Welcome from the Chair of the 4th Green & Sustainable Chemistry Conference.

With eager anticipation we look forward to the fourth edition of the Green & Sustainable Chemistry Conference. 4 years ago, when we thought about having such a conference for the first time, we were a bit reluctant and it felt quite like an adventure. Why another Green Chemistry conference? We entitled our conference "Green and Sustainable Chemistry Conference". Isn't green chemistry enough? Isn't it actually the same? Many green chemistry conferences have adopted this name in the meantime albeit their focus is still on green chemistry. The same holds for some academic institutions and departments and working groups of academic societies. Sustainable Chemistry seems to be fashionable nowadays.

Sustainable chemistry is system thinking. Service and function are the two main demands, not the chemical product itself. The very first question is: Do I need a chemical at all, or does a proper design, e.g. of buildings or textiles or vehicles, allow to omit certain chemicals? Or what should chemistry contribute to a system-entered approach, e. g. mobility, housing and living by using less chemical products? Sustainable chemistry also takes into account alternative business models as well as social, ethical and economic issues which are often linked to stakeholders along the life cycle of a chemical product. These points are important with regard to the service and function needed. However, they are neither addressed by the chemical science itself nor by the 12 principles of green chemistry. Sustainable chemistry takes into account that green does not mean sustainable per se. Renewables need resources too and are linked to energy consumption, possibly increase substance and materials flows and end of life issues beyond the products made of them including economical and societal issues. Metals for example are not renewable and may be dissipated with products and during recycling. Mining may be linked to child labor. Catalysis saves some activation energy but cannot rule out thermodynamics. That does not mean that we do not need green chemistry at all. Quite to the contrary, there will always be a need for chemical products. These have to be synthesized using less energy, less resources, being less toxic and generate less waste in synthesis and as products at the end of their lives. Sustainable chemistry includes green chemistry but looks on the need and usage of chemical products, too. As such, it embraces green chemistry but also goes far beyond it.

We need a broader and better understanding of what green, circular and sustainable means to allow for a true sustainable contribution and effective role of chemistry and pharmacy in sustainability and a better future. Such a broader view also allows to get a better understanding of circular economy, to reduce product, material and substance flows and to better understand its implications and limitations beyond chemistry on the one hand and economy on the other. Coming up with fewer chemicals for a certain service does not mean that fewer chemists will be needed in the future. On the contrary, we will need more chemists, among them more who can answer questions raised by sustainability and sustainable chemistry. Such chemists need a sound background in green chemistry but also increasingly an education that allows them to look or even to jump over the fence and to gasp this opportunity. Without chemistry there will be no sustainable future. Chemists can contribute much to it!

Including all stakeholders to promote it was a reason for the foundation of the International Sustainable Chemistry Collaborative Centre (ISC_3). At the public Leuphana University we are addressing this for example in an interdisciplinary master course "Sustainability" where chemistry, green chemistry and sustainable chemistry play an important role. We also started research into early foresight of new developments for this reason. From next spring on, a full first of its kind extra occupational accredited master course will be offered in English. Topics

included are concepts of green and sustainable chemistry, environmental chemistry, toxicology, computational chemistry and modeling, entrepreneurship, international regulations, ethics, and sustainability management.

I look forward to meeting you in Dresden at the 4th Green and Sustainable Chemistry Conference to further discuss the above-mentioned points. The conference is also a unique opportunity to exchange, learn, discuss and comprehend sustainable chemistry in all its facets including core green chemistry topics and solutions as well as new ideas for education, start-ups and entrepreneurs, circular economy and sustainable chemistry itself.

Welcome to the Green & Sustainable Chemistry Conference!

