



European Polysaccharide
Network Of Excellence

N°39 - MAY 2017



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

editorial

Dear Readers of the EPNOE Newsletter,

Publishing is an important activity in the EPNOE community. EPNOE scientists are very active in producing scientific articles in the best journals and several of them are editors, associate editors or members of editorial committees of most, if not all, the important journals of our community.

EPNOE is also engaged with the publisher Springer for organizing a SpringerBriefs collection on “Biobased Polymers”. Featuring compact volumes of 50 to 125 pages, the series covers a range of content from professional to academic. All aspects of basic and applied Biobased Polymer Science and Technology are considered. The series aims to cover all relevant scientific fields and application sectors, such as for example genetics and agronomy of polysaccharides, polysaccharide properties, characterization, chemistry, uses of polysaccharides, So far, five books are published, seven are under review and nine more are planned.

If you are interested in proposing a contribution, please look at <http://www.springer.com/series/15056> and send me a message (patrick.navard@mines-paristech.fr). We hope this book series to be a contribution to the advancement of the bio-based polymer field.

I cannot finish my editorial without reminding you the 5th EPNOE International Polysaccharide Conference supported by EPNOE and the American Chemical Society. It will be held in the Friedrich Schiller University of Jena, in Germany, August 20 – 24, 2017 (<http://www.epnoe2017.de>) I hope to meet you there.

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:

- **Course on "Textile and Polymer Science"** on September 18-29, 2017 at Innsbruck University (Austria) - Deadline to register: 31 July 2017

website <http://bit.ly/texpol>

Contacts: Avinash.Manian@uibk.ac.at or [Weiterbildung@uibk.ac.at](mailto>Weiterbildung@uibk.ac.at)

• 25 ICM&T third announcement

25th International Conference on Materials and Technology (ICM&T) which will be held on October 16-19, 2017 in Slovenia.

More information on the conference: <http://icmt25.com/en/>

Masters & PhD defenses:

- At **Jena University, Germany:**

- **Kristin Ganske** defended her PhD thesis "New cellulose derivatives by modification of cellulose phenylcarbonates"

New staff:

- At **Jena University, Germany:**

- **Jens Preßler** joined the group as PhD student working in the field of starch derivatives for medical applications under the supervision of Prof. Thomas Heinze.

- **Larissa Bialucha** joined the group as Bachelor student working in the field of functional hydrogels based on agarose under the supervision of Dr. Martin Gericke / Prof. Thomas Heinze.

- **Prof. Dr. Thomas Heinze** was appointed as guest professor at the University of Natural Resources and Life Sciences (BOKU) Vienna, Austria. In March 2017 he was working with Prof. Antje Potthast and Prof. Thomas Rosenau and gave lectures on chemistry of polysaccharides.



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Other News

Permanent Research Position Open in functional Biobased Polymers

In order to reinforce the «Biobased Polymers and Composites» group, MINES ParisTech opens a "Chargé de recherche" position on functional biobased polymers for its Centre for Materials Forming (CEMEF, <http://www.cemef.mines-paristech.fr/>). The candidate is expected to perform fundamental and applied research in the area of biobased polymers, to participate to various teaching activities in MINES ParisTech, to be involved in tutoring of Post-Master students as well as in advising PhD students and to develop high-level research attracting international recognition, in collaboration with CEMEF researchers.

Deadline for applying: October 1st, 2017. More information at: <http://www.cemef.mines-paristech.fr/sections/actualites/poste-charge-recherche-h>

Contact: Dr. Tatiana Budtova / tatiana.budtova@mines-paristech.fr

"Textile and Polymer Science" course

18-29 September 2017 at the University of Innsbruck, Austria.

This course (7.5 ECTS Credits) is divided in three parts: basics, advance understanding and lab training. The first two parts teach a basic and later advance understanding in textile chemistry and physics as well as in polymer science. These lectures will be held in the morning in the first six days. The lab training and project work in small groups is placed in the afternoon and later the whole day. Within the framework of this training, the previously received knowledge will be applied. The lab training will be supervised by the institute's research staff based on actual research topics.

