



European Polysaccharide
Network Of Excellence

N°51 - SEPTEMBER 2019



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

editorial

Dear Readers of the EPNOE Newsletter,

Summertime is a moment to relax, to read our favorite book, to meet friends and to listen the voice of inspiration in our hearts. After a short summer break our executive team is back full of energy for a very exciting and inspiring year ahead. We have plenty of good news to share with you.

EPNOE is now a member of Biobased Industries Consortium (BIC) and we will be glad in motivating our members to build and coordinate competitive consortia and to cooperate with the European stakeholders around the annual BBI-calls for proposals. Expertise in polysaccharides is very essential to advance innovation in Europe. We are also active towards policy makers and we will be strongly present at the event about microplastics in nature and society organized by Science Advice for Policy by European Academies (SAPEA), Slovenian Engineering Academy and University of Ljubljana in October.

The scientific program of EPNOE 2019 is ready and we will enjoy a high-level conference in Aveiro, Portugal in collaboration with the Cellulose Society of Japan and The Cellulose and Renewables Materials Division of the American Chemical Society. We also started the preparations for the EPNOE Junior conference to be held in Kortrijk, Belgium next year.

We have been busy with our home work in redesigning the new EPNOE webpage and in renewing our marketing materials and also in motivating our members to build and lead consortia for the calls of Marie Skłodowska-Curie Actions. We have created a Database to facilitate the mobility of staff and students using funding opportunities available in Europe. In July, we have been active in Brazil for a training school in Biomaterials Engineering and now in September we have a joint workshop with European Network of BioAdhesion Expertise (ENBA) in Leuven. We are also very happy to welcome our new members, University of Helsinki, Finland and University of Agriculture in Krakow, Poland.

Our future looks very promising and you are very welcome to join us. Still not convinced to become an EPNOE member? Let us share a glass of wine in Aveiro. We have a lot of new plans to tell you.



Pedro Fardim
President of EPNOE
Professor
Faculty of Engineering Science
Department of Chemical Engineering
KU Leuven (Belgium)

news

▶ Member's info



New projects:

- **At University of Natural Resources and Life Sciences Vienna (BOKU), Austria, Institute for Chemistry of Renewable Resources:**

Green chemicals and technologies for the wood-to-textile value chain (PI Potthast, A.; 2019 - 2022)

To improve the wood-to-textile value chain via breakthrough technologies based on novel ionic liquid and enzymes. The specific goals are to develop more sustainable ionic liquids (IL's) to replace the existing solvents in the value chain and to develop novel pretreatment technologies such as enzyme-aided modification or chemical modification enabling tailor-made structures. The use of innovative material combinations (e.g. cellulose with keratin) will further improve the textile properties. Overall, these developments will enable the improvement of solubility, dye adsorption, tailorability of the structures, pilling resistance of regenerated fibres/filaments.

From fundamentals to valorization: Enzymatic oxidation of cellulosic fibres and underlying mechanisms (PI Potthast, A.; 2019 - 2022)

Wood cellulose is a future super material for replacement many fossil-based products. Modification of the wood-pulp is needed for the preparation of value added products. Enzymes are specific, renewable and biodegradable tools for modification of the pulps in mild reaction conditions. Recently discovered novel types lytic polysaccharide monoxygenases, are enzymes that oxidize cellulose in the crystalline parts, thus representing a novel type of enzyme activity with capability to modify the most recalcitrant celluloses. This project will explore the potential of LPMOs in oxidative modification of cellulosic fibres. The consortium brings together top-class expertise in enzymatic modification of pulp and fibre applications, LPMO enzymology and cellulose analytics.

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The **6th EPNOE International Polysaccharide Conference** (<https://epnoe2019.sciencesconf.org/>) will take place from 21st– 25th of October 2019 in Aveiro, Portugal. The plenary speakers are:

- Orlando J. Rojas, Aalto University (Finland)
- Henk Schols, Wageningen University (The Netherlands)
- Chihiro Yamane, Kobe Women's University (Japan)
- João Mano, University of Aveiro (Portugal)
- Shinsuke Ifuku, Tottori University (Japan)
- Eugenia Kumacheva, University of Toronto (Canada)
- Samuel C. Zeeman, ETH Zurich (Switzerland)
- Pietro Matricardi, Sapienza Rome (Italy)
- José Manuel García Fernández, CSIC Seville (Spain)
- Redouane Borsali, University of Grenoble (France)
- Lennart Bergström, University of Stockholm (Sweden)
- Arthur Ragauskas, University of Tennessee (USA)

Along the 36 thematic sessions the conference will provide stage also to 36 invited Keynote Speakers and 160 oral communications, organized in 4 parallel sessions. Complementing the scientific program, the poster sessions include about 150 posters that will be displayed along all the conference days.

