BNN

01/2021

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,

with the end of 2020, the EU framework program Horizon 2020 came to an end. Besides the technological challenges tackled in the past seven years work programs, the COVID-situation and the climate crisis influenced H2020 and of course will have its impact on Horizon Europe as well. BNN has put lots of efforts into contributing to the shaping of the upcoming framework program, which will become visible soon when the work programs are published by the Commission. Together with our partners, either in the BioNanoNet network, on national level or on European level (e. g. in projects), we are co-developing scientific technological breakthroughs, supporting those to become real innovations, that enable to resolve societal challenges.

The collaborative efforts include supportive actions in the field of global collaboration, spanning from contributions to strategic developments (e. g. international network initiative, NNI-strategy workshop), via scientific/technical knowledge exchange activities (e. g. 4th ESG-symposium/NanoSyn, DTD-RNA-workshop) towards joining and participating in strategic partnerships (e.g. PARC, TERI-collaboration).

Looking back to our very interactive BioNanoNet General Assembly and BNN Networking Event on March 4th, we like to once again thank the great key-note speakers for their inspiring talks, including collaboration opportunities with already ongoing projects (i. e. open-calls of the OITB-calls). During the networking it became visible that despite the limitations of a virtual get2gether, our members did connect with each other intensively to identify collaboration partners for the upcoming Horizon Europe call topics. Of course, after the event is already before the next event – thus, we kindly invite you to book your calendar for the BioNanoNet Annual Forum & BNN Networking session, that will be held on September 16th and 17th.

Further (online)-highlights in the next months will be the NanoSyn2-NanoNet-Workshop (end of April), the EuroNanoForum including a NanoSafetyCluster-workshop on May 4th, the IMAGINE 21 (June 17th) having two sessions supported by NanoSyn2-project, and the EU-R&D&I-Days (June 23rd - 24th) that might find their way into your calendars – BNN will of course be present for our BioNanoNet-members.

We wish you a nice spring time, (web-)see you soon!

Andreas & the BNN–team

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BNN News

NEW BIONANONET MEMBERS

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

Bionanotechnology and Nanochemistry Group of BRFAA (Greece)

The Biomedical Research Foundation of the Academy of Athens (BRFAA) is the most recent addition to the Life Sciences Research organizations in Greece, which begun its activities in 2004.

The founding principle of BRFAA is to host both basic and clinical research, thus, providing an ideal setting for the emergence of translational activities (Medical Application). BRFAA is one of the few institutes with such character in Europe and is certainly unique for Greece.

The main goal of BRFAA is to achieve excellence in the Biomedical Sciences by recruiting high quality investigators carrying out cutting-edge basic and translational research and by training young researchers in a state-of-the-art facilities, which provide a particularly stimulating scientific environment and strong research infrastructures.

For more details visit www.bioacademy.gr

Virtual Vehicle Research GmbH (Austria)

Virtual Vehicle is a leading international R&D center for the automotive and rail industries. The center focuses on the advanced virtualization of vehicle development. This linking of numerical simulations and hardware testing leads to a comprehensive hardware–software system design.

For more details visit www.v2c2.at

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NEW BIONANONET STRATEGIC PARTNERSHIP

TERI–Deakin Nano–Biotechnology Centre and DTD–RNA Network (India)

BioNanoNet started a collaboration with TERI - The Energy and Resources Institute in the fields of nanosafety and on their way towards a global roadmap for nanotechnology!

We are looking forward to a great cooperation!

About TERI–Deakin Nano–Biotechnology Centre and DTD–RNA Network

Reimagining the future of food, agriculture and environment

Nanoparticles possess unique properties due to their small size (1-100 nm) and large surface area which give them the benefit and edge over other existing products. For a world that is confronted with depleting resources and a huge increase in agriculture demand, nano-biofertilizers and nano-pesticides are a game changing idea.

And behind their success is a young institute in India, the TERI-Deakin Nano-Biotechnology Centre (TD-NBC), in Gurugram, Haryana that was set up in 2010, to establish a world class facility for providing a platform to nurture young minds into science through Higher-Degree by Research training (PhD) via a joint PhD program between TERI and Deakin University and translational research in the field of agriculture, food security, environment and bioenergy. The centre has been expanded in April 2017 with the inauguration of the state-of-the-art world-class nanobiotechnology facility designed on the "Green" building concept. This Centre brought together TERI's experience in biotech and biological synthesis of nanomaterial applications and Deakin University's expertise in advanced materials. Over the last ten years, this Centre has made significant strides in developing various nano-nutrients, nano-pesticides and smart delivery vehicles. It has also developed solutions for remediation of polluted environments through natural products and also working on green energy solutions, such as using algae as a bio-refinery platform. Recognized as a Centre of Excellence for Advanced Research in Agriculture Nanotechnology by the Department of Biotechnology, it has now set up a 1000 litre bioreactor facility to ramp up manufacturing, and work with industry stakeholders for commercializing its nanoproducts. Also Recognized as National centre for Nanotoxicity testing, it is testing nano-agriproducts using multiple human & environment model systems and shouldering the scientific & social responsibilities of providing safe and sustainable solutions to mankind.

Beyond product and technology development, the Centre is contributing to various efforts of the government to shape policies and guidelines for evaluating nano-based agri-input and

food products in India.10 completed and 21 ongoing PhD projects, 120 research publications in reputed journals, strategic collaborations with over 40 academic and industrial partners, and 8 patents to its credit- the Centre is thriving with many ideas and opportunities that can transform the face of Indian agriculture. At the same time, it is striving to bring the global nanobiotechnology community together through various networks and initiatives so that the finest minds can share knowledge and resources, and reimagine the future of food, agriculture and environment.

DTD-RNA is dedicated to substantially enhancing research outcomes across continents in this important field by promoting effective collaborations, exposing researchers to alternative and complementary approaches from other fields, encouraging forums for postgraduate students and early career researchers, increasing nanotechnology infrastructure, enhancing awareness of existing infrastructure, creating technology pipelines and IPRs, facilitating technology incubation, transfers and commercialization, connect with industries and promoting international links.

Inauguration of the state-of-the-art TD-NBC building in April 2017. Prime Minister Narendra Modi along with Australian Prime Minister Malcolm Turnbull

TERI-Deakin Nanobiotechnology Centre (TDNBC), Gurugram, India and Deakin University, Australia, in association with Department of Biotechnology, Govt of India has created “DBT - TDNBC - DEAKIN – Research Network Across continents for learning and innovation (DTD-RNA)”. This network was launched on 3rd September 2019. Please visit network’s website https://www.teriin.org/projects/dtd-rna/ for details. This is the unique network and has the vision to contribute to a better world through nanotechnology. DTD-RNA will achieve these goals through its dedication to bringing together all the various groups working in the field of Nanotechnology and related areas across continents.

Contact:

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NEW BNN STAFF

We are happy to welcome our new BNN team member...

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Florian WALCH

My name is Florian Walch and it's my pleasure to shortly introduce myself.

I graduated from the Technical University of Denmark in 2020 with a master's degree in Advanced and Applied Chemistry. During my studies I specialized within catalysis and sustainable chemistry as well as the processing of renewable resources. This resulted in writing my master thesis at a private company, where I gained valuable insights into a result-driven scientific environment.

In February 2021 I joined the BNN team to support the Design for Technology Development area, where I will focus on Safety-by-Design and Sustainability-by-Design tasks. I am looking forward to implement my ideas and to obtain new insights by collaborating with you in current and upcoming projects.

Best wishes,
Florian

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BNN member presentations

BRAVE ANALYTICS GMBH

The interdisciplinary and intercultural BAVE Analytics team is in the process of growth. General Managers: 1. f. L.: Gerhard Prossliner, 2.f.L. Christian Hill (© BRAVE Analytics)

A BRAVE story to tell.

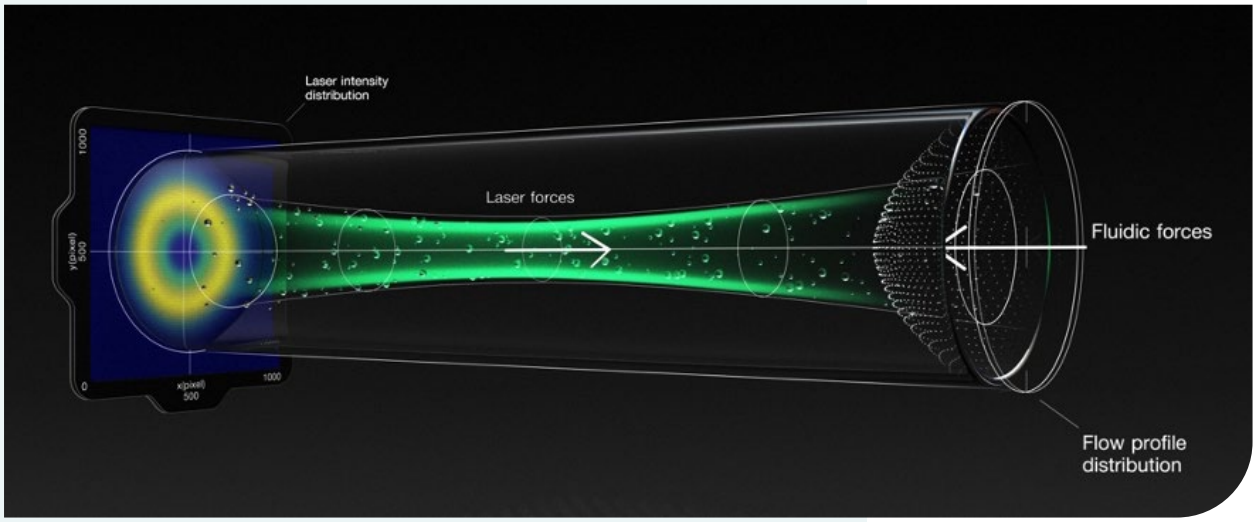
After eight years of hard work with an interdisciplinary and intercultural team, extensive research, nurturing creative ideas, exploring use cases and undertaking applicational work, BRAVE Analytics was finally established in 2020. Have a closer look at how an idea became entrepreneurial through passion and curiosity.

Everything started with two bright minds who had a shared passion for lasers and the idea to use laser light to characterize nanoparticles in fluids. At the Medical University of Graz (Gottfried Schatz Research Center - Biophysics), this idea led to the foundation of the spin-off project LightMatters in 2017 to actually translate their patented OptoFluidic Force Induction technology (OF2i).

The principle of the OF2i technology is based on a targeted (de)acceleration of nano-particles in liquids with the aid of laser light forces: The particles set in motion this way are captured by

a special camera system, tracked and evaluated by software algorithms and physical models. Based on their movement patterns, this process allows to calculate statistically relevant properties such as particle size, number-based size distribution and concentration. All this happens on-line, in parallel and in real time and can therefore be implemented directly into the manufacturing process as a PAT solution.

As a result, the new OF2i approach offers a much deeper and representative live insight into the



Principle of the laser-based OptoFluidic Force Induction (OF2i) technology (© BRAVE Analytics)

nano world than conventional reference measurement methods.

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, concentration and if possible, the shape of nanoparticles must be carefully designed and monitored.

BRAVE Analytics went far already: The prototype OF2i sensor (B1) was tested, optimized and verified in various Life Science applicational areas. And the next step with selected partners is already in preparation; the technology will be thoroughly tested in the first pilot plants: Offi-

cial collaborations with the pharmaceutical group Fresenius Kabi and the bio-based Nanolignin producer Lignovations (a spin-off project of the TU Wien) will lead to the integration of our B1 sensors into their industrial production lines for real time monitoring of critical quality attributes. Further, promising collaborations with biotech companies and various projects under the Horizon 2020 EU project NanoPAT have been launched. Now, common objectives and potentials are being explored.

All this became reality with the financial support of the spin-off fellowship grant program of the FFG funded by the Federal Ministry of Education Science and Research (BMBWF) and the participation at the aws Preseed Program funded by the Austrian Federal Ministry for Digital and Economic Affairs (BMDW). Thanks to the support of the Medical University of Graz, the Center for Knowledge and Technology Transfer in Medicine (ZWT), the human.technology.styria (HTS) Health Tech Cluster and the BioNanoNet Association (BNN) as well as Styrian Business Promotion Agency (SFG), the Gründungsgarage of the Center for Knowledge and Innovation Transfer (ZWI) and the high-tech start-up incubator Science Park Graz, BRAVE Analytics is getting closer to its BRAVE vision “sample in – data out” every day.

Contact

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LIXTEC GMBH

Lixtec is winner of the Energy Globe Austria 2020 award in the category “fire”

Light only when it is needed!

The necessity to save energy is a matter of course in everyday life. At night, however, thousands of kilometers are illuminated on our roads, regardless of the volume of traffic. Comfort and safety do not require permanent lighting, but rather a solution that provides light dynamically and precisely. lixtec - a BNN partner - has addressed this problem. Lixtec offers lighting control based on radar sensor technology for street lighting. Every LED-streetlight can thereby be transformed into an intelligent, demand-oriented light.

Functionality

The radar sensor emits electromagnetic waves with a certain frequency. If the signal hits an immobile body - such as a tree - it is reflected at the same frequency. However, if a person or vehicle moves towards or away from the sensor, the frequency of the reflected signal increases or decreases. The sensor registers this change as movement and then switches on the light. The radar sensor has a range of up to 100m.

Microelectronics with great effect

With the sensors from lixtec, a significant contribution can be made to the decrease of CO2 emissions as well as a significant reduction of light pollution, thus ensuring that people and nature enjoy a peaceful sleep during the quiet night hours.

Artificial light influences the orientation and activity of the animal world and thus has an effect on nutrition, predator-prey relationship, reproduction, communication, migration movements and resting phases. Special attention must be paid to sensitive habitats such as dry meadows, wetlands, water bodies, forest edges and generally protected areas. This is where the diversity of species and thus the potential danger from artificial light is greatest.

Particularly in the case of residential streets, footpaths, cycle paths and parks, the frequency of use at night is very often so low that conventional luminaires are in full-load operation for a large part of the time without any demand, thus wasting vast amounts of energy uselessly. The calculations and experience values of lixtec have shown an energy saving potential of about 60% compared to conventional LED street lighting without sensor technology. For a city like Graz, with 25.000 light points, this results in a CO2 saving of 652 tons of CO2 per year[1]. The energy and, by extension, CO2 savings potential demonstrates the necessity of dynamic street lighting in order to achieve the climate targets set by the EU. After all, by 2030 greenhouse gas emissions are to be reduced by at least 55% compared to 1990 and an increase in energy efficiency of at least 32.5% is to be achieved. In order to achieve the ambitious goals, measures must be taken at all levels - including in the area of street lighting.

The goal is to create lighting conditions without unnecessarily brightening the environment, without unnecessarily disturbing the animal world, without wasting unnecessary energy. With its sensor solutions lixtec wants to achieve an increase in energy efficiency and thus contribute to an ecologically and economically sustainable energy supply.

High–end sensor technology – made in Styria

Lixtec has received several awards, most recently at the Energy Globe Austria Award 2020 in the category Fire. This makes Lixtec one of the best sustainable projects in Austria. The hard-ware and software of the sensor technology was developed entirely at the company‘s head-quarter in Graz and is therefore „Made in Styria“. The lixtec team did not let the time with Corona pass by unused and developed a new product - lix.one SLC - a true Plug&Play solution. The new solution is – with the same functionality – much more compact, easier to mount and cheaper for the end customer.

[1] Calculation with the Austrian electricity mix 1kWh=0.28kg CO2

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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 DECEMBER 2020 – FEBRUARY 2021

Biomax Informatics AG

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Hahn–Schickard

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Recent publications from NanoSolveIT project

received fromBioNanoNet member NOVAMECHANICS

(contact: Dr. Antreas Afantitis afantitis@novamechanics.com, www.novamechanics.com – *NanoSolveIT project has received funding from the EU's H2020 research and innovation programme under the grant agreement n°814572.)*

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RCPE – Research Center for Pharmaceutical Engineering

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Project presentations

HARMLESS PROJECT KICKED OFF

Advanced High Aspect Ratio and Multicomponent materials: towards comprehensive intelLigent tEsting and Safe by design Strategies

Answering the H2020 NMBP-16-2020 call on "Safe-by-Design, from science to regulation: multicomponent nanomaterials", the brand-new project HARMLESS was kicked-off in the first week of February 2021. HARMLESS addresses the challenge of next generation nanomaterials and their risk assessment and management. The regulatory frameworks have just been modified to address risk assessment of primary nanomaterials with simple coatings and are currently in the first phase of implementing methods and tools adequate for simple nanomaterials. Next generation nanomaterials and products thereof, are multiconstituent substances which exhibit much more complex behaviour, potentially including mixture toxicology. The morphologies and stoichiometry of next generation advanced nanomaterials are not harmless, as designs including high aspect ratio shapes and heavy metal content are abundant. By elucidating the role of nanostructures, their transformation and initiation of adverse outcome pathways, HARMLESS will provide novel tools, guidance and decision support for balancing functionality versus risk to ensure that the next generation nanomaterials will be harmless.

Key topic within HARMLESS is the development of a Safe Innovation Approach that meets the demands of multi-component, hybrid materials and HARNs. Therefore, HARMLESS will transfer new approach methodologies with multi-omics approaches and modern in-silico and bioinformatics data analysis, into logically structured IATAs and ultimately into Safe-by-Design tools. The purpose is to enable fast and reliable decision-making for different purposes.

