

The top half of the image is a rectangular banner. It has a dark teal background with a subtle, glowing network of white and light blue dots connected by thin lines. Overlaid on this is a solid teal rounded rectangle containing the text 'BNIN' in white, bold, sans-serif capital letters.

BNIN

NEWS

The bottom half of the image is a rectangular banner with a dark teal background and a glowing network pattern, similar to the top banner but with a lighter teal gradient at the bottom. It contains the date '01/2020' in large white bold text and 'March 2020' in smaller white text below it.

01/2020

March 2020

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- [CNSystems is breaking new ground together with MEDS in non-invasive hemodynamic diagnostics](#) (*Spath Micro Electronic Design GmbH – MEDS*)
- [quantMRX - Quantitative magnetorelaxometry for magnetic nanoparticle monitoring assisting human cancer therapies \(quantMRX\)](#) (*UMIT – the health & life sciences university*)
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- [How to be a MedTech Start-Up workshop](#), 23rd of January 2020, Linz, Austria
- [Joint Meeting: NanoCommons – NanoSolveIT – RiskGONE](#), 6th of February 2020, Reykjavik, Iceland
- [BNN Networking Event](#), 27th of February 2020, Graz, Austria
- [15th nanoNET Meeting](#), 9th of March 2020, Vienna, Austria
- [ESG Think Tank](#), 9th of March 2020, Vienna, Austria
- [12th NanoTrust conference on advanced materials](#), 10th of March 2020, Vienna, Austria

Conference calendar

- [BNN events](#)
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Finally

Editorial – *Contemporary issues from the network*

Dear Ladies and Gentlemen,

we hope you had a great and successful start into 2020, which is also the last year of the runtime of the European framework program *Horizon 2020*. BNN was and still is very busy in supporting our members with their preparation of project proposals, as well as starting the recently granted projects. The projects that are about to start will receive more than 46 Mio EUR European funding, from which **our members benefit with a share of approx. 12 Mio EUR**. This success is based on our members' knowledge, expertise and competences combined with the strategic support by BNN through our regional, national and European activities.

Kick-started with the Annual Forum & Networking Event (including the strategy workshop) last September, the BNN team has been intensively working on the elaboration of its structures to meet the expectations of the BNN-community: we support and guide our members and customers towards a **sustainable development of connected technologies**. BNN is your key partner for

- design in technology development (Safe-by-Design, Quality-by-Design, Sustainability-by-Design),
- innovation management, and
- building alliances & initiatives.

BNN complements these services with many years of experience in project management and increases your visibility by targeted communication activities.

With this structure, BNN is able to serve our members and customers with support services tailored to their needs, taking into consideration upcoming challenges connected to the changing ecosystem in Europe (e.g. Green Deal, SDGs, etc.). If you are interested in benefiting from BNN's support and joining our scientific and innovative community and/or to get involved in the strategic work, please, contact [us](#).

Enjoy reading the 46th BNN newsletter, which presents scientific highlights, project outputs and reports about past events.

We do wish all the best to you affected by Corona-virus related issues!

Sincerely
BNN-Team

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BNN News

New BioNanoNet member

BNN is pleased to welcome its new members:

ams AG (Austria)



ams AG is a [silver BioNanoNet member](#) since January 2020.

ams designs and manufactures high-performance sensor solutions for applications requiring the highest level of miniaturization, integration, accuracy, sensitivity and lower power.

For more details visit <https://ams.com>.

Prospective Instruments (Austria)



Prospective Instruments is a [standard BioNanoNet member](#) since March 2020.

Prospective Instruments provides photonic-based multi-modal imaging and analytical solutions for research, life science and clinical care.

For more details visit <https://p-inst.com>.

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Member presentation

MyBiotech



Fusion: growth and expansion through a combination of biotechnology and pharmaceutical development

The two life science companies MyBiotech GmbH and MJR PharmJet GmbH merge and will continue to do business under the name MyBiotech.

MyBiotech GmbH, a start-up company in the biotech industry, and MJR PharmJet GmbH, experts in pharmaceutical development, have merged, while the name of MyBiotech has been retained. Merge not only aims to combine the portfolio of both companies, but also the great know-how of the highly competent employees. The result is be a young team of over 20 scientists, and lab technicians who are actively working on new technologies, products and formulations. Multidisciplinary nature of creating innovative products requires bringing biotechnologists, chemist, engineers and pharmacists among others. Under the umbrella of MyBiotech, a new cultivation for benefiting expertise and experience from different fields during daily work is realised. This strategy also offers accelerated development process and innovative products, thus a very good economic perspective.

MyBiotech`s current focus lies on green technologies and innovative, more efficient pharmaceutical products. Merge is the first step of the major changes planned at the Überherrn site. Starting immediately from 2020, company will develop own products and these products will be manufactured at the same site. Current products are realised by green technologies such as production of omega-3 fatty acids from algae. Innovative, more efficient pharmaceuticals are already identified for the short-term pipeline. In order to be able to offer contract manufacturing to the pharmaceutical sector, a GMP certification is to be realised. The establishment of the new GMP-compliant manufacturing site will serve to fill the gap for bringing the formulations with innovative character to the market.

This combination of biotechnology and pharmaceutical development and will help MyBiotech to further grow and expand production. MyBiotech`s mission is bringing biotechnology and pharmaceutical products in the market in a fast and efficient way and the company aims to be leading partner in biotechnology and pharmaceuticals research and development, manufacturing, and processing in Europe and beyond.

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Publications

Recent scientific publications of BioNanoNet association members

In this section we have listed all publications sent to us by our BioNanoNet members from 2018 up to now.

Our next newsletter issues will list only new publications of our members. Certainly, you can always view all publications on our [BNN website](#).

Period 2020

Austrian Academy of Sciences, ITA

Ortis, F., Rose, G., Gázsó, A., Greßler, S., & Pavlicek, A. (2020): Environment, Health und Safety Forschungsprojekte in Horizon 2020 (NanoTrust Dossier Nr. 053 - März 2020) (p. 6). Wien. doi:/10.1553/ita-nt-053

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D. Jimenez de Aberasturi, M. Henriksen-Lacey, L. Litti, J. Langer, L.M. Liz-Marzán. (2020) **Using SERS Tags to Image the Three-Dimensional Structure of Complex Cell Models**. *Adv. Funct. Mater.* DOI: [10.1002/adfm.201909655](https://doi.org/10.1002/adfm.201909655)

J. Plou, I. García, M. Charconnet, I. Astobiza, C. García-Astrain, C. Matricardi, A. Mihi, A. Carracedo, L.M. Liz-Marzán (2020) **Multiplex SERS Detection of Metabolic Alterations in Tumor Extracellular Media**. *Adv. Funct. Mater.* DOI: [10.1002/adfm.201910335](https://doi.org/10.1002/adfm.201910335)

Guerrón, N. E., Cobo, A., Serrano Olmedo, J. J., & Martín, C. (2020). *Sensitive interfaces for blind people in virtual visits inside unknown spaces*. *International Journal of Human-Computer Studies*, 133, 13–25. DOI: <https://doi.org/10.1016/j.ijhcs.2019.08.004>

Luxembourg Institute of Science and Technology (LIST)

Polet, M., Cambier, S., Ziebel, J., Gutleb, A.C., Schneider, Y.-J. 2020. Silver nanoparticles induce a polarized secretion of interleukin-8 in differentiated Caco-2 cells. *Toxicol. Lett.* 325, 14-24. doi:10.1016/j.toxlet.2020.02.004

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Afantitis, A., Melagraki, G., Isigonis, P., Tsoumanis, A., Varsou, D. D., Valsami-Jones, E., ... & Lynch, I. (2020). NanoSolveIT Project: Driving Nanoinformatics research to develop inno-

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UMIT – Institute of Electrical and Biomedical Engineering

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Jaufenthaler, A., Schier, P., Middelmann, T., ... Baumgarten, D. (2020): Quantitative 2D Magnetorelaxometry Imaging of Magnetic Nanoparticles using Optically Pumped Magnetometers. Sensors, 20(3), 753-764. doi: 10.3390/s20030753

Schier, P., Barton, C., Spasov, S., ... Steinhoff, U. (2020): European research on magnetic nanoparticles for biomedical applications: standardisation aspects. Current Trends in Biomedical Engineering and Bioimages Analysis, 316-326. doi: 10.1007/978-3-030-29885-2_291

Period 2019

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

Greßler, S., Prenner, S., Kurz, A., Resch S., Pavlicek, A., Part, F. (2019): Polymer-Nanokomposite: Additive, Eigenschaften, Anwendungen, Umweltaspekte No. 052 – November 2019. Wien: Institut für Technikfolgen-Abschätzung (ITA).

