



European Polysaccharide
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**“Nature makes polysaccharides,
EPNOE turns them into products”**

editorial

Dear Readers of the EPNOE Newsletter,

The first important news is that there is a slight change of date and a change of location for the EPNOE conference in 2017 (EPNOE 2017) due to logistic and cost reasons. **EPNOE 2017 will be held in Jena, Germany, August 20-24, 2017.** EPNOE 2017 is supported by EPNOE and the American Chemical Society. All the previous EPNOE conferences were huge successes with many scientists, students and company delegates from all sectors where polysaccharides are studied and used gathering in a warm, friendly and scientifically active atmosphere. We are welcoming you all in Jena.

As you know, EPNOE is actively involved in international relations. The next American Chemical Society National meeting will take place in San Francisco, California, April 2-6, 2017. The Cellulose and Renewable Materials division received 522 submissions, largely exceeding the previous years, showing how active is research interest in biobased materials. Among the 14 symposia, five symposia are co-organized by EPNOE members: *Processing & Properties of Biobased Composites & Blends, Functional Lignocellulosics & Nanotechnology, Bio-based Gels & Porous Materials, Design & Control in Polysaccharide Chemistry and New Horizons in Sustainable Materials.*

South America is also a target for collaboration and an EPNOE delegation will take part of the I&S Workshop “Insights and strategies towards a bio-based economy” in Montevideo, Uruguay, on November 22-25, 2016.

The next major EPNOE event is the meeting devoted to the **Latest trends and opportunities in polysaccharide science & technology** which will be held in Sophia Antipolis near Nice (France) on December 8-9, 2016. This meeting is open to everybody, member or not of EPNOE. It will focus on seven topics, *Plant fractionation & Biorefinery, Packaging & Cellulose-water interactions, Fibers derived from plants & Polymer composites, Lignin as a precursor for biobased polymers, Medical applications for polysaccharides, Aging, yellowing, and degradation of cellulose and Fatty acid cellulose derivatives.* The description of this event and its agenda are given in this Newsletter.



With my best wishes,

Dr. Patrick Navard
Coordinator of EPNOE
Armines/Mines ParisTech/CNRS
CEMEF - Centre for Material Forming
Sophia-Antipolis (France)

news

▶ Member's info



Events:

- The VLAG Graduate School, organizes **“Advanced food analysis”** (6th edition), 23-27 January 2017, Wageningen (the Netherlands)

More info: <http://www.vlaggraduateschool.nl/courses/food-analysis.htm>

Awards:

Kristin Ganske was awarded the “Henkel Laundry & Home Care Research Award” for her very successful research work in the field of biobased polymers for laundry applications.

New staff:

- At **Jena University**, Germany:
 - **Franz Steppeler** joined the group as Bachelor Student working in the field of 1,3-dicarbonyl-functionalized polysaccharide derivatives. Supervisor: Prof. Thomas Heinze
 - **Lisa Zeußel** joined the group as Bachelor Student working in the field of dextran derivatives bearing unsaturated moieties. Supervisor: Prof. Thomas Heinze
- At **Jan Dlugosz University in Czestochowa**, Poland:
 - **Marta Kocela** joined the group as PhD student working in the field of enzymatic modifications and transformations of pectins isolated from apple pomace. Work supervised jointly by prof. Piotr Balczewski (Centre of Molecular and Macromolecular Studies Polish Academy of Sciences) and Dr Janusz Kapusniak (Jan Dlugosz University in Czestochowa).

Masters & PhD defenses:

- At **Armines-CEMEF, France**:
 - **Otto Lintunen** (Aalto university) defended his Master degree on “All cellulose derivative composites”. Supervisors: P. Navard & T. Budtova.



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Third International Seminar on Aerogels in September 2016, Sophia Antipolis, France

The third International Seminar on Aerogels took place in September 2016 in Sophia Antipolis (France) at Mines-ParisTech. Researchers from more than 25 countries and representatives of industry used two days to exchange views and ideas on the synthesis, processing, characterization, production and applications of aerogels from inorganic and organic materials as well as their hybrid and carbon counterparts.

From 60 oral and 63 poster presentations 30 were dealing with the use of polysaccharides, natural fibers and lignin. Bio-aerogels is very quickly growing field which attracts a lot of interest both from academia and industry, with a large spectrum of applications (controlled release, scaffolds, thermal insulation, electro-chemistry, catalysis, etc).

A special session was devoted to the presentations from industry on the latest achievements in aerogels allowing learning from the “first hand” about new aerogel materials and prospects in their applications. The conference ended with aerogel art show.

The seminar was possible thanks to the sponsoring of several European, American and Japanese industrial companies (Aerogel Technologies, ASPEN, BASF, ENERSENS, NATEX, PAREX Group, TIEM Factory), the local community (CASA), and the strong support of MINES ParisTech.

Next International Seminar on Aerogels will be held in October 2018 in Hamburg at Technische Universität Hamburg-Harburg.



*This article was proposed by Tatiana Budtova,
ARMINES - CEMEF, France*

news

Member's info



Masters & PhD defenses:

- At **Armines-CEMEF, France**:
 - **Isadora De Souza Rufino** (EN-SIACET, Toulouse, France) defended her Master degree on "Cellulose solution droplet formation". Supervisors: P. Navard & T. Budtova.
 - **Gerrit Spiess** (university of Hamburg) completed his Master degree on "Wood based aerogels". Supervisor: T. Budtova
- At **Jan Dlugosz University in Czestochowa, Poland**:
 - **Izabella Utratna** successfully defended her master thesis in September 2016 (supervisor: Dr Janusz Kapusniak) on functional properties of starch dextrins for their application in beverages and nectars.
 - **Anna Sikora** defended her master thesis in September 2016 on biocatalysed esterification of maltodextrins. Work supervised by Dr Janusz Kapusniak.
 - **Karolina Wyrwal** defended her master thesis in July 2016 on comparison of oxidation products of starch as a material used in the pharmaceutical industry. Work supervised by Dr Przemyslaw Siemion.
- At **Jena University, Germany**:
 - **Lars Gabriel** defended his master "Chemical modification of pentosan for the preparation of water soluble functional polymers"
 - **Sascha Blohm** defended his master "Synthesis and characterization of novel cellulose derivatives with potential bioactivity"
 - **Franziska Obst** defended her master "Synthesis and film formation of novel furfuryl- and maleimide-functionalized dextran derivatives"
 - **Agnes Sitterli** defended her master "Synthesis and characterization of polysaccharide derivatives and preparation of bioconjugates for immunoassays"
 - **Franz Steppeler** defended his bachelor "1,3-Dicarbonyl-functionalized polysaccharide derivatives for the detection of cations"