19 international partners are working together in this project to build upon Safe-by-Design strategies for advanced materials, using already available data complemented by newly generated HARMLESS data. To test, validate and demonstrate the developed tools, 7 case studies from various sectors will be performed. Close collaboration with its sister projects SUNSHINE and DIAGONAL is envisaged, as well as with other NMBP-projects and the whole nanosafety community.

Role of BNN in HARMLESS project:

Safe Innovation Approach, Stakeholder engagement, Graphic Design, Communication & Dissemination.

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Get connected with HARMLESS on:

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HARMLESS

This project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 953183.

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PHOENIX

Pharmaceutical Open Innovation Test Bed for Enabling Nano–pharmaceutical Innovative Products

MyBiotech GmbH – Scientific Coordinator of PHOENIX project

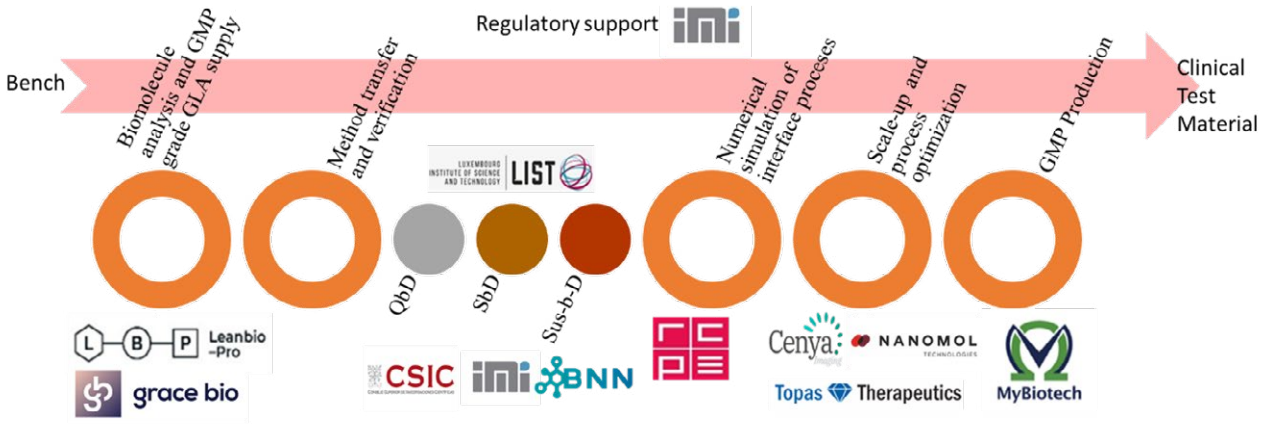
Emerging field of nanomedicine combines Research & Development & Innovation (R&D&I) areas such as drug delivery, in vivo imaging, in vitro diagnostics, biomaterials and active implants. Nano-pharmaceuticals have the potential to drive the scientific and technological uplift offering great clinical and socioeconomic benefits to the society in general, industry and interested parties, and key stakeholders. Affordable and advanced testing, manufacturing facilities and services for novel nano-pharmaceuticals are main prerequisites for successful implementation of these advances to further enhance the growth and innovation capacity. The establishment of good manufacturing practice (GMP) in nano-pharmaceutical manufacturing at large scale production represents the first prerequisite to transfer successfully the nano-pharmaceuticals from bench to bedside (from lab to industrial scale). Due to the lack of resources to implement GMP manufacturing at-site, the upscaling and production of innovative nano-pharmaceuticals is still challenging to main players of EU nanomedicine market, start-ups and SMEs. To allow successful implementation of the nano-pharmaceuticals in the nanomedicine field, there is an urgent need to establish science- and regulatory-based Open Innovation Test Bed (OITB).

PHOENIX project funded under call "Open Innovation Test Beds for nano-pharmaceuticals production (DT-NMBP-06-2020)" will provide a solution to that unmet need starting from 1st March 2021 with a project duration of 48 months (project end: 28th February 2021). The PHOENIX project is scientifically coordinated by Dr. Nazende Günday-Türeli from MyBiotech GmbH, where project coordination is led by Dr. Tommaso Serchi from Luxemburg Institute of Science and Technology. 11 partners from six different countries came together, sharing project budget of €14.45 million and a requested EU contribution of €11.1 million, for responding to the current and future needs and challenges in bringing the newly developed nano-pharmaceuticals from the bench to the bed side.

PHOENIX 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 PHOENIX-OITB. PHOENIX-OITB will offer a consolidated network of facilities, technologies, services and expertise for all the technology transfer aspects from characterization, testing, verification up to scale up, GMP compliant manufacturing and regulatory guidance, covering the whole supply chain for nano-pharmaceuticals. The services provided by the PHOENIX -OITB will be based on open access at fair conditions and

cost and are meant for users encompassing pharmaceutical quality management system (PQMS), methodological portfolio, characterization, testing and production facilities, as well as, communication strategy. And all of those will be realized in “One-stop shopping” manner.

develop and implement this strategy. MyBiotech will integrate its existing knowledge, best practices and expertise from relevant customer projects, and previous and on-going national, EU and international activities as the main pillar for establishment of the services.



PHOENIX will create a single-entry point (SEP) all stakeholders and end users. The hurdle in the translational process of most nano-pharmaceuticals - the so-called “innovation valley of death” situation due to lack/deficit of know-how, testing method, technology or facility prior to clinics – will be overcome by guiding technology transfer. Scale-up and GMP manufacturing problems will be encompassed by implementing a “fast-track-to-GMP” strategy. In addition to scientific coordination, MyBiotech, as an innovative SME with long years of R&D&I track, offering contractual development and manufacturing services for innovative nano-pharmaceuticals and nanomaterials with their proprietary production technologies to its customers with an excellent record and experience in leading and managing large EU and industry projects, will lead this role to

We are looking forward to achieving the highest impact for increasing the attractiveness of EU nano-pharmaceuticals market introducing high quality services to overcome the major factors hindering the production of high-quality products with our relevant expertise, equipment and infrastructure.

11 partners form the PHOENIX consortium:

- ✔ Luxembourg Institute of Science and Technology (LIST – RTO from Luxembourg) – Project coordinator
- ✔ MyBiotech (MyB – SME from Germany) – Project Scientific Coordinator
- ✔ Nanomol Technologies SL (NT – SME from Spain)
- ✔ LeanBio SL (LB – SME from Spain)

- BioNanoNet Forschungsgesellschaft mbH (BNN – RTO from Austria)
- Agencia Estatal Consejo Superior Deinvestigaciones Científicas (CSIC-ZAR/CSIC-BCN – RTO from Spain)
- Institute for Medical Research and Occupational Health (IMROH – RTO from Croatia)
- Research Center Pharmaceutical Engineering GmbH (RCPE – RTO from Austria)
- Cenya Imaging B.V. (Cenya – SME from The Netherlands)
- Topas Therapeutics GmbH (TT – Industry from Germany)
- Grace Bio SL (GB – SME from Spain)

Role of BNN in PHOENIX project:

Business development and overall sustainability of the project and the future OITB, being both of them Co-Leads of WP1. These activities will be in close collaboration with WP6, who's lead is BNN too which will be dedicated to dissemination and exploitation activities for marketing purposes and establishing the connections with stakeholders during the project.

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

Visit Horizon 2020 Website for more information about PHOENIX.

For additional information please contact the Project Coordinator at the Luxembourg Institute of Science and Technology or the Scientific Coordinator at MyBiotech:

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SABATLE

Safety assessment of flow battery electrolytes

The SABATLE project started on 1 January 2021 and will run for 24 months until 31 December 2022. The Project coordinator is Prof. Stefan Spirk (Graz University of Technology). Together with Mondi AG, University of Graz and BioNanoNet Forschungsgesellschaft mbH they compose the SABATLE project consortium.

Redox flow batteries are an emerging technology for medium and large-scale stationary energy storage and are considered as a viable option to buffer fluctuations in the energy grid. These fluctuations are caused by the increasing share of renewable energy (e. g. solar and wind energy) whose production is dependent on weather and seasonal conditions.

The core elements of a redox flow battery (RFB) are two tanks filled with the electrolytes. Currently used electrolytes feature several issues such as limited regional availability, stability, volatile price, lack of sustainability and – often neglected – significant toxicity. SABATLE aims at investigating the safety and (nano)toxicity aspects of current and emerging electrolytes in redox flow batteries as well as the corresponding environmental impacts by performing a life cycle assessment of the whole life cycle, from resource extraction to the end-of-life.

SABATLE will investigate electrolytes from the following commercially available RFB technologies: vanadium, zinc-bromine/chlorine, iron, and compare them to emerging electrolytes based on organic compounds derived from lignins, so called quinones, currently being developed at one of the partners. The lignins as well as decomposition products of the electrolytes may contain also nanoparticles which may pose an additional risk for the environment. Human toxicity and ecotoxicity of electrolyte solutions will be assessed using algae, daphnia, and zebrafish biological models. Exposure scenarios upon accidents during operation of the battery and after end-of-life will be considered, and realistic doses for human exposure and ecotoxicity will be developed. Further, high impact will be generated by developing a tailored safe-and-sustainable-by-design (SaSbD) concept.

Through the implementation of this concept a mitigation of potential hazards will be secured and more sustainable and inherently safe electrolytes will be provided. Public concerns, including risk assessment and stakeholder engagement will be covered in the project.

OECD-testing guidelines, risk governance needs, and SDGs compliance. BNN will be also in charge of the active interaction of the project with regulatory bodies and stakeholders.

Download SABATLE factsheet

For more information visit https://projekte.ffg.at/projekt/3845778

Role of BNN in SABATLE project:

BNN will perform the conceptualisation of the Safety and Sustainability-by-Design concept (SaSbD-concept) tailored to the specifications of the materials and align it with the OECD-testing guidelines, risk governance needs, and SDGs compliance. BNN will be also in charge of the active interaction of the project with regulatory bodies and stakeholders.

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Project updates

BIORIMA FORMS COVID-19 TASK FORCE

BIORIMA has succeeded to establish the first risk management framework for the safe handling of nano-engineered biomaterials used in medical applications. Due to the nature of the methods and materials developed in BIORIMA, the produced results can significantly support the combat of the ongoing pandemic, not only in the use of the nano-engineered biomaterials developed as carriers for vaccines, but also in future treatments against COVID-19. In response to the EU call to participate in the global effort to combat the COVID-19 pandemic, BIORIMA has formed a COVID-19 Task Force that already published a peer-reviewed paper on the use of nanomedicine against the SARS-COV-2 virus, showing the great potential of results produced to contribute to the control of the pandemic.

The mission statement of the Task Force is to identify science and technology solutions across the project which could be rapidly developed and deployed to reduce exposure and hazard posed by COVID-19. Furthermore, the Task Force aims to identify partners outside the project to further promote these initiatives. Overall, the aim is to bring the BIORIMA risk management framework for safe nano-engineered biomaterials to bear on the present and future pandemics. Members of the Task Force at present are: Anna Costa, Bernd Nowak, Bengt Fadeel, Danail Hristozov, Rudolf Reuther and Terry Wilkins.

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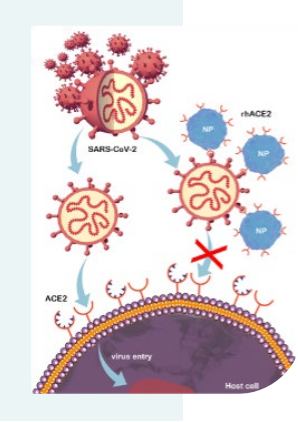
Further reading: Wilson Jones G, Monopoli M, Campagnolo L, Pietroiusti A, Tran L, Fadeel B. No small matter: a perspective on nanotechnology-enabled solutions to fight COVID-19. Nanomedicine (Lond). 2020 Oct;15(24):2411-27].

Role of BNN in BIORIMA project: Organization of Training Schools, Interprofessional education, Industrial case study development.



Potential nanotechnology-enabled solution. From: Wilson Jones G, et al. Nanomedicine (2020). This schematic figure shows SARS-CoV-2, the coronavirus that causes COVID-19, and its host receptor, ACE2. The BIORIMA Task Force and others have postulated that synthetic nanoparticles decorated with recombinant human ACE2 could potentially act as decoys, intercepting the virus and thereby preventing the entry of the virus into susceptible host cells.

This project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 760928.

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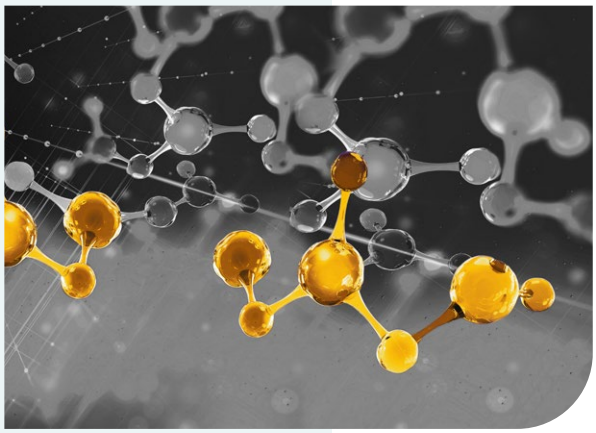
PRIME PROJECT PROGRESS AFTER ONE PROJECT YEAR

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

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



1st year progress report

Microfluidics enables handling minimal amounts of fluid, perform complex assays with precious samples and, also very importantly, reduce the assay time, becoming a key enabler in the fields of (bio)chemical analysis and biomedicine. Microfluidics has also been embraced as a new advanced tool for biology and clinical research as well as drug screening. As a result, microfluidics is an expanding area however existing technologies suffer of limitations that heavily limit the global microfluidics market: For example, current systems rely on the use of complex and expensive large-scale off-chip equipment needed to control the fluidic functions. Besides equipment operation generally requires a high degree of specialization limiting their application to highly specialized laboratories.

The implementation of active microfluidic chips, in which fluidic external connections and costly pumps are eliminated by integrating these complex functions in the chip itself, has been attempted in the laboratory by using for example piezoelectric pumps. Sensors have also been incorporated in microfluidic chips by using fluorescent probes. Despite these efforts, the intrinsic small size and complexity of microfluidic devices and the diver-

sity of often incompatible, types of materials and sophisticated processing technologies, makes the integration of all the functional (fluidic and sensing) elements in a monolithic chip difficult, inherently expensive and unfeasible for industrial production. PRIME aims to set the basis of a new technology that could not only make industrialization possible, but also bring smart material properties to the scenario, enabling the monolithic integration of new functional capabilities.

During the first reporting period, several sets of materials have been developed progressing towards the implementation of the PRIME technology. Smart materials with mechanical response have been explored to create elements with a well-defined mechanical response to external stimuli while considering their integration in microfluidic devices. Work in this direction carried out during the first year led us to reach first materials for responsive elements. The influence of the polymer chain nature and molecular weight have been considered to ensure appropriate rheological and mechanical properties required for optimal manufacturing and mechanical response. Processing of these materials as actuators, and their mechanical response characterization have also been carried out. Reversible mechanical response has been generated in the developed materials leading to contractions of more than 10% upon stimulation with response times in the order of tens of seconds. First valve designs have been introduced and numerical modelling has been carried out. First initial actuation experiments on composite systems comprising active and passive materials have been performed being the first steps of integration into the microfluidic chip. Sensing materials and their processing have also been undertaken seeking for a new generation of selective and ultrasensitive nanoparticle based sensors. First sensing materials have been developed together with protocols for their implementation in the chip.

Communication and dissemination of the project and its results has been done through PRIME website, social media, communication to conferences and publications. Regarding IPR and exploitation of results, a first patent application has been filed during June 2020 on active fluidic elements.

Role of BNN in PRIME project:

Communication & Dissemination acitvities

PRIME

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

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SUCCESS STORY: USER GUIDANCE BY NANOCOMMONS

The main aim of the H2020 Research Infrastructure project, NanoCommons, is to create a community framework, infrastructure and corresponding standards and guidelines for reproducible nanosafety science. Its focus is on developing data management tools to support implementation and community adoption of in silico workflows for nanomaterials safety assessment and beyond. It will achieve this by:

- integrating and federating existing nanomaterials characterisation and interaction mechanisms knowledge, protocols and data (beyond simple toxicity), along with quality assurance criteria and underpinning ontologies;
- developing a user-friendly interface for a suite of computational tools (the Knowledge Infrastructure) for mechanistic and statistical modelling, read-across, grouping, safe-by-design and life cycle assessment, developed by project partners and externally, and bench-marking of their predictive power; and
- providing access (typically remote) to its Knowledge Base, modelling toolbox (predictive, grouping, risk assessment) and workflow optimisation to maximise nanosafety data FAIRness, and the supporting expertise, to the broader user community.

NanoCommons has presented the first version of the community-wide infrastructure for nanosafety data and nanoinformatics tools, which federates other data warehouses and supports a wide range of data queries and predictive modelling tools. This is now accessible to the community and an additional series of training events are being rolled-out throughout 2021 to support community adoption of the tools and approaches.

The NanoCommons community infrastructure aims to reduce the major challenges hindering effective data (re-)usage, through a combination of practical tools and training to address each stage of the nanosafety data lifecycle (see Figure 1) from experimental design and planning, through data capture and processing, analysis and interpretation, and finally storage, archiving and ensuring re-usability.

