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May 2021 **EPNOE Newsletter**

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Editorial

Dear Readers,

Spring is in the air and EPNOE is flourishing with new activities. EPNOE webinars successfully debuted in May with very interesting lectures about aerogels given by Tatiana Budtova and Yuanyuan Li. EPNOE Roadmap activities for Research and Education are currently engaging more than 20 top scientists from 13 European countries to create unique critical mass about the directions of polysaccharide science, technology and education for the next 20 years. EPNOE Junior scientists are active to engage and support young scientists working with polysaccharides in building their networks and strengthening their skills for writing grants and excellent papers. Collaborative joint ventures with other European and non-European Associations are opening new doors and integrating new interdisciplinary knowledge to our members. EPNOE 2021 conference has received more than 300 submissions and an excellent conference program will be held in Nantes in October this year. The EPNOE Science Award and a newly created EPNOE Technology Award will be presented at the conference. The EPNOE member area is ready and offers numerous opportunities to interact online and to build your proposals for Horizon Europe. Our membership campaign goes on and we will be happy to welcome you and your company or institutions to join us. We have a bright future ahead and we want to share it with you.

Pedro Fardim
President of EPNOE

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News & Announcements

EPNOE CONFERENCE 2021

One of the major EPNOE events of this year is the 7th International Polysaccharide Conference which will be held in Nantes, France, 11-15 October 2021 (**https://symposium.inrae.fr/epnoe2021**/).

16 sessions are planned covering all aspects of fundamental and applied polysaccharide research (**https://symposium.inrae.fr/epnoe2021/Program2/Topic-sessions**). To date we received more than 300 abstracts ensuring an exciting program consisting in 5 plenary conferences, 16 key-note presentations, 230 talks and 100 posters (Poster submission is still possible). Assuming the deployments of vaccination strategies stay on course, and taking all the necessary safety measures, the conference will be organised “as before”, in presence. This will be one of the first large “post-COVID” events allowing enjoying not only the scientific program, but also the pleasure of direct exchange with colleagues and friends and appreciating the visit of beautiful Pays de la Loire region.

Do not miss the opportunity to join the EPNOE community in Nantes. Submission of poster abstracts is still possible till June 30th.

The organising committee

Register here

For more information concerning this campaign, email: **contact@epnoe.eu**

Welcome!

The Mediterranean Institute for Agriculture, Environment and Development from the Algarve University (MED-UAlg) in Portugal has just joined the EPNOE community!

UAlg is a Portuguese public higher education institution located in Algarve. With teaching and research as its core activities in different scientific areas: science and technology, management and economy, earth and marine sciences, social sciences, and health. UAlg internationalization is well sustained with the participation and coordination of several projects within ERASMUS+ and other European Programs.

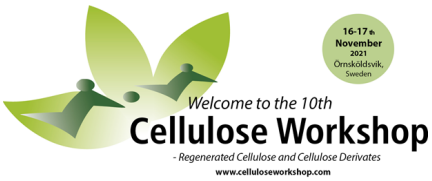
Within the MED-UAlg framework, at the Plant Biotechnology Lab we conduct research on the use of biotechnological approaches towards the conservation and sustainable use of plant genetic resources and on the biological and chemical characterization of natural compounds, mainly from plant origin. Some of our main research interests are related to:

- In vitro propagation of plants;
- Chemical and biological characterization of wild plants and agri-food products;
- Development and characterization of new solvents for biopolymer (e.g., lignin, fibroin, tannins, cellulose, chitin, etc.) extraction/dissolution and regeneration;
- Mechanical and optical rheometry of biopolymer-based systems;
- Physical and chemical polysaccharide-based hydrogels, particles, and films for probiotic encapsulation;
- Biopolymer-based “water-in-water” emulsions;
- Development of lignin-based derivatives for microplastic extraction from aqueous media;
- Microbiology of cellulose-based films;

For more info, **click here**

Click here to see the material from the previous webinar.

