



# BioSC Newsletter December 2019

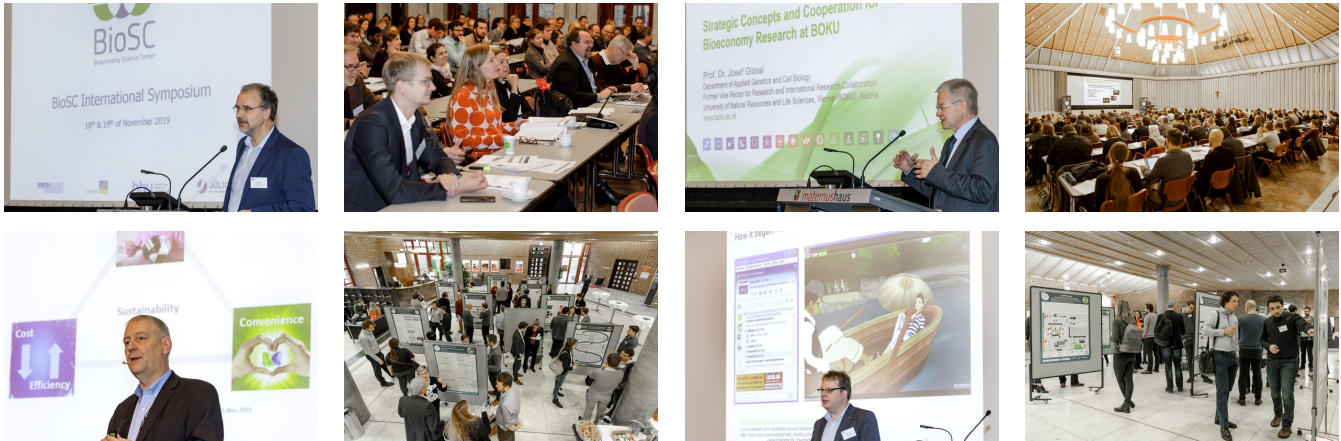


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# 4<sup>th</sup> International BioSC Symposium: Towards an Integrated Bioeconomy

On 18 and 19 November 2019 the 4th International BioSC Symposium took place in Cologne with about 180 participants. The speakers' contributions covered a broad spectrum from research to product development and market launch and reflected very different expertise and points of view. In addition to the presentations, 49 posters, three of which received awards, were points of contact for intensive scientific discussions. The conference has once again demonstrated the need for an integrated approach to bioeconomy and provided a platform for interdisciplinary exchange and future cooperation.



Photos: Forschungszentrum Jülich

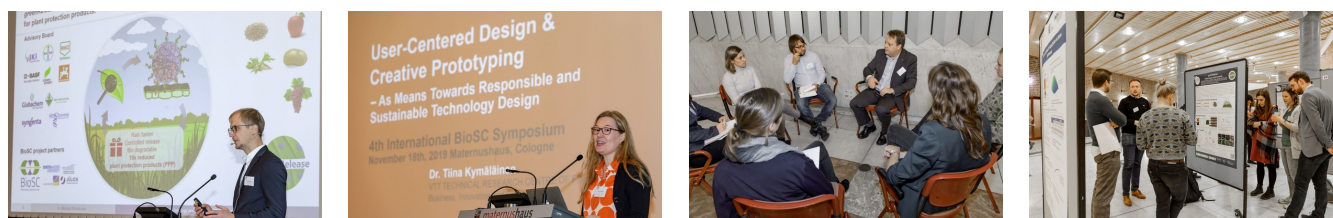
## Download Agenda

After the welcome address by the speaker of the BioSC, Ulrich Schurr (IBG-2, Forschungszentrum Jülich) the programme started with a keynote lecture by Frans Hermans from the [Leibniz Institute of Agricultural Development in Transition Economies \(IAMO\), Halle](#). He analysed the role of clusters in the development of the bioeconomy and stressed that policy strategies for cluster development are best conceived and implemented at the regional level. Prof. Josef Glössl then presented the concepts for bioeconomy research at the [University of Natural Resources and Life Sciences \(BOKU\) Vienna](#), which has long been based on the combination of natural sciences, engineering, economics and social sciences. In the third keynote speech, Thomas Müller-Kirschbaum presented the sustainability strategy of the [Henkel](#) company, which encompasses the entire value chain from raw materials through production, packaging and use to recycling.

The first poster session and the lunch break were followed by the lecture session „User experience and user-centered design methods in the bioeconomy“. [Rainer Harms \(University of Twente\)](#) presented how the early involvement of potential users can support the efficient and successful development of new products. [Michael Wustmans \(TIM, University of Bonn\)](#) presented new methods for involving users which were developed in connection with the BioSC FocusLab *greenRelease*. [Tiina Kymäläinen \(VTT Technical Research Centre of Finland, Tampere\)](#) presented the concept of „Science Fiction Prototyping“ which is based on the idea to describe the possibilities and effects of future technologies by creating science fiction stories. Afterwards, a one-hour World Café offered the participants the opportunity to discuss the topics of the lectures intensively with the speakers and other participants.

