BIO NANONET

NEWSLETTER

01/2016

March 2016

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Our next BioNanoNet newsletter will be published in June 2016.
BioNanoNet partners are welcome to send their contributions until 10th of June 2016!”

Editorial -
Contemporary issues from the network

Dear ladies, dear gentlemen,

Adding value is hard work. However, being successful with this, pays back for very intensive working periods in the year. Since years, BioNanoNet has been supporting not only the development of projects but also prepared the ground for research and innovation in Austria as well as on international level. An important part of this is the continuous dialogue with our members, who can offer the expertise needed for technical developments and applications. Indeed, a challenging task is to bundle top-experts and by this gaining critical mass. Here we would like to acknowledge and thank our members for their collaboration to bring their expertise into the sensortechnology folder – APPLICATIONS & TECHNOLOGIES. This document, which strengthens the visibility of the sensor-group, was already presented at conferences and strategic meetings (e.g. at the European Commission). Special thanks to Nikolaus Ladenhauf and Simone Jagersbacher, both doing great work in structuring and designing the folder.

Furthermore, the efforts to shape Austrian community in the field of nanomedicine will be transferred to a higher level by going public with the "NanoMedcine-Austria"-group which will enable to thematically interact on European level bringing needs and visions identified by the Austrian nanomedicine community to strategic documents of European platforms. The NanoMedicine-Austria day (April 5th; **registration is open till March 18th!**) will take place on the day before the international BioNanoMed-conference (April 6th-8th) starts, hence, both events will be in Krems – you are kindly invited to participate at these events.

In addition to the network-efforts, BioNanoNet could strengthen the visibility by further specializing in the field of nanosafety and safety-by-design. Here, in recent years we could establish core competence well known in Europe. Now we are able to cooperate as research partner in scientific and innovation projects, developing tiered safety assessment strategies with industrial partners. To further expand this position, BioNanoNet co-coordinated a H2020-proposal to create a network of nanosafety-centres in Europe and globally. Evaluation process is not yet finished, however, in any case, BioNanoNet will keep supporting development in the nanosafety field as connecting point of pilot line projects (industrial innova-

tion liaison-group; strongly linked with NanoSafety Cluster and European Pilot Production Network) as well as a key driver of the “Closer-to-the-market”-roadmap. This will increase the important interaction between research and industry in this developing area, enabling breakthroughs in a variety of sectors.

Sincerely,

BioNanoNet-team

BioNanoNet *news*

BioNanoNet welcomes its new members

Gold member:

- Vienna University of Technology

Silver member:

- Infineon Technologies Austria GmbH
- Materials Center Leoben - MCL

Extraordinary member:

- Hahn-Schickard

Sensortechnology Folder - APPLICATIONS & TECHNOLOGIES

Sensor Technology Folder published by BioNanoNet

Following the “role model” of the EURO-NanoTox Expertise Folder, 12 partners within the focus group Sensor Technology (AIT Austrian Institute of Technology GmbH, Austrian Centre for Electron Microscopy and Nanoanalysis, FH JOANNEUM - University of Applied Sciences, Graz University of Technology, JOANNEUM RESEARCH Forschungs GmbH, Kompetenzzentrum Holz GmbH, Medical University Graz, Montanuniversität Leoben, PROFACTOR GmbH, Research Center Pharmaceutical Engineering GmbH, TU Wien, and the University of Graz) contributed to the first edition of “**Sensor Technology – Applications & Technologies**”.

By including applications in the areas of Process Monitoring, Health Monitoring and Comfort Sensors, and Environmental Monitoring as well as its linked technologies, the folder clearly demonstrates the high knowledge within BNN’s network and will ensure improved visibility and representation of expertise.

Thank you to all contributors for the great team work realizing another milestone within our focus group!

If you are interested in contributing to future editions, please do not hesitate to contact the BioNanoNet team: office@bionanonet.at.

BIO NANONET on site

Nano World Cancer Day 2016

The Nano World Cancer Day 2016 took place on February 2nd in Vienna at the premises of the Federal Ministry of Science, Research and Economy (bmwfw).

Representatives from three Federal Ministries, MinR Mag. Dr. Aleksander Zilberszac (Federal Ministry of Health), Dr. Stefan Hanslik (Federal Ministry of Science, Research and Economy), and Mag. Alexander Pogany (Federal Ministry of Transport, Innovation and Technology) opened the press conference presenting statements from their point of view on nanomedicines in Austria.

From the left: Univ.-Prof. DI Dr. Hannes Stockinger (Med. Uni Wien), MinRat Mag. Dr. Aleksander Zilberszac (Bundesministerium für Gesundheit), Mag. Alexander Pogány (Bundesministerium für Verkehr, Innovation und Technologie), Andreas Falk, MSc. (BioNanoNet), Univ.-Prof. DI Dr. Robert Mader (Med. Uni Wien), Dr. Stefan Hanslik (Bundesministerium für Wissenschaft, Forschung und Wirtschaft)

The Federal Minister of Health, Dr. Sabine Oberhauser, MAS, delivered a written statement in which she emphasized the importance of science and research in the field of cancer-treatment, that nanomedicine is a promising tool with huge potential for improving this treatment, however, to also consider the risks of nanotechnology. Andreas Falk (Bio-NanoNet), organiser of this event, presented an introductory lecture on nanomedicines and the activities and interactions between “NanoMedicine-Austria”, which brings together the Austrian nanomedicine-community, and the European Technology Platform Nanomedicine. Prof. Robert Mader from Medical University of Vienna, Department clinical oncology, head of translational research, gave insights on the impact of nanotechnology towards personalized medicine and that these technologies, in diagnostic as well as in therapy, will enable doctors to fight against cancer with the diseases’ weapons. Prof. Hannes Stockinger, Medical University of Vienna, Department molecular immunology, pointed out the close connection between immune-system and cancer-treatment. Based on his extensive experience in translational projects (e.g. NANOFOL, FOLSMART) he described the significant influence nanotechnology has in the medical sector, and how important it is to have national resources dedicated to support research on this important topic. Especially, the translational work – from research to the market – needs access to significant support.

Presentation at NWCD 2016 by Prof. Hannes Stockinger, Medical University Vienna

The 13 participants from media (TV), press (journalists), universities, Federal Ministries and the Association of the Austrian Chemical Industry discussed about future opportunities to support Austrian translational nanomedical research and how to pave the way from research to market (start-ups) in this challenging field.

BioNanoNet as organiser of this event is grateful to give special thanks to all speakers, and especially to Dr. Stefan Hanslik (bmwfw) as well as to the Medical University of Vienna for supporting the event.

Please click on this link: **video about the Nano World Cancer Day from W24** to view the video!

Austria_Pressemitteilung_NWCD2016.pdf

Pressemappe_NWCD2016.pdf

Save the date:

BioNanoNet Strategy Workshop, Meeting of the Advisory Board and 10 years Anniversary

The BioNanoNet Strategy Workshop, the Meeting of the Advisory Board and our 10th BioNanoNet anniversary will take place on Thursday, 15th of September 2016 in Hotel Liebmann, Laßnitzhöhe (www.hotel-liebmann.at). Please save this date!