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EPNOE News

An EPNOE event

Latest trends and opportunities in polysaccharide science & technology

Thursday 8 and Friday 9 December 2016

Sophia Antipolis, near Nice, France

Two half-days for being up-dated with the latest trends:

- Understanding the basics
- Surveying the present to prepare for the future
- Steps towards innovation
- Opportunities and applications on seven hot topics

Plant fractionation & Biorefinery

Packaging & Cellulose-water interactions

Fibers derived from plants & Polymer composites

Lignin as a precursor for biobased polymers

Medical applications for polysaccharides

Aging, yellowing, and degradation of cellulotics

Fatty acid cellulose derivatives

European Polysaccharide Network of Excellence teams with the right expertise are gathering to give you the sharp, focused, science and application-oriented knowledge you need on seven topics.

Each topic will be composed of three presentations:

- a clear but detailed scientific introduction to the subject. Review of existing know-how from patents and papers. Application potential (45 mn)
- EPNOE expertise in this field (10mn)
- funding opportunities (EC, other) (5 mn)

The following documents will be provided to participants, on each topic

- Copy of the presentations.
- Comprehensive list of relevant publications.
- List of relevant patents.
- List of companies involved or potentially interested.
- List of new trends and applications
- List of EPNOE members having expertise in this topic, with a description of expertise and experimental facilities.
- Funding opportunities.

In addition, four lectures given by specialists of the domain will cover critical bioeconomy issues, the rules of building EC projects, publication trends in polysaccharide science and a survey of the biopolymer education "hot-spots" in Europe.

The afternoon will be devoted to optional face-to-face meetings with the lecturers or with other EPNOE members. This event will be organized for participants registering before November 20. A list of EPNOE members with their expertise will be sent to participants in order for them to choose the ones they wish to meet.

(continued overleaf)



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EPNOE News

An EPNOE event (continued)

Programme

December 8, 2016

- 13h00 – 13h15 Welcome. Presentation of EPNOE Presentation of the two days
13h15 – 13h35 Critical bioeconomy issues (P. Navard)
13h35 – 14h35 Plant fractionation & Biorefinery purification (ENSIACET Toulouse;
Lenzing AG; Wageningen university and research, VTT)
14h35 – 15h35 Fibers derived from plants & Polymer composites (Ecole des Mines d'Alès;
Mines ParisTech; Fraunhofer IAP; Lenzing AG; University of Innsbruck; VTT)
15h35 – 16h00 Break
16h00 – 16h30 The rules of building EC projects (P. Jongebloed, Wageningen university EC
liaison officer)
16h30 – 17h30 Lignin as a precursor for biobased polymers (Thuenen Institut / University of
Hamburg; Wageningen university and research, VTT)
17h30 – 18h30 Aging, yellowing, and degradation of cellulose (University of Vienna-Boku)
18h30 Buffet dinner

December 9, 2016

- 08h00 Coffee and drinks
08h30 – 09h00 Publication trends in polysaccharide science (senior editor from Carbohydrate
Polymers journal, Metadata analysis group of university of Maribor)
09h00 – 10h00 Fatty cellulose derivatives (ENSIACET Toulouse; Technical university of Graz)
10h00 – 11h00 Medical applications for polysaccharides (University of Maribor; University of
Aveiro; Wageningen university and research; University of Vienna-Boku)
11h00 – 11h20 Break
11h20 – 12h20 Packaging (University of Aveiro; Jan Dlugosz University in Czestochowa;
Technical university of Graz; Wageningen university and Research, VTT)
12h20 – 13h00 Education trends in Europe (presentation by several European universities)
13h00 – 14h00 Buffet-lunch
14h00 – 17h00 Face-to-face meetings (optional)

Registration

To register, send the registration form by e-mail to Sylvie Massol:

Sylvie Massol

Tel: +334 93 95 74 89

Mail: sylvie.massol@mines-paris.tech.fr



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EPNOE News

5th EPNOE International Polysaccharide Conference

**POLYSACCHARIDES AND POLYSACCHARIDE-BASED MATERIALS:
FROM SCIENCE TO INDUSTRIAL APPLICATION**

Friedrich Schiller University of Jena, Jena, Germany

August 20 – 24, 2017

Scope of the conference

POLYSACCHARIDES are used for food, for health care and for materials due to their renewable character and their low carbon footprint. However, due to the complexity of their synthesis in nature, to the difficulty in dis-assembling them, to the highly multidisciplinary character of polysaccharide research and to the very large variety of applications, there is a need for events where all the scientific specialties will meet. EPNOE International Polysaccharide Conferences are now key features of the calendar of European scientific events. The conference has been organized biannually since 2009. The conference aim is to bring together students, scientists and specialists working in industry, universities and research institutes to exchange experiences, present research results, develop a platform for mutual scientific contacts and intensify academic/industry cooperation.

Since 2013, the EPNOE International Polysaccharide Conference has been promoted and organised jointly by the European Polysaccharide Network of Excellence (**EPNOE**) and the Cellulose and Renewable Materials Division of the American Chemical Society (**ACS**). On behalf of EPNOE and ACS, we have the pleasure to invite you to participate.