After the second poster session the evening lecture session „Innovative concepts for green value chains“ started. Moritz Wagner ([Department Biobased Products, University of Hohenheim](#)) explained that renewable raw materials are only sustainable under certain conditions, for example when perennial biomass plants are used in the context of a circular economy. Karel De Winter ([BioBase Europe Pilot Plant, Ghent](#)) used impressive examples to show how a biorefinery designed as a service facility can enable product developments for small and medium-sized companies. Stefaan De Wildeman presented the start-up company [b4plastics](#) (Maasmechelen), which develops and produces new biodegradable plastics based on renewable raw materials. Finally, results from the BioSC FocusLabs [Bio<sup>2</sup>](#) and [CombiCom](#) were presented. Nina Ihling ([BioVT, RWTH Aachen](#)) and Anita Loeschcke ([IMET, HHU Düsseldorf](#)) demonstrated the successful use of *Pseudomonas putida* for the production of biosurfactants from agricultural residues as well as for the production of high-value natural substances and their chemical derivatives.

Three poster prizes were awarded at the end of the first day. The winners are Alina Herrmann ([Bioinorganic Chemistry, RWTH Aachen](#)) with „Renewables to high-performance bioplastics by sustainable production ways“, Liudmyla Goncharenko ([Biotechnology, RWTH Aachen](#)) with „greenRelease: Technology advancement“ and Samer Habash ([Molecular Phytomedicine, University of Bonn](#)) with „The plant secondary metabolite nootkatone inhibits plant parasitism of cyst nematode“.



The second day of the symposium began with a keynote speech by Thomas Gries ([ITA, RWTH Aachen](#)), who highlighted the special challenges and opportunities for textile production in the transition to renewable raw materials. In the following lecture session „BioSC meets friends“, the three clusters in North Rhine-Westphalia were presented which are funded within the framework of the Excellence Initiative of the Federal Government. Cyril Stachniss ([University of Bonn](#)) introduced the [PhenoRob](#) cluster, which aims to develop digital methods for the efficient cultivation of crops. Andreas Weber ([HHU Düsseldorf](#)) presented the [CEPLAS](#) cluster which focuses on the cultivation of crop plants in view of current and future global challenges. Bastian Lehrheuer ([RWTH Aachen](#)) introduced „[The Fuel Science Center](#)“ in which new fuels based on biomass, CO<sub>2</sub> and hydrogen are developed. In all three lectures possible starting points for cooperation with the BioSC became clear.

The concluding lecture session dealt with the topic „(Regional) Implementation of the Bioeconomy“. Michael Schweizer ([Ilsfeld](#)) introduced the company [TECNARO](#) which develops and produces plastics based on biopolymers and natural fibres. Johannes Rupp ([Institute for Ecological Economy Research, Berlin](#)) presented a concept for the establishment of the bioeconomy in rural areas, with a local and decentralised creation of value which goes beyond the pure cultivation of biomass. Christian Klar ([IBG-2, Forschungszentrum Jülich](#)) presented the project „[BioökonomieREVIER](#)“, which aims at the development of the Rhenish lignite mining area into a model region for bioeconomy within the framework of the coal phase-out, involving civil society and other stakeholders. Finally, Sandra Venghaus ([IEK-STE, Forschungszentrum Jülich](#)) spoke about transformation processes and stakeholder discourses using the example of structural change in Rhenish lignite mining and presented first results from the BioSC project



## Transform2Bio.

The next International BioSC Symposium will take place on 16 and 17 November 2020 in Berlin, in the context of the 3rd Global Bioeconomy Summit. Further information will be announced in time on the BioSC homepage.



## 6<sup>th</sup> BioSC Forum with Presentation of the Supervision Award 2019

On November 19, 2019 the sixth internal retreat for BioSC members took place in Cologne. The projects from phase 2 of the NRW Strategy Project BioSC that had started in 2017 and 2018 were presented with short presentations. This was followed by workshops on the future opportunities for cooperation in different topic areas. Dr. Thomas Drepper (HHU Düsseldorf) and Dr. Stephan Noack (Forschungszentrum Jülich) were awarded the BioSC Supervision Award 2019.



Photos: Forschungszentrum Jülich

The short presentations from the NRW strategy project started thematically with the provision and degradation of biomass. Philipp Grande (Forschungszentrum Jülich) gave an overview of current results in FocusLab AP<sup>3</sup>, in which an integrated biorefinery concept for the sustainable conversion of biomass from perennial plants using OrganoCat technology is established and economically validated. Vera Göhre (HHU Düsseldorf) then presented the results of the SEED FUND project iBiomass, in which the pest resistance of new biomass plants was investigated using the example of maize mutants with modified lignocellulose composition. Felix Jakob (RWTH Aachen) presented the current developments in the FocusLab greenRelease. Here, a new platform technology is being developed that aims to reduce the use of herbicides and fungicides by applying these substances to the plants in microgel particles and releasing them in a controlled manner over a longer period of time.