Please register for the strategy meeting, general meeting and 10 years anniversary via our Registration tool from 6th of April 2016!

The BioNanoNet team is grateful to announce that this event is **supported by the Federal Ministry of Health**. We are looking forward to your participation!

Opening up Research and Innovation to Society

The NanoDiode Experience

Working Conference, 31 May 2016, Centre for Fine Arts, Brussels

Join the debate on stakeholder engagement in European research and innovation. Policy makers, researchers, representatives from industry and civil society organizations will discuss ways to engage societal stakeholders and open up research and innovation to broader societal considerations.

- Find out about the latest insights from European research into the role of societal stakeholders.
- Learn how to organize stakeholder engagement in your own work during the knowledge fair.
- Discuss the future role of societal stakeholders in European research and innovation.

The working conference builds on the findings of the European project NanoDiode: from July 2013 to June 2016, NanoDiode has organized a range of engagement activities across Europe, involving stakeholders in a dialogue on the funding, performance and outcomes of nanotechnologies research.

BioNanoNet is partner in NanoDiode project focusing on educational activities specializing in the knowledge transfer of relevant nanotechnology information on several educational levels (secondary schools, universities, research facilities, etc.). BioNanoNet organized several citizen dialogues and in-depth interviews to reach the goal of developing an innovative outreach and dialogue on responsible nanotechnologies in EU civil society.

Program *(location: Centre for Fine Arts, Ravensteinstraat 23, 1000 Brussels, Belgium)*

10:00	*Coffee and registration*
10:30	Why engage societal stakeholders in research and innovation? This opening plenary will be a moderated session where representatives from policy making, civil society and the media engage in debate with the audience on the rationale for societal engagement.
12:00	*Lunch*
13:00	Knowledge fair: the what and how of stakeholder engagement. NanoDiode partners will discuss with conference participants how to organize stakeholder engagement in their own work, building on the results of the NanoDiode project.
14:45	Embedding stakeholder engagement in research and innovation practice. In this moderated session, representatives from research, industry and policy will explore how to open up research and innovation to broader societal considerations
15:45	*Coffee*
16:15	The future of stakeholder engagement Policy makers and engagement scholars and practitioners will discuss the future of stakeholder engagement with the audience.
17:15	*Drinks*

Register now for free! (deadline for registration: 15 May 2016)

For more details please visit the project website www.nanodiode.eu.

NanoDiode is a Coordination and Support Action funded by the European Union under the NMP Cooperation Work Programme of the 7th Framework Programme, Grant Agreement n° 608891.

BioNanoNet *member presentation*

FELMI-ZFE
Austrian Centre for Electron Microscopy and Nanoanalysis

Institute for Electron Microscopy and Nanoanalysis (FELMI)
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Graz Centre for Electron Microscopy (ZFE)
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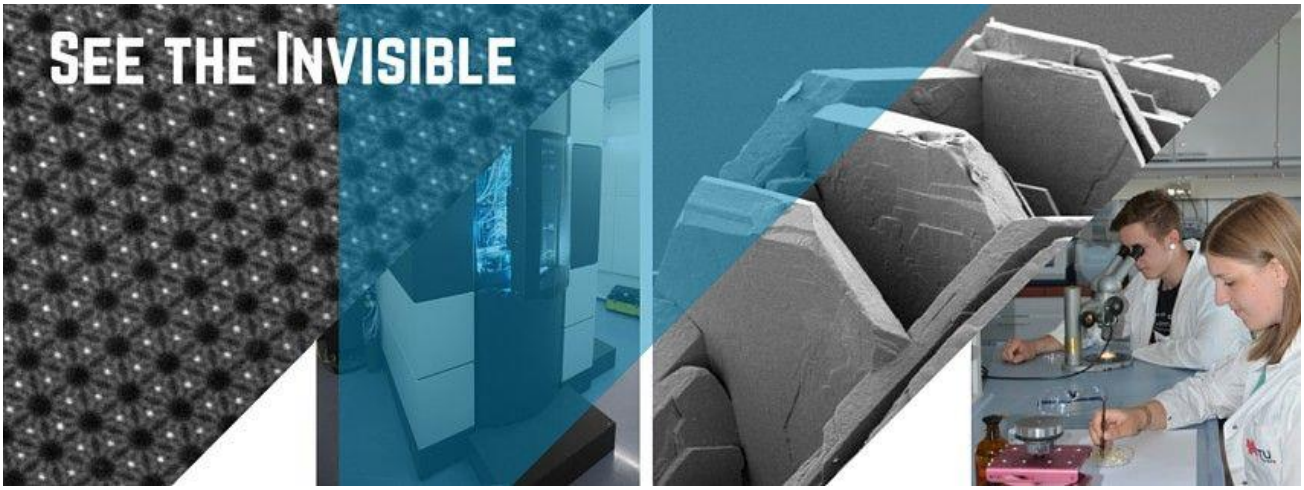


"*For 65 years, we are trying to bridge the gap between academic research and practical problem solving as well as industrial needs. The expertise of our staff and their contributions represent the most significant aspect of the institute fulfilling its task of seeing the invisible.*"

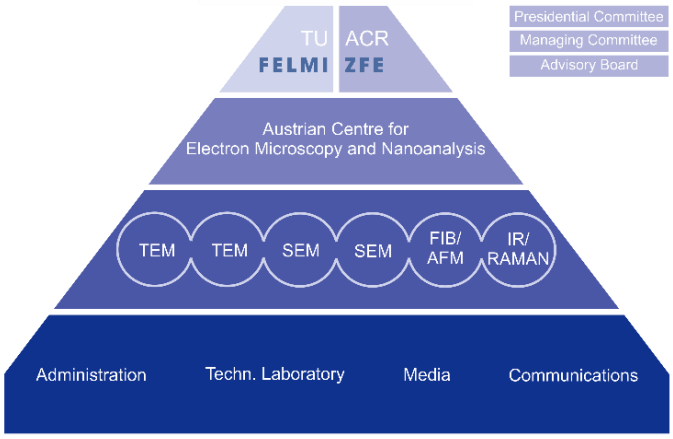
Ao.Univ.-Prof. Dipl.-Ing. Dr.techn. Ferdinand Hofer

Introduction

The Institute concentrates on research and teaching in the fields of physics, materials science, and soft matter analyses. Since the fifties of the last century, the Institute has been built on two main columns:

1. the Institute for Electron Microscopy and Nanoanalysis (FELMI) at the Faculty of Mathematics, Physics and Geodesy / Graz University of Technology (Austria)
2. the Graz Centre for Electron Microscopy (ZFE), a member of Austrian Cooperative Research (ACR).

Having their own legal status and budget, both institutes work in close alliance to ensure efficient use of personnel and instrumental resources. The Institute is located in the heart of Graz, on the campus of the Graz University of Technology. It is organised in research groups focusing on crucial aspects of microscopy or significant materials classes.



