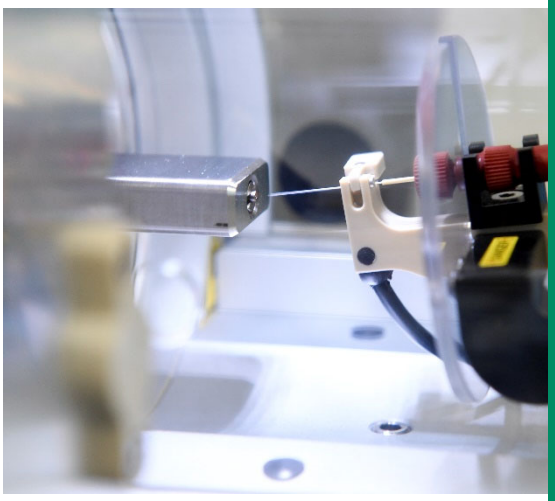
UNIVERSITÄT BIELEFELD

CeBiTec Center for Biotechnology

CeBiTec – Quarterly

Autumn 2021



- Advisory Board Meeting 2021
- The Future of the de.NBI Network and the German ELIXIR node
- EUROMAT Conference presentation of EU-Project on heterogeneous chemocatalysts with ROBOCATING 3D-printed material
- Former CeBiTec employee and Bielefeld University student Dr. Boas Pucker appointed Junior Professor at TU Braunschweig
- 11th International CeBiTec Research Conference Bielefeld on intensification of biocatalytic processes
- Inauguration of the CeBiTec Wall of Fame
- 7th CeBiTec Retreat held as an in-person meeting at Haus Düsse
- Lecture series "Forum Offene Wissenschaft" in winter semester 2021/22 focuses on biotechnology
- Two CeBiTec PhD students co-organized the 6th NRW PhD Day "Future Bioeconomy"
- 10th International CeBiTec Research Conference (ICRC2021) held as an in-person meeting at the ZiF

Advisory Board Meeting 2021

From the 5th to 6th of July 2021, the 8th assembly the CeBiTec Advisory Board (Figure 1) was held as a hybrid meeting to discuss the CeBiTec`s future strategic direction besides evaluating recent achievements. It was the first advisory board meeting for Prof. Dr. T. Erb, who succeeded Prof. Dr. Ralf Reski as an Advisory Board member in 2020. After a summarizing presentation about important past and future activities, given by the Scientific Director Prof. Dr. Olaf Kruse, representatives of the two research areas “Large Scale Genomics and Big Data Bioinformatics” and “Metabolic Engineering of Unicellular Systems and Bioproduction” addressed the collaboration of the CeBiTec with the new medical faculty in a shared *omics* core facility (apl. Prof. Dr. Jörn Kalinowski), the future direction of bioinformatics research at the CeBiTec (Prof. Dr. Jens Stoye), a new grant initiative emerging from the former CLIB competence center biotechnology (Prof. Dr. Volker Wendisch) and the future development of biocatalysis research at the CeBiTec (Prof. Dr. Norbert Sewald). Presentations were followed by intense discussions between board members, principal investigators and the Vice-Rector of Bielefeld University, Prof. Dr. Martin Egelhaaf.

Based on these discussions, the Advisory Board recommended a catalogue of strategic measures to the rectorate, which should help tackling future challenges and concluded the report by emphasizing the enormous benefit that the

CeBiTec represents for Bielefeld University, referring to its high national and international reputation.