Pavlicek, A., Rose, G., & Gazsó, A. (2019): Nano-registries: Country-specific Solutions for Nano-regulation No. 051en – June 2019. Wien: Institut für Technikfolgen-Abschätzung (ITA). <https://doi.org/10.1553/ita-nt-051en>

Rose, G., Pavlicek, A., & Gazsó, A. (2019): [Safe-by-Design – The Early Integration of Safety Aspects in Innovation Processes](#). NanoTrust dossier No. 050en – May 2019. Wien: Institut für Technikfolgen-Abschätzung (ITA). <https://doi.org/10.1553/ita-nt-050en>

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Mireia Pesarrodonà, Toni Jauset, Zamira V. Díaz-Riascos, Alejandro Sánchez-Chardi, Marie-Eve Beaulieu, Joaquín Seras-Franzoso, Laura Sánchez-García, Ricardo Baltà-Foix, Sandra Mancilla, Yolanda Fernández, Úrsula Rinas, Simó Schwartz Jr, Laura Soucek, Antonio Villaverde, Ibane Abasolo, Esther Vázquez (2019). Targeting Antitumoral Proteins to Breast Cancer by Local Administration of Functional Inclusion Bodies. *Advanced Science*. <https://doi.org/10.1002/advs.201900849>

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Kyndiah A. Leonardi F, Tarantino C, Cramer T, Millan-Solsona R, Garreta E, Montserrat N, Mas-Torrent M, Gomila G. (2019). Bioelectronic Recordings of Cardiomyocytes with Accumulation Mode Electrolyte Gated Organic Field Effect Transistors. *Biosens Bioelectron*. Nov. 6:111844. DOI: [doi: 10.1016/j.bios.2019.111844](https://doi.org/10.1016/j.bios.2019.111844)

Hayk Mnatsakanyan, Roser Sabater i Serra, Manuel Salmeron-Sanchez and Patricia Rico (2019). Zinc Maintains Embryonic Stem Cell Pluripotency and Multilineage Differentiation Potential via AKT Activation. *Frontiers in Cell and Developmental Biology*, vol 7, 2019. DOI <https://doi.org/10.3389/fcell.2019.00180>

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thritic Knee Joint Tissues in Response to Hyperacute Serum Treatment. *Cells*, 8(8). pii: E824. doi: 10.3390/cells8080824.

Stojanović, B., Bauer, C., Stotter, C., Klestil, T., Nehrer, S., Franek, F., Rodríguez Ripoll, M. (2019): Tribocorrosion of a CoCrMo alloy sliding against articular cartilage and the impact of metal ion release on chondrocytes. *Acta Biomater*, 94:597-609. doi: 10.1016/j.actbio.2019.06.015.

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Florian Part, Christoph Zaba, Oliver Bixner, Christian Zafiu, Sabine Lenz, Lukas Martetschläger, Stephan Hann, Marion Huber-Humer, and Eva-Kathrin Ehmoser, 2019. Mobility and fate of ligand stabilised semiconductor nanoparticles in landfill leachates. Currently under review in: *Journal of Hazardous Materials*.

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Investigation of the heterogeneity of bromine in plastic components as an indicator for brominated flame retardants in waste electrical and electronic equipment with regard to recyclability. Currently under review in: *Journal of Hazardous Materials*.

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Hays, J.P., Mitsakakis, K., Luz, S., van Belkum, A., Becker, K., van den Bruel, A., Harbarth, S., Rex, J.H., Simonsen, G.S., Werner, G., Di Gregori, V., Ludke, G., van Staa, T., Moran-Gilad, J., Bachmann, T.T., on behalf of the JPIAMR AMR-RDT consortium. (2019): The successful uptake and sustainability of rapid infectious disease and antimicrobial resistance point-of-care testing requires a complex 'mix-and-match' implementation package. *European Journal of Clinical Microbiology & Infectious Diseases*, 38(6), 1015-1022. doi: 10.1007/s10096-019-03492-4.

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Institute of Tendon & Bone Regeneration, Paracelsus Medical University

Costea, L., Meszaros, A., Bauer, H., Bauer, H. C., Traweger, A., Wilhelm, I., . . . Krizbai, I. A. (2019). The Blood-Brain Barrier and Its Intercellular Junctions in Age-Related Brain Disorders. *Int J Mol Sci*, 20(21). doi: 10.3390/ijms20215472

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Plachel, F., Heuberger, P., Gehwolf, R., Frank, J., Tempfer, H., Lehner, C., . . . Traweger, A. (2019). MicroRNA Profiling Reveals Distinct Signatures in Degenerative Rotator Cuff Pathologies. *Journal of orthopaedic research: official publication of the Orthopaedic Research Society*. doi: 10.1002/jor.24473

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JOANNEUM RESEARCH

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Know-Center GmbH

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NovaMechanics & National Technical University of Athens

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Luxembourg Institute of Science and Technology

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BNN project presentations

NanoSyn



NanoSciences and Materials: Exploratory Round Table Activities

The project "NanoSyn", which started in November 2019 for a period of 12 months, addresses nanosciences and nanotechnologies in Austria comprehensively. The relevant community in scientific and applied research as well as the industrial value chain shall be further developed. The aim of the project is the initiation of specific cooperation with special attention to the promotion of young scientists through conferences and trade fair presentations. The collaboration of the project partners "BioNanoNet Forschungsgesellschaft mbH (BNN)", "nanoNET-Austria e.V." and "Erwin Schrödinger Gesellschaft für Nanowissenschaften e.V." will strengthen the national community, support science and research activities as well as industrial collaboration from basic to applied sciences. Multidisciplinary collaboration on national and international level from research and development towards sustainable innovation will be facilitated.

Several events are supported by the project work, e.g. the [ESG-Think Tank](#) (9th of March 2020, Vienna), the [nanoNET-meeting](#) (9th of March 2020, Vienna), the [NanoTrust-Workshop](#) (10th of March 2020, Vienna), and the [4th EU-Asia Dialogue on NanoSafety](#) (7th of October 2020 (tbc), Vienna).

 Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

The project receives funding from the Federal Ministry Republic of Austria, Climate Action, Environment, Energy, Mobility, Innovation and Technology.

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Member Contributions

Contribution of CIBER-BBN



Integrated Cutting-edge Biomedical solutions for the nanotechnology based MedTech Sector

NANBIOSIS is a distributed **Unique Scientific and Technical Infrastructures** ([ICTS](#)) recognized by the **Spanish Council for Science Policy, Technology and Innovation** (MINECO) that group together 29 complementary and coordinated units located at different institutions, which in turn are distributed throughout seven Autonomous Communities in Spain: Andalusia, Aragon, Catalonia, Extremadura, Basque Country and Valencia. This ICTS is integrated by the **Biomedical Research Networking Center in Bioengineering, Biomaterials and Nanomedicine** (CIBER-BBN), the **Jesus Usón Minimally Invasive Surgery Centre** (JUMISC) and the recently joined **Andalusian Centre for Nanomedicine and Biotechnology**, BIONAND.

In 2010, the first contact between **CIBER-BBN** and **JUMISC** took place through the collaboration on an intramural project (Image Guided Minimally Invasive Therapies for Safer Surgeries (THEMIS) funded by CIBER-BBN and involving three research groups of this centre and another one from JUMISC in the area of bioengineering and biomedical imaging. After this project, the potential for collaboration between centres, in a broader sense, thrived. While CIBER-BBN provides basic and applied research, JUMISC provides infrastructure and experts to carry out preclinical assessment allowing continuous monitoring and on-site proof of concept. Observing the synergies and complementarity between both centres, CIBER-BBN and JUMISC's signed in November 2011 a scientific and technological cooperation agreement for the sharing of research platforms and services which was the germ that lead NANBIOSIS ICTS. In 2013, the institutions applied for the ICTS certification obtaining the approval one year later. During 2018, the **Andalusian Centre for Nanomedicine and Biotechnology** joined this distributed ICTS Nanbiosis.