Register here



Call for papers for the 10th Workshop on Cellulose, Regenerated Cellulose and Cellulose Derivatives

The deadline is 10th June 2021

More info

First European Summer School on Bio-based Composites (ESBBC) 6th to 8th of July 2021

This event is a unique event in Europe for master students, PhD students and young researchers working on bio-based composites wishing to learn, exchange experience and technical information on this multidisciplinary scientific field. It will be held at the University of Franche-Comté in Besançon, France.

More info

Polish Chitin Society Conference **"New aspects in chemistry and application of chitin and its derivatives",** which will be held on **September 23rd—24th, 2021.**

More information is available on the website

More info

The amazing history of element names
Pierre Avenas
EDP Sciences, octobre 2020
ISBN: 978-2-7598-2464-9

What is the connection between planet Mars and Iron Man, nickel and the Seven Dwarves, or DNA, walnuts and Jupiter, fuchsine, the fox and Zorro, or even ammoniac and the god Amun?
This book tells the stories behind the naming of the elements, whether they are chemical elements of the Periodic Table, first published by Mendeleev in 1869, or organic elements which are components of DNA and RNA, as well as proteins, themselves elements of living kingdom, plants and animals. The book goes further, into materials and products which became essential elements of modern life. Readers will learn that the names often refer to (or reveal) dreams and aspirations of men and women of their time. This truly amazing history of the names guides us through an incredible set of worlds: nature, astronomy, history, literature, journeys, and even takes in contributions from legends and mythology.

Pierre Avenas was deeply involved for several years in EPNOE as the representative of Armines, the collective member president of EPNOE.

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Projects

REviving agroFLOrestal RESidues: from intermolecular interactions in natural Polyphenols to new biomaterials of added value.

Grant number: PTDC/ASP-SIL/30619/2017
Funding agency: Portuguese Foundation for Science and Technology (FCT)
start date: 29-09-2018, end date: 28-09-2021

Due to numerous advantages of lignin and tannins, there is a great interest in developing added value products based on these natural polyphenols. However, their use is still negligible mainly due to the scarce separation techniques available which, in most of the cases, result in low extraction yields, extensive degradation or even undesired chemical modifications. While focusing on the fundamental interactions involved on the biomass dissolution, we foresee the development of newer processing strategies to develop attractive biomaterials such as resins, foams or even single-cell proteins. As the project prioritizes the use of local feedstock of the Algarve region, such as lignocellulose residues (pine and eucalyptus) and carob pod waste, we expect the outcome of it to help reviving the local agroforestry sector.

Sergiu Coseri-project director: Highly sensitive immunoassay device, based on natural resources; Acronym: HISENSE

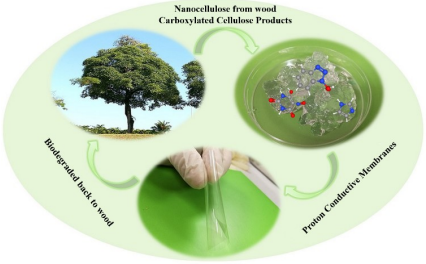
Grant number: PN-III-P2-2.1-PED-2019-0169; CNCS/CCCDI
Funding agency: Ministry of Research, Innovation and Digitization, UEFISCDI Romania
start date: 2020, end date: 2022

In the last years, significant progress has occurred in information technology, sensors, and materials science. In medicine particularly, a timely fashion detection of a certain disease and accurate diagnosis is crucial. HISENSE project envisions point-of-care biosensors as a future tool and proposes a new approach to fabricate such highly sensitive biosensors to detect proteins. The strategy involves the activation of cellulose substrate, by a nanostructured engineering procedure to selectively introduce a high amount of carboxyl groups, followed by anchoring specific moieties which will eventually act as a triggering sites for the specific

detection and immobilization of proteins. Two proteins were used as a model analyte to fabricate the immunosensor, i.e. human IgG, and bovine serum albumin. The proposed biosensor may exhibit a good specificity, stability, and reproducibility. Our strategy may pave a simple way to fabricate highly sensitive immunosensors for a wide range of applications.