Julia Otten (Forschungszentrum Jülich) presented results from the SEED FUND project [XyloSenS](#) in which biosensors were developed that enable the online detection of xylose as an alternative carbon source in small cultivation systems. The project is thematically linked to the FocusLab AP<sup>3</sup> and to the FocusLab [HylmPACT](#) which was subsequently presented by Dr. Stephan Noack (Forschungszentrum Jülich). HylmPACT develops a hybrid process consisting of microbial transformations, enzymatic reactions and chemical synthesis steps that makes it possible to produce various high-quality chemicals on the basis of lignocellulosic biomass. Sonja Herres-Pawlis (RWTH Aachen) informed about the SEED FUND project [R2HPBio](#) which is thematically linked to the FocusLabs HylmPACT and *greenRelease*. Here, biodegradable polymers are produced from platform chemicals made from renewable raw materials.

Nina Ihling (RWTH Aachen) presented the current status of work in the FocusLab [Bio<sup>2</sup>](#), in which a competitive biorefinery process is being developed for the production of next-generation biosurfactants from residual streams from the food industry. Anita Loeschcke (HHU Düsseldorf) presented the results of the FocusLab [CombiCom](#). The aim of CombiCom is to use synthetic biology to enable the sustainable production of natural substances and their chemical derivatives, to evaluate their efficacy, e.g. in plant protection, to investigate their acceptance by the general public and to develop strategies for their market launch. Ulrich Krauss (HHU Düsseldorf) presented the SEED FUND project [HySyn](#), in which selected examples of a recently discovered class of alkane/alkene synthesizing photoenzymes were expressed to test their biotechnologically relevant properties. Anna Joëlle Ruff (RWTH Aachen) presented the results of the SEED FUND project [QuantiP](#), which is developing a sensitive NMR methodology to quantify phosphate in algae, yeasts and plant material.

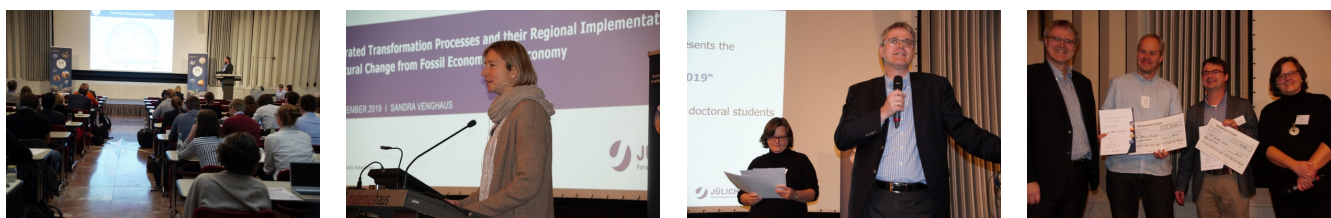


Finally, Sandra Venghaus (Forschungszentrum Jülich) presented the competence platform [Transform2Bio](#) which had been launched in September 2019. Transform2Bio examines the fundamental transformations of existing resource systems, value creation networks, business models, infrastructures and governance systems that are necessary for the establishment of a bioeconomy, using the example of the Rheinische Revier. There, the structural change initiated by the exit from coal, offers the opportunity to develop a regionally coherent bioeconomy. The establishment of an interactive stakeholder network is to enable the assessment of regional implementation options and create a basis for cooperation with the FocusLabs.

The short presentations were followed by workshops on opportunities for future collaboration within the BioSC. Under the headings "Sustainable plant production and resource management", "Biobased products and processes" and "Education", the participants developed new ideas and approaches for interdisciplinary research and training within the BioSC in groups of 8-15 persons.

At the end of the forum, the BioSC Supervision Award 2019 was awarded to Dr. Thomas Drepper from the Institute of Molecular Enzyme Technology (IMET) at HHU Düsseldorf and Dr. Stephan Noack from the IBG-1 Biotechnology at Forschungszentrum Jülich. With this award, the BioSC honours junior scientists and group leaders for excellent achievements in the supervision of doctoral candidates. It is endowed with 25,000 € each and is awarded in the frame of the NRW strategy project BioSC. Both nominations were supported by

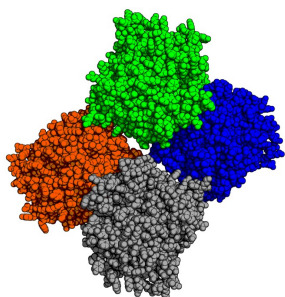
letters of recommendation from current and former doctoral students, who paid tribute to the outstanding commitment of the two prize winners.



