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- **3rd EU-Asia Dialogue on Nanosafety**, 18th of March, 2019, Bangkok, Thailand
- **Leveraging Interprofessional Education to the Study of Nanosafety and Nanomedicine: Insights from the Horizon 2020 BIORIMA, GRACIOUS and NanoinformaTIX Projects Joint Training School**, 25th to 29th of March, 2019, Venice, Italy
- **8th Annual NIA-Symposium**, 27th of March 2019, Brussels, Belgium
- **2nd Think Tank – Life Sciences in Digital Transformation “Human beings in the focus of interest”**, 2nd of April 2019, Graz, Austria
- **First Knowledge Exchange Conference (KEC)**, 3rd of April 2019, Amsterdam
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- **BioChip Berlin - Practical Solutions for Today’s Challenges**, 7th – 8th of May 2019, Berlin, Germany
- **Towards a New SusChem SIRA’ Workshop**, 16th – 17th of May 2019, Brussels, Belgium
- **Fifteen Seconds Festival 2019: 48 Hours for Curious Minds**, 6th – 7th of June 2019, Graz, Austria
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- **BioNanoNet events**
- **BioNanoNet on-site-events**
- **BioNanoNet Member-Event-Notifications**

Finally
Editorial - Contemporary issues from the network

Dear Ladies and Gentlemen,

the European research & innovation strategies are opening new fields for science, research and innovation. Thus, it is a continuous challenge for the network and our members to keep pace with changing environment and conditions for our work.

Besides this, BNN is on its way towards an updated strategic orientation of the network. With this, it shall be ensured that BNN is in the long run a strong partner for its members and in projects. With the strategy BNN2020+, which runs through internal consultation processes, the core competences of BNN as well as the key areas are defined and strategic goals described. Due to the fact that BNN’s activities are cross-sectoral as well as along the entire value chain, a completely new matrix is developed for our members. By the end of 2019, it is envisaged that the execution of the strategy BNN2020+ is started and that our members will already benefit from it.

Another benefit for our members comes through BNN-efforts to develop initiatives, proposals and projects.

- **FETOPEN** – project: first time for BNN, we are partner in a project under the scheme of future and emerging technologies “FETOPEN”. The project PRIME is now kicked-off, a report can be found in this newsletter. Based on this experience, we are ready for future proposals and hopefully projects in this field.

- **Conceptualisation of initiatives** → Nutrition & health: this initiative, which concept paper has been submitted to the Styrian government, has good chances to become another Styrian success story, following the human-technology-interface (HTI) success some years ago. Thus, we kindly draw your attention to the concept paper (German language only!) to start your brainstorming about scientific ideas, combining these two competence fields.

Finally, it is our great pleasure to announce the next BNN-events: **Annual Forum** (Sept. 10th) and **2nd AMI-Event** (Sept. 11th), both taking place in **Salzburg**, hosted by BNN-member **Allergy-Cancer-BioNano Research Centre of the University of Salzburg** back-to-back with the **International Young Scientists Forum** (Sept. 9th-10th) as well as the **International Particle Toxicology Conference** (Sept. 11th-13th).

Looking forward to see you there! Sincerely, BioNanoNet-Team

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The STEP Award is a competition in order to honour innovative and strongly growing German, Austrian and Swiss enterprises mainly operating in B2B business. The following categories are assessed: artificial intelligence, energy transition, health industry, material science and mobility as well as new work.

The aim of the STEP awards is to support young companies in future-oriented industries and to give them important impulses for their successful growth. The award and the network are supposed to pave the way for their crucial next “STEP”.

Already for the 14th time the F.A.Z.- Fachverlag with further sponsors and partners confer the STEP Award. Until the 15th of July 2019 innovative and growing companies operating in Germany, Austria and Switzerland, mainly in the B2B business, are kindly requested to apply to the competition.

You will find more detailed information as well as the application form at www.step-award.de.

Download FLYER
Faculty of Earth Sciences, Geography and Astronomy, University of Vienna

What impact do human activities have on soil and groundwater quality? How can we effectively protect our water resources and use them in a sustainable manner? Do nanoparticles have a major impact on contaminant relocation and element cycling? What is the behaviour and fate of organic trace pollutants in water and soils? These are some of the questions we are trying to answer at the Hofmann Group, Environmental Geosciences, Centre for Microbiology and Environmental Systems Science, University of Vienna.

We take an interdisciplinary approach to the investigation of aquatic and terrestrial processes that control the environment. Chemical, physical, biological, and geoscientific concepts and methods are applied to experimental work and field observations to arrive at a molecular scale mechanistic understanding and quantitative modelling of these processes. We are well equipped to seize opportunities presented by new developments in areas such as nanogeosciences, environmental chemical analytics, chemical speciation and modern hydrogeology. Our overall goal is to understand processes controlling the environmental systems and to apply fundamental insights to the solution of some of the pressing environmental problems of today and tomorrow.

**Engineered and Natural Nanoparticles: Nanogeoscience**

Nanoscale particles (colloids) are abundant in all environmental compartments. These nanophases may consist of natural organic matter (e.g. humic substances), biota (e.g. viruses and bacteria, including pathogens), inorganic particles (clays, oxides or carbonates), or man-made particles originating either from engineering (nanotechnology) or from wear, combustion, or corrosion. They span a broad size range from some fractions of a nanometer to several micrometers, and a natural colloidal system therefore typically consists of a wide variety of macromolecules and particles. This heterogeneity places high demands on
analytical equipment and analysis strategies. In contrast, engineered nanoparticles are typically well defined, but they occur in extremely low concentrations which makes them difficult to distinguish from natural particles. Nanoparticles are involved in natural processes such as soil development and nutrient cycling, but can also act as vehicles for contaminant transport or alter the bioavailability of substances, and hence their toxicity. The anticipated future nanotechnology market of several hundred billion US dollars will result in a widespread release of specially designed nanoparticles into natural environments. At present we do not know adequate about the behavior of those materials, but it is clear that they have characteristics that are quite different from those of bulk materials, and that some may penetrate skin, cell membranes, and the blood-brain barrier. Nanogeoscience research at the University of Vienna does focus on three main topics covering the characterization, environmental processes, and behavior of engineered nanoparticles.

Environmental Contaminants and Pollutant Dynamics

Understanding the fate of organic contaminants following their release into the natural environments is fundamental to obtaining an accurate assessment of their environmental behavior and predicting the associated risks. Such an understanding is essential if we are to ensure the safe use of both existing and yet-to-be-developed products, and is also required in order to be able to design efficient and economically viable remediation strategies for contaminated soil and water. Both natural and engineered colloidal systems are considered, including carbonaceous nanoparticles (e.g., fullerenes, carbon nanotubes), metallic nanoparticles (e.g., nanoscale zero-valent iron), and natural colloids (humic acids, clays, and oxides). We also work intensively with microplastics, with special attention to the release of additives and plasticizers, to tire wear, and to adsorption phenomena. Sorption and degradation are key processes affecting the fate of organic contaminants and interactions with colloids are known to significantly affect those processes. However, colloidal systems are technically challenging to investigate and there remains only a poor understanding of the mechanisms underlying these interactions. Our group is involved in developing and combining a range of suitable approaches for studying these complex systems (e.g. passive sampling, column experiments, etc.). Our research aims to elucidate the mechanisms involved in interactions between organic contaminants and both natural and synthetic sorbents, to develop prediction methods for situations where experimental data are not available, and to analyze consequences in terms of environmental fate and remediation strategies.
All forms of life depend on water: Hydrogeology

Providing safe drinking water will be one of the major challenges of this century. Apart from any quantitative problems, groundwater contamination is a major environmental concern. Such contamination can derive from inorganic, organic, or biological sources. Hydrogeology involves all processes from groundwater recharge to discharge into springs and rivers or oceans. It includes investigations into the fate and behavior of contaminants and trace elements in subsurface aquatic environments. Within Environmental Geosciences at the University of Vienna we cover projects that range from groundwater recharge modeling, hydrogeological modeling, isotope hydrogeology, artificial recharge of groundwater, to the modeling of groundwater flow using numerical codes. We are also studying the behavior of organic and inorganic substances in relation to the leaching of contaminated and recycling materials, mining activities, colloidal transport of trace substances, and are using trace contaminants as tracers to understand subsurface flow.

