

BIO \_\_\_\_\_  
NANONET

# NEWSLETTER

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March 2018

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## Finally

## Editorial - *Contemporary issues from the network*

Ladies and Gentlemen,

we hope, you had a good start into 2018. Kick-starting this year, BioNanoNet brought **nano-medicine** to the public: via a [TV interview](#), in an Austrian public radio magazine “Wissen spezial”, by the [NanoWorldCancerDay](#), the [2<sup>nd</sup> NanoMedicine-Austria-Day](#), and the event “[Open Campus: Future of nanomedicine](#)”. Additionally to all these activities, the FET flagship proposal “**Nano4P – Precision Nanomedicine for People, an (almost) invisible revolution**“, coordinated by [CIBER](#), one of our new members, is the highlight and the activity with the highest importance for the European nano-landscape. It clearly states what nanotechnology can enable to disruptively change healthcare in Europe and globally. Science and research will need dedicated support to reach the ambitious goals and to make the vision become reality: Nanomedicine has the potential to be the game changer in healthcare, how we treat patients, how social and economic burden can be conquered and overcome and especially to increase quality of life for everyone. To meet the requirements in the field of nanomedicine, sound characterisation and safety assessment by using standardized and quality assured methods/models are needed. Thus, BioNanoNet community compiles the 2018 edition of the **Nanotox & Nanosafety Compendium**. If you are interested to learn more about this and / or to contribute your high quality expertise, please contact [us](#).

Furthermore, spring time is perfect to initiate new consortia for European calls which have their deadlines next 6 – 12 months. Based on the very positive feedback after our networking event along the 2<sup>nd</sup> NanoMedicine-Austria-Day, we announce already now our [autumn meetings](#) (Graz, September 12<sup>th</sup>, 3:00 pm till September 14<sup>th</sup>, 1:00 p.) which will create space for starting collaborations with BioNanoNet-members as well as on September 13<sup>th</sup>, 1:00 – 7:00 pm also to connect non-members with the BioNanoNet-community. Knowing the huge potential of BioNanoNet network, we kindly invite also the broader community to get a look on the expertise and competences available. In case you are interested to become member or to participate in the 2018-autumn-meeting, just contact [us](#).

Sincerely,

BioNanoNet-Team

## BioNanoNet news

### New BioNanoNet members

It is a pleasure to welcome our new [BioNanoNet extraordinary members](#):

Centro de Investigacion Biomedica en Red (Ciber-BBN)

*ciber-bbn isciiii*

[www.ciber-bbn.es](http://www.ciber-bbn.es)

Institute for Medical Research and Occupational Health (IMI)



[www.imi.hr](http://www.imi.hr)

School of Physics UCD Science Center - North, University



[www.ucd.ie](http://www.ucd.ie)

TEMAS AG



[www.temas.ch](http://www.temas.ch)

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## New BioNanoNet staff

On 15<sup>th</sup> of January 2018 Mrs. Alfaro Serrano joined the BioNanoNet team. We are pleased to welcome Beatriz to our BioNanoNet team!



**Beatriz Alfaro Serrano**  
**Scientist**

Beatriz Alfaro Serrano is part of the BioNanoNet team since January 2018. She comes from Spain and after enjoying an Erasmus student program at the Graz University of Technology in 2003/2004 and finishing her studies as Telecommunications Engineer in 2005 in Spain she decided to come back to Graz to work there. In the last couple of years, she has been working as a project manager for different technical and technological companies as Enso-Detego GmbH and AVL GmbH. Now she works as a scientist at BioNanoNet.

Mrs. Alfaro Serrano can be reached at the phone number +43 699 15526607 and at the email address [beatriz.alfaro@bionanonet.at](mailto:beatriz.alfaro@bionanonet.at).

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## BioNanoNet *project presentations*

### NanoCommons



In January 2018, 14 partners from 7 European countries including one from USA met in Salzburg (Austria) to kick off the project NanoCommons, acronym for “The European Nanotechnology Community Informatics Platform: Bridging data and disciplinary gaps for industry and regulators”, which is funded within the *HORIZON 2020 EU research and innovation programme*. The meeting took place at the premises of University Salzburg, hosted by the group of Prof. Albert Duschl ([Allergy-Cancer-BioNano Research Centre - ACBN](#)). Together with BioNanoNet, they are representing Austria as partner in this 4-years EU-project, which is funded with a total of approx. 5,4 Mio Euro.

The **focus** of the NanoCommons project is to create an openly accessible e-infrastructure of scientific and cutting edge and managerial excellence provided by a combination of research intensive academic groups and SMEs serving the current and future (unmet) needs of the key research communities and pivotal industrial users and regulators. As such NanoCommons will bring pan-European added value and innovation opportunities, by answering the increasing demands concerning the **prediction of safety of existing and new nanoscale materials for health and environmental sustainability**. By specifically addressing the health and safety aspects of nanomaterials or other novel and emerging materials (NEMs) and providing solutions to industry and regulatory bottlenecks to commercialisation of nano-enabled products (as identified in EU Nanosafety Cluster (NSC) “Closer to the market” research roadmap<sup>2</sup>) NanoCommons is poised for enormous impact.

Nanotechnologies and the resulting novel and emerging materials (NEMs) represent major areas of investment and growth for the European economy. Recent advances have enabled confidence in the understanding of what constitutes toxicity of NEMs in relation to health and environmental hazards. However, the nanotechnology and nanosafety communities remain disparate and unconnected, whilst knowledge and data remain fragmented and inaccessible,

such that from a data integrating and mining perspective it is clearly a “starting community”. The field, and indeed the European open knowledge economy, requires conversion of these scientific discoveries into legislative frameworks and industrial applications, which can only be achieved through concerted efforts to integrate, consolidate, annotate and facilitate access to the disparate datasets.

NanoCommons brings together academia, industry and regulators to facilitate pooling and harmonising of methods and data for modelling, safe-by-design product development and regulatory approval purposes, thereby driving best practice and ensuring maximum access to data and tools.

*Networking Activities* span community needs assessment through development of demonstration case studies (e.g. exemplar regulatory dossiers).

*Joint Research Activities* will integrate existing resources and organise efficient curation, preservation and facilitate access to data/models.

*Transnational Access* will focus on standardisation of data generation workflows across the disparate communities and establishment of a common access procedure for transnational and/or virtual access to the data, and modelling and risk prediction/management tools developed and integrated.

The partners in the project, which has a duration of four years (2018 – 2021), come from academia, industries and organisations in 7 European countries and USA and are experts in their fields, covering nanosafety assessment, nanoregulation, nanoinformatics, nanomedicine, nanomaterials and emerging materials research.

The project coordinator is Professor Iseult Lynch from the University of Birmingham (United Kingdom). Further information about the NanoCommons project, updates on developments, and the role of BioNanoNet can be found [here](#). The official project webpage will be launched soon.





*Picture of the NanoCommons project Kick-Off meeting in Salzburg, Austria*

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731032.*



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## BioNanoNet *success stories*

# SbD-AT Safe-by-Design: Relevance and Added Value for Austrian Companies

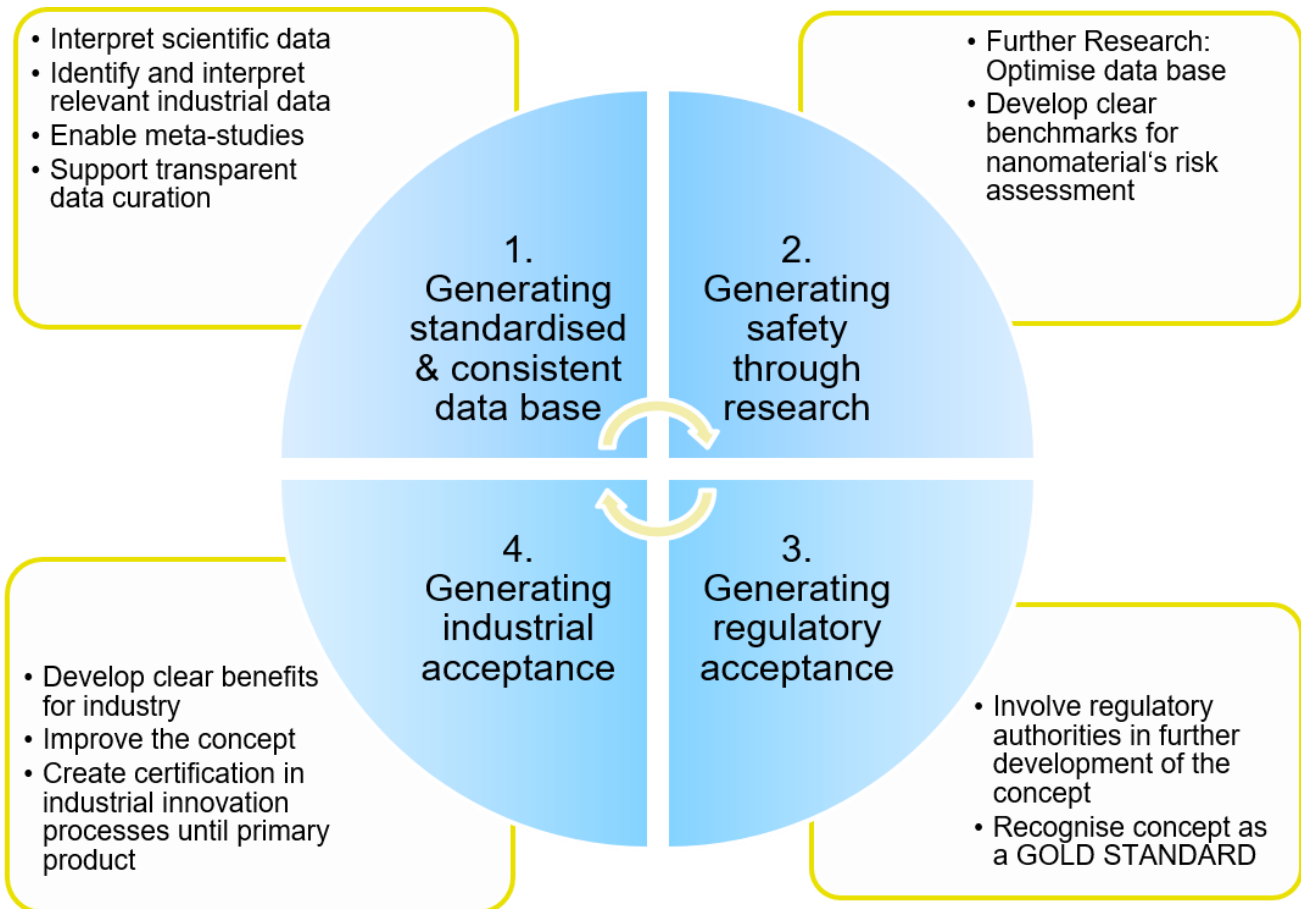
**SbD-AT**  
Safe-by-Design



A Safe-by-Design concept was developed in the course of the EU FP7 project NANoREG in order to support the safe development of nanomaterials. This concept focuses on assessment, evaluation and reduction of potential risks for humans and the environment posed by nanomaterials. The national project SbD-AT aimed to assess various aspects regarding the **potential implementation of Safe-by-Design concepts in industrial innovation processes**. Moreover, this study aimed at identifying and analysing **perceived advantages and disadvantages, risk awareness and acceptance barriers of the Safe-by-Design concept from a scientific and industrial perspective**. For this purpose, expert interviews with 17 national and international experts, as well as problem-centred interviews with 14 Austrian companies from the (i) biocidal, (ii) nanomedical and (iii) textile industry were conducted. The following table shows examples of perceived strengths and weaknesses of the SbD concept from experts' point of view, and drivers and barriers on implementing the SbD concept from industries' point of view:

Strengths	Weaknesses	Drivers	Barriers
<ul style="list-style-type: none"> <li>■ Safety issues are considered from the very beginning in the innovation process</li> <li>■ Step by step approach that can be integrated in existing processes</li> <li>■ Potential decision support for industry</li> <li>■ Reduction of animal testing</li> <li>■ Increased general awareness on nanosafety issues</li> </ul>	<ul style="list-style-type: none"> <li>■ Implementation/practical use too abstract</li> <li>■ Lack of standardised tools and analytical methods</li> <li>■ High complexity, external experts necessary</li> <li>■ Wording: term „safe“ promises too much</li> <li>■ (Up to now) no broad acceptance</li> </ul>	<ul style="list-style-type: none"> <li>■ Concept required, if the use of nanomaterials increases</li> <li>■ Early intervention in innovation processes</li> <li>■ Process optimisation for the development of new products and active agents</li> </ul>	<ul style="list-style-type: none"> <li>■ No nanomaterials currently used</li> <li>■ Missing commercial incentive/ clear benefit</li> <li>■ (Technical) feasibility questioned</li> </ul>

Based on the advantages and disadvantages of SbD highlighted above it remains open to question, if the identified problems and barriers are in contradiction to the potential added value for Austria - e.g., strengthening Austria as a technology location – by implementing the SbD concept. Although a precise answer to this question is hard to deduce, recommendations were derived from all conducted interviews, dialogs and workshop activities, in order to address the identified weaknesses and barriers:



The recommendations (i) **generating standardised and consistent database**, (ii) **generating safety through research**, (iii) **generating regulatory acceptance**, and (iv) **generating industrial acceptance** clearly show the main topics for future activities. Furthermore, the recommendations address issues that still need further efforts in order to fully exploit the potential of the SbD concept and to ensure that added value can be generated in a sustainable way.