The number of registered participants already reached more than 350. The EPNOE Science Award will be also given for the first time.

We hope that it will be an enjoyable event that will provide an opportunity for delegates to discuss and share knowledge, ideas and expertise with colleagues and peers.

A warm welcome to Aveiro

Carmen Freire & Manuel Coimbra
Program chairs EPNOE 2019



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8th Summer school of the LabEx CheMISyst

Behaviour of a macromolecular bioassembly in presence of aqueous electrolytes

September 2–6, 2019, IMT Mines Alès (France)

The 8th edition of the LabEx CheMISyst summer school was held from September 2 to 6th, 2019 in the C2MA laboratory of IMT Mines Alès. This annual summer school is open to PhDs, post-docs and master students from academia. The main theme was the study of the “Behaviour of a macromolecular bioassembly in presence of aqueous electrolytes” with as a system of study, wood.

The main goal of this week was to give students an overview of biomass valorisation and uses based on several lab practical work and conferences. Students worked in team with poplar wood samples that were handled in various aqueous electrolytes. The resulting modified wood structures were studied through various experimental techniques: elementary analyses (X-ray fluorescence, Energy-dispersive X-ray spectroscopy), free surface energy measurements (contact angle), thermal properties (calorimetry) and visco-elastic properties (Dynamic Mechanical Analysis). Students were thus able to discover and practice various physico-chemical and mechanical characterization techniques and exchange their knowledge and experience with the teaching team. At the end of the week, the whole data and analysis were opened for discussion in the frame of a plenary session.

In addition, five conferences in the field of (bio-based) chemistry and materials were given by internationally recognized researchers:

- Jean-François Dufrêche (ICSM - Marcoule): “*Osmosis, Osmotic pressure and Osmolarity*”
- Bruno Clair (LMGC - Montpellier): “*Wood structure and uses*”
- Nathalie Gontard (IATE - Montpellier): “*Plastic pollution & circular economy solutions: applications to bio-based and bio-degradable food packaging*”
- Sylvain Caillol (ICGM - Montpellier): “*A sustainable approach to biobased aromatic polymers*”
- Tatiana Budtova (CEMEF – Sophia Antipolis): “*Cellulose : extraction structure and processing porous materials*”

This week was finally a great opportunity for participants to meet specialists of bio-based chemistry and materials, to develop their scientific background with new experimental techniques and analysis, and to build up their networks.



This news was proposed by **Pauline Charriaux (LabEx CheMISyst, France)**,
Nicolas Le Moigne (IMT Mines Alès, France)



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Highlights of Training School in Brazil

Engineering Biomaterials for Human Health

July 10th - July 23th, 2019

Collaborative Course Unicamp, Brazil and KU Leuven, Belgium

School of Chemical Engineering, University of Campinas, Campinas, SP,
Brazil



KU Leuven and Unicamp joined efforts to offer an interdisciplinary and international course in the field of Engineering of Biomaterials for Human Health. The design and development of advanced biomaterials are essential to tackle numerous challenges in regenerative medicine and pharmaceuticals. The field of biomaterials is highly multidisciplinary involving complex biological interactions with designed interfaces and nanoenvironments. Polysaccharides are very relevant for understanding and controlling these interactions and biointerfaces.

The course program had lectures of seven professors in topics such as Biomaterials Properties and Design (Angela M. Moraes), Biomaterials Surface Coating (Marisa Beppu), Microfluidics (Lucimara de La Torre), Mechanobiology (Hans Van Oosterwyck), Biomaterials for Orthopaedic and Dental Implants (Annabel Braem), Tissue Engineering (Veerle Bloemen) and Biopolymer-based Biomaterials (Pedro Fardim). The students came from six top universities in Brazil and had different education backgrounds such as medicine, biomedical engineering, biology, chemistry, chemical engineering, material sciences and mechanical engineering. The course evaluation was based on creating an entrepreneur project for a start-up company in the area of Biomaterials. Eight business ideas were created by highly motivated groups of students and several included engineering, chemistry and biochemistry of polysaccharides. The following business ideas were presented: 1) SEALUNG: An Alginate-based sealant hydrogel for lung repair 2) TUPINK: Tunnable bioinks using Brazilian raw materials 3) EXOFILM: Personalised treatment for burn wound healing with a bioactive dressing 4) KNEEWS: 3-D printed scaffolds for an efficient meniscus tear recovery 5) SCTLABS: Development of a supercritical fluid process company 6) LIPINS: Hydrogel containing insulin for topic use 7) BONTIX-BONFIX: Mg alloys coated with polymer for bone repair application 8) HEARTS: High efficient antithrombogenic recoating to stents.