Location: Research Institute of Textile Chemistry and Textile Physics, Höchststraße 73, 6850 Dornbirn, Austria

Costs: € 1,500

Enrolment: until the 31 July 2017

For further information please visit our website <http://bit.ly/txpol> or contact us (Dr. Manian - Avinash. Manian@uibk.ac.at or [Weiterbildung@uibk.ac.at](mailto>Weiterbildung@uibk.ac.at)).

Participants have the possibility to get financial support from the Province of Vorarlberg. This sponsorships are individual related, hence we request you to get in touch with the relevant staff: <http://www.bildungszuschuss.at/de/zuschuesse/>

PhD studentships at the multidisciplinary Biopolymer Research Group based in the School of Applied Sciences at the University of Huddersfield

Applied Sciences

(Pharmaceutical Science/Chemical Science)

Start date: 10th of July 2017

Closing date for applications: 4th of June 2017

Interview date: 15th of June 2017

To apply, please go to: http://halo.hud.ac.uk/pg_r_onlineapps/ and complete the on-line application form, ensuring you select full-time PhD Chemistry. Please type 'LEO Pharma' in the 'Personal Statement' field. Please also email your CV, transcripts and two letters of recommendation in support of your application to Dr Gordon Morris (g.morris@hud.ac.uk) and Dr Alan Smith (a.m.smith@hud.ac.uk) and copy to PGR Administrator Fiona Cross (sasresearchadmin@hud.ac.uk). Please indicate in your email why you believe you are well-qualified for the project. For informal enquiries please contact Dr Morris or Dr Smith.

Open job positions at the InnoRenew Centre of Excellence in Slovenia

The following research group leader positions are currently open, and will remain open until filled:

Human Health in the Built Environment, Information and Computer Technologies used in the Field of Renewable Materials and Sustainable Buildings, Renewable Materials Composites, Sustainable Building with Renewable Materials, Experimental Design and Data Analysis

Other positions: Researcher (optimization of multivariate stochastic heterogeneous systems)

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EPNOE News

Johannes Ganster from Fraunhofer IAP now professor at BTU Cottbus–Senftenberg

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Dr. Johannes Ganster was appointed professor for "Biopolymers and Plastic Processing" at the Brandenburg University of Technology (BTU) Cottbus–Senftenberg. Within the framework of a joint appointment he will remain the director of the "Biopolymers" research division at the Fraunhofer Institute for Applied Polymer Research IAP in Potsdam–Golm. The professorship is closely linked with the Fraunhofer IAP Processing Pilot Plant for Biopolymers Schwarzheide.

Johannes Ganster has been studying polymers since the start of his professional career. He studied physics at TU Dresden and received his doctorate in 1990 from the Academy of Sciences in Teltow-Seehof on X-ray structure analysis of polymers in connection with molecular modeling. He continued to conduct research on the latter during his time abroad at Case Western Reserve University in Cleveland in 1994/95. There he created models of cellulose and its mechanical properties. Johannes Ganster has been working at the Fraunhofer IAP since 1990. He became head of the "Material Development and Structure Characterization" department in 2006 and of the "Biopolymers" research division in 2013. In this capacity he has spent the last ten years studying biobased plastics, polymeric compounds and composite materials with a focus on material development, polymer processing and structure characterization.



Prof. Johannes Ganster

This article was proposed by Prof. Dr. Dieter Hofmann, Fraunhofer Institute for Applied Polymer Research IAP, Germany



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EPNOE News

Twin-screw extrusion encapsulation of a hydrophobic model compound in a maltodextrin matrix using a compatibilizing biopolymer

Natalia Castro (a, b), Vanessa Durrieu (b), Christine Raynaud (a, b), Antoine Rouilly (a, b)
*a- Université de Toulouse, INP-ENSIACET, LCA (Laboratoire de Chimie Agro-industrielle),
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Email: Vanessa.Durrieu@ensiacet.fr

