record is perhaps the most important thing in a candidate's application. Some say the more publications the better. Some say the number of publications do not matter. Some say it's not about the number of publications but the publications where the applicant is the corresponding author. Would you be able to shed some light on this and what do you look for in a candidate's publication track record?**

*Kevin:* Most departments would not expect a student to be corresponding author on their papers; usually the PI is the corresponding author. However, they do value first author

status, which typically goes to the most important student contributor. Number of papers, first author status, the impact of the journals where they are published all are important factors influencing the perception of candidate productivity, which as I said is a crucial deciding element.

*Steve:* All of the above. Of course, it takes more time to get the higher impact papers and they do stand out from others. However, a strong publications record would be quantity and quality together. I do look at citations as well, since it gives some indication of whether someone's work is being read, but you have to be a little careful of this since it is not always a good indication of the "value" of someone's work. How a candidate has contributed can be assessed by their positioning in the author list. If the author is second or middle author then I would question their input. This can be cleared up at interview.

**Is the applicant expected to know the grant application process and funding source in the respective institute/country?**

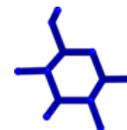
*Kevin:* Hiring committees like evidence that the candidate is willing to do homework; in academic hiring, just as in industrial hiring. Again, it is predictive of performance once on the job. Especially prior to any phone or in person interview, take the time to investigate the department and its areas of expertise. Take the time to investigate at least the basics of the funding process in that country; what agencies fund work on polysaccharides, for example? Remember that the internet is a great thing, but personal expertise and conversation are also great things. So don't hesitate to contact a colleague in that country, prior to application or interview, and learn a bit about the funding landscape. Networking is enormously valuable, and CELL Division is a great place to do that networking.

*Steve:* It helps if they have done some homework on this, but they won't know the full process until they have written a grant. At my current institution, we give a lot of support to new staff to help them get up to speed with the system, and we have internal peer-review to iron out issues with grants before they get submitted.

**Do you have any final advice for applicants?**

*Kevin:* Work with high standards; work on important problems. Write diligently throughout your graduate/postdoc career so you don't have to rush it at thesis or final report time. Get all the experience you can in teaching and writing grants. And don't forget to network!

*Steve:* Have a good think about what makes or will make your application different to other candidates. It's a very competitive process and so you have to think how you define yourself. Make sure you read the candidate specification and that you write your application to cover the aspects they are looking for. Also, take advice from a senior academic. They will generally know what people are looking for. Finally, don't give up. Keep applying!



## Call for Papers

**255th ACS National Meeting**  
**March 18-22, 2018, New Orleans, Louisiana**

CELL Program Chair:  
Maren Roman, [maren.roman@vt.edu](mailto:maren.roman@vt.edu)

**Abstracts Accepted: August 21, 2017 - October 16, 2017**

Submit abstracts to the CELL Division at <http://maps.acs.org>. Inquiries should be directed to the symposium organizers or program chair.

### **4th International Bacterial NanoCellulose Symposium: "The Biotech Cellulose: Commercial Production and Applications, Latest Research State"**

*Organizers: Francisco Miguel Portela Gama, [fmgama@deb.uminho.pt](mailto:fmgama@deb.uminho.pt); Thomas Rosenau, [thomas.rosenau@boku.ac.at](mailto:thomas.rosenau@boku.ac.at); Dieter Klemm, [dieter.klemm@uni-jena.de](mailto:dieter.klemm@uni-jena.de)*

The subject of this symposium is the current state of R&D in the field of Bacterial Nanocellulose (BNC). Presentations are encouraged that highlight topics such as: scaled-up and commercial production, design of BNC materials regarding shape, dimensions, and structure of surfaces and interfaces, modification of BNC during biosynthesis and in post-processing steps, polymer composites, analytical characterization of BNC products and their properties, and technical, cosmetic, and medical applications of BNC. The content of the symposium is not limited to these areas. Beyond these topics, new and interdisciplinary insights into BNC are welcome.

### **ACS Sustainable Chemistry & Engineering Lectureship**

*(Invited Papers Only)*

*Organizers: TBD*

Cosponsors: I&EC, ACS Publications Division

### **Assembly and Colloidal Interactions of Cellulose Nanocrystals**

*Organizers: Wim Thielemans, [wim.thielemans@kuleuven.be](mailto:wim.thielemans@kuleuven.be); Christina Schütz, [christina.schuetz@gmail.com](mailto:christina.schuetz@gmail.com)*

Cosponsor: COLL

This symposium is dedicated to presentations of work focused on controlling and understanding the assembly behavior of cellulose nanocrystals. This can entail the control over assembly in liquid state or in the dried state, either through external influences or through interactions of the nanocrystals. We are also open to studies using the change in surface chemistry to control the assembly behavior and the study of interaction with other nanoparticles or molecules as a function of varying surface chemistry.