The course was very successful and a new edition is planned for the next year in July. Are you interested to sponsor or to support the business ideas of the students? Please contact the course coordinators: Brazil- Prof. Angela Maria Moraes, Chemical Engineering, Unicamp (ammoraes@unicamp.br) and Europe - Prof. Pedro Fardim, Chemical Engineering, KU Leuven, Belgium (pedro.fardim@kuleuven.be).



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EPNOE new Collective Members University of Helsinki

Dr. Alistair King & Prof. Ilkka Kilpeläinen

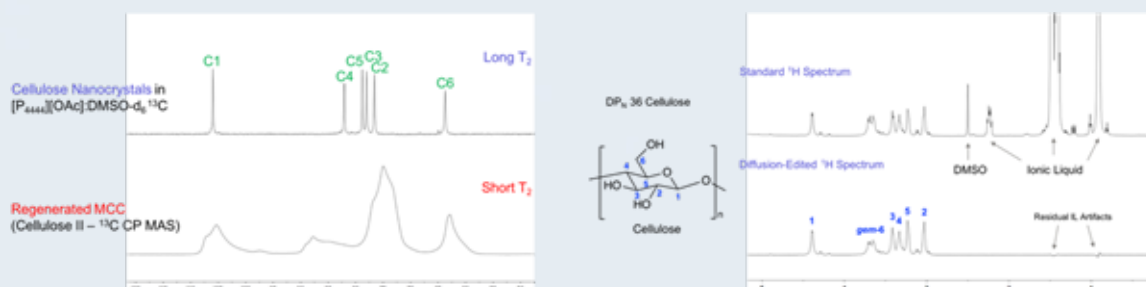


The University of Helsinki is the oldest (ca. 1640) and largest university in Finland with the widest range of disciplines available. Around 36,500 students are currently enrolled in the degree programs of the university spread across 11 faculties and 11 research institutes.

Myself (alistair.king@helsinki.fi) and Ilkka Kilpeläinen (ilkka.kilpelainen@helsinki.fi), from the University of Helsinki (Chemistry Department), are newcomers to the EPNOE but are familiar with many current members.

Our main topic of interest is in the development of ionic liquids for biomass (predominantly cellulose) processing. We have developed the ionic liquid class that is used in the IONCELL fibre-spinning process and currently support the technology side at Aalto University (Sixta & Hummel). We also have a spin-off development company (Liuotin Group Oy) who's mission is to 'fill the technology gap required to economically scale-up production of key ionic liquids, allowing businesses to innovate'. In addition to cellulose dissolution/regeneration phenomenon, we are interested in developing atom-efficient chemistries which can be applied in the solution state, specific to distillable superbase-derived ionic liquids.

Beyond fibre-spinning my own interests are in the development of sustainable methods for cellulose surface modification (pulp, fibres, films, aerogels or nanocelluloses). I have a project from the Finnish Academy concerning this topic, with a view for eventual introduction of dynamic covalent functionalities, which would allow for self-assembly of nanocelluloses. Two major milestones in this research are: 1) in the development of liquid-state NMR methods (Figure & Reference) for analysis of nanocelluloses and other crystalline celluloses, 2) selective surface acylation of nanocellulose, without leading to the traditional heterogeneous CTA product.



The NMR method is turning out to be very versatile for many types of crystalline celluloses. Myself and my post doc (Dr. Tetyana Koso) will look forward to telling you about these results at the upcoming EPNOE conference in Aveiro, Portugal.

NMR Publication: King et al. *Biomacromol.* **2018**, 19, 2708.

Extended Profile: <https://researchportal.helsinki.fi/en/persons/alistair-king>



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EPNOE new Collective Members

