



04/2020

NEWSLETTER



Our vision

is to shape the European hightech ecosystem to secure a sustainable and prosperous society.

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Editorial

CONTEMPORARY ISSUES FROM THE NETWORK

Dear Ladies and Gentlemen,

a very special year 2020 ends, and most of us will be keen on starting into the new year, hopefully with less challenging circumstances. We all are active in science and research, thus a lot of people look more interested towards the output created in that field. It is a big chance to bring evidence to the fact that society benefits a lot from any investment into research, and to make this more visible.

Thus, looking back we can proudly present the successful [4th EU-Asia Dialogue on Nanosafety](#), organized by BNN, which enabled great steps towards an international network initiative, boosting the ambition of “science without borders”. This is and will be supported by our project NanoSyn, and of course in the frame of our EU NanoSafetyCluster activities. The global aspect has also been addressed by the celebration of the Nanotechnology Day (October 9th, for 10-9, of course) all over the world. Within [NanoFabNet-project](#), a [buckyball model that had been around the world](#) virtually (see also <https://youtu.be/pranBKBgapg>) was handed over to the director of NNCO in US, who organized the 2020 edition of the [US-EU-Communities of Research](#) workshop.

Furthermore, another best practical example for such “open collaboration” is the interaction of governments within the “[Behörden-dialog](#)”. Besides this, our activities include support to the [European Researchers Night](#), [NanoSafe-education and training days](#), and the global work on standardization performed e. g. in the ISO TC 229, CEN TC 352. In all these actions, BNN and its members are involved putting in their efforts, and thus contributing to sustainable development of the high tech field in Europe and beyond.

Finally, we like to encourage you to follow us on [Twitter](#) and [LinkedIn](#), enabling you to keep track of our activities, and of course to empower you to join any of those initiatives. Thus, if you are interested in benefiting from BNN’s support, get involved in our scientific and innovative work, and join the BioNanoNet association with your expertise, please [contact us](#).

We wish you relaxing holidays, good recovery and send our best wishes for a great new year!

Andreas & the BNN-team

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BNN News

NEW BIONANONET MEMBERS

We are happy to welcome our new BioNanoNet members...



BDI-BioEnergy International (Austria)

BDI BioEnergy International GmbH is a full-range supplier of innovative greentech solutions.

For more details visit www.bdi-bioenergy.com



BRAVE Analytics GmbH (Austria)

BRAVE Analytics GmbH ... A BRAVE new way of online realtime (nano)particle characterization.

For more details visit www.braveanalytics.eu



CHASE GmbH (Austria)

Competence Center CHASE GmbH works towards a sustainable digitalized chemical process industry.

For more details visit www.chasecenter.at



lixtec GmbH (Austria)

Lixtec GmbH – dynamic light solutions - acts as a leading supplier of sensorics for demand-oriented street lighting.

For more details visit www.lixtec.com

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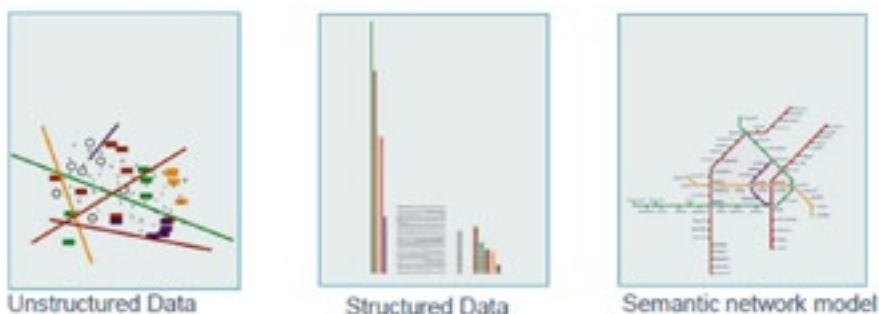
BNN member presentations

BIOMAX INFORMATICS AG



Value from Knowledge Management

You want to make better decisions based on the incredible growth of collective knowledge of living systems? Bringing order to data and connecting information generates actionable knowledge, not only when looking for the right underground connection but more and more also in the Life Sciences.



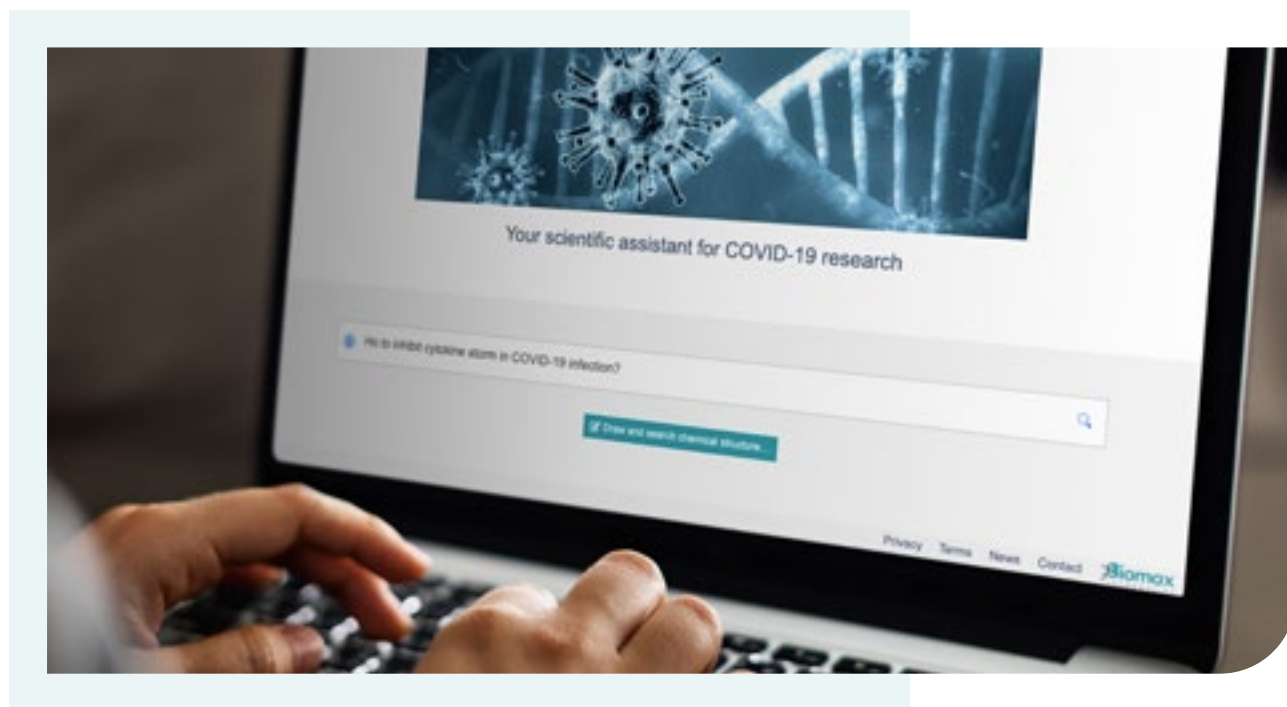
Biomax's expertise and technology enable you to master the complex process of learning and leveraging how living systems function, change and evolve. From Nanotoxicology to Bioprocess Optimization and Clinical Decision Support we provide you with Knowledge Management and Artificial Intelligence to systematically extract, integrate and learn from information.

With more than 20 years of experience and around 50 employees – including numerous life scientists, data scientists and software developers with a scientific background – Biomax is a competent partner in industrial settings as well as collaborative research projects.

Our unique technology, BioXM™ Knowledge Management Environment, is based on semantic modelling and allows us to go where others fail. Integrating hundreds of data sources, public and proprietary, interoperating with a diversity of protocols, technical standards and analytical tools, adapting the software user interface to specific customer processes and workflows, the following examples show how. Just remember: If anyone can do it, it's NOT for us

AILANI your Scientific Assistant for COVID-19 research

AILANI is a novel and unique semantic search solution for fast, easy and comprehensive knowledge discovery. It combines semantic modelling, ontologies, linguistics and artificial intelligence (AI) algorithms in a self-refining system that delivers results based on interrelations and meaning of facts.



Answer: As many of the elevated cytokines signal through Janus kinases, inhibition of these pathways with ruxolitinib has the potential to mitigate the COVID-19-associated cytokine storm and reduce mortality.

AILANI delivers the most relevant results and puts them in a wider context for deeper analysis. Queries can be expressed in natural language and AILANI will provide you with relevant answers regardless of the quality of your search term. The **Artificial Intelligence LAnguage Interface** is freely available at <https://ailani.ai>

Nanomaterials – Safe-by-design

Nanomaterials (NM) bring exciting novel materials properties with them to generate advanced materials and nanoelectronics and fulfil many urgent needs, from low friction tyres (nanotechnology) and high-performance batteries (advanced materials) to high efficiency LED and sensors (Nanoelectronics). They are a key enabling technology for European manufacturing and industrial innovation on its way to sustainable economies.

The novelty of the NM material properties requires a new approach to toxicology and materials design, integrating the material safety already into the design process, the safe-by-design approach. Biomax contributes to this approach in a number of large-scale EU-research projects on Nanosafety.

Biomax provides the BioXM™ Knowledge Management Environment in Nanosafety projects to generate a federated interoperability ecosystem that enables multiple existing project specific data warehouses, including the BioXM based NanoFASE and NanoMILE DBs, to be harmonised and accessed in a unified way. At the same time the BioXM technology provides the standardised application programming interface (API) to integrate analytical and computational modelling software. The resulting NanoCommons Knowledge Base is a proof-of-concept public Nanoinformatics infrastructure that is freely available for data storage, curation, search, retrieval and analysis as well as computational modelling. It forms the base of the NanoSolveIT platform which provides automatized workflows for an Integrated Approach to Testing and Assessment (IATA). Enabling Nanomaterial producers as well as regulators to access relevant data, simulation tools and results.

The NanoCommons Knowledge Base is freely available at www.nanotoxkb.eu.



Scientific dashboard for Systems Medicine

Clinical Scenario: Stratification of risk patients

As a clinician I need to stratify my COVID-19 patients according to their risk for severe complications. Currently we lack information about most of the parameters determining risk except from age and co-morbidities.

If we collect relevant information (real-world data, observational trials) and integrate across the multitude of ongoing international initiatives such as the PREPARE clinical trials network, we can, within the first wave of a pandemic, produce evidence for informed decisions.

Clinical Scenario: Individualized patient treatment

As a clinician I would like to treat the right patient with the right treatment at the right time. Currently our understanding of the pathobiology of SARS-CoV-19 is not sufficient to provide specific therapy. Similarly, our understanding of the mechanisms causing symptoms is too limited to provide individualized treatment beyond generic approaches to fever, breathing support and infection handling.

Integrating all prior knowledge about SARS-CoV-19 as well as related human Coronaviruses with the huge omics datasets being rapidly generated and enabling analytical data and know-

ledge exploration will improve our pathobiological understanding and assist informed decisions on individual treatment options.

These use cases involve different capabilities and services that Biomax has developed in large scale European collaborative clinical research projects as well as with individual clinical centers and now provides in the context of Knowledge Management for Systems Medicine:

- ✓ eCRF for clinical trial data capturing
- ✓ Clinical study data harmonization
- ✓ Omics data management
- ✓ Disease maps
- ✓ Integrative data and knowledge exploration
- ✓ Interoperability
- ✓ Collaboration support
- ✓ Supporting clinical research privacy tasks (GDPR, DTAs, ISO 27001)



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References: With over 1500 scientific publications co-authored by Biomax staff or applying Biomax software (including our Austrian subsidiary Viscovery) please visit www.biomax.com for more information.

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PROSPECTIVE INSTRUMENTS LOGO

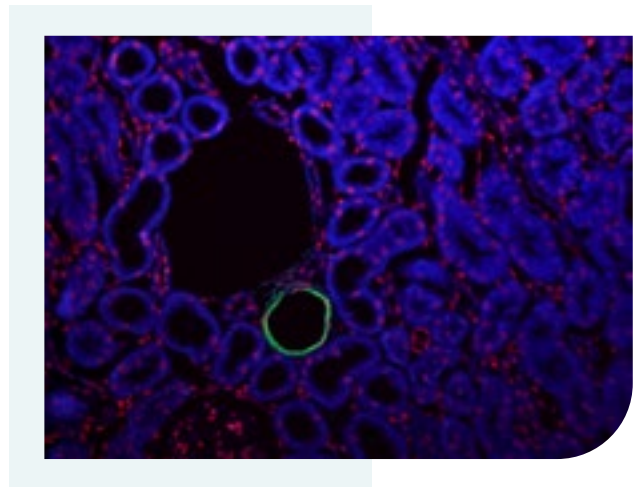


Prospective Instruments is located in Dornbirn, Austria and started operation in 2019.

The main goal of the company is to provide the research and clinical community with a turn-key, flexible, modular, robust and highly compact multi-photon multimodal imaging platform. All researchers, scientists and clinicians should have access to a high quality, affordable multimodal microscope. Their focus should be on their work and not on setting up the microscope and tinkering around with technical hurdles.



The MP-1040 set up on a regular office desk. © Biomax



Stitched fluorescence image of an unstained mouse kidney cryosection (16x, 0.8 NA, 300 μ m) © Biomax

MP-series – advanced multi-photon microscopy

Everyone in the field of microscopy is familiar with the traditional setup of a multi-photon microscope - large dimensions, complicated design and lacking usability. With the MP-series Prospective Instruments engineered a revolutionary imaging platform. Due to its novel design concept, various imaging configurations - inverted, upright, oblique angle or even horizontal - can be changed with minimum effort.