Research Areas

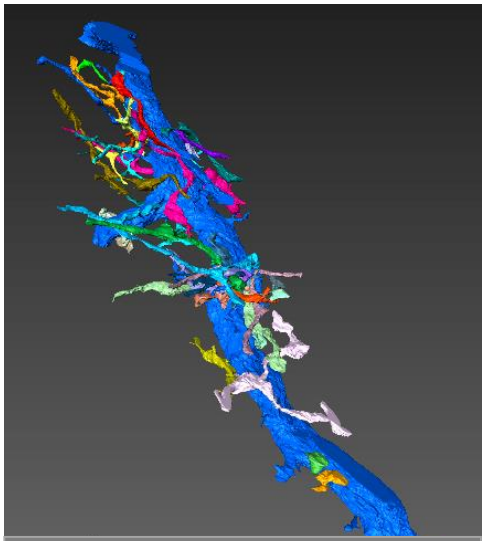
We have wide-ranging, comprehensive and exciting research activities. Our research is carried out under a broad scope of challenging themes from fundamental to applied sciences and contractual projects with Austrian and European companies. We study fundamental scientific problems and transfer the acquired knowledge and capabilities into practical collaborations with other university institutes and special industries – with a clear focus on small and medium-sized enterprises. However, the developments of the Institute's research

groups rely on an increasing number of high level research projects supported by European and Austrian funding organisations. We bring together

- *well-accepted laboratory methods*
- *leading-edge equipment* ranging from the latest light and electron microscopes to high performance computing hardware
- *advanced research skills*: 50 employees, from experienced scientists to fresh minds and reliable office staff

We specialise in research relevant to life. Our multi-disciplinary team of scientists aims to achieve the highest standards and conducts research in four main areas:

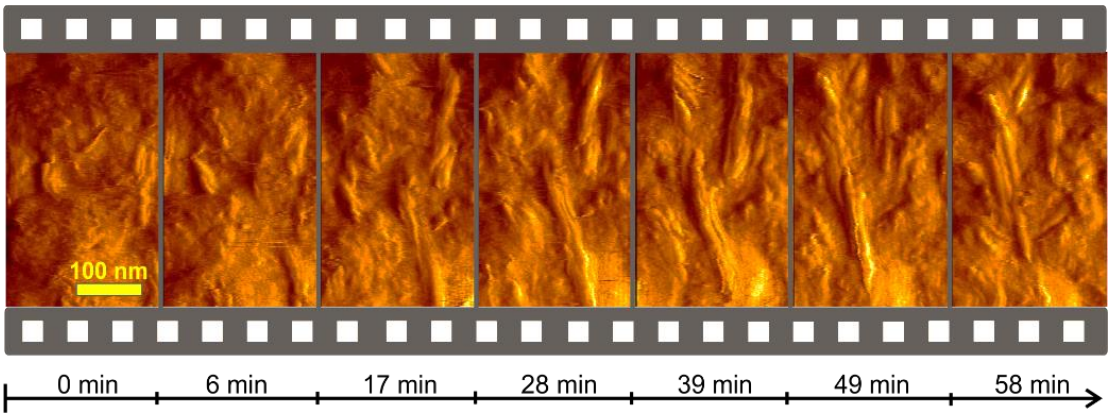
1. **Soft Matter and Biomicroscopy**: FELMI-ZFE has a long tradition of cutting-edge research in the field of real-time and *in situ* characterisation of bio-degradable and biocompatible materials. During the past decades these materials have gained more and more importance due to environmental protection and medical sciences issues such as toxicology. Our electron microscopes are equipped with different options such as ultramicrotomy (slice & view based 3D reconstruction), cooling stages for biomaterials (liquid N_2 temperatures), mechanical stress stages, and variable pressure systems



Reconstruction of a large neuron, in the visual system of a locust. Performed via analytical ESEM / Ultramicrotome 3D sectioning and reconstruction.

(up to 100 Pa) for dynamic investigations. Latest atomic force microscopy technology allows dynamic *in situ* characterisation in liquid environments at scan rates down to 1 frame per second and variable incubation possibilities. Together they provide a comprehensive insight into properties of soft matter and biomaterials from the upper micro- to the lower nanoscale.

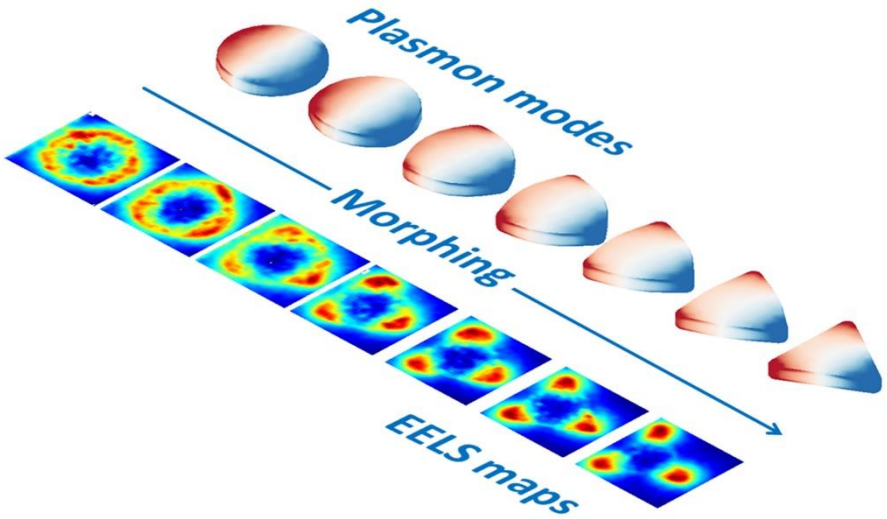
3**. 3D & *In Situ* Characterisation**: Research and development in high-performance materials requires increasingly sophisticated analysis methods. Dynamic experiments both in scanning and transmission electron microscopy enable the investigation of the progress of physical processes and chemical reactions at the micro- and nanoscale. Correlations between the microstructure of a material, its composition and its behaviour under various stresses (mechanical, thermal, …) can be deduced. Another advantage of *in situ* experiments is the fact that materials can be investigated under conditions they experience in their practical applications. Subsequent 3D reconstructions of the bulk of the material provide additional information about the material's properties and behaviour. Correlation of the results is gained from both the dynamic experiments and the 3D reconstructions which will facilitate the design and development of new materials.



***In situ* degradation of cellulose by *Trichoderma reesei* fungal enzymes.** Carried out via AFM in liquid environments in real-time.

