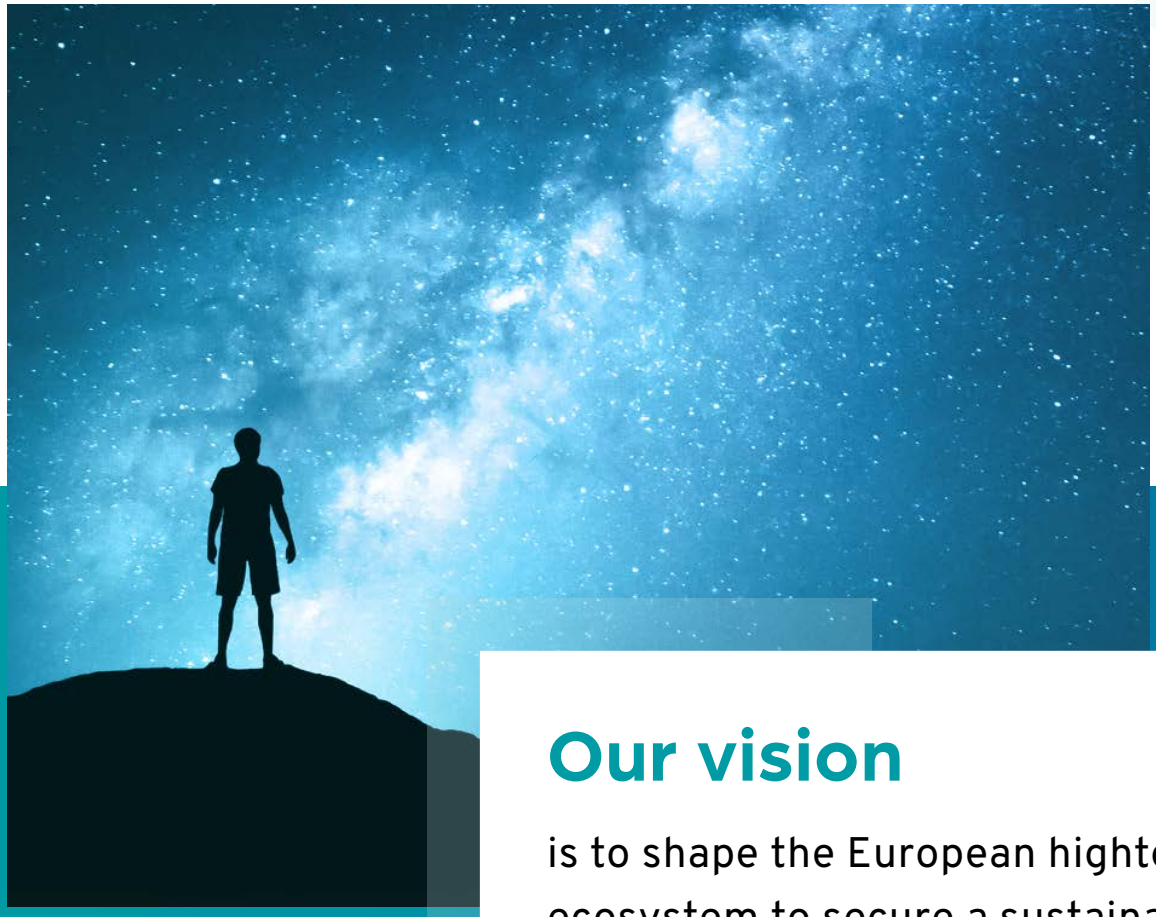
BNN

04/2021

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,

another avalanche of online-meetings is keeping us sitting in front of our screens, however, luckily some hybrid or even completely physical events happening in between. Of course, these settings make it very challenging to initiate collaboration, to start new relations either with well-known colleagues or newcomers. Even more important are networks, clusters and platforms which can help you out of the online-vacuum. The BNN-team has accepted those challenges and has put huge efforts into the maintenance of personal relations with and in between our members. Hybrid events (e.g. BioNanoNet Annual Forum & BNN Networking Session, Joint Austrian - Georgian Workshop), webinars (e.g. Members Welcome Webinar, AMI-Webinar) and physical meetings with members have enabled us to again support the preparation of proposals, that have been submitted to the first set of Horizon Europe calls, and are under development for the submissions in early 2022.

Along that lines, one of BNN's strengths can be seen in the field of "Alliances & Clustering". By connecting the members of the BioNanoNet Association to national and international strategic stakeholders, we establish and coordinate thematic platforms and lead initiatives that maximize our members impact globally. Through a strategic management of topics of common interests, we jointly contribute to the shaping of the R&D&I landscape in Europe. Together with stakeholders of our SusChem-AT-platform, we are currently supporting the preparation of the Safety-and-Sustainability-by-Design-(SSbD)-Roadmap. Furthermore, we have been invited to contribute to the "EU R&I plan for chemicals in the Green Deal era".

This is perfect timing to welcome our two new BNN-Team members: Nerea Argarate, who strengthens our scientific team in the Design for Technology Development area, and Melanie Mayr (Alliances & Clustering area), who will get active for our BioNanoNet association members including specific actions in our technology platforms NanoMedicine-Austria, SusChem-AT, and the Austrian Microfluidics Initiative, as well as BNN's role as Digital Innovation Hub.

The year 2022 we will start with the webinar "Impact & Evaluation Criteria in Industrial Horizon Europe Projects" on January 12th, jointly organized with the Austrian Funding Agency FFG. Another important item in our work and in projects will then be our thematic focus, specifically putting the topic "sustainability in science, research and development: challenges and opportunities" as the central aspect for the first half of 2022. Thus, the March-edi-

tion of BNN-Newsletter as well as our BioNanoNet-event on March 10th – including a SusChem-AT meeting – will be built around this topic.

Finally, we wish you a silent, healthy and joyful holiday season. See you in 2022!

Andreas & the BNN–team

P.S.: Are you interested to become active part of the BioNanoNet Association? Connect with us and we will identify the best plan for you.

Harmony, happiness & love should not be missing in this Festive Season.
We wish you merry and bright holidays and a new year full of health, peace & joy!

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BNN News

NEW BNN STAFF

We are happy to welcome our new team members!

Nerea ARGARATE

I am happy to introduce myself to you. I studied pharmacy at the University of Basque Country (EHU/UPV) in Vitoria-Gasteiz (Spain). After my university studies, I worked in the research of novel diagnostic methods for food safety within two European projects in the field of Food Safety, Analytical Techniques and Micro-nanosystems in the Food Research Division of AZTI Research Institute in Derio (Bizkaia, Spain).

Meanwhile, I did several research stays for improvement of some laboratory techniques in the Nanobiotechnology for Diagnostics Group (N4Dg), IQAC-CSIC in Barcelona, under the leadership of Prof. M.-P. Marco Colás for improvement of skills. The research was related with bio-recognition elements (antibodies and molecularly imprinted polymers) for biosensors, immunoassays (ELISA) and solid phase extraction cartridges development.

As a result, in 2010 I obtained my PhD in Pharmacy in the University of Basque Country (EHU/UPV). In 2011, I worked as a post-doctoral researcher at Biomedical Research Networking Centre in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN) located in the Biomaterials group of Tecnalia Research & Innovation Research Centre (San Sebastian, Spain) working in polymeric substrates for in vitro diagnostics, controlled drug delivery systems and analytical methods for drugs detection in real samples.

In 2016 the Biomedical Research Networking Centre in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN) offered me a R&D project management position in the Nanomedicine Research Line. After two years I continued working for the International Initiatives and Projects Program of the CIBER-BBN centre. During these years my main activities were to manage international research projects for CIBER-BBN researchers, liaising with other sites and institutions across Spain and Europe, identification of new project opportunities for the research lines assigned and participation in European Projects in H2020. Additionally, since 2019, I was nominated as

coordinator of the Spanish NANBIOSIS-ICTS (Unique Scientific and Technical Infrastructure, ICTS) Research Infrastructure for production and characterization of nanomedicines, biomaterials and devices portfolio of services with a single-entry point access.

In September 2021, I joined the BNN team to provide scientific support to the Design for Technology Development area mainly in health, safety & sustainability topics. Furthermore, my years of experience in researching international projects in a network environment would be valuable to the BNN network.

I look forward to building a close relationship with all of you, so that we can work together towards more sustainable and safe innovations.

Sincerely,

Nerea Argarate Madariaga

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Melanie MAYR

Dear BioNanoNet member,

My name is Melanie Mayr and I am happy to be a new team member of BNN. I am pleased to give you a short introduction about myself:

I studied Printing & Mediatechnology at Hochschule München University of Applied Sciences. In my Diploma thesis, I introduced quality management to a medium sized printing company in Germany with a sustainability effort. Afterwards, I was working as quality manager and responsible to integrate an inhouse marketing team for a big customer.

During my 2-year stay in Sweden, I was able to bring in my expertise to set up and manage an advertising department for an international food company in Stockholm (Sweden). Afterwards I moved to Graz, where I managed projects focusing on innovation, sustainability and safety in the printing and media industry from 2006 to 2016.

In 2016 I started to focus on the life science sector, when I joined Know-Center, a leading European research center for Data-driven Business and Artificial Intelligence. As a product manager for a publication-centric search application I was involved in different medical and health topics. In addition to agile product and project management, I was able to build up and expand the life science area as a deputy head over the last years. I focused on the national and international visibility and extension of the network activities with different cluster organization and companies by concentrating on innovation & sustainability of data-driven projects or activities.

It‘s a pleasure for me to be part of the BNN team and to support the BioNanoNet members & partners. I am really excited to expand the network activities, co-coordinate existing technology platforms and to develop new initiatives on national and international level.

Let´s make our environmental more sustainable and safer together!

I am looking forward to meeting you!

All the Best!

Melanie Mayr

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BNN JOB OFFER

Scientific Communication & Dissemination Manager (m/f/x)

We are looking for a Horizon Europe Framework Programme project Communication & Dissemination (C&D) expert with in-depth knowledge and at least three years' experience of complex European research and innovation projects. As a Horizon Europe C&D Expert in BNN, you will help develop and manage community building, stakeholder engagement, communication, media outreach and promotional messaging for European-funded and commercial research and innovation projects in a variety of fields and sectors, covering health, nanotechnology and advanced materials.

The main tasks are:

- Defining and implementing the communication plans for the assigned H2020 and/or Horizon Europe projects and liaising with academic and industrial partners to produce relevant content
- Ensuring that the European Commission's contractual obligations regarding communication and dissemination activities are fulfilled
- Organizing workshops, conferences and events in Europe and beyond with high-level stake-holders
- Animating social media channels (Twitter, LinkedIn) with project content
- Working closely with the rest of the BNN team, contribute to defining and maintaining the company's image, delivering communications to support marketing and business acquisi-tion, social media, events and content creation involving BNN

If you are interested in the position, please click here for more details.

Please send your CV, a selection of your best editorial work and a cover letter (clearly stating why you are the right person for the job) to office@bnn.at until January 31st, 2022.

We are looking forward to your application!

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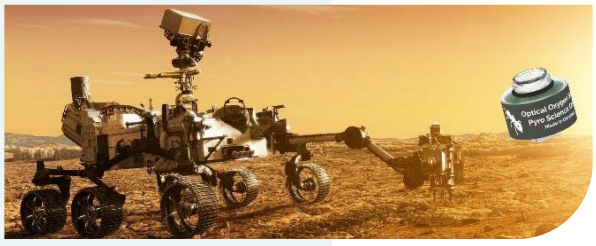
BioNanoNet member presentations

PYROSCIENCE GMBH

PyroScience GmbH is one of the world's leading manufacturers of optical pH, oxygen and temperature sensor technology for industrial and scientific applications. PyroScience was founded in 2011 and has headquarters in Germany and a subsidiary in Austria. The PyroScience group invests significant resources in continuous development of new innovative optical sensor solutions, also for growing markets in environmental monitoring, life science and biotechnology. All instruments and sensor heads are developed, designed and produced in-house. The application areas of our plug-and-play solutions range from deep-sea research over various laboratory applications to space exploration. PyroScience also offers smart OEM solutions and is renowned as a strong OEM partner for industrial customers.

ASA selected the PyroScience FDO2 oxygen sensor module for its Mars Mission 2020 and has landed recently on Mars with the NASA Rover Perseverance. The quality and robustness of the miniaturized oxygen sensor module FDO2 convinced the NASA and JPL engineers to integrate it into the scientific experiment MOXIE on board of the rover.



New Technology for Monitoring Effects of Climate Change in our Oceans

PyroScience has launched AquapHOx – the first high-performance, all-in-one optical sensor technology to monitor the Health of our Oceans with oxygen, pH and temperature sensors. Based on the need for an affordable, robust and reliable sensor for global pH monitoring in our oceans, PyroScience transformed their year-long experience in innovative lab sensor solutions towards a flexible underwater solution supported by prestigious EU-SME2 funding.

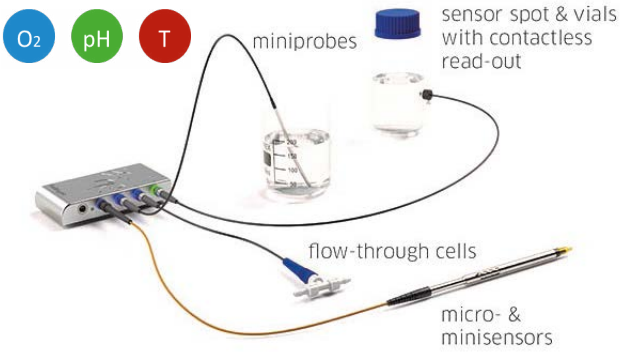
The revolutionary highly flexible AquapHOx technology can help researchers, (non-) governmental organisations and industry to monitor key parameters like acidification, de-oxygenation and temperature increase for evaluating, e.g., the status of our oceans or coastal habitats like endangered coral reefs. This can help to understand the effects of current changes in water temperature, oxygen decline and development of dead zones, ocean acidification, on biogeochemical cycles and marine

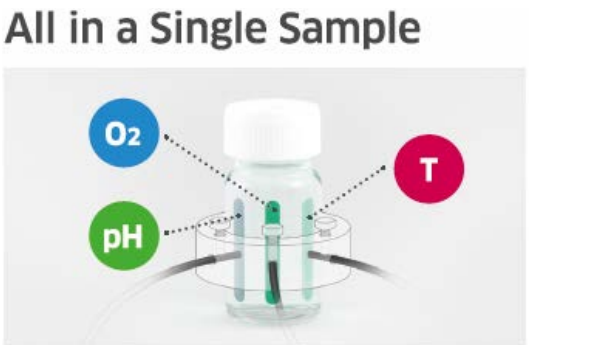
ecosystems, as well as to characterize the yet almost unexplored deep sea.

Premium class optical sensor solutions for most diverse lab & research applications

PyroSciences´ sensor concepts for lab applications include several ultra-compact stand-alone, PC-operated optical meters for oxygen, pH and temperature. They come with a great variety of fiber-based and contactless optical sensor heads based on the PyroScience RED-FLASH technology for application in gas, water and semi-solid samples.

Fiber-based sensors comprise micro- and minisensors and robwust probes for different analyte ranges, while contactless sensor solutions (flow-through cells, sensor spots & vials with contactless read-out) allow for measurements in closed set-ups. With this, even simultaneous O_2, pH and temperature measurements can be realized in a single sample with a single read-out device FireSting®-PRO, featuring unprecedented flexibility concerning analyte, sensor format and measuring ranges.





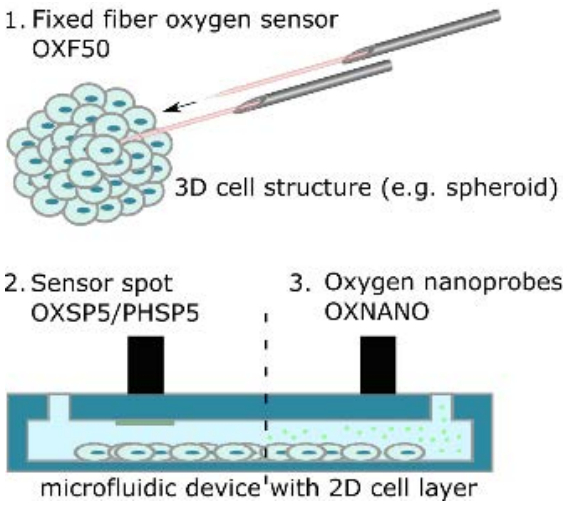
Special sensor systems for advanced & challenging applications

PyroScience also offers special sensor systems for advanced applications:

- ✔ in organic solvents
- ✔ for ultra-fast oxygen & temperature measurements
- ✔ microprofiling in semi-solid samples (biofilms, cell aggregates)
- ✔ microfluidics and high-throughput screening
- ✔ for measurements in 2D/3D cultures.