An important part of this are training and support activities for each stage of the process of making data FAIR (Findable, Accessible, Interoperable and Re-usable) including introducing the role of the data shepherd to bridge the gap between technical and scientific aspects of FAIR (see Figure 1) and bridging the roles and responsibilities of experimentalists and database technical personnel.

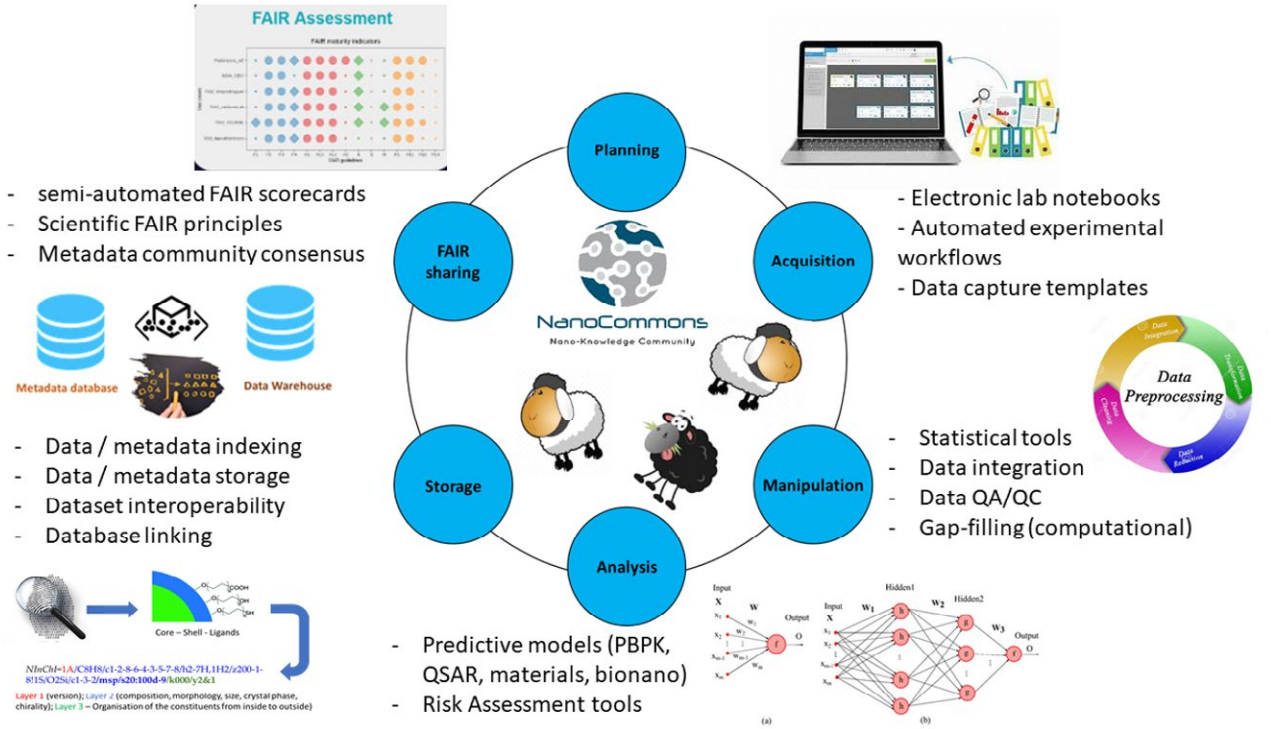

Figure 1: Illustration of the (nanosafety) data life cycle and the tools and supports NanoCom-mons has developed so far to support researchers and data re-users at every stage from exper-imental planning through to modelling and data storage solutions. NanoCommons envisages its role as shepherding researchers and their data towards community-agreed standards and community-developed solutions for long-term sustainability and re-usability of nanosafety data by the research, regulatory and industrial communities we serve.

To celebrate the end of its first 3 years of activity, NanoCommons has now launched the NanoCommons User Guidance Handbook, organising and structuring all outputs from the project to guide users through the relevant material, including concept papers, guidance documents and training materials (presentations and recordings) from the different webinars organised by NanoCommons. The training materials are grouped into different categories (see Figure 2), so that the user can easily find what they need: (i) Overview; (ii) Data Management, (iii) Nanoinformatics, (iv) workflows, (v) Electronic lab notebooks, and (vi) Ontologies. The User Guidance Handbook will continue to be extended by integrating materials from other projects and will be optimized for different stakeholder groups to generate a one-stop knowledge resource, suitable for users with different knowledge levels.

Figure 2: Overview of the Nano-Commons User Guidance Hand-book which collects together all the public outputs from Nano-Commons and organises them by topic (overview, data manage-ment, nanoinformatics, work-flows, electronic lab notebooks and ontologies), allowing users to work through relevant training materials and information at their own pace.

Role of BNN in NanoCommons project:

Community building, Business plan development, Sustainability aspects, Exploitation.

Get connected with NanoCommons on:

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NanoCommons
Nano-Knowledge Community

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

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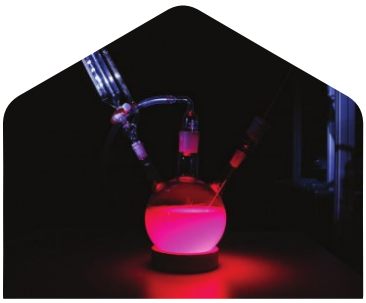
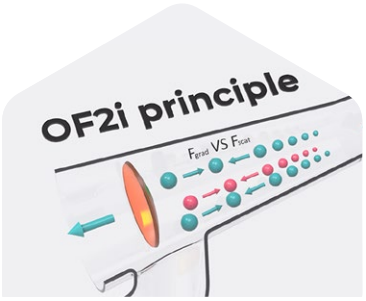
NANOPAT – CURRENT DEVELOPMENT

STATUS OF THE PATS

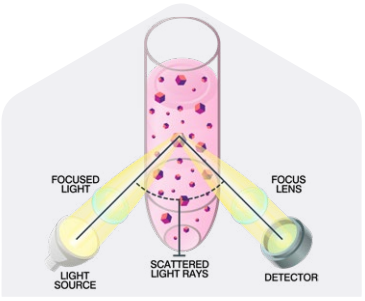
Process Analytical Technologies for Industrial Nanoparticle Production



Photon Density Wave Spectroscopy



OptoFluidic Force Induction



TUrbidity Spectrometry

The EU H2020 NanoPAT project started in June 2020 under Grant Agreement no.862583. It plans to use three new real-time analytical tools that overcome problems and limitations of conventional characterization technologies. These new process analytical technologies (PAT) will be **Photon Density Wave spectroscopy, OptoFluidic Force Induction and TUrbidity Spectrometry**. The innovative technologies will be combined with new data analysis methods to provide, for the first time, real-time analysis of particles on the nanometre scale with sub-minute temporal resolution. The three technologies will be advanced from the "lab status" to a technology demonstration level for inline/online process monitoring at pilot scale in the industrial environment on the NanoPAT industrial partners.

Within the first 9 months of the project, there has been some progress in the PATs.

Photon Density Wave Spectroscopy (PDW) is a process analytical technology capable of calibration-free, inline quantification of light absorption and light scattering in highly turbid, highly concentrated liquid dispersions. The project partner PDW Analytics GmbH (PDWA), from Germany, is our expert.

Over the past six months, PDW Spectroscopy has successfully been applied in the three different particle systems of our industrial partners Evonik (silica), Arkema (zeolites) and DSM (polymers). As a next step, process research regarding the synthesis transfer and implementation of PDW spectrometers in the lab environment of our RTO's is in progress. Here, one important aspect is the development of data analysis models for nanoparticle size analysis. In parallel, the construction of a demonstrator device has been started. This

PDW spectrometer is dedicated to be installed at industrial pilot plants for technology transfers throughout NanoPAT.

OptoFluidic Force Induction (OF2i) is an active, single particle based high throughput PAT based on induced photonic & microfluidic forces. It provides statistically relevant data streams for particles from 20 nm up to several microns. The project partner BRAVE Analytics (BRAVE), from Austria, is our expert.

Whilst acquiring off-line OF2i and reference particle characterization data of the different NanoPAT case studies together with the Medical University of Graz (MUG) in the past six months, BRAVE Analytics improved its signal processing and measurement stability towards hydroxyapatite (Fluidinova) and ceramic nanoparticles (Creative Nano). Furthermore, a small scale reactor from Fluidinova was installed at MUG facilities and the first continuous particle production procedures were successfully performed. Current steps include the construction of a small scale surface coating reactor together with Creative Nano, hardware design towards industrial robustness for two dedicated NanoPAT case study prototypes and their assembly, performance verification and thorough testing within the upcoming weeks.

Get connected with NanoPAT on:

SEE WEBSITE

TUrbidity Spectrometry (TUS) is a flexible optical technique for monitoring the evolution of suspending particles which size ranges from approx. 100 nm up to few microns. The project partner IRIS Technology Solutions S.L. (IRIS), from Spain, is our expert.

IRIS Turbidity Spectroscopy set-up has been designed to comply with the needs of the polymers, silica and ceramic nanoparticles production processes. We work in close collaboration with University of Pais Vasco (UPV) and DSM for the study of polymeric nanoparticles, with University of Potsdam (UP) and Evonik for silica nanoparticles and Cnano for ceramic ones. Two strategies are currently under investigation considering both the option of direct turbidity measurement and subsequent calibration against reference methods and all optical turbidity spectrometry in order to get single particle information.

Read more about the project on the project website and subscribe to our NanoPAT newsletter if you want to be up-to-date with our findings!

Role of BNN in NanoPAT project: Training, Graphic Design, Communication & Dissemination

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

BNN Member Contributions

CONTRIBUTION FROM ACIB – AUSTRIAN CENTRE OF INDUSTRIAL BIOTECHNOLOGY

Austrian Centre of Industrial Biotechnology – innovations from nature

The Austrian Centre of Industrial Biotechnology (acib) is an international competence centre, developing new, environmentally friendly, economically and technically advanced processes for the biotechnological, pharmaceutical and chemical industry – all of them modelled on nature. Currently, 200+ acib scientists are working on more than 100 industrial and strategic projects. This know-how is the foundation for new and improved applications and products in nearly all fields of life sciences all over the world, e. g. agriculture, environment and nature, food and feed, materials, pharma and cosmetics and health.

Bionanopolys

Climate protection, reduction of greenhouse gases and saving of fossil resources are key elements for a more sustainable future. Potential alternatives to fossil-based materials are so called Biomaterials. However, these substances, which interact with biological systems for medical, therapeutic or diagnostic purposes, must offer functional properties for high-volume applications and need to perform even better than their fossil counterparts. Besides, fossil-based materials are still cheaper – a barrier for a successful market entry stra-

tegy and the acceptance of these new biomaterials.

To provide biomaterials with the requested properties and make them more interesting for industrial use, the EU-project Bionanopolys was founded. European experts in this field, such as the Austrian Centre of Industrial Biotechnology (acib), want to transform these materials to nano-scale and moreover develop an open innovation test bed environment. The aim is to manufacture innovative bionanocomposites from main feedstocks in Europe as well as bio-based nano-products for packaging, textile, agriculture, cosmetics, pharma or food. Also, Bionanopolys aims at creating a network of 14 pilot plants and their complementary services to develop state-of-the art bionanomaterials, bionanocomposites and bio-based nanoproducts for a variety of applications for a greener future.

Biotech production of certain drugs twice as efficient

A consortium led by acib has developed a biosynthetic manufacturing route for biopharmaceuticals such as Levetiracetam, a drug used to treat epilepsy. The route promises twice the yield of current production methods while being environmentally friendly.

Epilepsies are the most common neurological disorder and are considered as one of the most common chronic diseases of childhood worldwide. About one percent of the population has active epilepsy and one in ten people will experience an epileptic seizure by the age of 80. For the medical treatment of epilepsy, today the mainly used active pharmaceutical ingredient is levetiracetam which is mainly produced via chemical synthesis. These chemical processes pollute the environment, consume a lot of energy and lead to high production costs. Previous methods also have the disadvantage to produce by-products that cause side effects in patients and must therefore, in complex processes, be separated from the desired active substance as unwanted waste. These factors have so far limited the yield of industrial production to less than 50 percent. The new synthesis variant of acib uses an improved enzyme that produces no side-products, therefore increasing the yield theoretically to 100%, making the new route twice as effective as conventional production routes and producing the desired, finished active ingredient in pure form. The new route offers the industry the added benefit of being more environmentally friendly in production as well, since the process can be carried out under mild conditions in an aqueous solution at room temperature and ambient pressure. After scaling up the process to industrial size, the new route could be used by industry in a year‘s time and could also make the production of other pharmaceuticals environmentally friendly and more efficient. Click here for more information!

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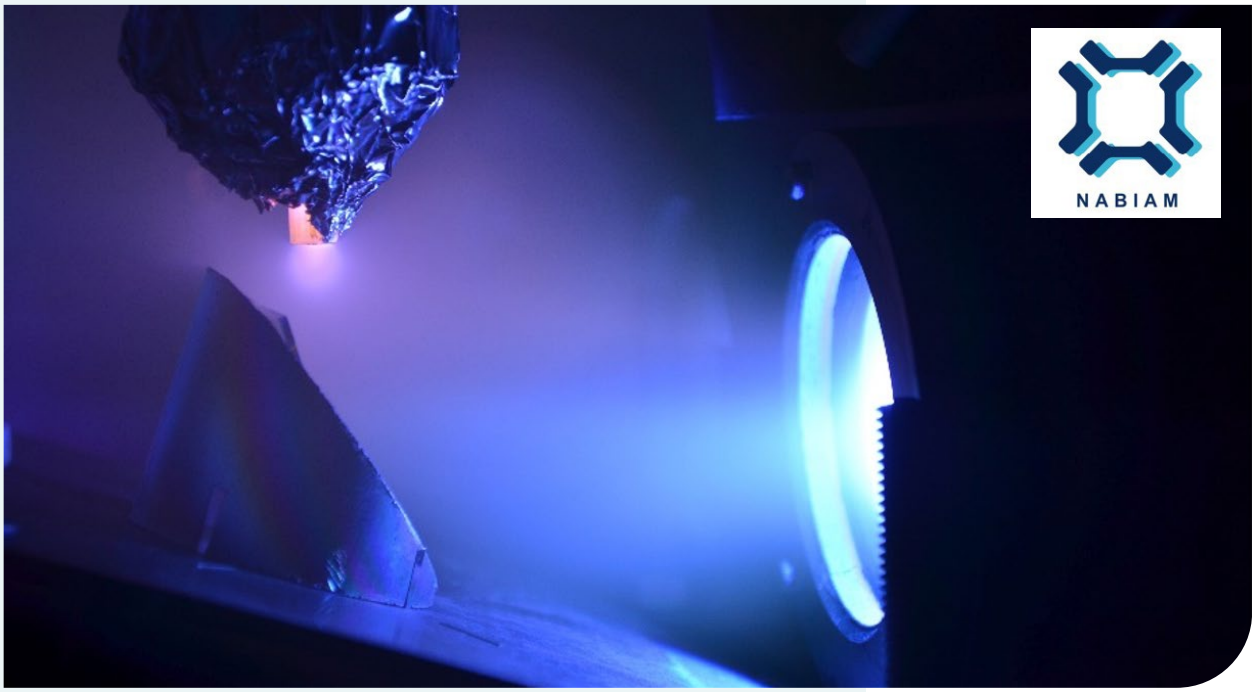
CONTRIBUTION FROM BUSINESS UPPER AUSTRIA

Research network advances medical technology



Combined magnetron/surfatron deposition of TiO2 in metallic mode.
© University of Budweis/Laboratory for Applied Plasma Physics and Nanostructures

NABIAM project links cooperation partners from Upper Austria and the Czech Republic for innovations

Plastics and medical technology are among the strong points of both Upper Austria and Southern Bohemia. Both regions have experts in the fields of nanotechnology, biosensors and additive manufacturing in research, business and start-ups. Together, they could bring innovations to market in medical technology. However, the networking and cooperation power can be expanded because the players know too little about the core competencies available in the regions. The existing know-how is not accessible without barriers, and innovative start-ups in particular lack access to high-tech production and research equipment. This is precisely where the NABIAM project now wants to start and network potential cooperation partners for cross-technology joint projects with a focus on medical technology applications. The project leader is Profactor. Business Upper Austria with the Plastics and Medical Technology Cluster are project

partner. The research partner is the University of South Bohemia in Ceske Budejovice with the Institute of Applied Computer Science.

New innovation network

NABIAM stands for nanotechnologies, biosensors and additive manufacturing. The Steyr-based innovation and research company Profactor GmbH came up with the idea for the project. “We have excellent researchers and technologies of international standing in both Upper Austria and Southern Bohemia. Due to the language barrier, we have hardly worked together so far. The NABIAM project will help us to use synergies to achieve greater clout and visibility together.” says Andreas Pichler, research and development manager at Profactor. In order to be able to implement the cooperation in the best possible way, a questionnaire is used to determine the research needs of the companies.