The MP-series is designed to make complex microscopy studies easy and accessible for every researcher, scientist and clinician independent of technical skills and budget. The main thought behind this particular microscope is to bring together multimodality at its best and maximized utility for the user.

The system is flexible, turn-key, easy-to-transport, compact, robust, energy efficient and designed for 24/7 operation. There is no technician for the initial setup necessary as the microscope is ready to go out of the box. It is extremely mobile and robust and thus can be set up in almost any indoor location.

The scanning process is designed to be as user-friendly as possible. No changing device options and accessories, no sample re-alignment – once the sample is positioned, the imaging process can begin. Modalities, sample levels and resolutions can be changed with a click via software.

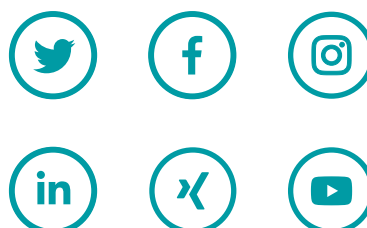
Outstanding benefits:

- ✓ **Modular concept:** The MP-series is based on a modular concept. There are three standard models, each can be upgraded with various options and accessories to completely maximize the utility of the design. This concept enables a multi-photon microscope tailored to every specific need and budget. With only a few steps the free-moving scanhead can be moved to up-right, inverted, oblique angle, or horizontal positions. This high configurability allows the instrument to be easily adaptable and expands diagnostic capabilities and application areas.
- ✓ **Stable performance 24/7:** Due to its robust design the device is engineered for easy transportation and setups in any environment. Temperatures swings between 18°C and 28°C do not influence the stability of its performance. This enables the user to get high quality images of the samples.
- ✓ **Extended services:** The service concept of Prospective Instruments proves to be as unique as the MP-series itself. There is the possibility to book the company's in-house laboratory or to book a well-equipped unit for a trial period in your facility with your team and your samples.
- ✓ **Energy efficient system:** The imaging platform is designed with energy-saving components, hence no large cooling units or energy consumption, saving significant cost.

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Recent scientific publications of BioNanoNet association members

In this newsletter issue only new publications of our members are listed.

Certainly, you can always view all members' publications sent to us from 2018 up to now by downloading the document [BioNanoNet member publications](#) or visiting our [BNN website](#).

PERIOD SEPTEMBER – NOVEMBER 2020

Austrian Academy of Sciences

Pavlicek, A., Part, F., Rose, G.E., Praetorius, A., Miernicki, M., Gazsó, A., Huber-Humer, M., 2020. A European nano-registry as a reliable database for quantitative risk assessment of nanomaterials? A comparison of national approaches. Nano Impact in press. <https://doi.org/10.1016/j.impact.2020.100276>

Greßler, S., Rose, G., Gazsó, A., Pavlicek, A., 2020. Titanium Dioxide as Food Additive. Nano Trust Dossiers 55en, 1–6. <https://doi.org/10.5772/intechopen.68883>

CIBER's Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN)

Rico, P., Rodrigo-Navarro, A., Sánchez Pérez, L. & Nael Salmerón Sanchez. Borax induces osteogenesis by stimulating NaBC1 transporter via activation of BMP pathway. Commun Biol 3, 717 (2020). <https://doi.org/10.1038/s42003-020-01449-4>

Jemni-Damer, N., Guedan-Duran, A. et al. "First steps for the development of silk fibroin-based 3D biohybrid retina for age-related macular degeneration (AMD)", Journal of Neural Engineering, octubre 2020. DOI: [10.1088/1741-2552/abb9c0](https://doi.org/10.1088/1741-2552/abb9c0).

Shape perception via a high-channel-count neuroprosthesis in monkey visual cortex. Xing Chen, Feng Wang, Eduardo Fernandez, and Pieter R. Roelfsema DOI: [10.1126/science.abd7435](https://doi.org/10.1126/science.abd7435)

Davia Prischich, Alexandre M. J. Gomila, Santiago Milla-Navarro, Gemma Sangüesa, Rebeca Díez-Alarcia, Beatrice Preda, Carlo Matera, Montserrat Batlle, Laura Ramírez, Ernest Giralt, Jordi Hernando, Eduard Guasch, J. Javier Meana, Pedro de la Villa, Pau Gorostiza. [Adrenergic modulation with photochromic ligands](#). Angewandte Chemie, International Edition. 2020.

Carrillo-Moreno, J., Pérez-Gandía, C., Sendra-Arranz, R. et al. Long short-term memory neural network for glucose prediction. *Neural Comput & Applic* (2020). <https://doi.org/10.1007/s00521-020-05248-0>

Emiliano Salvagni, Clara García, Àngels Manresa, Claudia Müller-Sánchez, Manuel Reina, Carlos Rodríguez-Abreu, Maria José García-Celma, Jordi Esquena. Short and ultrashort antimicrobial peptides anchored onto soft commercial contact lenses inhibit bacterial adhesion. <https://doi.org/10.1016/j.colsurfb.2020.111283>

Department of Obstetrics and Gynecology, Medical University of Graz

Gruber, M.M., Hirschmugl, B., Berger, N., Holter, M., Radulovic, S., Leitinger, G., Liesinger, L., Bergold, A., Roblegg, E., Birner-Gruenberger, R., Bjelic-Radisic, V., Wadsack, C. (2020): Plasma proteins facilitates placental transfer of polystyrene particles. *J Nanobiotechnol* 18, 128 <https://doi.org/10.1186/s12951-020-00676-5>

Hahn-Schickard

Paqué, P.N., Herz, C., Jenzer, J.S., Wiedemeier, D.B., Attin, T., Bostanci, N., Belibasakis, G., Bao, K., Körner, P., Fritz, T., Prinz, J., Schmidlin, P.R., Thurnheer, T., Wegehaupt, F.J., Mitsakakis, K., Peham, J.R. (2020): Microbial analysis of saliva to identify oral diseases using a point-of-care compatible qPCR assay. *J. Clin. Med.*, 9(9), 2945. DOI: 10.3390/jcm9092945.

Johannsen, B., Mark, D., Boillat-Blanco, N., Fresco, A., Baumgartner, D., Zengerle, R., Mitsakakis, K. (2020): Rapid diagnosis of respiratory tract infections using a point-of-care platform incorporating a clinical decision support algorithm. *Stud. in Health Technol. Inform.*, 273, 234-239. DOI: 10.3233/SHTI200646.

Rombach, M., Hin, S., Specht, M., Johannsen, B., Lüddecke, J., Paust, N., Zengerle, R., Roux, L., Sutcliffe, T., Peham, J.R., Herz, C., Panning, M., Donoso Mantke, O., Mitsakakis, K. (2020): RespiDisk: a Point-of-Care platform for fully automated detection of respiratory tract infection pathogens in clinical samples. *Analyst*, 145, 7040-7047. DOI: 10.1039/d0an01226b.

Belibasakis, G.N., Lund, B.K., Krüger Weiner, C., Johannsen, B., Baumgartner, D., Manoil, D., Hultin, M., Mitsakakis, K. (2020): Healthcare challenges and future solutions in dental practice: assessing oral antibiotic resistances by contemporary Point-Of-Care approaches. *Antibiotics*, 9, 810. DOI:10.3390/antibiotics9110810.

LIST

Karimi, S., Tabatabaei, S.N., Kharrazi, S., Novin, M.G., Ebrahimzadeh-Bideskam, Gutleb, A.C., Shams, Z. (2020): PEGylated iron oxide nanoparticles spare ovarian tissue in-vitro: a safety study. *Helyion*, 6, e04862. doi:10.1016/j.helyion.2020. e04862

Nelissen, I., Haase, A., Anguissola, S., Rocks, L., Jacobs, A., Willems, H., Riebeling, C., Luch, A., Piret, J.-P., Toussaint, O., Trouiller, B., Lacroix, G., Gutleb, A.C., Contal, S., Diabaté, S., Weiss, C., Lozano, T., Fernandez, A.G., Dusinska, M., Huk, A., Stone, V., Kanase, N., Nocuń, M., Stepnik, M., Meschini, S., Ammendolia, M.G., Lewinski, N., Riediker, M., Venturini, M., Benetti, F., Topinka, J., Brzicova, T., Milani, S., Rädler, J., Salvati, A., Dawson, K. (2020): Introducing best practice in nanosafety by training: An inter-laboratory comparison study of nanoparticle-induced cytotoxicity. *NanoMaterials*, 10, 1430. doi:10.3390/nano10081430

Ogunsuyi, O., Ogunsuyi, O., Akanni, O., Alabi, O., Alimba, C., Adaramoye, O., Cambier, S., Eswara, S., Gutleb, A.C., Bakare, A. (2020): Alteration of sperm parameters and reproductive hormones in Swiss mice via oxidative stress after co-exposure to titanium dioxide and zinc oxide particles. *Androl.*, e13758. doi:10.1111/and.13758

NovaMechanics Ltd.

Kohl, Y.; Rundén-Pran, E.; Mariussen, E.; Hesler, M.; El Yamani, N.; Longhin, E.M.; Dusinska, M. Genotoxicity of Nanomaterials: Advanced In Vitro Models and High Throughput Methods for Human Hazard Assessment—A Review. *Nanomaterials* 2020, 10, 1911. <https://doi.org/10.3390/nano10101911>

Alsharif, S.A.; Power, D.; Rouse, I.; Lobaskin, V. In Silico Prediction of Protein Adsorption Energy on Titanium Dioxide and Gold Nanoparticles. *Nanomaterials* 2020, 10, 1967. <https://doi.org/10.3390/nano10101967>

Rybińska-Fryca, A.; Mikolajczyk, A.; Puzyn, T. (2020). Structure–activity prediction networks (SAP-Nets): a step beyond Nano-QSAR for effective implementation of the safe-by-design concept. *Nanoscale*, 12(40), 20669–20676. <https://doi.org/10.1039/D0NR05220E>

Ammar, A.; Bonaretti, S.; Winckers, L.; Quik, J.; Bakker, M.; Maier, D.; Lynch, I.; van Rijn, J.; Willighagen, E. A Semi-Automated Workflow for FAIR Maturity Indicators in the Life Sciences. *Nanomaterials* 2020, 10, 2068. <https://doi.org/10.3390/nano10102068>

Papadimitrakopoulos, A.G.; Jänes, J.; Voyiatzis, E.; Sikk, L.; Burk, J.; Burk, P.; Tsoumanis, A.; Ha, M.K.; Yoon, T.H.; Valsami-Jones, E.; Lynch, I.; Melagraki, G.; Tamm, K.; Afantitis, A. Predicting Cytotoxicity of Metal Oxide Nanoparticles Using Isalos Analytics Platform. *Nanomaterials* 2020, 10, 2017. <https://doi.org/10.3390/nano10102017>

Papadimitrakopoulos, A.G.; Klaessig, F.C.; Exner, T.E.; Hofer, S.; Hofstaetter, N.; Himly, M.; Williams, M.A.; Doganis, P.; Hoover, M.D.; Afantitis, A.; Melagraki, G.; Nolan, T.S.; Rumble, J.; Maier, D.; Lynch, I. Metadata Stewardship in Nanosafety Research: Community-Driven Organisation of Metadata Schemas to Support FAIR Nanoscience Data. *Nanomaterials* 2020, 10, 2033. <https://doi.org/10.3390/nano10102033>

Saarimäki, L. A., Kinaret, P. A., Scala, G., del Giudice, G., Federico, A., Serra, A., & Greco, D. (2020). Toxicogenomics analysis of dynamic dose-response in macrophages highlights molecular alterations relevant for multi-walled carbon nanotube-induced lung fibrosis. *NanoImpact*, 100274. <https://doi.org/10.1016/j.impact.2020.100274>

UMIT

Jaufenthaler, A., Schultze, V., Scholtes, T., Schmidt, C.B., Handler, M., Stolz, R., Baumgarten, D. (2020): OPM magnetorelaxometry in the presence of a DC bias field, *EPJ Quantum Technology*, 7(12). doi: 10.1140/epjqt/s40507-020-00087-3

University of Graz

Paltauf, G., Nuster, R., Frenz, M. (2020): Progress in biomedical photoacoustic imaging instrumentation toward clinical application editors-pick, *Journal of Applied Physics* 128, 180907. <https://doi.org/10.1063/5.0028190>

Bag, A., Neugebauer, M., Mick, U. (2020): et al. Towards fully integrated photonic displacement sensors. *Nat Commun* 11, 2915. <https://doi.org/10.1038/s41467-020-16739-y>

Grosche, S., Hünermann, R., Sarau, G., Christiansen, S., Boyd, R., Leuchs, G., Banzer, P. (2020): Towards polarization-based excitation tailoring for extended Raman spectroscopy, Vol. 28, No7, *Optics Express* 28, 10239-10252. <https://doi.org/10.1364/OE.388943>

Berg-Johansen, S., Neugebauer, M., Aiello, A., Leuchs, G., Banzer P., Marquardt, Ch. (2020): Microsphere kinematics from the polarization of tightly focused nonseparable light, Physics Optics, 2010.16387, <https://arxiv.org/abs/2010.16387>

Krug, M., Haidar, I., Ragheb, I., Krenn, J. R., Hohenau, A., Kapetanovic, V., Bugnet, M., Radtke, G., Botton, G. A., Levi, G., Boubekeur-Lecaque, L., Felidj, N. (2020) Core-shell nanocuboid dimers with nanometric gaps. J. Phys. Chem. C 124, 18690-18697. <https://dx.doi.org/10.1021/acs.jpcc.0c03830>

Tretnak, V., Hohenester, U., Krenn, J. R., Hohenau, A. (2020) The role of particle size in the dispersion engineering of plasmonic arrays. J. Phys. Chem. C 124, 2104-2112. <https://dx.doi.org/10.1021/acs.jpcc.9b10235>

Nagy, B. J., Papa, Z., Peter, L., Prietl, C., Krenn, J. R., Dombi, P. (2020) Near-field-induced femtosecond breakdown of plasmonic nanoparticles. Plasmonics 15, 335-340. <https://doi.org/10.1007/s11468-019-01043-3>

Project presentation



CA19118 - HIGH-PERFORMANCE CARBON-BASED COMPOSITES WITH SMARTPROPERTIES FOR ADVANCED SENSING APPLICATIONS

The project EsSENce started on 21st of October 2020 and will run for four years. 33 countries are involved in this project.