The new sterilized self-adhesive sensor spots and flow-through cells for (trace) oxygen, pH and temperature for application in cell biology, microbiology, biotech, life sciences feature easy integration, beta-sterilized, contamination-free sensor read-out from outside.

Together with expert customer support, this extensive product line of cutting-edge sensor solutions from PyroScience are ideally suited for measurements in various disciplines with maximum flexibility concerning analyte, sensor format, measuring mode, and application range.



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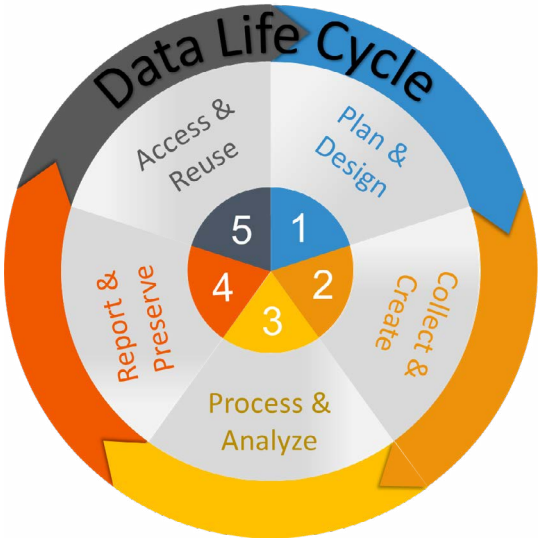
SEVEN PAST NINE (7P9)

Software–based data consultancy

After working together for more than 5 years for a company in the area of chemical and nano-material safety software development, the three founders decided to establish their own company in 2020 (operation started in Jan. 2021 in Slovenia and in Germany in April 2021) to be able to concentrate on software-based data consultancy and data shepherding. Even though there are many tools for data management available and overall consensus is that data sharing is absolutely essential to keep pace with the challenges of the modern world, many researchers, companies and collaborative research projects are struggling with understanding how to implement digital tools for their own benefits.

Everyone has their own way of managing data from sheets of paper to complex Excel spreadsheets to databases. This makes it almost impossible to share data and combine different sources in larger projects but will prove difficult just trying to incorporate your own data from a year ago or from the colleague working on the next bench. Even if this should be seen as an obvious problem, many especially small organizations try to survive with quick fixes. This is not possible anymore at the latest, when they become part of a publicly funded project, where the funder requests public sharing of data, e.g., via the EU's open science policy. Data management plans, harmonized and interoperable data, and FAIRification of data can however benefit not only possible re-use of data but even more important the first usage and documentation / reporting of the original results. Giving support on how to structure and annotate data to make / keep it understandable and enrichable by other sources and providing simple digital tools to do data collection and integration on the fly will make data management and sharing a less painful job and trigger adoption to have access to these benefits. And this is exactly what we are doing for consortia of publicly funded projects with the hope that the concepts will transite into personal workflows and individual institutions.



FAIR: findable, accessible, interoperable and (re–)usable

The FAIR Guiding Principles were created to deal with the increase in volume, complexity, and creation speed of scholarly data. However, since they are focusing on the reuse, they are seen by many data providers as additio-

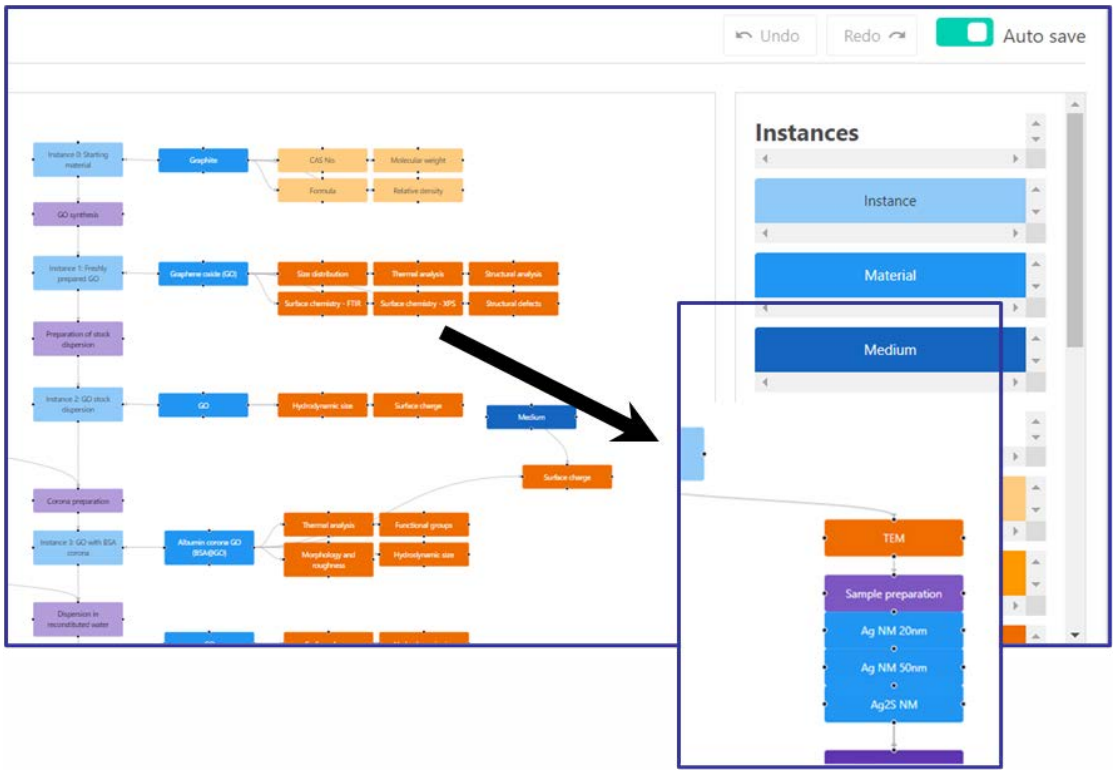
nal tasks enforced onto them for the benefit of others. With a little rephrasing and tooling not focusing on the data users but its creators, interoperability can simplify every aspect of the data life cycle from its production, processing, analysis, storage, retrieval and yes, also sharing. Just two examples: 1) (Meta)data reporting checklists and standards help to document all important information required for internal reporting or as part of scientific publications. 2) Exchange formats based on harmonized data can be used as input in different processing and analysis software packages without the need of time-consuming human conversion from one format to the next.

Manage data when it is created

Instead of being an extra task, data management can become part of the daily routine. Paper lab notebooks can be replaced by electronic ones with much more benefits than just having the data directly in electronic form.

These notebooks can be integrated with other data management tools for accessing information from chemical or material repositories and literature collections as well as for long-term conservation in institution-, project-, or community-wide storage. However, this is only possible, if all people involved in the process know what they have to do and have access to support personnel, namely the data shepherds, overseeing the full process and tools specifically designed for and customizable to their setting.

The first data is produced in the design phase of a study and, thus, data collection should also start there and not be pushed to a data



curator, who has to extract all the data from lab notebooks or publications once the study has been completed. One way to achieve this is to separate the complete study into separated tasks representing, on a high level, different experiments and, on a lower level, procedures for generating, processing and analyzing the data. We are currently developing a tool based on the concept of instance maps, which provides a visual representation of this separation usable as a guide to discuss the study design and then fill in the data whenever it is created potentially by different lab and data scientists. This will finally create harmonized data packages as the basis for internal data transfer and storage but also providing the metadata needed for FAIR data sharing.

NanoCommons: demonstrating how this works

As partner in the EU-funded infrastructure project NanoCommons, 7P9 is, on the one hand, collaborating with different software-developing partners on approaches to how such a modular data integration can work by combining functionalities of existing tools and just providing the glue between them. On the other hand, we work together with the potential customers using the mechanism of Transnational Access to guide project-wide data uttermost importance to establish community-wide interoperability, which is a major aspect of the training activities and the user guidance handbook as a central resource for new concepts and best-practice approaches. Due to NanoCommons' focus, this is limited to nanosafety and nanomaterial modelling applications but the concepts are general and can be easily transferred into projects in other areas by replacing the data management by data shepherding work packages.

Joh DOKLER

Maja BRAJNIK

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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 website.

PERIOD SEPTEMBER – NOVEMBER 2021

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Project presentation

STARS (STRATEGIC ALLIANCES BOOSTING RAILWAY SMES)

The project STARS (STrategic Alliances boosting Railway SMEs) is developing a comprehensive approach to the Action objectives, addressing 2.000+ European SMEs of the Railway and Multimodality meta-ecosystem working – with reference to the 14 Industrial ecosystems of the EU Industrial Strategy – both in the Mobility-, Transport and in the Construction ecosystem.

STARS has been developed and is coordinated by DITECFER Railway Cluster (Italy) and gathers in total 10 Railway Cluster organizations from 12 regions in 8 COSME countries (Belgium, France, Germany, Spain, Serbia, Turkey, United Kingdom), 5 Technology Centers offering complementary specializations suitable to accompany any type of SME for any type of transition need (Belgium, France, Germany, Italy, Turkey), 1 Digital Innovation Hub (Austria) and 1 start-up (Italy) developer and provider of a blockchain network that will be specifically made available and dedicated to the STARS project for the European railway value chain: the partners will become distributed "Mining Nodes" and the SMEs within the Strategic Alliances will be coached, enabled with individual accounts and a wide set of tagging systems, and assisted in the actual use of the technology. This unique opportunity will multiply the impact of the demonstration and learning-by-doing activities run by the Technology Centers to support the adoption of the advanced technologies, as well as of the "Hack & Match" events that will be organized. All this will enable the SMEs within the STARS Strategic Alliances - and beyond – to actually touch first-hand the technologies applied to their use-cases.

The STARS project has the support of 30 key relevant European organizations, among which the Shift2Rail Joint Undertaking, several railway and mobility research and demonstration centers, Digital Innovation Hubs, EEN contact points, members of EITs/KICs (Digital, Manufacturing, Raw Materials, Urban Mobility, Climate).

In answering the Action objectives, STARS addresses all aspects related to the uptake of Advanced Technologies by SMEs and includes – among others – support to the organizational/cultural change based on innovative models, support to a better understanding of investment aspects and return-on-investments (ROI) related to the adoption of Advanced Technologies, training and assistance on funding opportunities for investments, support for upskilling and reskilling.

All the activities planned for the Preparatory Phase have started: from the signature of the "Pact for Skills" charter - committing to a stronger European resilience also via new skills – to the organization of a two-days working and teaming-up meeting in Turin (Italy);

from the running development and customization of the STARS blockchain network to the running development of the key Communication, Inspiration and Dissemination activities that will help mobilize the potential beneficiaries and the relevant stakeholders, disseminate the lessons learnt with the European Institutions, the Member States, the European cluster community, and provide a long-term web platform where the European tech-savvy SMEs suitable to offer solutions and capabilities for the target meta-ecosystem and beyond will have their pan-European visibility.

DITECFER
DISTRICT FOR RAIL TECHNOLOGIES, HIGH SPEED, NETWORKS' SAFETY & SECURITY

Project Coordinator

Dott.ssa Veronica Elena Bocci (Ms.)

Role of BNN in STARS project

BNN joined the project in its role as DIH, contributing with Alliances & Clustering activities with SME's, stakeholder engagement including work with focus groups, and will be supporting with strategic alliancing mainly on European level.

BNN–contact for more information

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Project updates

NANOFABNET IMPLEMENTATION ROADMAP FOR EU-PROJECT COLLABORATION RELEASED

Seeking to provide help to EU-funded projects dealing with sustainable nanofabrication, BNN has recently released the NanoFabNet Implementation Roadmap for EU-Project Collaboration, one of the public reports to be delivered by the NanoFabNet project.

The roadmap has been developed, together with all the project partners and has been created using information gathered through different activities performed during the first one and half years of the project:

- ✔ Mapping and listing of former and current EU-funded projects relevant for the sustainable nanofabrication field,
- ✔ Active dialogue with NanoFabNet's stakeholders maintained during the 1st and 2nd Development Workshops, including a posterior analysis from the feedback, and
- ✔ Integration of complementary actions planned and/or undergone with other R&I initiatives like the NanoSafety Cluster (NSC), the EURONanoLAB initiative and EURAMET, to develop collaborations to

widen and strengthen the sustainable nanofabrication field across Europe.

The NanoFabNet hub will be officially launched in 2022 and will be the product of two years' collaborative work efforts from several European and international partners. It will be the virtual platform that will be hosted on NanoFabNet's website and serve as an important tool for nanotechnology professionals and entities. The NanoFabNet hub will be a one-stop-shop for all matters and concerns pertaining to sustainable nanofabrication.

The NanoFabNet Project has defined its own concept of Sustainability in Nanotechnology and Nanofabrication, which will be also adopted and promoted within the NanoFabNet Hub. This concept rests on three strong and well-identified pillars (Figure 1). These pillars are:

i) Environment, Health & Safety issues in Nanotechnology & Nanofabrication,

ii) Life Cycle Sustainability (LCA) in Nanotechnology & Nanofabrication, and

iii) Ethics and Governance issues in Nanotechnology & Nanofabrication.

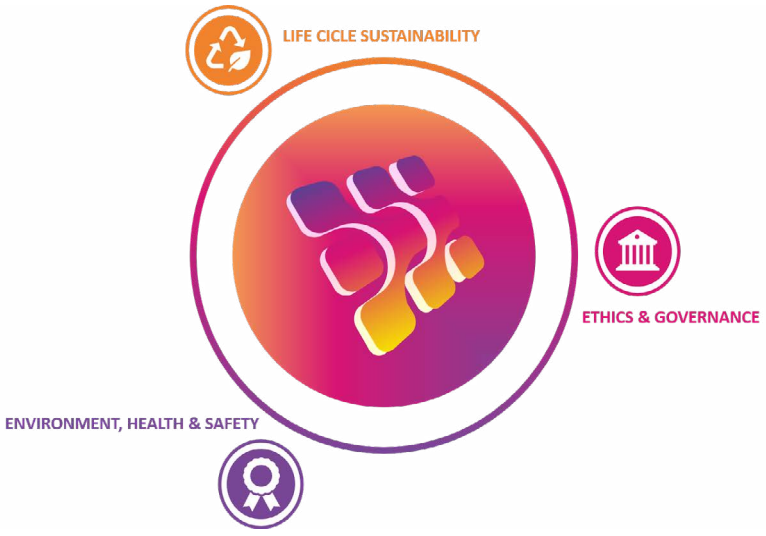

Figure 1. The three pillars of the NanoFabNet Project concept of Sustainable Nanofabrication

Download NanoFabNet Implementation Roadmap now & get inspired!

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.

NANOPAT NEWSLETTER PUBLISHED

NanoPAT project is delighted to present the third project newsletter with the main aim of sharing with you the latest technical achievements, introducing their innovative partners and sharing with the community inputs and curiosities related to nanotechnology and process monitoring.

Download the newsletter & enjoy reading!

If you don't recieve our newsletter yet, make sure to subscribe to it here!

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862583.