Faculty of Food Technology University of Agriculture in Krakow

Ph.D., D.Sc., Eng. Marcin Lukasiewicz

The Faculty of Food Technology is one of the seven faculties of the University of Agriculture in Krakow. In 2019, the Faculty celebrates its 45th anniversary and currently gathers over 170 scientists and teachers in the field of broadly understood food technology. The scientific activity of the faculty staff focuses on many aspects related to food production in which one of the important research field is polysaccharide chemistry and technology. For historical reasons, by far the greatest interest is directed towards starch, a key polysaccharide for food production. The research on starch was performed in Krakow since the end of World War II and for several years an International Starch Convention was organized by the faculty together with international partners. Starch investigation concerns both its physicochemical properties and modifications by chemical, physical or enzymatic methods. Research is also conducted on the functional properties of modified starches, the interactions of starches with other polysaccharides as well as the possibilities of applying starch materials in food technology and other fields. Other polysaccharides are also in the scope of the research including pectins or non-starch hydrocolloids. These studies relate to new, effective methods of obtaining polysaccharides, searching for new sources, investigating their properties and the interaction of polysaccharides with other substances in multicomponent systems. Studies on the physicochemical properties of polysaccharides include also the determination of colligative and hydrodynamic properties of polysaccharide solutions as well as the rheology of polysaccharide water systems. A nutritional research on polysaccharides (eg. fructans, β -glucans) as components that may serve as a functional food ingredients are also perform. On the other hand, relatively new research issues are: methods of producing nanostructures in polysaccharide matrices, studies of thin layers and polysaccharide films (single and multi-component), the chemistry of cyclic oligosaccharides or studies (including cyclodextrin modification as well as the chemistry of inclusion complexes phenomena) on biocatalysis for transformation of polysaccharides using enzymes immobilized on inorganic and organic matrices including conductive polymers matrices (eg. polyaniline). Research conducted at the faculty is carried out in cooperation with numerous centers in Poland and Europe. Nearly seventy research projects, including some financed from EU funds, have been implemented at the faculty over the past five years. Teaching activities on faculty includes all levels of education including Ph.D. study organized on international level with some cooperation of some European universities and international food producers. During the study more than 1600 polish and foreign students of the faculty can focus on various food-related issues by studying fields of study such as food technology and nutrition, brewing, food quality and safety, and dietetics.



Simple protocol for effective preparation of breast cancer cell cultures for possible 3D tumor modeling

Kristijan Skok^{1*}, Iztok Takač², Rajko Kavalar³, Lidija Gradisnik¹, Marko Milojević¹, Uroš Maver¹

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² Department of Gynaecology and Perinatology, University Medical Centre Maribor, Maribor, Slovenia

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Cell line (CL) culturing is becoming more and more elaborate in developing in vitro tumor models (2D, 3D) as well as providing a segue to in vivo models (e.g. xenografts). In the last years, several isolation protocols of breast (cancer) tissue cells have been developed and reported, which differ in complexity. Due to recent publications in high-profile journals [1] that have shown inconsistencies in CL culturing and reporting of results, we present a simple, unambiguous workflow protocol (figure 1) that incorporates the possibility of further 3D cell culture modeling (figure 2).