The goal of EsSENce is to develop an innovation scientific hub at European and International level, focusing on advanced composite materials reinforced with Carbon based (nano) materials (CNMs). The sharing of ideas and results will boost the development of high-performance composites with sensing properties. Special focus will be given in the utilization of these materials for the introduction of smart properties to the final composites and their application in the field of sensors development.

The aim of EsSENce hub, defined as a collaborative community, is to gather together scientific partners, research groups, technology providers and industrial key players aiming to enhance creativity and collaboration among them, by positioning the entrepreneurial individuals at the center. Indeed, by building a community with diversity both in the broad sense (gender, ethnicity) and with regards to

heterogeneous knowledge, the emergence of novel ideas and practices is fostered thus leading to unique and viable innovations.

EsSENce activities will focus on the promotion of the successful results from the involved partners and the utilization of the synergistic effect to improve exploitation and dissemination of knowledge. Dissemination and management actions will be organized to attract the interest of research and industry for higher awareness. The intention is to enable as many groups as possible to participate in a highly integrated innovation environment, which will develop Workgroups, will organize Workshops and Conferences, as well as Training Schools and Seminars. EsSENce will promote mobility among researchers, junior scientists and students working on these fields, while promoting contacts with related industries.

BioNanoNet is involved in BNN supported the project preparation and will contribute to the standardization & dissemination activities.

For more details visit the [COST website](#).

Get connected with cost action on:

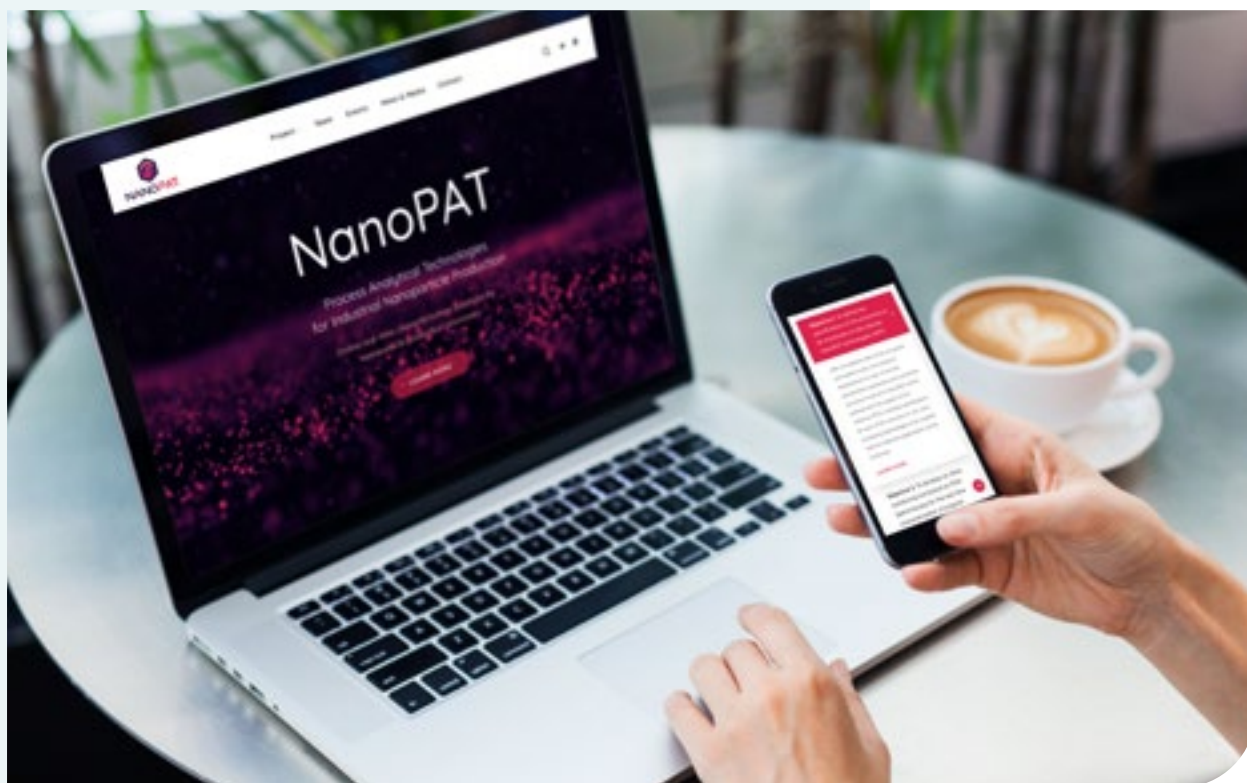


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Project update

NANO PAT

Process Analytical Technologies developed for the production of industrial nanoparticles in NanoPAT project



Nano-scaled materials are abundant in different stages of industrial manufacturing. Physical and chemical properties of these materials are strongly dependent on their size. Characterisation of mean size, size distribution, and shape of nano-scaled particles is very critical for the quality and efficiency of manufacturing processes.

The NanoPAT consortium aims at closing this gap by the demonstration of 3 novel, real-time nano-characterisation [Process Analytical Technologies \(PAT\)](#), namely Photon Density Wave spectroscopy (PDW), OptoFluidic force induction (OF2i) and TURbidity Spectrometry (TUS) including real-time data handling for digital process monitoring and product quality

control. Those will be validated in [5 different industrial ceramic, polymer and mineral nanoparticles manufacturing and converting environments](#).

NanoPAT [1st Newsletter](#) is already published. If you do not want to miss any news, just subscribe [here](#)!



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 862583.

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BNN Member Contributions



CONTRIBUTION FROM AMS AG

ams wins Federal funding in Austria to bolster pandemic control through a highly-accurate, cloud-connected lateral flow test device for SARS-CoV-2 (COVID-19) providing test results in around 15 minutes

ams, a leading worldwide supplier of high performance sensor solutions, has been awarded funding by the Austrian Federal Ministries for Transport, Innovation, and Technology, and for Digital and Economic Affairs, to speed development of a cloud-connected, highly-sensitive, accurate and unique Lateral Flow Test (LFT) to be used in the fight against the SARS-CoV-2 (COVID-19) virus.

The solution is based on the ams spectral sensor AS7341L and offers results for pandemic control in around 15 minutes, for example, at the point of care, at home, schools, airports, businesses, care facilities, and wherever needed. With the ambition to detect the virus at earlier stages of infection, even before symptoms have appeared, a highly-sensitive ams spectral sensor is utilized to read out each LFT objectively, matching lab-based measurement performance at a higher sensitivity than the human eye.

ams is honored to participate in the EUREKA funding program and join the Federal Ministries in the fight against the pandemic. EUREKA is the world's biggest public network for international cooperation in R&D and innovation, present in over 45 countries via national funding agencies. Unique new digital LFT solution has speed, access, and cost advantages over PCR testing

Current PCR testing needs expansive labs with many logistic and handling steps, which can result in restricted capacity leading to slow results to patients and high-cost tests. In addition, the uncomfortable but necessary nasal testing swab process requires trained staff. ams will offer technology for an approximate 15-minute rapid test solution to enable a fast, cost-efficient, highly-accurate, and cloud-connected LFT which uses saliva to detect antigen and blood to detect antibody for the SARS-CoV-2 (COVID-19) virus.

“The unique digital LFT solution from ams and our partners is a rapid, saliva-based antigen test which will become an essential critical weapon in the fight to resume the many economic and social activities that comprise what we call ‘normal life.’ The availability of this EUR 586,000 funding – EUR 314,000 Cov19Scan and EUR 273,000 AntigenSense – accelerates the development time to bring the lateral flow test and cloud solution to market to fight the SARS-CoV-2 (COVID-19) pandemic,” says Jennifer Zhao, Executive Vice President for the division Advanced Optical Sensors at ams.

The cloud-connected rapid Lateral Flow Test solution from ams and its partners can be produced at scale to support wide-spread availability. The solution digitizes the result from

the lateral flow test strips eliminating complicated logistics and clinical processing. The data is immediately available in a digital format and can be uploaded to national or global monitoring systems if desired.

Connected to secure medical services

The digital LFT cartridge will send encrypted data together with a unique test ID to a digital app on the user's smartphone. The app will act as a user guide and provide encrypted data transfer to a medical-grade, secure cloud including user information and geographical position. This secure cloud will analyze the data based on a lot-specific ID. The result can be sent to the user and also healthcare services enabling pandemic control. Supported standards include all software components being based on IEC-62304*, GDPR and HIPAA cybersecurity, in addition to data storage requirements. For more information on ams' AS7341L spectral sensor please go to <https://ams.com/AS7341L>

About ams

ams is a global leader in the design and manufacture of advanced sensor solutions. Our mission is to shape the world with sensor solutions by providing a seamless interface between humans and technology. ams' high-performance sensor solutions drive applications requiring small form factor, low power, highest sensitivity and multi-sensor integration. Products include sensor solutions, sensor ICs, interfaces and related software for consumer, communications, industrial, medical, and automotive markets.

With headquarters in Austria, ams employs around 9,000 people globally and serves

ams awarded Eureka funding – sensors for SARS-CoV-2 pandemic control

- Highly-accurate, cloud-connected lateral flow test device
- Providing highly accurate test results in around 15 minutes



more than 8,000 customers worldwide. ams is listed on the SIX Swiss Exchange (ticker symbol: AMS). More information about ams can be found at <https://ams.com>

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CONTRIBUTION FROM CIBER-BBN

Annual CIBER-BBN Conference 2020



Annual CIBER-BBN Conference 2020

CIBER-BBN's Annual Conference is the most awaited yearly event for our research community to gather and discuss over past year's achievements as well as to be updated about emerging key technologies. Under this light, this year's edition includes presentations of internal collaborative projects, three plenary talks given by acknowledged experts in the fields of Bio signal Analysis, Hybrid Nanomaterials and Drug Delivery, a forum about NANBIOSIS accomplishments, and a session dedicated to COVID-19 and the most recent

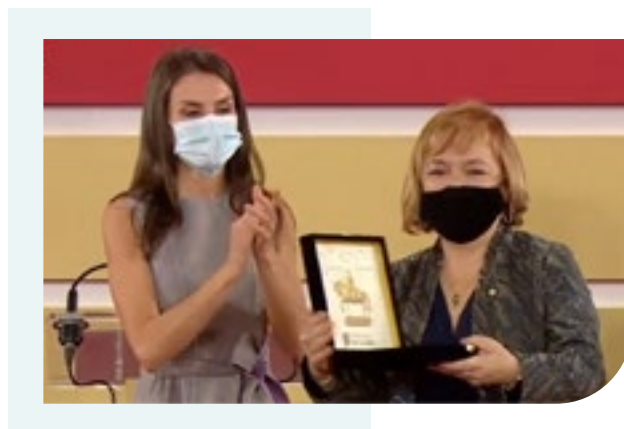
advances in the fight against it as for detection, prevention and therapy. Due to this year's exceptional circumstances, XIV CIBER-BBN Conference was held online during 16th-17th November 2020.

Dr. Raquel Yotti, Director of Carlos III Health Institute and Prof. Ramón Martínez Máñez, Scientific Director of CIBER-BBN opened the two-day meeting, the most awaited event for our community about emerging key technologies.

Research Infrastructures had also a specific session since CIBER-BBN manages a Unique Scientific and Technological Research Infrastructure for the production and characterization of nanomedicines, biomaterials and devices until the preclinical validation named NANBIOSIS-ICTS. The Session was chaired by its Scientific Director, Prof. Jaume Veciana and presentations from Prof. Ruth Schmid who gave a first lecture titled “How can nanomedicine in a cross-KET approach contribute to tackle various diseases?”, followed by Prof. Nora Ventosa head of Nanomol group of CIBER-BBN at ICMAB-CSIC and coordinator of Unit 6 of NANBIOSIS-ICTS who explained the contributions of different Units in the [Smart-4Fabry](#) project to the preclinical validation of nanoliposomes development and finally, Johanna Scheper from BioNanoNet who explained the Key factor of Success of BioNanoNet on-going initiatives and projects for future cross-collaborations.