## **Bio-Based Gels and Porous Materials**

*Organizers: Tatiana Budtova, [tatiana.budtova@mines-paristech.fr](mailto:tatiana.budtova@mines-paristech.fr); Falk Liebner, [falk.liebner@boku.ac.at](mailto:falk.liebner@boku.ac.at)*

Cosponsor: COLL

Gels are intriguing materials which have - virtually unnoticed by most people - become a “sine qua non” in our everyday life. Hydrogels, which are commonly associated with jelly, gummi bears, pudding, contact lenses or “super-slurping” polymers in disposable diapers, and organo gels – porous materials hosting organic liquids in their continuous void system – are of comparable importance as both types of gels feed a wide range of applications, such as in the food industry, medicine and cosmetics. Biobased gels are of particular importance because they are biocompatible and biodegradable.

Less well-known is that both hydrogels and organogels can be converted into highly open-porous, ultra-lightweight cryogels and aerogels, which are valuable materials, such as for surface protection, adsorption, filtration, catalysis, thermal and acoustic insulation, tissue engineering, paints, shock adsorption or slow release matrices. Provided that these porous solids are composed of an organic matrix, they can be furthermore converted to carbon aerogels, which are promising candidates for a variety of electrochemical applications.

This 2018 ACS CELL Symposium invites all material scientists dealing with biopolymers to present their most recent findings about hydrogels, organogels and open-porous solids derived thereof, and intends to serve as a platform for networking in this vivid field of research.

## **Biobased Water Purification System Approaches**

*Organizers: Lucian Lucia, [lalucia@ncsu.edu](mailto:lalucia@ncsu.edu); Nancy Simon, [nssimon@usgs.gov](mailto:nssimon@usgs.gov); Hasan Jameel, [jameel@ncsu.edu](mailto:jameel@ncsu.edu); Ronalds Gonzalez, [rwgonzal@ncsu.edu](mailto:rwgonzal@ncsu.edu)*

This symposium will provide a forum to discuss both pure and applied approaches for remediating water having toxic loads that include either one or more of the following, but are not limited to, pathogens, heavy metals, solvents, fertilizers, phosphates, and BOD/COD. The thrust is to shed light on new and emerging scientific approaches that are intimately biobased in nature, viz., based on replenishable resources.

## **Cellulose and Other Structural Biopolymers: Structure, Formation and Degradation: Anselme Payen Award Symposium in Honor of Junji Sugiyama (Invited Papers Only)**

*Organizers: Rajai Atalla, [rhatalla@wisc.edu](mailto:rhatalla@wisc.edu); Henri Chanzy, [chanzy@cermav.cnrs.fr](mailto:chanzy@cermav.cnrs.fr); Akira Isogai, [aisogai@mail.ecc.u-tokyo.ac.jp](mailto:aisogai@mail.ecc.u-tokyo.ac.jp)*

Recent discoveries in the fields of cellulose microfibril structure, biogenesis, and biodegradation have provided us with a better understanding of cellulose microfibrils as a product of a unique biological system. Cellulose and other structural biopolymers, such as chitin and lignin, are an important resource for a sustainable future. Therefore, it is now essential to share our new insights among physicists, biochemists, cell biologists, and molecular biologists to collectively advance our knowledge and understanding of these materials.

## **Failed Brilliance in Nanocellulose Science and Technology**

*Organizers: Eero Kontturi, [eero.kontturi@aalto.fi](mailto:eero.kontturi@aalto.fi); Koon-Yang Lee, [koonyang.lee@imperial.ac.uk](mailto:koonyang.lee@imperial.ac.uk); Alexander Bismarck, [alexander.bismarck@univie.ac.at](mailto:alexander.bismarck@univie.ac.at)*

Although the concept was known earlier, nanocellulose started to cause a stir in the research community only around ten years ago. The stakes were high: nanocellulose as an inexhaustible and cheap raw materials was to provide renewable substitutes to plastics and totally new templates for electronics among many other potential applications. Significant advances have been made within the past decade but - as is the case with all new research fields - many approaches have hit a dead end. This symposium is dedicated to the ideas and approaches that did not work with nanocellulose. It is open to both young academics and senior researchers. All areas of nanocellulose research are considered, from preparation, characterization and modification to end use applications. The aim of this symposium is to generate caution on falling into obvious traps and repeating the same mistakes all over again.