Nanbiosis research infrastructure is geared towards medical applications, offering **new integrated Cutting-edge biomedical solutions** using a single contact point model. Constituted as clusters of technological-Scientific equipment Nanbiosis offers **TOP-LEVEL tech-**

nological resources and internationally recognized groups behind to the scientific community in the public and private sector.

The development of novel nanomedicines, new medical devices for tissue and regenerative medicine and new in vitro diagnostics devices need of highly scientific and technological equipment that required top-level scientific knowledge and experience. The communities are mature and excellent; however, translation into clinical applications is still slow. Nanbiosis can contribute to translation offering integrated solutions to advanced challenges focused on the following sectors: (i) **nanomedicines preclinical validation** services (ii) **Customized (nano)biotherapeutics production** services (iii) **biomaterials preclinical validation** (iv) **in-vitro diagnostics and organ-on-chip** services. Focused on these fields, new advanced technologies for manufacturing, characterization and regulation aspects will guarantee the success and viability of the developed technologies. The objective of Nanbiosis is to guide excellent basic and applied research through the innovation process to develop new nanomedicine products/applications/tools. Moreover, the close collaboration with experts on Nanosafety, regulatory issues, investors and consultancy experts help us in the preparation of business plans for the creation of new spin-offs and start-up companies.

Specifically, NANBIOSIS provide a complete service that includes the design and production of biomaterials and nanomaterials and their nanoconjugates, and the characterization of these bio-/nanomaterials, tissues and medicals devices from a physic-chemical, functional, toxicological and biological (including preclinical validation) point of view, focused on biomedical applications such as: IVDs, biosensors, regenerative medicine, drug delivery, therapeutic agents or MRI contrast agents. A Unit dedicated to high performance computing is also included for those technological applications with large scale computational demand. **The coordination of the required units for the development of the project is offered under a “Single Contact Point” model** for either **subcontracting** or **collaboration in European Projects**. Moreover, as part of the CIBER-BBN, the groups have access to all the infrastructure units of the NANBIOSIS ICTS.

Specifically, Nanbiosis is involved in the European Project **SAFE-N-MEDTECH Open Innovation Test bed program** combining knowhow of experts from the consortium that will work together in the deep understanding and knowledge of the material-nano properties, their advance use and applications in Medical Technologies and other aspects involved in MT safety. CIBER-BBN and Nanbiosis are the WP3 Leaders coordinating the preclinical

assays portfolio and participating actively in all the Test Cases and working in close collaboration with four Test Case Developers: Stryker, RCL, HELIA Biomonitoring and TECNAN.

SAFEnmt test bed will help to accelerate the development nanotechnology based medical technologies products and services for future applications in clinical practice.

More information: www.ciber-bbn.es, www.nanbiosis.es,

Nanbiosis video www.youtube.com/watch?v=vezgov-kc0g



Nanbiosis ICTS-Platforms and Units

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Contribution of Graz University of Technology

New simulation-experiment combination allows deeper insights into ultrafast light-induced processes

Researchers from Graz University of Technology and the University of Vienna are demonstrating for the first time how the energy flow between strongly interacting molecular states can be better described.



*Their experiments were part of the success of the research: Pascal Heim, Stefan Cesnik & Markus Koch. (f. l.)
© Lunghammer - TU Graz*

Since the 1990s, femtochemistry has been researching ultrafast processes at the molecular level. In the last few years, the research group Femtosecond Dynamics at TU Graz's Institute of Experimental Physics has been able to achieve a number of successes in the area of light-matter interaction. "A precise understanding of the processes triggered by photoexcitation in molecules is, for example, a prerequisite for the development of sustainable technologies that enable an energy supply based on solar energy," says Markus Koch, the head of the working group. As an example, he cites photocatalysis, which helps to convert sunlight into chemical energy with advantages in terms of long-term storage and energy density when compared to the generation of electrical energy via photovoltaics.

One method for such molecular dynamic investigations makes use of so-called pump-probe measurements applying an ultrashort laser pulse to excite ("pump") a molecular system into a desired state. After an adjustable delay time, a second ("probe") laser interrogates the population of the excited state by ionizing the molecule. The energy of the emitted photoe-

lectrons is measured and by varying the pump-probe delay time, conclusions can be drawn about the energy flow in the molecule.

Heisenberg's energy-time uncertainty principle prevents exact results

An exact description of light-induced processes on their real time scale has so far failed for some polyatomic molecules that may take different decay or fragmentation routes after excitation, depending on the choice between closely spaced energy states. As a result of Heisenberg's energy-time uncertainty principle, laser pulses of only femtosecond (10^{-15} seconds) time duration cannot selectively excite closely neighbouring molecular states. However, short pulses are a prerequisite for the observation of extremely fast processes.

New approach combines theory and experiment

In collaboration with researchers of the Institute of Theoretical Chemistry at the Faculty of Chemistry of the University of Vienna under the direction of Prof. Leticia González, the experimental physicists in Graz have now overcome this hurdle. By combining experiments with ultrashort laser pulses and theoretical simulations of light-induced processes, the energy flow in acetone – a molecule that has already been well studied – could now be observed for the first time at a key energy window between three closely related states. Even for the Vienna group, a driving force in the field of the theoretical description of molecules after light excitation, the system under investigation presented a challenge. “For these simulations, new developments in our local software package SHARC were necessary, without which the correct description of acetone dynamics would not have been possible,” emphasizes González.

Synergy effects yield new insights

Both methods in themselves are widely used, but “while the energy-time-blur relation in femtosecond spectroscopy prevents precise results, real-time simulations provide deeper insights into molecular dynamics, which in turn require the experimental results to be verified,” explains Koch. The combination of these two techniques now provides researchers with a deeper insight into acetone dynamics and is a further milestone in the study of light-matter interactions. The results were published in *The Journal of Physical Chemistry Letters*.

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Member Contributions

Contribution of Graz University of Technology



Researcher of patterns in the large text of DNA

Leila Taher searches a "strange text" of three billion letters for patterns that define us as human beings. The TU Graz bioinformatician reads the human genome – and loves unanswered questions.



As a biotechnology student in Argentina, Leila Taher wanted to find the one formula that would explain everything. Today she is head of the Institute of Biomedical Informatics at TU Graz. © TU Graz

News+Stories: You have recently been appointed head of the newly founded Institute of Biomedical Informatics at Graz University of Technology (TU Graz) and conduct research in the field of genomics. What is that exactly?

Leila Taher: My topic is actually called "functional genomics" or "regulatory genomics" and is related to the genome. Children inherit the genome from their parents. It is basically what defines us. Mendel studied heredity about one hundred and fifty years ago, but in plants. He discovered the effect of the genes, even though he knew nothing about the genome. Genes are sections of the genome that need to be decoded by the cells to form proteins. Today, we know that different species are very similar at the gene level. As humans, we think that we have little in common with mice or flies, but the truth is that our genes differ little from theirs. What makes the difference is which genes are active, when, and how active they are. That's what interests me as a researcher. I am trying to understand the mechanisms by which proteins are produced and how many of them there are in the cells of our body.

As humans, we think that we have little in common with mice or flies, but the truth is that our genes differ little from theirs.

How does informatics come into play?

Leila Taher: This has little to do with classical computer science. As a genomic scientist, I study DNA. It's a very special molecule, composed of units which repeat themselves. You can read DNA like a text. It's a strange text consisting of three billion letters – a very boring text in the sense of the alphabet because it only contains the four letters A, C, G and T. These are the building blocks adenine, thymine, guanine and cytosine. In bioinformatics, we want to read the DNA text and know what sections in the text mean and what their function is for the structure of the proteins. And this is where computer science comes in. As a bioinformatician I try to recognize patterns in the large "DNA text". We use the Artificial Intelligence (AI) method for this, and we've been using it for a long time – long before anyone talked about it (laughs).

In bioinformatics, we want to read the DNA text and know what sections in the text mean and what their function is for the structure of the proteins. And this is where computer science comes in. As a bioinformatician I try to recognize patterns in the large "DNA text". We use the Artificial Intelligence (AI) method for this, and we've been using it for a long time – long before anyone talked about it.

So in other words, bioinformaticians look for repetitive combinations in the genetic information?

Leila Taher: Yes, since DNA consists of only four "letters", it is a matter of combination and context. This is how the meaning comes about. We often compare genomes with each other. Genomes of different people differ little. But if I assume that many people who get sick have a certain alteration in the genome that leads to the disease, I can systematically search for such sites. This can really only be done with a computer. To do this, you compare people – for example, people who are healthy with people who all have a particular disease – to find the difference. However, there is usually not only one difference, there are many differences – and most of them do not mean anything for the disease in question. They can have no meaning or a completely different meaning.