Sergiu Coseri-project director: Expanding cellulose's boundaries towards the fabrication of superior proton conductive membranes for fuel cells); Acronym: EXCELLFUEL

Grant number: PN-III-P4-ID-PCE-2020-0476
Funding agency:Ministry of Research, Innovation and Digitization, CNCS/CCCDI – UEFISCDI Romania
start date: 2021, end date: 2023



The design of chemically stable proton conductive membranes with high selectivity for application in fuel cells remains a significant challenge. In our project, we propose a new approach to construct proton conductive membranes based on a cheap, abundant, and renewable resource, based on cellulose. Our strategy involves firstly, selective oxidation and functionalization of cellulose, in order to increase its versatility, by introduction high amounts of carboxylic groups, able to serve as active sites of proton conductivity. Besides, nanocellulose prepared from agricultural wastes will act as a redoubtable reinforcing agent as well as providing high proton conductivity. Moreover, this matrix will incorporate different nitrogen-containing heterocycles.

These heterocycles are "*dry*" proton conducting ionomers which can substitute water because they form similar hydrogen bond networks as water. The complex interactions between the polymeric matrix (abundant in the COOH and OH groups) and the low molecular weight heterocyclic dopant, bearing nitrogen atoms and double bonds, create favorable prerequisites to realize new materials with conductive properties. The replacement of water by heterocycles should result in the cellulose based composites characterized by the conductivity in the intermediate temperature range (over 100 ^{o}C), under anhydrous conditions, desirable for various electrochemical devices, and are relevant in modern material science.

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Events

16th Summer Course Glycosciences

The **16th Summer Course Glycosciences** will take place **online** on **10, 11, 17 and 18 June 2021**. This broad course in glycosciences combines general introductions in the field of carbohydrates and glycoproteins with in-depth sessions. This gives participants the opportunity to focus on specific interests without losing a broad education. This course is organised by the Graduate School VLAG in co-operation with Wageningen University and Research, University of Groningen and Leiden University Medical Center
The course is at graduate level. The course is a must for those working in academia, research institutes or industry that want to refresh their knowledge on carbohydrates and for graduate students working on a PhD project related to carbohydrate chemistry, biochemistry, biology, chemical technology or food science. **All participants are encouraged to present a poster in one of the online poster sessions in which they introduce themselves and their work**.

The course will be held online on Thursday 10 June / Friday 11 June /Thursday 17 June and Friday 18 June 2021.
The study load of this course is 1.2 ECTS credits. Participants will receive 0.5 ECTS extra when presenting a poster.
For more information, **click here**

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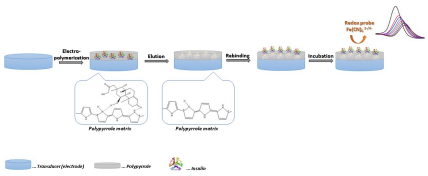
Research

Coupling molecular imprinting technology and biosensorics

T. Zidarič1
*1 Institute of Biomedical Sciences, Faculty of Medicine, University of Maribor, Taborska ulica 8, 2000 Maribor, Slovenia (**tanja.zidaric@um.si**)*

The field of biosensing has continuously grown in recent years. The rapid, selective, and cost-effective detection and determination of clinically relevant biomolecule analytes to better understand their biological and physiological functions or allow for early disease detection is becoming increasingly important. Naturally occurring “receptors” have a unique ability to interact with target molecules specifically. As a recognition element of biosensors, these receptors dictate the refined selectivity of a device. However, they are subject to instability under harsh environmental conditions and low durability. Using supramolecular chemistry principles, molecularly imprinted polymers (MIPs) can successfully replace natural receptors to circumvent these shortcomings.