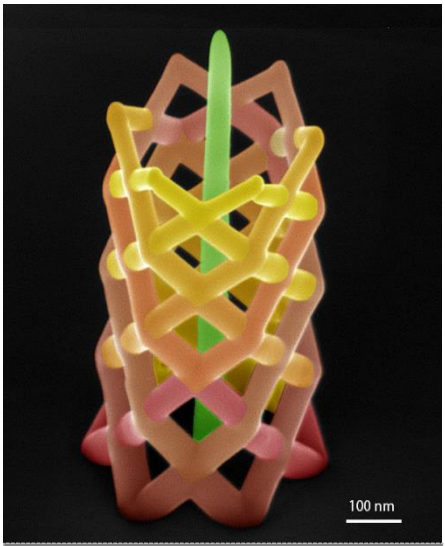
3. **Nanoanalysis of materials**: The ability of modern transmission electron microscopes to investigate solids at atomic resolution has led to a tremendous progress in materials science. With the basis of a monochromated transmission electron microscope (TEM) and our atomic resolution STEM (ASTEM), the Austrian Centre for Electron Microscopy and Nanoanalysis concentrates on the development of nanoanalytical methods using EELS and

EDXS. These advanced methods are used to explore the structure of materials and devices as diverse as transistors, turbine blades and biomaterials.



Morphing of plasmonic modes in an Au nanodisk in dependency on its shape. Performed via TEM based high-resolution EEL-maps.

4. **Functional nanofabrication**: During the last decade the fabrication of functional nanostructures has become increasingly important for the development of new applications for advanced microscopy. Such developments are based on a fundamental understanding of the physical and chemical properties of materials. Within the diverse range of fabrication methods, maskless direct-write techniques enable rapid-prototyping with superb spatial resolution down to the lower nanoscale. At FELMI-ZFE, our activities in this field are mainly based on two techniques: focused electron beam induced processing (FEBIP) and focused ion beam processing (FIB). Both provide unique fabrication capabilities. Our interest is a fundamental understanding of fabrication processes, related material properties and the development of new application concepts.



Shielded nano-resonator. Fabricated via focused electron beam induced, direct-write 3D nano-printing.

Instrumentation

We operate a wide range of cutting edge characterization instrument which allow comprehensive insight from millimetres down to the sub-atomic range:

- **AFM – Atomic Force Microscopes:** ***1)*** Fast Scan Bio (Bruker Nano); state-of-the-art high-speed AFM which allows *scan rates down to 1 sec. for real-time investigations*. Dedicated to *in situ* investigations in liquid environments for dynamic investigations with the *heating / cooling* possibilities (~ 4°C → ~50 °C). Special operation mode for *nano-mechanical characterisation* down to 10 pN. ***2)*** Dimension 3100 / Hybrid Scan Head (Bruker Nano); designed for larger areas (up to 90x90 µm^2) and the option to be *operated in inert N2 conditions*. Equipped with a *variable temperature gas exposure system*.

- **TEM – Transmission Electron Microscopes:**

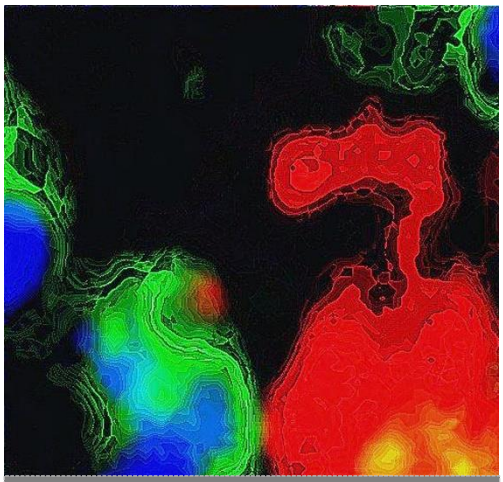
  1) TITAN 300-60 boxed (FEI) (right); CS corrected (< *70 pm resolution*), primary monochromator (<0.2 eV energy resolution); XFEG emission source for primary energies between *30 keV and 300 keV to investigate classical but also sensitive material systems*; Gatan Quantum high-resolution energy filter with dual EELS (up to 2000 spectra per second); Super-X EDXS detector, STEM, BF, ABF, HAADF possibilities as well as *Lorenz setup for magnetic investigations*, *fully equipped for nano-tomography*.

  2) Tecnai F20 (FEI): monochromated 200 keV system with the STEM, EDXS and EELS possibilities, *fully equipped for investigations at cryo-temperatures*.

  3) Tecnai T12 (FEI): 120 keV system *dedicated for low melting and biomaterials including a full setup for investigations at cryo-temperatures*.

State-of-the-art TEM (ASTEM) at the Austrian Centre for Electron Microscopy and Nanoanalysis.

- **DBM – Dual Beam Microscope Nova 200 (FEI):** electron / ion dual-beam microscope for *sub-surface and 3D investigations*, TEM lamella preparation, and functional nanofabrication. *Cryo-stage for biomaterials* (down to -150 °C) in combination with a *high-performance patterning engine for low damage processesing (poylmers / biomaterials)*, 5 gas injection systems (Au, Pt, SiO_X for deposition and XeF_2 and I_2 for etching), EDXS spectroscopy system and 4-axes micromanipulator, optional *in-situ* plasma cleaning possibility.
- **ESEM – Environmental Scanning Electron Microscopes:** Quanta 600 / Quanta 200 (FEI); both dedicated for *high-pressure investigations (up to 100 Pa H_2O) of polymers and biomaterials*, *3-VIEW which combines ultramicrotomy with ESEM investigations towards 3D analyses*, EDXS systems, high-temperature stage (up to 1200°C), mechanical stress-stage for mechanical *in-situ* investigations
- **RS – Raman Spectroscopy:** Labram 800 HR (Horiba) for *chemical spectroscopy / microscopy of low-melting and biomaterials*; 633 nm / 473 nm excitation, high-resolution Czerny-Turner spectrometer, *high-speed imaging for low dose investigations of sensitive materials*.
- **IS – Infrarot Spektroskopie:** TENSOR 27 / Hyperion 3000 (Bruker); single-reflection ATR-unit (Germanium / Diamond crystals), DTGS and MCT detectors with high-performance mode.
- **IM – Ion Milling:** low energy ion thinning system (NanoMill) for final preparation of ultra-thin TEM lamella. *Low energy / low dose options for sensitive materials (polymer / biomaterials).*
- **UM – Ultramicrotomy:** several ultramicrotomes dedicated for TEM lamellas of biological materials or polymers, *fully equipped for cryo-temperature operation*.
- **IFM – Infinte Focus Microscope:** InfiniteFocus (Alicona) system which allows optical 3D characterisation with a vertical resolution down to 10 nm. Full 3D or line scan option including roughness and volume analyses.



Combined light and IR microscopy image of an **effervescent tablet.**

International Collaborations

Each year we are collaborating on average with around 30 university institutes and more than 120 companies – mainly from Austria, but increasingly also from other European countries. Two main directions are being followed during recent years:

Firstly, collaborations within the *ACR group* which are developing well and secondly, the incorporation into important European research networks such as the *STREP project "CopPeR",* the *ENIAC initiative* or the *ESTEEM2 project.*

Being an interdisciplinary research institute we are constantly creating new knowledge and methods. We believe that it is not only our responsibility to support knowledge creation but also to share generated know-how and expertise with others: each year we welcome some 200 visitors from other research groups and companies. During the last three years 90 master and PhD students from other institutions have profited from our scientific and technical support.