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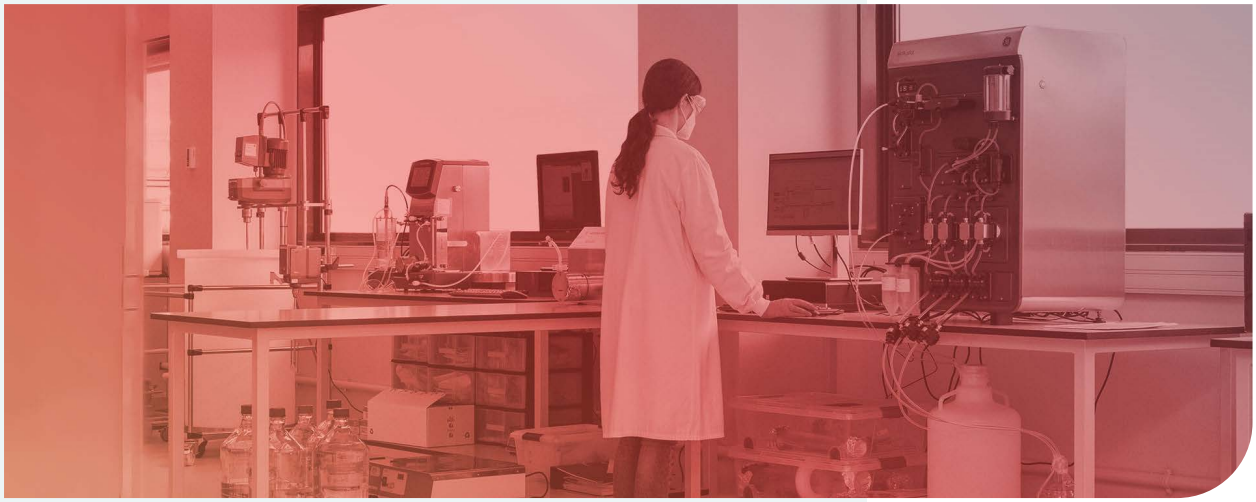
PHOENIX OITB – DEMONSTRATING SCALABILITY FROM PROTOTYPE TO INDUSTRIAL MANUFACTURING



PHOENIX, the pharmaceutical open innovation test bed (OITB) for enabling nano-pharmaceutical innovative products, aims to enable the seamless, timely and cost-friendly transfer of nano-pharmaceuticals from lab bench to clinical trials by providing the necessary advanced, affordable and easily accessible infrastructure. To test the operative capacity of PHOENIX-OITB, five demo-cases representatives of five different nano-pharmaceutical types, four different manufacturing methods and three different administration routes will be employed to demonstrate and verify the PHOENIX technologies in an industrially relevant environment.

In **Demo Case 1**, Cenya Imaging BV produces imaging agents (BEACONS) that work across imaging modalities, and can be used in a range of applications, including quantitative, non-radioactive cell tracking in preclinical or clinical settings. The agents consist of polymer entrapping a perfluorocarbon and other cargos, to allow of multimodal imaging. Extensive data on both, the imaging applications as well as the unusual internal structure and biocompatibility of the BEACONS has been published.

Demo Case 2, led by Topas Therapeutics, is focused on developing innovative Topas Particle Conjugates (TPCs) to re-instate, through its administration by intravenous injection, the immunological tolerance in a selected autoimmune disorder, in which antigen-specific therapies are still lacking. Disease-relevant peptides, which trigger T lymphocyte-mediated autoimmune response in the target disease, are coupled to these TPCs. The efficacy of

the TPCs will be assessed in preclinical proof of concept and toxicology studies using appropriate animal models, to disprove any toxic effects. The production of these particle-peptide conjugates will be scaled up according to GMP requirements to be ready for clinical application.

Within the **3rd Demo Case**, MyBiotech develops a fast-acting oral formulation of NSAID nanocrystals without food effect. Free base formulations of NSAIDs have low COGs but slow onset of action and are associated with GI-tract adverse events. Efforts to develop faster acting formulations resulted in increased COGs and couldn't eliminate performance difference between fed and fasted state. A fast-acting oral formulation of Ibuprofen nanocrystals without food effect produced with a process overcoming manufacturing challenges of scalability, stability and batch-to-batch variations for nanocrystals exceeds the expectations.

In **Demo Case 4**, Nanomol Technologies, ICMAB-CSIC, and Leanbio join efforts to advance the development of peptide targeted nanoliposomes for Fabry disease treatment. The entrapment of α-galactosidase (GLA) enzyme in these patented nanocarriers aims to improve the current enzymatic replacement therapy of Fabry disease, consisting in the intravenous administration of exogenous GLA to patients. These targeted nanovesicles are produced by the DELOS technology, a robust & green nanoformulation platform owned by Nanomol Technologies. This novel nanomedicine, designed as Orphan Drug by the EMA, has been developed under Smart4Fabry EU-project. Within PHOENIX, it will be scaled-up and manufactured under GMP by Grace Bio, to enable its clinical testing.

Under **Demo Case 5**, Nanomol Technologies and ICMAB-CSIC are co-developing an innovative nanomedicine for the topical treatment of microbial skin infections. This novel formulation, based on non-liposomal nanovesicles, exhibit inbuilt antimicrobial activity preventing infections, and has demonstrated to be effective against biofilms. The nanovesicles are prepared by the DELOS technology of Nanomol Technologies and show an extraordinary colloidal stability, which favours the production of high-quality pharmaceutical formulations. Within PHOENIX, the nanopharmaceutical will be scaled-up and manufactured under GMP.

Get connected with PHOENIX–OITB on:

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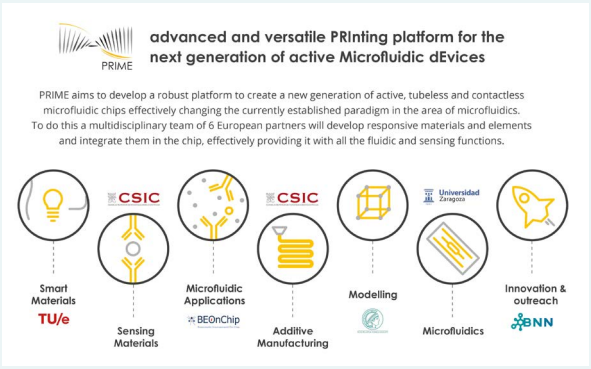
This project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 953110.

PRIME PROJECT VIDEOS PUBLISHED



The project PRIME - advanced and versatile PRInting platform for the next generation of active Microfluidic dEvices – recently published videos about the project and its partners' competences on the YouTube channel.

The video is featuring the following presenters:

- Carlos Sanchez, CSIC, is PRIME project coordinator. He is introducing the PRIME project at a glance.
- Sean Lugger, Eindhoven University of Technology, talking about Smart Materials.
- Gabriel Alfranca Ramón, CSIC, showing the Materials for the Biosensors.
- Rosa Monge, BEONCHIP S.L., speaking about the Microfluidic Applications.
- Lorena Ceamanos Fiances, CSIC, reporting their work regarding Additive Manufacturing.
- Alicja Szałapak, Max Planck Institute of Molecular Cell Biology and Genetics, talking about Modelling & Simulations.
- Ignacio Ochoa-Garrido, Medicine Faculty, Tissue Microenvironment (TME) Group at University of Zaragoza, reporting about Microfluidics technology.
- Andreas Falk, BioNanoNet Forschungsgesellschaft mbH, speaking about Innovation & Outreach in PRIME project.

Enjoy watching!

Get connected with PRIME on:

SEE WEBSITE

This project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 829010.

VIDEO PRESENTATION OF SABYDOMA'S FINDINGS

SABYDOMA has prepared a video presentation with some of its findings. In this occasion, Benjamin Trump, assisting Factor Social, explains in this presentation the results of the work carried out by SABYDOMA on the literature review on Safe-by-Design (SbD) in the current literature related to engineered nanomaterials (ENM). After going over the methodology following an extensive literature research, he discusses different themes, analyses and ideas that are discussed throughout different sections of the ENM and SbD literature. Furthermore, he explores a few selected policy documents that bring up core concepts of SbD within the ENM space, both as a philosophy and as a method, that can help further SbD development in the marketplace moving forward.

Get connected with SABYDOMA on:

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This project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 862296.

BioNanoNet Member Contributions

CONTRIBUTION FROM

BDI–BIOENERGY INTERNATIONAL GMBH

BDI BioEnergy International GmbH Celebrating its 25 years Company Anniversary

Company founders: Helmut Gössler, Wilhelm Hammer @BDI-Bioenergy

BDI-Anlagenbau GmbH was founded on 12th September, 1996. Today, the company is part of the internationally operating BDI Group. BDI's affiliated companies are showcasing the thought leadership and expertise of the Styrian business landscape. Their approach to technology and innovation is unrivalled and has transformed BDI into global industry leaders specializing in areas including plant manufacturing for renewable energy and production of high-quality algal recyclables.

It has been 25 years since the Spice Girls entered the charts with their song "Wannabe" and Roland Emmerich's blockbuster "Independence Day" was screened at movie theaters, Germany became European soccer champions thanks to Oliver Bierhoff's goal and Damon

Hill was crowned Formula 1 world champion. It has also been 25 years since Wilhelm Hammer and Helmut Göβler launched BDI-Anlagenbau GmbH. On 12th September, 1996, an impressive corporate history began, achieving numerous successes and milestones. 25 years later, BDI Holding GmbH today operates a financially strong holding company as part of the internationally operating BDI Group Their HQ is based in the Styrian town of Raaba-Grambach alongside their subsidiaries BDI-BioEnergy International GmbH, BDI-BioLife Science GmbH and BDI-Betriebs GmbH.

Technological pioneer for 25 years

The ongoing development of new technologies has always been deeply and firmly ingrained in BDI's corporate philosophy. For instance, BDI-BioEnergy International GmbH has established its own consulting department GreenTech Solutions. Equipped with high-end engineering competencies and supported by state-of-the-art test and laboratory facilities, an interdisciplinary team of experts offers tailor-made services in all phases of the technological development – from concept to market.

Innovative pioneer for 25 years

BDI gained international acclaim for its outstanding competences in both in-house development and the implementation of forward thinking and environmentally friendly technologies. The latter enables the profitable manufacturing of renewable energies through waste products and residual materials. BDI-BioEnergy International GmbH was in fact the first ever company to build industrial plants worldwide to convert used cooking oil and animal waste fats into top-quality biodiesel.

Exemplary visionary for 25 years

Many of their patented technologies are the result of a long-term collaboration with local Styrian colleges including the University of Technology in Graz and the University of Graz. Among these technologies, is RepCAT (Repeatable Catalyst), an environmentally friendly biodiesel manufacturing process with a recyclable catalytic converter. Development and progress are driven by research which is a core activity for BDI. For over a decade, BDI Group has been examining algae as a sustainable energy source. Using their in-house developed cultivation technology at the production site in Hartberg, BDI-BioLife Science GmbH manufactures natural premium algal recyclables that are distributed globally for use in the nutritional supplement and cosmetics industries.

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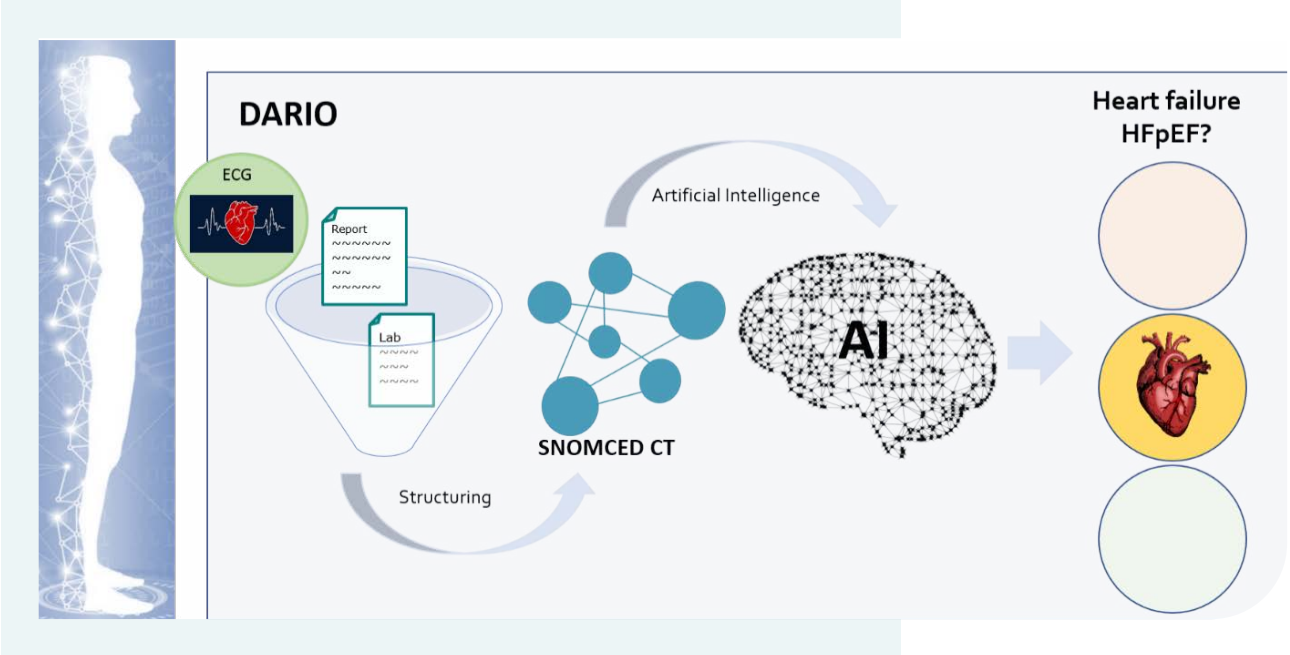
CONTRIBUTION FROM BIOMAX INFORMATICS

Biomax Informatics Supports two Research Projects with BioXM



DARIO, a clinical decision support system to diagnose heart insufficiency

Heart failure is one of the most frequent causes of hospitalization in Germany. In about half of all cases, the heart's pumping capacity remains intact. This is known as heart failure with preserved systolic pump function (HFpEF). Unfortunately, HFpEF often goes undiagnosed and in many cases leads to death. Under the name DARIO, Biomax now coordinates a research project on digital diagnostic support for heart failure. Together with partners from the Institute for Applied Medical Technology at RWTH Aachen University and the Clinic for Cardiology, Angiology and Internal Intensive Care Medicine at RWTH Aachen University Hospital and funded by the German Federal Ministry of Education and Research, Biomax is investing over one million euros in the development of a clinical decision support system.

The project aims to develop a digital diagnostic traffic light for HFpEF patients in order to detect the disease in an early stage, to predict the course of the disease and to improve treatment success through targeted therapy approaches. The diagnostic traffic light uses predictions based on artificial intelligence. To this end, data from everyday clinical practice and clinical studies as well as findings from doctors' letters are integrated in DARIO. The latter rely on the medical „standard dic-

tionary“ SNOMED CT and are converted into a computer-readable and standardized form by means of text mining. Biomax will use its semantic and technical interoperability platform, the BioXMTM Knowledge Management System, to link all data from various sources. In addition, Biomax will configure the user interface of the diagnostic traffic light to deliver it to the clinic. DARIO is designed to run for three years. Subsequently, Biomax plans to develop a medical product for the healthcare market based on the results of this novel digital solution approach.

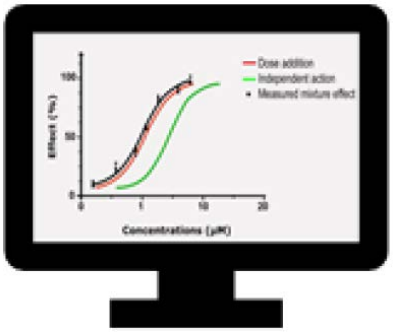
PANORAMIX, understanding the risks of chemical mixtures

Children are exposed to man-made chemicals already before they are born and each of us is constantly confronted with a host of chemicals. Huge progress has been made to ban many highly toxic substances and reduce levels of others below the amount known to cause issues if encountered as single chemical. However, new chemicals constantly enter the market and it is currently hard to predict the combined effect of chemical mixtures. PANORAMIX is a four-year project led by the Technical University of Denmark, focusing on innovative ways for quantifying the risk associated with exposure to chemical mixtures, without animal testing. The project is supported by the European Commission through the Horizon Europe program with a € 4.4 M grant.

Regulators and industry are longing for a scientific basis for risk assessment and regulation of chemical mixtures. The Chemical Strategy for Sustainability published in October 2020 stresses the need to address the combination effects of substances into the EU legislation to achieve a „toxic-free“ environment. PANORAMIX will provide detailed experimental assessment of real-life chemical mixtures extracted from environmental and human samples. Linking in-vitro toxicity assessment of the identified mixtures with long-term health effects studied in the Odense child cohort and computational models will enable accurate calculation of risk to establish a Chemical Mix ture Risk Prediction Tool for regulatory and industry risk assements.

Biomax will provide the Knowledge Management to the project, enabling the interoperability and integration of multiple existing toxicology databases as well as providing the user interface to the Chemical Mixture Risk Prediction Tool developed in the project.

In addition, the data generated by the 11 European PANORAMIX partners will be used to propose safety levels for chemical mixtures in water, food and the human body to guide regulators in shaping safety policies.