In the last decades, the incorporation of phytochemical or nutraceutical components into carbohydrate-based matrix using twin-screw extrusion has become a promising encapsulation technology. Carbohydrates (e.g. starch, maltodextrins) are the most recurrent materials employed in the food and pharmaceutical domains for the encapsulation of active components. However, the influence of all the process parameters on the properties of the final product remains a challenge and is quite difficult to estimate. Even though, there are now several groups of research interested in the elucidation of the effect of extrusion parameters (e.g. screw speed, screw geometry, and feed rates...) on the functional properties and microstructure of the final product, there is still a lot of things to explore and discover in this field. Therefore, in our study, special attention has been given to the incorporation of a hydrophobic model compound (medium chain triglyceride oil = MCT-oil), in a maltodextrin matrix with a compatibilizing biopolymer. A comparison between four different formulations and the influence of the MCT-oil content have also been investigated. Promising results were obtained comparing pea protein to a commonly used compatibilizer (octenyl succinate hydrolysate starch) especially concerning the physicochemical properties (i.e. hygroscopicity, glass transition temperature) of the delivery system and the encapsulation rates of the MCT-oil (up to 90% of encapsulation efficiency for a MCT-oil load of 12%). Moreover, twin-screw extrusion has proved to be a very suitable and versatile technology to be employed in this encapsulation domain.

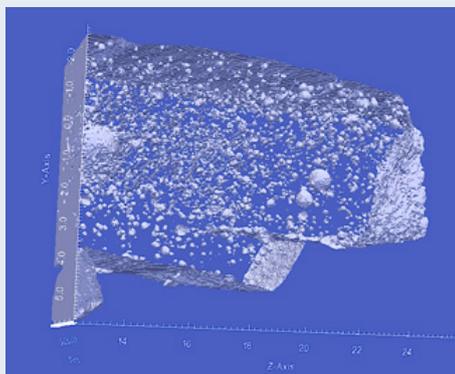


Figure 1. X-ray tomography image of formulation containing 8% (w/w) MCT-oil. Grey color corresponds to the border between two different phases

Acknowledgements:

Special thanks to Manuel Marcoux from the IMFT for the X-ray tomography analysis and Givaudan S.A.S France, for supporting this research project.

This article was proposed by INP Toulouse - ENSIACET, France



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EPNOE News

Scientific report on facts related to biobased and biodegradable plastics

Biobased plastics can be mechanically recycled just like conventional plastics and biodegradable plastics are not a solution to the plastic soup in the oceans. These are two key findings in the report 'Biobased and biodegradable plastics – Facts and Figures', released this week by Wageningen Food & Biobased Research. The report takes stock of scientific knowledge on biobased and biodegradable plastics, and focuses on the plastics used in the packaging industry.

There are many misunderstandings about biodegradable and biobased plastics, some of them quite persistent. As this makes the choice to switch to these materials difficult for companies, Wageningen Food & Biobased Research was commissioned by the Dutch government to carry out an inventory of the current scientific research into these plastics. "Companies and interest groups can state anything," points out Christiaan Bolck, programme manager for materials at Wageningen Food & Biobased Research. "This report is intended for those who wish to learn the facts. And it shows that the story is often more nuanced than it seems."

Terminology

The lack of clarity is partly due to terminology. The seemingly simple term 'bioplastic', for instance, normally refers to plastics made mostly from plant biomass, but has also been used as a synonym for biodegradable plastic. These are, however, two completely separate characteristics, and the report clearly distinguishes between them.

Facts, myths and nuance

The confusion surrounding biobased and biodegradable plastics is in part also due to assertions that lack nuance. For instance, saying that all plastic is bad for the environment is no more correct than stating that all bioplastics are green and good for the environment.

Such statements are, however, often made by both companies and environmental action groups in the market, and they eventually take on a life of their own. For example, we sometimes hear that the net CO₂ production of bio-based plastics barely differs from that of fossil-fuel plastics as any savings in oil are lost due to the energy consumption of the production process. "However, our report shows that the production of many biobased plastics does result in less net greenhouse gas emissions than traditional plastic," Bolck says.