Innovation through collaborations

The project aims to build long-term relationships with relevant research, development and business stakeholders in Upper Austria and South Bohemia on polymer electronics and medical technology, with a focus on the topics of biosensors, nano-technology and additive manufacturing (3D printing). This innovation network will strengthen the competitiveness and innovative power of the two project regions. „Coupled with a competence mapping for polymer electronics and medical technology, project consortia on specific topics are to be formed quickly in the future. In line with our motto: innovation through cooperation,“ says Wolfgang Bohmayr, manager of the Plastics Cluster. Funding is provided by regional, national and European support programs. NABIAM received funding of 85 percent of the project volume of 216,000 euros from the EU program INTERREG Austria - Czech Republic and the European Union‘s Regional Development Fund.

Innovative methods

NABIAM is now surveying the research priorities and research needs in the two regions and visualizing the competencies and research infrastructure in a technology roadmap and a competency map. „Medical technology is a key competence of both Upper Austria and South Bohemia. With NABIAM, we can drive research and development in the sector and thus arrive at innovative, individual solutions for patients,“ emphasizes Nora Mack, manager of the medical technology cluster.

Questionnaire: www.nabiam.eu/survey

More Information: http://www.nabiam.cz/en

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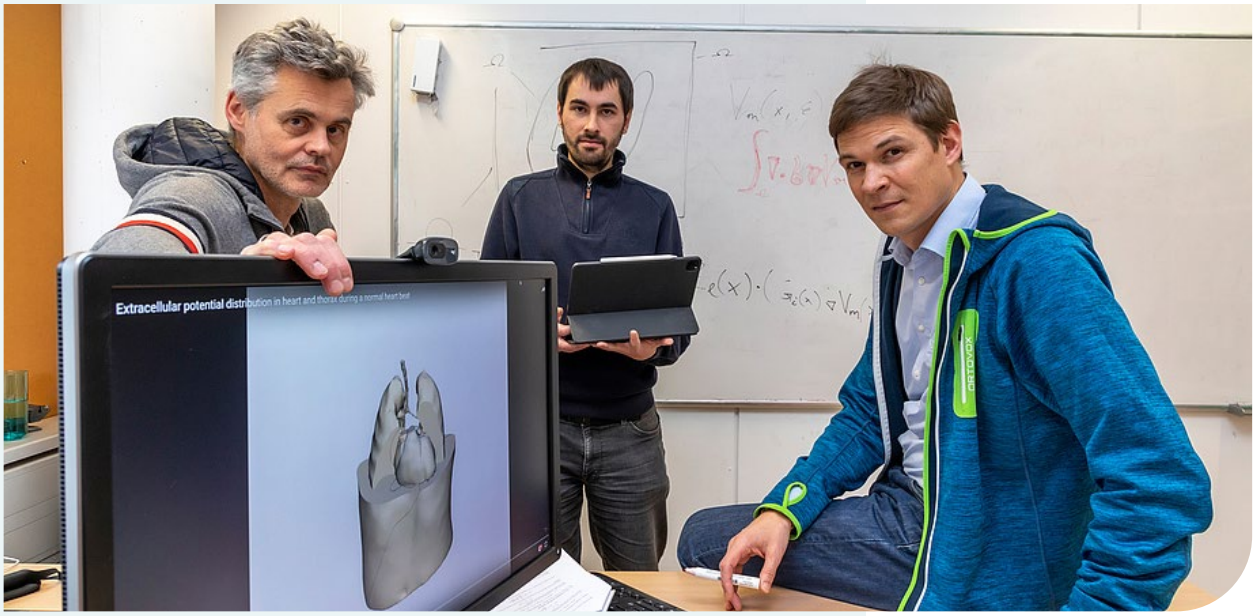
CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY

Cardiovascular diseases: New computer model improves therapy



Have perfected the Digital Twin approach for cardiology: Gernot Plank (Med Uni Graz), PhD student Thomas Grandits and Thomas Pock (both TU Graz, from left to right). © Lunghammer – TU Graz

Using mathematical image processing, scientists at the BioTechMed-Graz research cooperation have found a way to create digital twins from human hearts. The method opens up completely new possibilities in clinical diagnostics.

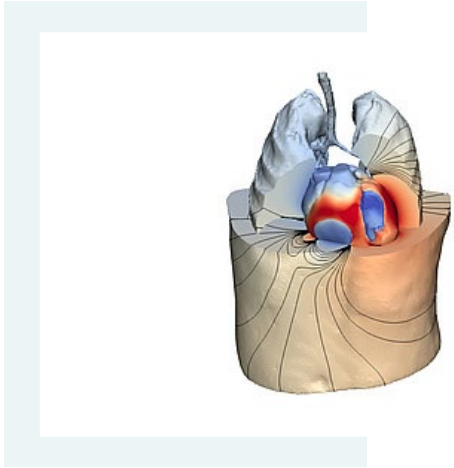
Although treatment options are constantly improving, cardiovascular diseases are still one of the most frequent causes of death in Europe. The success of the treatment varies from patient to patient and depends on the individual clinical picture, as Gernot Plank, researcher at the Institute of Biophysics at the Medical University of Graz explains using an example: „For example, pacemaker therapy is not successful in about 30 per cent of cardiac patients who have had a pacemaker implanted for mechanical resynchronization of the heartbeat.“ In order to be able to rule out such interventions in advance, Plank has developed a computer model together with the mathematicians Gundolf Haase and Kristian Bredies from the University of Graz and computer scientist Thomas Pock from the Institute of

Computer Vision and Representation at Graz University of Technology, respectively, with which doctors can pre-simulate the optimal therapy and dramatically improve the success of treatment.

Digital one–to–one models

The researchers use diagnostic data from MRI, ECG and other heart examinations of the person to be treated. Imaging algorithms put together a digital image of the patient‘s heart from this data material. This customized model ultimately provides a wealth of information that helps to understand the individual clinical picture and to run through various therapeutic scenarios.

Thomas Pock explains the challenge behind it: „To simulate such a heartbeat in the computer, you have to calculate millions of variables. This requires complex mathematical procedures, special algorithms and special hardware that can perform billions of computing actions per second.“



Digital simulation of a human heart.

The group around Thomas Pock, Gernot Plank and Thomas Grandits) worked for five years on the new computer model, with which doctors can pre-simulate the optimal therapy for cardiovascular diseases. © Lunghammer – TU Graz

Method is ready for use

The developed method is so sophisticated and automated that anatomically correct digital twins of patient hearts can already be routinely produced in a clinical setting. In a next step, the researchers want to further improve the technology and enable fully automatic adjustment of all functional aspects of the heartbeat. „This requires further efforts in basic research, especially in those areas of machine learning and artificial intelligence (AI) that allow a high degree of personalization,“ explains Pock.

Focus on further development

A very promising approach is based on the latest AI methods for optimal control and focuses on the wave propagation in the heart, which is controlled by the alignment of the heart muscle fibres. The consortium wants to

implement this approach in cooperation with Cardiocentro Ticinio (centre for computer-assisted cardiology, Lugano) in a new research project and try to incorporate the „control elements“ into the model using machine learning techniques in such a way that the simulated heartbeat comes as close as possible to the real heartbeat. The first clinical validation studies are in preparation for 2021 in cooperation with Daniel Scherr from the Division of Cardiology at the Medical University of Graz. Plank and Pock assume that clinically usable prototypes of a fully automated digital twin heart can be tested as early as 2022. The simulation technology on which the method is based is already being distributed by the Graz-based start-up NumeriCor and is used by leading medical technology companies in the R&D sector.

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CONTRIBUTION FROM GRAZ

UNIVERSITY OF TECHNOLOGY

Resistant rice plants: TU Graz identifies bacterium that protects rice plants against diseases

Researchers from TU Graz, working in an international team, identified a bacterium in rice seeds that can lead to complete resistance to a specific pathogen and is naturally transmitted from one generation of plants to another. © Mengcen Wang

With their expertise in microbiome research, the researchers at the Institute of Environmental Biotechnology were able to demonstrate how a specific bacterium inside the seeds of rice plants effectively and in an eco-friendly way inhibits destructive plant pathogens.

Rice is the staple food of about half the world's population. The cultivation of the rice plant is very water-intensive and, according to the German aid organization Welthungerhilfe, around 15 per cent of rice is grown in areas with a high risk of drought. Global warming is therefore becoming increasingly problematic for rice cultivation, leading more and more often to small harvests and hunger crises. Crop failures caused by plant pathogens further aggravate the situation. Here, conventional agriculture is trying to counteract this with pesticides, which are mostly used as a precautionary measure in rice cultivation. The breeding of resistant plants is the only alternative to these environmentally harmful agents – and currently only moderately successful. If the

plants are resistant to one pathogen thanks to their breeding, they are usually more susceptible to other pathogens or are less robust under adverse environmental conditions.

Bacterium confers pathogen resistance

For this reason, an international research group which includes the Institute of Environmental Biotechnology at Graz University of Technology has been studying the microbiome of rice plant seeds for some time now in order to establish correlations between plant health and the occurrence of certain microorganisms. The group has now achieved a major breakthrough. They identified a bacterium inside the seed that can lead to complete resistance to a particular pathogen and is naturally transmitted from one plant generation to another. The findings published in the scientific journal Nature Plants provide a completely new basis for designing biological plant protection products and additionally reducing harmful biotoxins produced by plant pathogens.

The TU Graz team, together with experts from China and Japan, studied the microbiome of rice seeds from different regions. Pictured: a rice seed. © Mengcen Wang

Bacterial composition as a decisive factor

The scientists found that the resistant plants have a different bacterial composition inside the seeds than the disease-susceptible plants. The bacterial genus Sphingomonas in particular was found significantly more often in resistant seeds. The researchers therefore isolated bacteria of this genus from the seeds and identified the bacterium Sphingomonas melonis as the responsible agent for disease resistance. This bacterium produces an organic acid (anthranilic acid), which inhibits the pathogen and thereby renders it harmless. „This also works when the isolated Sphingomonas melonis is applied to non-resistant rice plants. This automatically makes them resistant to the plant pathogen Burkholderia plantarii," explains Tomislav Cernava. In addition, the bacterium establishes itself in certain rice genotypes and is then passed on naturally from one plant generation to the next. „The potential of this finding is enormous. In the future, we will be able to use this strategy to reduce pesticides in agriculture and at the same time achieve good crop yields," emphasizes Cernava.

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CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY

RNA basic building block produced biocatalytically for the first time

Graz researchers are the first in the world to demonstrate „YeiN“, an enzyme that is a suitable biocatalyst for the production of C-nucleosides, the basic building blocks of RNA. (Symbolic photo) © Lunghammer - TU Graz

Researchers from TU Graz and acib succeed in the first enzyme-driven biocatalytic synthesis of nucleic acid building blocks. This facilitates the development of antiviral agents and RNA-based therapeutics.

Due to the COVID 19 pandemic and the associated intensive search for therapeutics and vaccines, the chemical substance class of nucleosides is experiencing an enormous increase in interest. Natural and synthetic nucleosides have an antiviral effect and can act as building blocks of ribonucleic acids (RNA). When incorporated into RNA, novel interactions within the macromolecule result with positive consequences for stability and biological effectiveness. In medicinal chemistry, the molecular family of carbon (C)-nucleosides is particularly in demand. These differ from the naturally more frequently occurring nitrogen (N)-nucleosides – the classical building blocks of RNA – in the way the sugar is linked to the so-called nucleic base. Instead of a carbon-nitrogen bond, C-nucleosides have a carbon-carbon bond. This is biochemically much more stable and gives active ingredients a longer biological half-life. For the first time, two researchers from Graz University of Technology and the acib competence centre have now succeeded in biocatalytically producing C-nucleosides with the help of enzymes. The

concrete results have been published in Nature Communications.

Yes to the enzyme „YeiN"

Bernd Nidetzky, Head of the Institute of Biotechnology and Bioprocess Engineering at TU Graz and at the same time Scientific Director of the Austrian Centre of Industrial Biotechnology (acib), and Martin Pfeiffer from acib discovered and characterized in a study the enzyme „YeiN", which can link the two nucleoside building blocks ribose-5-phosphates and uracil by means of a specific carbon bond. They are the first researchers worldwide to demonstrate an enzyme that is a suitable biocatalyst for the production of C-nucleosides.

Efficient and eco–friendly production

With the help of the catalytic power of „YeiN", the Graz-based company was able to produce several derivatives of the important C-nucleoid pseudouridine. They were also able to show that one of these derivatives can be incorporated into RNA and thus enable the modification of RNA. This is particularly relevant for the production of RNA-based therapeutic products, as the incorporation of pseudouridine into the RNA increases stability and half-life and thus improves the effectiveness of therapeutic RNA, such as a vaccine. „In our study we show that pseudouridine can be produced biocatalytically. Compared to a purely chemical synthesis, this is a much more efficient way, since fewer reaction steps and no toxic chemicals are required. The biocatalytic production of C-nucleosides is therefore a very strong, elegant alternative to classical chemical synthesis and even superior to it in terms of efficiency," says Bernd Nidetzky. Based on the findings published in Nature Communications, research can now be conducted to expand the substrate spectrum of „YeiN". The goal? The biocatalytic synthesis of further relevant C-nucleosides.

RNA vaccines

The first comprehensive vaccinations against COVID-19 with RNA vaccines have been running for a few days. These completely novel vaccines contain genetic information of the pathogen and induce cells to produce a viral protein, which is then presented to the immune system. The subsequent immune reaction protects the body from an actual virus infection. If one is already infected with the virus, antiviral drugs can prevent the virus from multiplying. The C-nucleoside based drug Remdesivir has these necessary antiviral properties and is effective against a number of RNA viruses, including corona and ebola viruses. The active ingredient has received conditional approval in the EU for the treatment of COVID-19 patients. The biocatalytic production of C-nucleosides could provide further impetus for this new hope as well as RNA vaccines based on C-nucleosides.

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CONTRIBUTION FROM HAHN–SCHICKARD

Hahn–Schickard apppoints Professor Boris Mizaikoff as new Institute Director

Seeking to continue the success story according to the Freiburg model, Prof. Dr. Boris Mizaikoff of the University of Ulm now complements the Hahn-Schickard Institute management team. © Hahn-Schickard

Strategic cooperation with Ulm University planned

The research and development service provider added a fourth location in Ulm in 2020 to the already existing three institutes in Stuttgart, Villingen-Schwenningen and Freiburg. Together, the Freiburg and Ulm sites form the Hahn-Schickard Institute for Microanalysis Systems. Professor Boris Mizaikoff, who has headed the Institute of Analytical and Bioanalytical Chemistry at Ulm University since 2007, now joins the Hahn-Schickard Institute leadership with Professors Alfons Dehé, Yiannos Manoli, Felix von Stetten, Roland Zengerle and André Zimmermann. Mizaikoff will retain his professorship in Ulm and, together with Roland Zengerle, professor at the University of Freiburg, will serve as part-time director of the Hahn-Schickard Institute.

“I am delighted to become part of Hahn-Schickard and am eager to continue the success story of the past years. In particular, I aim to establish a close strategic cooperation with Ulm University based on the Freiburg model,”

says Boris Mizaikoff. He brings his long-standing research interests in the fields of photonics in liquids and gases as well as biomimetic receptors to the Hahn-Schickard portfolio. Examples of his research include mobile analysis systems for respiratory gas diagnostics based on infrared spectroscopy and quantum cascade lasers. Typical fields of application for such research can be found in medicine, but there are also plans to apply this technology in biotechnology, environmental analysis or agriculture. Mizaikoff, 55, was born in Vienna and is a passionate long-distance runner. He is a member of the editorial advisory boards of renowned scientific journals and holds visiting professorships at the universities in Tromsø, Norway, and Johannesburg, South Africa.

"Today, innovation emerges when disciplines intersect," emphasizes Professor Zengerle, spokesman for the Hahn-Schickard Institute management team. "It is enormously important for us to have excellent connections to basic research at state universities in order to implement this efficiently. Further, it is essential that the team of Hahn-Schickard Institute directors represent key competencies. We look forward to achieving better visibility for companies in the Ulm region, as well as establishing close cooperation with the University of Ulm."

In addition to the changes effective Jan. 1, 2021, other appointments to key positions at Hahn-Schickard are also on the horizon: a Hahn-Schickard-funded appointment to the professorship for Intelligent Embedded Systems at the University of Freiburg is expected to strengthen research expertise in the field of computer science at the institute in Villingen-Schwenningen. When the six-member team of collegial Hahn-Schickard institute directors expands to seven people, it will be able to live up even more strongly to its own claim as a driver of innovation in the promising research fields worked on by Hahn-Schickard. In addition, Hahn-Schickard maintains close ties with the Offenburg University of Applied Sciences, in particular with the professorship of Axel Sikora, who is involved as Deputy Institute Director in Villingen-Schwenningen.

Hahn-Schickard recently exceeded 250 employees. One of several growth drivers is the Hahn-Schickard Institute for Microanalysis Systems, which was only founded in Freiburg in 2016 and currently has around 90 employees. In close strategic cooperation with the University of Freiburg and the joint spin-offs BioFluidix (2005), Cytena (2014), Spindiag (2016) and Actome (2018) and Dermagnostix (2020), this institute forms the core of Freiburg's high-tech network. It comprises more than 200 application-oriented research scientists in the fields of point-of-care diagnostics (rapid diagnostics in patients' homes), lab-on-a-chip, microfluidics and 3D bioprinting (tissue engineering).