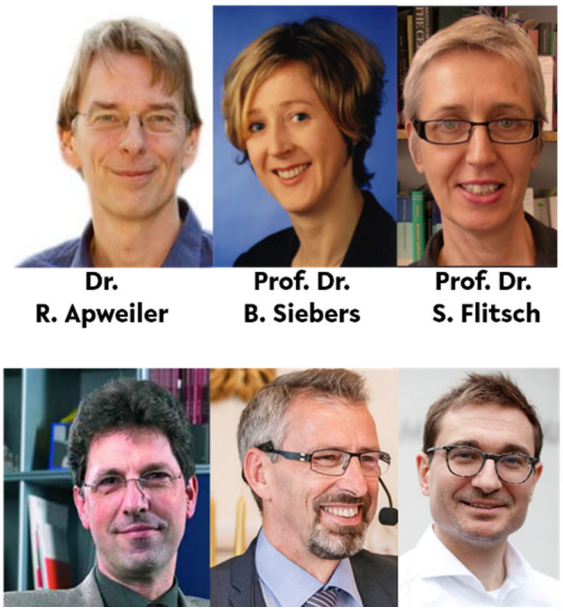


Figure 1: The CeBiTec Advisory Board

Member affiliations: **Dr. R. Apweiler:** EMBL – European Bioinformatics Institute Cambridge; **Prof. Dr. B. Siebers**: University of Duisburg-Essen, Faculty of Chemistry, Molecular Enzyme Technology and Biochemistry; **Prof. Dr. S. Flitsch**: The Manchester Institute of Biotechnology; **Prof. Dr. Dr. T. Lengauer**: Max-Planck Institut für Informatik, Research Group Computational Biology; **Dr. R. Kelle**: Evonik Nutrition & Care GmbH; **Prof. Dr. T. Erb**: Max Planck Institute for Terrestrial Microbiology

(Olaf Kruse & Lutz Wobbe)

The Future of the de.NBI Network and the German ELIXIR node

Since 2015, CeBiTec has been hosting an extensive BMBF project concerning the operation of two administration offices, one for the German Network for Bioinformatics Infrastructure (de.NBI) and the other for the German node of the European bioinformatics infrastructure organization ELIXIR. According to a decision of the German government, both the de.NBI network and the German ELIXIR node should permanently be integrated into the Helmholtz Research Center Jülich starting at the beginning of the next year. For this purpose, it is planned to establish a corresponding institute at the Research Center Jülich with a branch at Bielefeld University.

The staff of the two administration offices will be taken over by Research Center Jülich, but will continue to work at the Bielefeld branch. On invitation of the Rector of Bielefeld University, a delegation of the Research Center Jülich visited Bielefeld University on August 17, 2021 and was informed in particular about the activities of the two administration offices. For this purpose, a poster presentation (Figure 2) was held in the foyer of the CeBiTec building, which presented on the basis of 12 posters the activities of the two offices in the areas of service, training, cloud computing and public relations.

Figure 2: Poster session held in the Foyer of the CeBiTec building

In addition, the structure and management of the de.NBI network and ELIXIR Germany were also presented. This poster session was additionally used to show further de.NBI activities at Bielefeld

University. Thus, both the work and technical equipment of the de.NBI cloud site for the analysis of large amounts of data in the life sciences and the services of the Microbial Bioinformatics unit were presented in three posters each. The poster presenters subsequently reported that the overall presentation of the posters has attracted great interest. The plan to establish a branch office of an institute of Forschungszentrum Jülich in Bielefeld has thus received an enormous boost.

(A. Pühler)

EUROMAT Conference presentation of EU-Project on heterogeneous chemocatalysts with ROBOCATING 3D-printed material

Within the EU-programme "Innovative Training Networks (ITN) – European Industrial Doctorates (EID)" as a part of the H2020 Marie Skłodowska-Curie Actions (MSCA), the network project "INTERfaces - Heterogeneous biocatalysis reaction cascades training network" is running in collaboration with 12 non-academic partners ranging from high-tech SMEs to large producing companies in combination with 9 academic institutions including Bielefeld University (grant agreement no. 860414). One of the doctoral course students, Seika Ishii, who is jointly supervised by Bielefeld University (being represented in INTERfaces by CeBiTec and the Chair of Industrial Organic Chemistry and Biotechnology as its member) and by the Spanish start-up AENEAM S.L., has recently presented her research work at EUROMAT 2021 conference.