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CONTRIBUTION FROM BOKU

SafeLiBatt Project Presentation

Figure 1. Images at the top: Dismantling and artificial ageing of a lithium-ion battery pack from an electric vehicle. Images at the bottom: Safety and failure propagation tests of thermal runaways at the level of battery cells conducted in the test chamber of the BAM (© BAM, Berlin).

Risk and sustainability assessment of second life lithium-ion batteries from electric vehicles

Lithium-ion batteries (LIBs) have undergone enormous technological development in the past two decades and are crucial for electronic appliances, energy storage systems, and particularly for e-mobility. Especially the application of LIBs in electric vehicles (EVs) is expected to significantly increase as part of the energy transition strategy towards reducing CO_2 emissions generated in the transport sector. The LIBs installed in EVs are expected to last roughly 8-10 years, or until their original charge capacity does not fall below 80%. When this rest capacity of 80% will be reached, this first life (1stL) EV LIBs need to be replaced by new ones because of warranty reasons. In Europe by 2030, it is expected that there will be 6 million battery packs from EV per year that need to be replaced or disposed of.[1] This represents a huge recycling challenge on the one hand, but also significant resource potential for a possible, resource-saving reuse or remanufacturing of the EV batteries. Such reuse is also known as the second life (2ndL) of LIBs. Currently, the most promising 2ndL application for LIBs from EVs is a reuse in other mobile applications, such as forklifts, boats etc., or for energy storage systems, where there is a cost advantage potential of up to 30% compared to the new batteries.[2]

In general, LIBs are exposed to different extreme conditions with regard to fast charging and discharging, extreme operating temperatures, mechanical or chemical stresses that

lead to degradation and consequently to a loss of battery capacity. In case of accidents or other emergencies, LIBs can have thermal runaways and start emitting the outgas from the emergency cooling system, can catch fire, or even explode. Thus, thermal runaways represent a risk to human health, particularly to first responders, and to the environment. So far, there is still a significant knowledge gap about the safety of 2ndL application of LIBs.

In the "SafeLiBatt" project, therefore, safety guidelines for 1stL and 2ndL LIBs are being elaborated in more detail, whereby integrative methods for risk and safety management are being applied. In laboratory tests, the German Federal Institute for Materials Research and Testing (BAM) and the French National Institute for Industrial Environment and Risks (INERIS) currently test new 1stL and used 2ndL LIBs at cell level for thermal runaways and analyse the release of toxic gases and substances. One focus is on the different behaviour during failure propagation testing of 1stL and 2ndL LIBs. The aim is to collect safety-relevant information to be able to derive precautionary measures for first responders (fire brigade, rescue, police) in case of accidents or emergencies. In addition, the Austrian project partners from the University of Natural Resources and Life Sciences (BOKU, Vienna), the Austrian Academy of Sciences (ITA-OeAW), and Brimatech Services GmbH will conduct an integrated risk analysis. Using life cycle analysis (LCA) we currently model and quantify the environmental benefits, especially through the extension of battery life. In addition, primary data on emissions during thermal runaways obtained from the laboratory tests will be integrated into the LCA to assess potential impacts on human health and the environment. Furthermore, the economic and social impacts of LIBs will be investigated, focusing on the general acceptance and perceived drivers, opportunities, and barriers of 2ndL applications (e.g. for small energy storage systems for households). Finally, recommendations for action for the safe development and use of 1stL and 2ndL LIBs will be derived from the project results. In addition, the project results will be introduced into international and national standardisation committees for safety guidelines. The SAF€RA project[3] is supported by the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and by own funding from the BAM and INERIS. "SafLiBatt" will end in October 2023 and preliminary results on the ageing and safety assessment of the 1st and 2ndL LIBs will be expected in end of 2022. The LCA results of 2ndL applications may support to promote the sustainability of e-mobility and circularity of lithium-ion batteries.

[1] Source: https://www.transportenvironment.org/wp-content/uploads/2021/07/2021_02_Battery_raw_materials_report_final.pdf

[2] Source: Nils Steinbrecher | TES Sustainable Battery Solutions GmbH. Addressing the challenges of LI-battery disposal – Compliance, Envi-ronment, Technologies, 2nd Life. E-Waste World Conference&Expo – EV & Battery Recycling. Frankfurt, 30. November - 1. December 2021

[3] More project information can be found here

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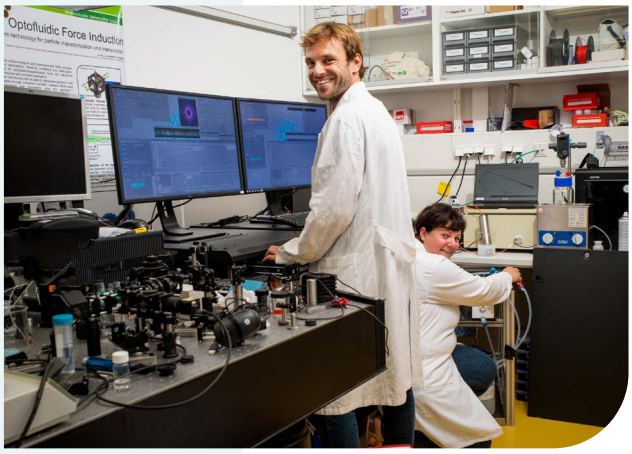
CONTRIBUTION FROM BRAVE ANALYTICS

Nanoparticles, Lasers and Liquids – A Revolutionary Recipe for Nanoparticle Characterization



BRAVE und MUG teams uncovering the brand-new BRAVE B1 prototypes.

BRAVE Analytics is now in its second year of existence and will be on market soon! Over the past year, a lot of development work has been done to ensure the smooth functioning of the BRAVE B1 sensor platform. In addition, various use cases have been assessed and two prototypes are already in use for our NanoPAT partners Creative Nano and Fluidinova.

Genesis

Did you know that laser light can be used to trap and set particles in motion? This fascinating theory, developed by Nobel Prize winner Arthur Ashkin, gave Christian Hill the idea of solving one of the most common problems in life sciences, namely measuring and characterizing nanoparticles. His passion for lasers combined with an entrepreneurial mindset led to crossing paths with Gerhard Prossliner in 2013. Working together with a team of physicists, developers and engineers, they applied the physical principles and mathematical theories that led to the development of the OptoFluidic Force Induction technology (OF2i®). As a next step BRAVE Analytics was founded in 2020. The main goal of BRAVE Analytics is to translate our patented OF2i® technology into sensor platforms which are able to provide automated, real time and 24/7 nano particle characterization directly integrable into manufacturing processes.

OF2i, small particles and a big impact

Nanoparticles are particles with the size of a few billionths of a meter. These particles are an essential part of nature down to our cell

structure. For example, they serve to transport nutrients, information and have many more essential tasks in living organisms. Scientists still discover the principles behind nano, setting the foundation for sheer endless number of innovations and products. Since the current state of the art struggles to fulfill industry requirements, the invention of the OF2i technology created a revolutionary possibility enabling our customers to measure their products in the nanometer range on-line and continuously. The combination of microfluidics and photonics opens novel insight into bio-physical industrial challenges.

The impact of this innovation is huge: Being still a bottleneck in production processes, the measurement and characterization of nanoparticles drastically gains relevance in pharmaceutical & medical products, cosmetics, paper, paints, surface coatings, lubricants and many more because these products can be optimized radically by applying nano principles. As an example, the efficacy of pharmaceuticals can be fundamentally improved through precisely tuned nanoparticles: reduce side effects, improve uptake and bioavailability, enable selective targeting etc. To achieve the desired performance, crucial parameters such as size, size distribution, concentration and if possible, the shape of nanoparticles must be carefully designed and monitored. Besides that, valuable resources can be saved when using the OF2i® technology! Waste and changes can be reduced through seamless production process monitoring. In addition, personnel costs can be reduced as automatic monitoring is guaranteed around the clock and can be controlled remotely.

The BRAVE B1 sensor platform and it's first applications

The OF2i sensors can be deployed for various applications and BRAVE is still identifying the specific areas. The first successful use cases are in the fields of pharmaceutical and biotech industry: Infusion and emulsion production (parenteral nutrition) and vaccines, but also low concentration and trace analysis such as ultrapure water (WFI) or nano plastics determinations in drinking water. Furthermore, basic research use cases have been identified in the fields of rehydration of bacteria and exosome studies. The efficacy measurement of emulsions, whether in the beauty and cosmetics sector or in medicine or studies on shelf-life and aggregation behavior are some further applications.

The first two prototypes of the sensors are already in use in the nanomedicine research team at the Department of Biophysics. They are being further optimized as part of the EU-funded project „NanoPat“ (Process Analytical Technologies for Industrial Nanoparticle Production), which is led from Spain: In cooperation with Fluidinova S.A. from Portugal, a case study focuses on the characterization of hydroxyapatite. This substance is mainly used in dentistry and for orthopedic implants. The second study with the Greek colleagues from Creative Nano is about electroplating. This involves treating a material in an electrolytic bath and covering its surface with another material. Here, the OF2i technology can continuously analyze the size, concentration and aggregation behavior of the individual nanoparticles already in the electrolyte bath.

A BRAVE way forward

In the next months, more use cases and technical adjustments will be worked out. Marketing and communications activities will be vastly expanded in the next months to path the way to a powerful market introduction. Presentations and live-tests are planned in relevant process analytics conferences and trade fairs like the DECHEMA EuroPact2021. In addition, information videos are currently being produced to better illustrate the technology and its possibilities.

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Positioning „Chemicals as a Service“ in the Technology Environment

Various organisations and political institutions (e.g. European Commission, OECD, consultancies) are addressing the prospects of the chemical industry in the context of the Green Deal as well as digitisation efforts. In order to intertwine these different approaches, function-oriented business models such as „Chemicals as a Service“ (CaaS) can be applied.

For this reason, the CaaS study was launched on behalf of the Federal Ministry for Climate Policy, Environment, Energy, Mobility, Innovation and Technology (BMK) and with the support of the Austrian Chemical Industry Association (FCIO). Within this study, conducted by Brimatech, the link between CaaS and digital technology trends was analysed and the relevance of advanced digital technologies for the implementation of CaaS business models was demonstrated on the basis of specific use cases. These use cases were developed on the basis of database and internet research as well as iterative expert interviews (n=19) and subsequently validated, supplemented and evaluated in an online survey (n=43). In addition, the study results as well as practical examples from companies along the value chain were communicated and an initial networking was arranged in a workshop (n=48) for stakeholders from both sectors.

In total, 28 different use cases in 7 different technology areas - sensor technologies, automation, digital twins, artificial intelligence, technology-enabled analytics, encryption & traceability and mixed reality - were identified. The use case „AI-supported setting of optimal production and process parameters“ was ra-

ted as the most promising by the respondents. “Continuous condition monitoring by sensors“ was perceived by most interviewees as a basic requirement for technology-supported CaaS models. In terms of application status, many use cases are already in use or in development, especially in the areas of automation, digital twins and mixed reality. Whereas many of the identified use cases from the areas of encryption & tracking and artificial intelligence are still unknown to most of the respondents or not (yet) in use. Reasons for this are seen by both stakeholder groups in a lack of data quality and also in a lack of knowledge about existing possibilities. Furthermore, a lack of expertise and concerns about data security were also classified as relevant barriers by both stakeholder groups. Lack of trust in advanced digital technologies was rated more relevant by digital technology stakeholders than by the chemical industry. No/low economic profitability, on the other hand, was only perceived as a barrier by survey participants from the chemical industry.

From the point of view of the interview partners and workshop participants, there is a specific need, among other things, for networking between the stakeholders of both sectors as well as the use of existing platforms and networks for the exchange of information and the development of jointly usable, high-quality data pools in order to promote a successful, technology-supported implementation of CaaS models. Furthermore, appropriate communication measures should demonstrate the added value of technology-supported CaaS business models and create trust and awareness.

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CIBER-BBN and NANBIOSIS, Advocates of Nanomedicine for the Medicine of the Future

Scientists of CIBER-BBN and NANBIOSIS ICTS participated in the 4th Conference "Anticipating the Medicine of the Future", which was organized by the Roche Institute Foundation on November 30th 2021 in Madrid. The topics for this edition were defined by the Observatory of Trends in the Medicine of the Future: Pharmacogenomics, Nanomedicine and Epigenomic

Three debates took place around these topics with the participation of experts in the corresponding fields. The debate on Nanomedicine, was led by Joaquín Arenas, Director of the Research Institute of the 12th October University Hospital and was opened by the talk entitled "Macro problems, nano solutions given by Ramón Martínez Máñez, Professor of Inorganic Chemistry at the Interuniversity Research Institute for Molecular Recognition and Technological Development (IDM) of the Polytechnic University of Valencia and Scientific Director of CIBER-BBN and the Unit 26 of NANBIOSIS.

After that, a debate run with the participation of Maria Pilar Marco, Research Professor of the Spanish Council for Scientific Research (CSIC) and Coordinator of the Nanomedicine Research Program CIBER-BBN and Scientific Director of the Unit 2 of NANBIOSIS, CabS; José Becerra, Emeritus Professor of Cell Biology of the University of Malaga and Principal

Investigator of CIBER-BBN, BIONAND and IBIMA; and Maria Jesús Vicent, Coordinator of the Advanced Therapies Area of the Principe Felipe Research Centre.

During the debate the applications of nanomedicine in the Medicine of the Future and in Personalized Precision Medicine, as well as the challenges of nanomedicine were discussed.

The Observatory of Trends in the Medicine of the Future, promoted by the Roche Institute Foundation, aims to generate and disseminate knowledge in the emerging field of Personalized Precision Medicine as part of the Medicine of the Future.

In this context, the foundation Instituto Roche has recently published a report on nanomedicine coordinated by Ramón Martínez in which Professors José Becerra, María Pilar Marco and María Jesús Vicent have participated as experts.

Currently, nanoparticles or nanostructures are being applied for the controlled release of drugs against cancer and other diseases, nanodevices for diagnosis and nanomaterials for applications in regenerative medicine. In the next years, and with the translation into clinical practice of even more results of these technologies, nanomedicine will contribute to the medicine of the future approaching the diagnosis and treatment of diseases earlier, more efficiently and in a more personalized way.

More information: www.institutoroche.es/observatorio/nanomedicina

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SAFE–N–MEDTECH and Phoenix OITBs at XV CIBER–BBN Annual Conference

National and international leading researchers met online on 15th & 16th November at the **XV CIBER–BBN Annual Congress** to discuss the latest advances in bioengineering, biomaterials and nanomedicine research, and promote further collaborations in the field.

This year's CIBER-BBN Annual Conference included three plenary lectures given by internationally recognized experts in the fields of SARS-CoV-2 infection and vaccination, biomedical signal processing for sleep disorders, and regenerative medicine and biosensors. In addition to a selection of internal collaborations, valorization projects and collaboration projects with the CIBER of Oncology, the three programs of the Precision Medicine Infrastructure (IMPaCT) were presented.

NANBIOSIS ICTS contributed to the scientific program of the Conference with a session dedicated to the Open Innovation Test Beds (OITBs). More precisely, Dr. Ángel del Pozo, from Biokeralty presented the SAFE-N-MEDTECH OITB as an example of innovation booster for medical devices, while Dr. Emre Türeli, from MyBiotech GmbH, was invited to describe PHOENIX, a Pharmaceutical OITB for Enabling Nano-pharmaceutical Innovative Products.

Both OITBs' scope is to cover the gap between research in nanomedicine and clinical practice. Their main objective is to provide the research community and the rest of stakeholders with a fully functional infrastructure for the testing, validation and upscaling of new nano-pharmaceuticals and medical devices through a single entry point.

NANBIOSIS is participating in SAFE-N-MEDTECH leading the corner stone work-package of preclinical validation of nano-enabled medical technologies and also contributing to their previous physico-chemical characterization. Besides that, it coordinates a Test Case about innovative nanostructured implants for

bone repair, and participates in three more, all proposed by industrial partners of the project.

CIBER-BBN is participating in Phoenix OITB, as well, with the Unit 6 of NANBIOSIS ICTS (Biomaterials Processing and Nanostructuring Unit) at the Institute of Materials Science in Barcelona (ICMAB-CSIC) as well as the Bio-NanoSurf group at the Aragon Institute of Materials Science (INMA-CSIC).