Plastic waste

The report also records facts relevant to current debates about plastic packaging waste. For instance, it has been shown that most of the bio-based and biodegradable plastics currently on the market can be mechanically recycled just as easily as ordinary types of plastic, but also that biodegradable plastic is no panacea to the environmental problems caused by littering. Whether – and, especially, how fast – a type of biodegradable plastic is broken down by microorganisms depends largely on the environment in which it ends up. "There are biodegradable plastics that completely break down in the sea within a few months, but seabirds can still choke on a biodegradable plastic bag," Bolck explains.

The full English report is now available for download here. https://www.wur.nl/upload_mm/b/b/7/d2e0a12c-d43a-4b5d-9cc5-785f0cda24ff_170419%20Report%20Bio-based%20Plastic%20Facts.pdf

This article was proposed by Wageningen University, The Netherlands

For more information, please contact Christiaan Bolck - christiaan.bolck@wur.nl.



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Wageningen University & Research achieves breakthrough in organic acid production

Scientists from Wageningen University & Research, in association with oil and gas company Total, have developed a new process for producing organic acids via a biotechnological method. The discovery of the *Monascus ruber* micro-organism proved to be the crucial step in the new process. The fungus is extremely suitable for producing organic acids in large-scale industrial fermentation processes. Moreover, the polylactic acids which result from the process are bio-degradable and have a range of interesting new properties.

"Total contacted us based on its interest in the sustainable production of chemicals, including organic acids from biomass," says Professor Gerrit Eggink, account manager for the bilateral project. "These acids can be used as building blocks for polymers such as polylactic acids, among other things. The downside of the micro-organisms that are currently being used is that they grow at high pH levels. This makes the recovery of organic acids expensive and results in unwanted residual waste, including gypsum. Total asked us to find a micro-organism that grows at low pH levels and is also resistant to high concentrations of organic acids."

Strain improvement

Wageningen Food & Biobased Research scientists mapped the genome and metabolic routes of several promising micro-organisms in the Wageningen lab, as Ruud Weusthuis, the project leader, explains: "We tested a wide range of micro-organisms and eventually made a choice based on several properties: the growth speed at high acid concentrations, genetic accessibility, patentability, and safety. The *Monascus ruber* fungus stood out in a positive way. We then looked at which genes had to be switched off or, in contrast, introduced to trigger the production of lactic acid. At the same time, we applied laboratory evolution to enable the microorganism to perform under optimal conditions. This way, we managed to make the *Monascus ruber* grow at very low pH levels, while producing organic acids and tolerating high concentrations per litre."

Mutual trust

Eggink is proud of how the project with Total developed: "The cooperation was excellent. We took a wild organism from nature without knowing where it would lead, which demanded trust on both sides. During the project, we constantly looked at the optimal composition of the Wageningen team. At one point, we would need a microbiologist while at others we required an expert in genomics or a process engineer. We were able to switch efficiently between applied scientists from Wageningen Food & Biobased Research and fundamental scientists from the Bioprocess Engineering, Microbiology and Systems & Synthetic Biology university groups. Thankfully, we quickly concluded that *Monascus ruber* was the way to go and eventually succeeded in transforming it into a 'cell factory' which works quickly and efficiently in industrial conditions."

An added bonus is that *Monascus ruber* is a food-grade fungus used in the production of red rice. Registered as safe, the path to further development is wide open. The lab results will soon be tested on a pilot scale at Total's facilities in the United States, where Wageningen scientists will provide the necessary knowledge transfer. The years of research and development activities are protected by three granted patents.