Did you come to bioinformatics because you wanted to research diseases?

Leila Taher: When I started, I thought about studying medicine because – like many young people – I wanted to cure diseases. But I was probably too introverted for dealing with patients. In addition, what really interests me are the mechanisms behind a disease. Doctors are trained to diagnose and treat diseases. The mechanisms by which diseases develop

are almost exclusively the concern of doctors working in research. On the advice of my father, who is a chemist, I therefore began to study biotechnology rather than medicine. This of course includes mathematics, chemistry, physics and biology. Biology was too descriptive for me; I wanted to find a formula that would explain everything. This is in principle what is now called quantitative biology, which is a very mathematical approach. At the time, this field did not exist and I studied mathematics parallel to biotechnology until I obtained my bachelor's degree. This mixture of biology and mathematics – that's my area.

So this is how you went from wanting to be a doctor to wanting to be a bioinformatician. What fascinates you most about it today?

Leila Taher: That we know so little about it; that there are so many challenges, so many unanswered questions. I just want to know. Of course, research today is much further ahead than it was about 20 years ago when the human genome was decoded. Nevertheless, we actually know very little, even though in the meantime not only one genome has been sequenced, i.e. read, but thousands of genomes – of humans, but also of other species. From a bioinformatics point of view, this is great. We can now compare them in order to identify and understand differences.

Has being a woman played a role in your career as a scientist?

Leila Taher: (Laughs) No. My mother is a scientist. For me it was always quite normal. During my studies, many female teachers also taught me. I never thought it could be a problem. Most women in Argentina work. As in France, for example, children normally go to a nursery. When I arrived in Germany, I noticed that career planning is different here. Many women stay longer at home with their children. This makes planning a career more difficult.

What is a perfect day for you?

It is a wonderful feeling when I can pass on some of my own enthusiasm. And then I feel that I've achieved something – and this turns a normal day into a perfect day.

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Member Contributions

Contribution of Graz University of Technology



Sustainable light sources: LEDs from bacterial production

In the FET Open project ENABLED, TU Graz protein-designer Gustav Oberdorfer is working together with researchers from Spain and Italy on environmentally friendly and inexpensive light-emitting diodes.



*Gustav Oberdorfer has been researching at the Institute of Biochemistry at TU Graz since February 2018.
© Lunghammer – TU Graz*

The basis for this vision is being laid at the Institute of Biochemistry at Graz University of Technology, where Gustav Oberdorfer and his team are designing proteins with the help of simulation software. "For this project, we're analysing fluorescent protein structures from nature and testing how we need to modify them so that they bind different fluorescent organic molecules," explains Oberdorfer. LEDs emit short-wave blue light which is then absorbed by a layer of inorganic lighting materials and converted into light of longer wavelength. The entire spectrum then results in the white light as we perceive it. Oberdorfer developed the idea for the project together with cooperation partners from Spain and Italy who worked on the topic independently of each other and were able to achieve promising success.

Environmentally friendly LED coating

Rubén Costa from the Madrid Institute for Advanced Studies (IMDEA) developed a stable organic LED coating as an alternative to conventional LED coatings, which usually consist

of problematic rare earth minerals. The mixture consists of organic polymers in which he and his team managed to embed fluorescent proteins. These fluorescent proteins are found in marine organisms and are used by them as a light source for hunting, communication and self-protection. The luminosity that can be achieved with such devices is however still too low to use them in lamps that illuminate entire rooms.

Organic dyes with good light emitting efficiency

Researchers of the Department of Chemistry at the University of Turin led by Claudia Barolo are in turn dealing with the synthesis of organic dyes that have a good light emitting efficiency and are used in organic light-emitting diodes (OLEDs). However, many of these dyes are costly and complex to synthesize. As part of the FET Open project, Barolo and her team are now looking for a suitable dye that can be produced with minimal effort and that can be modified so that it can be incorporated into proteins as an artificial amino acid.

FET Open project ENABLED combines the best of all the sub-sectors

The FET Open project ENABLED now brings together the successes of all groups. The goal is to use bacteria to develop completely new artificial fluorescent proteins. To this end, the Graz biochemists first simulate thousands of different hypothetical proteins that are to bind specifically to the synthetic dyes. A handful of these proteins – namely those closest to the structure of naturally fluorescent proteins – are then ordered as synthetic DNA constructs. The next step is to investigate whether these proteins really bind the dyes for which they were designed. As soon as this is confirmed, these new, artificial fluorescent proteins will be integrated into the polymer matrix and tested for their suitability with regard to bio-LEDs.

"The plan is that we will 'harvest' the proteins from the bacterial cell; in other words, we will be able to grow some part of the light sources," said Oberdorfer, hoping for a proof of principle at the end of the project in four years' time.

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Contribution of ICCRAM – Universidad de Burgos



11F | International Day of Women and Girls in Science

From February 1st to 15th, scientists from different fields of investigation working in ICCRAM took part in the initiative 11F, carrying out several activities that took place in many schools in Burgos, and one in “La Estación”, a public space in the city. Among the hold activities, workshops turned out very appealing for young people as they included basic science experiments and were adequately interactive and fun. All the activities were designed for different educational levels, from 5-years-old kids to 16-years-old teens.



There were three teams: Cristina, Félix and Lara; another one, formed by Sonia y Rocío; Brixhilda performed her actions by herself. Every workshop was divided into two parts. The first part was theoretical and tried to present prominent female personalities throughout history; and the second one, more of a practical kind, that gave the opportunity for students to witness and collaborate of some experiments, like a chemical volcano, energy with potatoes or slime, among others.



Complete Photo Album of 11F activities by ICCRAM: <http://bit.ly/11F2020> ICCRAM

Thanks to the communication actions developed by ICCRAM, the activities promoted by the research center have had a truly positive impact, reaching to more than 250.000 people. Via UBU's press bureau, a press release was sent to every news media reporting about the developed activities and providing information about the research center and project partners. We participated in the TV space "Magazine" in La8 Burgos CyLTV, a live podcast conducted by the scientist and disseminator Luis Quevedo, press release in two local newspapers and social media posts



TV Program:

<https://www.youtube.com/watch?v=85KFKTBOA4>



Live Podcast:

<https://cuonda.com/el-metodo/especial-dia-de-la-mujer-y-la-nina-en-la-ciencia>

16BURGOS

UNIVERSIDAD DE BURGOS | PROYECTOS

PEQUEÑAS MANOS PARA GRANDES PROYECTOS

Científicos del ICCRAM acercan la ciencia a los escolares de 6 colegios y visibilizan el papel de las mujeres en la investigación. Ayer lo hicieron con 45 alumnos de Infantil del Padre Manjón

DECLARACIONES:

NURIA GARCÍA
PROFESORA DE INFANTIL

«Repasaremos en el aula lo que hemos hecho en los talleres para ver en qué medida han adquirido los conocimientos»

SONIA MARTEL
INVESTIGADORA

«Son experimentos que permiten de alguna forma palpar por qué pasan las cosas»

ROCÍO BARROS
INVESTIGADORA PRINCIPAL

«Con el proyecto Greener desarrollamos tecnologías innovadoras para la descontaminación de aguas y suelos»

Los profesores, Rocío Barros y Nuria García, se mostraban encantadas con la iniciativa del ICCRAM y la respuesta de sus alumnas. «Les llama la atención lo que tiene que ver con manipular y observar, se paraban, resultando que las actividades estaban muy bien dirigidas para que los escolares pudieran entenderlas. No obstante, esta última sesión que una vez de vuelta al aula «repasaremos lo que hemos hecho en cada taller para ver en qué medida han adquirido los conocimientos que se pretendían».

El hilo conductor del programa es el proyecto europeo Greener. Su misión, explicó que se trata de un trabajo en el que se pretenden «desarrollar tecnologías innovadoras para la descontaminación de aguas y suelos», de ahí que muchas de las actividades a realizar tengan que ver con la importancia de cuidar el medio ambiente. En su primer año en marcha cuenta con un equipo de seis personas, a las que próximamente se unirá una séptima. Participan en su desarrollo 21 socios internacionales y su presupuesto alcanza los cinco millones de euros, de los cuales la UBU participa más de 400.000 euros.