Both projects are funded by the European Union Horizon 2020 Research and Innovation Programme under GA No. 814607 (SAFE-N-MEDTECH) and GA No. 953183 (PHOENIX). NANBIOSIS is the Infrastructure for the Production and Characterization of Nanomaterials, Biomaterials and Systems in Biomedicine recognized by the Spanish Ministry of Science and Innovation as Unique Scientific and Technological Infrastructure (ICTS).

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CONTRIBUTION FROM GRAZ

UNIVERSITY OF TECHNOLOGY

The Study of the Microbiome Enables New Strategies for Healthy and Climate–Resilient Crops

A study led by TU Graz is providing evidence for the co-evolution of plants and microorganisms. © Lunghammer, TUGraz

Study led by TU Graz shows that apple trees inherit their microbiome to the same extent as their genes. The results lay the foundation for new breeding strategies for healthy and climate-robust fruit and vegetables.

Agriculture is facing enormous challenges worldwide due to global changes caused by human activities. Drought, severe weather events, record temperatures and emerging pathogens threaten the world‘s food supply. For this reason, we need to make our crops more robust without further polluting the environment. Microbiome research and management offer great potential to achieve these goals. A new study by an international research group led by Graz University of Technology (TU Graz), published in the scientific journal New Phytologist, opens up new perspectives here.

The importance of the microbiome for living organisms

Microbiome research is only a few decades old, but it has already produced some ground-breaking findings. One is that humans, animals and plants have very specifically adapted microbiomes that have taken over essential functions. Both organism and microbiome have evolved in co-evolution, i.e.

in mutual influence. This was able to be confirmed by the present study. Today, we consider all organisms to be „holobionts“ – jointly functioning units with numerous specialized microorganisms. The latter are always numerically superior; humans, for example, have ten times more microorganisms than their own cells. The microbiome is thus classified as an important target for new health therapies and prophylaxis. This is equally true for cultivated plants, but the potential here has so far been little known or exploited.

Confirmation of the coevolution theory

The interdisciplinary group of researchers compared the microbiome of modern domesticated apple crops – i.e. specifically bred and cultivated varieties – with the microbiome of their wild ancestors as well as with the microbiome of closely related species. With the help of molecular analyses and bioinformatic methods, the group was able to determine for the first time that the microbiome is inherited to the same extent as the genes. Apples that are genetically similar thus also harbour a similar microbiome. And surprisingly, our modern apple varieties still contain some of the microbiome of their wild ancestors. The study shows that the microbiome is also „bred“ and has greatly changed over time. Until now, this has happened unintentionally and many microorganisms have been lost in the process. These lost microorganisms could now help us to make our crops fit for climate change again. This is because the focus of breeding now is no longer on the size and sweetness of the apples, but on their resilience and health. The research group is convinced that the microbiome of the wild ancestors originating from the Inner-Asian Tien Shan mountain range contains valuable microorganisms for this purpose. (The publication is listed in the publication list of this newsletter).

Useful research results for agriculture

For the first author in the study, Ahmed Abdelfattah from the Institute of Environmental Biotechnology, „the results clarify a long scientific debate and lay the groundwork for new ecological strategies in plant breeding.“ It would be conceivable, for example, to change the plant microbiome through the targeted introduction of microorganisms in order to increase the resistance of the plants. This is what the Institute of Environmental Biotechnology at TU Graz specializes in and Marie Curie Fellow Ahmed Abdelfattah specifically chose it as a research location due to its expertise in the field of microbiome biotechnology. “My apple microbiome journey started during my visit, as PhD student, to Dr. Michael Wisniewski’s lab in 2015”, Abdelfattah says. Wisniewski, the last author of the article and the research with whom the original experiment was designed, is a professor at Virginia Tech with a long-established scientific contribution to fruit research. In Graz again, the vision of Institute head Gabriele Berg and her team is to use this new knowledge for plant health as well as for that of humans and our planet. The apple is thus only a symbol, as it has been many times in human history.

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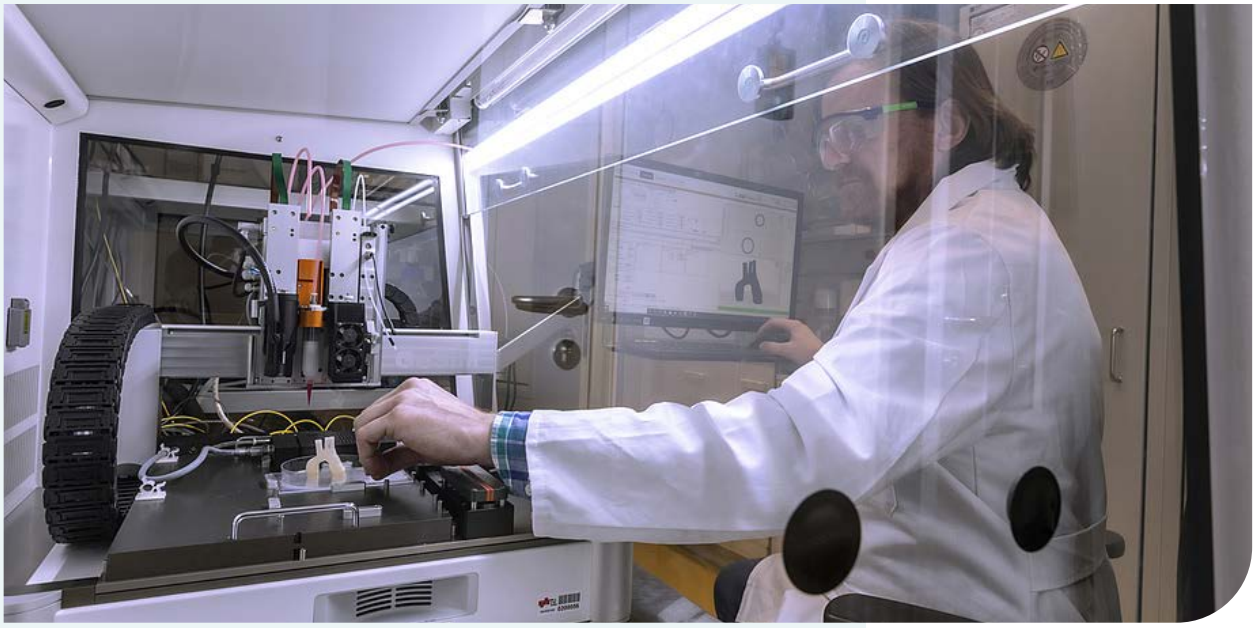
CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY

Artificial Tissue from the 3D Bioprinter



The BioScaffolder 3.2. in action in the iBioSys Lab. A model of an aorta was printed here. © Lunghammer, TUGraz

At the Institute of Chemistry and Technology of Biobased Systems, a new bioprinter recently entered service. It will produce individual models of blood vessels.

„Printing basically works like decorating a cake," says Rupert Kargl, a researcher at the iBioSys Lab of the Institute of Chemistry and Technology of Biobased Systems at Graz University of Technology (TU Graz), explaining how the new bioprinter works. This is a special type of 3D printer. 3D printers basically all work in the same way: „It's all about automatically distributing material in threedimentional space." This activity is usually performed by a robot arm or a lightbeam that is moved in the x, y and z directions. How the material is consolidated in place varies.

In the case of the bioprinter at TU Graz, it is a nozzle that processes soft or melted pastes – similar to a piping bag used to create artistic flowers or ornaments on a cake. But instead of icing and marzipan, the bioprinter processes other renewable and organic materials. And instead of flowers, it conjures up vascular walls or artificial skin, for example.

Unique in Austria

„Living tissue is an extremly complex mix of materials," explains Kargl. „Our printer therefore also allows us a lot of flexibility and combination options." The printer can process up to five different materials in one print layer and is, according to the researchers, unique in Austria in this way. In addition to different materials, the plan is to use the printer to attach living cells that can then build new tissue on their own. „For example, we can grow artificial skin."

Gelatin illustrates how chemically modified organic raw materials can be used. It consists of shortened collagen chains and is obtained from animal tissue. It can then be used for cooking on the one hand, but also to simulate skin tissue with the 3D printer. „In terms of stretchability and softness, gelatin has similar properties to human skin if the water content is controlled," Kargl explains.

The printer, the BioScaffolder BS 3.2, enables highest flexibility in the material mix, and the sophisticated software allows a precise application of material: „We can control and fill each voxel – each pixel in the volume – individually," says Kargl.

Strong cooperation partners sought

The bioprinter plays a major role in several projects at the institute. Kargl and his colleagues are currently working on printing models of human blood vessels, for example, which can be used in medical teaching and surgical planning. Most of the researchers at the institute come from materials science and chemistry, so they are looking to bring expertise from the fields of medicine and biology on board. „It's very important for us to have strong collaborative partners with whom we can do joint research projects," says Kargl, who is emphatic that the institute is „always on the look-out for research partners."

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CONTRIBUTION FROM HAHN–SCHICKARD

Dermagnostix Completes seven–Figure Seed Funding Round

The skin sample is analyzed fully automatically in a microfluidic plastic disc, which requires an analyzer. Source: Dermagnostix.

Dermagnostix GmbH, another Hahn-Schickard diagnostics startup, has successfully completed its seed round and raised a seven-figure financing amount. The financing round was supported by a selected network of investors from the medical and financial industries. The new capital will be used to finalize development and prepare for market entry.

The starting point was a molecular test jointly developed and patented at Helmholtz Zentrum München and Technical University of Munich to distinguish between psoriasis and eczema, two skin diseases that are sometimes difficult to distinguish when relying on conventional methods. To perform the molecular test at the point-of-care, the developers were looking for an appropriate diagnostic platform and found it at Hahn-Schickard.

“LabDisk technology makes it possible to measure more than 40 markers simultaneously within 60 to 90 min, even in tissues such as the skin,” describes CTO and co-founder Dr. Katharina Dormanns, who previously headed the LabDisk platform working group at Hahn-

Schickard in Freiburg. The innovative nature of the system and also its application for diagnostics in dermatology not only convinced the investors in this seed round, but it was also recognized by numerous juries. Competitive public funding of almost 3 million euros in the pre-founding phase enabled the system to be developed into a functional prototype. Numerous prizes in business competitions and inclusion in exclusive networks such as WECONOMY and CDL Oxford have enormously expanded the reach of the spin-off, which has been registered in the commercial register since 2021, within just a few months.

"Modern molecular diagnostics is the prerequisite for implementing precision medicine in dermatology. It not only supports conventional diagnostics, but also makes it possible to predict individual therapy response and disease progression," says CEO, dermatologist and co-founder Dr. Natalie Garzorz-Stark. She adds: "Unfortunately, the manual performance of the complex DNA- and RNA-based assays is time-consuming, error-prone and requires expertise, which is why widespread use has not been possible so far."

The seven-figure amount will now be used to bring the PCR-based on-site testing system to market with the first "PsorEx" test. Dr. Helmut Laaff, dermatopathologist from Freiburg and investor in the seed round, is already very excited to be able to integrate the system himself in his own laboratories and to contribute to the development of the portfolio's content.

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CONTRIBUTION FROM JOANNEUM RESEARCH – HEALTH

New Collaboration of JOANNEUM RESEARCH HEALTH Institute for the Development of Skin Treatments

Worldwide more than 200 million people are affected by atopic dermatitis (AD), a chronic inflammatory skin disease. AD patients can experience a significant psycho-social burden which can have a great impact on their quality of life. JOANNEUM RESEARCH HEALTH is working with both big pharma companies and innovative startups to develop novel therapeutic solutions to help AD patients.

TIRmed, a Swedish pharma startup that specializes in the development of topical therapies for skin disorders, is currently focusing on TIR-C – an immunomodulatory, non-steroid water-based cream for the treatment of mild/moderate AD. Discovered by the research team of TIRmed's founder Prof. Anna-Lena Spetz, TIR-C can selectively inhibit innate immune responses in AD patients to ameliorate itch and allow skin lesions to heal.

TIRmed and HEALTH are currently collaborating on a tissue permeability study. By sampling the interstitial fluids in freshly excised human skin explants using HEALTH's proprietary Open Flow Microperfusion (OFM) technology, the study aims to verify the availability of TIR-C in the relevant skin layer with the proper concentration - a critical validation milestone.

Customers who are interested in using this novel approach to generate de-risking/POC data to support key development decisions such as lead optimization and (re)formulation guidance, please get in touch with health@joanneum.at. We love to talk science and tailor solutions for customer's development needs.

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CONTRIBUTION FROM SPATH MICROELECTRONICDESIGN GMBH

AI Powered Digital Twin for Lighting Infrastructure in the Context of Front–End Industry 4.0

In all lighting sectors, warranty and customisation are becoming key product differentiators. In addition to that, the integration of more electronics and sensors in lighting systems will change what we call lighting today.

While the concepts of digitalisation and Industry 4.0 are progressing fast into the manufacturing world, in the lighting industry, the front-end product design is still using traditional simulation techniques and the back-end struggles to use all the data generated by sensors. An innovative approach is to couple digital twins with Artificial Intelligence to offer unlimited possibilities to the "first build and then tweak" approach.

The main goal of AI-TWILIGHT is to merge the virtual and physical worlds to pave the way for innovations in fields where the European lighting industry is likely to be competitive. Self-leaning digital twins of lighting systems (LED source, driver of a lighting application) will be created and used as input for predicting performance and lifetime of product and infrastructure design and management in an autonomous world. Tests will be carried out in selected application domains, e.g. automotive, horticulture, general and street-lighting.

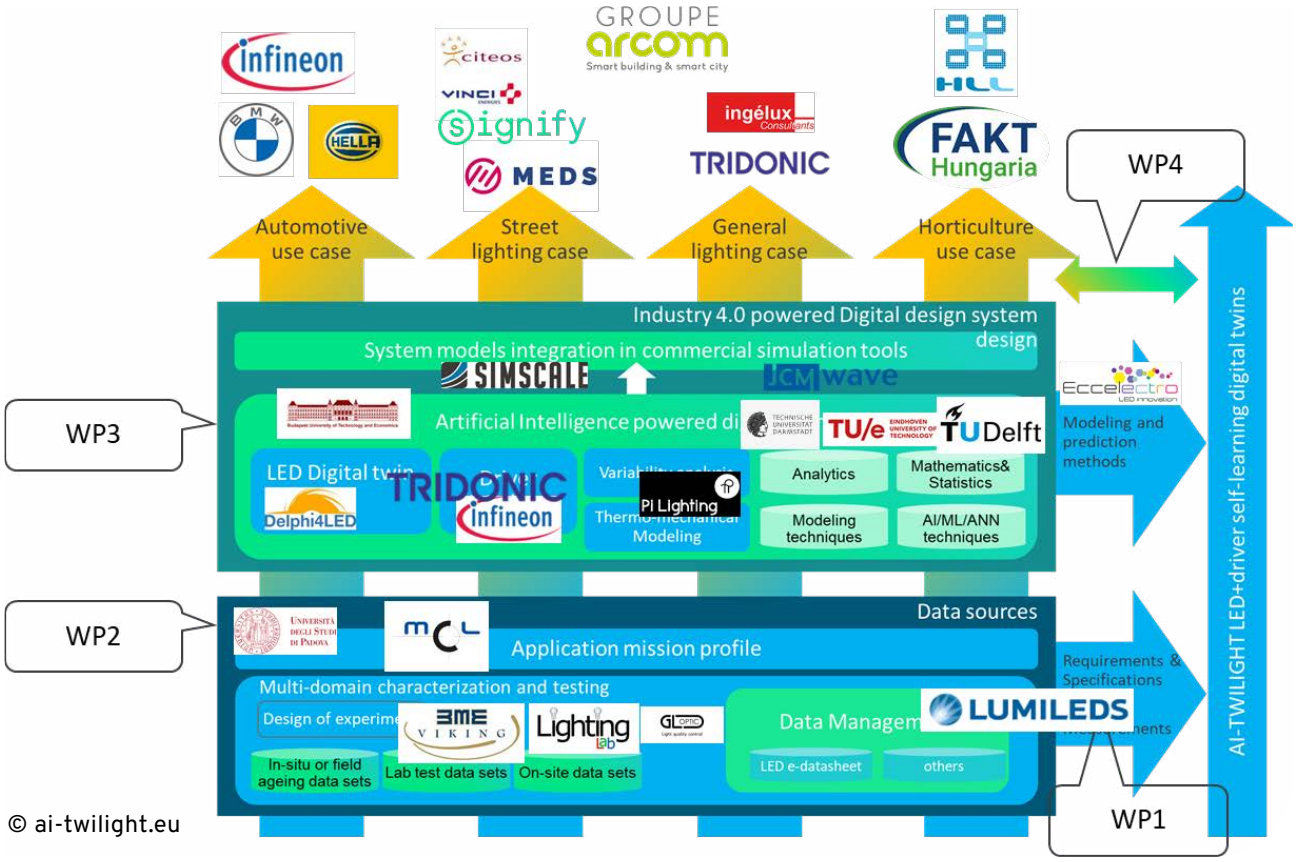
The key technical and exploitation objectives of the AI-TWILIGHT consortium are:

- To create digital twins of LED light-sources and electronics (driver)
- To create self-learning models using AI and analytics techniques
- To facilitate the implementation of the digital twins in digitalized design flow (for SSL product design) and facilitate their applications upstream, up to digital twins of lighting systems of large infrastructures (e.g. for building design).
- To implement the AI-TWILIGHT methods, models and tools within consortium partners to harvest its benefits

When translated to business goals, objectives will result in the introduction of more customised and connected products by 20% while reducing the time to market by 30%, and reducing by 25% the total cost of ownership of an AI-TWILIGHT powered system.