NATIONAL AWARD Rei JAUME I

Prof. Laura Lechuga, leader of the Nanobiosensors and Bioanalytical Applications group at ICN2-CSIC and the CIBER-BBN was conferred the Award Rei Jaume I in New Technologies in the ceremony presided by Reina Letizia (Spanish Queen). Prof. Laura M. Lechuga received the New Technologies Award for her career in the field of photonic and photonic nanobiosensors. Prof. Lechuga is recently working on a EU funded project (CoNVaT) aiming to apply these technologies to develop a fast, portable and cheap device for the diagnostic of COVID-19.



The ceremony of the 2020 Rei Jaume I Awards was held in Valencia on 30th November

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CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY



Cyanobacteria as "green" catalysts in biotechnology



Cyanobacteria are environmentally friendly and readily available biocatalysts for the production of new chemicals and, thanks to researchers at TU Graz, could soon be used in large-scale technological applications.

© Lunghammer - TU Graz

Researchers from TU Graz and Ruhr University Bochum show in the journal ACS Catalysis how the catalytic activity of cyanobacteria, also known as blue-green algae, can be significantly increased. This brings biotechnological and thus eco-friendly application a big step closer.

Cyanobacteria, despite staining water green through their special pigments, are colloquial-

ly known as "blue-green algae", and convert light energy into chemical energy particularly effectively thanks to their highly active photosynthetic cells. This makes them attractive for biotechnological application, where they could be used as environmentally friendly and readily available biocatalysts for the production of new chemicals using specifically introduced enzymes.



Robert Kourist from the TU Graz (I) and his colleague Marc Nowaczyk from the Ruhr University Bochum.
© Lunghammer - TU Graz

Limited light availability

What sounds good in theory, is still facing obstacles in the practical large-scale technological implementation. A decisive limiting factor is currently the availability of light, as Robert Kourist from the Institute of Molecular Biotechnology at Graz University of Technology explains: "When cyano-bacteria are densely grown, i.e. in high concentrations, only the cells located on the outside receive enough light. Inside it's pretty dark. This means that the amount of catalyst cannot be increased at will. After a cell density of a few grams per liter, the photosynthetic activity and thus the productivity of the cells decreases sharply. This is of course a considerable disadvantage for large-scale bio-technological production."

By comparison, previously established biocatalysts such as yeasts can be used with cell densities of 50 grams per litre and more. The

established production organisms have the major disadvantage that they depend on agricultural products as a basis for growth and thus consume many resources. "Algae-based catalysts can be grown from water and CO₂, so they are 'green' in a two-fold sense. For this reason, intensive efforts are under way to increase the catalytic performance of cyanobacteria," said Kourist.

Making better use of available light

Together with Ruhr University Bochum and the Finnish University of Turku, the algae working group at TU Graz has now succeeded in increasing precisely this catalytic performance by specifically redirecting the photosynthetic electron flow to the desired catalytic function. "For the first time, we were able to measure the supply of photosynthetic energy directly in the cells in a time-resolved manner so that we were able to identify bottlenecks in the

metabolism," explains Marc Nowaczyk from the Chair of Plant Biochemistry at the Ruhr University Bochum. "We have switched off a system in the genome of the cyanobacterium that is supposed to protect the cell from fluctuating light. This system is not necessary under controlled cultivation conditions, but consumes photosynthetic energy. Energy that we prefer to put into the target reaction," explains Hanna Büchsenschütz, doctoral student at TU Graz and first author of the study. In this way, the problem of low productivity of cyanobacteria due to high cell densities can be solved. "To put it another way, we can only use a certain amount of cells. That's why we have to make the cells go faster. We have developed a method using so-called metabolic engineering that makes cyanobacteria a great deal more mature for biotechnological application," said Kourist.

In addition to increasing the productivity of the cell itself through targeted interventions at the gene level, the Graz researchers are also working on new concepts for the algae cultivation process. One approach is to introduce light sources directly into the cell suspension, for example via mini LEDs. New geometries are also being experimented with. Thus, cyanobacteria in the form of encapsulated small spheres, so-called "beads", can absorb more light overall. Robert Kourist comments: "It is very important to develop all measures on the way to large-scale industrial application of algae-based biocatalysts in an integrated way. This is only possible with interdisciplinary research that looks at the function of an enzyme in the same way as we look at engineering in the photosynthetic cell."

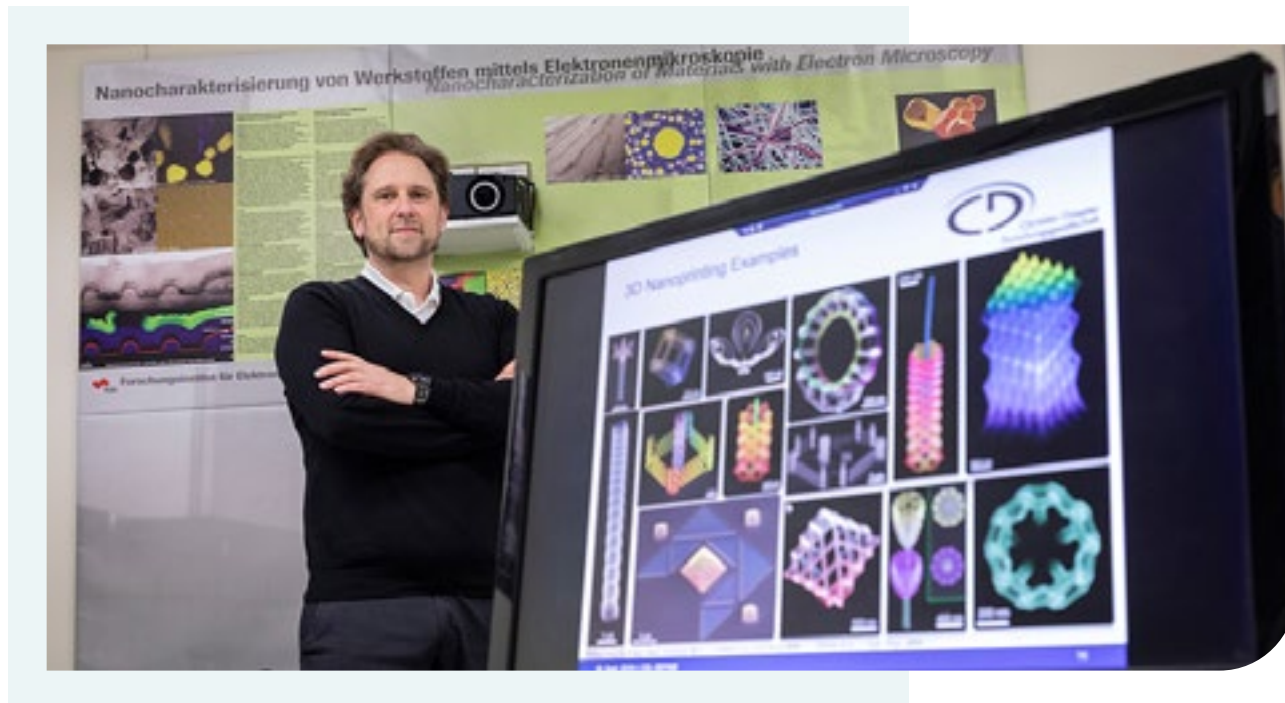
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CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY



Houska Prize 2020 goes to TU Graz researcher Harald Plank



TU Graz researcher Harald Plank was awarded the Houska Prize 2020 for the production of complex 3D-printed nano-components. © Lunghammer – TU Graz

With the research project "3D-Nanoprinting", Harald Plank from the Institute of Electron Microscopy and Nanoanalysis at TU Graz won the Houska Prize in the category "University Research", which is endowed with 150,000 euros.

Austria's largest private research prize – awarded annually by the B&C private foundation – goes to TU Graz in 2020. The physicist Harald Plank and his team can look forward to the co-

veted golden trophy and the prize money of 150,000 euros for the first-placed team. The prize was awarded yesterday, 24th September, in Vienna. A total of 500,000 euros was awarded to application-oriented research projects.

“This is a great success for the researchers and at the same time a wonderful acknowledgement of the efforts of TU Graz to specifically promote top performance. I sincerely congratulate Harald Plank and his entire team

for this extraordinary award," says a delighted Harald Kainz, Rector of Graz University of Technology.

Complex 3D structures on the nano scale

The researchers, led by Harald Plank, developed a novel 3D nanoprinting technology, known as FEBID technology (Focused Electron Beam Induced Deposition), for the production of complex, three-dimensional objects on the nanoscale. This new method is intended to open up new areas of application for the industry that were previously not possible with conventional 3D printing processes. This printing process has already made it possible to produce electrically conductive 3D high-resolution nanoprobes that are already being used by industrial partners in atomic force microscopes.

Future nanoprobes will allow simultaneous analysis of electrical, magnetic, chemical and optical surface properties, with performance significantly higher than that of alternative, commercially available products.

The successful research work was significantly supported by the Graz Centre for Electron Microscopy and by Austrian Cooperative Research in Vienna.

Harald Plank heads the Christian Doppler Laboratory for the Direct Fabrication of 3D Nanoprobes at TU Graz.



The winners of the Houska Prize Harald Plank (l.) and Christian Harwanegg (MacroArray Diagnostics GmbH), flanked by Mariella Schurz and Erich Hampel (both B&C). © B&C/Alexandra Thomson

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CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY



New research project on environmental and safety aspects of stationary energy storage



Together with their colleagues at TU Graz and external research partners, researchers Stefan Spirk (l.) and Werner Schlemmer are investigating the environmental and safety aspects of liquid electrolytes in redox flow batteries.
© Lunghammer - TU Graz

The SABATLE project coordinated by TU Graz focuses on the sustainability and safety of redox flow technologies, which are of imminent importance for the stabilization of the power grid.

The increasing use of battery technologies in the mobility sector and in stationary applications has been leading to increasing efforts in battery research of operational safety and battery recycling. The group led by Ste-

fan Spirk at the Institute of Bioproducts and Paper Technology at TU Graz is now also devoting itself to these topics. The [development of a vanillin-based redox flow battery](#) by Spirk and his team recently caused attention in international press reports. The environmental and safety aspects of these and all currently available redox flow technologies are being investigated in the SABATLE project (Safety assessment of flow battery electrolytes).

Environmental and safety aspects of battery technologies are also being researched at Graz University of Technology by other research groups, such as the Institute of Vehicle Safety (in the [K-Project Safe Battery](#) and the new [Battery Safety Center Graz](#)) and by the [Institute for Chemistry and Technology of Materials](#) (ICTM).

Toxicological evaluation and safety tests

Together with the partners BioNanoNet, the Institute of Systems Sciences, Innovation and Sustainability Research at the University of Graz, the company Mondi and the Spanish biotechnology company Biobide, researchers at TU Graz are investigating the safety risks for humans and the environment posed by redox flow technologies. "We consider exposure scenarios for accidents that may occur during and after the use of such batteries. We also want to find out what toxic doses people and the environment are realistically exposed to in such accidents," says Spirk.

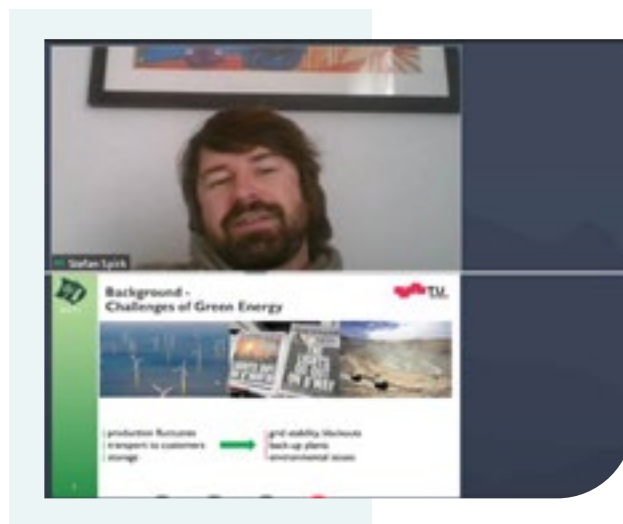
Redox flow technology is important for the expansion of renewable energies such as wind and solar power, as it is characterized by the storage of large amounts of energy and can therefore mitigate voltage peaks in the power grid. The batteries are also suitable as backup storage for stationary applications such as power plants, hospitals, mobile phone systems or e-fuelling stations. "We want to carry out a benchmarking study that identifies risk factors and highlights potential for improvement in this area," continued Spirk.

Thus, another core element of the project is the further development of such redox flow

systems according to the Safe-and-Sustainable-by-Design (SaSbD) concept, a core competence of the Graz-based research company BioNanoNet. Its CEO Andreas Falk names the advantages of SaSbD: "By implementing this concept, potential risks are mitigated and avoided, and this ultimately leads to better and safer electrolytes." Spirk and Mondi are already taking this concept into account in the current development of the vanillin-based redox flow battery mentioned above and have already been able to deliver promising results.

Presentation of the ecological redox flow variant at the [3rd NanoSyn Joint Meeting](#)

Stefan Spirk presented the concept of the vanillin-based redox flow battery and the SABATLE project on December 14, 2020 at the 3rd NanoSyn Joint Meeting. This event was jointly organized by nanoNET-Austria and the Austrian Microfluidics Initiative (AMI) and took place virtually this year due to the corona pandemic.