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Publications

Recent scientific publications of BNN association members

Period 2018

BioNanoNet


BOKU


CIBER-BBN


Medical University of Graz, Institute of Biophysics


Period 2019

Austrian Academy of Sciences (ÖAW), Institute of Technology Assessment (ITA)


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EU H2020 FET Open project PRIME

PRIME - Advanced and versatile PRInting platform for the next generation of active Microfluidic dEvices

PRIME project started on 1st of May 2019 and will last for 48 months.

What is PRIME about?

Microfluidic devices manipulate tiny amounts of fluid enabling cost-effective, fast, accurate and high throughput analytical assays. Progress in Microfluidics has huge impact on environmental pollution monitoring, biohazard detection and biomedicine, contributing to the development of new tools for drug screening, biological studies, point-of-care diagnostics and personalized medicine. Despite this huge potential, Microfluidics market growth is heavily constrained by the complexity and high prices of the required large-scale off-chip equipment and its operational cost. PRIME will implement and integrate smart valves and pumps in a microfluidic chip through additive manufacturing technologies. Furthermore, inkjet printing will be used to produce new ultrasensitive and selective sensors embedded in the chip and readable with light. The final device will be remotely addressed and take readings using simple photonic elements that can be integrated in compact, portable and cheap operation&read devices.

What are PRIME’s objectives?

PRIME aims to go beyond the state-of-the-art generating a robust platform to create a new generation of active, tubeless and contactless microfluidic chips effectively changing the currently established paradigm. PRIME will develop a radically new platform that i) integrates all the required responsive materials and elements in the chip, effectively providing it with all the fluidic and sensing functions, ii) uses compatible materials and manufacturing technologies making future industrial production viable and cost-effective, and iii) allows to implement with extensive freedom of design a plethora of new smart-integrated and easy-to-operate microfluidic chips.
Who are PRIME’s beneficiaries?

Six beneficiaries from four different countries collaborate in the PRIME project:

- Agencia Estatal Consejo Superior de Investigaciones Científicas (Project Coordinator, Spain)
- Eindhoven University of Technology (the Netherlands)
- Max Planck Institute (Germany)
- University of Saragossa (Spain)
- BioNanoNet Forschungsgesellschaft mbH (Austria)
- Beonchip SL (Spain)

PRIME Kick-off-meeting

The PRIME Kick-off-meeting took place at the Faculty of Medicine, University of Saragossa, Spain, on 27th and 28th of May 2019.

The meeting allowed all partners of the consortium to establish good relationships among them. All partners were provided with general information about the project and about the administrative and management procedures that will be followed during project execution. Additionally, the partners had fruitful discussions about the technical work to be carried out in each work package. PRIME’s kick-off meeting was the first step for a successful execution of this FET OPEN project.

BioNanoNet project tasks

Within PRIME, BNN will be responsible to ensure that all knowledge created during PRIME will be disseminated to the right target groups during the whole course of the project. BNN will design the PRIME website and keep its content regularly updated.

PRIME has received funding from the European Union’s Horizon 2020 Research & Innovation Programme under grant agreement no 829010.
Synopsys and Photonics Industry Leaders Partner to Advance PIC Technology with Plasmonics

EU Project PLASMOfab Successfully Completed

Synopsys, Inc. (Nasdaq: SNPS) today announced that PLASMOfab, a research project funded by the EU innovation program Horizon 2020, has been successfully completed to enable mass manufacturing of high-performance plasmo-photonic components. Launched in 2016, the project has brought together leading industrial partners and top-ranked academic and research institutes in the photonic integrated circuit (PIC) and opto-electronics value chain, including PhoeniX Software, now part of Synopsys’ Photonic Solutions.

The three-year research project has significantly advanced the state of the art in PICs and CMOS-compatible plasmonics for optical data communications and biosensing for point-of-care applications. PLASMOfab has developed CMOS-compatible plasmonics to consolidate advanced PICs with electronic ICs in volume manufacturing. The project focused on CMOS-compatible metals and photonic structures that are harmonically co-integrated with electronics using standardized CMOS processes. As part of project validation, the PIC platform was used along with advanced peripherals to develop predominant functional modules with unprecedented performance.

A key project achievement was the development of a groundbreaking ultra-compact plasmonic transmitter, which has a footprint of 90 x 5.5 µm² to transmit 0.8 TBit/s (800Gbit/s) through 4 individual 0.2 TBit/s transmitters. The project also demonstrated CMOS-compatible plasmonic waveguides with the lowest possible losses, as described in Nature’s Scientific Reports in September 2018.

“PLASMOfab’s main goal has been to address the ever increasing needs for low energy, small size, high complexity and high performance mass manufactured PICs,” said Nikos Pleros, assistant professor at the Aristotle University of Thessaloniki, Greece. “We have achieved this by developing a revolutionary yet CMOS-compatible fabrication platform for seamless co-integration of active plasmonics with photonic and electronic components.”
As a result of the PLASMOfab research, two new companies have been launched to commercialize the new technologies:

- bialoom Ltd will further explore plasmo-photonic biosensors in multichannel and high-sensitivity point-of-care diagnostics by combining plasmonic sensors with integrated Si3N4 photonic functionalities, electrical controls, biofunctionalization techniques, and microfluidics.
- Polariton Technologies Ltd. specializes in new photonic and electronic technologies for the testing, sensing, and telecommunications market. Their energy efficient and low-footprint plasmonic modulator will convert microwave signals to optical signals.

**About PLASMOfab**

PLASMOfab was a three-year collaborative project on CMOS-compatible photonic, plasmonic and electronic integration that brought together ten leading academic and research institutes and companies including the Aristotle University of Thessaloniki (Coordinator) (Greece), ams (Austria), AMO (Germany), PhoeniX Software, now part of Synopsys (Netherlands), ETHZ (Switzerland), Micram (Germany), University of Saarland (Germany), Austrian Institute of Technology (Austria), University of Burgundy (France) and Mellanox (Israel). The project was launched in January 2016 and it was funded by the European Union’s Horizon 2020 ICT research and innovation programme under grant agreement No 688166.

To learn more about the results of PLASMOfab visit [http://www.plasmofab.eu/](http://www.plasmofab.eu/).

**About Synopsys’ Photonic Solutions**

Synopsys is driving the PIC revolution with design automation solutions for a wide range of application requirements, from data communications to sensors and biomedical devices. Synopsys’ PIC Design Suite, which comprises the OptSim™ Circuit and OptoDesigner tools, offers a seamless PIC design flow from concept to manufacturable design, as well as access to a single, world-class support channel.

Learn more at [https://www.synopsys.com/photonic-solutions.html](https://www.synopsys.com/photonic-solutions.html).

**About Synopsys**

Synopsys, Inc. (Nasdaq: SNPS) is the Silicon to Software™ partner for innovative companies developing the electronic products and software applications we rely on every day. As the world’s 15th largest software company, Synopsys has a long history of being a global leader in electronic design automation (EDA) and semiconductor IP and is also growing its
leadership in software security and quality solutions. Whether you’re a system-on-chip (SoC) designer creating advanced semiconductors, or a software developer writing application that require the highest security and quality, Synopsys has the solutions needed to deliver innovative, high-quality, secure products.

Learn more at [www.synopsys.com](http://www.synopsys.com).

**Contact**

AIT – Austrian Institute of Technology
[https://www.ait.ac.at](https://www.ait.ac.at)
Contribution of Graz University of Technology

Excessive hygiene promotes resistance to antibiotics

In Nature Communications, researchers from Graz, Austria present new perspectives to prevent the spread of antibiotic resistances in hospitals.

One object of investigation was the intensive care unit of the Department of Internal Medicine at University Hospital Graz © Medical University of Graz

The number of people who die from antibiotic-resistant germs is increasing worldwide. The World Health Organization WHO considers the spread of antibiotic resistance and appropriate countermeasures as one of the most important global challenges nowadays. Against this background Gabriele Berg, who heads the Institute of Environmental Biotechnology at TU Graz, has initiated an interdisciplinary cooperation project called Plant-associated microbial communities in indoor environment which is funded by the Austrian Science Fund (FWF). The research group investigated microbial control – the degree of cleaning and hygiene measures – and how it influences the development of resistances. Research was carried out together with national partners of the Medical University of Graz in the framework of the BioTechMed-Graz inter-university cooperation and international partners. The results of the research have just been published now in Nature Communications.