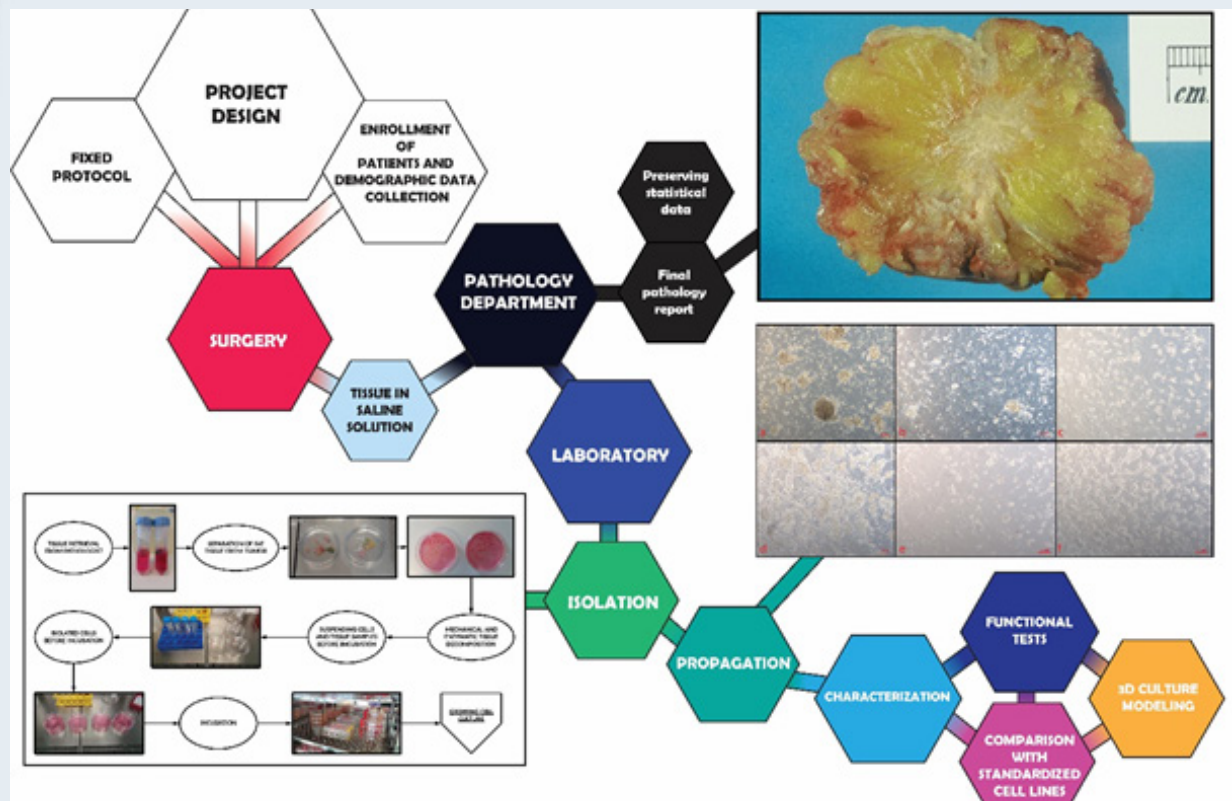


Figure 1: Workflow protocol

Beginning with a successful patient selection, surgery and tissue sample selection at the pathology department the tissue is brought to the laboratory where the cells are isolated and cultivated. Later begins the characterization which helps in determining all defining characteristics of the CL that must remain identical to the primary tissue. Following this workflow we successfully cultured a triple negative breast cancer CL, which we named according to the current international guidelines MFUM-BrTNBC-1 [2]. The subsequent step in our research to further investigate the complex intertumoral cellular network will be assessment of culturing conditions in 3D-printed polysaccharide scaffolds.

(continued overleaf)

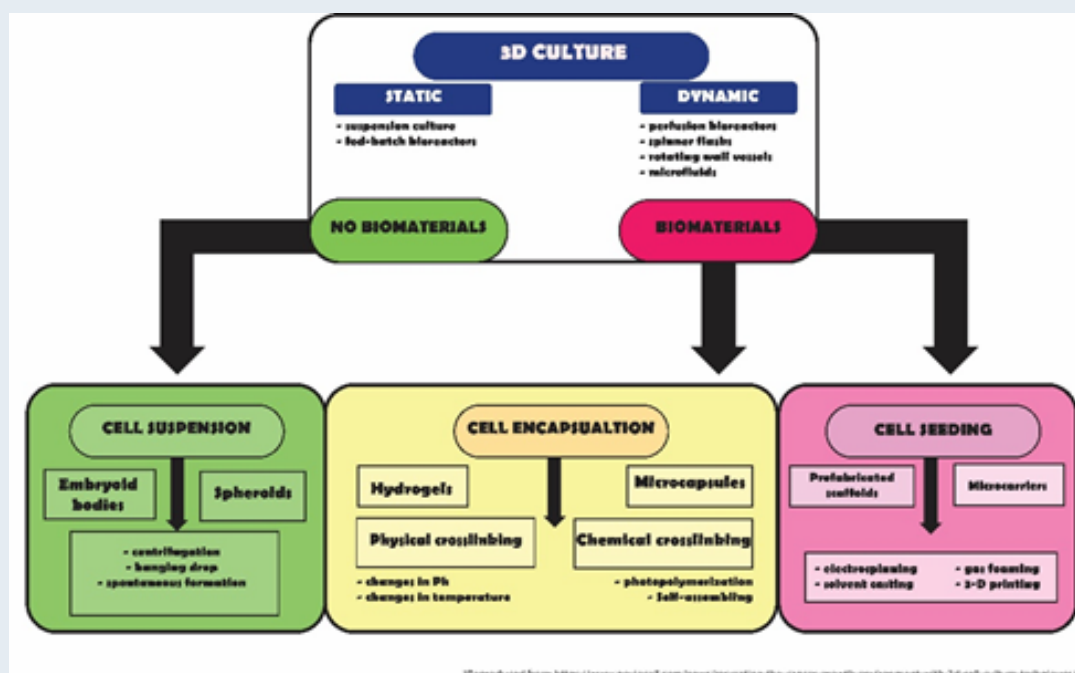


Simple protocol for effective preparation of breast cancer cell cultures for possible 3D tumor modeling

(continued)

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*Reproduced from: <https://www.nature.com/news/locating-the-cancer-growth-environment-with-3d-cell-culture-techniques>

Figure 2: 3D culturing approaches

1. Mullard A. Can you trust your cancer cell lines? *Nat Rev Drug Discov.* 2018;17:613.
2. Skok K, Gradišnik L, Čelešnik H, Potočnik U, Kavalarič R, Takač I, et al. Isolation and characterization of the first Slovenian human triple negative breast cancer cell line. *Breast J.* in press



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EPNOE Member's Scientific Publications

At University of Natural Resources and Life Sciences Vienna (BOKU),
Austria, Institute for Chemistry of Renewable Resources:

Most recent articles

Buathong, R., Schindler, F., Schinnerl, J., Valant-Vetschera, K., Bacher, M., Potthast, A., Rosenau, T., Vajrodaya, S., Uncommon fatty acids, Iridoids and other secondary metabolites from the medicinal plant species *Ixora cibdela* Craib (Rubiaceae). *Phytochemistry Letters* 2019, 33, 77-80.