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CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY, KNOW CENTER, LAND STEIERMARK, MEDICAL UNIVERSITY OF GRAZ, UNIVERSITY OF APPLIED SCIENCES, UNIVERSITY OF GRAZ

Innovative Data Environment @Styria

Everybody needs data. The efficiency and competitiveness of public institutions and private companies alike depends increasingly on computer-generated data. Universities and other research institutions, health care providers, all levels of the public administration as well as all kinds of businesses can benefit from state-of-the-art infrastructures and services that enable the efficient, safe and sustainable use of large amounts of data.

Data infrastructures: expensive and useless without people trained to run them. The construction and operation of data infrastructures is one of the main concerns everywhere—Styria is no exception. Understandably, most existing individual initiatives in the region focus on the physical and technical infrastructure, which carry huge costs, but the equally important human and social aspects are often neglected: data may not be usable without a high performance, technically advanced infrastructure, but such technologies are useless if the necessary policies, governance, skills training, support services, knowledge transfer, are missing across the region.

Regional approach required. It has therefore become clear to many that Styria must push forward a regional approach to face the growing demand of data-related resources. This strategy must develop an integrated technical infrastructure and take care of the human resources and legal tools required to succeed

in the endeavour. A joint regional initiative would enable to pool resources from EU and other sources for building and running the necessary infrastructure, and make possible the exploitation of synergies among stakeholders.

Two of the main European associations around data, the EU-funded High Performance Computing Joint Undertaking (www.eurohpc-ju.europa.eu) and its private counterpart the Big Data Value Association (www.bdva.eu), have long recognised that European infrastructures need to be built—but these must be complemented with agile initiatives at regional- and domain-specific level that are connected with central hubs and that incorporate their basic principles and standards.

Styria has what it takes. The above-average density of highly innovative companies in Europe, the automotive, Silicon Alps, eco and human technology clusters, the number of competence centres (e. g. KNOW-Center), universities and universities of applied sciences as well as the highest R&D investment rate/GDP in the EU makes Styria one of the leading research and innovation locations. Especially in the field of research data management (RDM) there are already various activities at the participating universities (e. g. Digitale TU Graz) and especially within joint initiatives such as BioTechMed, AlpLab, BioBank, BBMRI-ERIC, RRBM.at. For example, unique data sets are available in the context of the Medical University of Graz, which are essential for companies to develop products. A common strategy for data, information and knowledge management between universities, industry and public institutions is needed for the successful further development of Styria as a location for science and business.

Innovative Data Environments @ Styria (IDE@S). Prof. Stefanie Lindstaedt (Head of the Institute for Interactive Systems and Data Science, Graz University of Technology and CEO of Know-Center GmbH) together with Prof. Kurt Zatloukal (Head of Diagnostic and Research Center for Molecular BioMedicine, Medical Univeristy of Graz) initiated IDE@S, a project financed by Land Steiermark developing a common strategy for data, information and knowledge management between universities, industry and public institutions. The implementation of IDE@S will increase the competitiveness for Styrian universities and companies by establishing a secure, efficient, and collaborative data infrastructure for the archiving, communication and processing of large amounts of data. Within the project, important stakeholders in Styria will be involved in workshops and interviews to include requirements from public institutions, industry and academia in the concept. This project will be a model for Austria as well as other innovative European regions.

Next workshops will take place on 25th of March (Graz University of Technology). If you are interested in the initiative, please contact Miguel Rey Mazon. For more details visit www.tugraz.at/projekte/ideas/home.

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CONTRIBUTION FROM GRAZ UNIVERSITY OF TECHNOLOGY, INSTITUTE OF PHARMACEUTICAL SCIENCES, DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY AND BIOPHARMACY

ActiTOX: active organotypic models for nanoparticle toxicological screening

The ActiTOX project (www.actitox.eu) aims to develop novel and reliable 3D organotypic models for pre-clinical nanoparticle toxicological screening and drug development. The objective of the project is to increase the relevance of in-vitro studies by providing scalable bi-organ bioreactors that can simulate both the absorption and metabolism of the drug. More specifically, skin, lung and intestinal models will be developed to simulate particle/drug absorption. Liver and fat models will be developed to simulate the subsequent metabolism.

Invitation to the webinar Series: „Advanced Organotypic Models for Toxicological Screening“

The ActiTOX consortium is inviting everyone to join a webinar series on **Advanced organotypic models for toxicological screening**. The series started on 16th of March 2021 and will continue bi-weekly until summer 2021. The webinar series will cover various technologies in use and under development that are promising as in-vitro models for toxicological screening.

The program includes presentations on:

- Tissue-on-chip technologies for toxicology and drug development
- New approach methods (NAMs) for developmental neurotoxicology using human iPSC-derived 2D and 3D neuronal models
- Advanced electrospun scaffolds for in vitro toxicological models
- Advanced hiPSC-derived hepatic and neuronal in vitro models in toxicology
- Advanced in-vitro skin, intestinal and lung models for toxicological screening
- And many more!

A detailed program and information on the registration can be found at: www.actitox.eu/events

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CONTRIBUTION FROM INSTITUTE FOR MEDICAL RESEARCH AND OCCUPATIONAL HEALTH (IMI)

Institute for Medical Research and Occupational Health

Nano–bio interface between metallic nanoparticles and biomolecules of human origin

Researchers from the NanoBioFaces group at the Institute for Medical Research and Occupational Health, Zagreb, Croatia, employed a multimethod approach to evaluate biological fate and interaction of silver (AgNPs) and gold nanoparticles (AuNPs) relevant for the human exposure. Metallic NPs aggregate and dissolve in the complex environments of the human body. They can even re-form due to the presence of reducing molecules. In these environments, they also encounter biothiols as one of their primary complexants, due to the high affinity of the thiol group for metals. This large web of possible interactions and biotransformations has so far been too difficult to entangle, and thus insufficiently explored.

The NanoBioFaces group searched for appropriate methods for accurate, reliable and cost-effective determination of nano-bio interactions. In collaboration with the team of Prof Wolfgang Fritzsche from the Leibniz Institute of Photonic Technology, Jena, Germany, the localised surface plasmon resonance (LSPR)-based setup was created [1]. The study involved citrate-coated AuNPs interacting with bovine serum albumin (BSA), glycosylated human transferrin (hTRF), and non-glycosylated recombinant human transferrin (recTRF). The adsorption was found to be the strongest for BSA, compared to BOTH transferrins. It is likely that the glycosylation status and the presence of free cysteine residues plays a role in binding. Binding of BSA to AuNPs was cooperative, while the binding of TRF is anticooperative. The results obtained by LSPR were compared to the commonly used fluorescence spectroscopy. The LSPR, although with less developed theoretical background, possesses significant advantages compared to fluorescence quenching in terms of sample volume, sensitivity and cost.

In the study [2] focused on the biotransformation of AgNPs and AuNPs in the presence of cysteine (CYS) as a representative biothiol, the oxidation of CYS to cystine occurs during the formation of metallic NPs. The possible explanation is that oxidation process of CYS is governed by the reactive oxygen species (ROS) generated in biological media that is faced with metallic NPs. Theoretical (quantum chemical) calculations yielded two possible mechanisms of dimerization: through the S• radical, or through the formation of cysteine sulfenic acid, while the molecular dynamics simulations indicated the interactions with nanosurface leading to the cystine-coated NPs. This simplified model, extrapolated to in vivo circumstances, may indicate potential dangers to both NPs stability and cellular integrity. Following degradation in vivo, released metal ions will be exposed to the reducing molecules, initiating Ag or Au nucleation. The

catalytic effect and ROS production combined may lead to CYS depletion and oxidative damage to cells.

Another systematic study [3] on 16 different AgNPs encompassing different sizes, shapes and surface functionalization yielded surprising results and indicated much lower importance of NP size, shape and surface charge for binding affinity than previously assumed. Dominant NPs property for the interaction with proteins was the surface coating. Changes in protein functionality due to NP attachment should be considered in the design process of nanomedicines. Careful selection of size, shape and, most importantly, surface coating is vital to reducing the negative effects for NP stability and protein function.

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[2] Pem B, Toma M, Vrček V, Vinković Vrček I (2021) Combined NMR and Computational Study of Cysteine Oxidation during Nucleation of Metallic Clusters in Biological Systems, Inorg. Chem. doi:10.1021/acs.inorgchem.1c00321

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CONTRIBUTION FROM NOVAMECHANICS

NanoSolveIT highlights: An integrated computational framework for the estimation of the deposited doses of a nanomaterial to the human's respiratory system

Figure 1: Schematic representation of the developed applications. The Multi-box aerosol application computes the concentrations of the NM over time which, in turn, are fed to the Lung exposure application to compute the deposition dose in the various regions of the respiratory system.

From sunscreen and cosmetics twwwo clothes and printer tonner, nanomaterials have become part of our daily lives. Among others, nanomaterials enter the human body through the respiratory system, yet their effect on human health is still an open issue. We have developed an integrated computational framework in order to estimate the deposited doses of a nanomaterial to the human's respiratory system after. The framework consists of two independent applications: The Multi-box aerosol and Lung Exposure applications. The Multi-box aerosol application is based on a Multi-box model for estimating the concentration of the nanomaterial in indoor environments (Cheimarios et al. 2021, Jensen et al. 2018). The Lung exposure application is based on the International Commission on Radiological Protection (ICRP) model for calculating the deposited mass in Alveolar, Thracheo bronchial and Head airways parts of the respiratory system (Hinds, 1999). The "communication point" of the two applications is the concentration calculated from the Multi-box application which is transferred to the Lung exposure application in order to evaluate the deposition doses to the various regions of the respiratory system (Fig.1).

Both applications are complemented with REST APIs to make them available and easy to use programmatically (Fig. 2). The REST APIs are used to communicate with analytics platforms and request the necessary data submission and exchange in order to run the models. As the models require a large amount of data to be transferred, the API has been implemented using the POST Request Method. This method includes in the body of the request the user submitted data to be used to make the prediction.

The Multi-box aerosol and the Lung exposure applications are freely available and can be reached in the cloud:

Multi-box application:
https://aerosol.cloud.nanosolveit.eu

Lung exposure application:
https://lungexposure.cloud.nanosolveit.eu

Both applications were developed as part of the NanoSolveIT project (https://nanosolveit.eu/) which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 814572.

References (see list of publications of NOVAMECHANICS in this document)

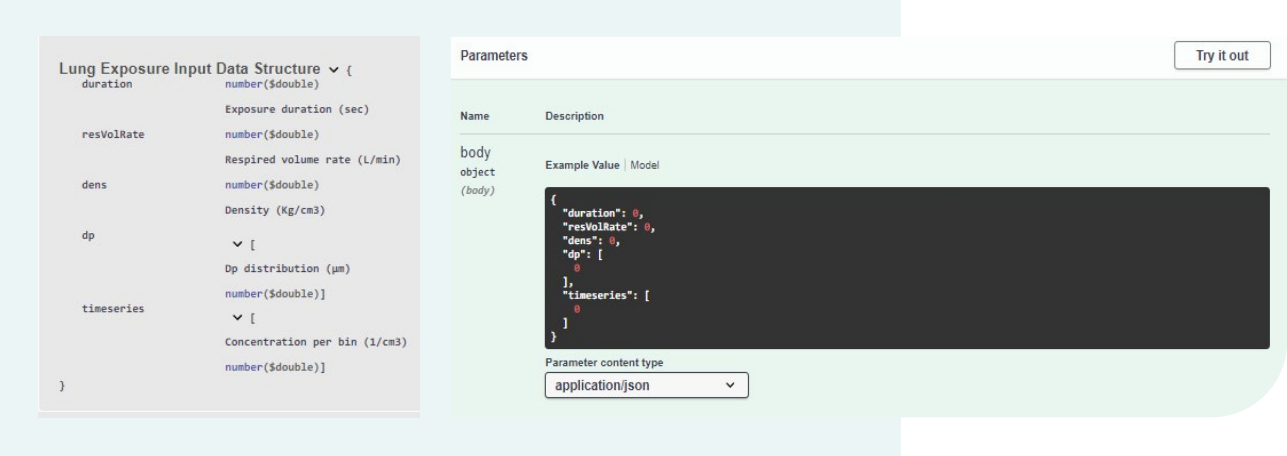

Figure 2: Example of Input Data Structure and NanoSolve REST APIs Parameters for the Lung exposure application.

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CONTRIBUTION FROM PROSPECTIVE INSTRUMENTS LK OG

PROSPECTIVE

Pump–Probe Elastography (PPE) – influence of the pump–pulse energy on the speed of acoustic waves in fluid and solid media

Wäger Felix[1],[2], Schürer Albert[1], Krainer Lukas[2], Domke Matthias[1]

1 Research Center for Microtechnology, University of Applied Science Vorarlberg, Hochschulstrasse 1, 6850 Dornbirn, Austria

2 Prospective Instruments, Stadtstrasse 33, 6850 Dornbirn, Austria

In recent years pump-probe microscopy has been used in several studies to investigate laser-material interaction processes. Thereby, acoustic waves could be imaged that were released into the vicinity of the irradiated spot. The question arose how the pump probe elastography can extract the information that the waves carry. The aim of this study was to investigate the influence of the pump-pulse energy on the speed and shape of acoustic waves in solid and fluid media.

For this purpose, the propagation of acoustic waves in glass and water was investigated with a pump-probe microscope with epi-illumination. Acoustic waves were generated by focusing a single laser pulse (pump-pulse) of 380 fs duration, 1040 nm wavelength, and 1 to 10 µJ pulse energy through the microscope objective onto the sample. To capture the propagation of the waves the fs-pulse was partly converted to 520 nm using second harmonic generation and then was delayed between 4 ns and 15 ns (probe pulse). This second path was used for Köhler illumination while imaging with a CMOS camera.

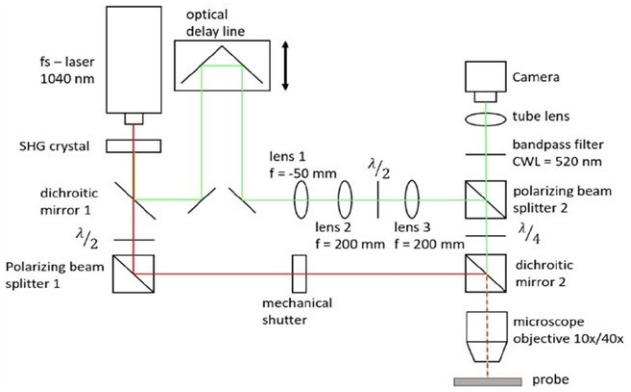

Figure 1: sketch of the microscope setup

Figure 2 left shows an exemplary image of an acoustic wave generated in water and captured at a delay time of 15.2 ns. The radius of the wave front was measured for three different delay times (4.3 ns, 11,5 ns and 15,2 ns) and plotted as function of pulse energy in Figure 2, middle.

The results indicate that the radii increase with different gradient factors and increasing pulse en-ergy, but from 2.5 µJ on the gradient factor seems to assimilate. This means that the speed of the wave at first increases with pulse energy but then stabilizes and stays at a level, as can be seen in Figure 2, right.

Figure 3 shows images of acoustic waves generated in glass and captured at delay times of 11.5 ns and 15.2 ns. The pulse energies were 5 and 9.5 µJ. In contrast to water, the radius and

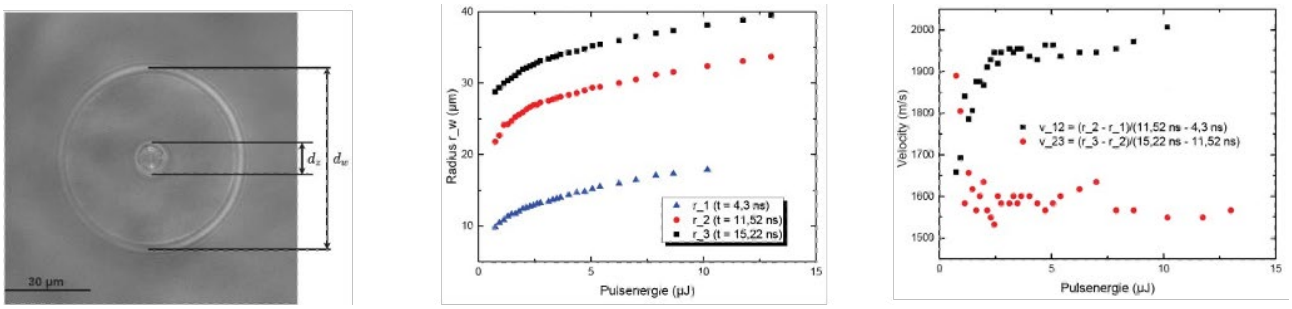

Figure 2: Left: Pump-probe microscopy image of an acoustic wave in water captured at a delay time of 15.2 ns. Middle: the radius dw/2 of the wave front was measured for three different delay times and plotted as function of pulse energy. Right: Derived velocitie

thus the speed of the wave fronts are independent from the pulse energy used (table 1). The calculated wave speed is at 5697 m/s, which is slightly higher than the literature value of 5600 m/s. This suggests that the wave moves with the speed of sound for glass.