Austrian Consortium

The Austrian consortium consists of 2 industrial partners (TRIDONIC, MEDS) and 1 research institution (MCL). Tridonic is a leading global provider of lighting technology and supports its customers with intelligent hardware and software. As part of the project, Tridonic will develop predictive compact models that take electrical, thermal and optical properties of LED systems into account. MEDS, as an SME and as a specialist for customer-specific solutions in the electronics industry, offers hardware and software development for analog



and digital switches as well as programmable logic development. MEDS will develop a sensor concept that can be used in field tests for LED applications to assess the reliability of LED applications. This is done in collaboration with MCL. MCL will use its extensive know-how in the areas of root cause analysis for failure and thermal management. In the project, MCL combines materials research with condition monitoring, lifecycle modeling and advanced process control for electronic systems. The said cooperation actions will establish activities as regional and European Digital Innovation Hub.

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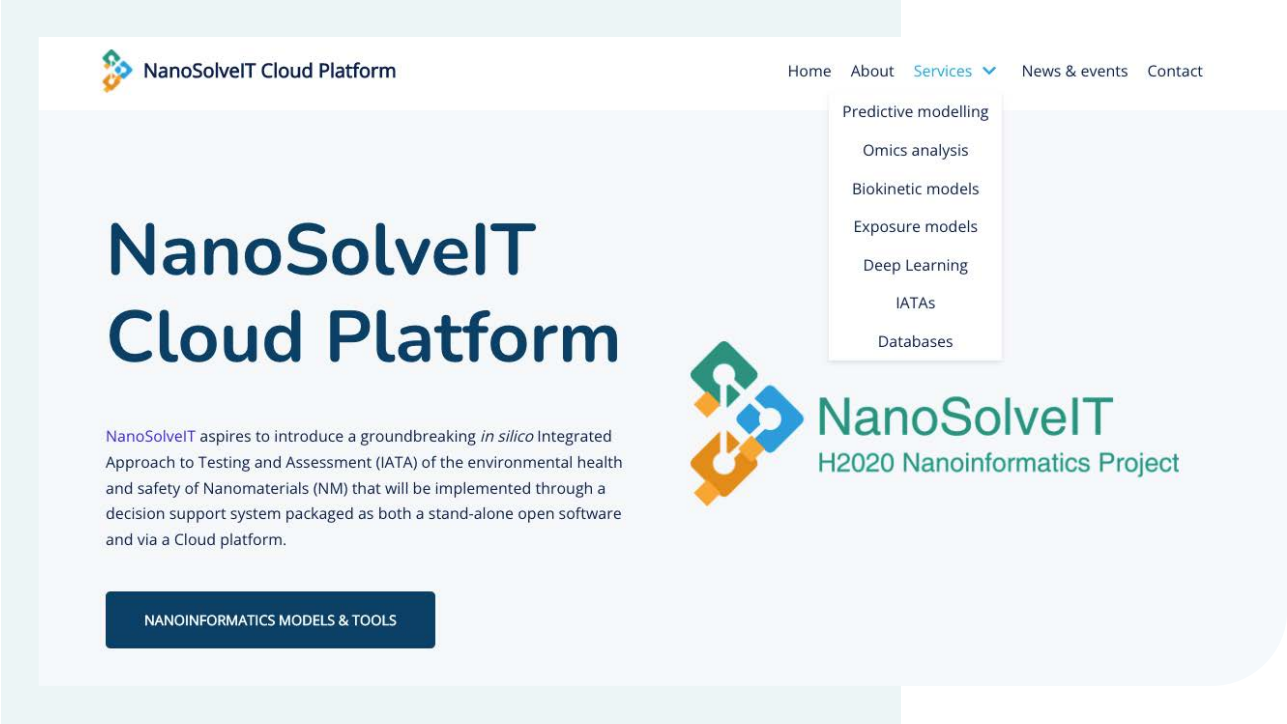
The contribution of European Union and the nationals are acknowledged for supporting the study in the context of the ECSEL Joint Undertaking programme (2021-2024) under the grant #101007319. Additional information are available on: www.AI-TWILIGHT.eu

CONTRIBUTION FROM NOVAMECHANICS

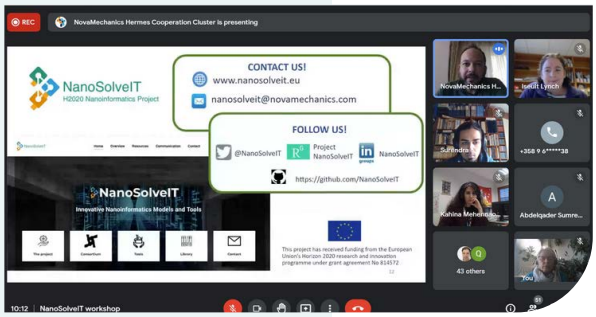
NanoSolveIT Stakeholder Workshop



IATA demonstration workshop for SMEs, regulators & relevant stakeholders

A demonstration workshop was organized by H2020-funded project NanoSolveIT on the 7th of December 2021 with the participation of more than 60 people from academia, industry, regulatory authorities, and EU Institutions.

The full list of the currently available NanoSolveIT model & tools (exposure models, predictive modelling, omics analysis, biokinetic models, deep learning, IATAs and databases) is available at the NanoSolveIT Cloud Platform, each with a user-friendly interface and complete documentation of its domain of applicability and validation. Additional models are constantly being developed and added.



Models & Tools @NanoSolveIT Cloud Platform

No	Category	Description	URL
1	Exposure Models	Multi-box aerosol occupational exposure model	https://aerosol.cloud.nanosolveit.eu/
2	Exposure Models / Integrated Approaches to Testing and Assessment (IATAs)	NanoFase WSO Environmental exposure model	https://nanofase.cloud.nanosolveit.eu/
3	Deep Learning & Image Analysis Tools	Deep Learning model to predict NM exposure effects on Daphnia Magna	https://deepdaph.cloud.nanosolveit.eu/
4	Predictive Models (QSAR/Read-across)	Cytotoxicity (Cell Viability) Prediction for Metal Oxide NPs	https://cellviability.cloud.nanosolveit.eu/
5	Predictive Models (QSAR/Read-across)	Read-Across Model for Zeta Potential Prediction	https://zetapotential.cloud.nanosolveit.eu/
6	Predictive Models (QSAR/Read-across)	MS^{3}bD Zeta Potential Predictive Model	https://mszeta.cloud.nanosolveit.eu/
7	Predictive Models (QSAR/Read-across)	Vythos (Gold NM cell association, CNT absorption coefficients)	https://vythos.cloud.nanosolveit.eu/
8	Predictive Models (QSAR/Read-across)	NanoPot (logP, Zeta Potential in water, Cellular Uptake of A549 of Gold ENM)	https://nanopot.cloud.nanosolveit.eu/
9	Predictive Models (QSAR/Read-across)	SAPNet: predict the toxicity of nanoparticle towards the CHO-K1 cell line	https://sapnets.cloud.nanosolveit.eu/
10	Predictive Models (QSAR/Read-across)	Cytotoxicity (Cell Viability) Classification Model	https://cytotoxicity.cloud.nanosolveit.eu/
11	Biokinetics models	Human Inhalation Model	https://lungexposure.cloud.nanosolveit.eu/
12	Biokinetics models	Nanobio: a Biokinetic model for ENM distribution in freshwater ecosystems	https://nanobio.cloud.nanosolveit.eu/
13	Biokinetics models	NanoInhale: a PBPK model for describing the biodistribution of TiO2 in humans after inhalation exposure	https://nanoinhale.cloud.nanosolveit.eu/
14	Biokinetics models	Biodaph: a simple kinetic model for describing the biodistribution of different TiO2 ENMs in D. magna	https://biodaph.cloud.nanosolveit.eu/
15	Omics Analysis/Molecular Pathways/AOPs	eUTOPIA - Preprocessing and analysis of omics data	https://eutopia.cloud.nanosolveit.eu/eUTOPIA/
16	Omics Analysis/Molecular Pathways/AOPs	FunMappOne - Visualisation of molecular biology experiments	https://funmappone.cloud.NanoSolveIT.eu/
17	Omics Analysis/Molecular Pathways/AOPs	Molecular Pathway database access with SPARQL queries	https://virtuoso.cloud.nanosolveit.eu/
18	Omics Analysis/Molecular Pathways/AOPs	Adverse Outcome Pathway Wiki data access with SPARQL queries	https://virtuoso.cloud.nanosolveit.eu/
19	Databases & Data Enrichment	NanoPharos database	https://db.nanopharos.eu/
20	Databases & Data Enrichment	NanoSolveIT Knowledge Base	https://ssl.biomax.de/nanosolveit/cgi/login_bioxm_portal.cgi
21	Databases & Data Enrichment	ChEMBL: protein binding info and assay data	https://chembl.mirror.rdf.bigcat-bioinformatics.org/
22	Databases & Data Enrichment	BridgeDb	https://bridgedb.github.io/swagger/
23	Integrated Approaches to Testing and Assessment (IATAs)	NanoSolveIT IATA: PBPK models and integration with the occupational exposure model	https://exposurepbpk.cloud.nanosolveit.eu/
24	Deep Learning & Image Analysis Tools	NanoImage: An automated tool for extracting descriptors from electronic images	https://nanoimage.cloud.nanosolveit.eu/nanoImage/
25	Predictive Models (QSAR/Read-across)	Model for zeta potential prediction	https://zetapot.cloud.nanosolveit.eu
26	Predictive Models (QSAR/Read-across)	Facet Cytotoxicity Prediction	https://facetcytotoxicity.cloud.nanosolveit.eu/
27	Exposure Models	Simple Box4Nano (beta version)	http://enaloscloud.novamechanics.com/beta/simplebox4nano/

Please feel free to register here to receive the training materials and more info about the workshop, if you are interested to test one of more of the models and give us feedback.

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NanoSolveIT project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 814572.

SEE WEBSITE

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CONTRIBUTION FROM

PROSPECTIVE INSTRUMENTS

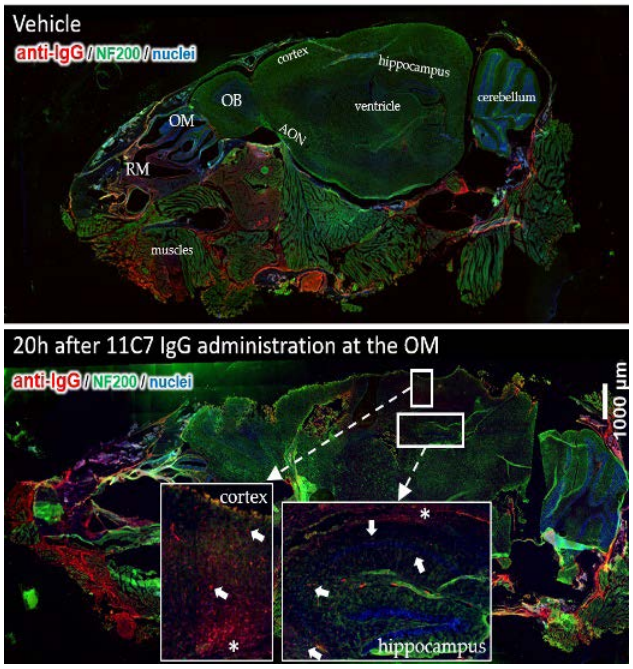
PROSPECTIVE

Selective CNS Targeting and Distribution with a Refined Region–Specific Intranasal Delivery Technique via the Olfactory Mucosa

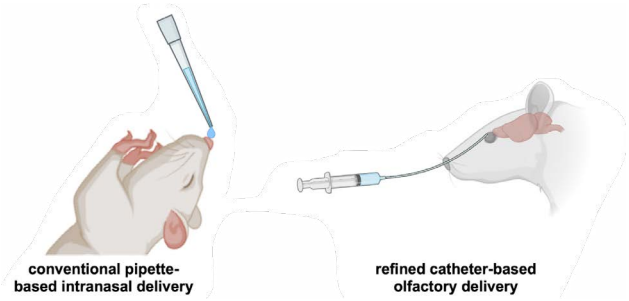
With growing numbers of patients suffering from neurological disorders, the need arises for treatment and administration approaches with the ability to deliver drug molecules in therapeutic quantities to the central nervous system (CNS). Yet, this need is nearly unmet. Drug delivery technologies are of high relevance as they ensure that a pharmaceutical compound can reach its pharmacological target, and thereby safely achieve its desired therapeutic effect. A highly critical point in drug delivery is the low availability of drugs in the CNS due to the blood brain barrier (BBB). The purpose of the BBB is to protect the brain by restricting the entry of most substances in order to prevent potential neurotoxicity. This is achieved by the tightly composed endothelial barrier, a structure that represents a major hurdle for drug molecules to enter the CNS. While for small molecule drugs, chemical modification may improve CNS delivery, nearly all macromolecules such as proteins and antibodies fail to cross the BBB in therapeutically relevant amounts. Drugs with a low central bioavailability are currently delivered via intrathecal, intracerebroventricular or intraparenchymal injections. In this way, they are delivered directly to the cerebrospinal fluid (CSF) of the CNS. However, such invasive delivery systems are also accompanied with lower patient compliance and a documented risk of infections and side effects. In recent past decades, the minimally-invasive approach of intranasal drug administration from the nose to the brain (N2B) has gained considerable attention as an alternative drug delivery route. The nasal cavity is highly suitable for minimally-invasive drug delivery, since the airway mucosa presents a good permeability and efficient absorption of both small molecule drugs and biopharmaceuticals. Intranasal drug transport via neuronal connections such as the olfactory nerves appears to be the most relevant pathway to reach the CNS. Intranasal drug delivery is a promising approach for the delivery of drugs to the CNS, but too heterogenous, unprecise delivery methods without standardization decrease the quality of many studies in rodents. Thus, the lack of a precise and region-specific application technique for mice is a major drawback. In this study, a previously developed catheter-based refined technique was validated against the conventional pipette-based method and used to specifically reach the olfactory or the respiratory nasal regions (www.n2b-patch.eu).

This study successfully demonstrated the specific targeting of the olfactory, or the respiratory region, by using a catheter-based refined technique that was previously developed and validated with 3D-printed casts of the murine nasal cavity under 3R criteria. For immunoglobulins, transport along the olfactory route

to the CNS via neuronal connections and distribution within the CNS was observed. In this study the antibody 11C7 directed against NoGoA was used to demonstrate region specific immunoglobulin delivery via N2B pathways. The inhibition of the NogoA pathway is discussed to increase the regeneration between relapses of Multiple Sclerosis. In summary, it was successfully demonstrated that region-specific intranasal administration via the olfactory region resulted in improved brain targeting and in reduced peripheral targeting in rodents. The present study was supported by the EU under the European Framework Program for Research and Innovation Horizon 2020 ('N2B-patch' Grant No. 721098).