Tripathi, A., Tardy, B. L., Khan, S. A., Liebner, F., Rojas, O. J., Expanding the upper limits of ro-bustness of cellulose nanocrystal aerogels: outstanding mechanical performance and associated pore compression response of chiral-nematic architectures. *J. Mater. Chem. A* 2019, 7 (25), 15309-15319.

Akramov, D. K.; Bacher, M.; Zengin, G.; Böhmdorfer, S.; Rosenau, T.; Azimova, S. S.; Mamadalieva, N. Z., Chemical Composition and Anticholinesterase Activity of *Lagochilus inebrians*. *Chemistry of Natural Compounds* 2019, 55 (3), 575-577.

García-González, C.A., Budtova, T., Durães, L., Erkey, C., Del Gaudio, P., Gurikov, P., Koebel, M., Liebner, F., Neagu, M., Smirnova, I., An Opinion Paper on Aerogels for Biomedical and Environmental Applications. *Molecules* 2019, 24, 1815.

Mimini, V., Kabrelian, V., Fackler, K., Hettegger, H., Potthast, A., Rosenau, T., Lignin-based foams as insulation materials: a review. *Holzforschung* 2019, 73 (1), 117-130.

Guggenberger, M., Potthast, A., Rosenau, T., Böhmdorfer, S., Quantification of Volatiles from Technical Lignins by Multiple Headspace Sampling-Solid-Phase Microextraction-Gas Chromatography-Mass Spectrometry. *ACS Sustainable Chemistry & Engineering* 2019, 7 (11), 9896-9903.

Mamadalieva, N. Z., Böhmdorfer, S., Zengin, G., Bacher, M., Potthast, A., Akramov, D. K., Janibe-kov, A., Rosenau, T., Phytochemical and biological activities of *Silene viridiflora* extractives. Development and validation of a HPTLC method for quantification of 20-hydroxyecdysone. *Industrial Crops and Products* 2019, 129, 542-548.

Lampl, M., Schlapp-Hackl, I., Wurst, K., Gelbrich, T., Kopacka, H., Müller, T., Kreutz, C., Naier, B., Partl, G. J., Kahlenberg, V., Amer, H., Bacher, M., Rosenau, T., Huppertz, H., Schottenberger, H., Synthetic and structural studies on pentafluorobenzylated imidazole systems. *J. Fluorine Chem.* 2019, 218, 51-62.

Ahead of Print

Musl, O., Holzlechner, M., Winklehner, S., Gübitz, G. M., Potthast, A., Rosenau, T., Böhmdorfer, S., Changing the Molecular Structure of Kraft Lignins - Ozone Treatment at Alkaline Conditions. *ACS Sustainable Chem. Eng.* 2019. DOI: 10.1021/acssuschemeng.9b01046

Wang, H., Hu, J.; Zhu, M., Li, Y.; Qian, H., Shen, X., Liebner, F., Rosenau, T., Full-color-emitting (CuInS₂) ZnS-alloyed core/shell quantum dots with trimethoxysilyl end-capped ligands soluble in an ionic liquid. *RSC Adv.* 2019. DOI: 10.1039/c9ra03066b

Wang, H., Liebner, F., Qiana, H., Shena, X., Zhanga, Y., Zhang, M., Porous ZCIS/ZnS QDs Fluorescent Aerogels with Tunable Emission Prepared from Porous 3D Nanofibrillar Bacterial Cellulose. *Carbohydrate Polymers* 2019. DOI: 10.1016/j.carbpol.2019.115173

Quraishi, S., Plappert, S. F., Grieser, T., Gindl-Altmatter, W., Liebner, F. W., Chemical versus physical grafting of photoluminescent amino-functional carbon dots onto transparent nematic nanocellulose gels and aerogels. *Cellulose* 2019. DOI: 10.1007/s10570-019-02619-2



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**At University of Natural Resources and Life Sciences Vienna (BOKU),
Austria, Institute for Chemistry of Renewable Resources:**

Ahead of Print

Lucia, A., van, H. H. W. G., Oberlerchner, J., Rosenau, T., Beaumont, M., Resource-saving Production of Dialdehyde Cellulose: Optimization of the Process at High-consistency. *ChemSusChem* 2019. DOI: 10.1002/cssc.201901885

Sulaeva, I., Vejdovszky, P., Beaumont, M., Rusakov, D., Rohrer, C., Rosenau, T., Potthast, A., A fast approach to the hydrophobization of bacterial cellulose via the direct polymerization of ethyl 2-cyanoacrylate. *Biomacromolecules* 2019. DOI: 10.1021/acs.biomac.9b00721

Mamadalieva, N., Akramov, D., Böhmdorfer, S., Azimova, S.S., Rosenau, T. (2019). Extractives and biological activities of Lamiaceae species growing in Uzbekistan. *Holzforschung*, ahead of print.