Yours sincerely,

Klaus Kümmerer
Conference Chair

Conference Organising Committee

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Prof. Dr. Vania Zuin, Federal University of São Carlos, Brazil

Oral Programme

Sunday, 5 May 2019		
13:00-17:00	**Entrepreneur Workshop** | Room: Salon Berlin Workshop and guidelines for young researchers interested in starting up their company (application necessary via conference website)	
15:00-17:00	**Registration** | Room: Congress Foyer & Piano Bar	
17:00-18:30	**Welcome Reception** | Congress Foyer & Piano Bar	
Monday, 6 May 2019		
07:30-08:30	**Registration** | Room: Congress Foyer &Piano Bar	
Room	Congress Saal I & II	
08:30-09:40	**Opening Address** **Klaus Kümmerer** *(Conference Chair), Leuphana Universität Lüneburg, Germany* **Matthias Urmann,** *President, German Chemical Society, Germany* **Jochen Flasbarth** *State Secretary for the Environment, Nature Conservation and Nuclear Safety, Germany* **Kumsal Bayazit,** *Chief Executive Officer, Elsevier B. V., The Netherlands*	
09:40-10:30	**Opening Lecture - [K.01] Anthropogenic change within planetary boundaries** **Prof. Dr. Johan Rockström,** *Director of the Potsdam Institute for Climate Impact Research and Professor at the Institute of Earth and Environmental Science at Potsdam University*	
10:30-11:00	**Refreshment Break and Poster Session 1** | Room: Congress Foyer, Piano Bar, Rotterdam & Petersburg	
Room	Congress Saal I & II	
11:00-11:10	**The Green and Sustainable Chemistry Challenge** Introduction by Klaus Kümmerer (Conference Chair) and Ylann Schemm (Elsevier Foundation)	
11:10-12:25	Short presentations finalists of: **Elsevier Foundation Green and Sustainable Chemistry Challenge**	
11:10-11:25	**[SP01] New green technique to remove toxic metal from wastewater** **Ramia Albakain,** *The University of Jordan, Jordan*	
11:25-11:40	**[SP02] Cross-cultural analysis of sustainable waste management** **Norris Erhabor,** *University of Benin, Nigeria*	
11:40-11:55	**[SP03] Butterfly attractant for pollination and ecosystem health** **Ankur Patwardhan,** *Abasaheb Gareware College, India*	
11:55-12:10	**[SP04] Photoxidative degradation of estrogen in water** **Julio Pinzon,** *Universidad Industrial de Santander, Colombia*	
12:10-12:25	**[SP05] Highly sustainable PV windows employing natural dyes** **Varun Vohra,** *University of Electro-Communications, Japan*	
12:25-13:30	**Lunch and Poster Session 1 (contd.)** | Room: Congress Foyer, Piano Bar, Rotterdam & Petersburg	
Rooms	Congress Saal I	Congress Saal II
13:30-15:40	**Session 1 – Energy Conversion and Storage** **Session chair:** Henning Friege	**Session 2 – CO_2 Utilization** **Session chair:** TBC
13:30-14:00	**[K.02] Metal organic frameworks for clean energy applications** **Bradley Ladewig,** *Imperial College London, UK*	**[K.03] Plasma technology: a novel solution for CO2 conversion?** ***Annemie Bogaerts,*** *Universiteit Antwerpen, Belgium*
14:00-14:20	**[O1.1]** **An investigation on thermo-catalytic cracking of waste plastics over nano-sized catalysts for the production of liquid hydrocarbons** U. Dwivedi*, K.K. Pant, S.N. Naik	**[O2.1]** **CO_2, water, and renewable energy to value: Dynamic integration of co-electrolysis and syngas methanation** C.M. Asmelash*[1], R.A. Eichel[2], R. Palkovits[1] *[1]RWTH Aachen University,*