A comparison of environments varying in their degree of microbial control

The researchers compared the microbiome and the resistome - i.e. all existing microorganisms and antibiotic resistances - at the intensive care unit of the Department of Internal Medicine at University Hospital Graz with clean rooms operated by the aerospace industry and public and private buildings. The analyses show that microbial diversity decreases in
areas with high levels of hygiene but that the diversity of resistances increases. ‘Built environments with strong microbial control like the intensive care unit and industrially used clean rooms show high proportions of antibiotic resistances which have the potential to get transferred into pathogens,’ explains Dr Alexander Mahnert, director of studies at the Institute of Environmental Biotechnology of TU Graz, who is currently conducting research at the Medical University of Graz.

**Results provide new approaches to prevent resistances**

The results indicate that a stable microbial diversity in clinical areas counteracts the spread of resistances. ‘The microbial control of pathogens is already established in cultivated plants and also in humans in the framework of stool transplantation. Our study provides an initial foundation to pursue such ideas in indoor areas in the future,’ says Berg. Regular airing, houseplants, the deliberate use of beneficial microorganisms and the reduction of antimicrobial cleaning agents could be the first strategies in maintaining or improving microbial diversity.

In a subsequent step, the research team at TU Graz would like to develop and implement biotechnological solutions for a tailor-made microbial diversity.

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How smart is our health?

IT-expert Christian Poellabauer conducts research on smart health at his home university Notre Dame du Lac in the US state of Indiana. In the summer semester he is carrying out research at TU Graz.

Christian Poellabauer studied at TU Wien (Vienna University of Technology). He is a professor at the University of Notre Dame du Lac – a private university in Indiana. His areas of focus are mobile computing and wireless networks, and he specialises in applications in the health sector. Poellabauer is a Fulbright Scholar at the Institute of Technical Informatics at Graz University of Technology.

News+Stories: What exactly is smart health?

Poellabauer: The main question in our research is: How can we use our current information and communication systems in order to improve our health system and especially healthcare? We would like to be able to make better predictions about what illnesses could occur in which persons in the future. Therapy could be individually adapted and would possibly be more effective. People should know in more detail what helps them to remain healthy and how they can adapt their behaviour. The aim of this, of course, is to improve quality of life. And of course, through our research we want to improve our understanding of illnesses per se.

How do doctors react to your research?

Poellabauer: They basically want more support in their work, more information. But of course, they want to keep control. I see it like this: we can provide them with more information so that they can make well-founded decisions. But in the final analysis, a decision must always be taken by a person.

Where can your research be applied?

Poellabauer: Let’s take an example of working on a project which deals with speech control in operating theatres. Surgical interventions often last many hours and the surgeons need information about medication which has already been administered and about the patients themselves. The operation cannot be simply interrupted in order to look at a computer. So a speech control and voice output would help very much here. In another project, we are conducting research into digital biomarkers. These are signals which the body sends out and by which we can trace possible illnesses. Let’s take the example of brain damage: the brain controls all the functions of the body. It has now been injured or impaired through
illness. This is noticed through the different processes in the body. For instance, you could develop a device which measures the reaction of the pupils to light. Or analyse how the voice changes in time. Or measure how stable someone’s mobility is. All these are examples of new digital biomarkers.

Smartphones and Smartwatches already record a lot of health data. The market is steadily growing. © Baustädter - TUG

What does such a device look like?

Poellabauer: Our smart phones can already do very much in this area. But of course, wearables, such as smart watches, are also a big topic. They have built-in accelerometers, pulse monitors or completely new electrocardiograms which can monitor the heart rhythm.

For instance, we work with people with brain damage who allow us to access the movement data on their smart phones. This enables us to investigate their mobility and their social life. How often do you leave the house? How many social contacts have you got? An injury can seriously impair a person’s life, and we hope to be able to help them in the future with our findings.

But we are also occupying ourselves with mobile diagnostic devices which can recognise a possible concussion faster. This is an important topic in top-class sport. Or wearables which measure blood volume, skin resistance and body temperature, thus allowing malaria to be recognised more quickly. All our projects have one thing in common: that we combine a wide variety of signals to be able to make an earlier diagnosis possible. All our projects have one thing in common: that we combine a wide variety of signals to be able to make an earlier diagnosis possible.

Is this data reliable?

Poellabauer: This is currently still a big problem with the devices freely available on the market, such as smartphones. Precision is at 85 to 90 per cent. Even when these results are very good, there is still room for improvement.

Two important aspects in smart health are big data and machine learning. With the help of a lot of data gathered from individual sensors, algorithms can make very good models. The more data there is, the more accurate the result.
When more data is used, data protection becomes more important. Medical data is definitely the most sensitive private data a person has. How can you guarantee security?

Poellabauer: All this data has to be carefully analysed and stored. Of course, you can recognize a particular person through lots of individual pieces of data. This is especially easy when speech data is analysed. And that’s why we are working on a model at the moment where speech data is altered and anonymized but which can nevertheless be processed correctly by the algorithm. Of course, we have to think very carefully about how much automation we actually allow.

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Pit stop for paper bags

What does industry-scale cement bag filling have in common with a pit stop in Formula 1? Filling a 25kg paper bag with cement in the factory takes about three seconds, about as long as a pit stop.

But packaging and paper manufacturer Mondi reckons this is too long. They asked TU Graz to study the material flow that is at work in this process. One of the deliverables is a simulation model for material transport through paper so that the knowledge of the “paper bags” can also be applied to other packaging applications.

Of course, the test piece on the rig is not conventional paper but so-called sack kraft paper designed to resist the filling pressure it is exposed to, for example in a cement filling line, without bursting. When a bag is filled with cement, up to 80 percent air is blown into the bag. This air can escape through pores on the paper’s surface. The Mondi-initiated Christian Doppler Laboratory (CD-Laboratory) for Mass Transport through Paper at TU Graz is now exploring these phenomena and developing simulation models to optimize the permeability of porous paper structures without compromising tear resistance.

Although firmly established in the automotive industry, computer simulations of material transport through real-world materials are still in their infancy, especially if natural products such as paper are involved. “We will not be able to create a virtual clone of a paper type on the computer,” CD lab coordinator Karin Zojer admits. The physicist at the Institute of Solid State Physics is an expert for the mathematical simulation of materials and explains: “As the fibre structure of paper is enormously heterogeneous, it would take no end of data to simulate it in its full complexity. While material models already exist for plastic films to simulate the material transport on the computer, so far there are none for paper.”

With the knowledge gained in the project, concepts for the modification of paper are to be developed. © Lunghammer - TUG
The CD-Laboratory

Researchers can now intensely research the material properties of paper packaging in the CD-Laboratory, to cast them into mathematical models. The new Christian Doppler Laboratory became operative in January 2018. Like all Christian Doppler Laboratories it builds a bridge between the worlds of business and science and in principle spans a term of seven years. The results are evaluated at two-year intervals.

The CD lab for Mass Transport through Paper is an exciting proposition for researchers from many disciplines because cellulose-based fibres of the paper interact readily with the environment. To begin with, the structures change in the presence of moisture, but the fibre surfaces also exhibit chemical functionalities that may interact with substances in the system (for example the interaction with fragrances or flavourings released by food products). These substances are just what Erich Leitner’s working group at the Institute of Analytical Chemistry and Food Chemistry is looking for.

Karin Zojer’s working group used x-ray tomography in the first stage to identify the sites where particles can potentially be deposited inside paper structures. In cooperation with Ulrich Him and Wolfgang Bauer from the Institute of Paper, Pulp and Fibre Technology, it is possible to plan and interpret such measurements of the microstructure specifically for paper. The experts of industrial partner Mondi support the research team of TU Graz with their in-depth knowledge in fibre technology and papermaking production procedures. They also help the researchers to formulate target-oriented mathematical assumptions for integration in future simulation models.

“The purpose of building these models is to predict how the underlying pore structure determines the transport processes,” Karin Zojer explains. “Examples of such processes include the oxygen transport in storage conditions, the drying speed of ink droplets during printing, or the air displacement processes that take place when paper bags are filled with bulk materials. In this way it is possible to pinpoint and predict the key properties of the pore structure. Consequently, methods to measure these properties are also developed as part of this research project.”

As a project partner of the CD lab, Clemens Kittinger’s research team from the Institute of Hygiene, Microbiology and Environmental Medicine at the Medical University of Graz is “to contribute microbiological models and techniques to the simulation of the transport processes through the existing pore structures so that they – by looking at them from a totally
different scientific angle – can ultimately be better understood and modelled," says Karin Zojer.