In conclusion the initial results indicate that acoustic waves can be detected in liquid and solid media using pump-probe microscopy. However, to determine elastic properties of soft or hard tissues, it must be taken into account that the acoustic waves generated in water are shock waves and their velocity changes with the radius. In contrast, the generated acoustic waves in glass appear to be sound waves, which are even independent of the pulse energy applied.

pulse energy [µJ]	r_{w1} [µm] at 11.5 ns	r_{w2} [µm] at 15.2 ns
5	67.74	88.95
6.5	67.99	88.70
8	57.74	88.95
9.5	67.99	89.19
average	67.99	88.95
SD (σ)	0.12	0.17

Table 1: measured radii for waves in the glass volume

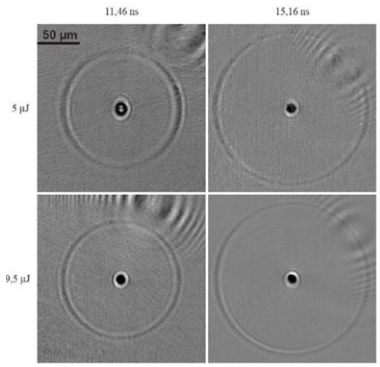

Figure 3: image of the wave within the glass volume

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CONTRIBUTION FROM PYROSCIENCE

PyroScience oxygen sensors measures on Mars

AquapHOx instrument for long-time monitoring of Oxygen and pH in shallow water and down to 4000m water depth.

PyroScience is a manufacturer of innovative sensor solutions founded in 1998, with headquarters in Germany and subsidiary in Austria. PyroScience offers innovative sensor concepts with expert customer support to the worldwide research and industrial community, NGOs and governmental organizations. These include several optical meters for oxygen, pH and temperature and a broad range of optical sensor heads based on the proprietary REDFLASH technology. PyroScience offers sensor solutions for many different applications in biology, biotechnology, ecophysiology, geochemistry, limnology, microbiology, oceanography, as well as in environmental analysis, scientific and R&D laboratories.

Monitoring Ocean acidification

In 2014, PyroScience attended in a worldwide competition, the Wendy Schmidt Ocean Health XPrize, based on the need for an affordable, robust and reliable sensor for global

A FDO2 oxygen sensor is used by the NASA in their Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE).

pH monitoring in our oceans. In the following, PyroScience transformed their year-long experience in innovative lab sensor solutions towards a flexible underwater solution supported by EU-SME2 funding.

Just recently, PyroScience launched AquapHOx – the first high-performance, all-in-one optical sensor technology to monitor the Health of our Oceans with oxygen and pH-sensors.

Mars Rock Solid Sensors

The PyroScience FDO2 oxygen sensor module is part of the NASA Mars Mission 2020 and has landed now on Mars with the NASA Rover Perseverance. The quality and robustness of the oxygen gas sensor FDO2 convinced the NASA and JPL engineers to integrate it into the scientific experiment MOXIE on board of the rover. This experiment aims to produce for the first-time oxygen from carbon dioxide in the Martian atmosphere, which would be a crucial step for preparing future human exploration: oxygen can be used as propellant for rockets and serve future explorers for breathing.

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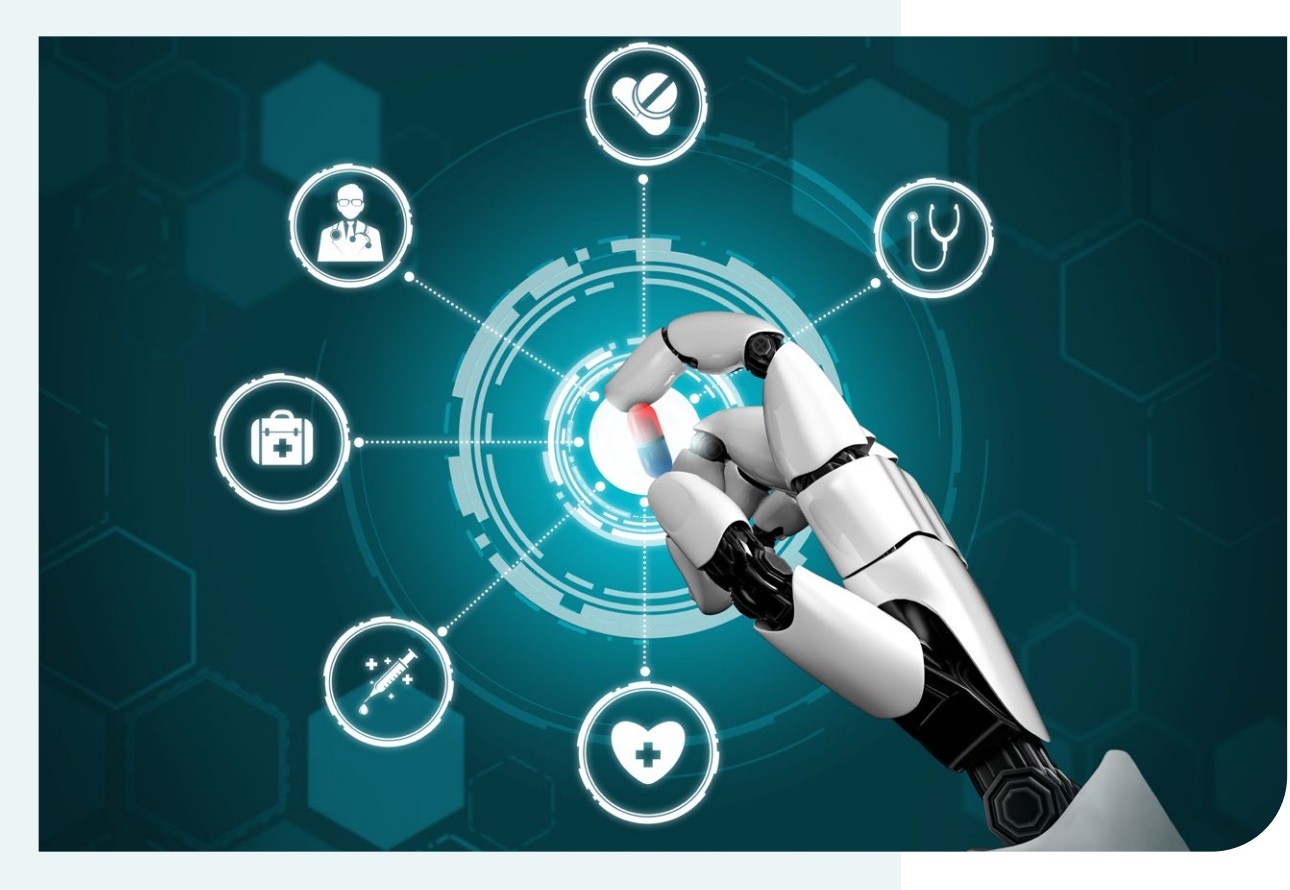
CONTRIBUTION FROM RESEARCH CENTER FOR PHARMACEUTICAL ENGINEERING (RCPE)

research center pharmaceutical engineering

RCPE awarded two FDA contracts for next-generation pharma technology



Digital simulation enhances pharma product and process development

The Research Center for Pharmaceutical Engineering, a global leader in pharmaceutical engineering sciences, has been awarded funding for two projects by the U.S. Food and Drug Administration (FDA), which reports to the U.S. Department of Health and Human Services.

With an average of only 5 to 10 projects awarded to EU companies by the FDA each year, this development represents a landmark achievement for RCPE and reflects the potential impact of these projects within the global pharma industry.

The two projects, which started in the fourth quarter of 2020, will focus on utilising advanced technologies to improve production processes within Pharma.

Prof. Johannes Khinast, CEO and Scientific Director of RCPE, is excited: "We are incredibly proud to have been awarded two FDA contracts in a single year. It is a fantastic endorsement of our pioneering approach to solving drug manufacturing challenges. Having achieved this important milestone, we look forward to working with our partners to improve their manufacturing technology, ultimately benefitting patients around the globe."

Real–time process monitoring

Fifteen years ago, the FDA published the guidance "PAT - A Framework for Innovative Pharmaceutical Development, Manufacturing, and Quality Assurance". This document created the basis for the adoption, development and application of PAT (Process Analytical Technology) tools in the pharmaceutical industry. While much progress has been made in some fields, monitoring and control approaches are still in need. One example is the coating process of tablets, where the coating layer thickness and quality can directly impact the product performance.

In partnership with major global pharma companies, including MSD and Pfizer, RCPE will use the FDA funding to investigate the use of optical coherence tomography (OCT) for real-time monitoring and control of the drug tablet coating process. Integrating this technology with artificial intelligence and machine learning approaches may enable researchers to effectively prevent errors in tablet coating before they occur. This can help to increase efficiency, minimise environmental impact and allow life-changing medicines to reach patients more rapidly.

High–fidelity digital twin

In addition, RCPE will also partner with MSD, Pfizer and other collaborators to pioneer the use of digital simulation tools in drug product manufacturing and process development. Building on previous work, this project will focus on the development of a digital twin-based platform to virtually explore drug production control strategies. The platform will model products, processes and conditions to enable earlier evaluation, as well as optimisation and scale up, without the need for extensive lab-based experiments. Adopting digital simulations is therefore anticipated to reduce not only drug development and manufacturing time, but also energy consumption and carbon footprint for next-generation pharmaceutical production.

Having been awarded funding by the FDA for these two projects, RCPE is now well positioned to achieve its vision of enhancing pharmaceutical product development through technological innovation in order to improve patient access to medicine.

Dr. Thomas Klein, CEO and Business Director of RCPE, comments: "We are delighted that the FDA has recognised the potential our projects offer for the industry and patients worldwide. The expertise and commitment of our multidisciplinary team have been instrumental in achieving our current success.

We are excited to further build on our legacy of innovation as we work to transform pharma product development through the power of new technologies."

Connect with us!

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CONTRIBUTION FROM FROM SITEX 45 SRL

Smart optical device for temperature sensing, based on innovative luminescent IV–VI quantum dots (QD`s) doped complex nanostructured thin films TEMSENSOPT

The innovation regarding the state of the art is related to: 1) Achievement of complex nanostructured materials based on innovative PbS and PbSe, QDs-doped phosphatesilicate thin films having enhanced luminescence and temperature sensitivity properties (high luminescence quantum efficiency, fast response, reproducibility under thermal cycling by temperature raising and cooling) for NIR domain as well as improved chemical and thermal stability by adding Al_2O_3, TiO_2, ZnO, ZrO_2. According to the knowledge of the present proposal authors, PbS and PbSe QDsdoped phosphatesilicate solgel thin films with complex composition was not reported so far. These materials could be considered as novel and promising candidates, applied in temperature sensing devices; 2) Achievement of an integrated prototype device based on innovative PbS/PbSe QDsdoped phosphatesilicate thin films having performing NIR luminescence efficiency and temperature sensitivity, simplicity, reliability and reproducibility, short response time, for real time noncontact temperature measurements applied for industrial environment protection.

The main objectives of the project are: i) Technology validation for synthesis of optical materials based on IVVI QDsdoped phosphatesilicate thin films with temperaturedependent luminescence; (ii) Achieving a temperature sensing device that incorporates the synthesized materials. High luminescence efficiency, based on quantum confinement effect, causes QDs to become useful low cost optical indicators for luminescencebased temperature sensing systems operating up to 400oC.

The specific objectives are consistent with the aim of the project: (i) To develop a laboratory solgel technology for the synthesis of innovative PbS and PbSe QDsdoped phosphatesilicate thin films deposited by: a) spin coating technique on planar substrates (silicon/glass/quartz), and, as an alternative route, by b) dip coating technique in which the deposition occurs on optical fibers; (ii) To investigate the luminescence properties in dependence on temperature (up to 400oC), correlated with the quantum confinement effect of PbS and PbSe QDs embedded in phosphatesilicate thin films with complex composition (Al_2O_3,

TiO_2, ZnO, ZrO_2 are added to improve chemical and thermal properties); (iii) To perform an experimental demonstrative setup followed by the prototype device that incorporate the innovative PbS and PbSe QDsdoped phosphatesilicate thin films with complex composition, showing the performing sensitivity to measure the environmental temperature changes, based on NIR luminescence variation.

Consortium

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University of Navarre, Pamplona, Spain

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CONTRIBUTION FROM FROM SITEX 45 SRL

Photo–Piezo–ActUators based on Light SEnsitive COMposite

H2020-EU.1.2.1.FEOPEN-01-2018-2019-2020 - FET-Open Challenging Current Thinking

Start date: 1 December 2019, **end date:** 30 November 2022

Our vision is based on the use of low cost photo-mobile polymer (PMP) films and a lead-free piezo-composite (PZL) to target their use in innovative new fields never before considered. Starting from phenomenological and modelling aspects of the composite materials, the consortium will fabricate and experimentally characterize Photo-Piezo-Actuators (PMP-PZL) proof of concept devices.

This study can open a new window on the future development of light-driven nanomotors and their potential applications in different areas such as biomedical, environmental and nanoengineering fields.

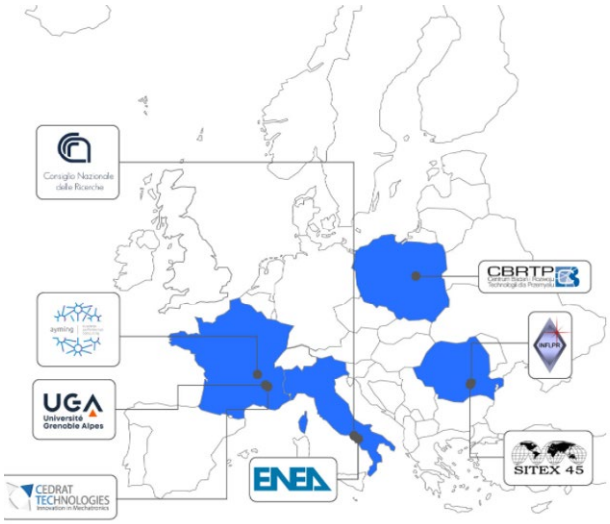
PULSE-COM aims to explore technological breakthroughs developing and integrating a new class of Photo-Piezo-Actuators to open a radical new future technology. Our vision is based on the use of low cost photo-mobile polymer(PMP) films and a lead-free piezo-composite (PZL) to target their use in innovative new fields never before considered. Starting from phenomenological and modelling aspects of the composite materials, we will fabricate and experimentally characterize Photo-Piezo-Actuators (PMP-PZL) proof of concept devices. The project will address through an ambitious interdisciplinary research to the employment of proper materials and the appropriate optical strategies to increase and tune the absorption of the light and finally to increase the PMP devices efficiency. With the same target electromechanical models and innovative growth processes will guide the optimization of the piezocomposite to improve its performance, and thus its sensitivity when coupled with the PMP. The PMP-PZL device will be integrated into more complex opto-electronic systems through high-risk incremental research to achieve pioneering industrial implementation. Specifically, we target the realization of cutting-edge applications based on photo-activated Meso-scale machines as opto-switches and opto-microvalves, Reconfigurable Optics and Photoenergy Harvesting Systems. Our

study can open a new window on the future development of light-driven nanomotors and their potential applications in different areas such as biomedical, environmental and nano-engineering fields.

Consortium

PULSE-COM gather 8 partners from 4 different European countries:

- CONSIGLIO NAZIONALE DELLE RICERCHE AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, Italy
- L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE, Italy
- UNIVERSITE GRENOBLE ALPES, France
- CEDRAT TECHNOLOGIES SA, France
- SITEX 45 SRL, Romania
- INSTITUTUL NATIONAL DE CERCETARE DEZVOLTARE PENTRU FIZICA LASERILOR PLASMEI SI RADIATIEI, Romania
- CENTRUM BADAN I ROZWOJU TECHNOLOGII DLA PRZEMYSLU SPOLKA AKCYJNA, Poland
- AYMING, France



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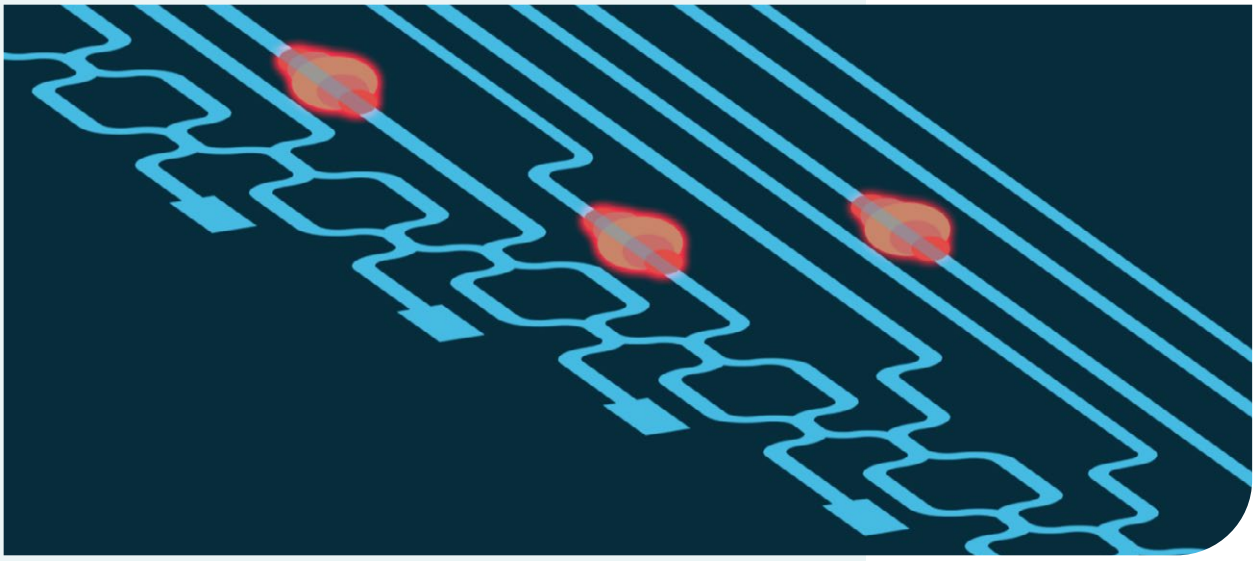
CONTRIBUTION FROM UNIVERSITY OF GRAZ, INSTITUTE OF PHYSICS

SuperPixels – Redefining the Way We Sense the World



Integrated Photonics for Building Next–Generation Camera Technology

Every day, billions of pictures are taken globally, capturing the world around us primarily through the recording of the intensity of light. Our eyes, much like cameras, are only sensitive to brightness, where colour is inferred through unique optical interactions. Consequently, most of the tools and technology we use for imaging our world are based on the same concept of sensing intensity distributions only. However, the light surrounding us carries considerably more information, where the polarization and phase of light can reveal critical information that is often overlooked through intensity only observations. Breaking away from this approach and developing cameras that can simultaneously observe the world in phase, polarisation, and intensity will lead to a paradigm shift in optical imaging and sensing.