Stefan Spirk presenting the SABATLE project at AMI workshop on 14th of December 2020

The SABATLE project is funded within the SAF€RA framework (FFG project number 34783338). SAF€RA is a network of 21 research funding agencies from 10 European countries, which carry out joint calls for proposals and manage projects in the field of industrial research security. In Austria the programme is supported by the FFG.

This research work is anchored in the Fields of Expertise "[Sustainable Systems](#)" and "[Advanced Materials Science](#)", two of the five strategic research foci of Graz University of Technology.

Participating research partners:

- ✓ [Institute of Bioproducts and Paper Technology at TU Graz \(Lead\)](#)
- ✓ [Institute of Chemical Engineering and Environmental Technology at TU Graz](#)
- ✓ [BioNanoNet Forschungsgesellschaft mbH](#)
- ✓ [Institute of Systems Sciences, Innovation and Sustainability Research at the University of Graz](#)
- ✓ [Mondi AG](#)
- ✓ [Biobide](#)

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CONTRIBUTION FROM HAHN-SCHICKARD

Hahn-Schickard has Felix von Stetten join the Institute's management in the field of bioanalytics



Prof. Dr. Felix von Stetten ©Hahn-Schickard

Hahn-Schickard is growing in leaps and bounds. With a total of 270 employees at the four locations including Stuttgart, Villingen-Schwenningen, Freiburg and Ulm, Hahn-Schickard covers a multitude of different application areas with its competence in the field of microsystems engineering. The area of bioanalytical assay development has expanded particularly dynamically in recent years, driven forward significantly by Prof. Dr. Felix von Stetten. Adding von Stetten to the board of the now five Hahn-Schickard Institute directors (previously Prof. Alfons Dehé, Prof. Yiannos

Manoli, Prof. Roland Zengerle and Prof. André Zimmermann) on December 1, 2020 will continue to expand this field with great momentum.

The Hahn-Schickard Institute of Microanalysis Systems, that up to now had been headed by the physicist Prof. Dr. Ing. Roland Zengerle, can point to many success stories with numerous technology transfers from research put into practice. The most recent example is the spin off company Spindiag in 2016 that launched a lab-quality corona rapid test in November 2020.

In 2008, von Stetten joined Hahn-Schickard as Head of Division and, together with his team, strongly promoted the development of such molecular diagnostic on-site tests. The associated growth led to the founding of the Hahn-Schickard Institute of Microanalysis Systems in Freiburg in 2016. Summarizing his goals, von Stetten stated, “I am now looking forward to contributing my specific experience in bioanalytical issues to the management board and to opening up further future perspectives.”

Von Stetten is currently working on the vision of so-called molecularly integrated test systems. These are tests that no longer require the sequential pipetting of liquids, since all reactions can run virtually side by side in a miniaturized reaction chamber. For von Stetten, the transfer into practical applications, into mobile test systems for personalized diagnostics as well as food and environmental analysis, is also at the forefront of these developments.

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CONTRIBUTION FROM HAHN-SCHICKARD

Proteomics4Future: Investigating new technologies for protein analysis in a "ZIM collaborative network"



The tryptic digestion of proteins to peptides as part of the sample preparation for mass spectrometric analysis takes place automatically in reaction chambers on the LabDisk. © Hahn-Schickard

Automated sample preparation for mass spectrometry-based proteomics

Proteins are the most important biochemical function carriers, the aggregation of which is the proteome. Since the proteome of a cell or an organism is strongly influenced by external factors such as temperature, pH value or drugs, proteome analysis - in short: proteomics - plays a major role in the pharmaceutical industry. The improved availability of modern measuring instruments enables the industry

to conduct target-independent drug discovery and to develop so-called biotherapeutics. These drugs, also known as "drugs of the future", are developed from living cells and enable more effective, safer and more cost-efficient therapies for personalized medicine. However, commercial use and large-scale application in clinical studies and routine diagnostics currently face challenges in terms of user-friendliness, sensitivity, robustness, costs and standardization.

The newly approved ZIM collaborative network “Proteomics4Future” officially started with an interactive online meeting on December 3rd. Twelve partners from research institutions and companies aim to accelerate the establishment of mass spectrometry-based proteomics on the market through new methods and workflow standardization. The Freiburg, Germany-based research and development service provider Hahn-Schickard develops automated sample preparation using centrifugal microfluidics while the start-up Alitheia Bio UG, works on bioinformatics products.

Based on their collaborative projects, the participating companies and research institutions want to create solutions for existing commercial and medical issues through research and development. Solutions include standardized technologies for sample preparation and AI-based methods for data analysis. The goal is to identify new applications and overcome existing limitations. Routine processes should allow for more reliable, faster and more cost-effective results. Automation of these laboratory procedures, especially sample handling and processing, is intended as a further leveraging tool for these network objectives.

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The [Central Innovation Program for small and medium-sized enterprises \(SMEs\)](#) from the Federal Ministry for Economic Affairs and Energy is funding the network while [ifectic Innvoationsförderung - Dr. Björn Mamat](#) has taken on the network's management. Additional network members include: [MSAID GmbH](#), [OmicScouts GmbH](#), [PreOmics GmbH](#), [A&M Labor für Analytik und Metabolis-musforschung Service GmbH](#), [Cellzome GmbH](#), [EpiQMax GmbH](#), [Hamilton Bonaduz AG](#), [Mannheim University of Applied Sciences \(CeMOS\)](#), [Immatix](#) and the [Technical University of Munich \(Institute of General and Surgical Pathology\)](#).

The network is seeking additional partners: Interested companies and research institutions that would like to participate in R&D projects and can contribute additional expertise are just as welcome as potential users of the newly developed solutions. Look for further information soon at www.proteomics4future.net.

Tryptic digestion of human serum for proteomic mass spectrometry automated by centrifugal microfluidics - [now published in Lab on a Chip](#)

CONTRIBUTION FROM JOANNEUM RESEARCH



Competitively priced method for the production of diagnostic chips



Inner Front Cover of „Lab on a Chip”: “High-Throughput Roll-to-Roll Production of Polymer Biochips for Multiplexed DNA Detection in Point-of-Care Diagnostics” von P. Toren et al.

In medical diagnostics, patient-oriented rapid diagnostics, so-called point-of-care diagnostics, is becoming more and more important. In this context, the JOANNEUM RESEARCH has successfully demonstrated high-throughput Roll-to-Roll production of polymer based diagnostic test chips.

There is great potential for microfluidic lab-on-a-chip systems, particularly in medicine, pharmaceuticals, production and analysis. One advantage of lab-on-a-chip systems is

that they allow the automated implementation of complex analyses even in small laboratories with limited technical equipment. At MATERIALS, the NextGenMicrofluidics project is working intensively on the implementation of roll-to-roll technologies for the high-throughput production of these microfluidic lab-on-a-chip systems. The resulting flexible polymer chips enable multiplexed, fast and reliable DNA or protein testing for in-vitro diagnostic applications. In the production of chip structures

for the clinical detection of the antibiotic-resistant pathogen Methicillin-resistant Staphylococcus aureus (MRSA), a production speed of 4500 chips per hour was achieved via our Roll-to-Roll (R2R) UV Nanoimprint Lithography (UV-NIL) pilot line. In comparison, the most commonly used injection molding technology allows the production of ~ 600 chips per hour.

“Our Roll-to-Roll UV NIL technology offers high-throughput and smart manufacturing of multiplexed polymer biochips, suitable for DNA and protein-based point-of-care diagnostics”, says Pelin Toren, first author of the article published about the technology developed at MATERIALS.

The article is published in ["Lab on a Chip"](#)

P. Toren et al., "High-throughput roll-to-roll production of polymer biochips for multiplexed DNA detection in point-of-care diagnostics", Lab on a Chip, 2020, 20, 4106-4117.

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NextGenMicrofluidics

The project combines the competences of 21 companies and research organizations along the entire value chain and offers services for the development and production of customized microfluidic lab-on-a-foil systems for companies - from start-ups to large industry. This includes a unique continuous roll-to-roll production line for high-throughput manufacturing of foil-based microfluidics.

The project is coordinated by JOANNEUM RESEARCH - MATERIALS in close cooperation with HEALTH.



NextGen
Microfluidics



This project has received funding from the European Union's HORIZON 2020 research & innovation programme under grant agreement n° 862092.

CONTRIBUTION FROM JOANNEUM RESEARCH



M3DLoC – Additive Manufacturing of 3D Microfluidic MEMS for Lab-on-a-Chip applications

Microfluidic MEMS are increasingly recognized as a unique technology field for the development of biomedical devices (BioMEMS), due to their functional performance on the microscale. M3DLoC aims at the employment of multi-material 3D printing technologies for the large-scale fabrication of microfluidic MEMS for lab-on-a-chip and sensing applications. The concept is based on the combination of a multimaterial direct-ink-writing method and an extrusion-based 3D printing pilot line, in order to fabricate microstructured diagnostic devices with the ability to perform all steps of chemical analysis in an automated fashion. The open access pilot line under development aims to perform manufacturing of macro-size products with micro-patterned features and functionalised sensing elements.

In M3DLoC, 3 different test cases are developed based on affinity-based assays for the identification of highly selective biomarkers in liquid biopsy:

- ✓ Detection of viral infections (HIV)
- ✓ Detection of bacterial infection and drug resistance (Tuberculosis) from DNA variations in bacterial strains
- ✓ Detection of oncogene mutations (lung cancer) on tumor-derived DNA

JOANNEUM RESEARCH HEALTH is partner in the M3DLoC consortium. The competence group „Medical Sensors“, which focuses on

electrochemical sensor development for medical diagnostics and Home Care applications, is involved in the sensor development for the tuberculosis test case. The detection platform is based on screen printed carbon electrodes integrated in a microfluidic cartridge which allows for multiplexed detection of bacterial tuberculosis DNA and specific mutations. This essential information can then be used to identify drug resistant bacterial strains and guide medical staff in the choice of the most efficient medications. The M3DLoC Project has been granted 7,9€ million from the EU Horizon 2020 framework programme. This 4-year project will be carried out by an international consortium of 17 organisations led by the National Technical University of Athens.



This project is supported by the European Union under the HORIZON2020 Framework Programme Grant Agreement n° 760662.

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CONTRIBUTION FROM KNOW-CENTER

FutureLab.Radiology



FutureLab.Radiology is a project focusing on the development of radiological support systems in order to improve the diagnostics at the Medical University of Graz (MUG). The approach includes the extraction of medical entities such as previous illnesses, symptoms or treatments and their interrelationships from radiological findings and their assignment to the respective CT/MR image to obtain a holistic view on the patient. This results in a database of CT/MR images where the extracted information and relations will serve as multi-dimensional labeling. These labeled data will then form the basis for deep learning applications to develop innovative radiological support systems.

A major radiological research area is the automated analysis, segmentation and classification of radiology images. Latest concepts use multimodal models where not only CT/MR scans but also clinical examinations and dia-

gnostic tests are used to improve the diagnosis in radiological findings.

This automated strategy is based on the current workflow radiologists use: not only writing a meaningful radiological report considering imaging examinations alone but also taking into account additional clinical information such as known previous illnesses and various personal information of a patient.

In many areas, especially in the medical field, the interpretability and explainability of predictive models, such as Deep Neural Networks (DNNs), play an important role. To achieve a better generalizability of predictive models, it is necessary to model the causality and thus the data generation process of explanatory- and response variables. With this, the causal influence of the individual factors on the result can be quantified.

In practice, hyperparameters can be adjusted according to the requirements. This allows to make statements about the workability of a model in different environments and with different probability distributions of their observables.

Finally, the influence of model parameters can be determined and therefore, the adjustment of parameters in case of insufficient output accuracy is unambiguous. Radiological reports usually contain extremely sensitive and highly private data of a patient that may not leave the research facility. However, scientific collaborations often require data sharing.

CyVerse Austria (CAT) addresses exactly this problem using a newly established infrastructure linking the MUG to University of Graz and University of Technology Graz for data management and data analytics. Anonymized reports could be loaded directly from the MUG database system to the distributed storage system based on the iRODS technology without leaving the research facility. A suitable infrastructure with sufficient computing power is also available for the development of algorithms and training of Neural Networks. Given that the computation and analysis is performed directly on MUG environment a maximum of data security is guaranteed. Another important point is user administration. Permissions for access to data sets or entries in the database can be individually created and controlled for MUG employees, so that data exchange always takes place via the CAT infrastructure.

For any future studies where it might be necessary that data leaves MUG boundaries for data analyses, privacy-preserving analytics comes

into play. In such a setting, it is essential that individual patients can no longer be identified from the datasets. New cryptographic methods ensure the highest standards for data protection while still allowing calculations and analysis on encrypted data. Such privacy-preserving tools are currently being developed in the DDAI COMET module and corresponding Horizon2020 research projects at Know-Center GmbH.

This project shows that in medical research it is crucial to have technologies enabling safe and secure data workflows. This ensures that insights can be made while still adhering to GDPR constraints.

This project is a cooperation between Medical University Graz and Know-Center GmbH Graz and received funding from the Styrian Government (Zukunftsfonds Steiermark)



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CONTRIBUTION FROM MYBIOTECH GMBH

BioNanoNet Member MyBiotech collaborated in the development of "NanoDis" System for Nanoparticle Dissolution Testing



The "NanoDis" System addresses the pharmaceutical industry's need for compliant, semi-automated testing of nanoparticle drug formulations

[Agilent Technologies Inc.](#) recently announced the introduction of the NanoDis System for nanoparticle dissolution testing. Combining Agilent instrumentation and software to enable customers to meet 21 CFR Part 11 and other regulations through its application, the new NanoDis System delivers a dedicated workflow that is automatable and auditable.