Seika Ishii`s work within the last months was conducted at AENEAM S.L. and focused on the preparation of porous solid oxide-based material scaffolds for chemo-/biocatalysts immobilization. Based on AENEAM`s competencies, which are centered on the production of advanced solid oxide materials, Seika Ishii succeeded to produce inorganic scaffold samples (Figure 3) and to functionalize them with a specific chemocatalyst.

Figure 3. 3D-printed ceramic monoliths for catalysts immobilization.

In the future, the use of such types of heterogenized catalysts in combination with enzymes should then enable the realization of chemoenzymatic cascades, for which the applied homogeneous chemo- and biocatalysts are not compatible with each other.

Further advantages provided by such an approach of using heterogenized catalysts are their easy recovery from the reaction mixture by simple filtration and, dependent on their stability, the re-use in further reaction cycles, thus improving the economy of chemoenzymatic processes.

In the conference talk (Figure 4), Seika Ishii reported the production of porous scaffolds based on an α-Al_2O_3- and yttrium-stabilized zirconia composite using a 3D-printing (robocasting) technique.

The robocasting pastes were based on aqueous systems and processing aids with low ash content, making this route environmentally

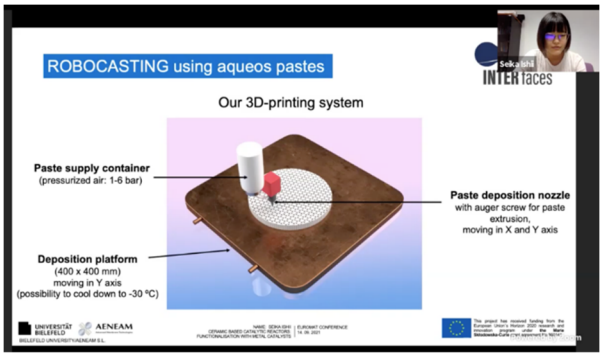


Figure 4. A screenshot from EUROMAT 2021 online conference presentation.

friendly and with negligible solid oxide composite contamination effect. Such a procedure enables a high control over solid oxide compositions as an important parameter in case of sensible catalyst systems. The produced porous scaffolds were functionalized with various metal catalysts and the obtained heterogeneous systems were tested in a Wacker oxidation reaction as one key step within a currently studied chemoenzymatic cascade. The catalyst screening revealed a heterogeneous system, which exhibited superior catalytic activity compared with the conventional homogeneous system, especially when operating at low catalyst loading. Furthermore, Seika Ishii reported the ultimate upgrade within AENEAM S.L. robocasting system, where the 3D printing technique was enhanced by adding the freeze casting option. By means of this route, the liquid phase of the robocasting paste is frozen upon deposition and removed subsequently through lyophilization.

The formation of ice dendrites introduces lamellar porosity within final scaffold microstructure and prevents the formation of drying shrinkage effects in the case of pastes with high content of liquid phase.

(S. Ishii, J. Gurauskis & H. Gröger)

Former CeBiTec employee and Bielefeld University student Dr. Boas Pucker appointed Junior Professor at TU Braunschweig

The former student and Bielefeld University / CeBiTec employee Dr. Boas Pucker was appointed as Junior Professor at TU Braunschweig on August 24th 2021 (Figure 5).


Figure 5: Appointment of B. Pucker as Junior Professor at TU Braunschweig
From left to right: **Prof. Christoph Jacob**, dean of the Faculty of Life Sciences of TU Braunschweig; **Jun.-Prof. Boas Pucker**; **Prof. Angela Ittel**, president.