## **Frontiers in Glycoscience: Bridging the Gap Between Carbohydrate and Polysaccharide Chemistries** *(Invited Papers Only)*

*Organizers: Hiroshi Kamitakahara, [hkamitan@kais.kyoto-u.ac.jp](mailto:hkamitan@kais.kyoto-u.ac.jp); Chi-Huey Wong, [wong@scripps.edu](mailto:wong@scripps.edu)*

Cosponsor: CARB

This symposium will feature perspectives in the field about critical issues in glycoscience, and about recent progress against those issues. Two years ago, "Frontiers in Glycoscience, Control of sequence and regiochemistry" was jointly organized and sponsored by the ACS divisions of Cellulose and Renewable Materials (CELL) and Carbohydrate Chemistry (CARB), in collaboration with the National Research Council (NRC) on the occasion of the 249th ACS National Meeting in Denver, CO on March 22-26, 2015. The NRC white paper "Transforming Glycoscience, A Roadmap for the Future" describes glycoscience in health, energy, and materials as a key issue. After two years, we would like to update our knowledge with regard to the state-of-the-art advances in glycoscience.

## **Functional Structures from Wood-Based Materials**

*Organizers: Tiina Nypelö, [tiina.nypelo@chalmers.se](mailto:tiina.nypelo@chalmers.se); Ilari Filpponen, [Ilari.filpponen@auburn.edu](mailto:Ilari.filpponen@auburn.edu); Stefan Spirk, [stefan.spirk@tugraz.at](mailto:stefan.spirk@tugraz.at); Monica Ek, [monicaek@kth.se](mailto:monicaek@kth.se); Justin Zoppe, [justin.zoppe@unifr.ch](mailto:justin.zoppe@unifr.ch)*

Cosponsor: COLL

The symposium will discuss the transformation of molecules, particles and fibers from wood to interconnected structures, e.g., films, fibers and paper through both covalent and non-covalent interactions. The topics involve molecular level interactions in solvent-rich structures leading to organized dry structures, fiber and film formation phenomena, wood-based biopolymers as structural raw materials and potential end-uses of such structures.

## **General Posters**

*Organizer: Maren Roman, [maren.roman@vt.edu](mailto:maren.roman@vt.edu)*

## **Lignin: From Fundamentals to New Materials and Applications**

*Organizers: Claudia Crestini, [crestini@uniroma2.it](mailto:crestini@uniroma2.it); Heiko Lange, [heiko.lange@uniroma2.it](mailto:heiko.lange@uniroma2.it); Monika Österberg, [monika.osterberg@aalto.fi](mailto:monika.osterberg@aalto.fi); Mika Sipponen, [mika.sipponen@aalto.fi](mailto:mika.sipponen@aalto.fi); Maija-Liisa Mattinen, [majja-liisa.mattinen@aalto.fi](mailto:majja-liisa.mattinen@aalto.fi)*

Cosponsor: POLY

Lignin is a major plant polymer, and largely untapped industrial side product needing valorization. Recent years have seen great progress in our understanding of fundamental chemical and physical structure and properties of lignin. Technologies to render lignin into defined morphologies from nano-sized spherical particles to microcapsules and carbon fibers have also been developed. Scale-up and commercialization of new lignin-based products can be expected in due course. Another trend in the field is the application of biochemical and chemical modifications of lignin that can significantly alter physico-chemical properties and functionality of lignin products. Despite the many advances in characterization, processing, and applications of lignin, its heterogeneous and source-dependent structure still poses many challenges. It is therefore essential to bring together different experts to increase collaboration across various disciplines, and to unlock the full potential of this interesting polymer.

## **New Horizons in Sustainable Materials**

*(Invited Papers Only)*

*Organizers: Maren Roman, [maren.roman@vt.edu](mailto:maren.roman@vt.edu); Sheila Murphy, [murphysheila@gmail.com](mailto:murphysheila@gmail.com)*

Sustainable materials are of growing importance to society for environmental, security, and quality of life reasons. This symposium celebrates the works of the KINGFA Young Investigator Awardee, the Graduate Student Awardee, and fellow early career scientists who show outstanding promise in the field.