**Consortium:**

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*This project received funding in the frame of the 4<sup>th</sup> national call of the programme **Nano Environment, Health and Safety (NANO EHS)**.*

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## BioNanoNet *member presentations*

# CIBER - Consorcio Centro de Investigación Biomédica en Red

ciber-bbn



**CIBER** (Consorcio Centro de Investigación Biomédica en Red, M.P, [www.ciber.es](http://www.ciber.es)) is a public research consortium set up in 2006 as an initiative of the “*Instituto de Salud Carlos III*” (ISCIII). Its aim is to further excellence research in Biomedicine and Health Sciences. CIBER is composed by 11 different consortiums (Bioengineering, Biomaterials and Nanomedicine [CIBER-BBN](http://www.ciber-bbn.es), Liver and Digestive Diseases [CIBEREHD](http://www.ciber-rehd.es), Cardiovascular Diseases [CIBERCV](http://www.ciber-cv.es), Oncology [CIBERONC](http://www.ciber-onc.es), Rare Diseases [CIBERER](http://www.ciber-rd.es), Respiratory Diseases [CIBERES](http://www.ciber-res.es), Epidemiology and Public Health [CIBERESP](http://www.ciber-esp.es), Physiopathology of Obesity and Nutrition [CIBEROBN](http://www.ciber-obn.es), Fragility and Healthy Aging [CIBERFES](http://www.ciber-fes.es), Mental Health [CIBERSAM](http://www.ciber-sam.es), Diabetes and Associated Metabolic Diseases [CIBERDEM](http://www.ciber-dem.es)). (See video at <https://youtu.be/N11nyZClxCA> ).

**CIBER’s Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN)** ([www.ciber-bbn.es](http://www.ciber-bbn.es) ) is an independent research centre as regards scientific management, although it is a subject area within CIBER, a unique research structure in Spain in the field of biomedical research that has a huge scientific potential. CIBER-BBN subject area currently consists of 47 research groups, selected on the basis of their scientific excellence, primarily working within three scientific programmes: 1. Bioengineering and Medical Imaging, 2. Biomaterials and Advanced Therapies and 3. Nanomedicine. CIBER-BBN has been carrying out its work since 2007, providing support, training, infrastructures and resources to researchers and therefore helping to promote scientific research in Spain.



CIBER-BBN Research Groups

The centre's activity focuses on the **development of prevention, diagnosis and follow-up systems**, the **development of technologies related to specific therapies and regenerative medicine and nanotherapies**.

“**CIBER-BBN's vision** is to be a **reference in research and innovation at national and internationally level**, positioned as a leader in research on technological breakthroughs and the transfer of that research to clinical practice. Our **mission is to conduct research of excellence aimed at ultimately transferring results to industry and translating them to clinical practice** through the development of the scientific areas of **bioengineering, biomaterials and nanomedicine**”.

The four structural objectives of CIBER-BBN to promote and protect health by means of encouraging basic research and research aimed at clinical and translational aspects are:

- **To maintain the excellent level of scientific-technological quality** achieved in these years of operation.
- **To promote collaboration between CIBER-BBN research groups** by potentiating stable alliances that allow combining basic and clinical research, **as well as the formation of multidisciplinary teams**.
- **To favour translation by establishing the required channels** so that the research conducted in CIBER-BBN can result in improving patient health.
- **To make it easier to transfer the results of the research groups to companies** through patents, joint publications, collaborations for the creation of new technology firms, providing advisory services to companies and their employees in connection with research, technology and innovation.

CIBER-BBN is composed by a Research Programme and five other Transversal Programmes (Industrial Transference Progr., Translational Research Progr., Training and Qualification Progr., Internalization and Dissemination Progr.).

The **Research Programme** is divided in six main Research Lines: (i) Multimodal Diagnostics, (ii) Intelligent Devices and Systems, (iii) Gene therapy and cell therapy, (iv) Tissue engineering, (v) Nanodiagnosis and (vi) Therapeutic Nanosystems. Inside this programme different type of research projects are developed, focused on specific pathologies, with clinical entities and in collaboration with CIBER-BBN's Equipment Platforms.

The **Industrial Transference Programme** is one of the priority aspects for CIBER-BBN. To promote the transfer of technologies developed in its hospitals, universities and public research institutions to business and industrial networks actions which make knowledge and technology transfer from the scientific environment to the production environment easier and more dynamic implemented in CIBER-BBN are [CIBER-BBN - Industrial Forums](#), [Calls for Transfer Projects](#) and its Technology Offer.

Inside the **Translational Research Programme**, the translation in the biomedical field is understood as the application of basic knowledge acquired in the research laboratory to clinical practice for the purpose of improving medical assistance. This type of research is a necessary element for the success of any strategy that seeks to improve citizen health through specific programmes. Two of the main activities that CIBER-BBN performs in this programme are: [CIBER-BBN forums and clinical events](#) and a site in the webpage for [Resource of interest: European and Spanish legislation](#).

CIBER-BBN's **Training Programme** objective is to increase the research capacities of the integrated staff by means of improving the professional competency of researchers, as a factor of change, transforming attitudes, knowledge and skills depending on the needs that arise as they develop their research activity. Two different types of grants are available: (i) Grants for Research Initiation Training and (ii) Grants for Mobility.

Furthermore, CIBER-BBN counts with an outstanding **Scientific and Technological Equipment Platform** for the Production and Characterization of nanomaterials, biomaterials and systems in biomedicine. It is called **NANBIOSIS – ICTS** ([www.nanbiosis.es](http://www.nanbiosis.es)).

NANBIOSIS is an integrated platform with cutting-edge scientific and technological infrastructure and its scientific coordinators from the different units are among the best Spanish researchers in the areas integrated in the scope of activity of the infrastructure. NANBIOSIS consists of 27 units coordinated under a one-stop shop model. Together, these units offer a complementary service including the design and production of biomaterials and nanomaterials as well as the characterization of these bio- and nanomaterials, tissues, medical devices and systems from a physicochemical, functional, toxicological and biological viewpoint (including the preclinical validation), focusing on biomedical applications.

All this potential, which allows from developing a therapeutic agent to entering the preclinical validation, under the auspices of NANBIOSIS, backed by some of the best Spanish research

groups in bioengineering, biomaterials and nanomedicine, is open to the scientific community under specific conditions.

Some of CIBER-BBN's highlights of the last few months are:

### ■ **“Precision Nanomedicine for People” (Nano4P)**

CIBER-BBN along with other leading partners from various European countries, such as Prof. Jürgen Borlak (Hannover Medical School), Prof. Fabio Biscarini, (University of Modena and Reggio Emilia), Prof. João Mano (University of Aveiro), Prof. Adriele Prina-Mel. lo (Trinity College of Dublin), Mr. Andreas Falk (BioNanoNet ForschungsGmbH), Prof. Cesare Furlanello (Fondazione Bruno Kessler), Prof. Berthold Huppertz (Biobank Graz), Dr. Peter Wick (EMPA), Prof. Manuel Serrano (IRB) and Dr. Claire Skentelbery (Nanotechnologies Industries Association) are setting up the **“Precision Nanomedicine for People (Nano4P)” Flagship Initiative** ([www.nano4p.eu](http://www.nano4p.eu)).



***Nano4P aims to develop material science and nanotechnology-based highly precise tools for the detection and tailored treatments of diseases, based on the unique characteristics of each person and taking advantage of stratification and molecular-level information.***

Nano4P is the response to the EU call FET-Flagships: “Tackling grand interdisciplinary science and technology challenges”. To get the expected outcome and an added value for Europe in the healthcare sector, the close collaboration of a large number of different scientific disciplines, industries, public regulatory agencies and nanosafety agents is mandatory. Within the Nano4P initiative, the different stakeholders will co-ordinate to foster an integrative approach aiming to improve and accelerate the translation of advanced personalised nanomedical research into products.

A website has been launched ([www.nano4p.eu](http://www.nano4p.eu)) where you can find more information about the project and participants. You can show adhesion to the initiative in the "SUPPORT NANO4P" section by filling in the online template.

If you believe that Precision Nanomedicine is the right field to ‘become a game changer’ in impacts on economy and society, benefitting European citizens and paving the way for global



technological and industrial leadership in the Health and Life Science area, **we cordially invite you to support Nano4P**. The interplay of all of us will definitively strength the Initiative as well as will build a network of excellence leading from the invention and development of disruptive technologies to the needs of the European society.

**“...The time for precision nanomedicine has come to stay...”**

## ■ **“Integrated Precision Medicine Research Center of Excellence – IPMT CoE”**

The European project "Integrated Precision Medicine Research Center of Excellence - IPMT CoE" is funded by the European Commission under the "Spreading Excellence and Widening Participation" programme (TEAMING for Excellence (CoEs) call) whose objective is the creation of a multi-



disciplinary center inspired by research and innovation with the potential to become one of the leading centres in the development of new technologies that allow, drive and accelerate the development, translation and application of personalized medicine.

The coordinator of the proposal is the University Cyprus (UCY). The project intends to benefit from the successful experience of CIBER-BBN to apply it for the development of a new high-capacity center in Cyprus that will become a new benchmark at national and international level. The proposal counts among its regional partners with the largest hospital centers in the country, the Ministry of Health / General Hospital of Nicosia (MOH) and the Institute of Neurology and Genetics of Cyprus (CING) as well as private medical organizations and SMEs. CIBER-BBN and the Fraunhofer Institute for Biomedical Engineering (IBMT) in Germany are the reference advisory centers chosen on this occasion to act as mentors to the Cypriot university.

CIBER-BBN will host the third meeting of the project the 22<sup>nd</sup> and 23<sup>rd</sup> of March in Barcelona.

## ■ The development a microfluidic microchip that replicates the human blood-retina barrier

A team of scientists of CIBER-BBN, together with scientists of the CNM-CSIC and CIBER-DEM, have developed a microfluidic device that reproduces the blood-retinal barrier. The work, cover page of the journal Lab-on-a-chip, is what is called a "proof of concept". It shows that the idea imagined by scientists works.



The microdevice consists of several parallel compartments, in which different types of cells have been cultivated to emulate the structure of cellular layers of the retina. These, are endothelial cells that form the internal part of the barrier, in contact with the blood capillaries, through which oxygen and nutrients reach the retina. In addition, it is also composed of neuronal cells (which form the neuroretina), and pigment epithelial cells, which constitute the outer layer.

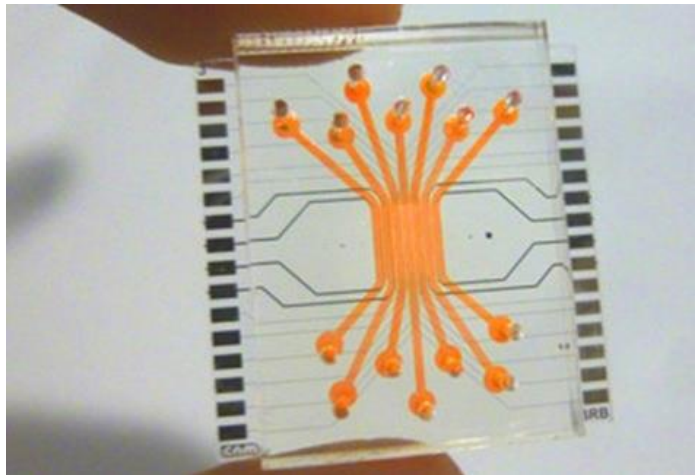
The compartments are interconnected in their lower part by a network of microgrooves, so as to allow an intercellular communication through the exchange of signaling molecules between cells. Thus,

cells can send their signals to others and interact, much like they would in a living organism. In addition, the microdevice allows the endothelial cells to be subjected to the mechanical stimulus induced by the flow to emulate a more physiological microenvironment. The correct formation of the blood-retinal barrier has been evaluated by performing permeability, electrical resistance tests, as well as protein expression of tight junctions between cells. These tests were intended to verify that the barrier is well formed, that it has been closed, but maintains natural permeability, sufficient to allow the passage of nutrients and oxygen, and that the cells are in contact and interact with each other.