Designed in collaboration with Dr. Emre Türeli from nanoparticle manufacturer [MyBiotech](#)

[GmbH](#), the NanoDis System enables R&D formulation chemists to deliver new formulations into manufacturing faster, and also allows manufacturing teams to deliver consistent batches of QC-passed new drug products ready for commercial sale—all in an automated and compliant manner.

"Agilent's introduction of the NanoDis System is significant in that it is the first nanoparticle testing solution that allows methods to be easily transferred from R&D to QC, supporting scientists in meeting the requirements of United States Pharmacopeia (USP)," said Michael Frank, associate vice president of global mar-

keting for Agilent's Liquid Phase Separation division. "The NanoDis System can be universally implemented, therefore ensuring that our customers' global laboratory locations deliver the same results every time. Additionally, the NanoDis System is an end-to-end, single-vendor solution that is fully supported by a dedicated global team."

Lifesaving drugs are increasingly being developed using nanoparticles for targeted drug delivery. These new dosage forms offer the promise of advancing patient care and treatment outcomes—particularly for oncology and cardiology patients—by reducing side-effects and improving drug solubility and bioavailability. However, nanoparticles can be incredibly difficult to work with from a dissolution testing perspective. This testing is a critical regulatory requirement for the development, manufacturing, and QC of medical drug dosage forms.

"The new NanoDis System gives us a far better insight and thorough understanding of dissolution of nanoparticles, enabling a truly efficient formulation development where we can

rely on in-vitro data for the lead formulation selection," commented Dr. Emre Türeli, CSO MyBiotech GmbH.

The Agilent NanoDis System was selected as a finalist for the CPhI Pharma Awards for excellence in Pharma: Analysis, Testing and Quality Control. The awards celebrate the thinkers and creators at the forefront of driving the pharmaceutical industry forward through innovation, technology and strategies.



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Contact:

MyBiotech GmbH
www.mybiotech.de

CONTRIBUTION FROM MYBIOTECH GMH



Bio2Brain set to develop effective drug delivery to central nervous system

20 project partners from academia and industry have joined forces in the Bio2Brain network to investigate efficient administration routes of biopharmaceuticals for the treatment of disorders of the central nervous system (CNS). The challenge is an endogenous defense system that normally protects the CNS from unwanted substances. The downside, however, is that commercial or even potential drugs cannot readily cross this barrier.

In order to respond to this challenge, the Bio2Brain network will pursue more effective approaches and develop new paradigms for drug delivery technologies in the treatment of CNS diseases.

Disorders of the central nervous system, including multiple sclerosis and Alzheimer's and Parkinson's diseases, affect around 165 million people in Europe. These disorders are often associated with severe suffering of the patients and their families, as well as an enormous burden on the social systems. Therefore, the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB coordinates the establishment of a trans-European research network to promote efficient drug administration to the CNS.

A highly critical challenge in that context is the existence of the blood-brain barrier (BBB), an effective human defence system that protects the CNS from circulating pathogens. Ho-

wever, it also results in a low central availability of drugs in the CNS, especially innovative biopharmaceuticals like monoclonal antibodies (mAbs). As a consequence, drugs with a low CNS bioavailability are currently delivered directly to the CNS via intrathecal, intracerebroventricular, or intraparenchymal injections. Unfortunately, such delivery systems are invasive, require surgery with high risks, have very low patient compliance, and are poorly controllable. Hence, there is a critical need for an effective new approach for drug delivery technologies in the treatment of brain diseases with CNS active molecules.

Trans-European research and training program with cross-sectional expertise

"We have launched the Bio2Brain network in order to actively shape this change," explains Dr. Carmen Gruber-Traub, a specialist for functional surfaces and materials at the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB and the coordinator of the project. The project is a four-year Marie Skłodowska-Curie Action (MSCA) Innovative Training Network (ITN) funded by European Union's Horizon 2020 research and innovation program. "We are very pleased that we were selected for funding as these actions are not only very popular but also highly competitive due to the bottom-up approach and the required scientific excellence," says Dr. Carmen Gruber-Traub.

The Bio2Brain network will create a research environment for the interdisciplinary and intersectoral training of 13 Early Stage Researchers (ESRs) supported by 11 academic teams, 6 key industrial stakeholders, and an academic non-profit organization. Over a duration of 36 months, each ESR will work on their individual research projects (IRPs) in the scientific work packages (WPs) based on the training-through-research principle. A personalized training program combining local trainings, network training, and international training via conferences and secondments will guide them.

The research and training program covers the development of new advanced materials, formulations, and engineered proteins for the intranasal CNS delivery of mAbs. The ESRs will obtain experience in the entire transdisciplinary development cycle of the medicinal product, from pharmacological drug pathway validation, product and process design, synthesis to characterization, as well as validation and quality control. The training will be complemented with useful tools for the time to market and commercialization phase.

Participation of MyBiotech GmbH

The MyBiotech GmbH will employ one ESR who will work on (bio)polymer-based particulate formulations for the intranasal transmucosal delivery of biopharmaceuticals. The ESR will conduct research on developing pharmaceutically approved (bio)polymer based biopharmaceutical delivery systems with tailored transmucosal passage properties.

Bio2Brain project consortium:

Beneficiaries:

- ✓ Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB, Germany (Coordinator)
- ✓ MyBiotech GmbH, Germany
- ✓ Hochschule Biberach, Germany
- ✓ Universität Bern, Switzerland
- ✓ Laboratorio Europeo di Spettroscopia Non Lineari, Italy
- ✓ Centre for Research and Technology Hellas – CERTH, Greece
- ✓ Queen Mary University of London, United Kingdom
- ✓ University of Cambridge, United Kingdom
- ✓ Contipro a.s., Czech Republic

Partner organisations

- ✓ Universität Stuttgart, Germany
- ✓ Universität Saarland, Germany
- ✓ Università degli Studi di Firenze – UniFI, Italy
- ✓ Aristotle University of Thessaloniki, Greece
- ✓ Beiter GmbH & Co. KG, Sigmaringendorf, Germany
- ✓ Vektor Pharma TF GmbH, Germany
- ✓ CSL Behring AG, Switzerland
- ✓ Boehringer Ingelheim, Germany
- ✓ European Academy of Neurology, Austria

CONTRIBUTION FROM NOVAMECHANICS



NanoSolveIT researchers presenting project's nanoinformatics tools during the NanoSafe 2020 digital conference and the NSC Training Day



[NanoSolveIT](#) (Innovative Nanoinformatics models and tools: towards a Solid, verified and Integrated Approach to Predictive (eco)Toxicology) partners have successfully participated with oral and poster presentations at the [NANOSAFE 2020 Digital Conference](#) (17 - 20 Nov 2020), which included interesting updates about the performed work and the developed tools.

List of presentations:

- ✓ Papadiamantis et al. – “Metadata Stewardship in Nanosafety Research: Significance and Community Consensus Potential to Support FAIR Nanoscience Data”
- ✓ Radnik et al. – “Minimum Information Requirements for Electron Microscopy and Surface Analysis Data for Risk Assessment of Nanoforms”
- ✓ Afantitis et al. – “NanoSolveIT Project: Innovative and Integrated Tools for In Silico Assessment and Safe-by-Design Approaches of Nanomaterials”
- ✓ Papadiamantis et al. – Enrichment and Meta-Analysis of a Harmonised Library of 69 Engineered Nanomaterials for the Development of a Z-Potential Predictive Model with Read-Across and Safe-by-Design Applicability

During the [NSC Education Day](#) and [NSC Training Day](#) NanoSafe satellite events, [NanoSolveIT](#) demonstrated some of the in silico tools developed by the consortium and collaborating projects like [NanoCommons](#), as well as tools developed by the project for the assessment of human and environmental exposure to nanomaterials. Furthermore, NanoSolveIT actively contributed to the NSC projects' panel discussion on nanotechnology related regulations and risk governance.

NSC Education Day

- ✓ Dario Greco, UTA – “Beyond chemocentric models: from toxicogenomics to integrated approaches for IATA development”
- ✓ Papadiamantis et al., UoB – “Showcasing read-across of NM properties (i.e. [zeta potential](#)) to [cytotoxicity](#) using NanoSolveIT's and NanoCommons' nanoinformatics models”

- ✓ Cheimarios et al., NovaMechanics – “[Showcasing NanoSolveIT's human exposure assessment](#)”

NSC Training Day

- ✓ Afantitis et al. - “NanoSolveIT tools for assessment of human and environmental exposure to nanomaterials”
- ✓ Afantitis et al. - “Introduction to Nanotechnology Regulations & Risk Governance (NSC Working Group G)”

We hope that our tools can spike your interest to the project and we look forward to receiving your ideas, input or questions in relation to nanoinformatics, so feel free to contact us!

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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.

BNN retrospect

2020 U.S.-EU NANOEHS COR WORKSHOP

Bridging Insights and Perspectives

16th – 17th of September 2020



The [ninth annual meeting of the NanoEHS Communities of Research \(CORs\)](#) was held as a virtual workshop on 16th and 17th of September, 2020.

The meeting, co-hosted by NNCO and the European Commission (EC), serves as the annual gathering of the U.S.-EU CORs. The meeting extended the bridging theme that launched the CORs to sharing how lessons learned from nanoEHS research can be, and are being, applied to other areas such as emerging technologies, incidental nanomaterials, and novel contaminants. As with previous meetings, conversations at this meeting are shaping the activities and collaborations within and across the seven nanoEHS CORs.

More than 185 attendees from diverse disciplines and backgrounds participated in the event, attesting to the interest in, and continuing relevance, of the transatlantic COR platform. The workshop archives are posted. Further information about the CORs: <https://us-eu.org/>

Several EU NanoSafetyCluster (NSC) partners as well as BNN participated in the workshop, either as presenter or contributor. Within the recently started international network initiative, the NSC will continue and further extend this successful collaboration.

Contact:

Stacey STANDRIDGE, Deputy Director
National Nanotechnology Coordination Office
www.nano.gov

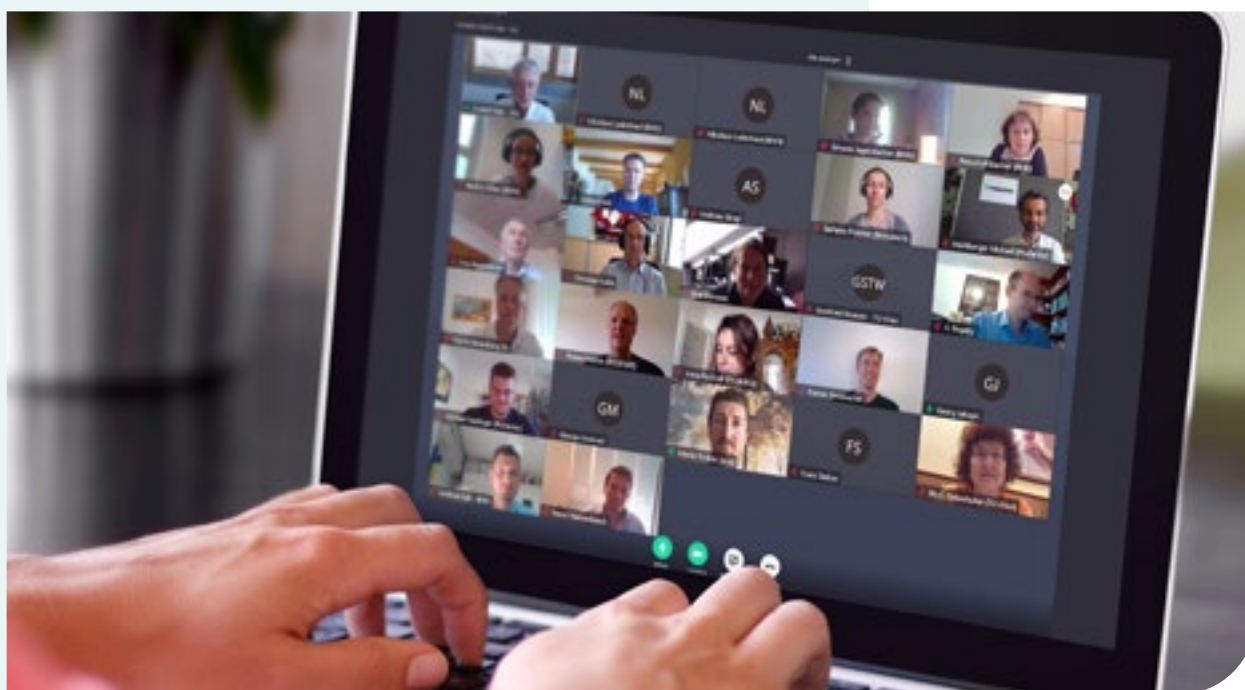
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2ND NANOSYN JOINT WORKSHOP - 16TH NANONET-MEETING

18th of September 2020, online



Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie



In line with its tradition nanoNET-Austria invited top-class speakers from different sectors of industry, research and academia with focus on nanotechnology to give lectures during the 16th nanoNET-meeting on September 18th.