## **Plant Heteropolysaccharides: Interactions within Lignocellulosics, New Modifications and Future Applications**

*Organizers: Kirsi Mikkonen, [kirsi.s.mikkonen@helsinki.fi](mailto:kirsi.s.mikkonen@helsinki.fi); Francisco Vilaplana, [franvila@kth.se](mailto:franvila@kth.se); Maija Tenkanen, [majja.tenkanen@helsinki.fi](mailto:majja.tenkanen@helsinki.fi)*

Cosponsor: CARB

Lignocellulosic plant biomass comprises a complex hierarchical structure with cellulose microfibrils embedded in a matrix of non-cellulosic polysaccharides (hemicelluloses and pectins) and polyphenolic lignins. The role of matrix heteropolysaccharides in guaranteeing the integrity of lignocellulosic biomass is receiving increasing attention. In this symposium we intend to gather innovative scientific contributions focused on the fine molecular structure and the conformation of plant heteropolysaccharides, with a focus on hemicelluloses and pectins, towards a fundamental understanding of the biosynthesis and the interactions with other cell wall components, including water, cellulose and lignin. The development of novel strategies to modify the structure and properties of plant heteropolysaccharides using chemo-enzymatic and in planta (molecular biology) strategies will be highlighted. Finally, the role of heteropolysaccharides in the development of integral lignocellulosic biorefineries with an optimized utilization of these valuable biomolecules in biomass will be considered, focusing on novel fractionation techniques and innovative applications.

## **Polysaccharide Solutions and Their Processing**

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Processing of polysaccharides is often made from their solutions. The solubility of polysaccharides is still not well understood which limits its uses. New solvents are emerging. The symposium aims at bringing scientists from different fundamental disciplines: chemistry, theoretical physics, thermodynamics, rheology, together with materials science and processing (spinning, filming, 3D objects) and end-use applications such as food, cosmetics, textile, packaging or emerging ones like 3D printing.

It is hoped that such symposium will contribute to open widely the opportunities offered to individual scientists to collect knowledge developed in fields distant from their own ones.

## **Sustainable Production and Processing of Agricultural Crops: The Food, Energy, Water Nexus**

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Cosponsor: MPPG

Water is a finite resource. Agriculture accounts for 69% of global water withdrawal (FAO). In addition, the food production and supply chain accounts for more than one-quarter of total global energy consumption (UNESCO). The inextricable link between food, water, and energy requires an integrated approach to sustainable agriculture. This symposium intends to showcase innovations in the sustainable production and processing of agricultural crops that will improve our ability to meet future global water, energy, and/or food demands. The symposium will also discuss the food, water and energy nexus in urban environments, and the potential for water/energy conservation and food security through integrated urban agriculture and decentralized water and energy systems.

## **Valorization of Renewable Resources and Residuals into New Materials and Multiphase Systems**

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Cosponsor: POLY

This symposium will consider contributions in the area of valorization of residual lignocellulose and bio-based materials (biomass processing by-products, wastes, agricultural and fiber processing side-streams, etc.) to develop new materials (functional fibers, composites, films and particles) as well as multiphase systems, including dispersions, suspensions, foams, gels, emulsions, etc.

Possible Subjects:

1. Valorization of residual lignocellulose (biomass processing by-products, wastes and side-streams) I: Nanomaterials, intermediates and end products
2. Valorization of residual lignocellulose (biomass processing by-products, wastes and side-streams) II: Other materials different than nanocellulose-based
3. Valorization of non-lignocellulosics
4. Valorization of agricultural residues and proteins

## **Wood-Based Materials for Energy and Water**

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Cosponsor: MPPG

Energy and water are two of the most essential needs of human life, but both have increasingly faced shortage issues around the world. Over 80% of the energy consumed nowadays is generated from fossil fuels, requiring an urgent switch to more sustainable sources. Wood represents an enormous reservoir of renewable materials that, if being utilized efficiently, could be the foundation for a sustainable economy and ensure the longevity of our globe while maintaining the welfare of human beings.

This symposium will focus on the most recent developments in utilizing wood-based materials for energy generation and water treatment. Presentation should place emphasis on using wood-based materials (wood as whole, or its individual components, such as cellulose, hemicellulose and lignin) in electrochemical, electrical, thermal, chemical, and mechanical energy generation, as well as water treatment, including desalination, steam generation, and water purification.