## SEED FUND 2.0: New Projects

There were two SEED FUND calls in 2019 as part of phase 2 of the NRW BioSC strategy project. The OPEN Call was without thematic restrictions while the LINK call focused on topics related to the FocusLabs. Five projects were selected and started in September 2019.

### SEED FUND 2.0 - OPEN projects



#### **GlycoHype - Synthesis of glycosides by hyperthermophilic glycosidases**

**Project coordination:** Prof. Dr. Lothar Elling, Biotechnology, RWTH Aachen University

**Partners:**

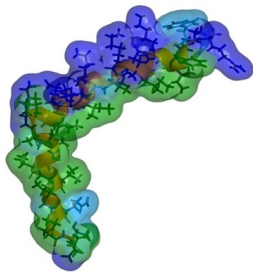
Dr. Andreas Knapp, Prof. Dr. Karl-Erich Jaeger, Molecular Enzyme Technology, HHU Düsseldorf

Prof. Dr. Jochen Büchs, Biochemical Engineering, RWTH Aachen University

Prof. Dr. Holger Gohlke, Pharmaceutical and Medical Chemistry, HHU Düsseldorf

The sustainable synthesis of industrially relevant glycosides, such as surfactants (alkylglycosides) for laundry and cosmetics formulations or building blocks (acrylate-glycosides) for the synthesis of polymers with anti-fouling properties and fragrance and aroma molecules in cosmetics and food (aryl-glycosides), is still not well developed. As biocatalysts, glycosidases represent an alternative for currently applied chemical catalysts in glycoside synthesis with expected significant reduction of waste. Especially, hyperthermophilic glycosidases are considered as favorable enzymes in terms of process parameters such as higher solubility of substrates at higher temperatures. In the project GlycoHype, expertise in the research fields of biotransformation, biochemical engineering, and computational structural biology will be combined to expand the scope of this enzyme for the synthesis of industrially relevant glycosides.

Duration: 11 months



## PepUse - Peptide adhesion promoters for user centered plant health applications

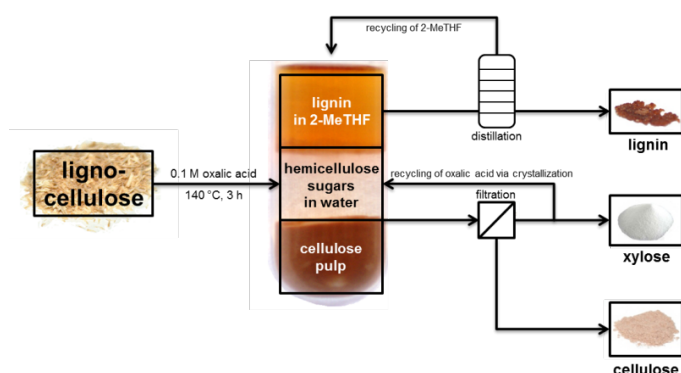
**Project coordination:** Dr. Mehdi Davari, Dr. Felix Jakob, Prof. Dr. Ulrich Schwaneberg, Biotechnology, RWTH Aachen University

### Partners:

PD Dr. Bernd König, Prof. Dr. Henrike Heise, Physical Biology, HHU Düsseldorf and Structural Biochemistry, Forschungszentrum Jülich  
 Dr. Michael Wustmans, Dr. Chad Baum, Prof. Dr. Stefanie Bröring, Technology and Innovation Management in Agribusiness, University of Bonn

Peptide adhesion promoters (anchor peptides, APs) that universally bind compound containers or antimicrobial peptides/enzymes specifically to plant surfaces are of high interest to design novel plant health/protection agents for a resource-efficient and sustainable production in agriculture. In order to enable the rational design of tailor-made adhesion promoters for application requirements, two key aspects have to be explored: (1) detailed definition of application requirements from a user (farmer) point of view, (2) understanding of the surface bound anchor peptide structure and its binding mechanism. With the envisioned results we enable the identification of novel applications areas (e.g. in seed coatings, root binding or microplastic management) and the development of efficient formulations. The PepUse team aims to promote translation research for follow up projects with agricultural industries employing for instance bifunctional peptides.

Duration: 12 months



## Lignin2Value - Valorization of lignin from agricultural residues for integrated biorefinery

**Project coordination:** Dr. Katja Koschorreck, Prof. Vlada Urlacher, Biochemistry, HHU Düsseldorf



**Partners:**

Dr. Philipp Grande, Prof. Dr. Ulrich Schurr, Plant Sciences, Forschungszentrum Jülich

Dr. Stephan Noack, Prof. Dr. Wolfgang Wiechert, Biotechnology, Forschungszentrum Jülich

For the development of economically feasible biorefinery concepts, value-added strategies for all three main components of lignocellulose – lignin, cellulose and non-cellulosic sugars – are needed. While for cellulose and non-cellulosic polysaccharides several valorization strategies have been proposed, the conversion of lignin into high-value products is still a crucial challenge, because lignin depolymerization into soluble mono- and oligolignols, convertible by microorganisms, is quite challenging due to its recalcitrance and complex structure. In the project Lignin2Value, OrganoCat-lignin fractions from agricultural residues will be treated with a set of naturally occurring lignin-degrading enzymes from bacteria and fungi. This will lead to the production of monomers which will first be utilized as carbon source for the growth of *Corynebacterium glutamicum* and later for production of succinic acid.