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**Bibliographic Reference:**

“A compartmentalized microfluidic chip with crisscross microgrooves and electro-physiological electrodes for modeling the blood–retinal barrier”. *Jose Yeste, Marta García-Ramírez, Xavi Illa, Anton Guimerà, Cristina Hernández, Rafael Simó and Rosa Villa.* [DOI: 10.1039/C7LC00795G](https://doi.org/10.1039/C7LC00795G) *Lab Chip, 2018, 18, 95-105.*



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■ **Researchers from CIBER-BBN and CIBEREHD create the Barcelona Liver Bioservices spin-off**

Researchers of CIBER-BBN (Bioengineering, Biomaterials and Nanomaterials) and CIBEREHD (Liver and Digestive diseases) constituted last October the spin-off company “Barcelona Liver Bioservices” (BLB). The company designs and develops pre-clinical studies in the field of liver diseases and hepatotoxicity.

The co-founders of the company are Rosa Villa, Jordi Gracia-Sancho, Jaume Bosch and Juan Carlos García-Pagan.

This spin-off was born, in part, thanks to the “CaixaImpulse Programme”, the programme devoted to scientific entrepreneurs of the “Obra Social La Caixa” and the “Caixa Capital Risc”, venture capital arm of CriteriaCaixa, an investor that provides equity and convertible loans to innovative companies in their early stages.

The company's main asset - a patent licensed to the spin-off, of which CIBER-BBN and CIBEREHD are co-inventors - is a liver-on-a-chip system, unique and protected, that mimics the microenvironment of the liver in a chamber of cell co-culture with microfluidics. This device allows maintaining the phenotype and function of human liver cells in culture for long periods of time and under better conditions than conventional culture methods. This in vitro hepatic function maintenance allows studies of drug efficacy and toxicity in a microenvironment as close as possible to the human liver. The characteristics of the device make it a

model of high value within the pre-clinical phases of the development of new drugs in the field of liver diseases.

It should be noted that the potential and benefits of the device have been recognized both inside and outside Spanish borders: it was selected for oral presentation in plenary session of the annual congress of the American Society of Hepatology, won the innovation contest VHIR-Biocat-Roche, and was selected in the CaixaImpulse 2016 programme among others. The ultimate goal of BLB is to put this, and other products intended for pre-clinical research in hepatology at the disposal of pharmaceutical companies, small Biotech, CROs and research groups.

## ■ Novel activators of a possible therapeutic target for the treatment of diabetes and insulin resistance.

Researchers from CIBER-BBN and CIBERDEM have identified activators of the mitochondrial protein Mitofusin 2, a possible therapeutic target for the treatment of patients with diabetes type 2.



*Prof. Fernando Albericio (University of Barcelona – CIBER BBN) & Prof. Antonio Zorzano (IRB – CIBERDEM).*

Led by Antonio Zorzano at IRB Barcelona (CIBERDEM) and Fernando Albericio at the University of Barcelona (CIBER-BBN) researchers have identified activators of the mitochondrial protein Mitofusin 2 for the treatment of diabetes type 2. This protein is expressed at abnormally low levels in the tissues of patients with diabetes. Studies of phenotypic screening

and validation studies in human cells have demonstrate the role of the protein Mitofusin 2 in the development of many of the alterations associated to diabetes.

These studies have been possible thanks to the work of biologists and chemists from different CIBER areas and with different type of scientific skills like synthetic chemistry, molecular screening and functional analysis.

**Bibliographic Reference:**

“Identification of New Activators of Mitochondrial Fusion Reveals a Link between Mitochondrial Morphology and Pyrimidine Metabolism”. *Miret-Casals L, Sebastián D, Brea J, Rico-Leo EM, Palacín M, Fernández-Salguero PM, Loza MI, Albericio F, Zorzano A. Cell Chem Biol. 2017 Dec 23.* pii: S2451-9456(17)30428-2. doi: [10.1016/j.chembiol.2017.12.001](https://doi.org/10.1016/j.chembiol.2017.12.001).

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## Know-Center GmbH



**Know-Center is Austria's leading research center for data-driven business and Big Data analytics. With our data-driven technologies we make Europe's economy ready for Big Data and the data-driven business models of tomorrow.**

As a connecting link between science and industry, the Know-Center conducts application-oriented research in cooperation with a large network of international academic institutions and companies. Our scientific strategy is to integrate approaches from (Big) Data analytics with human-centered computing to create cognitive computing systems that will enable humans to utilize massive amounts of data. In these systems the latest findings and technologies from the fields of data analytics, machine learning, semantic systems and interactive and human centered design are incorporated. Depending on the specific needs of our partners and customers, our approach to problem-solving involves different perspectives: sometimes data acts as starting point, other times we start from the point of view of work processes. The Know-Center is located in Graz and home to more than 100 data scientists and researchers. In its 17 years of experience the Know-Center has carried out more than 600 applied industry / research projects and more than 30 EU projects. This know-how qualifies Know-Center as the central hub for Europe's data-driven economy and Austria's focal point for data-driven business and Big Data analytics.

We generate regional, national and international impact:

- Empower Austrian industry with data-driven business know-how for better strategic decision making based on external market and competitor data
- More effective engineering and production processes based on intelligent utilization of internal data, upcoming industrial change processes from traditional industry to data-driven business
- Provide a data science laboratory to Austrian science and industry
- Establish internationally renowned qualification programs for data scientists
- Develop software and services

Big Data is commonly viewed as a quantitative phenomenon along the dimensions of volume, velocity and variety. In the life science domain companies as well as research are steadily faced with the challenge of handling tremendous amounts of data.

Our Business Area Digital Life Science offers among others the following competences:

- Machine Learning (e.g. Deep Learning) for clinical and research data
- Sensor Analytics: Mobile Sensing, Context Modelling
- Modeling, Prediction and Forecasting
- Personalized Recommender Systems
- (Mobile) Applications for Decision Support
- Consulting
- Information Quality Assessment

These competences have for instance been applied in the following selected use cases:

- Implementation of automated learning strategies
- Time and stress management tools for doctors and care takers
- Development and implementation of decision support models / systems for doctors and care takers aligned with all internal and external regulatories
- Expert systems for knowledge management
- Visual analytics tools for analysis of large amount of medical publication data
- Analysis and application of machine learning on physiological data
- Alzheimer and dementia support via personalized music recommendations through emotion detection via wearable devices
- Process modelling and support in pharmaceutical engineering via knowledge management and visualization

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DI (FH) Melanie Mayr

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## Member contributions

### Contribution of FELMI-ZFE Graz, Austria

# What is house dust and how does it affect human health? Four Austrian companies launch a cross-disciplinary research project



**Dust is a collective term to describe the wide variety of organic and inorganic particles that can accumulate in the home, school, office, or other closed environment. Europeans, on average, spend approximately 90 percent of their time indoors. When e.g. walking around, dust particles are being stirred up into the air. Humans then breathe in these particles or absorb them through their skin. Reason enough to conduct a thorough study to fully understand its composition and its effects on the human body.**

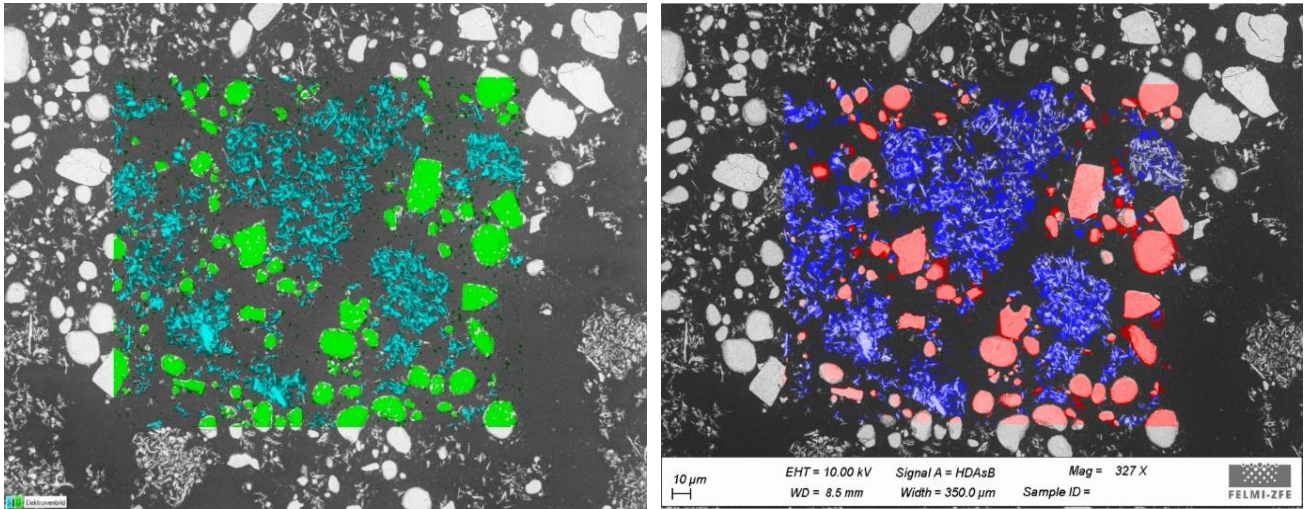
The hereby presented research project (Strategisches Projekt Austrian Cooperative Research ACR) is specifically concentrating on this topic. **Four ACR-Institutes\*** are working in close cooperation to analyse house dust and its influence as one of the major parameters affecting indoor air quality. Indoor concentrations of some pollutants have increased in recent decades due to manifold factors (energy-efficient building construction, increased use of syn-



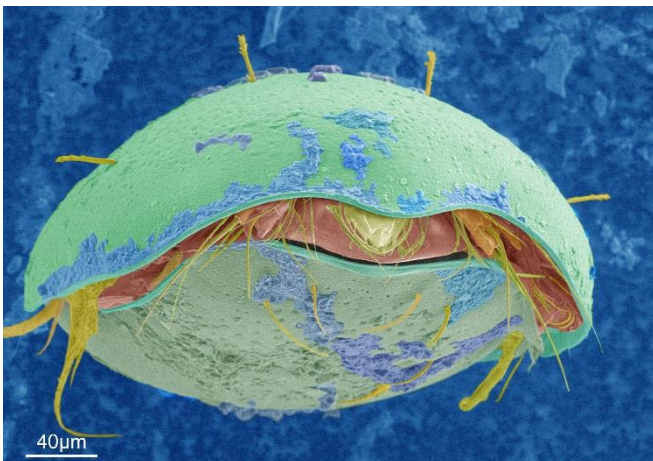
thetic building materials, furnishings, personal care products, pesticides, household cleaners). Plenty of them have already been subject to various analyses. House dust, however, has been neglected so far. Neither its composition nor its concentration have been given real consideration when it comes to its effects on indoor air quality and subsequently on human health.

Dust is a collective term describing a wide variety of organic and inorganic volatile particles that collect in the home: shed human skin cells, pet dander, dust mites, pollen, bacteria, plant and insect parts, fibres, and many more. All of them have different structures and forms, a fact that makes research studies even more challenging. This research project combines the expertise of each institute and makes it possible to investigate house dust as vital part of indoor air quality, taking various factors into account: source identification, impact on occupants, distribution effects, filtration, and fixation.

HFA will be dealing with basic discontinuous analyses and reference samples, IBO is responsible for the correlation between the dust concentration and physiological parameters, the expertise of KOV lies in simulations of dust movement, ZFE will be focusing on the thorough characterisation of complex particles on the micro- and nanoscale. Therefore, the newly installed Scanning Electron Microscope (SEM) combined with Raman spectroscopy and energy dispersive X-ray spectroscopy (EDX) (1st installation in world) will be intensively used. With the correlation of high resolution SEM, EDX-mapping and Raman mapping of the same specimen, material and chemical compositions of dust particles are being examined – for the first time – within the same system. Additionally, the included particle analysing tool enables the automated examination of a huge quantity of particles, which – in comparison to standard systems – guarantees a higher throughput and thus more reliable data for statistical evaluation. These results will help understanding the composition and chemistry of organic as well as inorganic particles found in indoor dusts.