Scientific Program

- Polysaccharides – Resources, Isolation and Standardization
- Physical and Chemical Characterization of Polysaccharides and their Derivatives in Bulk, Solution and on Surfaces (e.g., Molecular and Supramolecular Structure, Morphology, Assembling and Disassembling, Interaction with Solvents and Surfaces)
- Biotechnology of Polysaccharides and their Applications (Bacterial Cellulose, Dextran, etc.)
- Chemistry of Polysaccharides – Novel Synthesis Paths and New Products
- Solvents for Polysaccharides for Shaping, Analysing and Homogeneous Chemistry
- Fibres, Films, Sponges, Particles and Composites derived from Polysaccharides and their Derivatives
- Nanotechnology with Polysaccharides and their Derivatives (Nanocellulose, Nanoparticles, Whiskers)
- Applications of Polysaccharides and Polysaccharide Derivatives (Food, Pharma, Cosmetics, Laundry, and other fields of interest)
- Pulp and Paper
- Conversion of Polysaccharide Biomass into Biofuels, Platform Chemicals, or Energy

Pre-Conference Course

A pre-conference course on “Cellulose solvents for shaping and homogeneous phase chemistry” will be organised on Sunday August 20, 2017. Students with oral or poster presentations during the conference and participating to this pre-conference course will receive a written certificate.

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EPNOE News

5th EPNOE International Polysaccharide Conference

(continued)

EPNOE-ACS Committee

Pedro Fardim (EPNOE-Finland), Chairperson
Patrick Navard (President EPNOE)
Youssef Habibi (ACS-Luxemburg)
Anton Huber (EPNOE-Austria)
Karin Stana-Kleinschek (EPNOE-Slovenia)
Kevin Edgar (ACS-USA)
Thomas Heinze (EPNOE-Germany)
Valeria Harabagiu (EPNOE-Romania)
Marie-Pierre Laborie (ACS-Germany)

Local Organizer

Ralf Bauer, Chairman
Thomas Heinze, Vice-Chairman
Frank Meister
Andreas Koschella
Michael Schöbitz
Martin Gericke
Sabine Rother
Annett Pfeiffer

Conference Venue

The conference will take place in the lecture theatres of Friedrich-Schiller-University Jena. It offers modern and well equipped rooms. All the buildings can be easily reached without getting your feet wet, and have access to the outdoor area whenever the occasion may demand.

You will be welcomed to Jena, located in the picturesque valley of the River Saale and surrounded by shell-limestone slopes. Here an attractive mix of innovative culture and unparalleled nature awaits you, whatever the season. Favourable transport links to most of the largest German Airports at Frankfurt, Munich, Berlin and Leipzig and the ambience exuded by the historical city create ideal conditions for events.

Important dates

- 15 November 2016: Opening of abstract submission
- 15 March 2017: Deadline for submitting abstracts
- 30 June 2017: Deadline for early registration

Contact: https://www.epnoe_2017.uni-jena.de



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EPNOE News

Report on the 2nd International EPNOE Junior Scientists Meeting

"FUTURE PERSPECTIVES IN POLYSACCHARIDE RESEARCH"

The 2nd edition of the EPNOE International Junior Scientists meeting, held October 13-14 in Sophia Antipolis (France), was a real success with about 90 participants from all over the world (17 European countries, Australia and Russia). The conference was attended by representatives of the scientific community, students, industrial scientists, and business professionals and provided an opportunity for Junior Scientists to meet and share their work and visions on future perspectives in polysaccharide research.

During the course of two full days, 45 oral presentations and 41 posters were presented. Many topics along the value chain of polysaccharides and biomass were discussed; from isolation, purification, and characterization of natural polysaccharides, to their chemical and physical modification and finally the processing of polysaccharides into specific shapes and materials for advanced applications. Moreover, the participants could attend a workshop on "How to publish in scholarly journals" by 'Elsevier B.V.'. The talks brought together young researchers of different backgrounds. Many scientific discussions evolved that were continued in the coffee breaks and poster sessions. The dinner that was organized at the first evening with help of a co-sponsoring from the 'Cellulose and Renewable Materials Division' of the 'American Chemical Society' was a particular highlight in this regard. It was a good occasion for the Junior Scientists to have more informal talks about scientific research, life experiences, and culture of different countries. Some impressions on the meeting along with further information can be accessed from the EPNOE web page (<http://www.epnoe.eu/> and <http://www.epnoe.eu/?q=content/epnoe-junior-scientists-meeting>). From the many contributions five were awarded for their outstanding quality:

Best Presentation Awards (sponsored by 'Elsevier B.V.') to Ricardo Pinto (University of Aveiro/Portugal) for "Development of novel biobased hybrid materials based on nanocellulose and copper nanowires for electrical conductivity applications" and Alaitz Etxabide Etxeberria (Escuela Politécnica (UPV/EHU)/Spain) for "A simple extraction method to obtain chitin from squid pen: characterization and environmental assessment".

Best Poster Awards ('Springer International Publishing AG') to Simon Gustafsson (University of Uppsala/Sweden) for "Mille-feuille paper: a novel type of filter architecture for advanced virus separation applications" and Katrin Niegelhell (Technical University Graz/Austria) for "Enzymatic treatment for patterning of bicomponent biopolymer thin films".

Travel grant (sponsored by 'Lenzing AG') to Michael Weiß (Technical University Graz/Austria) for the poster "Coating of cellulose fibers with inorganic nanoparticles in the course of the Viscose process".

The meeting was organized by young researchers from the EPNOE community and specifically addressed to fellow scientists from the polysaccharide area that are at an early stage of their career. Due to the great success, the EPNOE International Junior Scientists Meetings will be established as a constant platform for scientific discourse on a biannual basis. The next meeting of this kind is already being planned for spring 2018.