This article was proposed by Wageningen University, The Netherlands

For more information, please contact dr. Ruud Weusthuis - ruud.weusthuis@wur.nl



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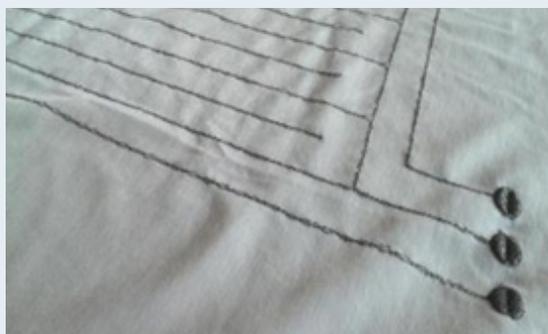
New innovation impulse for the textile industry through interdisciplinary research

The University of Innsbruck and partners aim to develop new and innovative technologies in composites, smart textiles, and technical textiles branches through the creation of the TCCV – Textile Competence Center Vorarlberg.

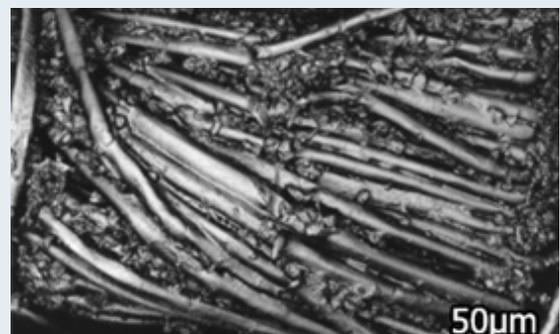


In April, the joint research K-project TCCV-Textile Competence Centre Vorarlberg kicked off with the presence of all project partners, including 7 research centers and 19 industrial companies. The vision of the TCCV project, initiated by the University of Innsbruck – Research Institute for Textile Chemistry and Textile Physics, is to further fields based in smart textiles, textile based composites, and technical textiles through an interdisciplinary network that supports cross-sector R&D. Sector specific expertise from textile producers and specialists in various fields will be combined with the solution-focused research of the joint research partners. The R&D will embrace fields including automotive, heavy machinery, construction, high performance electronics, sports equipment, personal protection, and medical applications.

Of particular interest are lightweight composites made of cellulose where intermingled fibers using cellulose and a thermoplast will be consolidated into composite structures. A further project will integrate sensors into textiles to increase the comfort and use of textiles in the assisted living and home-care industries. Additionally, in the sports sector, the functionalizing of lyocell surfaces will be explored to create more effective and environmentally friendly fabrics.



Embroidered washable sensor for incontinence detection for care homes.



Microcellulose on lyocell textile

This article was proposed by Thomas Bechtold, University of Innsbruck, Austria



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EPNOE Member's Scientific Publications

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

Most recent articles

Beaumont, M., König, J., Opiećnik, M., Potthast, A., Rosenau, T., Drying of a cellulose II gel: effect of physical modification and redispersibility in water. *Cellulose*, 24/3 (2017) 1199-1209.

Zutz, C., Chiang, Y.M., Faehrich, B., Bacher, M., Hellinger, R., Kluger, B., Wagner, M., Strauss, J., Rychli, K., Butyrate influences intracellular levels of adenine and adenine derivatives in the fungus *Penicillium restrictum*. *Microbiol Res* 197 (2017) 1-8.

Sumerskii, I., Zweckmair, T., Hettegger, H., Zinovyev, G., Bacher, M., Rosenau, T., Potthast, A., A fast track for the accurate determination of methoxyl and ethoxyl groups in lignin. *RSC Adv.* 2017, 7 (37), 22974-22982.

Hutterer, C., Kliba, G., Punz, M., Fackler, K., Potthast, A., Enzymatic pulp upgrade for producing high-value cellulose out of a Kraft paper pulp. *Enzyme Microb. Technol.* 102 (2007) 67-73.

Hutterer, C., Kliba, G., Fackler, K., Böhmendorfer, S., Potthast, A., Hyphenated Size Exclusion Chromatography to Study Residual Lignin in Alkali Extracted Xylans from Paper Pulps. *Curr. Chromatogr.* 4/1 (2017) 66-75.

Schedl, A., Zweckmair, T., Kikul, F., Henniges, U., Rosenau, T., Potthast, A., Aging of paper - Ultra-fast quantification of 2,5-dihydroxyacetophenone, as a key chromophore in cellulose, by reactive paper spray-mass spectrometry. *Talanta* 167 (2017) 672-680.