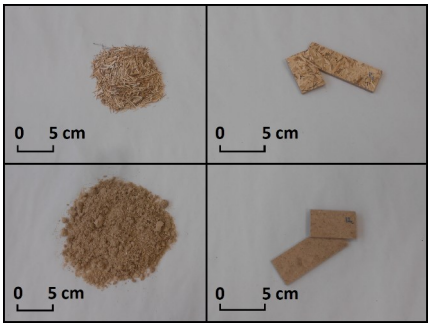
In the project funded by the Ministry of Education, Science, and Sports (grant number: C3330-19-952027) we combine molecular recognition by electrosynthesized MIP with an electrochemical transducer to create a biomimetic sensor for insulin detection. Since such sensors present a fast and simple alternative to clinical or ELISA-based methods of insulin detection, they could present a reasonable future approach for point-of-care devices. These could lead to more efficient diabetes type 1 control in patients in combination with continuous glucose monitoring.

More info

Figure: The concept of electrosynthesized MIP preparation for insulin detection.

Twin-Screw Extrusion Process to Produce Renewable Fiberboards

Philippe Evon1, Laurent Labonne1, Saif Ullah Khan1,2,3, Pierre Ouagne3, Pierre-Yves Pontalier1, Antoine Rouilly1
1Laboratoire de Chimie Agro-industrielle (LCA), Université de Toulouse, INRAE, INPT, 2Balochistan University of Information Technology, Engineering and Management Sciences, 3Laboratoire Génie de Production (LGP), Université de Toulouse, INPT



More info

A versatile twin-screw extrusion process to provide an efficient thermo-mechano-chemical pre-treatment on lignocellulosic biomass before using it as source of mechanical reinforcement in fully bio-based fiberboards was developed. Various lignocellulosic crop by-products have already been successfully pre-treated through this process, e.g., cereal straws (especially rice), coriander straw, shives from oleaginous flax straw, and bark of both amaranth and sunflower stems.

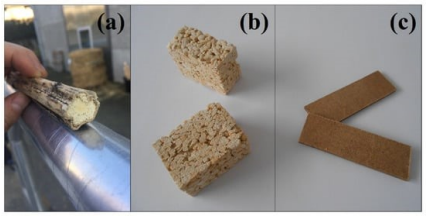
The extrusion process results in a marked increase in the average fiber aspect ratio, leading to improved mechanical properties of fiberboards. The twin-screw extruder can also be fitted with a filtration module at the end of the barrel. The continuous extraction of various chemicals (e.g., free sugars, hemicelluloses, volatiles from essential oil fractions, etc.) from the lignocellulosic substrate, and the fiber refining can, therefore, be performed simultaneously.
https://dx.doi.org/10.3791/62072

Low-Density Insulation Blocks and Hardboards from Amaranth (Amaranthus cruentus) Stems, a New Perspective for Building Applications

Philippe Evon1, Guyonne de Langalerie1,2, Laurent Labonne1, Othmane Merah1,3, Thierry Talou1, Stéphane Ballas2 and Thierry Véronèse2
1Laboratoire de Chimie Agro-industrielle (LCA), Université de Toulouse, ENSIACET, INRAE, Toulouse INP, 4 allée Emile Monso, 31030 Toulouse, France
2Ovalie Innovation, 2 rue Marguerite Duras, 32000 Auch, France
3Département Génie Biologique, IUT A, Université Paul Sabatier, 24 rue d’Embaques, 32000 Auch, France

Nowadays, amaranth appears as a promising source of squalene of vegetable origin. Amaranth oil is indeed one of the most concentrated vegetable oils in squalene, i.e., up to 6% (w/w). This triterpene is highly appreciated in cosmetology, especially for the formulation of moisturizing creams. It is almost exclusively extracted from the liver of sharks, causing their overfishing. Thus, providing a squalene of renewable origin is a major challenge for the cosmetic industry.

The amaranth plant has thus experienced renewed interest in recent years. In addition to the seeds, a stem is also produced during cultivation. Representing up to



80% (w/w) of the plant aerial part, it is composed of a ligneous fraction, the bark, on its periphery, and a pith in its middle. In this study, a fractionation process was developed to separate bark and pith. These two fractions were then used to produce renewable materials for building applications. On the one hand, the bark was used to produce hardboards, with the deoiled seeds acting as natural binder. Such boards are a viable alternative to commercial wood-based panels. On the other hand, the pith was transformed into cohesive and machinable low-density insulation blocks revealing a low thermal conductivity value.

https://doi.org/10.3390/coatings11030349

Films for Future!