He holds a doctoral degree in biology from Bielefeld University awarded in 2019 for extensive work in plant genomics. This work was supervised by Prof. Dr. Bernd Weisshaar and Prof. Dr. Jörn Kalinowski. Boas' projects at the CeBiTec targeted the construction of plant genome sequences based on long read sequencing technologies as well as mapping-by-sequencing approaches.
From 2016 to 2019, he advised the iGEM teams at the CeBiTec. Since April 2020, he worked as a postdoctoral researcher at the Department of Plant Sciences of the University of Cambridge on the evolution of plant pigments in the Caryophyllales. Now, he is establishing a new research group designated 'Plant Biotechnology

and Bioinformatics' at TU Braunschweig. He plans to work on specialized plant metabolites with a focus on biomedical applications. Several scientific collaborations with CeBiTec members are still ongoing.

The CeBiTec sees itself as a research incubator and is proud to support the careers of young scientists. The former colleagues at CeBiTec and Uni Bielefeld say goodbye to an exceptional colleague and good friend, and we hope for fruitful networking in the future.

(B. Weisshaar & J. Kalinowski)

11th International CeBiTec Research Conference Bielefeld on intensification of biocatalytic processes

The 11th international CeBiTec Conference on 'Intensifying Biocatalytic Processes – From Enzyme and Material Design to Industrial Applications' (IBPRO2022) will be held from March 28-30, 2022, with a focus on the theme of strategies to intensify biocatalytic processes.

This conference will be co-organized by the research group "Industrial Organic Chemistry and Biotechnology" as a member of the CeBiTec and the EU-Project (H2020-MSCA-ITN) "INTERfaces" (to which the CeBiTec also contributes with a research project). The program of IBPRO2022 consists of four sessions with lectures from invited speakers coming from both academia and industry as well as oral presentations. In addition, poster sessions will take place. The goal of this conference is to provide a platform for presenting and discussing new findings in the areas of biocatalysis, material sciences and bioprocess development. The four sessions are entitled "Enzyme discovery and design for industrial applications", "Heterogenization of biocatalysts with tailor-made materials", "Intensification of heterogenized bioprocesses: Multicatalytic cascades and flow biocatalysis" and "Out-of-the-box methods: Future trends in biocatalysis". The invited speakers are Prof. Rebecca Buller (Zurich University of Applied Sciences), Dr. Erika Tassano (Novartis), Dr. Jan von Langermann (University of Rostock), Dr. Alessandra Basso (Purolite), Prof. Francesca Paradisi (University of Bern), Dr. Joseph Hosford (GlaxoSmithKline), Dr. Martin Schürmann (InnoSyn) and Prof. Bernhard Hauer (University of Stuttgart).

Further information about this conference as well as registration details are available in the internet through this link.

(H. Gröger)

Inauguration of the CeBiTec Wall of Fame

On the 16th of July 2021, Prof. Dr. Alfred Pühler and Prof. Dr. Thomas Noll were honoured by having their photographs installed at the wall of fame next to the director`s office on level G2 of the CeBiTec building. These two photographs are the founder pictures of the new wall of fame to acknowledge the merits of former scientific directors of the CeBiTec. The former directors received congratulations from the current scien-

Figure 6: A. Pühler and T. Noll being honoured for their merits as former CeBiTec Scientific Directors.

tific director, Prof. Dr. Olaf Kruse, members of the CeBiTec Research Board and the CeBiTec administration.

(Olaf Kruse & Lutz Wobbe)

7th CeBiTec Retreat held as an in-person meeting at Haus Düsse

After its cancellation due to the pandemic in 2020, the CeBiTec Retreat could fortunately take place from the 6th to 7th of 2021 at *Haus Düsse,* the seat of the *Landwirtschaftskammer NRW* (Chamber of Agriculture of North Rhine-Westphalia), in Bad Sassensdorf. Application of strict hygiene rules allowed 60 participants to gather in the lecture hall (Figure 7). During the two-day meeting, 22 PhD students from 13 distinct CeBiTec research groups presented their results and progress followed by intense discussions. In addition, the new CeBiTec member Jun.-Prof. Dr. Romy Schmidt gave an intriguing overview about the research topics of her group.

Figure 7: View in the lecture hall at Haus Düsse.