The knowledge gained in the CD-Laboratory at TU Graz culminates in the development of concepts to modify paper – either to improve existing applications or to create entirely new products. And perhaps also to fill cement bags just that little bit faster. Lewis Hamilton will turn green with envy. His fastest pit stop so far was 2.33 seconds.

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Contribution of Graz University of Technology

Young Skin thanks to Sugar

Since the EU sugar quota was liberalised, the market price is low, and sugar stocks are full. An international team has been conducting research on how sucrose can be valorized on an industrial scale.

Up to 300,000 tonnes of sugar per year is estimated to be piling up in Europe. The fact that not only sweet things can be made from sucrose is an opportunity for sugar growers. Using biochemical methods, a wide range of components for cosmetics, cleaning agents and bioplastics can be made from the sugar constituents glucose and fructose.

“The CARBAFIN project is about scaling available biotechnological knowledge and methods to an industrial level and to find out whether the processes are economically viable,” says Christiane Luley. The biochemist is an expert in enzyme technology and the project manager of CARBAFIN. The EU project is being led by TU Graz Professor Bernd Nidetzky, the scientific head of the K2-competence centre “acib” in Graz. Also on board are research institutions and companies from Germany, Switzerland, Belgium and the Netherlands. Part of the team are also several research groups at TU Graz whose project activities are coordinated by Barbara Petschacher from the Institute of Biotechnology and Biochemical Engineering.

Experiments are being carried out in the laboratory of the Institute of Biotechnology and Biochemical Engineering. © Lunghammer – TUG.

Glycosylation as basis

The CARBAFIN project team will develop a platform technology by the end of 2021 through which glucose and fructose can be innovatively exploited on an industrial scale. The basis for this is the biocatalytic process of glycosylation. With the help of enzymes which are be-
ing improved by Ghent University, glucose can be combined with other molecules. The resulting glucosides have a wide range of uses. Depending on the relevant involved substances, these include functional additives in cosmetics or as fibre or bran in foodstuffs and animal feed, and in the longterm as surfaceactive substances in detergents. The German CARBAFIN partner bitop, based in Dortmund, has already recognised the potential of glycosylation with respect to cosmetics. bitop is producing a natural glycosidic substance on a glycerine basis which is capable of slowing down cell ageing in the skin (Glycoin natural®).

Fructose, which accumulates as a side product in glucosylation based on sucrose, is an alternative sweetener in food. Fructose, however, is garnering increasing interest for industrial, non-food-related areas. Because from this second component of sugar, hydroxymethylfurfural can be obtained, which can be used in resins, paints, glues, biofuels and biopolymer products – in other words bioplastics. And here, a Swiss company called AVA Biochem – a world market leader in HMF production – is on board.

**High degree of technological maturity**

“CARBAFIN has a high technology readiness level and in the course of the project an application demonstration will be done by the companies involved. From the academic point of view, we are entering the field with a high level of previous knowledge of biocatalysis, and we will be concentrating more on the commercially viable implementation of reaction and processes engineering,” says Barbara Petschacher. Alexander Passer’s working group at TU Graz’s Institute of Technology and Testing of Construction Materials will play an important role because it will evaluate the technical strategies of glycosylation. “Following a new approach, we integrate the lifecycle and cost analysis into the development at an early stage,” says Petschacher. “This optimises the future process both ecologically and economically.” Another important aspect of developing the process is compliance with EU guidelines, in particular for food products; this will be monitored by our project partner GALAB.
The aim of the CARBAFIN project is to develop a platform technology through which glucose and fructose can be innovatively valorised on an industrial scale.

The CARBAFIN description of actions comprises 21 milestones, which are assigned to a number of work packages. Initial measures after the project launch in January 2018 were set by the European Commission. As in all projects which are funded in the framework of Horizon 2020, it was necessary to create a platform with open access to the research results. Next, there will be a plan for dissemination and exploitation of project results. “We want to set up a glycosylation platform,” says Christiane Luley. “What we develop in terms of techniques in the context of CARBAFIN, will be available later for many different applications. We will be supported by PNO Consultants in the exploitation of the technology.”

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Accredited laboratory @ MCL

Materials Center Leoben has been successful accredited as testing laboratory according to the accreditation law 2012 BGBl. I No. 28/2012 according to EN ISO / IEC 17025: 2017. The decision of the Federal Ministry sets the effectiveness from 29.03.2019.

The following procedures are currently included in the scope of accreditation:

- Tensile test at room temperature according to EN ISO 6892-1
- Tensile test at high temperatures according to EN ISO 6892-2
- Brinell hardness measurements according to EN ISO 6506-1
- Vickers hardness measurements according to EN ISO 6507-1
- Rockwell C hardness measurements according to EN ISO 6508-1

With this step, as MCL, we are now expanding the offer for our customers as a conformity assessment body and state-approved testing laboratory.

Download Accreditation Certificate

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**Contribution of NORGANOID**

**Winner in the category 'Visionärin' STEIRERIN AWARD 2019**

For the second time, the magazine STEIRERIN awarded nine women for their work and engagement in the Styrian society.

This year one of the awards goes to Charlotte Ohonin who won in the category 'Visionärin'. At Science Park Graz her team is developing an advanced approach of brain-on-chip for modelling neurodegenerative diseases and testing therapeutics more accurately.

*Charlotte Ohonin, founder of NORGANOID (left) and Christian Purrer, spokesman of the Management Board, ENERGIE STEIERMARK.* © Thomas Luef

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Non-destructive testing has become indispensable in almost all branches of industry for checking and ensuring the quality of materials, components and products. Since its foundation in 2009, RECENDT, the Research Center for Non-Destructive Testing in Linz, a member of the Upper Austrian Research (UAR) innovation network with around 40 employees, has played a decisive role in the success story of these modern testing methods. On the occasion of the 10th anniversary of RECENDT, a festive event took place on May 22nd, 2019, in Linz.

“Today, the production of airplanes, cars and even food packaging is unthinkable without constant monitoring of quality, using non-destructive testing methods. Every part relevant to safety and health is put through its paces. The highly industrialized state of Upper Austrian in particular needs strong innovation partners in this field, such as RECENDT, who can deal with new technological approaches at an early stage, quickly put them into practical application with and for industry and thus secure an innovation and quality lead,” said Markus Achleitner, State Councillor for Economic Affairs and Research, who was impressed by the company’s research performance and congratulated the research centre on its anniversary.
"RECENDT has established itself as a fixed factor within the non-university research landscape in Upper Austria and beyond. This is why the province of Upper Austria has already invested a total of 13 million euros in the centre itself and in the projects in which it is involved since it was founded in 2008. Since 2014, the state has generated a total project volume of 790.4 million euros in research funding alone with 155.3 million euros in state funds, which corresponds to five times the investment leverage," Achleitner emphasised. “A total of 4,537 projects with a funding volume of around 500 million euros were supported within the framework of the current economic and research strategy "Innovative Upper Austria 2020", which triggered a total project volume of 2.2 billion euros,” says Achleitner.

Combinations of modern technologies

Around 100 guests from business, industry and science accepted the invitation to the ballrooms of Sparkasse OÖ to look back together on the successes of recent years and to look into the future of non-destructive testing methods. Completely new possibilities in non-destructive quality testing also arise through the combination with Augmented Reality. In future, quality managers will be able to use data goggles to inspect measurement data directly on real components, such as an entire aircraft fuselage. RECENDT accompanies several renowned industrial companies - such as the manufacturer of aircraft components FACC or voestalpine - in such or similar innovation projects.

"A total of 22 patents and licences and around 300 scientific publications, which were developed from more than 400 projects, prove the success of the past years in figures too", emphasised RECENDT Managing Director Dr. Peter Burgholzer.
Know-how transfer to medical technology

The UAR Innovation Network currently includes a total of 16 non-university research centres with over 1,000 employees. Production research - with a focus on information and communication technologies, mechatronics and innovative materials - is a particular strength. "Technologies developed from production research also offer great potential for use in medical technology and in research for public health and food safety and are increasingly gaining a foothold in this field," explained DI Dr. Wilfried Enzenhofer, Managing Director of Upper Austrian Research GmbH.