Duration: 12 months

## SEED FUND 2.0 - LINK projects

**HaloEnz - Enzymatic halogenation: Enzyme identification, characterization, application**

- linked to FocusLabs CombiCom, greenRelease and HylmPAct -

**Project coordination:** Prof. Dr. Holger Gohlke, Pharmaceutical and Medical Chemistry, HHU Düsseldorf

**Partners:**

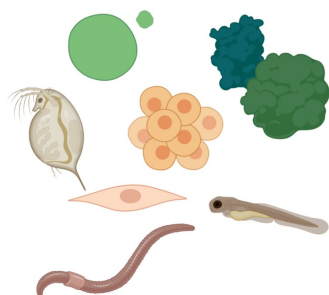
Dr. Thomas Claasen, Prof. Dr. Jörg Pietruszka, Bioorganic Chemistry, HHU Düsseldorf

Prof. Dr. Björn Usadel, Botany and Molecular Genetics, RWTH Aachen University

Organohalogen moieties occur frequently in pharmaceuticals and agrochemical products as halogen insertion can improve compound properties, including bioactivity. However, traditional synthetic halogenation methods are complicated by a lack of specificity and regioselectivity and/or require toxic and environmental-harmful halogen sources. Therefore, methods for the facile, selective, and environmental-friendly installation of halogen-substituents are required. The project HaloEnz aims at identifying, characterizing, and utilizing novel halogenase enzymes from secondary metabolism of algae, that way

introducing a novel strategy for exploiting natural resources towards halogenating enzymes and leading to the development of novel synthetic methods for the creation of new compounds with enhanced functions.

Duration: 24 months



### **GreenToxiConomy - Green toxicology for a green bioeconomy**

- linked to FocusLabs Bio2, CombiCom and greenRelease -

**Project coordination:** Dr. Sebastian Heger, Dr. Thomas-Benjamin Seiler, Dr. Martina Roß-Nickoll, Prof. Dr. Henner Hollert, Environmental Research, RWTH Aachen University

#### **Partners:**

Dr. Till Tiso, Prof. Dr. Lars Blank, Microbiology, RWTH Aachen University

Dr. Kerstin Schipper, Prof. Dr. Michael Fedbrügge, Microbiology, HHU Düsseldorf

Dr. Christian Bergs, Prof. Dr. Andrij Pich, Technical und Macromolecular Chemistry, RWTH Aachen University

Bioeconomy bears the potential to significantly reduce environmental pollution based on the integrated use of sustainable resources and processes. In this context, the toxicity of novel products is of uppermost importance. The integration of (eco)toxicological test systems in the development process of novel compounds enables an early identification of potentially harmful effects, and, thus, the focus of the product development on less toxic products and production pathways. In this project, a substance-specific and exposure-based proof-of-concept strategy should be developed for the first time within the BioSC. Two different product categories, biosurfactants as well as microgel-based pesticide release systems will be investigated. The results on the product toxicity obtained within this project can be used for further applications, such as Life Cycle Assessments or socioeconomic studies.

Duration: 24 months

## International BioSC Workshop „Sustainable solutions for closing nutrient loops in algae“

On 19 September 2019 at RWTH Aachen University, an international BioSC workshop on the treatment of wastewater with the aid of algae was held for the second time. The workshop was led by Tania V. Fernandez (Netherlands Institute of Ecology, Wageningen), Ladislav Nedbal (Forschungszentrum Jülich/BioSC) and Patrik Jones (Imperial College, London). Among the approximately 50 participants were algae scientists from Israel, the USA and numerous European countries.



Photos: Forschungszentrum Jülich

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The treatment of waste water with algae and the simultaneous recovery and utilization of nutrients is an increasingly important topic. Algae can accumulate large amounts of e.g. phosphate or nitrate and thus have the potential to purify agricultural waste water on the one hand and to be used as nitrogen and phosphate fertilizers on the other. At the second international BioSC workshop on this topic, various specific aspects were discussed.

The first lecture session was entitled „Microalgae-based wastewater treatment“. Tania V. Fernandez (Netherlands Institute of Ecology, Wageningen) presented an algae-based purification system for human waste water, focusing in particular on the problem of removing pathogens, pharmaceuticals and heavy metals that may not enter the fertilization of crops with algae biomass. Dean Calahan (Research Centre Jülich) presented new developments in Algal Turf Scrubber (ATS) technology. Algae grow in surface waters on large sieves and are harvested regularly. This efficiently removes inorganic nutrients from the water. Sema Sirin (University of Turku) presented the co-cultivation of microalgae in greenhouses. The algae utilize the inorganic nutrients from the effluents of cucumber, tomato and salad production and

accumulate lipids, which are then used for the production of biodiesel. Ania Escudero (Glasgow Caledonian University) presented the Europe-wide project Phos4You, which has already implemented the removal of phosphate from wastewater using green algae at various sites.