As usual, the Monday night get-together with cold drinks and salty snacks created a pleasant environment for networking. Next year's retreat is already being planned and will again take place at *Haus Düsse*.

(L. Wobbe)

Lecture series "Forum Offene Wissenschaft" in winter semester 2021/22 focuses on biotechnology

In the winter semester 2021/22, the "Forum Offene Wissenschaft" will focus on the lecture series "Is biotechnology revolutionizing society? Opportunities, Risks, Acceptance".
This lecture series refers to the topic of bioeconomy of the current Science Year of the German government.
The bioeconomy has set itself the task of replacing the petroleum-based economy with the use of biological resources. The heart of the bioeconomy is biotechnology.

Figure 8: Title slide of the lecture.

The introductory lecture to the series "Forum Offene Wissenschaft" on October 4, 2021 was given by Alfred Pühler, Senior Research Professor at the Center for Biotechnology (CeBiTec) at Bielefeld University. In his lecture entitled "Biotechnology uses genetic engineering and omics data", he provided information on the brilliant development of biotechnology in the last 40-50 years. With the help of genetic engineering, it has been possible to develop high-performance microbial strains and cell cultures whose products find a wide range of applications in agriculture, medicine and industry. A breakthrough is represented by omics technologies, which help to determine the overall events in living cells. The omics data generated provide the basis for cell-based systems biology. The production of biotechnological substances can thus be understood in detail and contributes to the optimization of organisms used for biotechnological purposes.

The latest development is synthetic biology, which builds on systems biology and provides a new direction for future biotechnology.

Synthetic biology gives rise to the hope that in the future it will be possible to produce any complex substances in simple, easy-to-handle microorganisms. This development of biotechnology in the last decades was communicated by A. Pühler based on several projects, including some of his own.

The lecture made clear that the CeBiTec at Bielefeld University has been involved in the rapid development of biotechnology. With the help of a large DFG project (2000 - 2007), the development of bioinformatics was advanced. A BMBF-funded sequencing project (2001 - 2010) enabled the analysis of bacterial genomes of organisms of biotechnological importance. Currently, two long-term industrial projects are being carried out on the production of acarbose, an active ingredient against type II diabetes, and xanthan gum, a thickening agent for use in the food, cosmetics and pharmaceutical sectors. The CeBiTec is also coordinating a major project on behalf of the BMBF aimed at establishing a bioinformatics infrastructure in Germany. This project is designed to help researchers in the life sciences to analyse large data sets.

Other speakers from CeBiTec are scheduled to speak in the ongoing series of lectures at the "Forum Offene Wissenschaft", highlighting the prominent position of the Center for Biotechnology.

Norbert Grotjohann will deal with the transfer of biotechnological knowledge to pupils, Karsten Niehaus will report specifically on the biotechnological production of insulin, and Olaf

Kruse will talk about the use of algae as green cell factories.

(A. Pühler)

Two CeBiTec PhD students co-organized the 6th NRW PhD Day "Future Bioeconomy"

Leonie Benninghaus and Vanessa Göttl from the Wendisch lab participated in the organization of the 6th NRW PhD Day "Future Bioeconomy", a full-day virtual event held on September 28th, 2021 via Zoom and Gathertown. The aim of the NRW PhD day is to bring together young PhD scientists from different scientific fields and locations in NRW to provide them with a framework for networking and discussion about future developments and career paths in the bioeconomy.

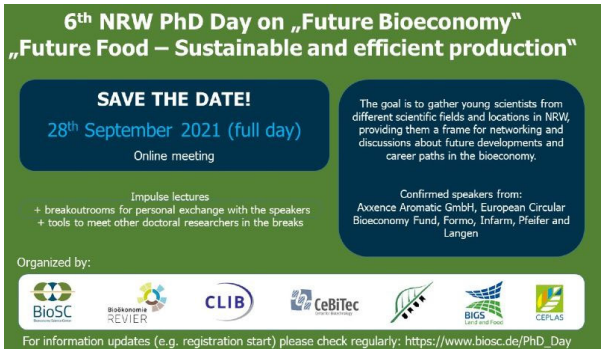


Figure 9: Announcement flyer of the 6th NRW PhD Day (https://www.biosc.de/PhD_Day)

The 6th BioSC NRW PhD-Day was co-organized by several stakeholders of bioeconomy and bioeconomy education including BioSC, CLIB and CeBiTec.