Quality Assurance

The Institute works under an advanced quality management system according to the rules of EN ISO 9001. The aim is to maintain the outstanding quality of our work and analysis results and to improve continuously our organisation and management structures. Following the successful audits performed by TÜV Austria, the Institute was awarded the EN ISO 9001 certificate.

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Performance report 2012–2014

Infineon Technologies Austria AG

Welcome to the big world of very small things

Infineon Technologies Austria AG is a Group subsidiary Infineon Technologies AG, a world leader in semiconductor solutions that make life easier, safer and greener. Its main seat is in Villach, with further branches in Graz, Klagenfurt, Linz and Vienna.

Austria is the only location of the Group outside of Germany where Infineon pools competences for research and development, production and global business responsibility.

Energy efficiency, mobility and security are three global mega trends in modern society. They are also the central challenges that Infineon addresses with its semiconductor and system solutions. Whether in the car, in the smartphone, industrial electronics or with debit cards and ID cards – know-how from Infineon Austria is found in many everyday applications.

With effort and excellence to the top

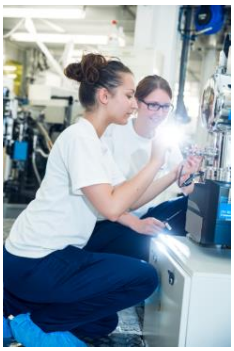
According to the top 500 ranking in business magazine “trend”, Infineon Austria was in terms of research the strongest industrial company in Austria in 2014. In the fiscal year 2015, approximately 25 percent of the overall sales went into research and development. There are 1,269 experts working in the development centers in Villach, Graz and in the Danube Integrated Circuit Engineering (DICE) holding company in Linz, developing new solutions, technologies and innovations.

Local competences and global research tasks have been developed continually at Infineon Austria in recent years in the areas of Energy efficiency, mobility and security. The concept for success includes short development-cycles, the highest quality and a focus on customer-oriented system solutions with a “from product to system” approach. The content-related focal points include the development of power semiconductors and thin wafer technologies, as well as sensors, micromechanics, new semiconductor materials and contactless security applications.

People are our success

Excellent employees are the foundation of Infineon Austria. They contribute significantly to the company’s success with their motivation, flexibility and technical competence, and characterize the culture in the locations across Austria.

Infineon Austria strives to recruit people with outstanding qualifications for the company in the long term – regardless of their age, gender, origin or skin color. The figures prove our success: 22 percent of our 3,493 employees are from abroad. About 60 countries are represented in the company.


Leading factory for innovative semiconductors

In the fiscal year 2015, 15.5 billion chips were produced in Villach. The electronic parts are processed on silicon discs called wafers. These parts are produced and tested in different technologies and complexities in up to 1,200 production steps and with four different wafer diameters. In total, the factory produces approximately 1,900 basic product types simultaneously in the best quality, around the clock and 365 days a year. Maximum reliability and precision are required: accuracies up to well below 100 nanometers, i.e. approximately 700

times less than the diameter of a human hair, prove the site's vast technological competence.

Synergies in research, development and production at the site drive the development of new, pioneering products to production maturity. To strengthen global competitiveness, production technologies and manufacturing competences are continually developed, most of all by the recent development of production according to the principles of Industry 4.0. This modern environment makes Infineon Austria a pioneer in terms of smart production.

Excellence from the idea to the product

Optimized pooling of competences and cross-departmental teams permit short processing times from the idea to the finished product. Villach's production innovations focus on several areas: single-process technology, equipment engineering, new materials and future-oriented automation, digitalization and production concepts. The best example for this is the world's first production of power semiconductors in 300 millimeter thin wafer technology. These particularly thin energy saving chips ensure even more efficient energy conversion in electronic systems. At the same time, mass production is made more productive. A 300 millimeter wafer will result in about two and a half times the number of chips in one production run than a 200 millimeter wafer could produce.

Driving force for technology leadership

Infineon Austria has the globally unique competence of producing up to 40 micrometer (0.04 millimeters) thin silicon wafers at high volumes. The next step is halving the thickness

again to produce wafers with a thickness of 20 micrometers at high volumes. For comparison: the wafers would be five times thinner than a normal sheet of paper.

The use of new semiconductor materials such as silicon carbide (SiC) and gallium nitride (GaN) facilitates the implementation of particularly high-performance and quick switching mains units with maximum reliability and low electric consumption. Products from these technologies are used in promising markets for the future, such as solar energy and wind power, drives in public transport, hybrid and electric cars and household appliances. Besides

this, the energy saving chips of the future allow further miniaturization in their application and are an important step on the path towards the matchbox-sized laptop mains unit – or one installed in a practical plug.

Since 2008, MEMS – microelectromechanical systems – have been produced in Villach. These micromachines are used in diverse areas, e.g. in tire pressure sensors or as a nano-format silicon microphone. The further development of MEMS components not only expands the local product, technology and production competences, but also drives the global market success. The proof: every third smartphone in the world now contains a silicon

Microphone “made in Austria“.

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BioNanoNet presentations

NANOGENTOOLS Project

In January 2016, a new EU-funded project, NANOGENTOOLS, was launched. The project aims at developing new methodologies for the identification and control of hazards and risks associated with nanomaterials in order to ensure safe handling, considering the entire life cycle of nanomaterials from synthesis to consumers use. The main objective is to generate a common solid knowledge basis arising from the fruitful cross-sectorial synergy, and to create a multidisciplinary approach that will provide new tests and methodologies (or improve existing ones) to assess the long term risks of nanomaterials in a rapid and cost effective manner, suitable for incorporation into regulatory frameworks.

NANOGENTOOLS answers the challenge of nanomaterials safety by joining industry and academia to create a collaborative excellence-based knowledge exchange network that will:

- Push forward knowledge via method development and pre-validation.
- Train scientists in new methodologies to assess long term nanosafety.
- Support their inclusion in standardization as well as present and future EU regulations.

The project combines genomics (toxicogenomics), proteomics and multidisciplinary science (biophysics, molecular modelling, chemistry, bioinformatics, chemoinformatics) to develop fast in vitro high throughput (HTS) assays, with molecular based computational models for better understanding of the molecular fundamentals of nanotoxicity, and it will initiate the development of online nanosafety assays for use by SMEs during product development.

The expected impacts include pre-validated tools for efficient cost-effective nanosafety assessment applicable to SMEs.