Join VTT's & LUT's F^3 project creating and exploring cellulose based films to tackle global challenges such as plastic pollution, climate change and resource scarcity. Our project aims to create and demonstrate materials for many end-uses including packaging.
To learn more of the project in preparation, please contact Jussi Lahtinen, **jussi.h.lahtinen@vtt.fi**

INN-PRESSME Innovation ecosystem launched

The INN-PRESSME project, coordinated by VTT and involving 26 other European organisations, has received EUR 14.5 million funding from the European Union's Horizon 2020 programme. The project aims to replace petroleum-based materials with bio-based alternatives in packaging, automotive, and other consumer goods industries.
https://www.vttresearch.com/en/news-and-ideas/new-innovation-ecosystem-launched-support-market-access-bio-based-consumer-products

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Cellulose-based materials for 3D printing

EU funded project NOVUM, coordinated by VTT, targets at building a pilot line for producing components from cellulose-based materials by 3D printing for diverse applications in electrical insulation, marine and automotive industries. The thermoplastic cellulose-based materials contain cellulose derivatives, cellulose powders, and bio-based plasticizers.
http://novumproject.eu/index.php/open-technology-platform/

Fine cellulose powder from kraft pulp

VTT has published a new study on production of cellulose powder from chemically crosslinked kraft pulp using dry milling. Chemical crosslinking pre-treatment enhances the dry milling of kraft pulps to a fine powder. The yield of this method is 100% compared to chemical routes where much of the material is lost.
https://cris.vtt.fi/en/publications/manufacture-of-fine-cellulose-powder-from-chemically-crosslinked-

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Sustainable regenerated cellulosic fibres

VTT's new study on improvement of Biocelsol process for production of regenerated cellulosic fibres. The limited scalability of cellulose activation and dissolution stages had thus far hindered the commercialization of the Biocelsol technology. The recent development enables continuous production of regenerated cellulosic fibers.
https://cris.vtt.fi/en/publications/sustainable-continuous-process-for-cellulosic-regenerated-fibers

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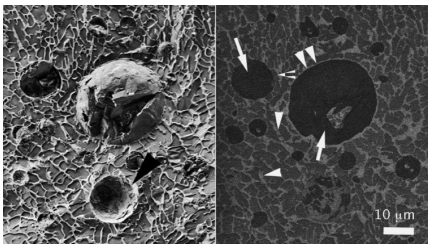

Cellulose-stabilized oil-in-water emulsions: Structural features, microrheology, and stability

Carolina Costa, Pedro Rosa, Alexandra Filipe, Bruno Medronho, Anabela Romano, Lucy Liberman, Yeshayahu Talmon, Magnus Norgren
Carbohydrate Polymers 252 (2021) 117092
doi: https://doi.org/10.1016/j.carbpol.2020.117092

Highlights:

- Cryo-SEM showed that cellulose was effectively adsorbed at the oil-water interface, resembling a film-like shell.
- The non-adsorbed cellulose enhances the viscosity of the continuous aqueous medium, contributing to a better stabilization of the emulsions.
- Higher cellulose concentrations and mixing rates lead to the formation of smaller droplets and more stable emulsions.
- DWS is a very reliable method to investigate the microrheology and stability of emulsions.
- Cryo-SEM and DWS combined, revealed a very appealing and robust methodology for the characterization and design of novel emulsion-based formulations.

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Education

Welcome to new students and researchers

IMT Mines Alès, France
Jeanne Aigoin started her intership in the PCH team to work on the rheological and crystallization behaviour of natural fibres reinforced PLA biocomposites. Supervisor: Aurélie Taguet, Nicolas Le Moigne

University Jena, Germany
Dipl.-Chem. **Artem Skabeev** joinded the group as scientific coworker. He is working in the field of starch esters for 3D-printing applications.