From the left: DI Wolfgang Stadlbauer / UAR, Dr. Peter Burgholzer / RECENDT, State Councillor for Economics and Research Markus Achleitner, Dr.in Kathrin Kober-Rychli / K-Zentrum FFoQSI, Prof. Dr. Alexander Egyed / JKU Vice Rector for Research, Helmut Höller / FACC. © Cityfoto / Roland Pelzl

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TECHNOLOGY OFFER: Low-Cost Hyperspectral Chemical Imaging

More than just an image – Hyperspectral imaging for as low as € 500

Recent advances in mid-infrared (MIR) spectroscopy technology, accompanied by cost reductions of the hardware, enable cost-effective and flexible hyperspectral imaging solutions. In addition to an approximately 100-fold cost reduction to existing solutions our technology offers the advantage of high robustness and compact size, making it suitable for integration into handheld devices for the first time. This technology allows spectrally resolved imaging in the mid-infrared fingerprint region at video frame rate. This opens up a large number of applications wherever spatially resolved chemical information is of importance, like impurities or sorting according to chemical composition.

Spatially resolved chemical identification of macroscopic samples is requested in many fields such as industrial process analytics e.g. in food industry, as well as biomedical, pharmaceutical, forensic and cultural heritage science or in atmospheric gas sensing applications. Commercial MIR hyperspectral imaging systems are typically expensive, not portable, not capable of real-time acquisition and bound to fixed sample sizes. By careful selection of suitable low-cost hardware, we can offer customer specific low-cost solutions (< € 500 hardware costs possible) capable of spatially resolved MIR hyperspectral imaging of macroscopic samples at large distances of tens of cm.

This gives the unique opportunity to obtain spatially resolved chemical information, useful in a large number of industrial and scientific applications, for a very reasonable budget that also allows for mass production. Additionally, the high robustness and small size of the involved hardware components allows for a compact device that can easily fit in any measurement environment, such as handheld devices.
Spatially resolved Hyperspectral Image of four different types of glue, photograph (left) for comparison to spectral image (right), recorded by the novel device and processed by a classification algorithm. © RECENDT

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Nanoparticles Can Wrap Epithelial Cell Membranes and Relocate Them Across the Epithelial Cell Layer

Although the correlation between the inhalation of nanoparticles and development of cardiovascular diseases is well established, the specific molecular mechanisms of the nanoparticle action are not known. One possible pathway of the toxic action is the nanoparticle-induced coagulation via translocation of the tissue factor (TF) present in epithelial cell membranes to the bloodstream through the less than a micrometre thin air-blood barrier. This hypothesis has recently been assessed in a joint work of teams from Jožef Stefan Institute and University College Dublin, member of BioNanoNet, within the H2020 SmartNanoTox consortium. The researchers used advanced microscopy and spectroscopy techniques to show that the nanoparticles wrap themselves with epithelial-cell membranes, which might then relocate parts of the membrane across the epithelial layer. Proteomic analysis of the protein content in the nanoparticles wraps/corona after the uptake indeed reveals the presence of the coagulation-initiating factors, including tissue factor (TF) as well as factor X (fX) supporting the proposed causal link between the inhalation of nanoparticles and cardiovascular disease. The consortium then proposed a new adverse outcome pathway (AOP) based on these observations. This research has been published in NanoLetters (Nano Lett. 18: 5294-5305 (2018), https://doi.org/10.1021/acs.nanolett.8b02291).
AOP proposal: nanoparticle-induced fibrin clot formation

© School of Physics, University College Dublin

SmartNanoTox is a EU H2020 research and innovation project, funded under grant agreement No 686098.


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3rd EU-Asia Dialogue on Nanosafety

18th of March, 2019, Bangkok, Thailand

On 18th of March, 2019, the 3rd edition of the “EU-Asia Dialogue on Nanosafety” took place in Bangkok, Thailand. NANOTEC organized the event during the ASEAN Next 2019 conference held at Pullman Hotel (Soi Rangnam) in Bangkok. Over 70 participants from 16 nations attended to this dialogue.

The aim of the EU-Asia Dialogue on Nanosafety is to exchange information, knowledge and experience, as well as sharing resources between the major players from the EU and Asia. The 1st EU-Asia Dialogue on Nanosafety was held in Tehran, Iran, on 28th of November, 2017, followed by the 2nd EU-Asia Dialogue on Nanosafety on 29th of October, 2018, in Vienna, Austria. The main topic of the 3rd Dialogue event was “Occupational Exposures to Manufactured Nanomaterials and Waste Disposal”. The decision to focus on occupational exposure and waste disposal was based on the discussion held between OECD and CDC – The National Institute for Occupational Safety and Health (NIOSH) program which gives importance to life cycle assessment of manufactured nanomaterials and related exposure scenarios in workplaces.

The dialogue started with key note presentations and invited talks given by Asian and European experts, and continued with breakout sessions to discuss specific topics:

- Breakout Session 1 “Scientific Data Collaboration”
- Breakout Session 2 “Nano-Certification & Nanostandardisation”
- Breakout Session 3 “Social Dialogue and Governance”
- Breakout Session 4 “Nanosafety & Nanomedicine Characterisation”

Among others, the event was supported by the Austrian Federal Ministry for Transport, Innovation and Technology. Mag. Alexander Pogany gave a key note talk on the “Applicability of the Safe-by-design concept to the specific business case of nanoclay-containing plastic coffee capsules”.
Mag. Susanne Resch from BioNanoNet participated the dialogue event as EU delegate and held an invited talk on “Gov4Nano and the Malta Initiative”, presenting the new H2020 project Gov4Nano and its activities and efforts in the “Malta Initiative”, an initiative that aims to adapt existing OECD testing guidelines and guidance documents specifically for nanomaterials. In addition, she chaired the breakout session on “Social Dialogue and Governance” that facilitated the exchange between Asian and European nanosafety experts on these important topics.

Impressions of the 3rd EU-Asia Dialogue on Nanosafety in Bangkok, Thailand. ©NANOTEC

Gov4Nano has received funding from the European Union’s Horizon 2020 Research and Innovation Programme under Grant Agreement No 814401.
Leveraging Interprofessional Education to the Study of Nanosafety and Nanomedicine: Insights from the Horizon 2020 BIORIMA, GRACIOUS and NanoInformaTIX Projects Joint Training School

25th – 29th of March, 2019, Venice, Italy

Creating a meaningful dialogue about risk assessment and management of nano-(bio)materials through cross-cutting insights from nanosafety and nanomedicine fields was the mission a training school delivered by three EU-funded Horizon 2020 projects BIORIMA, GRACIOUS and NanoInformaTIX. 47 young researchers were brought together from across the globe (spanning Europe, North and Latin America) to learn from 26 nanotechnology experts at the historic centre of Venice, Italy, over the week of 25th to 29th March 2019, for intensive yet exciting training.

Inspired by the need to promote and foster a dialogue between the nanosafety and nanomedicine communities, the Programme Committee of the school came up with the novel idea to design a training school which combines Interprofessional Education (IPE) and Case-based Learning (CBL).

While IPE promotes engagement and learning from students/professionals with different backgrounds, CBL aims to link theory to practice by the application of knowledge to real-world problems.

Combining the two approaches allows that students use their background knowledge in an active way while developing new knowledge through interactions around the problems assigned to them in group work.

Turning this idea into practice, prominent key-note speakers featuring representatives from industry, academia, the Organisation for Economic Co-operation and Development and the European Commission were invited to join forces with world renowned nano-environmental,
health and safety, and biomedicine professionals to deliver the 1st interprofessional education nano-focused training school “Cutting Edge Approaches for the Risk Assessment and Management of Nano-(bio)materials: From the Lab to the Market”. Early stage researchers with different backgrounds (e.g. environmental science, chemistry, biology, physics, mathematics) were grouped together in highly interactive sessions to discuss and find solutions to problems posed on a number of diverse topics such as hazard to human health & environment, fate & exposure assessment, risk assessment & risk management, and nanomedicine. Further, the training was complemented with hands-on sessions on modelling, grouping and read-across approaches relevant for nano-(bio)materials risk assessment.

The school proved to be a successful synergistic effort among the three EU-funded projects BIORIMA, GRACIOUS and NanoinformaTIX, and made an important contribution to the training of a new generation of creative and innovative researchers from the cross-cutting disciplines of nanosafety and nanomedicine. Furthermore, the adopted teaching approach was warmly welcomed by students as manifested in the results from a post-event evaluation survey: nearly 70 % of the students completing the survey found that CBL is a more efficient way to acquire new knowledge.