This special event was supported by the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) funded project NanoSyn and its partners BioNanoNet Forschungsgesellschaft mbH, Verein Erwin Schrödinger Gesellschaft

für Nanowissenschaften and Verein nanoNET-Austria.

As the overall goal of the project NanoSyn (Nano-Community in Austria - Synergy Potentials) addresses the topic “Nanosciences in Austria” comprehensively, supporting this 16th nanoNET-meeting contributed to NanoSyn by utilizing synergies and initiating cooperation of Austria’s nanotechnology research networks with industry.

For the first time in the long history of the nanoNET-meetings we could not have a face-to-face meeting due to the omnipresent COVID-19 pandemic. However, 38 persons have registered for the first virtual nanoNET-meeting and 32 attendees followed actively the virtual presentations.

Besides the attractiveness of the meeting from scientific and economic points of view, some attendees appreciated the organization as an online meeting very much and encouraged us to offer this service in parallel to future face to face meetings. This desire was supported by almost all audience and the organizers. Consequently, we aim to offer this service in future as well.

Since the 16th nanoNET-Austria was organized synergetic with the BNN annual forum, which took place on September 17th, our members and guests have been invited to follow the presentation from Dr. Köstner, who is the Austrian research Promotion Agency (FFG) expert for European and International Funding Programs on emerging topics in nanotechnology, materials, production and process technologies. Receiving first-hand information on near future hot topics and program developments was clearly beneficial for all, the BNN and nanoNET-Austria audience.

The traditional 16th nanoNET-Meeting was organized, as usual, in 4 thematic blocks which evolve continuously during the nanoNET-Austria meeting series over the years.

The first block was dedicated to nanotechnology topics from industry. Here we started with the presentation of Dr. Pesendorfer from IN-OCN Technologie GmbH on the topic “Mikro-

und Nano-Schichten mittels atmosphärischen Plasmas”. In his presentation a fascinating industrial realization of in-situ nanoparticle fabrication and processing was shown.

Dr. Mühlberger from PROFACTOR GmbH presented the applicability and manifoldness of “Step & repeat UV-Nanoimprinting as a versatile tool in the Nanoimprint process chain for applications ranging from optics to life sciences”. The potential for high volume production of nanostructures on surfaces was demonstrated through several demonstrations on various substrates ranging from crystalline rigid surfaces to soft and flexible textiles.

Dr. Ostermaier from Infineon Technologies Austria AG presented during his talk on “GaN Power Devices: Development, Application, and Challenges” several technological challenges, and scientific solutions to bring CMOS compatible nanotechnology successfully into the wafer fab.

The second block was dedicated to nanotechnology research in academia where Dr. Schimpf from Johannes Kepler University Linz gave an in-depth introduction to “Quantum Cryptography with Semiconductor Quantum Dots” and motivated this hot topic by the need of save and secure exchange of encryption keys during digital communication.

The third block was dedicated to the traditional nanotechnology report from Mag. A. Pogány who is with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and reported nano-activities from the perspective of the BMK with focus on Austria, Europe and international cooperation. He presented details of

the next calls for funded projects in the field of nanomaterial production within the funding program "Production of the future".

The fourth and last block was dedicated to information, directly from the nanoNET-Austria association on the topics stakeholder survey, upcoming events, the NanoSyn project and any other business. This information was given and moderated by Dr. Heer from Silicon Austria Labs GmbH.

In summary, the 16th nanoNET-Austria meeting, which was actively supported by BNN, showed the benefits gained by NanoSyn-project and can be concluded that it was a great success!

In the image below we show some participants which gave their approval for sharing this image in this newsletter.

NanoSyn has received funding from BMK.

4TH EU-ASIA DIALOGUE ON NANOSAFETY

7th of October 2020, online



Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie



The 4th EU-Asia dialogue on Nanosafety was performed in a way to make progress from discussions towards implementation of actions. Thus, already developed initiatives have been presented as well as findings from previous workshops.

Specific activities and recommendations from that pre-work have been central part of the meeting, (i) already in the preparation in the information package to bring all participants on the same information level, and (ii) during the event with excellent talks and working sessions.

A report about this EU-Asia dialogue is now available. This meeting report includes recommendations (breakout session A), which research needs shall be addressed within future programs (e.g. Horizon Europe, actional programs in Europe and Asia, etc.) and what are the take home messages from the governance discussions (breakout session B).

All presentation slides can be downloaded [HERE](#).

The report “[REPORT of the 4th EU Asia Dialogue on Nanosafety](#)” focusses on the results of the breakout sessions and a short “action plan on the way towards the 5th EU-Asia Dialogue on Nanosafety”. Some colleagues have also shared publications specifically relevant for the participants. Please find those added at the end of this report.

If you are interested to join e.g. the international network-initiative, please contact the BNN-team.

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12TH EUROPEAN AND GLOBAL SUMMIT FOR NANOMEDICINE

Clinical Nanomedicine and the Impact of Digitalization and Artificial Intelligence for Precision Medicine – The Technologies for Diagnosis & Therapy in Patient-Centric Medicine

26th – 28th of October 2020



This year's CLINAM Summit was held as live streaming online event from 26 to 28 October 2020.

The CLINAM Summit event brings together all stakeholders in nanomedicine, targeted medicine and precision medicine. In its 12th conference, key topics besides nanomedicine and related fields were the role of digitalization and artificial intelligence, highlighting the present achievements with the ambitious goal to shape together the medicine of the future. The Summit builds on the principle that fundamental and applied scientists, developers, clinicians, regulators and professionals from various related fields can mutually learn from each other to find better solutions. This leads to new collaboration and consortia of experts that will accelerate the development and strengthen the efforts towards a medicine that delivers more benefits to patients and society.

Nanotechnology for COVID-19

Due to the worldwide recent pandemic situation, the treatment of COVID 19 by nanotechnology-based developments towards vaccines was discussed. Thus, the regulatory authorities' session – every year a highlight at CLINAM – was dedicated in 2020 to COVID 19.

BNN participated in the CLINAM Summit as virtual exhibitor and joined the international nanomedicine community at various sessions and discussions, representing the H2020 research projects BIORIMA and Smart-4-Fabry.



These projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 720942 and n° 760928

Get connected with Smart4Fabry on:



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Get connected with Biorima on:



[SEE WEBSITE](#)

14TH INTERNATIONAL NANO-DIALOGUE



Life Cycle and Regulation of Advanced (Nano-)Materials

12th – 13th of November 2020, online

On November 12th and 13th 2020, the 14th International Nano-Dialogue took place not as planned in Vaduz, but virtually – because of an approximately 100 nanometer-sized virus. The main topic of discussion were novel materials, also known as "advanced materials". A total of sixteen presentations were given and lively discussions were held at the event to broaden the understanding of advanced materials and highlight implications for the various stakeholders. The "Nano Roadmap 2025", a framework document of the nano-dialogue was also discussed and updated.

Following the traditional opening of the event by the host, the Office for the Environment Liechtenstein, and the "Tour de Table" with updates from the countries represented, the "Advanced Materials" were discussed in four blocks in the light of a life cycle approach.

New (nano-)materials and novel manufacturing processes

In the keynote speech on new (nano-)materials and novel manufacturing processes, Abdelqader Sumrein from ECHA presented the EUON study on second and higher generation nanomaterials and presented its results. The concept of "higher generations" has been introduced to highlight the potential of nanotechnology. The study concludes that due to

the increasing complexity of and combination of organic and inorganic components in novel materials, new guidance documents might be necessary. With the basic statement "Graphene is not always graphene", Peter Wick from EMPA explained that the term "graphene" is imprecise because there exists a variety of different forms that can be summed up into "graphene-related materials" (GRMs). This can lead to misunderstandings in the dialogue between science, industry and authorities. The "Graphene Flagship Project" developed a helpful classification grid for such GRMs.

Additive manufacturing (AM) is regarded by experts as a novel manufacturing process with great potential. In his presentation, Steffen Scholz from KIT presented the DIMAP project in which the state of the art of additive manufacturing is being investigated by NM-reinforced printing inks, among other things. Within the project, an interesting "safe-by-design" approach was carried out. Adriaan Spierings from Inspire AG and Christoph Bosshard from SUVA gave a tandem presentation on additive manufacturing from the perspective of industry and occupational health and safety. In this context, a considerable need for practical information and simple guidelines/action aids for users, especially SMEs, that can be implemented in industry, is already apparent.

Occupational safety and implementation of safety-by-design concepts

In the next part, Rolf Packroff from BAuA pointed out challenges for occupational safety with regard to rigid CNTs and brittle materials that release dusts with critical morphology. Asbestos-like examples are pitch-based graphite carbon fibers. Although appropriate protective measures are in place for such "hazardous chemical agents", there is no obligation to pass on information in the supply chain. In addition, there are no fiber-specific test methods, evaluation and information requirements. Andreas Falk of BioNanoNet highlighted in his presentation the increasing importance of the "safety-by-design" concept in the application of new materials and especially the SbD approaches in European research projects.

Regulatory aspects of advanced materials and higher order nanomaterials

Thomas Kuhlbusch from BAuA presented the NanoHarmony project for the development of eight new test methods, in cooperation with ECHA, the Malta Initiative, the OECD Working Party on Manufactured Nanomaterials and nanomaterial manufacturers. In addition, the project aims to establish a long-term cooperation through the established network, to allow for quick and purposeful development and adaptation of future test guidelines. The REFINE project and the resulting white paper was presented by Matthias Rösslein from EMPA. The paper summarizes the most important regulatory requirements of nanomedicine and highlights the challenges in regulation. Beat Flühmann of Vifor Pharma also gave a presen-

tation on nanomedicine and gave the perspective of a manufacturer. The characterization of the company's products, Non-Biological Complex Drugs (NBCD), is complex and difficult because the entire product is considered an active substance. Thus, there are hurdles on the way to approval. This also applies to nanosimilars and their proof of equivalence, since even small changes in the manufacturing process can change the characteristics of the nanomedical product.

End-of-Life-Management of Advanced (Nano-)Materials

Manuela Kienegger from the AIT presented the "NanoCycle" study, which examines whether and how NM in plastics can influence or even impair the recycling process using PET as an example. The quantities of NM in plastic waste streams are unknown, but operators of recycling plants estimate the quantities to be relatively small. In addition, no effects on the processes or recycling products have been identified so far. Little is known about exposure to NM in waste and recycling streams, but it can be assumed that releases from polymer matrices are very low.

Great progress has been made in the environmental risk assessment of NM over the past ten years, as Bernd Nowack from EMPA reported. With his research group, he has particularly advanced the modeling of substance flows and releases. Specifically, he presented the possibility of dynamic and prospective modeling and the consideration of different nanoforms in the assessments. These methods are also interesting for the modeling of flows of novel (nano-)materials.

Andrea Haase presented the InnoMat.Life project, which is dedicated to three novel, as of yet little studied classes of materials. The overall goal is the establishment of grouping approaches and related criteria, so that novel or more complex materials can be grouped and evaluated with respect to their hazard and risk potentials, which includes the adaptation or establishment of appropriate experimental test methods. First research results suggest that grouping approaches for innovative or more complex materials can be established with the help of selected materials.

Tobias Walser from Vereala GmbH in Zurich concluded the series of presentations. He explained the innovations in the Swiss precautionary matrix for synthetic nanomaterials and pointed out that the tool will be updated in 2021. Synthetic nanomaterials can fall into the category of advanced materials. The Swiss precautionary matrix could also be suitable

for the risk assessment of advanced materials. However, it would have to be adapted accordingly. In conclusion, he noted that a general understanding of advanced materials is more important than an exact definition, since a large and heterogeneous spectrum of materials is covered by the term.

Outlook

Even with the conference being held online, the response of the participants overall was very positive. In addition to many interesting presentations, there were also stimulating discussions and the "Nano Roadmap 2025" was discussed and updated. Although in a somewhat limited form, the 14th International Nano-Dialogue was successfully concluded according to the motto "Better to stick to the dialogue than to shake hands". The next Nano-Dialogue is set to take place in Switzerland - hopefully in person.

7TH INTERNATIONAL CONFERENCE NANOSAFE 2020

6th – 20th of November 2020, online



Organized every two years since 2008, NANOSAFE Conference is intended for sharing latest research results on health and safety issues related to nanomaterials and beyond for a socially responsible approach. This special edition was organized digitally with the ambition to cover the newest findings concerning Safer- and Eco-Designed innovative nanomaterials.

Additionally, [BNN-member Martin Himly](#) from PLUS ([Allergy-Cancer-BioNano Research Centre - University of Salzburg](#)), chair of the EU NanoSafetyCluster (NSC) working group A “Training and Education” coordinated the organization of the NSC-days in the frame of the NANOSAFE 2020. The first day, November 16th, 2020, acted as guidance for the entire NanoSafety community, including young researchers, to highlight how individual research projects fit as a puzzle piece into the

wider picture. It was an orientation-giving and educational event depicting the overall strategy behind NanoSafe(ty). On November 23rd, 2020, in depth training contributions (as proposed) by individual projects included two parallel sessions: (i) Hands-on Training on Nanosafety Tools and Models, as well as (ii) NanoSafety Stakeholder engagement, Diplomacy, Regulation and Risk Governance. BNN furthermore contributed to several sessions on both days, presenting successful activities in our EU funded nano-safety relevant projects (e.g. ACEnano, Gov4Nano, NanoCommons, NanoFabNet, SABYDOMA).