Left: Distribution of oxygen (green) and sulphide (light blue) additionally tungsten was found in all particles under investigation; right: corresponding Raman spectroscopy con-firms the chemistry and determines the oxidation state of the oxides (WS2 blue; WO3 red) ©FELMI-ZFE



Dust mite (SEM)

©FELMI-ZFE

**Project title: Staubanalyse in der Innenraumluf**

**Project duration: 18 months**

**Starting date: 01.03.2018**

#### Did you already know?

**ACR – Austrian Cooperative Research** is an umbrella organisation for cooperative research institutes offering applied research and development especially for the benefit of small and medium sized enterprises. ACR stimulates and enables innovation within trade and industry, thus improving the competitiveness of the Austrian economy.

Please find more information:  
<https://www.acr.ac.at/english>

## \*Project partners

### Holzforschung Austria (HFA, LEAD)



Holzforschung Austria is the largest research and testing institute for wood in Austria. It addresses the entire value chain –from the storing of wood in the forest, wood processing to the different products. Surface coatings, wood preservatives and adhesives are also within its scope. Research is focussed on use of wood based products in practice. [www.holzforschung.at](http://www.holzforschung.at)

### Österreichisches Institut für Baubiologie und -ökologie (IBO)

The IBO – Austrian Institute for Building and Ecology GmbH is an engineering consultancy, which services are based on the research activities of the institute. These services include material ecology and product testing, building physics and building certification with national and international rating systems. Main fields of activity are also building monitoring, indoor air quality and comfort research. [www.ibo.at](http://www.ibo.at)

### Österreichischer Kachelofenverband (KOV)

The Austrian Kachelofen Association does research around the Kachelofen (tile stove). Furthermore the KOV provides education for stove builders and informs the public about the innovations and advantages of tile stoves. Membership in the Non-Profit-Association is voluntary, and both stove builders and the supply industry are represented by the Association. [www.kachelofenverband.at](http://www.kachelofenverband.at)

### Zentrum für Elektronenmikroskopie Graz (ZFE)



The ZFE is a microscopy facility in the physical and biological sciences; housing many high-end microscopes, we focus on interdisciplinary research, teaching and industry services and cooperate with universities and enterprises throughout Europe. Our field of activity ranges from fundamental to applied research. [www.felmi-zfe.at](http://www.felmi-zfe.at)

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## Contribution of Graz University of Technology

# Photosynthetic microalgae as biocatalysts



*Biotechnological production of chemicals using enzymes coupled with the photosynthesis of microalgae is the topic of the new EU project PhotoBioCat. TU Graz is the project coordinator.*



*Photosynthetically active microalgae have great potential for biotechnological applications.  
© Lunghammer - TU Graz*

### Powering enzymes using light

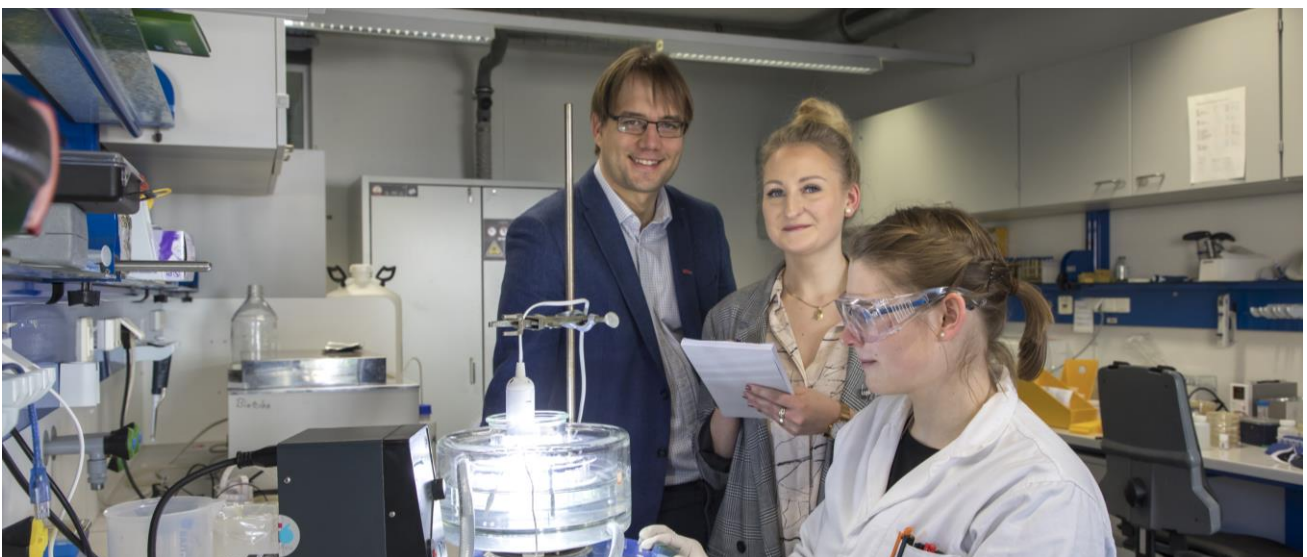
The project PhotoBioCat has two main areas of focus. In one area, the use of cyanobacteria as biocatalysts for light-driven biotechnological applications is being examined and tested in a range of industrially relevant model reactions. Chemicals for polymers, cosmetics and medicines are being increasingly technologically produced using enzymes to accelerate reactions. However, up to now the enzymes have had to be driven using reducing equivalents – very complex molecules which are very expensive to synthesise. Cyanobacteria carry out photosynthesis, in other words they transform low-energy materials into energy-rich substances purely with the help of light, water and CO<sub>2</sub>. If enzymes are genetically introduced into cyanobacteria, thanks to their catalytic function they will drive the chemical reaction, thus rendering the expensive reducing equivalent superfluous.

Project leader Robert Kourist explains: “If the enzymes are coupled to the photosynthesis of the cyanobacteria, expensive waste and by-products can be avoided and the biotechnological production of chemicals becomes easier, faster and cheaper.” Savings can be made on large quantities of NADPH (nicotinamide adenine dinucleotide phosphate), which at more than 1000 euros per gram is a very expensive reaction partner. But there is still a lot to do until then. “However, we know it works in the lab. The big challenge now is to transfer the process to an industrial scale,” says Kourist. The photosynthesis coupling will be tried out with several enzymes, thus expanding the future range of producible chemicals.

The second area of focus of the project will be on raising the efficiency by which light energy is harvested and can be passed on to enzymatic reactions (in vitro, in other words without living carrier organisms, such as cyanobacteria).

### **An algae lab at TU Graz**

Microalgae have been growing and thriving in glass tubes and flasks in a controlled way at TU Graz for several weeks, and of course, not without reason. “A sub-area which we will look into very carefully in PhotoBioCat is growing algae for biotechnological use on an industrial scale. Cyanobacteria can be grown in special algae labs and irradiated with light. But after a certain degree of growth, the cells shade each other. The light has less effect, the algae cannot exploit their photosynthetic potential to the full and valuable reaction activity is lost,” explains project leader Robert Kourist.



*Project manager Robert Kourist with Sandy Schmidt and Hanna Büchsenschütz, both in the project team of "PhotoBioCat". © Lunghammer - TU Graz*



*In the algae laboratory of the Institute for Molecular Biotechnology at TU Graz, microalgae grow and thrive. © Lunghammer - TU Graz*

### **PhotoBioCat as a doctoral students' network**

At the same time, the PhotoBioCat project is also an European network of doctoral students which will work on this light-driven reaction for biotechnological applications under the guidance of experts from 2018 to 2021. The 12 consortium members come from Austria, Germany, France, Portugal, Denmark and the Netherlands. Four doctoral students will work on the project at TU Graz's Institute of Molecular Biotechnology and at the University of Graz's Institute of Chemistry under Wolfgang Kroutil. Educational contents of the PhotoBioCat network will range from alteration of the energy metabolism of microalgae using modern tools of synthetic biology to driving biotechnological reactions through photosynthesis, the development of novel light-driven enzymatic processes and the development of photobioreactors.

*This project is anchored in the Field of Expertise "Human & Biotechnology", one of five research foci of TU Graz. At the University of Graz, it is part of the research core areas "Molecular Enzymology and Physiology" and "Environment and Global Change".*

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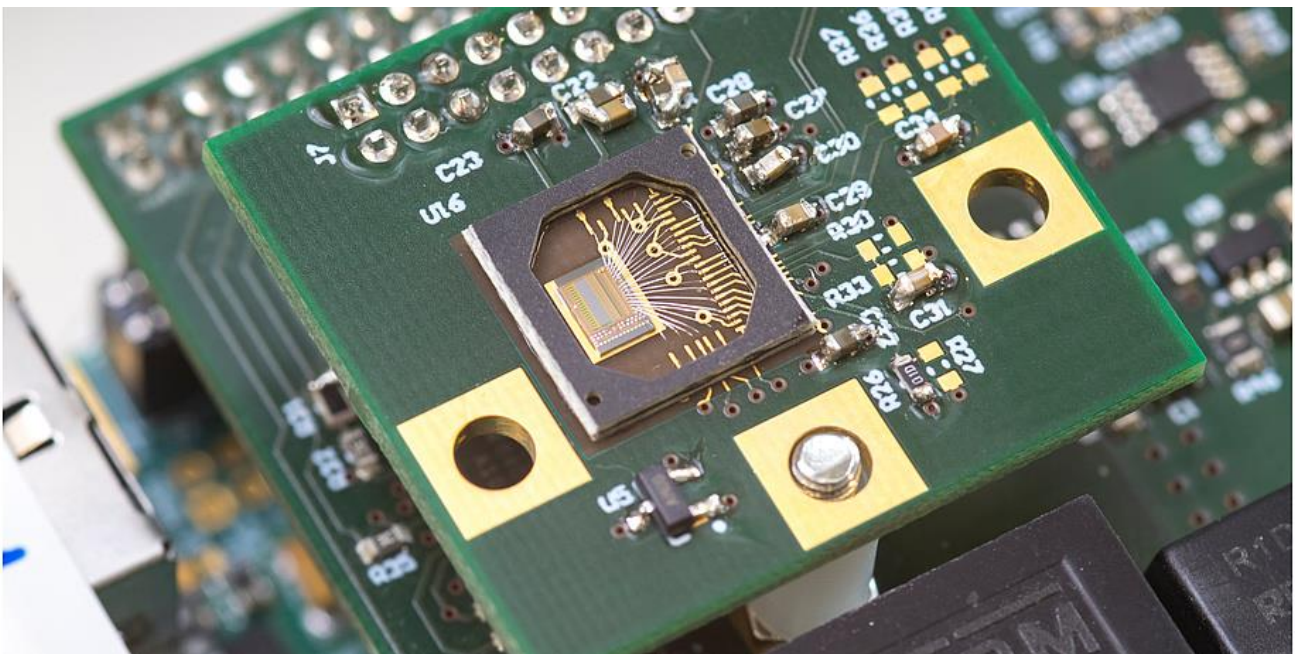
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## Contribution of Graz University of Technology



# Environmental sensor systems: a deep breath for science

*Alexander Bergmann and his team at TU Graz's Institute of Electronic Sensor Systems have made it their aim to improve our quality of air and life by means of sophisticated sensor systems.*