The specific objectives of the project are:

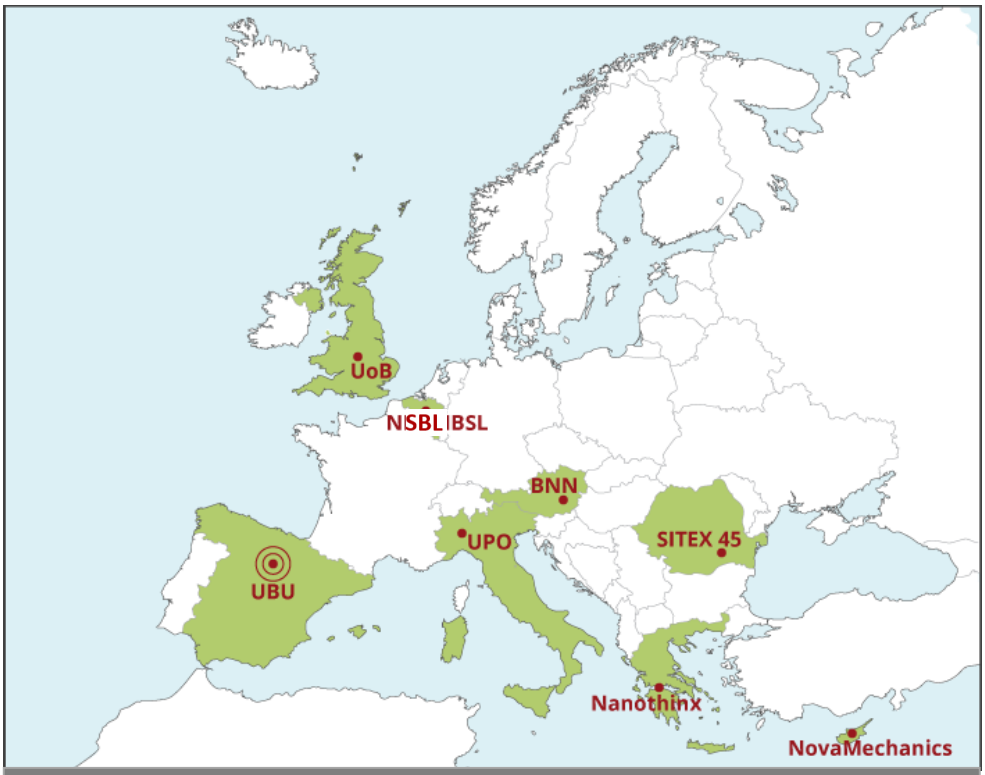
- To provide solutions for faster and more reliable assessment of nanomaterials toxicity and propose a series of HTS and -omics tools suitable for predicting toxicological properties of nanomaterials.
- To develop new bioinformatics methodologies capable of analyzing -omics data and create an open database for the scientific community in collaboration with the EU Nanosafety Cluster.
- To conduct research and training on biophysical techniques and mathematical models for accurate and fast nanotoxicity prediction linked to safety-by-design concepts.
- To understand, build and improve the safe by design concept, with demonstration using carbon-based NMs and nanosensors and demonstrate translation across applications and NMs.
- To place new knowledge in the context of present regulations and EU roadmaps.

NANOGENTOOLS is a project under call H2020-MSCA-RISE-2015: Marie Skłodowska-Curie Research and Innovation Staff Exchange. The Marie Skłodowska-Curie Actions programme offers opportunities for advanced training and development of next generation researchers through international training networks. The twinning of academic and industry partners throughout the project enables international cooperation by the exchange of staff between academic and non-academic sector.

NANOGENTOOLS was launched in January 2016 and will run for 4 years.

The partners in the project come from academia, industries and organisations in 8 European countries and represent important stakeholder groups in nanosafety technologies in their respective territories with significant experience.

The project coordinator is Dr. Santiago Cuesta-Lopez from Universidad de Burgos (ESP). Further academic partners are Università del Piemonte Orientale - Vercelli Novara Alessandria (IT) and the University of Birmingham (UK). Non-academic organisations contributing are NANOTHINX S.A. (GR), SITEX 45 SRL (RO), NovaMechanics Ltd (CY) and Nanotechnology Industries Association AISBL (BE). BioNanoNet (AT) completes the project's consortium.



Project partners in NANOGENTOOLS.

Training Events

The project encourages the development of joint research and innovation activities between the project partners. This is aimed at knowledge sharing via international as well as inter-sectoral mobility, based on secondments of research and innovation staff (i.e. exchanges) with an in-built return mechanism: organisations in the project contribute directly to the implementation of the joint research and innovation activities by seconding and hosting eligible staff members. In addition to the scheduled secondments, various training sessions will be organized throughout the project lifespan, involving participation of all partners in order to discuss and understand the regulatory impact of nanosafety recommendations arising from new methodologies. BioNanoNet is responsible for the organization of workshops focussing on interlinking the methodologies addressed by NANOGENTOOLS, and their importance as new vehicles for nanosafety assessment. Furthermore, webinars will be carried out, and also summer and winter schools at the Universities are envisaged.

Winter School:

Safety of carbon nanomaterials

Expected celebration place & dates: Universidad de Burgos (ESP), November 2017

Summer School:

Biophysical and multidisciplinary frontier techniques to assess Nanosafety

Expected celebration place & dates: University of Birmingham (UK), June 2018

Summer School:

Advanced Genomics and proteomics methods to predict long term Nanotoxicity

Expected celebration place & dates: Università del Piemonte Orientale -Vercelli Novara Alessandria, UPO (IT), June 2019

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

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 691095.

Immunology Platform for Biomarker Research

CBmed is a newly founded Austrian K1 competence center which links excellent research infrastructure, scientific expertise, medical knowledge, national and international industry partners for systematic medical biomarker research.

The immunology group at CBmed is specialized in several immunological assays for both, human in- vivo and in-vitro studies. In addition, we perform cell culture studies and measurements with material from animal models of type 1 and type 2 diabetes mellitus as well as multiple sclerosis. CBmed's key research interest in immunology revolves around the role of regulatory T-cells in autoimmune disease (e.g. diabetes, irritable bowel disease, rheumatoid arthritis), cancer (e.g. colorectal cancer, leukemia) and rejection of transplants. The core of our immunology laboratories is a state-of-the-art flow cytometer with capabilities to detect up to 18 markers simultaneously. FACS analysis is performed with high workflow quality, guaranteed by implementation of the EuroFlow Consortium guidelines. Currently we are also performing sterile primary human cell cultures and functional tests with peripheral blood cells from patients with varying diseases (e.g. proliferation assays in co-cultures, ELISpot, ELISA, chemotaxis assays). In addition we have extensive experience in performance of high quality measurements for national and international multicenter clinical patient trials and prospective collection of biological material from a variety of disease areas.

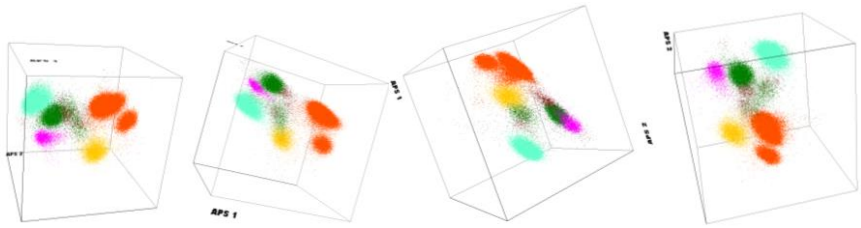
Our equipment park includes a cytometer (LSRFortessa, BD), a sterile cell culture lab and ELISpot and ELISA equipment, but we also have access to additional equipment at the Medical University of Graz.