	Spain, [2]Universidad Técnica de Machala, Ecuador, [3]Commissariat à l'Energie Atomique et aux Energies Alternatives, France, [4]Instituto Nacional de Investigaciones Agropecuarias, Ecuador	
10:30-10:50	**[O5.4]** ***Biosorptive removal of a textile dye Basic Violet 16 on the green adsorbent vermicompost: sustainable environmentally friendly clean up technique*** *E. Khalilzadeh Shirazi*, J. Metzger, K. Fischer, A. Hassani* *[1]University of Stuttgart, Germany*	**[O6.4]** **Characterisation of levan and levan/gelatin blend films using AFM and FTIR spectroscopy** B. Loncarevic[1], V. Nikolic[2], D. Randjelovic[1], G. Gojgic-Cvijovic[1], J. Sinik[2], D. Jakovljevic[1], V.P. Beskoski*[2] *[1]Technology and Metallurgy-University of Belgrade, Serbia, [2]Chemistry-University of Belgrade, Serbia*
10:50-11:10	**[O5.5]** **Fenton-based advanced oxidations of technical lignins for artificial humifications** H.Y. Yoon*, H.J. Jeong, J.R. Jeon *Gyeongsang national university, Republic of Korea*	**[O6.5]** **Avoiding the use of specific chemical products: A neglected aspect of sustainable chemistry** S. Wieck*, A. Friesen *Environment Agency, Germany*
11:10-11:40	**Refreshment Break and Poster Session 2** | Room: Congress Foyer, Piano Bar, Rotterdam & Petersburg	
Rooms	Congress Saal I	Congress Saal II
11:40-12:00	**[O5.6]** **Valorisation of agave bagasse from the tequila industry through sequential enzymatic saccharification** E. Bárzana*[1], O. Hernández-Meléndez[1], C. Montiel-Pacheco[1], F. Miguel-Cruz[2] *[1]Universidad Nacional Autonoma de Mexico, Mexico, [2]Consejo Regulador del Tequila, Mexico*	**[O6.6]** **Colloids for catalysts (Co4Cat): surfactant-free solutions to precious metal nanoparticles with superior catalytic performances** J. Quinson*[1], S. Neumann[2], F. Bizzotto[3], J. Bucher[1], S. Kunz[2], M. Arenz[3] *[1]University of Copenhagen, Denmark, [2]University of Bremen, Germany, [3]University of Bern, Switzerland*
12:00-12:20	**[O5.7]** **Evaluation of polyhydroxybutyrate production by Cupriavidus necator DSM-545 using apple pomace.** A. Chávez Chávez[1], J. Guerrero[1], J. Winterburn[2], I. Salmerón-Ochoa[1], S. Pérez[1], C. Molina-Guerrero*[1] *[1]Autonomous University of Chihuahua, Mexico, [2]The University of Manchester, UK*	**[O6.7] TBC**
12:20-12:40	**[O5.8]** **Techno-economic assessment of a direct fermentative production of lactic acid from food waste in batch and continuous flow cultures** D. Pleissner*[1], J. Peinemann[1], F. Demichelis[2], S. Fiore[2] *[1]Leuphana University of Lüneburg, Germany, [2]Politecnico di Torino, Italy*	**[O6.8]** **Plastics in construction and buildings - a challenge for sustainable development** H. Friege[1] *[1]N³ Tinking Ahead Dr. Friege & Partners, Germany, [2]Leuphana University, Lüneburg, Germany*
12:40-13:00	**[O5.9]** **The chemistry of palm-oil degradation: relevance, mechanisms and cure** L. Bonoldi*, L. Montanari, N. Sommariva, C. Passerini, S. Pavoni, T. Pasini *ENI Spa, Italy*	**[O6.9]** **Towards the first high-performance, semi-crystalline polyesters based on bis-pyrrolidones obtained from renewable itaconic acid** G.J. Noordzij*, M. Roy, C.H.R.M. Wilsens, S. Rastogi *Maastricht University, The Netherlands*

[O6.4]

Characterisation of levan and levan/gelatin blend films using AFM and FTIR spectroscopy