Organising Committee:

- Sylvie Massol (CEMEF/Mines Paris Tech, France)
- Carmen Freire (CICECO/University of Aveiro, Portugal)
- Martin Gericke (Friedrich Schiller University of Jena, Germany)
- Nicolas Le Moigne (Centre des Matériaux des Mines d'Alès, France)
- Zdenka Persin (University of Maribor, Slovenia)
- Stefan Spirk (Graz University of Technology, Austria)
- Carmen-Mihaela Popescu (Petru Poni Institute of Macromolecular Chemistry, Romania)



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EPNOE News

The way to greater applicability of newly developed polymer materials

The Laboratory for Characterization and Processing of Polymers (LCPP) has many experiences in the surface characterization and modification of polymers and other solids. Its core expertise are the properties and behaviour of materials at the solid/liquid solid/gas interface. For that purpose LCPP is equipped with the latest surface analytical tools (e.g. quartz crystal microbalance, surface sensitive infrared spectroscopy, contact angle and surface tension measurements, fibre surface analysis, charge titration tools etc.) and material fabrication devices (3D printing, inkjet printing, electrospinning, spin-coating, nano-lithography etc.) for the application in various industrial and scientific branches such as biosensors for the detection of DNA and proteins on surfaces, materials for regenerative medicine, water purification, textile finishing, paper coating, polymer nano-particle interactions, anti-microbial coatings, preparation of nano-metric thin layers of polymer films and other fields of nanotechnology. LCPP has therefore all the necessary background knowledge, infrastructure and resources to produce completely new applicable materials. Before actual use of new materials, especially in different branches of biomedicine, there is a long way of in vitro biocompatibility testing and further even clinical testing. The Institute of Biomedical Sciences of Faculty of Medicine in Maribor therefore helps LCPP to reduce the gap between research and clinical applicability. The latter has developed and efficiently implemented different in vitro testing protocols and platforms to test newly formed materials on cell models, which are mostly of human tissue origin. Using these, the safety (biocompatibility and cytotoxicity testing) and efficiency (functional testing on cell models) of prepared materials can be proven. Recently, the two groups have focused more on several aspects of regenerative medicine, both in the sense of finding novel more patient friendly materials solutions, as well as to develop whole sets of novel treatment options (wound care and skin cancer treatment). The latter are developed based on novel findings in the fields of materials science, pharmacology with toxicology, as well as the physiological aspects of wound healing at the molecular level. IBS is a fully equipped institute for all-important aspects of modern research in regenerative medicine, and as such can greatly contribute to the development and further application testing of newly formed materials, produced by LCPP.



Figure 1: Collaboration can make a difference.

Authors:

Tina Maver (Faculty of Mechanical Engineering, University of Maribor), Karin Stana Kleinschek (Faculty of Mechanical Engineering, University of Maribor), Uroš Maver (Faculty of Medicine, University of Maribor)



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EPNOE News

The EPNOE Member University of Maribor spreads polysaccharide research into new territories

Interdisciplinary research is being increasingly recognized as key for the discovery of new phenomena and the development of new products. The EPNOE member **University of Maribor** sets new milestones in polysaccharide research by joining forces in three complementary areas. Within the University a collaboration is established between the following partners:

The Laboratory for Characterization and Processing of Polymers (LCPP)

<http://lcpp.um.si/>

The Laboratory for Electrooptics and Sensor Systems (LEOSS)

<http://au.feri.um.si/leoss/>

The Institute of Biomedical Sciences (IBS)

<http://www.mf.uni-mb.si/>

Since 2005 LCPP shapes, grows and spreads its core competences in the material and surface science of polysaccharides within the EPNOE community and beyond. It is in the possession of accumulated know-how and the latest surface and bulk analytical methods necessary to warrant high impact research and scientific novelty of its output. However, many unexplored research areas exist whose experts are not aware of the potential of polysaccharides and the capabilities of the EPNOE community. On the other hand, EPNOE scientists are often too concerned with the properties of their own materials so that the skills of scientists with very different backgrounds are not taken into account appropriately. Following this reasoning it is expected that the establishment of the above mentioned collaboration, and its subsequent transfer of knowledge, will lead to unprecedented developments in the material science of polysaccharides, opto-electrical sensors and their applications in biomedicine.

In this collaboration LCPP will provide the necessary background of surface chemistry (coating, biomolecule interaction, material forming and 3D printing with a newly acquired **bioprinter for polysaccharides**) whereas LEOSS will contribute optical sensors and fibers, the interrogation of signals from these and the necessary electronic hardware. Before the actual use of new materials that are obtained by joint developments of both labs, in vitro biocompatibility assessment and even further clinical testing is required. IBS therefore assists in reducing the gap between research and clinical applicability. It has developed and implemented different in vitro protocols to test newly formed materials on cell models, which are mostly of human origin. Using these, the safety and efficiency of prepared materials will be proven. Recently, LCPP and IBS focused on several aspects of regenerative medicine by finding novel, patient friendly materials and by the development of new wound care and skin cancer treatments. These are based on novel findings in material science, pharmacology, toxicology and the physiological aspects of wound healing at the molecular level. IBS is a fully equipped institute for all important aspects of modern research in regenerative medicine and as such significantly contributes to the development and application of targeted materials. The established collaboration is expected to grow the portfolio of advanced products that simultaneously contain biopolymers, sensors and therapeutic agents for the use in biomedicine.