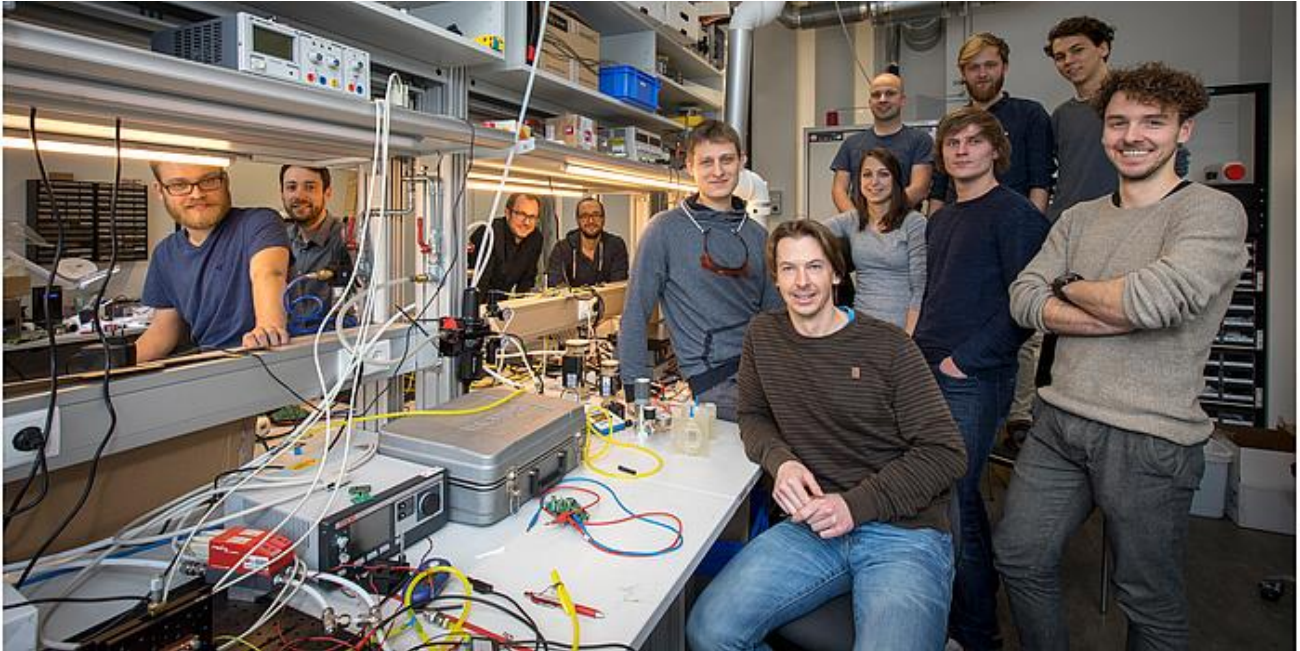


*Small but powerful: A small but powerful sensor was built at the Institute of Electronic Sensor Systems, which measures particles and gases in environmental air. © TUG*

It's a radiantly beautiful day as Alexander Bergmann talks about his research area in his Graz Inffeldgasse office, which is bathed in light. The air is clear, the sunrays warm and the 10-square-metre room with radiantly white walls smells fresh – all general signs of good air quality. And it is exactly the air quality and its measurability that is at the focus of the research interest of Alexander Bergmann, who set up the newly established [Institute of Electronic Sensor Systems](#) at TU Graz two years ago and has been heading it ever since. His research is in the field of environmental sensor systems: he primarily develops sensors which measure particles and gases in environmental air. Among other things, this includes particulate matter, nitrogen oxides and car exhaust gases. "I was always interested in quantifying things which



our human senses couldn't apprehend. What, how much and where," he says, explaining his interest in sensor technology, for which he developed a passion in his student years and which now inspires his young team of meanwhile ten doctoral students.



Alexander Bergmann and his team at the Institute of Electronic Sensor Systems. © TUG

### The vision of a greener world

Today, research at the Institute is working towards implementing one vision in particular: making a publicly accessible air-quality index. This index should be able to describe air quality exactly at particular places. For instance, it could allow the healthiest cycle routes to be filtered out and reveal the degree of air pollution at home or at work, thus also allowing for improvement measures. "This would have massive effects," says Bergmann. "For instance on property prices and other things." But aren't there already air-quality maps? "Yes, there are. But the data pool is taken from fewer public measuring stations with less corresponding spatial resolution and then projected using appropriate models. Up to now a comprehensive measurement hasn't been possible because we haven't had sufficient cheap and accurate sensors," explains Bergmann.

*"I was always interested in quantifying things which our human senses couldn't apprehend."*

At the Institute researchers are working on particularly small sensors which could be integrated, for instance, in small devices such as networked air conditioners in houses, mobile

phones and wearables. “With these we could create a close-knit network of sensor nodes which could make really accurate statements,” he explained. Of course, with all the talk of ever smaller sizes, these sensors would have to be completely reliable and ensure a high data quality, because “The best analyses are only as good as the data which the sensors supply.”

### Problematic process

For use in houses, mobile phones and wearables, the sensors have to be designed in small sizes and at low cost without measuring more inaccurately than their shoe-box sized and expensive relatives. This poses challenges to the developers, Bergmann adds: “On the one hand, we have to make sure that even in the case of the smallest possible architectures, sufficient air will be sucked in so that representative statements can be made about it. On the other hand, the particular matter has to be removed completely so that it doesn’t contaminate the surface of the sensor and make it unusable.” The sensors are just like the people they help: breathing in and out in polluted air is not easy – for neither man nor machine.



*A doctoral student demonstrates, how tiny the new sensors really are. The actual sensor is located right under the small black tube.*

© TUG

Also, Alexander Bergmann and his team are participating in the large-scale EU project [Down-ToTen](#), which is being funded by the Horizon2020 funding framework. In this project, researchers from Finland, Greece, Germany, Italy, Great Britain and Austria share a common

goal of correctly measuring the concentration of automobile exhaust gas particles down to a size of ten nanometers to pave the way for future, stricter EU regulations.

### **Nature as model**

In the future, Alexander Bergmann would additionally like to use nature as a model for his research. For instance, to investigate what sensors plants use to perceive their environment. “Unfortunately, we humans, for example, don’t have any inbuilt sensors to measure particular matter.” One area of application in a subsequent step could be health. At the Institute, we have been thinking a great deal about sensors, for example, ones which can make use of a wide variety of methods to be able to measure glucose or lactate values without relying on annoying needle pricks. “The technologisation of biology will have a huge impact in the future,” predicts Bergmann.

### **The perfect time**

The time seems to be perfect to be grappling with sensor technology. More and more data is being collected, transmitted to the digital world and analysed using Big Data approaches. And in the automation of production in high-tech factories, for example, better and better sensors are needed to be able to work efficiently and reliably. If you think about all the current hype about autonomous driving, the necessity of comprehensive sensor systems is obvious. Other applications range from baking ovens to snow cannons, or, as Alexander Bergmann puts it: “You can always do with a good sensor.”

This research project is attributed to the Fields of Expertise „[Sustainable Systems](#)“ and „[Advanced Materials Science](#)“, two of TU Graz' five strategic areas of research. Visit [Planet research](#) for more research related news.

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## **Contribution of JOANNEUM RESEARCH**



# **BASi and JOANNEUM RESEARCH commercialize Open Flow Microperfusion in America**



Bioanalytical Systems, Inc. (NASDAQ:BASi) ("BASi" or the "Company"), a recognized global leader in the development of instrumentation for microdialysis and in vivo sampling in animal models, today announced that it has entered into a collaborative agreement with JOANNEUM RESEARCH to commercialize the Open Flow Microperfusion (OFM) technology for preclinical applications.

Under the terms of the agreement, BASi will be granted exclusivity to promote and distribute OFM products meant for preclinical research applications in the North and South American markets.

**Open Flow Microperfusion (OFM)** is a novel in-vivo technology for continuous sampling of the interstitial fluid from brain and peripheral tissues. Application of the OFM technology is focused on cerebral tissue (cOFM) and dermal as well as subcutaneous adipose tissue (dOFM, aOFM). OFM has the ability to sample a wide range of substances from small ions, small molecules, and lipophilic drugs to large proteins, antibodies, vesicles, and even cells.

The distinct **advantage** of OFM lies in the use of patented membrane-free probes. Membrane-based sampling technologies like Microdialysis are restricted by a nominal size cut-off value and encounter problems when sampling high molecular weight or highly lipophilic substances in the interstitial fluid. Minimally-invasive OFM probes overcome these problems by featuring an exchange area with macroscopic openings instead of a membrane. OFM probes have either a linear (dOFM, aOFM) or a concentric design (cOFM). In combination with a specialized peristaltic OFM pump, OFM achieves a stable recovery of interstitial fluid samples. This unfiltered sampling results in a complete representation of the interstitial fluid for relative and absolute quantification in the target tissue.

Importantly, **cerebral OFM** allows sampling with an intact blood–brain barrier as it, unlike existing cerebral microdialysis tools, features a membrane-free probe and uses a probe-dummy during healing which allows tissue regeneration without the formation of scar tissue at the implant site. Therefore, the possibility of long-term implantation into the brain makes cOFM an out-standing tool in the development of brain relevant pharmaceuticals.

“We couldn’t be more pleased to be partnering with JOANNEUM RESEARCH in bringing the innovative OFM technology to the scientific community. OFM will be a potential tool for researchers interested in understanding the tissue specific Pharmacokinetics and Pharmacodynamics (PK-PD). Drug Discovery and Academic scientists in the field of Neuroscience / Neuropharmacology, Dermal, Oncology, Biomarker and PK-PD research will certainly be benefitted by getting access to this cutting-edge in-vivo sampling platform. OFM has distinct advantages over Microdialysis and Ultrafiltration like sampling with intact blood-brain barrier integrity and molecular size inclusivity, providing the competitive edge in characterizing neurotransmitters, peptide and protein biomarkers, antibodies, transporters, enzymes, bound and unbound drugs and even vesicles and cells from the extracellular space. OFM products are compatible with BASi’s in-vivo sampling systems and therefore certainly a great complement and addition to BASi’s product portfolio. We certainly look forward to excel and furthering this collaboration with JOANNEUM RESEARCH...” said Dr. Srinivasa Jayaraman, Product Manager and Principal Investigator at BASi.

“We have developed and validated Open Flow Microperfusion (OFM) in the last 20 years and created a tool that gives insight in local, tissue specific Pharmacokinetic and Pharmacodynamics. We are more than happy that we found in BASi an experienced partner for the commercialization of our product in order to make our remarkable tool accessible for a wide range of customers. Currently, the main application fields for OFM are monitoring of transport across biological barriers such as the blood-brain barrier and the skin as well as bioequivalence studies. OFM is also successfully used in drug and formulation development, biomarker research, and nano-technology as well as basic research projects such as the investigation of local immune cell populations and microvesicle release. We are happy to provide support with the application of OFM technology and design of optimized study setups.” State Dr. Frank Sinner, Director of the Institute HEALTH at JOANNEUM RESEARCH and Dr. Thomas Birngruber, Leader of the OFM Research and Development Team.

## **About JOANNEUM RESEARCH**

JOANNEUM RESEARCH Forschungsgesellschaft mbH is a leading international research organisation that develops solutions and technologies for businesses and industry covering a wide range of sectors. As an INNOVATION COMPANY focused on applied research and technology development, it plays a key role in facilitating the transfer of technology and knowledge in Austria.

HEALTH: The Institute for Biomedicine and Health Sciences acts as a link between basic medical research and industrial application in close cooperation with the Medical University of Graz.

HEALTH as the inventor of OFM provides high-quality PK/PD services in preclinical and clinical settings ranging from experiments in explanted human tissue, different animal models up to clinical studies in healthy subjects and patient cohorts with different conditions. These services are supplemented by GLP compliant bioanalytics, data management and statistics. Visit [www.openflowmicroperfusion.com](http://www.openflowmicroperfusion.com) for more information about OFM.

## **About Bioanalytical Systems, Inc.**

BASi is a pharmaceutical development company providing contract research services and monitoring instruments to the world's leading drug development companies and medical research organizations.

The Company focuses on developing innovative services and products that increase efficiency and reduce the cost of taking a new drug to market. Visit [www.BASinc.com](http://www.BASinc.com) for more information about BASi.

*This release may contain forward-looking statements that are subject to risks and uncertainties including, but not limited to, risks and uncertainties related to changes in the market and demand for our products and services, the development, marketing and sales of products and services, changes in technology, industry standards and regulatory standards, and various market and operating risks detailed in the company's filings with the Securities and Exchange Commission.*

**Reference:** [Nasdaq News](#)

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## **Contribution of JOANNEUM RESEARCH**



# **NanoData: Providing services in support of research and policy in the field of nanosciences and nanotechnologies**



The project, commissioned by DG Research and Innovation, aimed to provide information for policies that lead to the creation and improvement of the conditions which will allow researchers and European industries to safely master the properties of nanomaterials and to innovate with nanotechnology.

The consortium carrying out this project thus adopted a coherent framework which presents nano data and pieces of information in a way which provides systematic insights into the whole nano-value chain, from scientific research to market, from the basic materials, via nano-enabled components and products, to “end-of-life” solutions; clearly indicates the interconnections between the different aspects; is up-to-date, providing insights into the recent dynamics in the field of nanotechnology, nano-industries and related markets; makes the relation of issues of risk and regulation to these developments visible; and makes this integrated information base adequately accessible for the wider public, for interested stakeholders and for specialists at the same time.