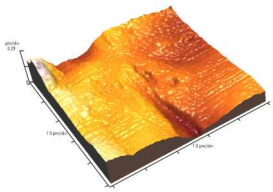
B. Loncarevic[1], V. Nikolic[2], D. Randjelovic[1], G. Gojgic-Cvijovic[1], J. Sinik[2], D. Jakovljevic[1], V.P. Beskoski*[2]

[1]Technology and Metallurgy-University of Belgrade, Serbia, [2]Chemistry-University of Belgrade, Serbia

Food packaging concerns a preservation and protection of all types of food and therefore is important part of food technology. Today, synthetic packaging films are predominantly used, however they are very slow or only partially degradable. Due to incomplete degradation of synthetic polymers, micro and nanoplastic could be produced, which is in last year's considered as a new threat to human health. Microbial polysaccharide levan is natural biopolymer produced by broad range of microorganisms and has promising properties such as biocompatibility, renewability, high molecular height, low viscous nature, antioxidant and prebiotic activities. Gelatine, due to its affordability, biodegradability, low cost and excellent functional and film properties is currently the most preferred protein derivative.

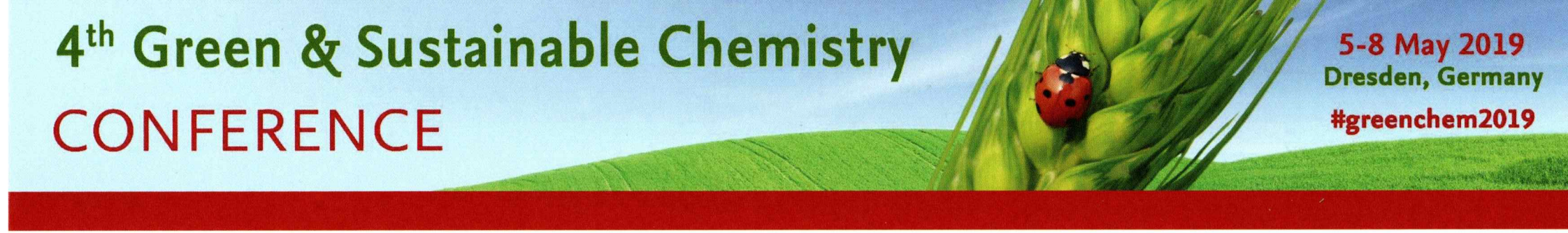
The levan used was produced by the Bacillus licheniformis NS032 strain and gelatin was commercially available. Levan /gelatin blend films were made by separately dissolving levan and gelatine in distilled water on magnetic stirrer. When levan and gelatin were completely dissolved, they were combined in various ratios and after addition of glycerol additionally stirred for 30 minutes. All obtained suspensions were casted onto 50 mm diameter Teflon plates and evaporated at room temperature. FTIR (Fourier transform infrared spectroscopy) spectra were recorded using Thermo Nicolet 6700 in ATR mode and morphology of the obtained films were studied by AFM (Atomic force microscopy), AutoProbe CP-Research SPM (TM Microscopes-Bruker). FTIR spectra confirmed the presence of all characteristic signals for both levan and gelatine. In the Figure 1. AFM image of levan/gelatin film is given. Based on morphological measurements, it can be concluded that higher concentrations of gelatine reduces the roughness of the film. Obtained films with smoother surface and lower roughness, composed of biodegradable polymers are potentially applicable in food, medical or cosmetic industry.

Figure 1. AFM three-dimensional image (surface 5x5μm) of levan/gelatin blend film