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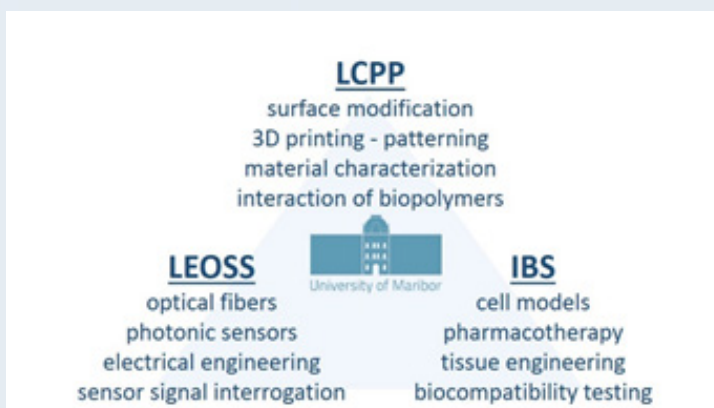
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The EPNOE Member University of Maribor spreads polysaccharide research into new territories (*continued*)



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LEOSS: denis.donlagic@um.si, **Prof Dr Denis Đonlagić**, Laboratory for Electrooptics and Sensor Systems, Institute for Automation, Faculty of Electrical Engineering and Computer Science, University of Maribor, Smetanova Ulica 17, 2000, Maribor, Slovenia.

IBS: uros.maver@um.si, **Dr Uroš Maver**, Institute of Biomedical Sciences, Faculty of Medicine, University of Maribor, Taborska ulica 8, 2000 Maribor, Slovenia.

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Tunable nanocellulose and hemicellulose films for packaging purposes

Lignocelluloses, such as nanocelluloses and hemicelluloses, offer a promising feedstock for completely new functional materials, such as humidity sensors and smart and bioactive films. Novel films for packaging purposes as well as smart and intelligent packaging solutions have been developed in the EU-financed WoodWisdom-Net project called TunableFilms, coordinated by VTT.

Novel lignocellulosic materials can be developed by exploiting inherent features, such as tendency to form films, or sensitivity to moisture, of wood components. Further functionalization is often needed to create materials that respond to external stimuli. Examples include humidity-sensitive, antimicrobial, antioxidant, or temperature moldable films. Several fundamental methods have been developed for producing and characterizing these films. Figure 1 shows a method for constructing such films and few of their possible responses.

Ultrathin films of nanocellulosic materials were constructed on inorganic solid substrates. Their response towards humidity was examined by using quartz crystal microbalance with dissipation monitoring and environmental ellipsometric porosimetry. The technique revealed fundamental aspects that facilitate the exploitation of wood-based materials as water/vapour barriers and sensor elements. The results were included in the doctoral dissertation of Elina Niinivaara.

In this project, a newly developed method allowed the study of the submicron structure of cellulose nanofibril (CNF) films containing other carbohydrate-based components (see Figure 2). It was observed that a uniform chemical composition within the film matrix has positive impact on physical features of the formed films. The method is based on a special mode of atomic force microscope imaging. With it, the phenomena behind differences in barrier and strength properties were explained. (VTT/BOKU cooperation).

Additionally, bioactive and antimicrobial materials were successfully produced in the project. Antibodies were conjugated onto oxidized CNF films, and to bacterial cellulose tubes that had been modified with carboxymethyl cellulose. These materials selectively captured the target antigens. Antimicrobial CNF materials were created by embedding antimicrobial polymers with coating techniques. More than 99.9% of the bacteria present in a bacterial suspension were removed by these films. Findings related to antimicrobial films are summarized in the licentiate thesis of Jonatan Henschen.

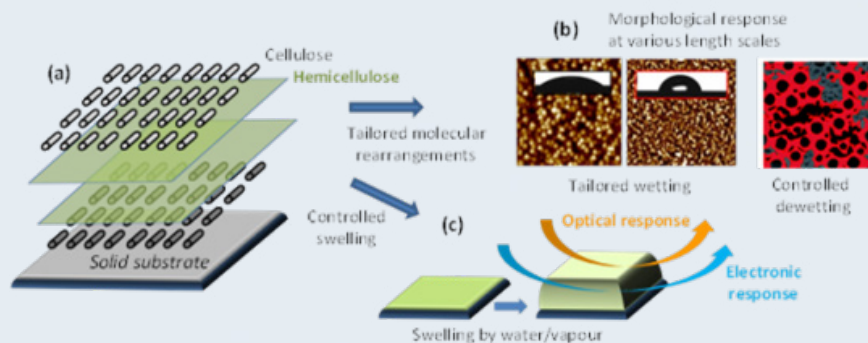


Figure: Schematic presentation of mono- and multicomponent films constructed from various building blocks of wood-based polymers and the possibilities for introducing responding functionalities.

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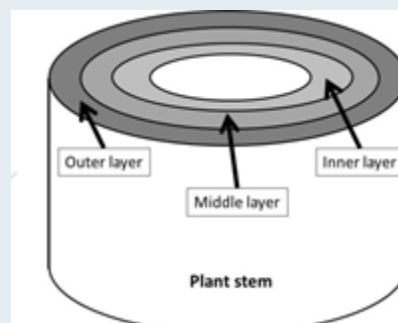
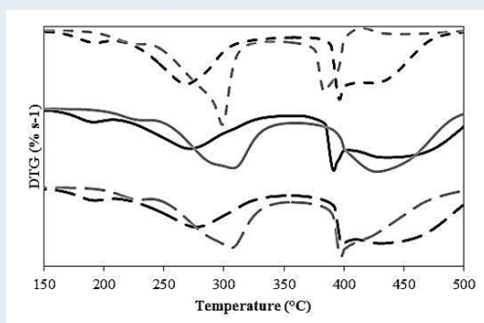
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How easy is it to assess the thermal behaviour of a plant extract?

A contribution from Lucie Chupin, Dieter de Ridder, Anne Clément-Vidal, Armelle Soutiras, Emilie Gineau, Grégory Mouille, Stéphanie Arnoult, Maryse Brancourt-Hulmel, Catherine Lapierre, David Pot, Luc Vincent, Alice Mija and Patrick Navard from Cemef Mines-ParisTech, Sophia Antipolis, Cirad, Montpellier, INRA Versailles and Estrées-Mons and université de Nice Sophia antipolis.

To answer the question in the title, a very detailed thermal analysis study was performed with two plant species, miscanthus and sorghum, where stem pieces were taken at well-defined positions of the stem.