Events like this allow reaching to the general public, so we must take advantage of these opportunities to spread all the pertinent information, which is essential in dissemination activities for any H2020 project. We are committed to being recognized by our role on culture dissemination, bringing science closer to general public and reinforcing the role of women in the Science.

Contact us

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International Research Center in Critical Raw Materials for Advanced Industrial Technologies

Press Release:

<https://www.ubu.es/agenda/el-iccram-participa-en-el-dia-internacional-de-la-mujer-y-la-nina-en-la-ciencia>

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Know-Center sets next milestone towards safe, verifiable and explainable AI

The COMET module "DDAI - Data Driven Artificial Intelligence" (DDAI), endowed with 4 million euros and funded by the Austrian research funding agency FFG, Styrian Business Promotion Agency SFG and partners from industry, marks the next milestone in fundamental research around AI, security and privacy. Know-center, a leading European Research Center for Data-Driven Business and AI homebased in the city of Graz, took over the leading role in this project and collaborates with excellent project partner AVL List, Magna Steyr, AT&S and NXP as well as the blockchain expert loV42 from England to strengthen Austria's visibility in the international AI-community even more.

The revolutionary project will make it easier for future companies to understand and use data and algorithms with a maximum of data protection. They will be able to train machine learning models on encrypted data without the fear of leaking confidential information or private data. Know-center, a leading European Research Center for Data-Driven Business and AI homebased in the city of Graz, is leading this project and collaborates with excellent national and international project partners from industry and academia. The companies AVL List, Magna Steyr, AT&S and NXP as well as the blockchain expert loV42 from England are contributing with use cases and know-how from the industry side. The Graz University of Technology, KU Leuven, University of Passau, and University of Twente strengthen the scientific aspects of the project as well as a broad scientific advisory board with members from the Universities of Pittsburgh, Delft, and Karlsruhe.



Christian Rechberger (Know-Center), Stefanie Lindstaedt (Know-Center), Harald Kainz (TU Graz), Gerhard Schagerl (AVL) © Know-Center

Data Driven Artificial Intelligence

The core of the “DDAI” module is the development of a theoretical basis for safe artificial intelligence algorithms that can be easily explained and verified. “Data is the new gold” - but many different aspects prevent companies from mining for this gold: Modern data-driven AI is highly complex, the path from data to the analysis result is difficult to understand and hard to verify, and its application requires expert knowledge which is not available in every company. In addition, the confidentiality of data prevents business partners from sharing analytical results with each other. Especially when it comes to personal health or medical data the importance of secure and encrypted analytics is evident. In a world filled with persistent data collectors and an alarming growth of data monopolists we believe that our privacy-preserving AI methods are a step into a more sustainable and secure digital future.

Step by step towards safe, verifiable and explainable AI

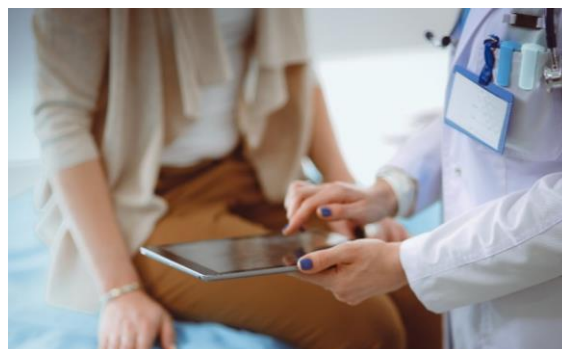
The aim of the COMET module is to address all of these points and to develop safe, verifiable and explainable AI as well as to create a curriculum for AI-user, which should create an understanding of how to deal with AI and the limits. The module thus includes all stations in the data processing chain, from data management and infrastructure, via cryptographic methods for secure data processing, to the AI-user.

Know-Center works with a strong network of experts

When the Know-Center was founded in 2001, AI was only an issue among IT experts. Today the potential is known across all industries and the Know-Center has built up its competence over the years. Stefanie Lindstaedt, CEO and CSO of the Know-Center and Director of the ISDS at TU Graz, on AI: *“Big data and AI is a big topic today. However, it is a matter of implementing and developing business models, which we also do continuously in around 150 projects every year. This requires specialist knowledge and a lot of experience, but also a strong international network of experts, which we have built up over 20 years.”*

Data-driven Life sciences

The life science industry is also entering a phase of radical change. Technology-driven trends powered by data and AI are transforming healthcare delivery to increase meaningful value.



Know-Center also supports and accompanies Life Sciences organizations through the journey of becoming data-driven. All services are based on the fundamental premise that in order to generate the maximum value from data in an effective and efficient manner, customer's domain experts need to play a major role in a cooperative process. Know-Center provides services to identify, evaluate and plan data-driven use cases across the full value chain. Furthermore, Know-Center experts recommend and design data management platforms based on specific requirements and develop prototypes applying cutting edge big data analytics methods, including advanced statistical algorithms as well as cognitive computing.

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Are you looking for project partners and funding in the field of medical diagnostics?

The DIGI-B-CUBE project, funded by the European Union's Horizon 2020 research and innovation programme, aims to improve the cross-sectoral cooperation potential of SMEs by combining artificial intelligence (AI), digital technologies of cognitive computing (CCDT) and the bioimaging-biosensing-biobanking (B-CUBE) industry. Through the project, SMEs have the opportunity to develop and improve market-sensitive and disruptive technologies and generate innovative solutions that ultimately improve patient-centric and diagnostic workflows.

DIGI-B-CUBE will support the development of tailor-made solutions and prototypes by providing innovative small and medium-sized enterprises (SMEs) in the EU and associated countries with access to vouchers of up to € 60,000.

The call will be opened in April 2020. More information can be found at: <https://digibcube.eu>.

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NanoSolveIT H2020 project consortium meeting 2020

The third consortium meeting and General Assembly (GA) of the EU Horizon 2020 research project [NanoSolveIT](#) (Innovative Nanoinformatics models and tools: towards a Solid, verified and Integrated Approach to Predictive (eco)Toxicology) was held in Reykjavik, Iceland on the 4th of February 2020, gathering more than 30 experts in the field of nanoinformatics to discuss the latest developments in the field of *in silico* modelling for the environmental health and safety of nanomaterials (ENM), summarise the current project progress and advances, and set the targets for year 2 of the project.

The [NanoSolveIT](#) GA was preceded by a workshop organised jointly with the [NanoCommons](#), on the development of InChI identifiers for nanomaterials, that will be used for both scientific and regulatory purposes. The workshop lasted one and a half days and was attended by nanosafety researchers and regulators from both the EU and the Americas (U.S.A., Brazil).

Following the [NanoSolveIT](#) GA, a joint [NanoSolveIT](#), [NanoCommons](#) and [RiskGONE](#) project meeting took place, with scientists from all three consortia discussing the latest activities of their ongoing joint actions and planning further collaborations to advance safe nanotechnology, focussed on areas of mutual activity such as development of Adverse Outcome Pathways (AOPs) and data sharing.



(Left) A working group within the InChI for nano workshop, (Right) The three projects meeting session aligning joint research priorities across the projects.

Important progress has been noted and fruitful discussions were held on several main topics of the research project, such as

- The NanoSolveIT knowledge base, ontologies, datasets and data gap filling approaches;
- Adverse Outcome Pathways (AOPs) and nanomaterials fingerprints;
- The NanoSolveIT Integrated Approach to Testing and Assessment (IATA);
- NanoInformatics Models and the NanoSolveIT Cloud Platform.



(Left) NanoSolveIT group photo and (Right) NanoSolveIT GA session

A [NanoSolveIT](#) review has just been published in Computational & Structural Biotechnology Journal ([link](#)), describing the state-of-the-art in computational modelling for nanomaterials and the vision of the consortium for development of innovative and integrated tools for *in silico* nanosafety assessment.

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The project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement n°814572.

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Contribution of ScienceConsult – DI Thomas Mohr KG

**Science
Consult**

Nanoparticle gene/protein expression database

The AirClean and Protect projects

ScienceConsult - DI Thomas Mohr KG participates in several projects involving a strong bioinformatics/computational biology component. During the last years, ScienceConsult has gained considerable experience with data mining and utilization of these mined data.

proTect - new concepts for an in vitro modeling of biocompatibility of medical products

For two years, ScienceConsult has participated in proTect, a project aiming at *in vitro* testing of biocompatibility. The project consists of three parts

- human cell cultures will be treated with a diverse range of relevant materials. High resolution mass spectrometry will be used to gain protein expression profiles. These profiles will be set into biologic context using bioinformatics/computational biology methods
- established immunologic methods will be used to test whether the materials trigger an immune response (adaptive or humoral)
- finally, a toxicologic screen panel will be established to test further toxicologic parameters.