DOI: 10.1515/hf-2018-0296

Mimini, V., Amer, H., Hettegger, H., Bacher, M., Gebauer, I., Bischof, R., Fackler, K., Potthast, A., Rosenau, T., Lignosulfonate-based polyurethane materials via cyclic carbonates: preparation and characterization. *Holzforschung*, 2019. DOI: 10.1515/hf-2018-0298

Amer, H., Mimini, V., Schild, D., Rinner, U., Bacher, M., Potthast, A., Rosenau, T., Gram-scale economical synthesis of trans-coniferyl alcohol and its corresponding thiol. *Holzforschung*, 2019.

DOI: 10.1515/hf-2018-0297

At Armines-CEMEF, France:

- C. A. GARCÍA-GONZÁLEZ, T. BUDTOVA, L. DURÃES, C. ERKEY, P. DEL GAUDIO, P. GURIKOV, M. KOEBEL, F. LIEBNER, M. NEAGU, I. SMIRNOVA "An Opinion Paper on Aerogels for Biomedical and Environmental Applications", *Molecules*, 24, 1815 (2019)

- O. KORHONEN, T. BUDTOVA "Gelation of cellulose-NaOH solutions in the presence of cellulose fibers", *Carbohydrate Polymers*, on line

At Jena University, Germany:

Engineered polysaccharides: α -1,3-Glucan acetates showing upper critical solution temperature in organic solvents

Th. Heinze, A. Pfeifer, A. Koschella, D. Adelman, L. Howe, N. Behabtu, C. Lenges
Macromolecular Chemistry and Physics 220 (2019) 1900112

Amino acid substituted dextran based non-viral vectors for gene delivery

M. Zink, K. Hotzel, U. S. Schubert, Th. Heinze, D. Fischer
Macromolecular Bioscience 19 (2019) 1900085

Studies about the acylation of starch in dipolar aprotic solvents

S. Blohm, Th. Heinze
Starch 71 (2019) 1900053



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EPNOE Member's Scientific Publications

At Jena University, Germany:

Non-cytotoxic agarose/hydroxyapatite composite scaffolds for drug release
M. Witzler, P. F. Ottensmeyer, M. Gericke, Th. Heinze, E. Tobiasch, M. Schulze
International Journal of Molecular Sciences 20 (2019) 3565.

Neutral polysaccharide from the leaves of *Pseuderanthemum carruthersii*: Presence of
3-O-methyl galactose and anti-inflammatory activity in LPS-stimulated RAW264.7 cells
V. H. Bac, B. S. Paulsen, L. V. Truong, A. Koschella, T. C. Trinh, Ch.W. Wold, S. Yogarajah, Th.
Heinze
Polymers 11 (2019) 1219.

At Mines d'Alès, C2MA, France:

[1] S.M. Aguilera Segura, J. Bossu, S. Corn, P. Trens, T. Mineva, N. Le Moigne, F. Di Renzo,
Synergistic Sorption of Mixed Solvents in Wood Cell Walls: Experimental and Theoretical Approach,
Macromol. Symp. 386 (2019) 1900022. doi:10.1002/masy.201900022.

[2] H.N. Vo, M.F. Pucci, S. Corn, N. Le Moigne, W. Garat, S. Drapier, P. Liotier, Consideration of the
dual scale of pore size in wicking - validation on carbon reinforcements and application to the conside-
ration of the dual scale of pore size in wicking – validation on carbon reinforcements and application to
the swelling of bio-based, in: Proceeding of ICCM22, Melbourne, Australia, 2019.

[3] K. Iggui, M. Kaci, M. Mahlous, N. Le Moigne, A. Bergeret, The Effects of Gamma Irradiation on
Molecular Weight, Morphology and Physical Properties of PHBV/ Cloisite 30B Bionanocomposites, J.
Renew. Mater., in press (2019).

From Franco Furlani, Individual member:

From Franco Furlani, Individual member:

Biomimetic, Multi-Responsive and Self-Healing Lactose-modified Chitosan (CTL)-based Gels formed via
Competitor-assisted Mechanism

Franco Furlani , Pasquale Sacco, Michela Cok , Gaia de Marzo, Eleonora Marsich , Sergio Paoletti, Ivan
Donati

ACS Biomaterials Science & Engineering(2019) Publication Date:September 4, 2019

DOI: 10.1021/acsbmaterials.9b01256

pH-Assisted Gelation of Lactose-Modified Chitosan

Pasquale Sacco, Franco Furlani, Sergio Paoletti, Ivan Donati

Biomacromolecules (2019), 20 (8), 3070-3075

DOI: 10.1021/acs.biomac.9b00636 Link which enables to download for free the paper (before July 2020,
for 50 times):