PhD defenses

Petru Poni, Romania
Romanian Academy; "Petru Poni" Institute of Macromolecular Chemistry Iasi, PhD student: **Andra Humelnicu**,
Title: Modified chitosan designed for biomedical and high-tech applications. Supervisor: Dr. Valeria Harabagiu

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Open Positions

Postdoctoral position
INRAE Nantes (France)
"Activity of LPMO enzymes on cellulose"
Apply by June 16th 2021

Contact: Dr. Jean-Guy Berrin (jean-guy.berrin@inrae.fr); Dr. Bernard Cathala (bernard.cathala@inrae.fr); Dr. Ana Villares (ana.villares@inrae.fr).
This postdoctoral position aims at investigating the action of lytic polysaccharide monooxygenase (LPMO) enzymes on the cellulose fiber. The purpose of the study is to control the enzymatic activity for two main goals: (i) to get more insight into the mechanism of action of LPMO enzymes, and (ii) to use LPMO enzymes as a tool for the functionalization of cellulose fibers. For this purpose, we propose the following objectives:
1. To understand the mechanism of action of LPMO enzymes on cellulose.
2. To quantify the oxidative action of LPMO enzymes.
3. To develop one-pot functionalization of cellulose.
More information: **Click here**

PhD student positions
University of Innsbruck Research Institute for Textile Chemistry and Textile Physics, Dornbirn, Austria
in the following areas:
− Modification of bio-based fiber surface and interfaces in composites and hybrids
− Development of textile based conductive structures and energy storage systems
− Recycling and reuse of post-consumer textile waste
Apply by July 31st, 2021
Contact: Prof. Tung Pham (tung.pham@uibk.ac.at)
More information: **Click here**

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Member in highlight

Carbohydrate research at Wageningen Food & Biobased Research
Lambertus A.M. van den Broek, Frits van der Klis and Maurice K.H Essers

Wageningen Food & Biobased Research (WFBR), part of Wageningen University and Research (WUR) in the Netherlands, is a contract research organisation that develops insights and technologies that support industries, governments and consumers to make the right choices and to innovate responsibly and effectively. Our in-depth knowledge of the entire chain, from raw materials through processing to end product, drives our approach. We partner in the creation and production of healthy and tasty foods, of truly-sustainable food chains, and in developing chemicals and materials that use biomass instead of fossil resources. Driven by a perceptive, knowledge-based curiosity, our multidisciplinary researchers, from diverse yet complementary backgrounds, approach problems with scientific rigor and creativity. Working closely together, we solve complex questions through a combination of intelligent analysis and pragmatic invention. Grounded in science and business, our researchers bring a no-nonsense attitude to their work.

Read more

For more information about carbohydrate research at Wageningen Food & Biobased Research you can contact the EPNOE members:
Ben van den Broek Ben.vandenbroek@wur.nl
Frits van der Klis Frits.vanderklis@wur.nl
Maurice Essers Maurice.essers@wur.nl

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Recent Scientific Publications of EPNOE Members

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Call for Papers

Polymers | Special Issue "Cellulose and Lignin Feedstock for Renewable Materials" in
https://www.mdpi.com/journal/polymers/special_issues/cellulose_lignin_feedstock
Deadline (20 September 2021)

Lignin and cellulose are prominent renewable and sustainable resources whose processing into novel materials has been a very appealing research field for many years. This is reflected in both applications—earlier and novel—and new scientific questions. These abundant natural resources already occupy a leading place regarding the bulk use of renewable feedstock, offering a wide variety of properties and applications that are hardly matched by any other natural or synthetic compound. This Special Issue attempts to connect a state-of-the-art fundamental understanding of different molecular aspects with novel cellulose and/or lignin-based applications and renewable materials.

Guest editors: Bruno Medronho and Magnus Norgren

MDPI Coatings | Special Issue **"** Polymer Coatings, Films, and Dyes**"** (open untill 30 September 2021) Guest editors: dr. Alenka Ojstršek and dr. Selestina Gorgieva, University of Maribor, Slovenia
https://www.mdpi.com/journal/coatings/special_issues/polymer_dyes

For all the calls on the EPNOE website, **click here**