The second lecture session was dedicated to the topic „Microalgae physiology“. Alexei Solovchenko (Lomonosov Moscow State University) spoke about the mechanisms of absorption, storage and release of phosphate by microalgae and their genetic basis. Peter Mojzeš (Charles University, Prague) and Lu Gao (Research Centre Jülich/BioSC) showed the possibilities of Raman spectroscopy for the in situ detection of phosphate in individual cells. Yagut Allahverdiyevy-Rinne (University of Turku) presented impressive work on the optimization of photosynthesis in algae. She also presented a bioreactor with microalgae immobilized on nanocellulose, which offers numerous advantages over suspension culture, such as lower water consumption, better utilization of light and high cell density. Patrik Jones (Imperial College, London) discussed the combination of algae-based recovery of inorganic nutrients with autotrophic N<sub>2</sub> fixation.

The topic of the last session was „Microalgae application“. Jonas Christ (RWTH Aachen) presented a process for the recovery of phosphate from rapeseed press cakes using yeasts to synthesise food grade polyphosphate. Ilya Gelfand (Ben Gurion University, Israel) presented the results of field trials in which wheat was fertilized with algae biomass. She was able to show that this fertilization was accompanied by a more efficient use of water by the plants and a reduction of N<sub>2</sub>O emissions. Also with wheat fertilized with algae biomass, Diana Hofmann (Forschungszentrum Jülich/BioSC) used radioactive isotopes to investigate the distribution of phosphate from the algae in the roots and in the soil. In contrast to mineral phosphate, which binds quickly to soil minerals and is then no longer absorbed by the plant, phosphate from algae biomass is released continuously over a longer period of time and is therefore used more efficiently by the plants. Diana Reinecke-Levi (Research Center Jülich/BioSC) presented various successful examples of algae-based value creation in rural areas in Europe and developing countries.

Finally, Holger Klose (Forschungszentrum Jülich/BioSC) presented the project „Bioökonomie-REVIER Rheinland“, which sees the structural change initiated by the withdrawal of coal as an opportunity to establish a regionally coherent bioeconomy in the Rhineland region. In this context, he pointed out various implementation possibilities for algae technologies in North Rhine-Westphalia. In the final discussion, the participants agreed that the development of algae technologies in the future must involve various stakeholders such as farmers, business representatives, regulatory authorities and the public and that the technologies must be adapted to local and regional conditions.



## PhD Training 2019: Excursions and NRW PhD Day

In July and October, the PhD students in the FocusLabs had the opportunity to gain insights into the bioeconomy-relevant industry through excursions to BAYER Crop Science (Monheim) and B.R.A.I.N. Biotech (Zwingenberg). On 30 October, the fourth NRW PhD Day „Future bioeconomy“ took place in Düsseldorf-Neuss.



Photos: Forschungszentrum Jülich

At BAYER Crop Science and B.R.A.I.N. the PhD students were familiarised with the corporate strategy in the context of bioeconomy and were able to gain deeper insights into some departments through guided tours and lectures. However, both dates were also linked to the improvement of their own lecture competence and feedback on their own research work. The visit to BAYER was followed by a one-day independent workshop in which the PhD students, coached by Dr. Silvia Löhken, a proven communications expert, learned to communicate their research content briefly, concisely and specifically to a very heterogeneous audience. The feedback of the PhD students on this workshop was enthusiastic.

During the visit to B.R.A.I.N, some of the PhD students were able to apply their knowledge directly, as they had the opportunity to present their research to the company employees. Stefanie Brands (RWTH Aachen, Biotechnology), Carl Brehl (RWTH Aachen, Process Engineering), Fabienne Hilgers (HHU Düsseldorf, Molecular Enzyme Technology) and Jungho Lee (HHU Düsseldorf, Microbiology) presented their work in the FocusLab CombiCom. Lora Tsvetanova (University of Bonn, Food and Resource Economics) presented her results in the FocusLab AP<sup>3</sup>, Liudmyla Goncharenko (RWTH Aachen, Biotechnology) presented her work in the FocusLab greenRelease and Mohamed Labib (Forschungszentrum Jülich, IBG-1 Biotechnology) spoke about his results in the FocusLab HyImpAct. The subsequent lively discussion between the PhD students and the company employees was regarded by all participants as particularly helpful and constructive. All participants agreed that such a meeting should be repeated.