In close cooperation with clinicians at the Medical University of Graz we are investigating immune regulation in patient samples in the fields of cancer, autoimmunity and metabolism. By using state-of-the-art technology (FACS Fortessa, ELISpot etc.) and following EuroFlow guidelines we are performing high quality data analysis for academic and clinical biomarker research.

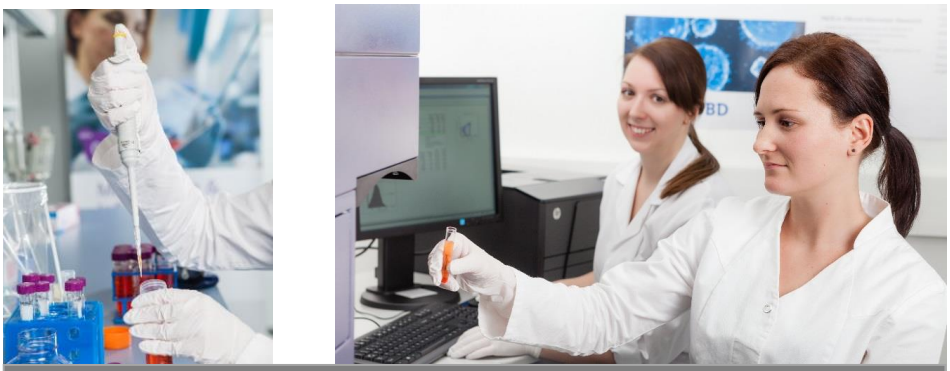
FACS LSR Fortessa (equipment)

Currently we are working on:

1. FACS quantification of peripheral immune cell subtypes involved in autoimmunity, cancer and rejection of transplants.
2. FACS quantification of peripheral immune cells affected by metabolic changes and life-style modifications.
3. Standardized rare event detection by FACS technology.
4. Quantification of mRNA in combination with protein expression via FACS technology.
5. Sterile cell culture with primary human cells and cell lines.
6. Clinical studies to investigate the effect of drugs involved in metabolic changes and the incretin effect.
7. In-vitro studies on regulatory T cell function, chemotaxis, proliferation and apoptosis of human immune cells.
8. Isolation of immune cells from human tissue (e.g. adipose tissue, placenta, gut biopsies) and standardized FACS quantification.
9. In-vivo and in-vitro studies with animal models for multiple sclerosis and diabetes.
10. ELISpot quantification of T cell responses and ELISA techniques.



FACS APS software tool for automated population separation



CBmed Laboratory (copyright: CBmed / Regine Schöttl)

Contact: Mag.ª rer.nat. Barbara Prietl, barbara.prietl@cbmed.at, www.cbmed.org

BioNanoNet *retrospect*

NanoValid and the final Conference with MARINA at the OECD

Paris, 29th – 30th of September 2015

By Rudolf Reuther

NanoValid has been successfully finalized! After 48 months of intensive research and development work, a vast amount of unique and novel results has been produced, including a wide panel of new and well-defined, representative test and reference materials and a large number of newly validated standard operation procedures (SOP) for the characterization of different types and properties of nanomaterials, and their hazard, exposure and fate assessment. Main results and achievements have been discussed and evaluated at a final meeting in Paris, on the 1 October 2015, and presented to main stakeholders and the wider scientific community at an international conference, together with Marina, at the OECD in Paris, on 29-20 September 2015 (see photos below).

Final regular NanoValid project meeting,
Paris, 1 October 2015 (©Rudolf Reuther 2015)

The final conference in Paris could successfully demonstrate how both projects have paved the way during the last 4 years, towards a better understanding of the complex nature of nanomaterials. One major step taken within NanoValid was the development of a range of rigorously validated methods that consider the unique size / structure related properties of nanomaterials. Method validation was achieved by implementing comprehensive inter-laboratory comparison campaigns among various partner test laboratories to assess and compare the performance of methods developed for conventional chemicals for physico-chemical (size, surface area and charge, shape) measurement and for *in vitro* / *in vivo* testing by using a panel of selected well defined test materials. A tremendous amount of new exciting results was presented at the Paris meeting and discussed with leading European and international experts from relevant stakeholders including the European Commission, policy makers, industries and the academia.

Marina-NanoValid Conference, OECD
Paris, 29-30 September 2015 (©Marcus Hank 2015)

The overwhelming data produced by both projects on hazard and exposure will shed new light on processes and factors that have not been taken into account when assessing and managing the risk associated with handling, use and occurrence of materials at the nano-scale in various complex man-made and natural systems, along their life cycle and for distinct product value chains.

Launching both NanoValid and Marina was the consequence of the fact that many current measurement and testing techniques developed for the risk assessment of particulate

chemicals often do not reflect the size specific properties of nanomaterials and associated effects. The lack of reliable risk assessment tools that are applicable to nanomaterials has caused considerable uncertainties in knowing what is really going on, when nanomaterials enter living systems. It consequently provoked the urgent need to develop more reliable, namely validated methods that can help to overcome these uncertainties.

NanoValid was one of the first EU funded “flagship” project that was solely devoted to address this need! An ambitious work program was set-up and implemented during 4 years (2011-2015) by more than 30 partners coming from more than 13 European countries, as well as from India, Brazil, Canada and the US. Comprehensive inter-laboratory comparison studies have been used to develop new and validated methods for characterizing, measuring and testing commercially and environmentally relevant nanomaterials. At the end, the project has generated a wide panel of well defined reference tools, including new and validated SOPs, reference test materials, such as certified reference materials (CRM) that can be used by industry, research and regulatory bodies to early identify and manage possible risks that may arise from manufacturing and handling of nanomaterials. Two different types of reference materials have been synthesized and tested, (1) CRMs that can be used as calibrants to validate measurement/imaging methods (Au for particle size and TiO2 for specific surface area), and (2) reference materials available in big batches and suitable for ecotox studies (2 SiO2 prototypes for size distribution and other size-related parameters).

For the first time, specific reference methods have been tested and validated to characterize the physicochemical properties of nanomaterials (such as DLS, Zeta, BET, XRD, TEM, NTA/AFM, ICP-MS, XPS) prior to biological testing. The reliability of these reference tools was confirmed by uncertainty and traceability measurements. In addition, reference methods have been established also for (i) particle dispersion control for various test media (already submitted for standardization under ISO TC 201), (ii) quantification of labeled NPs (lanthanide-doped Y2O3 NPs) in various matrices, (iii) assessing uptake and distribution of nanoparticles (such as SPIONS, Ag, Au, SiO2, CuO, ZnO, TiO2, nano-whiskers, C60) in the human body, including *in vitro* human toxicity assays, such as ATP, Propidium Iodide, Mitochondrial Dehydrogenase, or NRU OECD GD 129, and for (iv) ecotoxicological testing, including the *Sinorhizobium meliloti* bacteria test, the OECD 208 plant or *Porcellio scaber*

terrestrial test, or the *Daphnia magna* (freshwater) and Artemia salina (seawater) test, all having a great potential for further standardization.

To prove the robustness and applicability of theses validated methods under real conditions, six case studies have been successfully realized focusing on problems that may occur in working environments and natural systems, including a computational model to simulate a transport accident and an explosive release of nanoparticles.