Taken together, these parts will allow a realistic assessment about the reaction profile of human cells when confronted with medical products.

Nanoparticles are becoming more and more important with regard to many medical applications, therefore it was decided by the project consortium, that nanoparticles will become an integral part of proTect. ScienceConsult has been tasked to do research data availability and to construct a data repository containing available information as well as processed - and if available raw data from these datasets.

Publicly available data are a valuable contribution to own data

ScienceConsult was able to collect 66 datasets of gene and protein expression data, 39 originating from species *Homo sapiens* and 27 from *Mus musculus*. Queried databases were ArrayExpress, Gene Expression Omnibus and ProteomeXchange. To ensure the

quality of data, whenever possible raw data were downloaded and preprocessed according to our in house quality control pipelines.

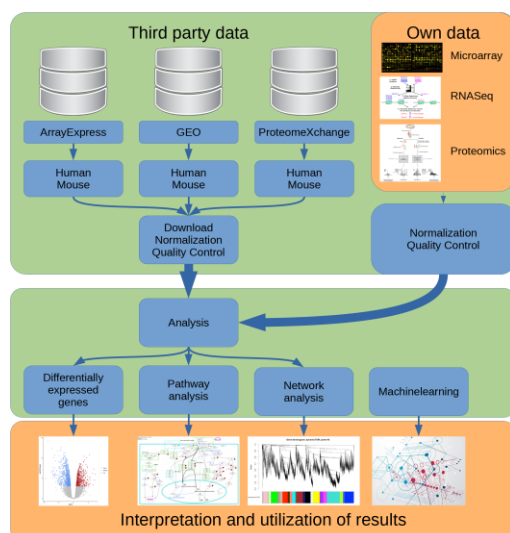
These data sets represent a variety of different types of mostly inorganic nanoparticles, for instance gold, cerium, zinc, and others. Zell models included various cell types such as hepatocytes, lung epithelium cells, endothelial cells, immune cells, and others.

New insights into molecular networks by state of the art analysis methods

Network based analyses have been successfully used with almost all -omics type expression data, such as microarray, shotgun proteomics, RNASeq and single cell RNASeq analysis. They provide a unique insight into cellular processes. Commonly used methods such as differential gene/protein analysis are restricted to a look at one gene at a time. However, genes do not work alone; they are part of a complex machinery. The hypothesis behind network based analysis is the assumption, that genes associated with a certain biological process tend to have similar expression levels and co-expression network topologies. The topology of the inferred network is used to make predictions about the genes, especially about potential gene regulatory networks, target genes, biomarkers, and key regulators.

With this unique data set in combination with state-of-the art network based analysis methods, ScienceConsult hopes to further contribute to nanoparticle research, especially in the fields of toxicology and biocompatibility. The next step will be to introduce these data into COST Action CA17104 - New diagnostic and therapeutic tools against multidrug resistant tumors, which contains a sizeable nanomedicine component

For further informations on the data set resp. our other projects, please feel free to contact Thomas Mohr at thomas.mohr@mohrkeg.co.at



Workflow of potential projects. Green is ScienceConsults part, orange the clients part. First, data are selected according to the scientific question on hand. Data are normalized, and put into “usable” format, resp. integrated with own or client supplied data. Finally, state of the art analysis methods such as pathway analysis, network based analysis or machine learning analysis methods are employed.

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Contribution Spath Micro Electronic Design GmbH – MEDS



CNSystems is breaking new ground together with MEDS in non-invasive hemodynamic diagnostics

Cardiovascular disease is the leading cause of death in industrialized countries.

The Task Force Core is providing a platform for advanced hemodynamic diagnostics. The non-invasive CNAP® blood pressure measurement, including cardiac output and dynamic fluid parameters PPV / SVV (Pulse Pressure Variation / Stroke Volume Variation), form a unique combination to improve diagnostics for a variety of applications.

This method achieves cost-effective and low-risk monitoring for different interventions, in which an arterial catheter measurement is not indicated but continuous values must be obtained. This enables a quick reaction to hemodynamic changes.

Task Force Core – device by CNSystems

With CNAP®, the continuous blood pressure waveform for each individual heartbeat is measured on the finger artery. The system is measuring non-invasively and continuously, using a double finger sensor based on a small pneumatic cuff and optical detection system. To attribute for orthostatic differences in the absolute blood pressure value, the system calibrates the measured arterial blood pressure values based on an included intermittent upper arm blood pressure measurement (NIBP).

The medical device integrates into the workflow and can offer flexible blood pressure measurement, especially when arterial measurements is not indicated, or possible, and intermittent NIBP measurements are not representative enough. It is hence possible to monitor the patient's hemodynamic status continuously, in a non-invasive manner without the need for an invasive arterial access.

Successful implementation with ISO13485 certified MEDS as partner

Competence and extensive experience in developing hardware, software and firmware for medical devices and life science applications was a key metric for CNSystems in choosing a partner. So bringing MEDS onboard was a logical consequence.

MEDS implemented the following significant innovations to meet the requirements:

- Full electrical safety in accordance with IEC 60601-1
- Future proof and highly configurable architecture

Eight high-resolution Analog-Digital Converter interfaces that can be configured as inputs or outputs. Variable hardware configuration so critical components can be assembled during manufacturing process alternatively so hardware redesigns are not necessary. Two interfaces for future integration on existing OEM modules.

- Modular design and tight integration

A variable design of the electronics in the basic module allows the use in OEM applications in addition to existing equipment as well as integration of devices based on CNAP® technology.

Key advantage of this modular approach is that cost-incurring changes in design are avoided.

Early involvement as the key to success

Due to the early involvement of MEDS into the project, the expertise of the team has been a true asset during the design and development phases. The early involvement helped significantly during the joint development process whereby the team discussed challenges in advance for an efficient development process avoiding costly redesign loops.

The software development and documentation is according to ICE 62304, support for EMC tests is in accordance with IEC 60601-1-2: 2014 (Edition 4).

When to buy

Clinical studies were conducted throughout 2020 and the system is expected to be finally approved this year. We are proud to be part of this achievement - so stay tuned for announcement of market entry.

For more information: www.cnsystems.com



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Contribution of UMIT – Institute of Electrical and Biomedical Engineering



quantMRX - Quantitative magnetorelaxometry for magnetic nanoparticle monitoring assisting human cancer therapies (quantMRX)

DFG and FWF – DACH Joint Research Project



The PTB – Physikalisch-Technische Bundesanstalt, Berlin and UMIT – Private University for Health Sciences, Medical Informatics and Technology in Hall in Tirol have joined forces and started a new research project for the quantitative imaging of magnetic nanoparticles (MNP) in the human body, funded by the German Research Foundation

(DFG) and the Austrian Science Fund (FWF). These magnetic nanoparticles are employed in novel cancer therapies for the delivery of therapeutic substances to the tumor (magnetic drug targeting) or for the controlled and localized heat generation to destroy cancer cells (magnetic hyperthermia). Thereby, the quantitative imaging detection of the magnetic nanoparticle distributions in the human body is crucial for the assessment und the individual control of the treatment process.

The method of magnetorelaxometry (MRX) provides a mature measurement technology which has already demonstrated its fundamental suitability for the sensitive and specific detection of MNP in tissue in pre-clinical applications. In this project, the required technology will be further developed on this basis so that MNP distributions in specific human body regions such as the brain, the prostate, the lymphatic nodes, the gastrointestinal tract, the lungs or the extremities can be quantitatively imaged.

The images of the magnetic nanoparticle distributions should be available immediately during or after the MRX measurements (online monitoring) in order to allow the treating physician an instantaneous assessment of the patient. For this purpose, novel approaches need to be realized for the data processing and for the reconstruction of the distributions with

high spatial resolution and, at the same time, with a substantial reduction of the computing time. In addition, approaches for the multi-modal integration of the quantitative MNP distribution and the associated anatomic structure of the body region will to be developed, with the anatomic data being obtained by established procedures such as CT, MRT or laser scanning of the body surface.

Another field of activity in this project consists in the investigation of possibilities of MRX imaging for the demonstration of molecular changes in the body. In this respect, the nanoparticles are employed as sensitive sensors for changes in their immediate vicinity. This information can then be integrated again in images of larger body regions and used for the investigation of physiological processes in the body.