The NRW PhD Day 2019 took place in Düsseldorf-Neuss, organised by BioSC, CLIB, CEPLAS and the MPI for Plant Breeding Research Cologne. More than 60 PhD students discussed the topics „Value creation in

agriculture“ and „Molecules and active compounds“ with the speakers. In his welcoming address, Prof. Dr. Ulrich Schurr presented the pilot region „BioökonomieREVIER Rheinland“. Dr. Frederike Körber gave an overview of her work at Hild Samen GmbH and the importance of resistance breeding. Dr. Jens Uhlemann (BAYER Crop Science) informed about BAYER's bioeconomy strategies and explained the use of formulations e.g. of pesticides in the field.

Dr. Frank Kensy then explained the vision of b.Fab., a company founded in 2018. The company combines electrochemistry with biotechnology by generating formic acid with energy from different resources and using it for the production of feed additives, chemicals and biofuels. The last speaker of the day was Dr. Martin Bellof, who explained the importance of palm oil for the industry. In his work for the company Autodisplay Biotech, he deals with the recycling of residues from palm oil production and gave an overview of the associated challenges.

In the afternoon, the students were able to discuss their questions and ideas with the speakers in three World Café sessions. After the intensive discussions, Prof. Dr. Ingar Janzik thanked all participants for their active contribution.

## BioSC Lectures and Science Nights in Autumn 2019

**Dr. Christiane S. Farinas from the Brazilian agricultural research institute Embrapa, Prof. Wout Boerjan from the University of Ghent and Dr. Jochen Förster from the Carlsberg company were BioSC guest speakers in September and October. The BioSC was represented at the science nights of HHU Düsseldorf and RWTH Aachen University with lectures by Prof. Markus Pauly and Prof. Andreas Jupke.**



Photos: Forschungszentrum Jülich

The **22nd BioSC Lecture „Integrated use of biomass as a platform to obtain biofuels, nanocellulose and biofertilizers“** took place on 11 September at Forschungszentrum Jülich. Dr. Christiane S. Farinas from the Brazilian agricultural research institute Embrapa first presented cost-effective optimizations of the enzymatic digestion of lignocellulose-containing biomass, where two known

problems, the adsorption and inhibition of enzymes, are considerably reduced by the addition of soy proteins from press cakes and ash from sugar cane bagasse. In addition, she presented a process for the integrated recovery of sugars and nanocellulose from eucalyptus. In recent years, nanocellulose has increasingly been used as a material, for example for screens or solar panels. Finally, she presented the use of a nanocomposite consisting of starch, ground phosphate rock and *Aspergillus niger* for fertilization. The phosphate is solubilized by *A.niger* and released continuously over a longer period of time. The nanocomposite can also be loaded with other nutrients and, in initial experiments with ryegrass, produced plant growth comparable to that of chemical fertilizers.

The **23rd BioSC Lecture „From lager to wild yeast for beer production“** was held on 27 September as part of the Jülich Biotech Day. Dr. Jochen Förster from Carlsberg (Copenhagen) presented historical and current yeast breeding programmes from Carlsberg as well as current sustainability projects to reduce emissions and water consumption in beer production.

The **24th BioSC Lecture „Genetic engineering of poplar trees for the biorefinery“** on 17 October was also held at Forschungszentrum Jülich. Prof. Wout Boerjan from the University of Ghent presented work on the elucidation and targeted alteration of the biosynthetic pathway of lignin on *Arabidopsis* and poplars. The down-regulation of certain enzymes leads to a lower lignin content and a considerably higher sugar yield. However, field trials have shown that the plants are smaller because their water-conducting vessels are no longer stable enough and collapse. By using a promoter that is only active in the vessels, the lignin content of the vessels can be specifically normalised and the plants return to their normal size. Prof. Boerjan also presented results on changes in lignin composition, which also lead to an improved sugar yield in biomass digestion.

Lectures for the general public were also offered. At the 3rd **Night of Science at the HHU Düsseldorf** on 13 September, Prof. Markus Pauly gave a lecture for the BioSC on „Bioeconomy - A solution to mitigate climate change?“ After an introduction to the topic of climate change and fossil fuels, he spoke about the advantages, limitations and potential sustainability of the use of plant biomass. This year's **RWTH Science Night „Fünf vor zwölf“** took place on 8 November. Prof. Andreas Jupke gave a lecture on „Bioeconomy - Sustainable Use of Biological Resources“ for the BioSC. He explained the differences in the processing of crude oil and biomass and discussed the conditions under which the use of renewable raw materials can be sustainable. At the BioSC information stand, the research topics of the BioSC were presented and bioeconomy products that are already available on the market today were shown. The BioSC's information offerings at the science nights were well attended and met with broad interest.