The SuperPixels project, aims to tackle the challenge of imaging beyond intensity and is working to develop a new integrated photonic sensor platform that will revolutionise the way we process and detect light allowing for the full measurements of light's many degrees of freedom.

SuperPixels-based sensor technology is designed to be integrated into future smartphones, microscopes, cameras, optical communication systems, and environmental sensors. These

next generation systems have a wide range of applications across both scientific and industrial sectors including: nano-particle detection and tracking, compact atmospheric corrected imaging systems, endoscopy, on-chip processing of structured light and adaptive communication systems.

At the heart of the SuperPixels chip is a versatile and dynamic integrating photonic chip with free-space-optical enhanced grating couplers, waveguides and meshes of Mach-Zehnder interferometers that can both measure and transform intensity, phase and polarisation distributions of any incident optical field.

For this project, the University of Graz (Austria), University of Glasgow (Scotland), Max Planck Institute for the Science of Light (Germany), Institute of Scientific Instruments at the Czech Academy of Sciences (Czech Republic), Politecnico di Milano (Italy), and Stanford University (US) are working together to develop this next-generation integrated photonics and sensor technologies that push the boundaries of our understanding of structured light. The SuperPixels project has already resulted in global recognition with over 20 publications, numerous international presentations, and growing industrial engagement.

Prof Peter Banzer, University of Graz, is leading the imaging work package, focusing on applications of this next-generation camera technology in nano-metrology, high-resolution microscopy and imaging, fibre-based endoscopy. Co-development is critical in creating a new photonic platform, where both fundamental and applied studies have guided the design of the SuperPixels technology. At the heart of such studies are the interaction of light with matter at small length-scales and the spatial degrees of freedom of electromagnetic fields engineered at the nanoscale. In this context members of the consortium recently showed that ultra-precise tracking of nanoparticles is possible using a SuperPixels-like configuration [1,2]. Next steps include, but are not limited to, the utilization of SuperPixels technology for the study of nano-systems from localization and parameter retrieval all the way to imaging.

The SuperPixels project received more than €2,4 million of funding in the framework of the European Union's Horizon 2020 research and innovation programme Future and Emerging Technologies (FET) Open. The 4-year project is coordinated by Prof Martin Lavery at the University of Glasgow.

[1] P. Beck et al. LPR 14, 2000110 (2020)

[2] A. Bag et al., Nat. Commun. 11, 2915 (2020)

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SuperPixels

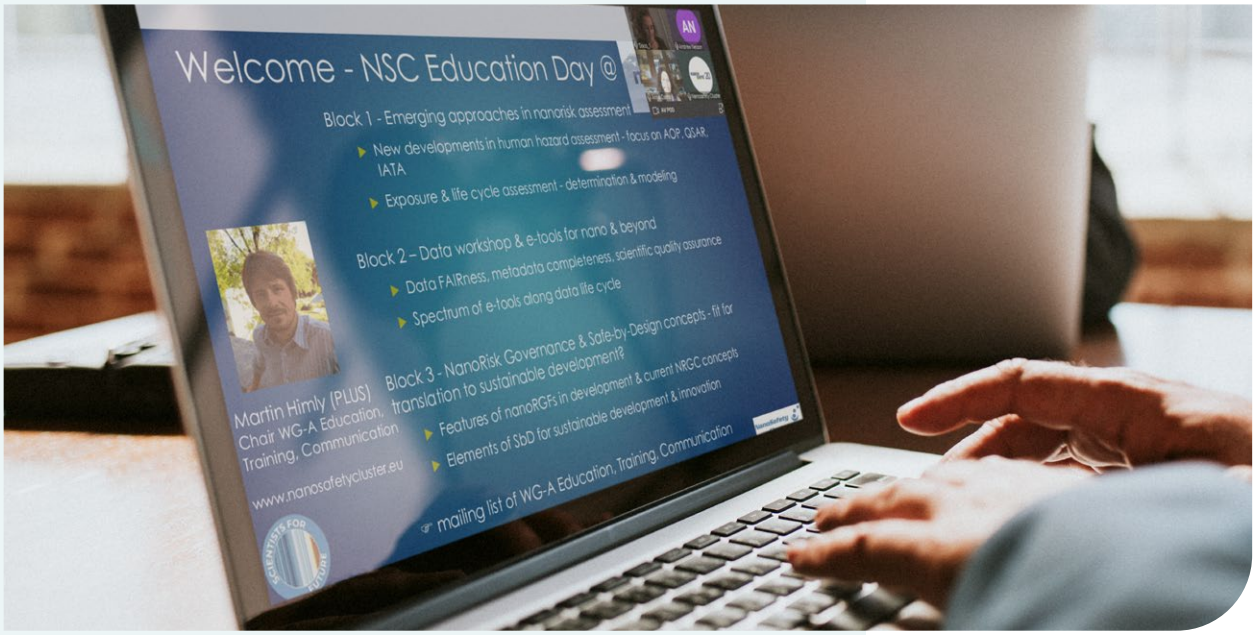
This project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 829116.

SEE WEBSITE

BNN retrospect

RECORDINGS FROM THE NANOSAFETY CLUSTER EDUCATION & TRAINING DAYS

16th – 23rd of November 2020, online event



As a response to Covid-19 the nanoSAFE community met virtually for nanoSAFE 20 from 16th – 20th November 2020. The event, hosted by the Chair and Co-Chair of the NSC Working Group A: Martin Himly and Stella Stoycheva, enabled all participants to share the latest R&D results on envi-ronmental, health and safety issues related to nanomaterials and beyond.

The presentations were captured and are now available to view on the NSC YouTube Channel.

The agenda can also be downloaded here.

For more information about upcoming NSC activities please visit www.nanosafetycluster.eu.

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4TH ERWIN SCHRÖDINGER SYMPOSIUM 2021

11th – 12th of January 2021, online event

„Advanced Materials“ have been defined as „Key enablers“ in all national and transnational value networks to achieve sustainable development goals. With the 4th symposium we reached an international, inter- and transdisciplinary audience. The event benefited from the spontaneity and enthusiasm with which the speakers presented their current research findings and contexts. Extremely lively discussions and suggestions for further research ideas emerged from the auditorium. Interdisciplinary exchange and information sharing took place surprisingly well in the virtual setting. We are somewhat more relaxed about the future of virtual conferences and colloquia, having found this event positive, even though our goal will always remain physical presence as the basis of scientific communication. On behalf of the Board of Directors, the Erwin Schrödinger Society would like to thank its Vice President, Prof. Dr. Wolfgang Kautek, for his efforts in making this event a success. He was supported by Dr. Aida Naghilou, MedUniWien and Dr. Oskar Armbruster, Plasmo, to whom we would also like to express our sincere thanks.

We would also like to thank the NanoNET Gesellschaft, Rudolf Heer, and BioNanoNet GmbH, Andreas Falk, for carrying out the NanoSyn project, which we owe to funding from the Federal Ministry for Climate Protection, Environment, Energy and Mobility.

Feel free to download the presentation slides here.

More details about this event can be found on the ESG website.

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2021 NNI STRATEGIC PLANNING STAKEHOLDER WORKSHOP: CHARTING THE PATH FORWARD

11th – 13th of January 2021, online event

BNN attended the NNI Strategic Planning Stakeholder Workshop with the theme "Charting the Path Forward" which took place virtually from 11th – 13th January 2021. More than 280 people participated at this interesting workshop.

Over the past 20 years, the National Nanotechnology Initiative (NNI) has supported nanotechnology discovery, development, and deployment, and has nurtured the strong ecosystem that exists today. Building on this foundation, nanoscience will underpin a wide range of advanced technologies and enable solutions to challenges into the future. Conversations at this workshop identified effective mechanisms to advance research and development, strategies for communication, and priority topics to shape future directions.

For more information about the National Nanotechnology Initiative (NNI) visit its website.

The first day of the meeting was dominated by tow panel discussions. The first panel discussion dealt with world-class research & development and the send panel discussion had the theme "the Nanotechnology Development Pathway". On the next meeting day there were interesting concurrent breakout sessions with the topics research & development, commercialization, physical & cyber infrastructure and responsible development.

This meeting day was closed with an exciting synthesizing breakout discussion.

The archives of the plenary sessions are posted on the NNI's YouTube channel NanoTube and on the workshop webcast site. For background information on NNI physical and cyber infrastructure networks click here.

NanoSyn

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

NanoSyn is funded by the Federal Ministry of Republic of Austria, Climate Action, Environment, Energy, Mobility, Innovation and Technology.

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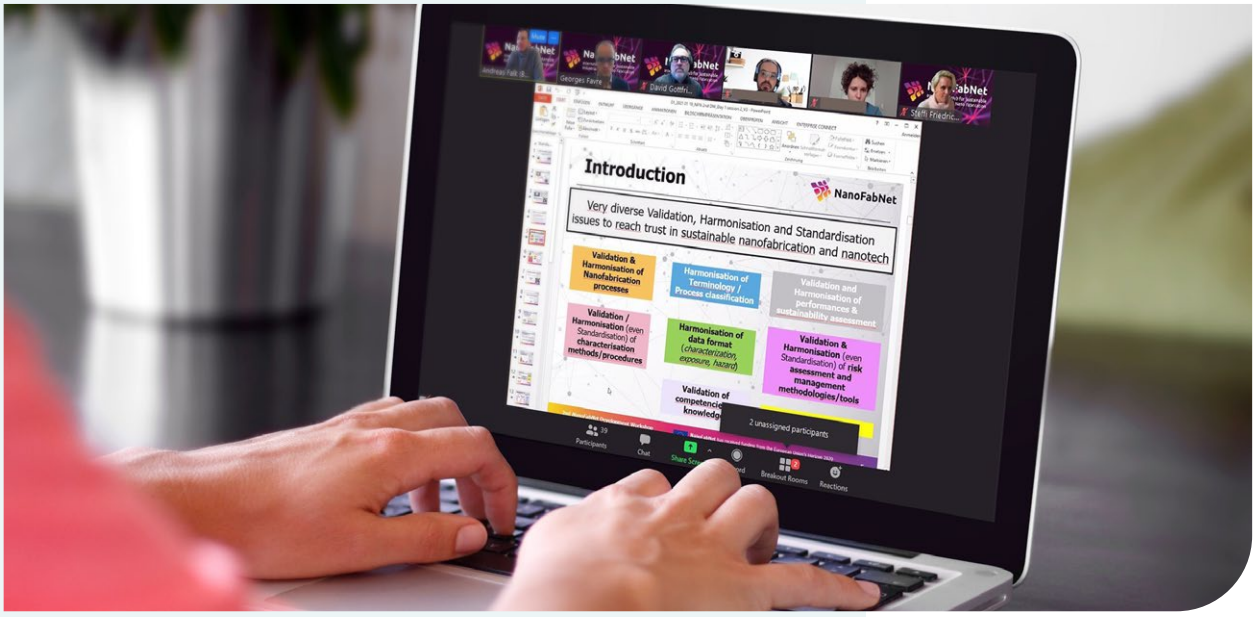
NANOFABNET CONCLUDES 2ND DEVELOPMENT WORKSHOP

20th – 21th January 2021, online



The NanoFabNet consoritum hosted an interactive online workshop from January 20th to 21st 2021, which attracted more than 170 participants from the research, industrial, and academic sectors working in the fields of nanotechnology and sustainability, gathering valuable insights into the needs and solutions for the development of this important sector.

The aim of the workshop was to offer nanotechnology stakeholders the opportunity to discuss the challenges and opportunities currently facing the sector, as well as the chance to connect to other professionals and researchers to build the nano community. The information collected will be used to structure the upcoming NanoFabNet Hub (the core output of the NanoFabNet project) to be launched in 2022.

A variety of sessions were held at the workshop. Specific breakout sessions included:

- ✔ Sustainability & NanoFabNet Hub Structure
- ✔ Validation, Harmonisation, Standardisation & NanoFabNet Hub Structure
- ✔ Ethical Requirements of Nanotechnology & Nanofabrication
- ✔ Infrastructure & Skills of Nanotechnology & Nanofabrication

✔ Global NanoFabNet Communications & User Experience

The workshop enabled lively discussion and exchange, encouraging attendees to actively engage in the process through various online tools, which saw the event maximising the quality of outcomes. From live polling to interactive whiteboard sessions, presentations to the 1st NanoFabNet Pub Quiz, attendees were offered a full programme to support the aims of the event.

Lead Project Coordinator and CEO of AcumenIST Dr Steffi Friedrichs considered the event a success. "We had planned a complex meeting with interactive tools to come as close as possible to the much missed and needed face-to-face experience of engagement workshops – everything was live and happened in real-time, and it all worked very well. The workshop's success was evident from the lively participation and the engagement of attendees, and their input gave us the valuable information our consortium needs to now firmly establish the NanoFabNet Hub for the community."

The main outcomes of the discussions have already proven helpful in aligning and developing the ongoing strategy for the NanoFabNet Hub, which will now be implemented over the coming months. From gaining a solid overview of the needs for facilitating knowledge exchange, delivering workshops and developing new trainings, to the requirements for sustainability indicators, validation services and harmonisation support, the event was able to explore the needs of this community, gathered directly from those who are at its heart, allowing the NanoFabNet Hub to co-create solutions directly with those who would benefit from them.

Other insights were also gained in the areas of high-level characterisation and metrology activities as well as ethics requirements for the sector as a whole, which can now pave the way for further proactive initiatives to be implemented by the NanoFabNet Hub. User requirements for online and in-person services for the sustainable nanotechnology community were also explored in- depth to ensure that whatever initiatives and solutions the NanoFabNet Hub implements, these will be conducted through a user-friendly approach, ensuring constant value and relevance in this emerging work.

To join in these efforts as a stakeholder or for more information about project partners, upcoming events and our ongoing outcomes, please visit the NanoFabNet website: www.nanofabnet.net or contact NanoFabNet@AcumenIST.com.

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.

SABYDOMA'S 1ST LEGAL WORKSHOP

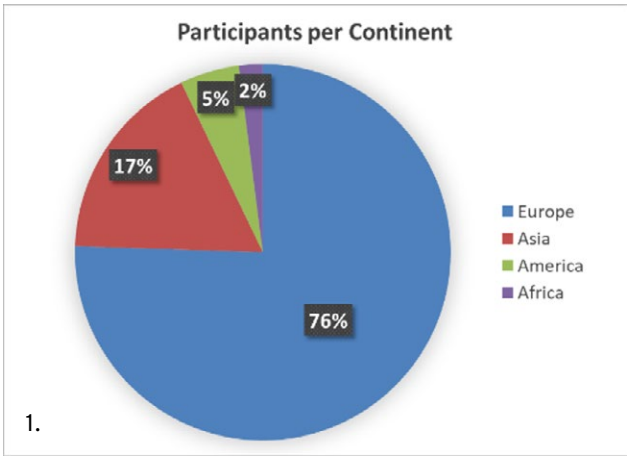
SAFE-BY-DESIGN

28th January 2021, online

On Thursday 28th January 2021, BNN was one of the key organisers in the frame of EU H2020 project **SABYDOMA the 1st Legal Workshop on Safety-by-Design**. The virtual workshop was moderated by Mr Anthony Bochon, from Gil Robles – San Bartolome & Partners (Belgium), who is SABYDOMA project's expert in legal practice nanotechnology-related regulations.

With expert lawyers and scientists from different regions of the world among the speakers, the workshop covered legal aspects of the Safe-by-Design approach in the field of nanotechnology, expanding out to "By-Design" approaches relevant in different technological industries, such as chemical and pharma.

Scientists, industry and commercial managers, public policy stakeholders, lawyers (in-house, in a public administration or in private practice), compliance officers, patent attorneys, trade associations and NGOs representatives and other stakeholders, interested in the safe design of (nano)technologies participated in the workshop. A total of 100 participants joined it to increase their knowledge in SbD (legal) aspects and practical approaches of SbD worldwide. As can be seen in the figures below, the workshop had a global outreach and included a wide range of stakeholders.