The difficulty of ascribing a thermal behaviour to plant stems is due to the fact that thermal analysis is performed with samples in the order of tens of mg while stems can be four meters long with a diameter of several cm. Owing to the vertical heterogeneity from the bottom to the top of the stem and the horizontal heterogeneity from the rind to the pith, it is obvious that even using randomization of samples, there is a bias due to the small amount of material tested and the division state of the analysed samples. Two different genotypes and two internode levels were selected for miscanthus. For each region, the stem was divided into three radial layers. For sorghum, two different genotypes were selected and the stem was divided into the same three radial layers. For each small sample, the biochemical composition was measured and a statistical analysis was performed in order to see the correlations between the thermal analysis and the composition. The results show that the thermal analysis is only sensitive to very large variations of compositions. But aside of such large composition differences, it is impossible to correlate thermal effects to biochemical composition even on very small size, well-identified pieces of plant materials. The interplay between sugar-based components, lignin and minerals is totally blurring the thermal response. Extreme care must be exercised when willing to explain why a given plant material has a thermal behaviour different of another plant material.



Differential thermal analysis of two sorghum genotypes (grey and black) inner layer(- - -), middle layer(—) and outer layer (— -).

A contribution from Lucie Chupin, Dieter de Ridder, Anne Clément-Vidal, Armelle Soutiras, Emilie Gineau, Grégory Mouille, Stéphanie Arnoult, Maryse Brancourt-Hulmel, Catherine Lapierre, David Pot, Luc Vincent, Alice Mija and Patrick Navard from Cemef Mines-ParisTech, Sophia Antipolis, Cirad, Montpellier, INRA Versailles and Estrées-Mons and université de Nice Sophia antipolis.



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EPNOE News

New technologies for milder and more efficient modification of starch

Wageningen University & Research and TNO aim to develop new, milder and more efficient technologies for the modification of starch polysaccharides - and processing of the main potato organic side stream: potato fiber. Modified polysaccharides are of huge economic importance. They are widely used in food products such as desserts, soups, sauces and dairy products.

In food products, modified starches (especially etherified starches) exhibit an improved thickening of food formulations compared to non- modified starches. Annually, millions of tons of starch-based products are produced. Modified starches have an added value for the economy: they save costs and energy (less chemical usage, less energy usage, less after-treatment to eliminate side products) and create value as a new food ingredient developed from starch and potato fiber.

Joint research project Wageningen University & Research and TNO

The aim of the project, initiated by Wageningen University & Research and TNO, is to develop more efficient technologies for the conversion of starch polysaccharides into food grade ingredients and the isolation of high value non-starch carbohydrate fractions from potato fibre. The project will create more scientific insight into the modification and isolation of polysaccharides and will answer the question on how the hydroxyl groups are selectively activated in order to steer the desired reaction and to suppress side reactions.

Participating companies

Two companies participate in the project: the Dutch companies AVEBE and FLOWID. AVEBE is the largest potato starch company in The Netherlands, producing both starch-based ingredients for the food and non-food market. FLOWID is an SME with an impressive track record in processing and mixing of powders and solid systems. FLOWID believes in solutions that increase safety, efficiency and flexibility of the process industry that lie far beyond the beaten track.

*This article was proposed by Wageningen Food & Biobased Research, The Netherlands
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Thermoplasticity would widen the range of applications of cellulose

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Cellulose would be even more widely used if it was thermoplastic material, either intrinsically or due to functionalization. One way to increase the reactivity of cellulose, a prerequisite for functionalization, is to decrease its molar mass in a controlled manner. VTT has developed technologies to achieve this.

Cellulose is one of the most abundant and oldest natural polymers on earth. It is a major raw material for production of textiles, papers, foods, cosmetics and biomaterials. Cellulose is a linear polymer that consists of linked glucose units. Its hydroxyl groups form strong inter- and intra-molecular hydrogen bonds. Van der Waals interactions form a resistant microfibril network that gives cellulose its natural strength and reactivity. Cellulose would be even more widely used if it was thermoplastic, either intrinsically or due to functionalization. In order to achieve thermoplasticity, the solubility and mechanical properties of cellulose need to be tailored, without significantly affecting its natural performance.

There is another motivation to increase reactivity of cellulose. Currently long chain cellulose esters are not broadly used in the industry. Their preparation typically requires a huge excess of chemicals, which makes the process expensive. To reduce the chemical consumption, reactivity of cellulose needs to be increased without losing its other qualities. One way to increase the reactivity is to decrease its molar mass in a controlled manner.

VTT has developed technologies to decrease the cellulose molar mass using both chemical and biotechnical routes (see Figure 1). The technologies have been demonstrated with dissolved cellulose, kraft cellulose, as well as with recycled paper. Both routes provide cellulose that can be further functionalized with much lower chemical dosage. These cellulose esters form optically transparent, flexible and heat-sealable films with excellent water barrier properties. They can be processed without plasticizer additives. Furthermore, the films have mechanical properties comparable to widely used commercial polymers. These excellent properties suggest that our molar mass-controlled cellulose esters could be potential candidates for various applications, such as films and composites.

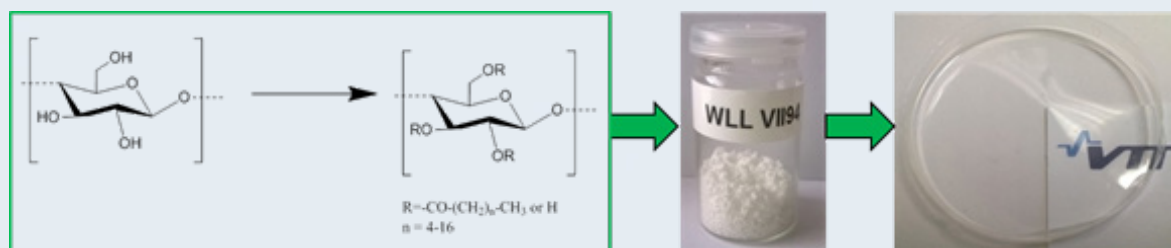


Figure 1. Schematic route for transparent and mechanically strong cellulose ester films. Patent application FI20155406; Willberg-Keyriläinen et al; The effect of cellulose molar mass on the properties of palmitate esters, Carbohydrate Polymers 151 (2016) 988–995.