## People in BioSC

**The BioSC was able to welcome two new Core Groups in the course of 2019. Prof. Dr. Thomas Gries heads the Institute of Textile Technology (ITA) at RWTH Aachen University. Prof. Dr. Silke Hüttel holds the Chair of Production Economics at the University of Bonn.**

### **Prof. Dr. Thomas Gries, Institute of Textile Technology at RWTH Aachen University**

The Institute of Textile Technology (ITA) at RWTH Aachen University is affiliated with the Department of Textile Technology in Mechanical Engineering and has set itself the goal of implementing the vision of a fully biobased textile value chain and thereby contributing to the establishment of a bio-economy. The research fields of the ITA related to the bio-economy are the development of manufacturing processes for bio-based and biodegradable polymer fibers and yarns, the development of natural fiber yarns, the development of textile structures (e.g. fabrics, braids, nonwovens) on the basis of natural fibers and bio-based polymer fibers, the development and processing of bio-based additives and the development of bio-based and biodegradable composite plastics. In addition to materials, process and product development, ITA is also engaged in the development of new business models and value chains for bio-based textile products to create public visibility and market access for bio-economy products. The research at ITA is practical and application-oriented in order to increase the acceptance in the industry and to enable rapid adaptation.



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**Photo: RWTH Aachen University**

### **Prof. Dr. Silke Hüttel, Chair of Production Economics, University of Bonn**

The Chair of Production Economics at the University of Bonn mainly works quantitatively on farm- and firm-level decisions, in particular on dis-investment decisions to analyse structural change in agriculture using microeconomic methods, farmland market analysis, land auction analysis, impact evaluation of policies



and practices that target at improving ecological outcomes and farm animal welfare of food production and measurement of firm-specific efficiency under risk. Thereby the group relies on methods for ecological and economic efficiency analysis (eco-efficiency).

Current research projects related to the bio-economy are:

- Causal impact evaluation of agri-environmental schemes
- Eco-efficiency of sustainable intensification practices in Germany
- The production economics of P-fertilization strategies in Germany
- Farmland markets in the EU: efficiency and regulation
- Asymmetries in farmland auctions



**Prof. Dr. Silke Hüttl**

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[Homepage of the Chair](#)

**Photo: University of Bonn**

## Events and Calls

### ***Events (selected)***

#### **IDEA-Workshop“Algenbasierte Wertschöpfungsketten und Schnittstellen zur Bioökonomie”**

16<sup>th</sup> January 2020, 9:00-17:00 h

Forschungszentrum Jülich, IBG-2, Building 6.2

Deadline for registration: 10<sup>th</sup> January 2020

[More information](#)

#### **BioSC Spotlight “Modular Biotransformations in a Circular Bioeconomy”**

5<sup>th</sup> February 2020, 10:30 - 17:00 h

NGP<sup>2</sup> - Center for Next Generation Processes and Products, Forckenbeckstr. 51, 52074 Aachen

Deadline for registration: 20<sup>th</sup> January 2020

[More information](#)

### **BioSC Workshop “Closing Cycles in the Plastics Bioeconomy”**

10<sup>th</sup> February 2020, 09:45 - 16:30 h

NGP<sup>2</sup> - Center for Next Generation Processes and Products, Forckenbeckstr. 51, 52074 Aachen

Deadline for registration: 27<sup>th</sup> January 2020

[More information](#)

### **NGP<sup>2</sup> Symposium “Next Generation Processes and Products”**

4<sup>th</sup>-5<sup>th</sup> March 2020

NGP<sup>2</sup> - Center for Next Generation Processes and Products, Forckenbeckstr. 51, 52074 Aachen

[More information](#)

### **MECP 2020 “Multistep Enzyme Catalytic Processes”, Aachen**

30<sup>th</sup> March - 2<sup>nd</sup> April 2020

Deadline for abstracts: 31<sup>st</sup> December 2019

Deadline for registration: 28<sup>th</sup> February 2020

[More information](#)

### **International Symposium on Horticulture, Stuttgart**

2<sup>nd</sup> - 6<sup>th</sup> June 2020

Deadline for abstracts: 15<sup>th</sup> December 2019

[More information](#)

### **ELB 2020 “Exploring Lignocellulosic Biomass: Challenges and opportunities for bioeconomy”, Reims (France)**

23<sup>th</sup> - 26<sup>th</sup> June 2020

Deadline for abstracts: 14<sup>th</sup> February 2020

[More information](#)

### **International Conference “Fuel Science - From Production to Propulsion”, Aachen**

23<sup>th</sup> - 25<sup>th</sup> June 2020

Deadline for abstracts: 12<sup>th</sup> January 2020 (extended abstracts: 19<sup>th</sup> April 2020)

[More information](#)

**10. ProcessNet-Jahrestagung und 34. DECHEMA-Jahrestagung der Biotechnologen 2020, Aachen**

21<sup>st</sup> - 24<sup>th</sup> September 2020

[More information](#)

***Calls (selected)***

**Call for Future Food Fellowship**

Deadline for application: 31<sup>st</sup> March 2020

[More information](#)

**Förderinitiative GO-Bio**

Deadline for application: 15<sup>th</sup> February 2020

[More information](#)