Whole slide images made with the MPX-1040 (Prospective Instruments) of a vehicle treated animal demonstrate endoge-nous IgGs in the nasal mucus, (A). The intranasal applied 11C7 antibody could clearly be detected in the olfactory bulbs and in the dentate gyrus of the hippocampus (B). Arrowheads point to 11c7 antibody-stained structures in the cortex and hippo-campus of the CNS. Hence, we could prove nose to brain immunoglobulin transport to specific brain regions where 11c7 antibody is needed for a therapeutic effect. OM, olfactory mucosa; RM, respiratory mucosa; OB, olfactory bulb; AON, anterior olfactory nucleus; DG, dentate gyrus. Scale bar, 1000 µm. Figure reproduced under CC licence from https://doi.org/10.3390/pharmaceutics13111904.



Sketches of the conventional method (left) and the refined technique using a catheter (right; created with BioRender).

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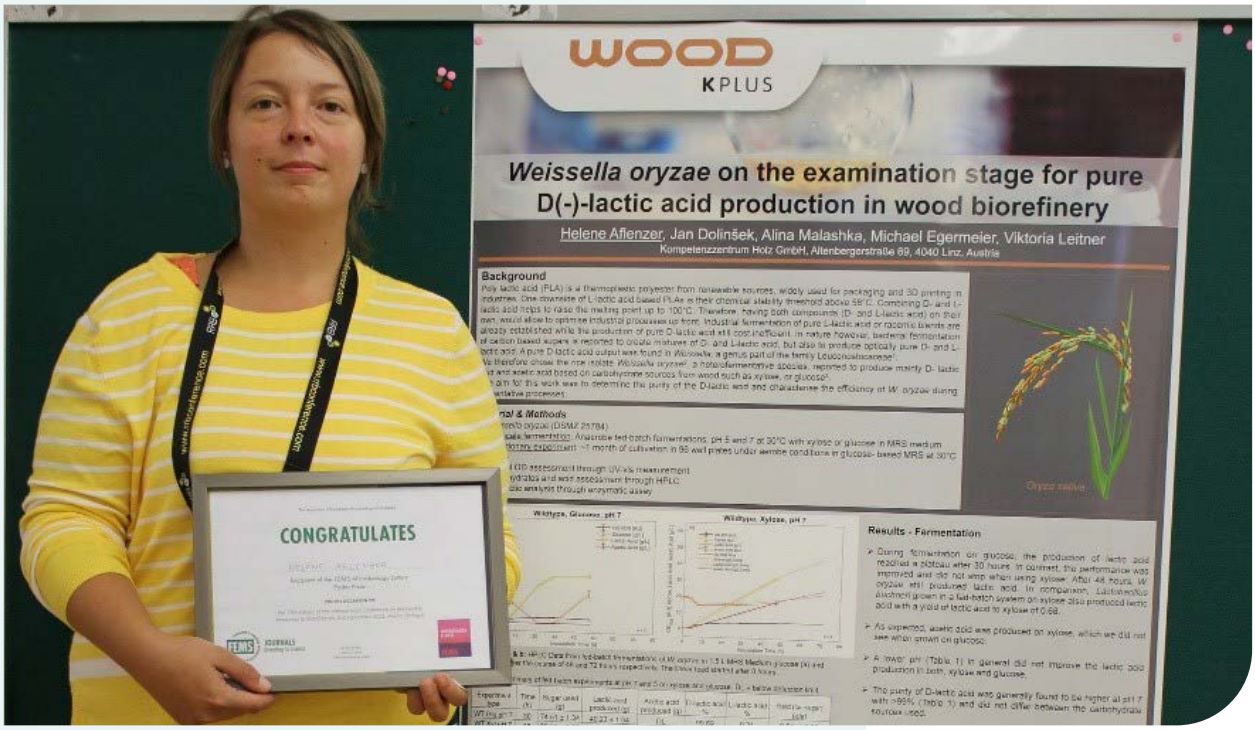
CONTRIBUTION FROM WOOD K PLUS – KOMPETENZZENTRUM HOLZ GMBH

Weissella oryzae on the examination stage for wood biorefineries



Helene Aflenzer in fornt of her award-winning poster at RRB2021 (rrbconference.com)

Lactic acid bacteria of the genus Weissella occur in a wide range of habitats and play a crucial role in fermentation processes for food and feed products[1]. These obligatory heterofermentative species produce lactic acid in either D(-)-, L(+)- or in a mixed form together with acetic acid. In recent years, the gain of pure D-lactic acid has grown interest in industries since it improves thermostability of the biodegradable poly L-lactic acid polymer (PLA). Combining D- and L-lactic acid improves cristalinity and the glass transition temperature of PLA polymers.

In our study, the rice-isolated species Weissella oryzae was chosen for its reported characteristic to produce pure D-lactic acid[2]. With this sparsely examined lactic acid bacteria, we aimed to urge its metabolism to increase D-lactic acid yields using lignocellulosic sugars glucose and xylose as major carbon sources.

A short-term adaptive laboratory evolution experiment (approx. 100 generations) in unbuffered MRS media already improved the ratio of lactic acid to acetic acid.

Characterization of the fermentative capabilities of W. oryzae was examined in anaerobic and pH-controlled bioreactor cultivations of 1,5 litre scale, using either glucose or xylose as sole carbon sources. For both substrates conversion yields of >0.55 g/g were achieved and the optical purity of D-lactic acid was >99.3%.

These results represented a first step in the characterisation of Weissella oryzae as potential host for industrial lactic acid production and were presented from 6th – 8th of September, 2021 by Helene Aflenzer at the 17th International Conference on Renewable Resources & Biorefineries (RRB 2021) in Aveiro, Portugal and awarded with the FEMS Microbiology Letters poster prize.

RRB is an international conference with plenary lectures, oral presentations, poster sessions and exhibition spaces focusing on industrial biotechnology, sustainable (green) chemistry and other topics related to renewable raw materials. After last years cancelation, more than 250 international participants from science and industry were again able to enjoy real-life conversations and presentations from their colleagues, guarded by extensive hygiene and safety measures. Next years edition will take place from 8th - 10th June 2022 in Ghent, Belgium.

[1] Tohno, M. et al. (2013): Weissella oryzae sp. nov., isolated from fermented rice grains. In: International journal of systematic and evolutionary microbiology 63 (Pt 4), S. 1417–1420. DOI: 10.1099/ijs.0.043612-0.

[2] Fusco, V. et al. (2015): The genus Weissella. Taxonomy, ecology and biotechnological potential. In: Frontiers in microbiology 6, S. 155. DOI: 10.3389/fmicb.2015.00155.

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Acknowledgement

This work was funded by the Upper Austrian funding agency in alliance with the European funds for regional development (EFRE). Project BioRest: Production of biopolymers from biogenic raw and waste materials.

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BNN retrospect

NanoSyn 2
FUNDED BY
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Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

JOINT AUSTRIAN – GEORGIAN WORKSHOP

21st October 2021, Wiener Neustadt, Austria

Laszlo Sajti from BioNanoNet-member AIT GmbH has initiated the "Joint Austrian - Georgian workshop" with the theme "New Horizons of Applied Physics for Nanobiomedicine", organized in the frame of the project "Development of new method of optical spectrometry of viruses (SPEC-TROVIR-1)". It took place on 21st October, 2021 in the TFZ Technologie- und Forschungszentrum Wiener Neustadt, Austria and online, and was supported by NanoSyn2 project as well. Many respected organizations such as the Ministry of Foreign Affairs of Georgia, the BMK of the Republic of Austria, the Georgian Academy of Natural Sciences, the Georgian Technical University, the Silicon Austria Labs, the University of Applied Sciences Wiener Neustadt, the National Center for Disease Control and Public Health in Tbilisi, the BioNanoNet Forschungsgesellschaft mbH, the nanoNET-Austria and the ecoplus were represented at this workshop. The attendees had a great scientific exchange, enjoyed the fruitful discussions and used the opportunity to initiate future cooperation.

NANOSYN2–JOINT MEETING &

19TH NANONET–AUSTRIA MEETING

29th September 2021, Lustenau, Austria & online

Alexander Pogany talking with Rudolf Heer © Mike Sibklik

The 19th nanoNET-Austria Meeting was embedded in the 2021 Millennium Innovation Days (m-i-d.io) and was organized as the 2nd NanoSyn2 Joint Meeting with the support of the Smart Textiles platform and the BioNano-Net Forschungsgesellschaft mbH through the NanoSyn2 project. This enabled us to reach an audience of the Austrian nano community that goes beyond the circle of members and interested parties of nanoNET-Austria.

Mr. Mag. Wolfram Rhomberg from the Austrian Institute of Technology opened and chaired the nanoNET-Austria meeting and guided through the presentations. A welcome message from the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK) started the meeting and gave an overview on current topics and activities in the field of production technologies. This was followed by a report

from the nanoNET-Austria network and an outlook on the planned events, in particular the planned presentations at international trade fairs and delegation trips. The scientific presentations focused on the ecologically sustainable production of nanomaterials and their interaction with biological systems. The potential and challenges of nanomaterials for applications in physical sensor technology and in electrochemical biosensor technology have been presented.

In detail the following invited talks have been given in a hybrid format:

- Welcome message from the BMK & Overview of nano-activities from the perspective of the BMK - Mag. Alexander Pogány | BMK | Vienna, AT
- Report on activities of nanoNET-Austria - Dipl.-Ing. Dr. Rudolf Heer | Silicon Austria Labs (SAL) |Graz, Linz & Villach, AT
- Nanomaterials for electrochemical biosensing: challenges and opportunities - Mag. Dr. Eva Melnik | Austrian Institute of Technology (AIT) | Vienna, AT
- Smart-textile wearable sensor for Realtime sweat analysis - Dr. Gaffar Hossain | V-trion textile research GmbH | Hohenems, AT
- Novel high-performance nanomaterials based on sustainable design - Dipl.-Ing. Andreas Stingl | Phornano Holding GmbH | Korneuburg, AT
- Nanoparticles in the context of cellular uptake - novel experimental approaches - Univ.Prof. Dr.rer.nat. Eva Ehmoser | Universität für Bodenkultur | Vienna, AT
- Nanotechnology in sensor development - Univ.-Prof. Dr. Hubert Brückl | Department for Integrated Sensor System Danube University | Krems, AT

Five presentations have been given in presence and two in the form of online contributions.

The meeting was closed by Mr. Wolfram Rhomberg by a Q&A session for the live and online audience and a summary of the presented and discussed topics.

We were pleased to hold this meeting after a long time in the form of a face-to-face workshop with great support from the Smart Textiles platform. This gave us the chance to reach an audience of approximately 50 on site and more than 10 via the video conference tool.

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NanoSyn 2
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This event was funded by the BMK project

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PHOTONICS AUSTRIA MEMBERS MEETING

5th November 2021, Graz, Austria

BNN was invited to present the BioNanoNet association and the NanoSyn2-project at the Photonics Austria Members Meeting on 5th November, 2021 in Graz and hybrid. The face-to-face event was attended by more than 30 colleagues of the Austrian photonics community physically, and some more joined the event online.

Prof. Joachim Krenn (University of Graz) in his role as the host of the event, and Michael Wurzinger (JOANNEUM RESEARCH) who coordinates the Photonics Austria platform welcomed the participants and highlighted the collaboration with BioNanoNet that shall be further intensified. The introduction was followed by Andreas Falk (BNN) presenting NanoSyn2-project, the Safety-and-Sustainability-by-design concept, as well as core competences from the BioNanoNet associations' members. Furthermore, he presented EU call topics interesting for BioNanoNet members, that might fit for collaboration with members of Photonics Austria. Highly appreciated for all participants was the personal exchange on different topics during the networking lunch.

The afternoon session started with the key note presentation by Prof. Peter Banzer (Experimental Physics at the University of Graz), who highlighted scientific findings on the topic „Sensor technology reimagined - camera technology of the next generation“.

BNN and the coordinators of Photonics Austria took the event as an opportunity to plan further steps to strengthen the collaboration between each other, and thus boosting the synergies within the Austrian science & research community.

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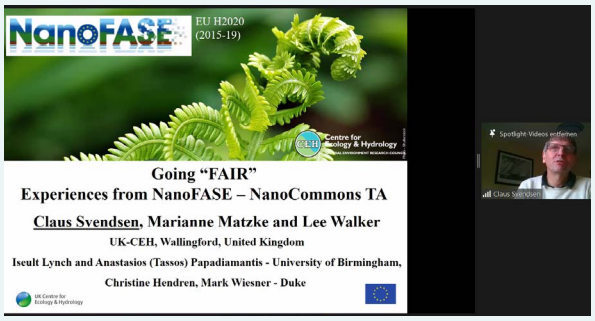
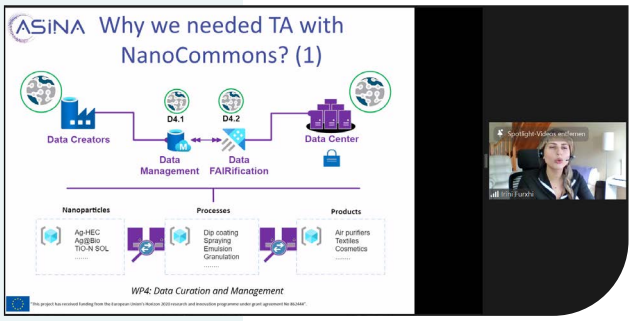
NANOCOMMONS "COLLABORATIVE RESEARCH WORKSHOP"

9th November 2021, online





left: Claus Svendsen presenting NanoFASE's experience with NanoCommons - Data services TA
right: Irini Furxhi presenting ASINA's experience with NanoCommons - Data services TA

On 9th November 2021, the H2020 project NanoCommons, in a joint initiative with the EU NanoSafety Cluster (NSC), organised an online interactive workshop to foster collaborative research by trying to bring the nanosafety community together and to work hands-on on establishing ways to make data and software platforms, developed in different projects, talk to each other.

Under the title "**If you want to go far go together - Collaborative research supported by NanoCommons transnational access**", and after a short introduction of NanoCommons coordinator Iseult Lynch (University of Birmingham), Thomas Exner (7past9) guided the participants through the different presentations. The external speakers (Claus Svendsen, UK CEH - Irini Furxhi, Trangero Ltd - Francesco Dondero, University of Piemonte Orientale - Felice Simeone, National Research Council of Italy) presented their experiences as applicants of Transnational Access (TA) to different NanoCommons Data and Nanoinformatics services.

Furthermore, the internal speakers (Dieter Mayer, Biomax Informatix AG - Haralambos Sarimveis and Philip Doganis, NTUA - Antreas Afantitis, NovaMechanics) gave an overview about Data and Nanoinformatics services used in successful TAs as well as a presentation on Nanoinformatics model development and hosting using the Jaqpot tool.

left: Francesco Dondero presenting NanoGenTool's experience with NanoCommons - Nanoinformatics services TA
right: Felice Simeone presenting ASINA's experience with NanoCommons - Nanoinformatics services TA

Thereafter, Thomas Exner explained the support possibilities that NanoCommons offers via its TAs:

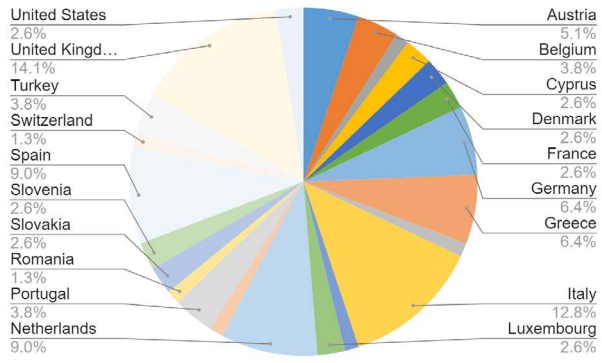
1. Knowledge collection and exchange
2. Findability of approaches
3. Data sharing
4. Nanoinformatics tool and platform integration

Finally, Martin Himly (PLUS) presented the new NanoCommons User Guidance Handbook, where it is possible to find the different training materials offered by NanoCommons.

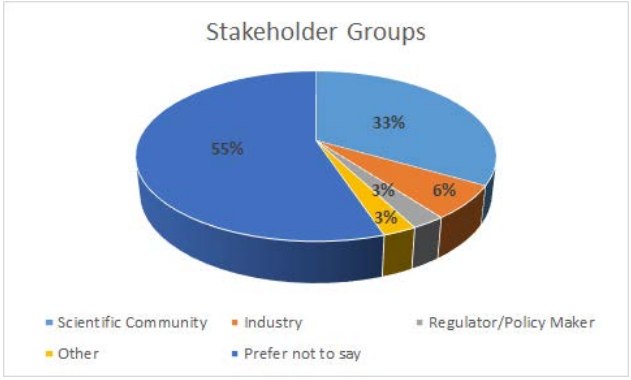
Furthermore, Martin announced the forthcoming events being organised by NanoCommons.