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At Armines-CEMEF, France:

M. BULOTA, T. BUDTOVA

"Valorisation of macroalgae industrial by-product as filler in thermoplastic polymer composites",
Composites: Part A, 90, 271–277 (2016).

E. DI GIUSEPPE, R. CASTELLANI, S. DOBOSZ, J. MALVESTIO, F. BERZIN, J. BEAUGRAND, C.
DELISEE, B. VERGNES, T. BUDTOVA

« Reliability evaluation of automated analysis, 2D scanner, and micro-tomography methods for
measuring fiber dimensions in polymer-lignocellulosic fiber composites » Composites: Part A, 90,
320–329 (2016).

A. DEMILECAMPS, M. ALVES, A. RIGACCI, G. REICHENAUER, T. BUDTOVA "Nanostructured
interpenetrated organic-inorganic aerogels with thermal superinsulating properties", Journal of Non-
Crystalline Solids 452 (2016) 259–265.

J. GIRONES, L VO, S. ARNOULT, M. BRANCOURT-HULMEL and P. NAVARD "Miscanthus stem frag-
ment - reinforced polypropylene composites: development of an optimized preparation procedure at
small scale and its validation for differentiating genotypes", Polymer Testing, 55, 166–172 (2016)

At BOKU University, Austria:

Odabas, N., Henniges, U., Potthast, A., Rosenau, T., Cellulosic fines: Properties and effects. Progress in
Materials Science 83 (2016) 574-594. 10.1016/j.pmatsci.2016.07.006

Beaumont, M., Rennhofer, H., Opietnik, M., Lichtenegger, H.C., Potthast, A., Rosenau, T., Nanostructured
Cellulose II Gel Consisting of Spherical Particles. ACS Sustainable Chemistry and Engineering 4/8 (2016)
4424-4432. DOI:10.1021/acssuschemeng.6b01036

Amer, H., Nypelö, T. E., Sulaeva, I., Bacher, M., Henniges, U., Potthast, A., Rosenau, T., Synthesis and
characterization of periodate-oxidized polysaccharides: Dialdehyde xylan (DAX). Biomacromolecules
2016. DOI: 10.1021/acs.biomac.6b00777

Köhnke, J., Fürst, C., Unterweger, C., Rennhofer, H., Lichtenegger, H.C., Keckes, J., Emsenhuber, G.,
Mahendran, A.R., Liebner, F., Gindl-Altmutter, W. Carbon microparticles from organosolv lignin as filler for
conducting Poly(lactic acid). Polymers 8/6 (2016) 205.
DOI: 10.3390/polym8060205

Hutterer, C., Schild, G., Kliba, G., Potthast, A., Lignin profiling in extracted xylans by size-exclusion chro-
matography. Carbohydrate Polymers 151 (2016) 821 - 826. DOI: 10.1016/j.carbpol.2016.06.019

Becker, M., Meyer, F., Jeong, M.-J., Ahn, K., Henniges, U., Potthast, A., The museum in a test tube -
Adding a third dimension to the evaluation of the impact of volatile organic acids on paper. Polymer
Degradation and Stability 130 (2016) 109-117.
DOI: 10.1016/j.polymdegradstab.2016.05.026



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At ARMINES-C2MA, France:

REGAZZI A., CORN S., IENNY P., BERGERET A., Coupled hydro-mechanical aging of short flax fiber reinforced composites, *Polymer Degradation and Stability* 130 (2016) 300-306

REGAZZI A., LEGER R., CORN S., IENNY P., Modeling of hydrothermal aging of short flax fiber reinforced composites, *Composites: Part A* 90 (2016) 559–566

R. NAVARRO, I. SAUCEDO, V. GALLARDO, E. GUIBAL, "Fe(III) recovery from HCl solutions using Amberlite XAD-7 resin impregnated with a tetraalkylphosphonium ionic liquid", *Can J. Chem. Eng.*, 94(1) 107-116 (2016) (doi:10.1002/cjce.22356).

C. BERTAGNOLLI, A. GRISHIN, T. VINCENT, E. GUIBAL, "Recovering heavy metal ions from complex solutions using polyethyleneimine derivatives encapsulated in alginate matrix", *Ind. Eng. Chem. Res.*, 55(8) 2461-2470 (2016) (doi: 10.1021/acs.iecr.5b04683).

A.A. GALHOUM, A.A. ATIA, M.G. MAHFOUZ, S.S. ABDEL-REHEM, N.A. GOMAA, T. VINCENT, E. GUIBAL, "Alanine and serine functionalized chitosan magnetic nano-based particles for sorption of Nd(III) and Yb(III)", *Adv. Environ. Res.*, 5(1) 1-18 (2016) (doi: 10.12989/aer.2016.5.1.000).

M.A. LIRA, R. NAVARRO, I. SAUCEDO, M. MARTINEZ, E. GUIBAL, "Influence of textural characteristics of the support on Au(III) sorption from HCl solutions using Cyphos IL 101-impregnated resins", *Chem. Eng. J.* 302, 426-436 (2016) (doi: 10.1016/j.cej.2016.05.059).

Z. YANG, K. REN, E. GUIBAL, S. JIA, J. SHEN, X. ZHANG, W. YANG, "Removal of trace nonylphenol from surface water in the coexistence of suspended inorganic particles and NOMs by using a cellulose-based flocculant", *Chemosphere* 161, 482-490 (2016) (doi: 10.1016/j.chemosphere.2016.07.036).