The project focused on four crucial elements: landscaping of nanotechnology (products and markets, policies, publications and patents, patenting, research & innovation, industry, and EHS issues), impact assessments (combining ex-ante and ex-post IA)<sup>1</sup>, an interactive website, and the provision of deepened intelligence on markets, technologies and trends (future market trends, foresight, and proxies for market data). The consortium focused largely on

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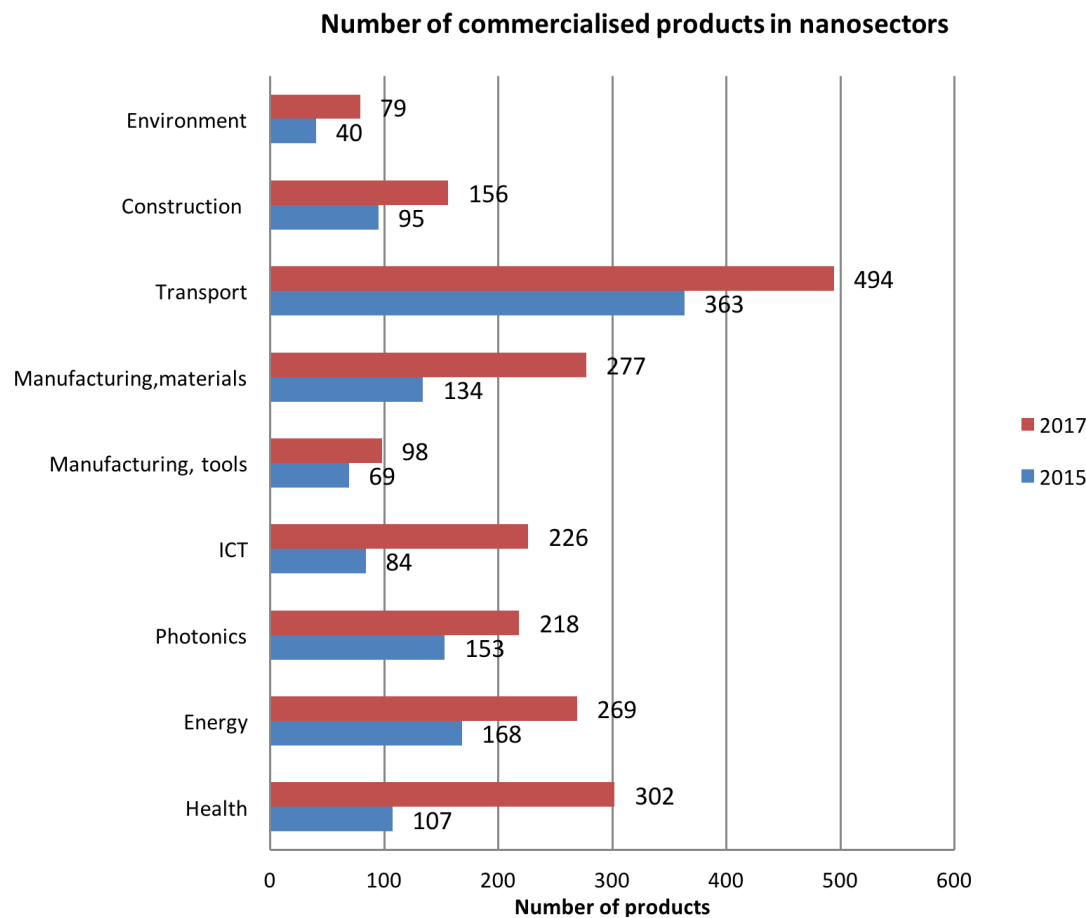
<sup>1</sup> Reports are available at: [https://publications.europa.eu/en/search-results?p\\_p\\_id=portal2012searchExecutor\\_WAR\\_portal2012portlet\\_INSTANCE\\_q8EzsBteHybf&p\\_p\\_lifecycle=1&p\\_p\\_state=normal&queryText=nanoData+Impact+Assessment&facet.collection=EUPub&language=en&startRow=1&resultsPerPage=10&SEARCH\\_TYPE=SIMPLE](https://publications.europa.eu/en/search-results?p_p_id=portal2012searchExecutor_WAR_portal2012portlet_INSTANCE_q8EzsBteHybf&p_p_lifecycle=1&p_p_state=normal&queryText=nanoData+Impact+Assessment&facet.collection=EUPub&language=en&startRow=1&resultsPerPage=10&SEARCH_TYPE=SIMPLE)

primary data. Work on this project began in April 2013 and was to running for a period of 4 years.

For the purpose of this project, JIIP, including its members TNO, TECNALIA and Joanneum Research, entered into a consortium with Frost & Sullivan, the University of Leiden, the Nanotechnology Industries Association (NIA) and Oakdene Hollins.

JOANNEUM RESEARCH, POLICIES – the Institute for Economic and Innovation Research contributed to all four main elements of the project:

In the landscaping of nanotechnology the team of POLICIES charted commercially available nanotechnology enabled products and producers but also provided market data and forecasts for the landscape reports for the following application fields of nanotechnology: health, photonics, ICT, energy, manufacturing, building & construction, environment, and transport. Furthermore strategies, programmes and other public interventions in favour of nanotechnology development were analysed for EU countries as well as on an international level.



Source: JIIP, 2017



In the framework of the impact assessments the team of POLICIES conducted a survey among European companies, research institutions and policy actors to build an evidence base and also prepared impact assessment studies for the sectors ICT and manufacturing. For the interactive website the team of POLICIES collected in-depth information on commercially available nanotechnology products so as to be integrated in the online database.

For the provision of deepened intelligence on markets, technologies and trends the team of POLICIES prepared and conducted in 2017 three foresight workshops in London, Brussels and Valetta and developed with European nanotechnology expert and stakeholders scenarios. Furthermore, it performed technology and market scanning and evaluation, prepared illustrative case studies, developed proxies for market data.

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## Contribution of Materials Center Leoben



## 3<sup>rd</sup> conference nanoFIS 2017 was a great success again!



The International Conference "*nanoFIS 2017 - Functional Integrated nanoSystems*" was held for the third time in Graz, Austria, from 22<sup>nd</sup> to 24<sup>th</sup> November 2017, in the beautiful historic Aula of Karl Franzens University Graz. The *nanoFIS* conference series is addressing important topics of Micro- and Nanoelectronics industry, which is with 250.000 direct employees of high strategic importance for Europe.

A total of 110 scientists, researchers, engineers, technologists, and advanced students from 23 nations from all over the world joined the third *nanoFIS 2017* and made the conference a great success. Latest R&D results were presented in 41 lectures and 40 poster contributions amongst them excellent key note and invited speakers ensuring a high technical and scientific quality.

Jo De Boeck, Executive Vice President & CTO from imec, a world leading R&D institute in micro- and nanoelectronics in Belgium, gave a visionary overview of emerging technology platforms for impacting upcoming consumer electronics and Internet-of-Things applications. Chul-Hong Kim, head of the Global Open Innovation Department from LG Display, Republic of Korea, demonstrated breathtaking prospects and strategies for Next-Generation Displays. Sophisticated nanophotonic devices and their impact on future quantum computing and next generation optical communication technologies were shown by Val Zwiller from the KTH Royal Institute of Technology Stockholm. Eight invited speakers presented latest R&D results ranging from new nano-based materials, carbon nanotube sensors, and nanopore devices to quantum cascade laser systems, novel approaches for 3D-system integration and the future of nanoelectronics beyond CMOS-Devices.

"Nanodevices and Nanosystems - Soon Reality or Pie in the Sky?" was the provoking initial question of the panel discussion, which was chaired by Anton Köck (MCL). Jo De Boeck (imec), Christofer Hierold (ETH Zurich), Helmut Pairitsch (Infineon Technologies Austria AG), and Ewald Wachmann (ams AG) discussed the impact of nanotechnology on the development of new micro- and nanoelectronics products. Key message was that efforts should focus on leveraging novel manufacturing technologies to an industrial level in order to close the critical gap in technology readiness levels between universities and industries. Thereby nanotechnology might have a great impact on smart system development and integration for making More-then-Moore Devices a success story for European Micro- and Nanoelectronics industry.

The participation of NETZSCH Gerätebau GmbH, EVGroup, Swiss Litho AG, Raith Nanofabrication GmbH, ams AG, Keysight Technologies, Lyncee Tec, Physical Electronics GmbH, and LaborChemie GmbH in the company exhibition demonstrated the industrial relevance of the *nanoFIS* 2017 conference.

*nanoFIS* 2017 was jointly organized by the Materials Center Leoben Forschung GmbH, one of the leading research companies in Austria, working in the field of materials engineering and technology, and Techkonnex - High-Tech Promotion, a company organizing high-tech events, conferences and workshops.

Your *nanoFIS* Organizing Committee

Anton Köck, Reinhold Ebner, Margit Malatschnig

## Impressions of the conference:



*Val Zwiller from the KTH Royal Institute of Technology Stockholm in the Aula of Karl Franzens University Graz presenting sophisticated nanophotonic devices for quantum computing and next generation optical communication technologies.*

© MCL



*Chul-Hong Kim, head of the Global Open Innovation Department from LG Display, discussing breathtaking prospects and strategies for Next-Generation Displays.*

© MCL



A total of 110 scientists, researchers, engineers, technologists, and advanced students from 23 nations from all over the world made the third nanoFIS 2017 conference a great success again. © MCL



Panel discussion "Nanodevices and Nanosystems - Soon Reality or Pie in the Sky?" with Christofer Hierold (ETH Zurich), Jo De Boeck (imec), Helmut Pairitsch (Infineon Technologies Austria AG), Ewald Wachmann (ams AG), and Anton Köck (MCL) (from left to right). © MCL

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[www.mcl.at](http://www.mcl.at) – [www.nanofis.net](http://www.nanofis.net) – [www.multisensorplatform.eu](http://www.multisensorplatform.eu)

Organiser of the Eurosensors 2018 [www.eurosensors2018.eu](http://www.eurosensors2018.eu)

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## BioNanoNet *retrospect*

# Exchanging knowledge within the NANO- GENTOOLS Project

## Secondment of BioNanoNet to SITEX 45



NANOGEN TOOLS is a H2020 MSCA-RISE project to exchange knowledge in nanosafety. The 4-year European project, devoted to the development and implementation of a new generation of nanosafety assessment tools, was launched in January 2016, and addresses the challenge of identifying and controlling the hazards associated with Nanomaterials (NMs) by joining industry and academia to create a collaborative excellence-based knowledge exchange network in the MSCA-RISE framework. The project is delivered through cross-sectoral/disciplinary secondments linking EU academic institutes/networks with industry including SMEs and policy makers across 8 countries. The secondments play a key role in facilitating knowledge exchange between experts with different backgrounds and knowledge.

### Secondment of BioNanoNet to SITEX 45

In December 2017 and January 2018, BioNanoNet seconded its early stage researcher (ESR) Mag. pharm. Susanne Resch to SITEX45, a Romanian SME located in Bucharest. SITEX45 focuses on the development of innovative biosensors using advanced nanomaterials. Beside the close collaboration between BioNanoNet and SITEX45 and knowledge exchange between this two organisations, several other meetings were arranged to discuss nanosafety related topics, to disseminate the NANOGEN TOOLS project aims, and to present BioNanoNet's and SITEX' activities. The meetings posed a very good opportunity for detailed presentations about the various fields of expertise, to identify possible overlaps and potential possibilities for future collaborations, and to discuss the need of further investigations in nanosafety related topics. The use of a Safe-by-Design concept for nanomaterials was also

discussed. The practical implementation of this concept in real-life industrial processes is currently tested. BioNanoNet addresses Safe-by-Design in the H2020 pilot line project Hi-Response.

Moreover, there was extensive knowledge exchange between the H2020 MSCA-RISE TROPSENSE ([http://www.tropsense.eu/en/index\\_en.php](http://www.tropsense.eu/en/index_en.php)) project partners and BioNanoNet. Joint meetings and joint visits of Romanian institutions and organisations were performed.





*SITEX45 hosting BioNanoNet in Bucharest, Romania. © SITEX45*

Further information on the NANOGENTOOLS project and updates on developments can be obtained from <http://www3.ubu.es/nanogentools>.

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*These projects have received funding from the European Union's Horizon 2020 programme under grant agreement No 691095 and No 646296.*



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## Nano World Cancer Day 2018

### Precision Medicine for People – Smart Biomarkers, Nanotechnologies and more



**31<sup>st</sup> January, 2018, Vienna, Austria**

BioNanoNet, CBmed and the Ludwig Boltzmann Institute for Experimental and Clinical Traumatology organised the Nano World Cancer Day on 31<sup>st</sup> of January, 2018 at the Unfallkrankenhaus Lorenz Böhler in Vienna, Austria.