Rosenau, T., Potthast, A., Kosma, P., Hosoya, T., Henniges, U., Mereiter, K., French, A. D., 2,4'-2',4-Dianhydride of 3-keto-glucoside, a precursor to chromophores of aged, yellow cellulose, and its weak interactions. *Cellulose* 24 (2017) 1227-1234.

Sulaeva, I., Zinovyev, G., Plankeele, J.-M., Sumerskii, I., Rosenau, T., Potthast, A., Fast Track to Molar-Mass Distributions of Technical Lignins. *ChemSusChem* 10/3 (2016) 629-635.

Ahead of Print

Kluge, M., Veigel, S., Pinkl, S., Henniges, U., Zollfrank, C., Rössler, A., Gindl-Altmutter, W., Nano-cellulosic fillers for waterborne wood coatings: reinforcement effect on free-standing coating films. *Wood Sci. Technol.* 2017. DOI: 10.1007/s00226-017-0892-y

Stutzenstein, P., Bacher, M., Rosenau, T., Pfeifer, C., Optimization of Nutrient and Carbon Recovery from Anaerobic Digestate via Hydrothermal Carbonization and Investigation of the Influence of the Process Parameters. *Waste and Biomass Valorization* 2017. DOI: 10.1007/s12649-017-9902-4

Böhmendorfer, S., Hosoya, T., Röder, T., Potthast, A., Rosenau, T., A cautionary note on thermal runaway reactions in mixtures of 1-alkyl-3-methylimidazolium ionic liquids and N-methylmorpholine-N-oxide. *Cellulose* 2017. DOI: 10.1007/s10570-017-1257-2

Geroldinger, G., Tonner, M., Hettegger, H., Bacher, M., Monzote, L., Walter, M., Staniek, K., Rosenau, T., Gille, L., Mechanism of ascaridole activation in *Leishmania*. *Biochem. Pharmacol.* 2017, DOI: 10.1016/j.bcp.2017.02.023

Zweckmair, T., Hell, S., Klinger, K. M., Rosenau, T., Potthast, A., Böhmendorfer, S., Recycling of analytical grade solvents on lab-scale with a purpose-built temperature-controlled distillation unit. *Org. Process Res. Dev.* 2017. DOI: 10.1021/acs.oprd.7b00007



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EPNOE Member's Scientific Publications

At Jena University, Germany:

Sulfoethylated nanofibrillated cellulose: production and properties A. Naderi, A. Koschella, Th. Heinze, K.-C. Shih, M.-P. Nieh, A. Pfeifer, C.-C. Chang, J. Erlandsson Carbohydrate Polymers (2017) DOI: 10.1016/j.carbpol.2017.04.026

Adsorption studies of amino cellulose on cellulose K. Jedvert, Th. Elschner, Th. Heinze Macromolecular Materials and Engineering (2017), DOI: 10.1002/mame.201700022

Synthesis and characterization of novel water-soluble and bactericidal cationic starch esters A. Pfeifer, R. Hampe, Th. Heinze Starch/Stärke 2017, DOI: 10.1002/star.201700029

Meltable magnetic biocomposites for controlled release R. Müller, M. Zhou, A. Dellith, T. Liebert, T. Heinze Journal of Magnetism and Magnetic Materials 431 (2017) 289-293.

Mobility investigations of magnetic nanoparticles in biocomposites R. Müller, M. Zhou, T. Liebert, J. Landers, S. Salamon, S. Webers, A. Dellith, D. Borin, Th. Heinze, H. Wende Materials Chemistry and Physics 193 (2017) 364-370.

Fluorescent multifunctional polysaccharides for sustainable supramolecular functionalization of fibers in water O. Grigoray, H. Wondraczek, A. Pfeifer, P. Fardim, Th. Heinze ACS Sustainable Chemistry and Engineering 5 (2017) 1794-1803.