For the evaluation of MRX imaging, special body-part phantoms will be developed within the project, which reproduce the physiological and physical parameters in selected therapy scenarios and which can be loaded with MNPs in a defined way. These investigations will be carried out in close cooperation with clinical partners to ensure the medical relevance and to take the clinical requirements and the demands on the imaging modality from a medical point of view into account.

At the end of the three-year funding period, all technical requirements should be complied with in order to apply magnetorelaxometry imaging of magnetic nanoparticles for the clinical research of the novel MNP-based cancer therapies in humans.



The quantMRX team at the Kickoff meeting in Hall in Tirol in February 2020 © UMIT

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UMIT – Private University for Health Sciences, Medical Informatics and Technology, Institute of Biomedical Engineering and Informatics

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Working Group 8.23: Metrology for Magnetic Nanoparticles

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Contribution of University of Graz
Institute of Pharmaceutical Sciences, Pharmaceutical Technology & Biopharmacy



ActiTOX - Active organotypic models for nanoparticle toxicological screening

The ActiTOX project receives funding from the European Union's H2020 program under Marie Skłodowska-Curie grant agreement No 823981. The project aims to develop novel and reliable 3D organotypic models for pre-clinical nanoparticle toxicological screening and drug development via ADME (absorption, distribution, metabolism, excretion) studies.

The objective of the project is to increase the relevance of in-vitro studies by providing scalable bi-organ bioreactors that can simulate both the absorption and metabolism of the drug. More specifically, skin, lung and intestinal models will be developed to simulate particle/drug absorption, and liver and fat models will be developed to simulate the subsequent metabolism. 10 partners are working closely together to achieve the goals during the timeframe of four years (started 08/2019).

To increase the relevance of in-vitro toxicological studies the project will:

- Develop 3D biomimetic scaffolds with chemical and mechanical properties optimized for a particular tissue.
- Develop active and cell-stimulating scaffolds that provide the chemical signaling during cell differentiation and growth.
- Customizing the bioactive molecules release from scaffolds and establish the protocols for regulated differentiation of induced pluripotent stem cells to desired cell lines.
- Develop a bi-organ bioreactor platform with two flow circuits: for particle exposure, and for simulation of vascular flow.
- Reduce the overall cost of the toxicological screening by lowering the consumption of active molecules and combining the absorption and metabolism testing into one device.

During the project kick-off meeting on the 22nd and 23rd of October 2019, partners defined the workplan, future staff exchange, workshops and trainings planned in the next years. In order to achieve the project goals, a training network enabling efficient short-term second-

ments between industry and academia will be established to strengthen the active collaboration between stakeholders. ActiTOX partners are experts in the production of scaffold and drug delivery systems (InoCure s.r.o.), special cell culture media (OrthoSera), bioreactor development (OSPIN GmbH, Vienna Technical University), organotypic models (Fraunhofer IBMT, University of Graz, BIONEER, Institute of Experimental Medicine, BIOFABICS), and in nanoparticle production (Creative Nano).

www.actitox.eu



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BNN retrospect

How to be a MedTech Start-up? Workshop

23rd of January 2020, Linz, Austria

BNN attended the first Innovation Workshop “How to be a MedTech Start-Up”, organized by Tech2b, together with BioNanoNet member **Medical Technology Cluster** of Business Upper Austria (MTC). In this exclusive setting, the participants were offered top speakers from all the fields that should be taken into account when creating a start-up.

The focus was on the four key components (regulatory environment, property rights strategy (IP), data security, data protection and financing) for the successful establishment of a company in the field of medical technology and digital health.

At the event, not only experts of different fields presented their industry-specific knowledge, but also exciting and already successful start-ups showed the way they had to undergo and shared their personal experience. The participants also had the unique opportunity to exchange ideas with experts and like-minded people.

How to be a MedTech Start-up?



DER INKUBATOR

TEIL VON



Gefördert durch das AplusB Scale-up Programm des bmvit und des Landes OÖ, abgewickelt durch die aws. Basisfinanziert durch das Land OÖ.



The medical technology industry is one of the most research-intensive and innovative industries. In order to make the best possible use of the innovations in this industry, a comprehensive understanding of the special requirements, such as regulatory framework, research and development cycles is needed. The innovation activities of BNN are tailored to support researchers on their ambitious way, helping the science and research to increase the value of their developments.

tech2b Inkubator GmbH
Medizintechnik-Cluster / Business Upper Austria –OÖ Wirtschaftsagentur GmbH

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Joint Meeting: NanoCommons – NanoSolveIT – RiskGONE

6th of February 2020, Reykjavik, Iceland

Three EU H2020 projects working on nanosafety, met for a joint meeting in *Reykjavik* on *February 6th, 2020*, right after the *NanoCommons 5th General Assembly* (on February, 5th). Both meetings were preceded by a two-day-workshop about *InChiKey identifiers for nano* (on February, 2nd and 3rd), organised jointly by the three projects [NanoCommons](#), [NanoSolveIT](#) and [RiskGONE](#).

The aim of the meeting was to advance on the ongoing joint actions and to plan further collaborations on safe nanotechnology. The meeting addressed these three common issues:

- AOPs and IATA
- Data Management and Sharing
- Common Dissemination Activities

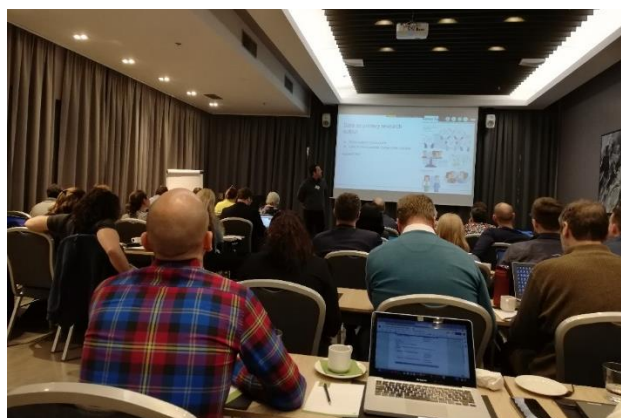


Figure 1: Joint Meeting - Presenter: Antreas Afantitis (NovaMechanics)

The intense discussions about the mentioned topics, as well as the test of the advancement of their ongoing joint actions and dissemination activities led to clear steps forward and new insights how to reach the broadest community. BNN contributes to the sustainability plan for NanoCommons and supports establishing interactions with projects concerning *nanoinformatics*, *data management*, *modelling and risk assessment* tools and services. If your project is not yet collaborating with NanoCommons, please do not hesitate to contact [Beatriz Alfaro](#) from BNN-team.

The BioNanoNet members [Allergy-Cancer-BioNano Research Centre of the University of Salzburg](#); [NovaMechanics](#); [University College Dublin - School of Physics, Science Centre](#); [Unit of Process Control and Informatics - National Technical University of Athens \(UPCI - NTUA\)](#); as well as BNN itself are consortium partners in NanoCommons.



These projects have received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement numbers 731032 (NanoCommons), 814572 (NanoSolveIT) and 814425 (RiskGONE).

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BNN Networking Event

27th of February 2020, Graz, Austria



The BNN Networking event took place on 27th of February 2020 at the premises of JO-ANNEUM RESEARCH in Graz attracting more than 50 participants.

The BNN Networking event was opened with an introductory speech from the host organization JOANNEUM RESEARCH, presented by **Helmut Wiedenhofer**. This was followed by scientific keynote lectures: **Jesus Martinez de la Fuente** from Universidad de Zaragoza, CSIC, CIBER talked about „European Projects Successful Stories“, mentioning also successful FETOPEN-projects e.g. [PRIME](#). **Cesare Furlanello** from HK3Lab - FBK Fondazione Bruno Kessler spoke about “Deep Learning for Predictive Medicine” and **Dieter Maier** from BIOMAX Informatics AG gave a presentation on “Knowledge Management - from Nanoinformatics to Clinical Decision Support”, also highlighting e.g. the transnational access of [NanoCommons](#) project.