This year the topic was on "Future Food - sustainable and efficient production", were the PhD students should see how far-reaching the relevance and the possibilities of the topic "Bioeconomy in the Food Industry" is for science and industry. The meeting was opened by welcome addresses from the Ministry of Science and Culture NRW (Dr. Sonja Brandt) and the board of the Research Center Jülich (Prof. Dr. Frauke Melchior).

The invited speakers discussed “Options to reduce the carbon footprint of food production” (Dr. Ananya Manna, European Circular Bioeconomy Fund), “Indoor urban farming” (Dr. Katarzyna Wolińska-Griese, Infarm), “Innovating food from field to fork” (Sören Schilasky, Pfeifer & Langen), “Combining biotechnology and food for sustainable cheese production” (Dr. Britta Winterberg, Formo) and “The role of biotechnology for natural flavour ingredients” (Dr. Peter van der Schaft, Axxence Aromatic).

The discussion of the invited speakers was lively and the questions addressed by the PhD students ranged from hurdles for bioeconomy developments, to CO_2 footprints and to the career paths of the speakers. Overall it was an excellent chance for all participants to connect and to discuss.

(L. Benninghaus, V. Göttl & V. Wendisch)

10th International CeBiTec Research Conference (ICRC2021) held as an in-person meeting at the ZiF

Chaired by Prof. Dr. Ben Hankamer (The University of Queensland, AUS) and Prof. Dr. Patrik Jones (Imperial College London, GBR) , the 10th International CeBiTec Research Conference

(ICRC2021) was held from Sep. 13th to Sep. 15th 2021 at the Center for interdisciplinary research (ZiF).

Prof. Dr. Olaf Kruse headed the local organization team and was the host for fifty-seven participants from seven countries, who had registered to the conference to discuss prospects and challenges for the development of algal biotechnology.

Figure 10: Fifty-seven participants from seven countries registered to the ICRC2021 conference.

For many, this was the first in-person conference since the beginning of the SARS-CoV-2 pandemic and strict safety precautions were in place to guarantee a safe environment for all participants. An additional live stream of the event was implemented to provide external access for registered participants who could not join the conference in person.

Excellent oral presentation of eleven invited and seventeen selected speakers, accompanied by fourteen poster presentations, provided deep insights into top-level research in the field of advanced green biotechnology.

Lively discussions in- and outside of the lecture hall offered many opportunities for the exchange of ideas and the development of new research collaborations.

Amongst the many highlights, the *CeBiTec Distinguished Lecture* of Prof. Dr. Sarah E. O´Connor (Max Planck Institute for Chemical Ecology, Jena) stood out, who provided impressive insights into new ways of harnessing the chemistry of plant natural product biosynthesis.

Figure 11: Prof. Dr. Sarah E. O´Connor from the Max Planck Institute for Chemical Ecology in Jena gave the CeBiTec Distinguished Lecture on new ways of harnessing the chemistry of plant natural product biosynthesis.

The *Young Researcher Award 2021* was given to Jun.-Prof. Julie A. Z. Zedler (Friedrich Schiller University, Jena) for her work on scaffolding and co-localisation of heterologous enzymes in cyanobacteria.

Figure 12: Jun.-Prof. Julie A. Z. Zedler from Friedrich Schiller University in Jena won the Young Researcher Award for her work about scaffolding and co-localisation of heterologous enzymes in cyanobacteria.

After three days of intense scientific exchange and many stimulating debates, the farewell address of Prof. Kruse concluded the ICRC2021 conference.

(J. Mussgnug & O. Kruse)

Impressum

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