All participants are looking forward to hopefully be able to meet physically in 2022, at the 8th NANOSAFE conference in Grenoble.

See also [NanoSolveIT & nanoSafe 2020](#) contribution in this newsletter!

Get connected with ACEnano:

[SEE WEBSITE](#)



ACEnano project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 720952.

Get connected with Gov4Nano on:


[SEE WEBSITE](#)


Gov4Nano project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 814401.

Get connected with NanoCommons on:


[SEE WEBSITE](#)


NanoCommons project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 731032.

Get connected with NanoFabNet on:


[SEE WEBSITE](#)


NanoFabNet project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 886171.

Get connected with SABYDOMA on:

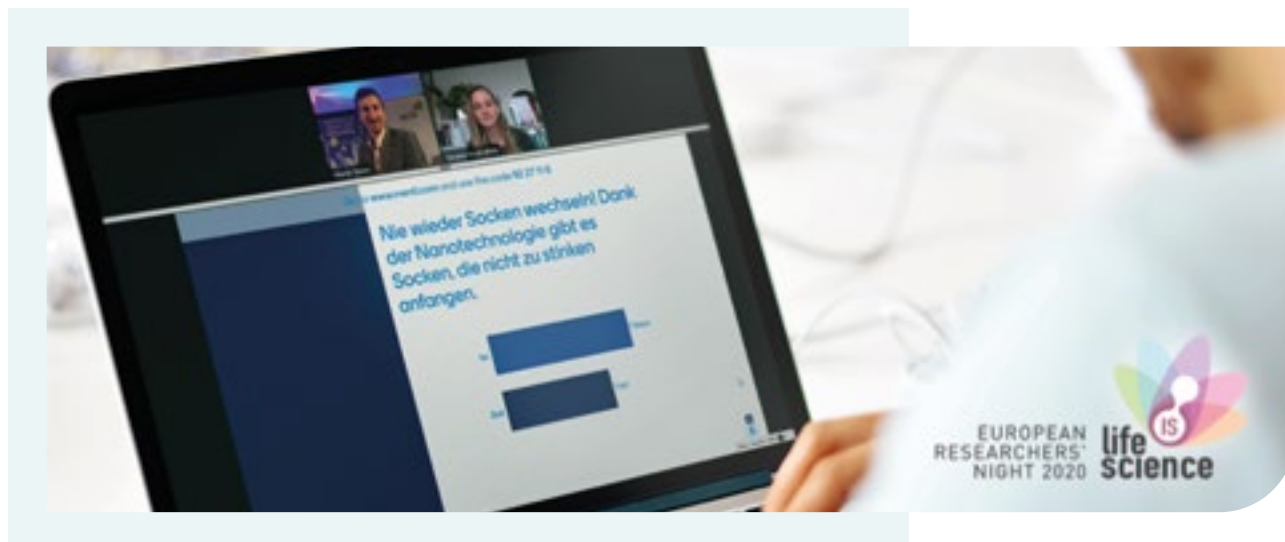

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SABYDOMA project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement n° 862291.

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EUROPEAN RESEARCHERS NIGHT 2020: LIFE IS SCIENCE

27th of November 2020, online



The Styrian edition of the European Researchers' Night took place under the thread "Life is Science" on the 27th November 2020 between 08:00 – 21:00 CET and was organized by the Austrian Centre of Industrial Biotechnology (acib). As one of the biggest scientific public events, the ERN takes place simultaneously once a year throughout Europe. At "Life is Science", more than 2.000 online participants were able to get a taste of everyday life of a research institution such as acib and connect the dots between research in Life Sciences and the public's daily in topics "Health", "Food Technology" and "Renewable Resources".

Due to the current COVID-19 pandemic, the event has been carried out solely online. For this, a diverse program, specifically for the ERN2020, was tailored. "For an event of this length and importance, it was crucial for us

to communicate Life Sciences and it's fascinating impacts on our daily life in an exciting, thrilling and interactive way", says project leader Olivia Laggner.

The audience from all age groups (but especially interested pupils and students) was invited to join various activities such as Science shows with the famous Science Busters, Lab tours on site at the acib company partner bisy in Gleisdorf, Workshops – for example a career corner for aspiring young scientist who are interested in a science career, or different live talks, quizzes and DIY experiments to try at home.

Current issues and renowned speakers

The event focused on current issues and topics, e.g. "sustainable food management" or "meat from the lab" and emphasized the im-

portance of bioeconomy for a healthy and liveable future. Sophia Kiechl from VASCage in Tyrol gave a talk about on how to stay young and what life-style helps preventing coronary diseases – the main cause of death among people.

Another session was a quiz by Susanne Resch from BioNanoNet, where the audience had the chance to answer questions as fact or fiction, following a very interesting presentation about Nanoparticles and their safety.

But one topic that is on everybody's mind right now, is the Coronavirus. Next to the development of vaccines against the virus it will be important to drugs in order to prevent the disease. Christian Gruber from Innophore and acib explained, how computer simulations and -data helps to find a cure and how small proteins act as biotech-tools to tread illnesses.

Undoubtedly one of the highlights of the “Life is Science” ERN 2020 event was the live talk of Florian Krammer. As an acclaimed international virologist and expert in the field of vaccines and testing (Krammer together with acib and partners invented the first non-commercial PCR-test) gave an exciting and informative overview about different kinds of vaccines and their development and gave answers to questions from interested audience members.

“Bringing the ERN2020 to Styria sends an important signal for Austria as a research hotspot and strengthens the international reputation of Graz as an important biotech player”, says Dr. Mathias Drexler, CEO of acib.

Contact and more information at <https://www.lifeisscience.at>

About Austrian Centre of Industrial Biotechnology (acib) – innovations from nature

The Austrian Centre of Industrial Biotechnology (acib) is an international competence centre, developing new, environmentally friendly, economically and technically advanced processes for the biotechnological, pharmaceutical and chemical industry – all of them modelled on nature. Currently, more than 250 acib scientists are working on more than 150 industrial and strategic projects. This know-how is the foundation for new and improved applications and products in nearly all fields of life sciences all over the world, e.g. agriculture, environment and nature, food and feed, materials, pharma and cosmetics and health.

3RD NANOSYN-JOINT WORKSHOP:

17TH NANONET-AUSTRIA MEETING & AMI WORKSHOP

14th of December 2020, online



Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie



AUSTRIAN
MICROFLUIDICS
INITIATIVE



Part of participants of nanoNET Meeting

The 3rd NanoSyn Joint Workshop, hosting the 17th nanoNET-Austria Meeting and the AMI Workshop, took place on 14th of December as online meeting and attracted more than 50 participants.

NanoNET-Austria and the Austrian Microfluidics Initiative (AMI) launched a program with top-class speakers from different sectors of

industry and research in the fields of micro- and nanotechnology with a focus on producibility of microfluidics.

nanoNET-Austria Meeting

This 17th nanoNET-Austria Meeting focused the application and characterisation of nano particles ranging from novel gas sensor and

air quality surveillance concepts to versatile AFM metrology. Finally, cutting edge packaging strategies and realizations for heterogeneously integrated nano devices have been presented.

Mr. Rudolf Heer from Silicon Austria Labs opened and chaired the nanoNET-Austria meeting which gave the audience to follow the invited presentations on:

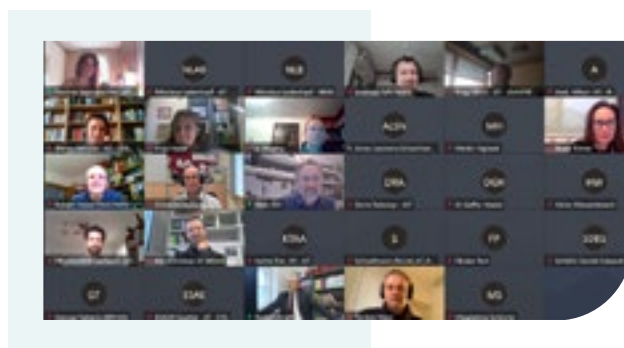
- ✓ “Nanomaterial challenges for autonomous sensor nodes” by Marco Deluca from Materials Center Leoben
- ✓ “New possibilities of AFM analysis for nanostructured materials through a fully integrated measuring sensor for electrical and mechanical properties” by Martin Pfeiler-Deutschmann from Anton Paar
- ✓ “New developments in the field of nano-sensors for the detection of aerosol” by Alexander Bergmann, Graz University of Technology
- ✓ „Reactive Al/Ni-Nanocomposite Bonding for MOEMS packaging” by Ali Roshanghias, Silicon Austria Labs

Furthermore, Alexander Pogany from the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK) gave a lecture on current topics and activities in the field of production technologies (Austria, EU, international/China, production of nanomaterials, call "Production of the future", calls and other activities).

Additionally, two interesting projects, which are related to safety & risk, funded under the “2020 SAF€RA joint call” were presented:

- ✓ „Safety assessment of flow battery electrolytes - SABATLE“ by Stefan Spirk from Graz University of Technology and
- ✓ „Safety and risk assessment of 1st and 2nd life lithium-ion batteries – SafeLiBatt” by Florian Part from the University of Natural Resources and Life Sciences (BOKU Wien)

The session was closed by Rudolf Heer from the Silicon Austria Labs with a report from the nanoNET-Austria network and an outlook on planned events, especially the planned presentations at international trade fairs and delegation trips.



Part of participants of AMI workshop

AMI workshop of the Austrian Microfluidics Initiative

The AMI workshop of the Austrian Microfluidics Initiative took place in the afternoon of the 14th of December.

The workshop provided an overview on current national and international projects involving microfluidic devices that are funded in part by the Austrian Research Promotion agency

(FFG) under the framework of “Production of the Future” and microfluidic research and development.

Among the selected projects, Anja Haase from JOANNEUM RESEARCH Forschungsgesellschaft mbH presented a midterm update of the HOPoVER project involving roll-to-roll microfabrication (PdZ 2019- [HOPoVER at ffg.at](#)), Beate Rinner from the Medical University of Graz introduced the recently funded project TransCell using microdevices to transport complex living cell cultures (PdZ 2019-[TRACE at FFG](#)) and Martin Smolka from JOANNEUM RESEARCH Forschungsgesellschaft mbH talked about the EU-H2020-OITB NextGenMicrofluidics (www.nextgenmicrofluidics.eu) and the need to develop rapid, portable and affordable testing systems (e.g. COVID-19 screen).

Following these presentations, Peter Ertl from the Technische Universität Wien led an interesting discussion about the knowledge exchange between industry and academia as well as the need for a dedicated microfluidics research call. The importance of microfluidics as enabling technology and platform was highlighted by the broad range of different applications.

In the last session “Start-Ups in μ -fluidics” five entrepreneurs introduced their recent start-up ventures in form from 5 min business pitches to further highlight the innovative nature and dynamic character of the Austrian R&D field:

- ✓ [SAICO Biosystems KG](#) (Rudolf Zinell)
- ✓ [Orbillion Inc](#) (Patricia Bubner)

- ✓ [Pregenerate](#) (Julie Rosser)
- ✓ [Akribes Biomedical GmbH](#) (Barbara Wolff-Winiski)
- ✓ [BRAVE Analytics GmbH](#) (Gerhard Prossliner)

After the individual pitch presentations, the access to skilled work force, technology costs, public and private funding was debated by the participants.

The meeting was closed with reflections by Alexander Pogány from the Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology, highlighting the great success achieved by the microfluidics group in and for Austria. Furthermore, he showed interest in discussing potential funding opportunities also in connection with the presented OITB (NextGenMicrofluidics) and to discuss with the community about further involvement of microfluidics in the Austrian Produktion der Zukunft calls. nanoNET-AT may use the Austrian community via NanoSyn-collaboration to collect experts feedback contributing to this funding scheme.

BNN will of course support this process as a central part of future NanoSyn activities.

Feel free to download the presentations of the AMI workshop from the [BNN website!](#)

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Conference calendar

BNN EVENTS & BNN CO-ORGANISED EVENTS

BNN Networking Event & BioNanoNet General Assembly

When? 4 March 2021

Where? online

BioNanoNet General Assembly and Networking Event will take place virtually on 4th of March 2021! Save the date! This event is free for BioNanoNet members.

More information coming soon on our [website!](#)

BNN Annual Forum & Networking Event

When? 16 – 17 September 2021

Where? tbd

Save the date for our annually BNN forum in September 2021!

[More information coming soon!](#)

Nanosafety Training School – From Basic Science to Risk Governance

When? 20 – 25 June 2021

Where? Venice, Italy

The School will feature keynote speeches, hands-on sessions and a dedicated Young Scientist Forum Day (22nd March) during which early career researchers (PhD students, PhD candidates and Post-Docs) will have the opportunity to present their work.

Read more [here!](#)

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BNN PARTICIPATES**EuroNanoForum 2021****When?** 4 – 6 May 2021**Where?** Portugal, tbdFor more details [click here!](#)[→ TABLE OF CONTENTS](#)

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 March 2021. **BioNanoNet members are welcome to send their contributions until 13th of March 2021!**

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An abstract graphic of a molecular structure, possibly representing a chemical compound like a protein or a polymer, rendered in a lighter shade of blue against the background. It features a central hexagonal ring with several branches ending in circular nodes.

**INNOVATION IS THE KEY.
SUSTAINABILITY LEADS THE WAY.**

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