K.Z. ELWAKEEL, E. GUIBAL, "potential use of magnetic glycidyl methacrylate resin as a mercury sorbent: From basic study to the application to wastewater treatment", *J. Environ. Chem. Eng.* 4(3) 3632-3645 (2016) (doi: 10.1016/j.jece.2016.08.001).

J.A. FERNANDEZ-LOPEZ, J.M. ANGOSTO, E. GUIBAL, M. ROSIQUE, M.D. AVILES, "Factorial design methodological approach for enhanced cadmium ions bioremoval by Opuntia biomass, *Clean – Soil, Air, Water*, 44(8) 959-966 (2016) (doi: 10.1002/clen.201500368).

O. GADY, M. POIRSON, R. SONNIER, T. VINCENT, E. GUIBAL, "Elaboration of light composite materials based on alginate and algal biomass for flame retardancy – Preliminary tests", *J. Mater. Sci.* 51(22), 10035-10047 (2016) (doi: 10.1007/s10853-016-0230-z).

S. WANG, T. VINCENT, C. FAUR, E. GUIBAL, "Alginate and algal-based beads for the sorption of metal cations: Cu(II) and Pb(II)", invited paper, *Int. J. Mol. Sci.*, S.I. "Frontiers of Marine Biomaterials", 17(9) art. 1453 (2016) (doi: 10.3390/ijms17091453).

A.A. GALHOUM, M.G. MAHFOUZ, N.M. GOMAA, T. VINCENT, E. GUIBAL, "Uranium(VI) sorption using functionalized chitosan magnetic nano-based sorbents", *Hydrometallurgy*, in press (2016) (doi: 10.1016/j.hydromet.2016.08.011).



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A. BALLESTER, L. CASTRO, M.C. COSTA, J. CARLIER, M. GARCIA ROIG, P. PEREZ GALENDE, A. ALVAREZ, C. BERTAGNOLLI, E. GUIBAL, "Design of bioremediation pilot plants for the treatment of metal-bearing effluents (BIOMETAL DEMO Project): Lab tests", Hydrometallurgy, in press (2016) (doi: 10.1016/j.hydromet.2016.NNNN).

A. REZGUI, Y. HANNACHI, E. GUIBAL, T. BOUBAKER, "Sorption of Hg(II) and Zn(II) ions using lignocellulosic sorbent (date pits)", Can. J. Chem. Eng. in press (2016) (doi:10.1002/cjce.NNNN) .



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News from outside the EPNOE Network

ICBMC 2017 - International Conference on Biobased Materials and Composites

Nantes (France) 29-31 March 2017

The conference aims to emphasize interdisciplinary research on processing, morphology, structure and properties of natural polymers, biomaterials, biopolymers, their blends, composites, IPNS and gels from macro to nano scales and their various applications.

Call for abstracts is opened until december, 15, 2016.

More information and registrations: <https://symposium.inra.fr/icbmc2017>

European Biomass Conference and Exhibition

Stockholm (Sweden) 12-15 June 2017

The European Biomass Conference and Exhibition will be held in Stockholm, Sweden at Stockholmsmässan (Stockholm International Fairs and Congress Centre) from 12 to 15 June 2017. More information on www.eubce.com

10th International Conference on Bio-based Materials

10 – 11 May 2017, Maternushaus, Cologne, Germany

The 10th International Conference on Bio-based Materials is aimed at providing international major players from the bio-based building blocks, polymers and industrial biotechnology industries with an opportunity to present and discuss their latest developments and strategies.

<http://news.bio-based.eu/save-the-date-10th-international-conference-on-bio-based-materials>

1st IWA Conference on Algal Technologies for Wastewater Treatment and Resource Recovery

16 and 17 March 2017 - Delft, The Netherlands

For more information about the conference visit www.unesco-ihe.org/algaltechnologies

7th Nordic Wood Biorefinery Conference

Stockholm 28-30 March 2017.

The leading event where research and industry meet to discuss recent wood-based biorefinery developments.

Read more about the conference here: <http://www.innventia.com/nwbc2017>

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Confederation of European Paper Industry CEPI 2015 Key statistics

In 2015 CEPI members produced 90.9 million tonnes of paper and board, which represents a limited decrease of 0.2% (-147,000 tonnes) over 2014 and a relative stability over the last three years. The peak production of 102.1 million tonnes was recorded in 2007.

Paper and board delivered within CEPI countries increased by 1.3% when compared with 2014,. Imports from non-CEPI member countries rose by 6.3% (+325,000 tonnes) whilst exports of paper and board to non-CEPI member countries showed a decrease of 1.1% (-210,000 tonnes). The overall output performance of the CEPI countries in total during 2015 was slightly better than in most the other major traditional paper-producing regions of the world, with a fall in production being recorded by all except China. Paper and board production decreased in Brazil (-0.5%), South Korea (-0.9%), the USA (-1.0%), Japan (-1.0%) and Canada (-7.4%). Production in China rose by 2.3% compared to 2014.

*Full report at the following page of the CEPI website:
<http://www.cepi.org/topics/statistics>*

Panorama des coproduits et résidus biomasse à usage des filières chimie et matériaux biosourcés en France (in French)

La production de produits dits principaux génère des matières secondaires, appelées coproduits, sous-produits, résidus, déchets selon leur statut réglementaire ou le vocabulaire employé par les filières. Certaines de ces matières secondaires ont des usages identifiés pouvant permettre d'engendrer des gains aux niveaux économique, environnemental ou social. Ces avantages potentiels sont à mettre en lien avec le principe d'efficacité des ressources, fondateur de l'économie circulaire. Les matières n'ayant pas encore d'usage défini sont actuellement éliminées et constituent un potentiel pour de futurs débouchés.

<http://www.ademe.fr/panorama-coproduits-residus-biomasse-a-usage-filieres-chimie-materiaux-bio-sources-france>

European edition of BioBased World News

Relaunch of the "International Directory for Bio-based Businesses (iBIB)" (www.bio-based.eu/iBIB)