One of the delegates commented:

“It was a great opportunity to network with students and researchers in the field, as well as a very constructive learning experience with interdisciplinary case studies.”

Another participant added:

“Group work, where people have different backgrounds, is very efficient. Case studies are great, they make you feel the subject”.

The three projects will continue to work together and are discussing new collaboration options with other EU-funded initiatives, with the aim to re-shape and deliver a future multidisciplinary nanosafety training agenda.
Project Facts:

**GRACIOUS** develops a highly innovative science-based framework to enable practical application of Grouping, leading to Read Across and classification of nanomaterials and nanoforms.

**Project Duration:** 42 months, starting in January 2018

**Consortium:** The GRACIOUS consortium consists of 23 partners spanning Europe and the USA, including representatives from academia, industry, policy makers and regulators.

**Total Budget:** 7.1 Million EUR

**BIORIMA** aims to develop an Integrated Risk Management (IRM) framework for nano-(bio)materials used in advanced therapy medicinal products and medical devices.

**Project Duration:** 48 months, starting in November 2017

**Consortium:** BIORIMA brings together Europe’s foremost experts in the fields of human and environmental safety assessment, nano-(bio)material analytical analysis and physico-chemical characterisation, in-silico modelling, exposure, and risk assessment. The BIORIMA consortium consists of 41 partners, spanning 14 countries in the EU. Additionally, there is strong global collaboration with partners also located in China and Japan.

**Total Budget:** 7.6 Million EUR

**NanoInformaTIX** aims to develop, validate and implement a sustainable informatics framework, based on modelling of the entire life cycle, for the risk assessment of engineered nanomaterials for informing safer design of quality products.

**Project Duration:** 50 months, starting in January 2019

**Consortium:** NanoInformaTIX gathers 36 partners from 18 European and 4 international countries (Taiwan, China, South Africa, Israel), counting on renowned experts in the fields of nanomaterials safety, modelling, computational chemistry, toxicology and eco-toxicology.

**Total Budget:** 7.7 Million EUR

BioNanoNet is part of the BIORIMA Consortium and coordinates related training activities. For further information, please contact Mag. Susanne Resch (susanne.resch@bionanonet.at).
Impressions of the 1st Interprofessional Education Training School in Venice, Italy. ©BIORIMA–GRACIOUS – NanoInformaTIX

These projects have received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 760928, No 760840 and No 814426.
8th Annual NIA-Symposium

27th of March, Brussels, Belgium

NIA a.s.b.l. welcomed members and guests to its 8th Annual Symposium in Brussels on March 27th 2019.

The day-long event addressed key aspects of successful commercial delivery of nanotechnologies, including societal position, novel applications, challenges through the business pipeline, plus policy and regulator future vision. The day included an afternoon focus on nano in waste, with an in depth look at latest research, current business practice and what the future might hold from a regulatory perspective.

Speakers were represented from the European Commission, ECHA, industry and research centres, with the event also featuring the ‘Project Corner’, with 18 H2020 projects linked to nanosafety and innovation. Catch up with the agenda, speakers and projects HERE.

BNN is associated partner of NIA a.s.b.l. and participated at the event, promoting Nano-GenTools and NanoCommons project.

NanoCommons and NanoGenTools project well represented at 8th NIA symposium. © NIA & BioNanoNet

NANOGENTOOLS project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 691095.

NanoCommons project has received funding from the European Union’s Horizon 2020 programme under grant agreement No 731032.
2nd Think Tank – Life Sciences in Digital Transformation
“Human beings in the focus of interest”

2nd of April 2019, Graz, Austria

Human.technology Styria GmbH, Know-Center GmbH and BioNanoNet Forschungs GmbH (BNN) hosted the 2nd Think Tank on "Life Sciences in Digital Transformation" on the 2nd of April 2019, hosted by the Medical University of Graz.

The Think Tank was officially opened by Prof. Stefanie Lindstaedt (CEO of Know-Center GmbH), Dr. Johann Harer (CEO of Human.technology Styria GmbH) - both organizations are BNN-members - as well as by Andreas Falk, CEO of BNN.

The event focused on the exciting topic of "Human telemetry - human beings in the focus of interest". Know-Center presented two important projects, on the one hand EMMA, a digital assistant to help older people to live independently for longer period, and on the other hand the MoreGrasp project, which is working on a thought-controlled neuroprosthesis.

Talking calendars that plan purchases, smart washing machines, and smart stoves that sound the alarm when lunch burns. Assistants who rely on AI give older people more and more opportunities to live longer time on their own. Active Assisted Living (AAL) is the name of the exciting field of research that is working to improve home-based care with state-of-the-art techniques. The main goal is everyday assistance systems that extend the quality of life within your own four walls while relieving caring relatives.

The Know-Center, Austria's leading research institution for big data and data-driven business, also places a strong focus on AAL – for example with the digital tool EMMA, which was presented at the event by Hermann Stern, Business Area Manager at Know-Center, and Thomas Diviak, CEO of the start-up e-innovation better life solutions, co-founded by Know-Center and responsible for the development of EMMA. What does EMMA do? The digital assistant helps to organize the care of elderly people. Specifically, people who look
after their parents, for example, are supported to find service providers who do the shopping, mow the lawn, or even cook. A digital marketplace for caregivers that should not replace family contact in any case. "Especially in nursing, people should and must continue to be the focus of attention," emphasizes Hermann Stern. "Whether it's health, home-care, or work-life balance – digital solutions can provide significant support without monitoring or replacing family ties." In addition, EMMA offers several Support modules such as drinking and appointment reminders. Know-Center CEO Stefanie Lindstaedt: "First and foremost, it's about creating an optimal support profile. A central question to be answered by the recommender: Which service provider suits me particularly well? People caring for their relatives should be given the opportunity to just spend time with their loved ones while not having to work at the same time."

Eduardo Veas, Deputy Area Head of the Knowledge Visualization research area, also presented the MoreGrasp project, which is working on a mind-controlled gripping neuro-prosthesis. MoreGrasp tackles the issue that more than half of all people with a spinal cord injury suffer from impairments of both hands, which leads to a huge decline in the quality of life. Functional recovery is possible with neural prostheses based on functional electrostimulation (FES) - but today's systems are neither intelligent nor intuitive. MoreGrasp aims to develop a multi-adaptive, multimodal user interface with brain-computer interfaces for intuitive control of a semi-autonomous engine.
Impressions of the 2nd Think Tank on Life Sciences in Digital Transformation. ©Know-Center GmbH

For further information, please visit www.know-center.tugraz.at.
First Knowledge Exchange Conference (KEC)

April 3rd, 2019, Amsterdam

The 1st Knowledge Exchange Conference aimed to identify possible synergies between the various industrial sectors involved in the regulation of nano-enabled products. In this context, this first Knowledge Exchange Conference (KEC) focused at capturing the experience and knowledge of sectors and communities which have been long using nano-enabled or nano-formulated products such as Food, Cosmetic, Chemicals, Medicinal product, Medical Devices. The conference tried to recognise those activities, projects and lessons learnt that could be of general interest. A focus during the conference has been set on the identification of common needs for standards, methods and tools. At this KEC-event, the project coordinator announced that the white paper on describing the refinement of standard testing methods is under development and will be prioritized in the summer period.

BNN was invited to participate in this event, contributed to the workshop and gained insights in the work of REFINE project, which further supports to connect this with the Gov4Nano-project as well as with national activities in the nanoEHS-field. BNN members TCD and EMPA are project partners in REFINE.

Group photo of the 1st KEC event in Amsterdam 3rd of April 2019. © REFINE Project
10th Anniversary of BioNanoMed Congress Series

15th – 17th of April 2019, Graz, Austria

From 15th to 17th April 2019, the 10th International Congress of Nanotechnology in Medicine & Biology took place at the University of Graz, Austria. The event provided a forum for researchers, engineers, students and practitioners from natural sciences, medical sciences and engineering, to discuss current, emerging and future trends of the converging fields of nanotechnology, biotechnology and medicine.

A great variety of different presentations were performed by international experts, addressing the key topic “Nanotechnology in Biology and Medicine”.