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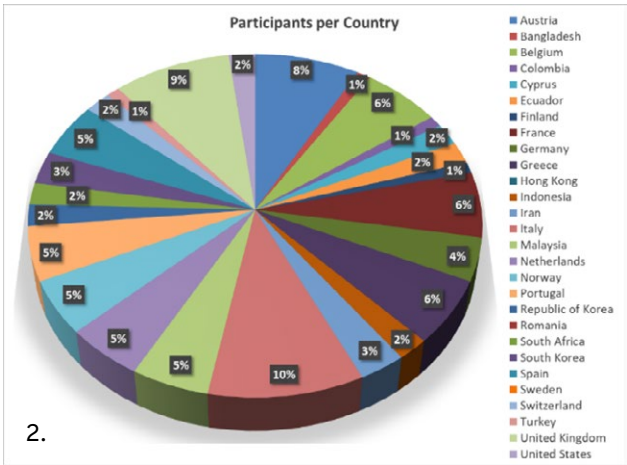

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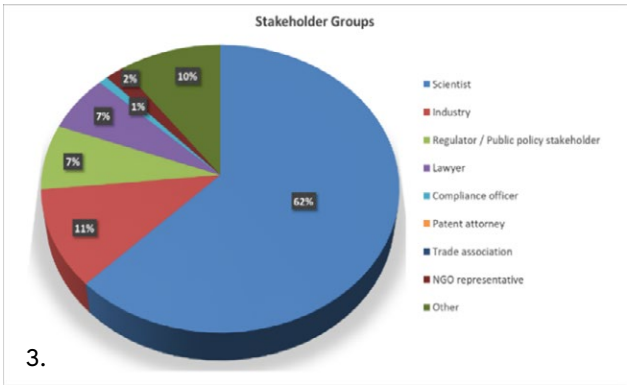

3.

Figure 1. & 2. Participants per Continent & per Country

Figure 3. Representation of the different stakeholder groups among the workshop participants

After a warm welcome to the workshop by the chair/moderator Mr Anthony Bochon, SABYDOMA's coordinator, Prof. Andrew Nelson, from the University of Leeds, UK, introduced the project to the audience as well as its close links with the SbD concept. Prof. Mohammad Ershadul Karim, from the Faculty of Law of the University of Malaya, Malaysia, presented the Asian perspective of the SbD approach and Mr Anthony Bochon, attorney at law at the Brussels Bar and associate lecturer at the Université Libre de Bruxelles, Belgium, the EU one. Dr Mirella Miettinen, from the Law School at University of Eastern Finland, extended that to further "By-Design"-approaches and interdisciplinarity. This session was followed by the presentation of the current literature status of the SbD concept by Dr Benjamin Trump from the University of Michigan (USA) and Factor Social (Portugal), and Mr Ignasi Gispert from Applied Nanoparticles S.L., Spain. In the last "formal" session, Prof. Ira Rubinstein, from the New York University School of Law, USA, and former deputy general counsel of techgiant Microsoft, gave a talk about the technologies "By-Design" and lessons from privacy-by-design.

The workshop ended with a very interactive Round Table discussion on possible SbD legal approaches, where the six panellists (Prof. Fernand Doridot (from the Institut Catholique d'Arts et Métiers of Lille, France), Prof. Andrew Nelson (from the University of Leeds, UK), Prof. Maria Dusinska (from NILU – Norwegian Institute for Air Research, Norway), Dr Igor Linkov (from Factor Social, Portugal), Dr Benjamin Trump (from the University of Michigan (USA) and Factor Social (Portugal)), Mr Ignasi Gispert (from Applied Nanoparticles S.L., Spain) were interviewed by the moderator Anthony Bochon.

This first workshop dedicated to the emerging legal definition of SbD will be used as a starting point for an informal working group of stakeholders which will be consulted and share information during the project on legal definition of SbD.

The presentations and recordings of the workshop are available on the project website.

Get connected with SABYDOMA on:

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

SMART4FABRY FINAL WORKSHOP

3rd February 2021, online

The Smart4Fabry Final Workshop was held on 3rd February 2021. The workshop presented the history and the most outstanding results of the Smart4Fabry project.

Dr. Guillem Pintos-Morell, MD, PhD (Paediatrics), an authority in the areas of Rare Diseases and Hereditary Metabolic Disorders and Lysosomal Storage Disorders, made the introduction to the workshop.

The speakers were researchers from the consortium, who described the history of the project from the initial proposal to its latest results. They explained how the solution proposed by Smart4Fabry was developed, why and what for. They expounded how, through cooperation at the European level, each work package contributed to achieve the projects objectives.

The workshop was divided into 9 sessions with a total of 12 talks and a final round table. The narrative of the program goes from the clinical problem of Fabry's disease to the results obtained by the project, through all its phases.

The target audience was broad, ranging from diverse scientific profiles to graduate students.

- Scientific community
- Researchers in the addressed Topics (rare diseases, ionic transport at cell membrane, nanotechnology, self-assembling technology, drug delivery, nanomedicine)
- Industry, specifically pharmaceutical companies
- Patients associations
- Policy-makers and Health Authorities
- Related projects and initiatives
- People in general, civil society

For more information about the Smart4Fabry project visit the project website or have a look on the project's latest publication on "Application of Quality by Design to the robust preparation of a liposomal GLA formulation by DELOS-susp method" in the Journal of Supercritical Fluids, where BNN also contributed as co-author (doi:10.1016/j.supflu.2021.105204).

Contact

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Get connected with Smart4Fabry on:

SEE WEBSITE

Smart-4-Fabry project has received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement n° 720942.

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OUR FIRST BIONANONET MEMBER

WELCOME WEBINAR WAS A SUCCESS!

9th February 2021, online

The 1st BioNanoNet Member Welcome Webinar took place virtually on 9th February! More than 40 people attended our webinar where our new members BDI-Bioenergy International GmbH, BRAVE Analytics Gmb, Competence Center CHASE GmbH and lixtec GmbH presented their companies. All presenters gave an insight into their interesting expertise and had a fruitful discussion with the participants!

Download the videos and the presentation slides of each presenter:

Fabian Weinhandl presenting **BDI–Bioenergy International GmbH**

- Download presentation
- Watch video

Christian Hill & Gerhard Prossliner presenting **BRAVE Analytics GmbH**

- Download presentation
- Watch video

Patrick Pammer presenting **Competence Center CHASE GmbH**

- Download presentation
- Watch video

Gerold Meininger presenting **lixtec GmbH**

- Download presentation
- Watch video

All videos published by BNN so far can be watched on our BNN YouTube channel.

„DEVELOPING CROSS-BORDER NETWORKS OF ATI TECHNOLOGY CENTRES IN THE FIELD OF LOW CARBON INDUSTRIAL PROCESSES: CHALLENGES AND OPPORTUNITIES" WORKSHOP

11th February 2021, online

The workshop "Developing cross-border networks of ATI technology centres (TCs) in the field of low carbon industrial processes: challenges and opportunities" was one of the workshops organised within the Advanced Technologies for Industry (ATI) project (https://ati.ec.europa.eu) commissioned by the Executive agency for Small and Medium-Sized Enterprises and the European Commission DG GROW.

The objective of this workshop was to gather insights for developing a series of recommendations on how networks of technology centres in the field of low carbon industrial processes can be more effective in addressing and fulfilling the needs of SMEs and industry, by among others including actors over the entire value chain.

BNN participated in the workshop and will monitor the developments towards cross-border networks relevant especially for the BNN-coordinated technology platforms SCA, AMI and NMA.

Feel free to download the conclusions of the ATI Workshop!

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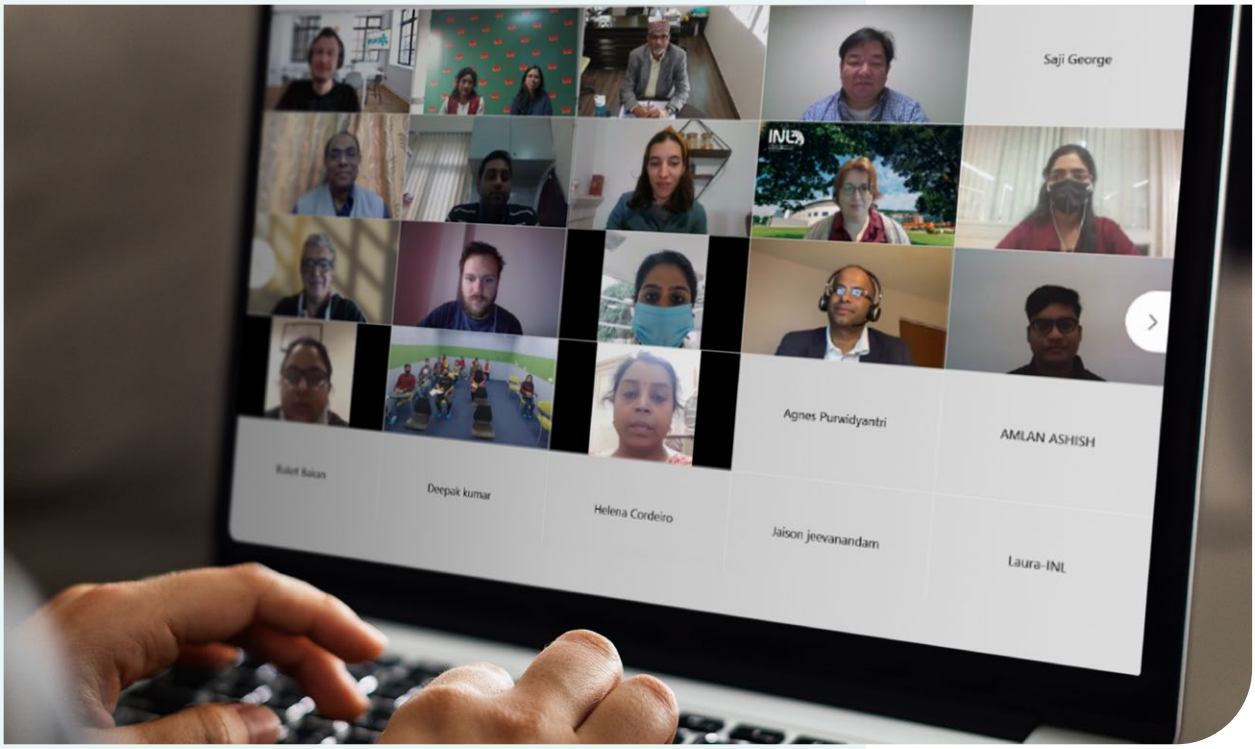
WEBINAR ON NANOSAFETY / ECONANOTOXICITY AND REGULATORY ASPECTS OF NANOPRODUCTS

19th February 2021, online



The webinar on nanosafety / econanotoxicity and regulatory aspects of nanoproducts took place virtually on 19th of February 2021. This event was organized by the BNN-cooperation partner The Energy and Resources Institute (TERI) together with the International Iberian Nanotechnology Laboratory (INL), attracting approximately 100 participants.

The event was opened by Ernesto Alfaro from INL (Portugal), coordinator of Sinfonia-project, setting the scene around the health and environmental nanosafety aspects addressed at his centre, highlighting especially the organ-on-chip and microfluidics techniques that shall support the reduction of animal testings. Begona Espina, also from INL, then discussed advancements in econanosafety, extending the scope to tools, methods and applications for safe-by-design in the nano-field.

The second session centralized around nano-regulations, in which Amit Kumar Dinda from AIIMS (India) discussed guidelines for evaluation of nanopharmaceuticals, followed by Alok Adholeya from TERI (India), presenting ecosafety and regulatory guidelines for the evaluation of NanoAgri-products. Both presentations clearly highlighting the importance of harmonization across the globe and to look very carefully into each of the sectors to tackle the specific needs for those.

After the question and answers session, the final round was chaired by Alok Adholeya, including Tae Hyun Yoon (Institute of Next Generation Material Design, Korea), Amitabha Acharya (CSIR IHBT, India), Saji George (McGill University, Canada) and Andreas Falk (BNN, Austria) as panellists. It was discussed the way forward to strengthen global collaboration in the field of nanosafety, taking advantage of EU NanoSafetyCluster, international network initiative, NanoFabNet as hub for sustainable nanofabrication, and how to further develop regulatory frames without stifling innovation.

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

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BIONANONET GENERAL ASSEMBLY AND BNN NETWORKING EVENT

4th March 2021 , online

The BioNanoNet General Assembly and BNN Networking Event too took place virtually on 4th March as an online meeting, attracting more than 70 participants.

The event started with the BioNanoNet General Assembly chaired by the president of the BioNanoNet Association Erwin Kubista, updating our members about the performance and reporting about the association actions.

The BNN Networking event then kicked off with the key notes from BNN-supported success stories: the NextGenMicrofluidics project presented by Martin SMOLKA from JOANNEUM RESEARCH followed by the presentation of its (Open Innovation Test Bed) sister project FlexFunction2Sustain by John FAHLTEICH from the Fraunhofer Institute for Organic Electronics. Nazende GÜNDAY-TÜRELI from MyBiotech presented the nanopharmaceutical test bed project PHOENIX, which she is leading as scientific coordinator. The session was closed by Juan Antonio Tamayo RAMOS from the Universidad de Burgos (ICCRAM) who informed about the project DIAGONAL. The recordings of the presentations about NextGenMicrofluidics, DIAGONAL and PHOENIX and FlexFunction2Sustain are now available. Click here to watch the presentations!

The BNN Networking Session “Part 2” focused on new initiatives to address upcoming calls within the framework Horizon Europe. Applying digital networking tools enabled to implement a Call Matchmaking for our members with the opportunity to identify potential collaborators with complementary expertise to form consortia for specific call topics. Supported by the BNN-team the participants could learn more about other members‘ call interest, extend their contacts and concretize their project ideas and initiating proposals.

The BioNanoNet community already comprises more than 60 member organizations. The continuous growth of the network enables expanding the thematic horizon of BioNanoNet to the benefit of our members and thus supporting research, development and innovation activities in different branches.

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

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Conference calendar

BNN EVENTS & BNN CO-ORGANISED EVENTS

BioNanoNet Annual Forum & BNN Networking Session

When? 16 – 17 September 2021

Where? tbd

More information coming soon!

NanoTox 2021 *(co-organized by BNN)*

When? 20 – 22 April 2021

Where? Online meeting

For more details click here!

Nanosafety Training School
From Basic Science to Risk Governance *(co-organized by BNN)*

When? 20 – 25 June 2021

Where? Venice, Italy

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

For more details click here!

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BNN PARTICIPATES

InterNanoPoland 2021

When? 14 – 15 April 2021

Where? Online meeting

For more details click here!

EuroNanoForum 2021

When? 5 – 6 May 2021

Where? Online meeting

For more details click here!

Global Innovation Summit 2021

When? 18 – 20 May 2021

Where? Online meeting

For more details click here!

IMAGINE 21 & Austrian Data Day21

When? 16 – 17 June 2021

Where? Klagenfurt, Austria

For more details click here!

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MEMBER EVENTS

NANOTOX 2021

When? 20 - 22 April 2021

Where? Online meeting

This year, due to the current COVID pandemic and the restrictions imposed by the UK and Scottish Governments on face-to-face meetings, the NanoTox 2021 Organising Committee has taken the difficult decision to move the conference to a Virtual Conference to ensure the safety of our attendees and invited speakers.

The Virtual Conference remains aimed at personnel from research and academic institutions as well as from industry, government agencies, and other relevant organisations interested in:

- Nanotechnology
- Hazard and risk assessment of nanomaterials and advanced materials, and their governance
- Alternative methods for nanomaterial hazard testing, release and exposure.
- safe(r) by design (SbD) of nanomaterials and advanced materials.

The 2021 Virtual Conference is jointly organised by three leading EU Horizon 2020 Projects, BIORIMA, PATROLS and GRACIOUS, focusing on development of novel tools for evaluating human and environmental hazard, and strategies for nonmaterial characterisation, classification, grouping and read-across for risk analysis.

BIORIMA has submitted a significant number of abstracts, some of which are highlighted in the next article. Registration is now open here.

For a more complete view of the R&D activities that have been performed so far in BIORIMA and to get in touch with our experts, please feel free to follow us on:

SEE WEBSITE

dHealth
15th Annual Conference on Health Informatics meets Digital Health

When? 11 - 12 May 2021

Where? Vienna, Austria

This year's motto is: "Digital Health – navigating healthcare through challenging times" For more details click here!

Webinar Series: „Advanced Organotypic Models for Toxicological Screening''

When? 16 March 2021 & continuously bi-weekly until summer 2021

Where? Online meeting

The ActiTOX consortium is inviting everyone to join a webinar series on Advanced organotypic models for toxicological screening. The series started on 16th of March 2021 and will continue bi-weekly until summer 2021.

A detailed program and information on the registration can be found at Actitox website.

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Finally

We hope you enjoyed our BNN NEWSLETTER! Please do not hesitate to contact us if you would like to give us any suggestions or feedback! Our next BNN NEWSLETTER will be published in June 2021. **BioNanoNet members are welcome to send their contributions until 14th of June 2021!**

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SUSTAINABILITY LEADS THE WAY.

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