<https://pubs.acs.org/articlesonrequest/AOR-vi64K8tY8e3JT4z7QtNT>



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Other News

Tec 21 Winter school on "Multi scale approaches and multiphysics couplings in fluid and solid mechanics » (4th Edition)

Grenoble - 20th to 24th January 2020

Objectives: Important societal issues require to solve problems in mechanical and process engineering of increasing complexity. A key vector of progress relies on multi-scale and multi-physics approaches. The aim of this summer school is to make an overview of the different approaches, numerical and experimental techniques allowing to tackle this complexity. All the courses will be illustrated through various recent examples. Two days will be dedicated to practical exercises on « high tech demonstrators » based on the most up-to-date techniques and methods developed by partner laboratories of Tec21. Finally on Friday, invited lecturers will give a focus on « waves in fluids and solids ».

Web Page: <https://www.tec21.fr/summer-school/>

The number of participants is limited and registrations are subject to availability.

Registration dead line: 1st December 2019.

Online registration: <https://www.tec21.fr/summer-school/online-registration/>



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EPNOE BULLETIN D'ADHESION INDIVIDUEL - Membre Affilié
EPNOE INDIVIDUAL MEMBERSHIP FORM – Affiliated Member

Je, I, (nom et prénom, *name and firstname*):

.....

Organisation (*organization*):

.....

dont l'adresse est (*which address is*):

.....
.....

e-mail :

déclare adhérer comme Membre Affilié **Individuel** à l'**Association EPNOE**, Association Loi 1901, sise 60 Bd St Michel 75006 Paris, déclarée le 14 décembre 2007 et publiée au Journal Officiel le 5 janvier 2008 sous le numéro 1006, et accepter ses statuts.

*(declare to join as **Individual** Affiliated Member the **EPNOE Association**, 60 Bd St Michel 75006 Paris, declared under law of 1901 on December 14th 2007 and published in the French Journal Officiel on January 5th 2008 under number 1006, and accept its statutes.)*

L'adhésion est effective pour l'année calendaire en cours dès le paiement de la cotisation annuelle.
(Membership is effective for the current calendar year upon payment of the annual membership fee.)

Cotisation annuelle (*Annual membership fee*) 150 euros HT (hors taxes) (*net fee excluding taxes and duties*). 50 euros HT pour les étudiants en Master et en thèse. *50 euros for Master and PhD students.*

Fait à (lieu), **done in** (*place*):

Date:

Signature:

A compléter et envoyer à l'adresse postale suivante, to be filled in and sent to the following postal address:

**Sylvie Massol, CEMEF ARMINES, CS10207
F-06904 Sophia Antipolis – France**

Ou par e-mail (or by e-mail to) contact@epnoe.eu

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EPNOE BULLETIN D'ADHESION COLLECTIF- Membre Affilié
EPNOE COLLECTIVE MEMBERSHIP FORM – Affiliated Member

Nous, We, (nom du centre de recherche/institut, *name of the research centre/institute*):

.....
dont la forme et le capital sont (*which form and capital are*):

.....
dont l'adresse est (*which address is*):

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.....
déclarons adhérer comme Membre Affilié à l'**Association EPNOE**, Association Loi 1901, sise 60
Bd St Michel 75006 Paris, déclarée le 14 décembre 2007 et publiée au Journal Officiel le 5 janvier
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(1 000 euros the first year net fee excluding taxes and duties) et 700 euros les années suivantes *(700
euros the following years)*

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Par (nom), By (name):

Titre, Title:

dûment habilité(e) à cet effet (*duly empowered to that effect*).

Signature:

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COLLECTIVE MEMBERSHIP FORM – BIC « Business & Industry Club » Member

Nous, We, (nom de la société/organisation, name of the company/organisation) :

.....
dont la forme et le capital sont (which form and capital are) :

.....
dont l'adresse est (which address is):

.....
déclarons adhérer comme Membre BIC à l'Association EPNOE, Association Loi 1901, sise 60 Bd St Michel 75006 Paris, déclarée le 14 décembre 2007 et publiée au Journal Officiel le 5 janvier 2008 sous le numéro 1006, et accepter ses statuts.

(declare to join as BIC Member the EPNOE Association, 60 Bd St Michel 75006 Paris, declared under law of 1901 on December 14th 2007 and published in the French Journal Officiel on January 5th 2008 under number 1006, and accept its statutes.)

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| Moins de 50 employés, less than 50 employees | <input type="checkbox"/> | 1000 euros HT, net fee. |
| 51 à 500 employés, 51 up to 500 employees | <input type="checkbox"/> | 2500 euros HT, net fee. |
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Date:

Par (nom), *By* (name):

Titre, *Title*:

dûment habilité(e) à cet effet (*duly empowered to that effect*).

Signature:

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