Specifically, the scientific sessions addressed the following topics:

- Nanomaterials for Medicine
- Nanotechnology in Medical Diagnostics and Therapy
- Pharmaceutical Nanotechnology in Research and Development
- Nanotechnology in Cancer and Immunotherapy
- Nano-enabled Microfluidics and high-throughput Technologies (supported by BioNanoNet Forschungsgesellschaft mbH)

The congress organized by Techkonnex – High-Tech Promotion and the University of Graz, in collaboration with Medical University of Graz, was again a remarkable success. More than 110 participants from 19 different nations were joining the BioNanoMed 2019 congress. Recent advances in nanomedicine and latest research results were presented and lead to inspiring discussions.

The Austrian nano-Community supported the BioNanoMed 2019, e.g. by organizing the session on microfluidics & high-throughput technologies, and bringing several international re-known speakers (members of BioNanoNet Association) to the event. Furthermore, post-
ers presented by young and active researchers, were awarded by the “Erwin Schrödinger Society for Nanosciences” sponsoring 4 poster prices.

BNN-memebers University of Graz and Medical University of Graz as leaders of the scientific organization of the conference, contributed to the further development and increased the visibility of excellent scientific work which is done by Austrian researchers. BNN is member of European Technology Platform Nanomedicine, coordinates the NanoMedicine-Austria group and thus is serving as the connecting point for nanomedicine in Austria. If you interested to get involved, please contact us.
BIOCHIP Berlin International Forum on Biochip Solutions offered a unique forum to review the present status, latest developments and future prospects from both commercial and academic worlds. The focal topics of the exhibition included Biochips, Microarrays, Microfluidics, Lab-on-a-chip, Organ/body-on-a-chip, Biosensors, BioMEMS and Bionanotechnology, Instruments and software. Opportunities, potentials and innovations in research and applications were discussed to identify new technology trends, development tools, product opportunities, R&D collaborations, and commercialization partners. Participants in the field of design, development and deployment of biochips, technologies, instruments, related products and services got a complete overview on the state of the art in these fields.

The project R2R Biofluidics (www.r2r-biofluidics.eu) was represented with a booth (supported by BNN), and an invited talk by project coordinator Dr. Martin Smolka (“Roll-to-Roll Imprinting and Microarray Spotting of Biosensors”).

Attendees had the opportunity to engage in comprehensive dialogue to gain technological insight and critical market information from the most influential players in the industry. The next conference will take place in Berlin on June 16th/17th, 2020!

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement n° 646260.

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Towards a New SusChem SIRA' Workshop

16th - 17th of May 2019, Brussels, Belgium

SusChem stakeholders met on 16 and 17 May in Brussels to work on the next SusChem Strategic Innovation and Research Agenda (SIRA), reflecting on the new opportunities and challenges to be faced in the next European research and innovation framework programme: Horizon Europe. This SusChem SIRA-dedicated workshop brought together members of the SusChem Board, the SusChem NTPs and experts from across Industry, Academia and SMEs, to finalise the technology content of the SusChem SIRA. The SusChem community continued a process that was initiated at the SusChem Stakeholders 2018 meeting, followed by nominations of experts and two consultation rounds. The communication of the new SusChem SIRA is expected at the upcoming 2019 SusChem Stakeholder meeting on 27 November 2019.

SusChem has been working on identifying technology priorities along its three main technology pillars: Advanced Materials, Advanced Processes and enabling Digital technologies. The new SIRA will reflect on the overall strategy and role of Sustainable Chemistry and Industrial Biotechnology in boosting innovation in Europe and tackling global challenges, in the context of Horizon Europe.

On day one, participants focused on four cross-cutting topics of high relevance for SusChem: 'Circular Economy', 'Process Intensification', 'Sustainability Assessment Innovation', and 'Safe -by-design innovation'. The second day of the workshop began with a summary of the outcomes of day one, followed by a panel discussion on strategic research priorities for Sustainable Chemistry and Industrial Biotechnology in the context of the transition to Horizon Europe.

Over the two days of the workshop a considerable number of ideas and initiatives were discussed and captured. Existing input from expert groups and the wider consultation process were reviewed and validated and technology gaps were identified with relevant input suggested. All-in-all an excellent basis for refining and completing the revised SIRA.
BNN participated in the workshop, representing the Austrian NTP SusChem-AT. Furthermore, BNN promoted the NanoGenTools-Spring School as well as the NanoCommons-TA-Call. Important information could be exchanged to increase the value of this strategic activity and involve Austrian scientific community, which is part of the activities in a national project funded by the BMBWF.

NANOGENTOOLS project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 691095.

NanoCommons project has received funding from the European Union’s Horizon 2020 programme under grant agreement No 731032.
Fifteen Seconds Festival 2019: 48 Hours for Curious Minds

6th – 7th of June 2019, Graz, Austria

“This year’s festival is going to be the best one yet because we are combining all the good things from the previous five,” promised co-founder Stefan Stöcklschweiger at the Opening Ceremony on the evening before Fifteen Seconds Festival 2019. And the festival delivered on its promise: A record-breaking 6,127 attendees, 300 international speakers, and more than 200 exhibitors and partners have made 2019’s event the biggest one so far.

After opening words from Fifteen Seconds’ founders, productivity guru David Allen (“Getting Things Done”) kicked things off on the Main Festival Stage, one of eight stages at Fifteen Seconds Festival 2019. The “festival for curious minds” has extended its platform this year, introducing new areas dedicated to science, mobility, and technology in addition to the business and startup areas known from previous years. Consequently, Fifteen Seconds brought big names from a variety of fields to Graz this year, among them Eriona Hysolli from Harvard Medical School (Science Stage) who talked about her cutting-edge research into genome editing and de-extinction; serial entrepreneur and Skype investor Morten Lund (Startup Stage) who shared with the audience his insights into high-end sustainable movement; and famous Internet critic Andrew Keen (Main Festival Stage) who shared his thoughts on “how to fix the future.”

“We thought that technology would enrich democracy, that everyone has a voice – we were wrong.” Now, says Keen, the future needs fixing: “There’s no app [for that]. It’s going to take generations, but we need to start NOW.” After 48 hours of knowledge transfer, networking, and exploring the 15,000 sqm expo area, Fifteen Seconds Festival 2019 was closed by British entertainer and leadership consultant Andrew Tarvin. His message: Humor is the number one missing skill in the workplace and in people’s lives. “If you get people to laugh, you get people to listen and if you get people to listen, you get them to learn.”

After a highly successful 2019 edition, Europe’s leading festival for business, creativity, and innovation has already announced its date for next year: Fifteen Seconds Festival 2020 will take place on June 4 and 5 at Stadthalle Graz. https://fifteenseconds.co/en/festival

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EuroNanoForum 2019

12th – 14th of June 2019, Bucharest, Romania

The 9th edition of the EuroNanoForum conference took place from 12 – 14 June, 2019 in Bucharest, Romania, at the Palace of Parliament. The most significant European conference was offering opportunities to debate on industrial application of research results and future strategic research priorities in the area of Nanotechnology and Advanced Materials of the Horizon 2020 NMBP Programme and beyond. ENF2019 brought together in the conference sessions over 90 speakers from industry, scientific community, European Clusters and Technology platforms and stakeholders. They could debate on topics related to advanced materials and nanotechnologies for energy, healthcare, safe by design & open innovation testbeds, nano for EU re-industrialisation, nano and multiscale modelling and characterisation, and instruments for nanomaterials application.

Furthermore, within thematic workshops, the conference opened the floor for in depth discussions, the exhibition enabled connecting with e.g. EU NanoSafetyCluster (with a huge joint booth with 18 projects participating in, performing a two-days-program entitled “Focus on Nanosafety”), etc. and the poster sessions offered a nice stage for young scientists to present their excellent work to the community.

BNN has been very active at the event, representing three EU-H2020-projects (R2R Biofluidics, ACEnano, NanoCommons) and performing the following contributions:

- Poster presentation: „Fabrication of Bioanalytical Microfluidic Lab-on-Chip Devices by Roll-to-Roll (R2R) Nanoimprinting“
- EU NanoSafetyCluster booth participation (e.g. meet the NSC-community, meet the experts)
- Invited talk at NanoSafetyCluster-Workshop entitled „Nanosafety and Innovation: towards safe innovation“
- Moderation of the “SESSION 4.2 Nano Biomaterials and nanomembranes”
Connecting with scientists and “meet the experts” activity.

BNN-member Vladimir Lobaskin presenting (below picture) at the NanoSafetyCluster booth during ENF 2019.