The Nano World Cancer Day is an event series held in parallel in different European countries to raise awareness about how nanomedical innovations help to fight cancer. The purpose of this event is to inform the wider public about latest findings in nanomedical research and applications in the oncological field. Its main objective is to raise the public awareness about nanomedicine and its ability to introduce new opportunities and game changers in the fight against cancer.

The scientific presentations at the NWCD gave the unique opportunity to enlighten the public about the benefits of nanomedicine and its applications for cancer patients. The lectures also provided information about the European Technology Platform of Nanomedicine and its resources in structuring and federating the nanomedicine community.





Lecturers at NWCD (from left to right): Andreas Falk, Heinz Redl, Alexander Pogany, Hannes Mikula, Thomas Pieber. © BioNanoNet



Lecturers at scientific symposium (from left to right): Andreas Falk (co-chair), Thomas Mohr, Gregory Vladimer, Amin El-Heliebi, Thomas Pieber (chair). © BioNanoNet



Impressions of the Nano World Cancer Day 2018 in Vienna, Austria. © BioNanoNet

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## Kick-off of the new H2020 project BIORIMA – BIOMaterial Risk Management



**19<sup>th</sup> – 21<sup>st</sup> of February, 2018, in Paris, France**

The newly launched Horizon 2020 project BIORIMA aims to develop an Integrated Risk Management (IRM) framework for nanobiomaterials used in advanced therapeutics and medical devices. The BIORIMA IRM framework is a structure upon which the validated tools and methods for materials, exposure, hazard and risk identification/assessment and management are allocated plus a rationale for selecting and using them to manage and reduce the risk for specific nanobiomaterials used in medical applications.

Within the BIORIMA consortium, Austria has dual representation. BioNanoNet and Joanneum Research HEALTH - Institute for Biomedicine and Health Sciences are BIORIMA project partners. BioNanoNet is key partner in dissemination and training activities, and contributes its expertise in bridging academia and industry through planning and supporting the project's case studies. Joanneum Research's HEALTH institute is responsible to test and investigate the dermal uptake of nanobiomaterials while using its unique and patented Open Flow Microperfusion technique.

On 19<sup>th</sup> and 20<sup>th</sup> of February 2018, the University of Paris Diderot hosted the BIORIMA Working Meeting on its premises. Beneficiaries from all partner institutions intensively discussed how the project objectives can be achieved. Furthermore, it was discussed how the expectations of the various stakeholders (i.e. policy makers, scientific community and the general public) can be met with respect to the intended project outcome. On 21<sup>st</sup> of February 2018, the Kick-off and Dissemination Meeting was held at the OECD Conference Centre in Paris.

In addition, the following upcoming BIORIMA activities and events were presented and discussed at the Kick-off Meeting:

## **3<sup>rd</sup> Italian-Swedish Workshop on NanoBioMaterials - From safety assessment to biomedical uses**

**22<sup>nd</sup> – 23<sup>rd</sup> of March 2018, Turin, Italy**

This event is organised following the success of previous meetings on health impacts of nanomaterials (Rome, 2010 and Stockholm, 2013). This 3<sup>rd</sup> Workshop of Italian and Swedish scientists will focus on nanobiomaterials – from safety assessment to biomedical uses. The scientific aim of this 2-days workshop is to provide up-to-date information on material characteristics, their application and potential adverse health effects mainly dealing with nanobiomaterials, as well to highlight current and future biomedical applications including targeted drug delivery systems and regenerative medicine. The main lectures of the workshop given by leading Italian and Swedish scientists are intended to give the audience a comprehensive and critical overview of the State-of-the-Art, integrated by current data based on the personal experience of the speakers in each respective field.

## **1<sup>st</sup> BIORIMA Training School**

**16<sup>th</sup> – 20<sup>th</sup> of April 2018, Venice, Italy**

The first edition of a series of Training Schools will take place in the historic centre of Venice, Italy. The School aims to transfer the State-of-the-Art knowledge on a variety of topics from key experts to the new generation of nano-environmental, health and safety, and biomedicine professionals.

### Target audience:

The 1<sup>st</sup> BIORIMA Training School is especially designed for personnel from research and academic institutions as well as from industry, governmental agencies and hospital departments. The School is aimed at senior researchers, young scientists, PhD students and in fact anyone interested in safe nanotechnology, risk assessment and nano-medicine.

### School topics:

- Advanced Nano-Biomaterials
- Fate & Exposure Scenarios
- Hazard to Human Health & Environment
- Risk Assessment & Risk Management

The programme can be downloaded [here](#).

### Benefits from attending the school:

- Learn the latest trends in safe biomedicine gaining an in-depth understanding of the above-mentioned key topics.
- Engage in a dialogue with peers and key experts.
- Benefit from a variety of additional networking opportunities such as boat trip in the Venetian Lagoon and a social dinner in the historical centre of amazing Venice.

**BIO RIMA**  
Biomaterial  
Risk Management

# 1<sup>st</sup> BIORIMA Training School

April 16–20, 2018 University Ca' Foscari  
Venice, Italy

**REGISTER NOW!**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760928

For further information on the project as well as the mentioned events, please visit the official project's webpage [www.biorima.eu](http://www.biorima.eu).





*Impressions of the BIORIMA Working Meeting at the University of Paris Diderot and the project's Kick-off at the OECD Conference Centre.*

©BIORIMA Consortium

*BIORIMA project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760928.*



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## EU Industry Day



**22<sup>nd</sup> – 23<sup>rd</sup> of February, 2018, Brussels, Belgium**

EU Industry Day 2018 updated stakeholders on the Commission's strategic approach to industrial policy and actions to further develop industrial competitiveness in Europe.

It also served as a forum for stakeholders contributing to European industrial competitiveness to showcase their activities, learn from each other, discuss cross-cutting issues and develop joint visions for the future.

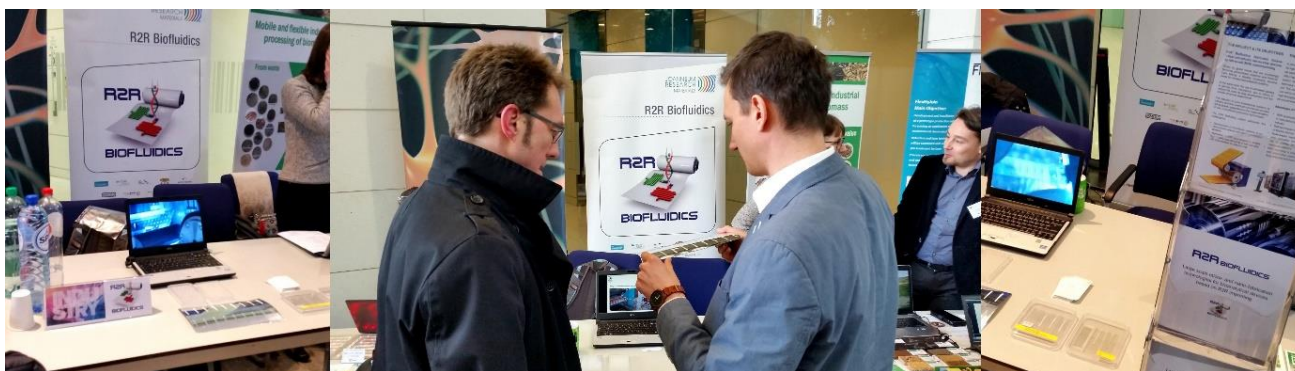


Attendees came from a variety of industrial sectors, finance, research and innovation, government and public administration.

The main event in Brussels, Belgium on 22<sup>nd</sup> – 23<sup>rd</sup> of February was a high-level conference with many key experts and a number of stakeholder workshops.

A large number of events also took place all around Europe under the 'European Industry Week' brand.

JOANNEUM RESEARCH and BioNanoNet participated actively by presenting the H2020 project R2R Biofluidics ([www.r2r-biofluidics.eu](http://www.r2r-biofluidics.eu)) with a booth. The project was selected and invited to present the results and concrete achievements at the exhibition which was part of the EU Industry Day.



*Project coordinator Dr. Martin Smolka presents a demonstrator to Project Officer Mathias Lucas.  
© BioNanoNet*

Source and further information: [https://ec.europa.eu/info/events/eu-industry-day\\_en](https://ec.europa.eu/info/events/eu-industry-day_en)

*These projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 646260 and n°731032.*



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## 2<sup>nd</sup> NanoMedicine-Austria Day

### Latest Developments & Future Trends in Nanomedical Research

27<sup>th</sup> of February, 2018, Graz, Austria

NANO  
MEDICINE  
AUSTRIA

BIONANONET  
NANO TOXICOLOGY

BIONANONET  
HEALTH SAFETY MEDICINE

Bio- and nanomedicine opens up fascinating new chances for medical applications by offering novel methods for drug delivery systems, imaging techniques, diagnostic tools, etc. The diversity of these topics encourages interdisciplinary collaboration and connects a variety of scientific fields. The use of smallest particles in the nanometer range enables new methods for improved treatment of numerous diseases.

In 2015, BioNanoNet founded the National technology platform "NanoMedicine-Austria" aiming to:

- Bring together bio- and nanomedical experts
- Establish & improve interdisciplinary cooperation
- Increase the success of nanomedical solutions in tackling medical challenges
- Boost the visibility of high-level research in nanomedicine-related topics
- Promote nanomedical technologies and applications

The 2<sup>nd</sup> of NanoMedicine-Austria Day, organised by the BioNanoNet Association, was held on the 27<sup>th</sup> of February 2018 at JOANNEUM RESEARCH headquarter in Graz, Austria. A very interesting key note lecture on "Drug Delivery: Towards Precision Medicine", presented by Assoz. Prof.<sup>in</sup> Dr.<sup>in</sup> Ruth Prassl, built a great starting point for further discussions. European key experts in the nanomedical field talked about nanomedical topics to be dealt with in the coming years and the necessary framework conditions in research, education and technology transfer. Representatives from ongoing EU funded H2020 projects NanoCommons, Smart-

4-Fabry and BIORIMA also joined the interdisciplinary dialogue. Interesting ideas were exchanged and views on possible future nanomedical applications for the coming years were given.

*Impressions of the 2<sup>nd</sup> NanoMedicine-Austria Day in Graz, Austria. © BioNanoNet*





We kindly invite you to become part of NanoMedicine-Austria community and to contribute your relevant key expertise. If you are interested, please contact us: [office@nanomedicine-austria.at](mailto:office@nanomedicine-austria.at).



*These projects have received funding from the European Union's Horizon 2020 programme under grant agreement No 731032, No 720942 and No 760928.*



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## Open Campus Day - Future of Nanomedicine

28<sup>th</sup> of February, 2018, Graz, Austria



Prevention, early diagnosis and effective treatment of diseases such as cancer, multiple sclerosis or Alzheimer's are major challenges for science and research as well as for our society. Nanotechnological developments combined with medical knowhow offer revolutionary opportunities for patients. The event "Open Campus" on the topic "Future of Nanomedicine" offered valuable insight which of these challenges are already addressed by nanotechnological developments in medicine, and how through intensive collaboration between research and development a better and more efficient healthcare can be achieved.

For this event, internationally recognized top researchers in the field of nanomedicine could be attracted as key note speakers:

Dr. Adriele Prina-Mello of Trinity College Dublin / Ireland, one of the internationally recognized leading researchers in the field of nanomedicine, presented in his lecture, how far nanomedical research has already come and in which direction it will develop in the future.

Ing. Christian Hill, MA from the Institute of Biophysics / Medical University of Graz presented the latest developments in the characterization of nanomaterials and how the Optofluidic Force Induction (OFI) method can be used.





Lecturers at Open Campus Day (from left to right): Johann Harer (chair), Adriele Prina-Mello, Christian Hill, Andreas Falk (co-chair)  
© HTS



*Impressions of the Open Campus Day in Graz, Austria.*

© HTS

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## COST Action MP1404 Spring Meeting & Workshop

### “Particle Engineering and Device Development for Pulmonary Drug Delivery: What is new?”

27<sup>th</sup> of February – 2<sup>nd</sup> of March, 2018, Belgrade, Serbia



The SimInhale Spring Meeting took place on February 27<sup>th</sup> – March 2<sup>nd</sup> in Belgrade. The event was coordinated by Professor Dr Svetlana Ibrić from the University of Belgrade/Faculty of Pharmacy and excellently supported by the Computer Science Department, University of Cyprus.