Cellulose modification and shaping – a review K. Jedvert, Th. Heinze Journal of Polymer Engineering (2017), DOI: 10.1515/polyeng-2016-0272



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News from outside the EPNOE Network

Position of Assistant/Associate Professor – Biopolymer Materials at Virginia Tech

Dept. of Sustainable Biomaterials at Virginia Tech (VT) seeks applications for the position of assistant/associate professor in the area of biopolymer materials. Tenure-track position will be at the Assistant/Associate Professor level, academic year (9 mo.) appointment. Position split ca. 50% fundamental or applied research and 50% teaching. Successful candidate is expected to develop internationally recognized research program in biomaterials from renewable resources, with major focus on biopolymers.

Candidates must have a Ph.D. in chemistry, polymer science, wood science, chemical engineering, biomaterials, materials science engineering, macromolecular science and engineering, or closely allied fields, with demonstrated experience in biomaterial science.

Candidate file review begins March 21, 2017, continuing until suitable candidate is identified. More information at: <https://listings.jobs.vt.edu/postings/73978>. Posting number TR0170016
Enquiries: contact Dr. Kevin Edgar at kjedgar@vt.edu

Who's who in the Bio-based Economy

An interesting site for finding relevant information about companies working in the biobased sector.
See : <http://www.bio-based.eu/iBIB/>

Final Programme of the 14th Conference of the European Industrial Hemp Association (EIHA)

7 - 8 June 2017 at the Maternushaus Cologne, Germany. The final programme is available at : <http://www.eiha-conference.org/programme>

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.

1000 abstracts have been received from 78 countries all over the world. More than 50% of the abstracts were submitted on biomass conversion and more than 10% were addressing industry topics, which show the large interest in technological development and industrial application. Biomass resources and bio-mass policies, markets and sustainability were also in focus with 19% and 16% of the abstracts received. More information on www.eubce.com

6th Biobased Performance Materials symposium

15 June 2017, Wageningen, the Netherlands

The 2017 edition of the BPM symposium will focus on the topic "How R&D on biobased materials leads to market entry". Key industry players from the entire value chain- ranging from agrifood to polymer processing companies, end application producers and users, will reflect on their R&D strategies. In the Biobased Performance Materials (BPM) research programme, companies and knowledge institutes from across the value chain are working together in developing high-quality materials based on biomass; materials that are being increasingly applied in practice. The research focuses on two types of materials: polymers produced by plants, and polymers from biobased building blocks produced via biotechnology or chemical catalysis. The BPM programme is partly financed by the Dutch Top Sector Chemistry and is led by Wageningen University & Research Food & Biobased Research.

For more information, contact

BPM Project Office

T: +31 317 480229

E: bpm.projectoffice@wur.nl

I : www.biobasedperformancematerials.nl



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9th European Symposium on Biopolymers: ESBP 2017

5-7 July 2017, Toulouse, France

ESBP 2017 will focus on recent developments in the area of biopolymers production, characterization and processing but also on the numerous applications of biopolymeric materials in a variety of fields, including medicine and medical devices, smart materials, coatings, personal care products, structural materials, agro food and agriculture, and many other areas.

The main spotlight of ESBP will be on Biopolymers like polyhydroxyalkanoates (PHA), cellulose, alginates, cyanophycin, poly phosphate, rubber (polyisoprene), etc.

3 April 2017: Abstract submission deadline

<https://esbp2017.sciencesconf.org/>

2nd International Bioeconomy Congress

12-13 September 2017 in Stuttgart, Germany

The congress will be an interdisciplinary meeting dedicated to systemic approaches of bioeconomy for experts from research and industry and stakeholders. Basic research will be covered in addition to implementation strategies for markets and society in order to develop future bioeconomy scenarios.
www.bioeconomy-congress.de

Biopolymers and Bioplastics 2017

7th International Conference and Exhibition on Biopolymers and Bioplastics

October 19-21, 2017 San Francisco, USA

For more details and submission of abstract please visit: <https://goo.gl/sqwJa2>