The impressive lectures were followed by the BNN's Members Expertise Mapping and Networking session. Andreas Falk, CEO of BNN, presented first results of the BNN mapping, enabling the visualization of BioNanoNet members` expertise as well as the tailored initiation of cooperations. Furthermore, the updated strategy of the network, BNN`s vision and mission, and how its core competences support members and projects. As the European research & innovation strategies are opening new fields for science, research and innovation, it is one of the goals to keep pace with changing environment and conditions for the work of our members and BNN itself. The BioNanoNet community already comprises 59 member organisations. The continuous growth of the network enables expanding the thematic horizon of BioNanoNet to the benefit of our members and thus supporting research and development activities in different branches.

During the networking part of the event existing contacts could be consolidated and new contacts could be established for future cooperation. A smooth fade-out of the meeting was ensured with a nice dinner in a pleasant atmosphere at a restaurant in the center of Graz.

The presentations and pictures made during the meeting are available in the [BioNanoNet members area](#) in the folder “[meeting & events](#)”.

We like to cordially thank JOANNEUM RESEARCH, especially **Erwin Kubista** and **Helmut Wiedenhofer** for being great hosts for our event!

If you are interested to join BioNanoNet, please contact us (office@bnn.at).

Impressions from the event:



from the left: Erwin Kubista and Helmut Wiedenhofer (JOANNEUM RESEARCH), Dieter Maier (BIOMAX), Andreas Falk (BNN)





NanoCommons and PRIME have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 731032 and n° 829010.

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15th nanoNET Meeting

NanoSyn

9th of March 2020, Vienna, Austria

nanoNET-Austria, Erwin Schrödinger Society for Nanosciences and BioNanoNet joined forces in the recently BMK funded project NanoSyn to foster public visibility and to discuss nanotechnology from a comprehensive point of view. Thanks to NanoSyn we were able to embed our 15th nanoNET Meeting in the ESG Thinktank *Material Innovations for Medicine, Technology and Environment* on March 9th, 2020 in Vienna.

This opportunity gave our attendees the chance to, not only to get an insight in the BMK nano related activities and invited talks from science, applied science and industry, but also to participate the talks and discussions of the ESG Thinktank which tackled very important nano related issues that are not directly in the nanoNET-Austria focus. Feedback from our attendees encouraged us to pursue this common workshops in future. Consequently, we want to reinforce the cooperation and start a series of joined workshops.

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nanoNET
Austria



 Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

NanoSyn project receives funding from the Federal Ministry Republic of Austria, Climate Action, Environment, Energy, Mobility, Innovation and Technology.

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ESG ThinkTank “Material innovations for medicine, technology and environmental protection”

9th of March 2020, Vienna, Austria

NanoSyn

On 9th of March 2020, the Erwin - Schrödinger Gesellschaft (ESG) for Nanosciences organised a workshop on the topic of think tanks funded by the Federal Ministry for Climate Protection with the title:

"Material innovations for medicine, technology and environmental protection"

Members of the ESG, the Institute for Technology Assessment (ITA) and the Austrian NanoNET and the BioNanoNet (BNN) were invited, i.e. from experts and members of the Austrian research and industrial landscape.

The event was marked by a pilot project currently being funded, namely the NanoSyn, which unites Austria's three initiatives in joint activities in the field of nanomaterial research.

In Austria, research funding on nanomaterials faces current challenges.

A key outcome of the discussions on that day was the synergy of research into the complex field of nanoscience, which in the past has led to the development of high-resolution methods that make the molecular level tangible.

Now under the topic 'nano ' we are experiencing the consolidation back into the perspective of advanced materials – and its related research fields in material science that continue to use synergies from chemistry, medicine, biology and physics supported by mathematics.

Especially in the title area of the workshop, or rather 'ThinkTanks', to reinforce the invitation for open-minded discussions, new challenges were posed for research in Austria. Especially against the background of the corona situation, the methodological and conceptual approach, which can only be used as a model for our university and industrial research in the future, was identified with a broadly based program for promoting young talent. Because individual research fields can no longer handle the research questions of our society alone! Science must happen in future in research networks and hopefully will be embedded in the ethical - normative contexts of our European society. These questions formed the focus of the next day, which was organized by the Institute for Technology Assessment (ITA). Mr.

André Gaszó took over the moderation and organization of this day, supported by Ms. Rose Gloria and Ms. Anna Pavlicek.

We as ESG would like to thank VINZIRAST again for the extremely pleasant, successful and friendly reception in the premises and the excellent culinary care.

With that, I remain with kind regards,

Eva Ehmoser and Oskar Armbruster from the Erwin Schrödinger Society for Nanoscience



© ESG-nano

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nanoNET
Austria



 **Federal Ministry
 Republic of Austria**
 Climate Action, Environment,
 Energy, Mobility,
 Innovation and Technology

NanoSyn project receives funding from the Federal Ministry Republic of Austria, Climate Action, Environment, Energy, Mobility, Innovation and Technology.

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12th NanoTrust Conference on Advanced Materials



10th of March 2020, Vienna, Austria

Innovative materials hold much promise: from new types of additives in food packaging to ultralight metal foams, wearables and drug carriers, the applications range across various fields and may impact different industries. In many cases these new materials offer attractive solutions for well-known problems (e.g. in contributing to energy and weight savings). However, new materials and/or new functionalities always bear uncertainties and may affect human health and the environment.



© Institute of Technology Assessment, Austrian Academy of Sciences

These advanced materials and resulting emerging issues were the topic of the 12th annual NanoTrust Conference, which took place on the 10th of March 2020 in Vienna, organized by the [NanoTrust project](#) of the Institute of Technology Assessment (ITA) of the Austrian Academy of Sciences (ÖAW). At the conference 30 experts from the German-speaking nano risk governance community discussed advanced materials in the light of safety and sustainability. The main focus was placed on exploring how the knowledge, approaches and resources built and nurtured throughout the past decade in the field of nanotechnology could be applied to the broader field of advanced materials. Due to the thematic proximity, this year's conference was coordinated with the Think Tank of the [Erwin Schrödinger Society for Nanosciences \(ESG\)](#) which took place the previous day with a focus on current (EU) projects and funding programs for advanced materials with regard to their purpose and impact on the research landscape.

Looking back on a successful event with much lively discussion with international experts from research, worker safety and authorities, such as representatives from the German and Austrian federal agencies for occupational safety and health and the Austrian federal ministries for innovation and health, and contributions from various different disciplines and fields, the NanoTrust team expresses their gratitude for their invited speakers who shared their insights and expertise and provided a fruitful basis for discussion. We would also like to give special thanks to all participants for their active participation and constructive input, playing an essential part in fostering a valuable dialogue between various interest groups, the development of a community for advanced materials in the German-speaking area and the exchange of knowledge and experience on possible opportunities and risks.

The stage is now set for productive future dialogues and collaborations to specify research and action requirements and create suitable processes for assessing the risks and opportunities of these “advanced” materials and products.

Click [HERE](#) to watch the video of the event (in German language)



© Institute of Technology Assessment, Austrian Academy of Sciences

Four experts provide a brief outlook on what to expect and how to address advanced materials in a video featured on the ITA News page: <https://www.oeaw.ac.at/en/ita/detail/news>

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BNN conference calendar

BNN events & BNN co-organised events

BNN Annual Forum & Networking Event

When? 17 – 18 September 2020

Where? Linz, Austria

Save the date! More details coming soon.

4th EU-Asia Dialogue on Nanosafety, 7 October 2020 (tbc), Vienna, Austria

We will confirm the date as soon as possible!

When? 7 October 2020 (tbc)

Where? Vienna, Austria

This workshop is focused towards more synergy between Asian and European countries with respect to safe nanomaterials including standardization and test guideline development.

Download [PRELIMINARY AGENDA](#)

BNN on site events

Due to the CORONA-virus-situation most of the upcoming events were and still will be cancelled and or postponed to a later date. BNN has continuously been updating the list of external events on our website. We invite you to take a look at our [BNN website](#) for all these events. (Note that BNN is not liable for the correctness, up-to-dateness and completeness of the data or contents). Please come back to us, if you find anything that needs to be updated. Thank you for your support.

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Finally

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

Our next BNN NEWSLETTER will be published in June 2020.

BioNanoNet members are welcome to send their contributions until 8th of June 2020!

Contact: BioNanoNet Forschungsgesellschaft mbH

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Your BioNanoNet team

from the left ...

Johanna K. Scheper, Beatriz Alfaro Serrano, Susanne Resch, Andreas Falk, Christine Halbedel,
Angelika Halbedl-Herrich, Simone Jagersbacher and Nikolaus Ladenhauf

The BioNanoNet team wishes you



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