The SimInhale Cost Action ([www.siminhale-cost.eu](http://www.siminhale-cost.eu)) is working to accelerate the introduction of a new generation of safer and more effective inhaled medicines with obvious social and economic benefits. It will advance pharmaceuticals with higher effectiveness and fewer side effects, thus reducing Health Care costs in the long run and help sustain innovation in the industry of inhaled pharmaceuticals and inhaler devices. Through a pan-European network of experts it aims to:

- advance particle designs for improved deposition and interaction with lung tissue,
- promote realistic computer simulations of particle aerosolization, delivery and deposition,
- promote patient-tailored inhaled medicines,
- promote integration of device and formulation design, and
- promote critical assessment of toxicity issues and related risks.

The event kicked off with the Workshop “Particle Engineering and Device Development for Pulmonary Drug Delivery: What is new?”. It attracted a very large group of young scientists and early stage researchers from all over Europe and lasted over a period of 2 days. The workshop was addressed by a various eminent European and US speakers from the academia, industry and the regulatory field and focused on:

- Lung Biopharmaceutics and Pharmacokinetics
- Particle engineering and formulation
- Device engineering

- Lung targeting and toxicity
- Regulatory aspects including the human factor

The workshop was followed by the various working group meetings which discussed the deliverables and way forward. The event came to a conclusion with the management committee meeting chaired by Prof. Dr. Stavros Kassinos, from the University of Cyprus who is the Action Chair and grant holder.



*Impressions from the SimInhale Spring Meeting 2018*

© BioNanoNet

Prof. Dr. Eleonore Fröhlich from the Medical University of Graz and BioNanoNet are part of the SimInhale Working Group 5 – “Toxicity, xenobiotics, risk assessment and policy development” to bring in their expertise to address the following COST objectives:

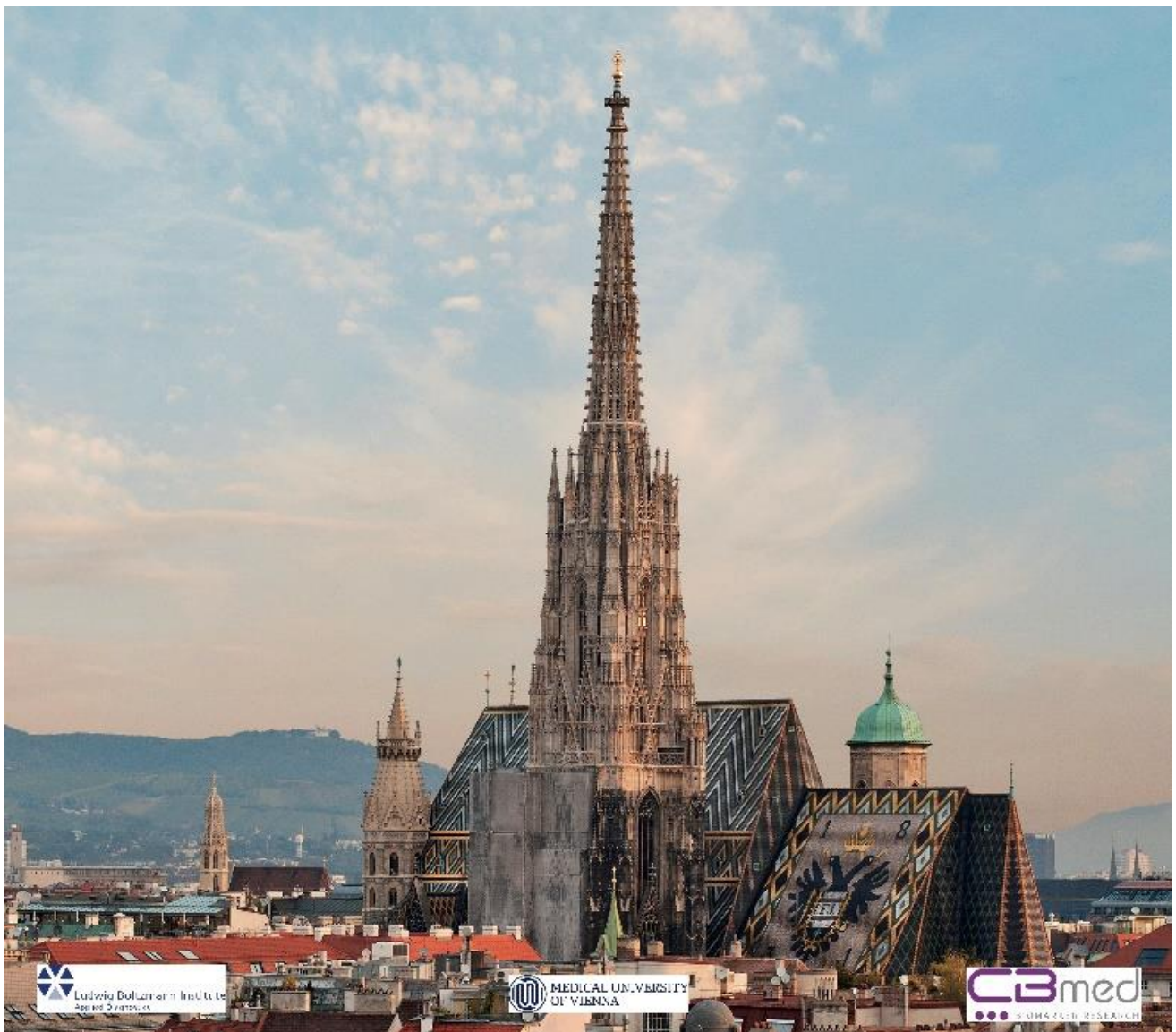
- I. establish the factors that affect dosimetry in toxicity studies for inhaled medicines,
- II. identify test systems (in vitro, in vivo, in silico) to address the preclinical aspects of inhalational medicinal products (e.g., delivery, absorption distribution metabolism and excretion (ADME), activity, toxicity), and
- III. promote the Risk-Based Approach to establish the safety testing programs of inhalational medicinal products.

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## 2<sup>nd</sup> Donauesymposium including the 3<sup>rd</sup> CBmed Biomarker Conference

14<sup>th</sup> – 16<sup>th</sup> of March, 2018, Vienna, Austria

From March 14<sup>th</sup> to 16<sup>th</sup>, the 2<sup>nd</sup> Donauesymposium was held in Vienna highlighting important aspects of image based and other non-invasive biomarker derivation and quantification in the context of expanding the understanding of disease mechanisms and the definition of appropriate therapeutic strategies.





In a joint effort of the Medical University of Vienna, the Ludwig-Boltzmann Institute (LBI) Applied Diagnostics and the Center for Biomarker Research in Medicine (CBmed GmbH, Graz, Austria; [www.cbmed.at](http://www.cbmed.at)) this conference was organized in close collaboration. Experts from different fields in biomarker research, molecular imaging, biobanking, health technology assessment, omics technologies and ethical research came together in the prestigious meeting halls of the Park Hyatt Vienna to discuss and debate how to shape the future of biomarker research together. While being in active pursuit by several groups, state-of-the-art diagnostics including molecular imaging, molecular pathology, laboratory medicine and deep phenotyping methods cannot be regarded as independent anymore; instead a convergent approach appears most promising in bringing together specialty expertise that previously has advanced autonomously. This was one of the major goals of the symposium that could be achieved without any doubt.

This year the Biomarker Conference of CBmed which was held for the 3<sup>rd</sup> time, was also integrated within the programme with two dedicated sessions on “Standardization and Quality in Biospecimens” and “Next-Generation Biomarkers”. Distinguished experts such as Ulrich Stelzl (Karl-Franzens University of Graz), Johannes Czernin (UCLA, CA, USA) and Kurt Zatloukal (Medical University of Graz) followed the concept to bring together different disciplines and covered topics from interactomics to modern biobanking strategies and answered the question whether molecular imaging and omics can form a perfect match.

150 attendees and representatives of more than 20 exhibitors and sponsors listened furthermore to invited talks about data sharing and knowledge generation from big data as well as novel data processing and integration strategies. Roundtable discussions on hot topics, including the need to align on educating the next generation of molecular diagnostics experts as well as a poster session and rapid fire talks rounded up the exciting programme.



Overall, the meeting was a great success and intensive discussions always continued into the well-organized coffee or lunch breaks and even to the conference dinner at a typical Viennese “Heuriger”. Outstanding talks, excellent food and inquisitive participants made this meeting a huge success. All attendees look forward to a 3<sup>rd</sup> edition of the Donausymposium in the next years.

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# Conference Calendar

## *BioNanoNet events*

### Think Tank “Life Sciences im digitalen Wandel”

*organised by Know-Center and BioNanoNet*



**KNOW**  
Center

BIO  
NANONET

**Think Tank “Life Sciences im digitalen Wandel”**  
@ Know-Center GmbH, Inffeldgasse 13, 8010 Graz - 5. April 2018 / 14-18.30h

 <http://bit.ly/2DSulE0>  
Melanie Mayr, mmayr@know-center.at



**When?** 5 April, 2018

**Where?** Know-Center GmbH, Graz, Austria

Download [Agenda & invitation](#) and [Event flyer](#)

For more information please visit the [BioNanoNet website](#).

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## BioNanoNet General Assembly & Strategic Development & Networking Event



© BioNanoNet

**When?** 13 September, 2018, 9:30 a.m. – 7:00 p.m.

**Where?** Graz, Austria

For BioNanoNet members only! Save the date!

For more information please visit the [event website](#).

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## ***BioNanoNet on site events***

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### **Nanosafety Cluster Meeting**

**When?** 22 – 23 March, 2018

**Where?** Athens, Greece

For more information please contact [office@bionanonet.at](mailto:office@bionanonet.at).

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### **Upcon 2018 - 2<sup>nd</sup> Conference and Spring School on Properties, Design and Applications of Upconversion Nanomaterials**

**When?** 2 – 6 April, 2018

**Where?** Valencia, Spain

For more information please visit the [BioNanoNet website](#).

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### **NIA Annual Symposium**

**When?** 10 April, 2018

**Where?** Brussels, Belgium

For more information please visit the [BioNanoNet website](#).

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### **Driving economic development from nanotechnology**

**When?** 11 April, 2018

**Where?** Brussels, Belgium

For more information please visit the [BioNanoNet website](#).

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### **1<sup>st</sup> BIORIMA Training School**

**When?** 16 – 20 April, 2018

**Where?** Venice, Italy

For more information please visit the [event website](#).

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### **BioNanoMed**

**When?** 25 – 27 April, 2018

**Where?** Graz, Austria

For more information please visit the [event website](#).

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### **EUFEPS Annual Meeting 2018**

**When?** 24 – 26 May, 2018

**Where?** Athens, Greece

For more information please visit the [event website](#).

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### **ETPN Annual Forum 2018**

**When?** 28 – 30 May, 2018

**Where?** Berlin, Germany

For more information please visit the [event website](#).

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### **Vienna Summer School on Spectroscopy focussed on carbon-related materials**

**When?** 6 – 8 June, 2018

**Where?** Vienna, Austria

For more information please visit the [event website](#).

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### **EU Brokerage Event on KET in Horizon 2020**

**When?** 7 June, 2018

**Where?** Mainz, Germany

For more information please visit the [event website](#).

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### **Nanotech France 2018**

**When?** 27 – 29 June, 2018

**Where?** Paris, France

For more information please visit the [event website](#).

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### **NanoTox 2018 - 9<sup>th</sup> International Conference on Nanotoxicology**

**When?** 18 – 21 September, 2018

**Where?** Neuss, Germany

EXTENDED ABSTRACT SUBMISSION DEADLINE UNTIL 23 MARCH 2018!

For more information please visit the [event website](#).

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### **OpenTox Euro 2018**

**When?** 8 – 11 October, 2018

**Where?** Athens, Greece

For more information please visit the [event website](#).

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## **Industrial Technologies Conference 2018**

**When?** 8 – 11 October, 2018

**Where?** Athens, Greece

For more information please visit the [event website](#).

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**For all events visit our [BioNanonet website](#)!**

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## 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 June 2018. BioNanoNet partners are welcome to send their contributions until 15<sup>th</sup> of June 2018!

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### Your BioNanoNet team

*from the left ...*

Christa Schimpel (scientist), Beatriz Alfaro Serrano (scientist), Susanne Resch (scientist), Andreas Falk (CEO), Gabriele Katz (CEO), Christine Halbedel (office), Angelika Halbedl-Herrich (office), Simone Jagersbacher (Public Relations) and Nikolaus Ladenhauf (project manager)

### The BioNanoNet team wishes you



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