Keywords: Levan/gelatin blend films, Atomic force microscopy, Biodegradable films, Food packaging

	containing industrial wastewaters M. Vogel*, S. Matys, R. Hübner, K. Pollmann *Helmholtz-Zentrum Dresden-Rossendorf, Germany*	E.S. Lokteva*, I.Y. Kaplin *Lomonosov Moscow State University, Russia*
12:40-13:00	**[O9.9]** **Recovery of boron from wastewater by mesoporous aluminosilicate nanocomposite synthesized from waste display panel using green approach** C.K. Tsai*, N.T. Lee, G.H. Huang, R.A. Doong, *NTHU, Taiwan*	**[O10.9]** **Synthesis of HHD and HHD-derived chemicals from HMF** B. Wozniak[1], B. Spiegelberg*[1], Y. Li[2], S. Tin[1], S. Hinze[1], J.G. de Vries[1] *[1]Leibniz-Institut für Katalyse e. V., Germany, [2]Lanzou Institute of Chemical Physics, China*
13:00-14:00	**Lunch** | Room: Congress Foyer & Piano Bar	
Rooms	Congress Saal I	Congress Saal II
14:00-16:00	**Session 11 – Photochemistry and Photocatalysis** **Session chairs**: Leigh Aldous	**Session 12 – Sustainable chemistry in developing countries** **Session chairs**: Vladimir Beskoski
14:00-14:30	**[K.12] Designing Heterogeneous Catalysts for Sustainable Chemical Processes** **Karen Wilson,** *RMIT University, School of Science, Melbourne, Australia*	**14:10-14:30** **[O12.1] Comparison of the effect and insight into the mechanism of aromatic organoarsenic compound adsorption on iron and manganese based adsorbents** T.P. Joshi*[1], R. Liu[2], H. Liu[2], J. Qu[2] *[1]Nepal Academy of Science and Technology, Nepal, [2]Chinese Academy of Sciences,* China
14:30-14:50	**[O11.1]** **Nitrogen vacancies modified graphitic carbon nitride: scalable and one-step fabrication with efficient visible-light-driven hydrogen evolution** X. Tao*, J. Wu, N. Li, Y-Z. Zheng *Beijing University of Chemical Technology, China*	**[O12.2]** **PhosFATE: From food industry by-product to phosphorous fertilizers** F. Carella*[1], M. Iafisco[1], M. Seck[2], H. Diadhiout[2], A. Tampieri[1], A. Adamiano[1] *[1]Istec CNR, Italy, [2]ISRA-CRODT, Senegal*
14:50-15:10	**[O11.2]** **Green synthesis of Cu/Cu_2O/carbonhybrid materials for the photocatalytic degradation of ciprofloxacin** C-H. Huang*[1], R-A. Doong[2] *[1]National Chiao Tung University, Taiwan, [2]National Tsing Hua University, Taiwan*	**[O12.3]** **Profitable high-density sea cultivation of brown macroalgae and efficient microbial bioconversion of their carbohydrates using modified microbial strains to produce commodity and specialty chemicals: a developing sustainable and green chemical industry in Chile** A. Olivera-Nappa*[1], C. Camus[1,2], A.H. Buschmann[1,2] *[1]University of Chile, Chile, [2]Universidad de Los Lagos, Chile*
15:10-15:30	**[O11.3]** **Critical reflections on the photocatalytic reduction of Cr(VI) with plasmonic catalysts** D. Hollmann*[1], A.B. Ngo[2,3] *[1]University of Rostock, Germany, [2]Leibniz-Institute for Catalysis, Germany, [3]Hanoi University of Science and Technology, Vietnam*	**[O12.4]** **Degradation of methylene blue and hydrogenation of nitrobenzene over low-cost bio-iron and -cobalt particles synthesized using biomass extracts** L. Ombaka*, R. Otieno *Leibniz University of Hannover, Germany*
15:30-15:50	**[O11.4]** **Techno-economic sensitivity analysis of a large-scale production of chitosan microbeads**	**[O12.5]** **Gamma-radiation induced effects on textile wastewater for reuse and isolation of radio-resistant bacteria for green bioplastic (PHAs)**



Certificate of Presentation

We hereby confirm that

Vladimir Beskoski

Presented

Characterisation of levan and levan/gelatin blend films using AFM and FTIR spectroscopy

4th Green & Sustainable Chemistry Conference
5 – 8 May 2019, Dresden, Germany

Lizzy Birnie
For and on behalf of Elsevier Ltd