The workshop ended with very nice discussions, moderated by Thomas Exner and Iseult Lynch.

It was a very well attended workshop with more than 70 international, active and very interested participants (mainly from academia, but industry and regulators were also present) who communicated their appreciation at the end of the webinar for the high interactivity and the information shared.



Participants' background



The webinar presentation slides and the recording (recorded for educational purposes) are available in Zenodo and on YouTube.

Thomas Exner (7P9, Schopfheim, DE, thomas.exner@sevenpastnine.com) is co-coordinator of NanoCommons and leads the NanoCommons work package on Dissemination and Case Studies. Martin Himly (PLUS, Salzburg, AT, martin.himly@sbg.ac.at) takes care of all Training issues within NanoCommons and is the chair of the EU NanoSafety Cluster - Working Group A on Education, Training, and Communication. Beatriz Alfaro Serrano (BNN, Graz, AT, beatriz.alfaro@bnn.at) leads the NanoCommons work package on Integration & Sustainability.

Get connected with NanoCommons on:

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

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TOTAL NANOSAFE CONFERENCE AND SINFONIA PROJECT ADVISORY BOARD MEETING

11th – 12th November 2021, Braga, Portugal

The 'Total-Nanosafe' Conference, organized in the frame of Sinfonia-project, brought together experts in different fields related to the use of nanomaterials, nanotechnology awnd how these are related to different aspects of safety, regarding health and environment.

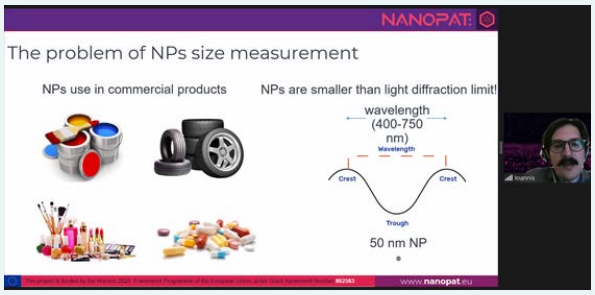
Experts were talking about nanotoxicology, organ-on-a-chip, cheminformatics, public health and environment, among the main topics. Amongst the invited speakers there have been BioNanoNet members: Martin Himly from Paris-Lodron-Universität Salzburg, talking about "Advanced immuno-nanotoxicology goes FAIR", and Arno Gutleb, Luxemburg Institute of Science and Technology, showing his work on "Lung-cell based in vitro models for toxicological purposes".

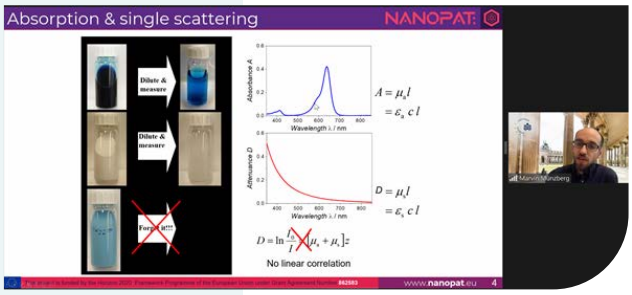
This conference helped to get a broad overview of the state of the art in the different aspects of nanosafety, to increase the interactions among the community of experts, providing the chance of sharing new ideas and generating new collaborations. In context with NanoSyn2-project, the participation to the event enabled to connect our nano community with international experts.

NANOPAT INTERACTIVE WORKSHOP

@ EUROPACT 2021

15th November 2021, online





left: Ioannis presenting the NanoPAT project, right: Marvin giving an introduction to PDW

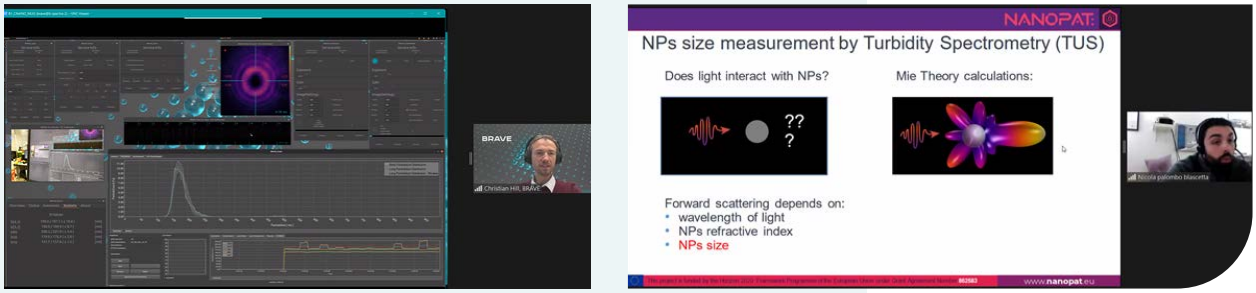
Under the title "Online real time characterisation solutions for nanoparticle solution processes", the H2020 project NanoPAT aims to demonstrate 3 novel real-time nano-characterisation Process Analytical Technologies (PAT) [(1) Photon Density Wave spectroscopy (PDW), (2) OptoFluidic Force Induction (OF2i), (3) 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.

Within the framework of the virtual EuroPACT 2021 conference, NanoPAT organised on Monday 15th November 2021, an online interactive PAT workshop to explain to the community the three novel characterization technologies being developed in the project (PDW, OF2i and TUS) and to live demonstrate them.

The workshop started with the NanoPAT coordinator Ioannis Kakogiannos (IRIS Technology Solutions) briefly presenting the overall activities of the project. After that, the three PAT experts continued by introducing the technologies.

First, Marvin Münzberg (University Potsdam) introduced the fundamentals of the PDW technology to the participants. Afterwards there was a live switch into the laboratory showcasing a live demonstration of a real-time analysis of the optical coefficients as well as particle size during a chemical reaction. Furthermore, application examples were shown and discussed by the audience.

Christian Hill (BRAVE Analytics GmbH) presented the OF2i technology to the audience, the use cases where it is being applied. Furthermore, he made a live demonstration of the

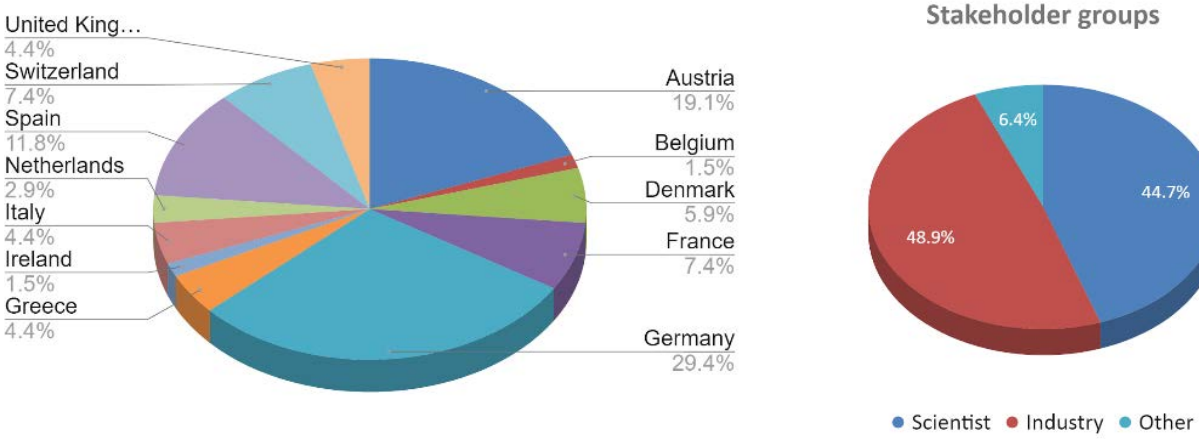


left: Christian during the live demonstration of the OF2i technology, right: Nicola talking about TUS

BRAVE B1 sensor station, showing a real-time online Measurement with the device.

Last but not least, Nicola Palombo (IRIS Technology) explained the basics of nanoparticle size measurement by TUS, how this technology works, its potential and limitations and the case studies where it will be used within the NanoPAT project.

The workshop counted with 80 participants, mainly from academia and industry, which were very interested in the new PATs being developed by NanoPAT. It was an introductory workshop to the three novel technologies for a group of stakeholders with limited knowledge on them. The high interest of the participants and the live demonstrations of the PATs gave floor to lively discussions.



Participants' background

PAT knowledge of the workshop participants previous to the workshop

The workshop presentation slides are available on the NanoPAT website, as well as in Zenodo.

Get connected with NanoPAT on:

SEE WEBSITE

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862583.

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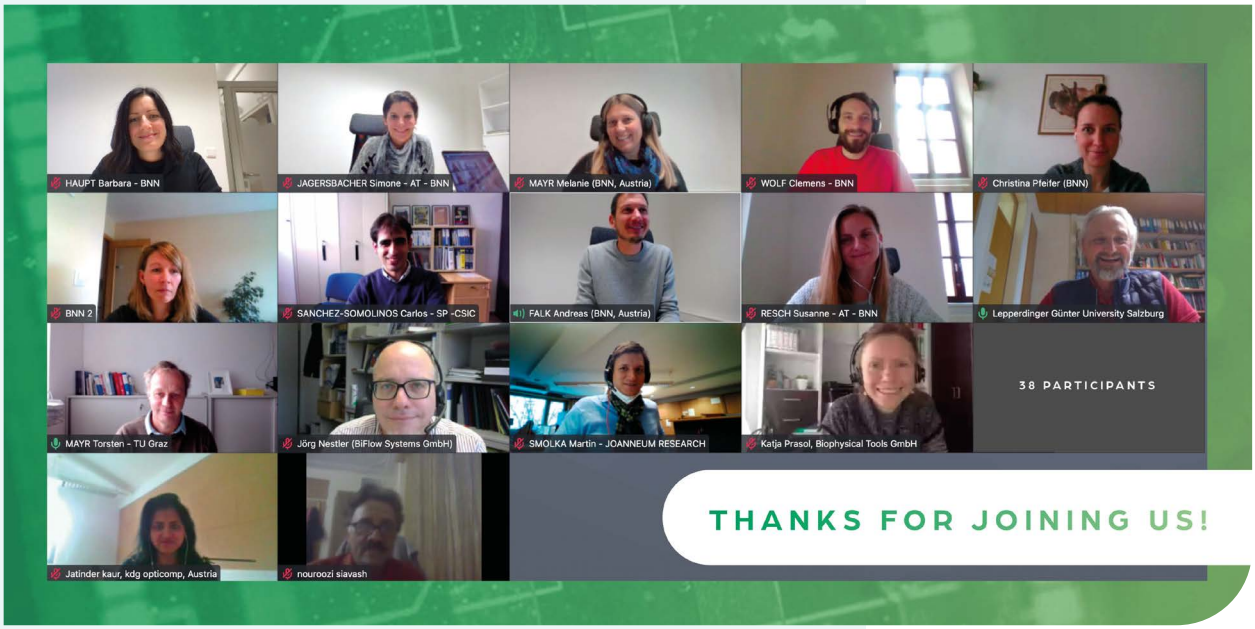
AMI WEBINAR "SCIENTIFIC EXCELLENCE IN MICROFLUIDICS"

16th November 2021, online



AUSTRIAN Microfluidics Initiative
OPERATED BY BNN

PRIME

NextGen Microfluidics

NanoSyn 2
FUNDED BY
Federal Ministry Republic of Austria
Climate Action, Environment, Energy, Mobility, Innovation and Technology

BNN hosted a webinar of the Austrian Microfluidics Initiative (AMI) with the title "Scientific Excellence in Microfluidics" with speakers from two European Research Projects and contributions from the AMI platform chairs.

After an introduction from Andreas Falk (CEO BNN) the project coordinator Carlos SÁNCHEZ-SOMOLINOS from CSIC gave interesting insights of the EU project „PRIME: advanced and versatile PRInting platform for the next generation of active Microfluidic dEvices" – A European Collaborative Project on the Next Generation of Active Microfluidic Devices.

The talk focused on additive manufacturing technologies and smart materials in microfluidic applications, and gave a great overview of the project PRIME and furthermore under-

lined the importance of collaborations of science and industry.

The first talk made the perfect transition to the next speaker - George TSEKENIS from BRFAA presented one of the five Demo Cases of the Open Innovation Test Bed (OITB) Next Generation Microfluidics. His talk with the title "The NextGenMicrofluidics Platform: Development and Upscaling of Microfluidic Cartridges for LoC Nucleic Acid Amplification and Micro Array Detection" was all about advantages and challenges with the development of microfluidic devices and how this emerging forward-looking scientific field can help to tackle societal crises.

The project presentations were followed by teaser presentations of the AMI chairs Peter ERTL (TU Wien, excused absence), Torsten MAYR (TU Graz & PYROSCIENCE) and Günter LEPPERDINGER (PLUS). The presentations outlined the potential for innovation, potential areas of application for the technology and the educational needs and challenges.

For additional information take a look at the presentations and watch the recordings on our YouTube channel.

Contact

Austrian Microfluidics Initiative
office@microfluidics-austria.at
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Events

BNN EVENTS & EVENTS SUPPORTED BY BNN

Impact & Evaluation Criteria in Industrial Horizon Europe Projects

When? 12th January 2022, 13:00 – 14:00

Where? online

Lessons Learned on Cluster 4 Destination 1 & 2 so far

At this compact online event, we provide information about impact and evaluation criteria relevant in proposals answering industrial Horizon Europe calls within Cluster 4 with focus on Destination 1 "Climate neutral, circular and digitised production" and Destination 2 "Increased autonomy in key strategic value chains for resilient industry".

The results of the first calls in Cluster 4 Destination 1 & 2 are expected in December 2021 and will be the basis for the reflections presented during this event.

The aim of this event is to support proposers with the most recent lessons learned, helping to improve the chances to win proposals in the current Cluster 4 Call.

More information

BioNanoNet General Assembly & BNN Networking Event

When? 10th March 2022

Where? Graz, Austria

Save the date for our BioNanoNet General Assembly & BNN Networking Event with the title "**Sustainability in science, research and development: challenges and opportunities**".

More information

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CLINAM Summit 2022

When? 2nd – 4th May 2022

Where? online

The summit will be in streamline and in debate rooms with verbal communication. Make your submissions until 15th February 2022!

More information

NanoWeek 2022

When? 20th – 24th June 2022

Where? Cyprus

NanoCommons celebrates its final event and co-organizes the "NanoWeek" together with other NMBP projects as well as the EU NanoSafety Cluster, bringing the whole nano-community together.

More information

11th Nano Training School 2022

When? May/June 2022

Where? Venice, Italy

More information coming soon!

BioNanoNet Annual Forum & BNN Networking Sessions

When? 15th September 2022

Where? Austria

More information coming soon!

MEMBER EVENT NOTIFICATIONS

ESIB – European Summit of Industrial Biotechnology

When? 14th – 16th November 2022

Where? Graz, Austria

You are active in industrial biotechnology and you are looking for something special? You always thought of an event that not only covers science but also deals with industrial needs and hopes, economic demands, funding resources or political aspirations and still leaves space for networking and recreation? The European Summit of Industrial Biotechnology (esib) is the European communication platform for industrial biotechnology. Stay tuned!

The Austrian Centre of Industrial Biotechnology (acib) is again organizing the ESIB2022 from November 14th -16th, 2022 in Graz.

The previous 3x ESIBs were very successful with each approx. 500 international participants from research and industry. ESIB2022 will have several highly interesting scientific parallel sessions in addition to extensive networking opportunities, pitches and a matchmaking event.

We offer you the opportunity to present itself and to enable you to connect to new potential partners and/or customers.

Please find several opportunities for being an exhibitor or sponsor here!

Looking very much forward to hearing from you!

Contact:

ACIB - Austrian Centre of Industrial Biotechnology
Martin U. Trinker
martin.trinker@acib.at

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Finally

We hope you enjoyed reading the BNN newsletter! Please do not hesitate to contact us if you would like to give us any suggestions or feedback.

Our next BNN newsletter issue will focus on the topic "**Sustainability in science, research and development: challenges & opportunities**". BioNanoNet members are kindly invited to publish specific expertise on this topic. It will be published in March 2022, so please submit your contributions by 7th March 2022!

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SUSTAINABILITY LEADS THE WAY.

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