EU NanoSafetyCluster Coordination team members at the NanoSafetyCluster booth during ENF 2019. All pictures © BioNanoNet

These projects have received funding from the European Union’s HORIZON 2020 research and innovation programme under grant agreement No 720952, No 731032 and No 646260.
BioNanoNet conference calendar

BioNanoNet events

BioNanoNet Annual Forum 2019
When? 10 September 2019
Where? Salzburg, Austria
REGISTRATION

2nd AMI (Austrian Microfluidics Initiative) Event: Workshop "Biomedicine on Biochip"
When? 11 September 2019
Where? Salzburg, Austria
REGISTRATION

BioNanoNet on site events

Brokerage Event on KETs NMBP - Call 2020 & 360°
When? 27 June 2019
Where? Strasbourg, France
For more information visit the BioNanoNet website!

NANOTEXNOLOGY 2019
When? 29 June – 6 July 2019
Where? Thessaloniki, Greece
For more information visit the BioNanoNet website!
International Young Scientist Forum 2019

When? 9 – 10 September 2019
Where? Salzburg, Austria

The 1st International Young Scientist Forum will be organized as a satellite event of the International Particle Toxicology Conference (IPTC) and will take place in Salzburg, Austria on 9th and 10th September 2019.

The event is an open forum specifically dedicated for young investigators (i.e., students, PhD candidates and early stage post docs) working in all fields in the broader area of particle and fibre toxicology. This forum will not only discuss state-of-the-art science to broaden the scientific knowledge of the participants but allow the young researchers to benefit as well from several specifically designed interactive sessions to advance their own career and research. In particular, the forum aims to foster the spirit of teamwork among the participants, providing the opportunity to network globally and to establish own professional networks. Each participant will receive a certificate of attendance highlighting the contents of the forum. Furthermore, all young investigators will have the opportunity to win several prestigious awards (Best Poster Award / Best Talk Award / Best Team Award).

Abstract submissions are welcome in all relevant fields connected broadly to the overarching topic of particle and fibre toxicology including material synthesis & characterization, exposure assessment, toxicology & ecotoxicology, modelling, risk assessment and risk management.

Key Facts:

- **Date:** 09th – 10th of September 2019
- **Location:** University of Salzburg, Austria
- **Size:** Approx. 50 – 70 participants
- **Target Audience:** Early Stage Researcher (ESR) (including everybody up to 3 years after PhD graduation)
- **Topics:** All topics related to particles in general (including but not limited to nanoparticles and particle-enabled technologies)
BNN-member Allergy-Cancer-BioNano Research Centre of the University of Salzburg (ACBN), as organizer of the IPTC2019, locally supports the Young Scientists forum. Furthermore, ACBN together with Bundesinstitut für Risikobewertung (BfR); University of Birmingham; as well as BioNanoNet (BNN) are consortium partners in the H2020 project NanoCommons and belong to the organisation committee of the event. If you have any further questions, please don’t hesitate to contact Beatriz Alfaro.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 731032. www.nanocommons.eu

International Particle Toxicology Conference

When? 11 – 13 September 2019
Where? Salzburg, Austria

For more information visit the BioNanoNet website.

4th International Conference on Nanotechnologies and Biomedical Engineering

When? 18 – 21 September 2019
Where? Chisinau, Moldova

For more information visit the BioNanoNet website.

EU Research and Innovation Days

When? 24 – 26 September 2019
Where? Brussels, Belgium

For more information visit the BioNanoNet website.

Open Campus “Precision Medicine”

When? 22 October 2019
Where? Graz, Austria

For more information visit the BioNanoNet website.

For all events visit our BioNanoNet website!
# BioNanoNet Member-Event-Notifications

## #Selber Machen – Do Innovation Yourself

**When?** 18 June 2019  
**Where?** TU Graz, Institut für Innovation und industriemanagement, Labor für Innovation, Inffeldgasse 11/3  
**Organizers:** TU Graz, Green Tech Cluster & Human.technology Styria  
For more details visit the [HTS website](#).

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## Final project conference YoungTECHforFOOD

**When?** 02.07.19 10:00 am - 1:00 pm  
**Where?** Graz, Austria (Bildungshaus Schloss St. Martin | Kehlbergstraße 35 | 8054 Graz)

[https://www.fh-joanneum.at/youngtechforfood/](https://www.fh-joanneum.at/youngtechforfood/)

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## FF4U @ Technologiepark SPACE ONE

**When?** 10 September 2019, 16:30 p.m.  
**Where?** Technologiepark Space One, Kratkystraße 2, 8020 Graz

This event is a cooperation with ACstyria Mobilitätscluster and Technologiepark Space One.  
For more details visit the [HTS website](#).
Advancing Adverse Outcome Pathway (AOP) Development for Nanomaterial Risk Assessment

When? 11 – 12 September 2019
Where? Paris, France

You are invited to two workshops: Advancing Adverse Outcome Pathway (AOP) Development for Nanomaterial Risk Assessment and PATROLS Stakeholders Workshop to be held on the 11-12 September 2019 at the OECD Conference Centre, Paris.

Sept 11: OECD Workshop jointly organized with EU H2020 projects SmartNanoTox and PATROLS

This workshop will bring together AOP and manufactured nanomaterials (MN[NG-N1] ) research, regulation and policy experts to discuss the use of Adverse Outcome Pathway (AOP) frameworks to support future NM risk assessment. It will include presentations and discussions on three related projects:

- The OECD WPMN NanoAOP project aiming to develop an approach to advance the future development of AOPs for NMs using existing nanotoxicology literature;
- The EU H2020 SmartNanoTox project, using in vivo, in vitro and in silico research to develop MN-relevant AOPs in the respiratory pathway; and
- The EU H2020 PATROLS project, developing non-animal (in vitro) models and computational tools targeting the key events in established AOPs.

The workshop will include presentations and break-out discussions to disseminate and gain expert input on the results of these projects. Experts will comment on how outcomes from these three related projects can be used advance future AOP development to support decision making (e.g. grouping, categorization, read-across, and/or quantitative dose response relationships) and to derive regulatory oversight.

Sept 12: PATROLS Project Stakeholder Workshop

PATROLS (Physiologically Anchored Tools for Realistic nanOmateriaL hazard aSSessment) is holding a stakeholder workshop to present and discuss advanced methods and tools being developed within the project, which can also be used to support development of AOPs for nanomaterial hazard assessment.

The workshop will include presentations on advanced systems in the areas of: Ecotoxicology; In silico hazard testing systems; In vitro human tissue models; and characterisation in biological systems. The aim of the workshop is to showcase and seek stakeholder feedback on tools being developed within PATROLS, and participants are encouraged to take an active role in our discussions.

For more details visit the event website!
Workshop "Micro-nano Technologies for Integrated Microscopy"

When? 16 September 2019, 13:30 – 17:00 p.m.

Where? Belgrade, Serbia

The EC funded project ChipScope is developing the first chip-sized optical microscope with super resolution capabilities.

All interested people are invited to attend the public workshop "Micro-nano Technologies for Integrated Microscopy" on 16 September 2019 in Belgrade (during the international MCM congress - Multinational Congress on Microscopy).

Download >> Workshop Programm and visit the event website for more details!

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20 years Materials Center Leoben Forschung GmbH

… let’s celebrate:

When? 20 – 22 November 2019

Where? Leoben, Austria

The Materials Center Leoben Forschung GmbH invites existing and future partners from academia and industry, sponsors, stakeholders as well as alumni and employees to the celebration of its anniversary “20 years MCL” on Wednesday afternoon, 20 November 2019 in Leoben, Austria. Linked with this anniversary, the MCL is organizing an international conference “IC-MPPE 2019”. The conference aims to bring together partners from industry and university research institutes in the framework of the COMET research program "Integrated Computational Materials, Process and Product Engineering (IC-MPPE)".

Event registration

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AICI forum Villach

When? 06 – 07 December 2019

Where? Congress-Center Villach, Europapl. 1, 9500 Villach

For more details visit the HTS website.
Finally

We hope you enjoyed our BioNanoNet newsletter!
Please do not hesitate to contact us if you would like to give us any suggestions or feedback!

Our next BioNanoNet newsletter will be published in September 2019.

BioNanoNet partners are welcome to send their contributions until 20th of September 2019!

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Your BioNanoNet team

from the left …

Christa Schimpel, Beatriz Alfaro Serrano, Susanne Resch, Andreas Falk, Christine Halbedel, Angelika Halbedl-Herrich, Simone Jagersbacher and Nikolaus Ladenhauf

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