Case study on occupational exposure during production of carbon nanotubes (CNT) (©BAUA 2015)

The extensive method and material testing and development did not only generate new scientific data, knowledge and expertise, but also new insights into critical dose-response relationships, adverse (toxic) pathways and relevant end-points and on processes and factors that steer the release, distribution, bioavailability and uptake of nanoparticles in man and the environment along their life cycle.

Also a variety of practical and commercially relevant tools and models was produced, including a prototype of a new hot gas nano-sampler, a novel online exposure device combining physical and biological assays for airborne nanoparticles, a fish cell barrier model that can predict uptake of nanoparticles in aquatic systems, a new aerosol generation chamber to simulate accidental and/or work place releases and exposure, a test battery to rapidly screen the toxicological profile of newly synthesized or unknown nanomaterials and guide safe design or early detect adverse properties during material and product development, or

a panel of “decision trees” that provide practical guidance in selecting appropriate methods during regulatory testing as part of the risk assessment.

Another more practical outcome was a new technical guidance and training manual, the “Nano to go!”, which can be directly used in research laboratories, by instrument or material manufacturers, or small and start-ups, to ensure safe handling of nanomaterials.

Guidance and training manual “Nano to go!” for safe handling of nanomaterials (©BAUA 2015)

However, one of the most significant highlights achieved within NanoValid was the strong and still ongoing contribution to relevant standardization efforts, such as CEN/TC 352 “Nanotechnologies”, ISO/TC 229 “Nanotechnologies”, or ISO/TC 24/SC 4 “Particle characterization”. This was particularly realized by drafting and preparing new work item proposals (NWIP) for method standardization, including a “ENP Specification Form” that already entered into a new ISO standard, to specify properties of test materials used for toxicological testing.

Summarizing, the methodology developed by NanoValid, in particular the new and validated SOPs on particle measurements, dispersion control, labeling and *in vitro* / *in vivo* testing, will serve and support future regulatory method development, adaption and modification (such as in NanoReg), but also the establishment of practical measurement strategies needed by relevant industries, to reliably but rapidly and cost-efficiently characterize and test nanomaterials, in particular when more advanced functionalized nanomaterials embed-

ded in complex product and environmental matrices. At the end, NanoValid could prove that a scientifically sound sample preparation of nanomaterials prior to biological testing, combined with reliable measurement of their properties, that takes different dispersion, dissolution, agglomeration or aggregation behavior into account, is one of the most critical steps to arrive at comparable and reproducible results, which we urgently need to improve current regulatory risk and life cycle assessment tools , and to enforce and comply with relevant legislation, such as REACH, CLP or relevant directives (such as for food, cosmetics etc.). Upgrading these tools by using methods developed and validated by NanoValid will help to early identify critical processes along product value chains, ensure the design of safer properties and prevent any harm to man or the environment along their life cycles.

A great deal of the produced results has already been (and still will be) published in more than 100 peer-reviewed journals and by means of numerous oral and poster presentations. A big endeavor has come to an end. But for sure, the work performed and results achieved will have a lasting impact far beyond the project. They will continue to inspire new research groups and trigger new projects that carry on the work and new knowledge and understanding that NanoValid has produced to ensure sustainable innovation and the safe use of nanotechnology.

For more information or contact: www.nanovalid.eu and rudolf.reuther@enas-online.com.

NANOGENTOOLS Kick-off-meeting

28th – 29th of January 2016, Burgos, Spain

NANOGENTOOLS kick-off meeting was held in Burgos, Spain, on 28th and 29th of January 2016.

This meeting allowed all partners of the consortium to establish good relationships among them. All partners were provided with general information about the project and about the administrative and management procedures that will be followed during project execution. The partners had fruitful discussions about the projects key topics to be carried out during the whole project lifespan. In addition, the consortium had a close look on the scheduled secondments.

The kick-off meeting was the first step for a successful execution of the NANOGENTOOLS project.

NANOGENTOOLS project kick-off meeting in Burgos, Spain.

eNanoMapper Workshop

10th February 2016, Basel, Switzerland

The eNanoMapper project, a Seventh Framework Programme (FP7) initiative, organized a "Hands-on Workshop on Nano Safety Assessment" on 10th February 2016 at Technology Park Basel, Switzerland. This joint event was bringing together inputs and approaches from several EU NMP projects (e.g. eNanoMapper, NanoFASE, GUIDEnano, SUN).

The workshop focused on nanotechnology safety examples and exercises using existing data resources and modelling tools. Specific cases were presented and used to perform modelling, analysis and assessment exercises.

Invited experts presented their recent findings and gave insight into their ongoing work, focusing on the actual application of different programmes and data bases. After a short introduction, all participants tried first test-runs with the presented software, simulating different situations with experts support and assistance. These trials familiarized the attendees with the possible implementation of different risk assessment models and tools. The participants worked through the modelling of exposure scenarios, considering human and consumer exposure to nanoparticles across different scenarios in the life cycle of a product, as well as life cycle analysis of nanoparticles in the environment. In addition, risk assessment examples were carried out, combining hazard and exposure data. For nanotoxicity read across predictions, data requirements and the role of harmonisation and ontology in the use of multiple modelling and assessment tools applied to nanosafety were discussed. Attending the instructive workshop was an interesting occasion to share experiences in nano-related risk predictions.

Hands-on workshop on nano safety assessment in Basel, Switzerland.

Conference Calendar

BIO NANONET on site

EUROPT(R)ODE XIII 2016

When? 20 – 23 March 2016

Where? Graz, Austria

For more information please visit the event website.

Functional Nanomaterials in Industrial Applications: Academic-Industry Meet

When? 29 – 31 March 2016

Where? Preston, UK

For more information please visit the event website.

International Conference on Nanobiotechnology (ICNB'16)

When? 1 – 2 April 2016

Where? Prague, Czech Republic

For more information please visit the event website.

International Conference on Nanomedicine, Drug Delivery, and Tissue Engineering (NDDTE'16)

When? 1 – 2 April 2016

Where? Prague, Czech Republic

For more information please visit the event website.

International Conference on Nanomaterials, Nanodevices, Fabrication and Characterization (ICNNFC'16)

When? 1 – 2 April 2016

Where? Prague, Czech Republic

For more information please visit the event website.

International Nanotechnology Conference & Expo

When? 4 – 6 April 2016

Where? Baltimore, United States

For more information please visit the event website.

12th microRNA as biomarkers and diagnostics

When? 4 – 6 April 2016

Where? Cambridge, Massachusetts

For more information please visit the event website.

10th WORLD MEETING on Pharmaceutics, Biopharmaceutics and Pharmaceutical Technology

When? 4 – 7 April 2016

Where? Glasgow, Scotland

For more information please visit the event website.

NaNaX7

When? 4 – 8 April 2016

Where? Marburg, Slovenija

For more information please visit the event website.

BIO NANONET on site

NanoMedicine-Austria Tag 2016

When? 5 April 2016 → **Registration open till March 18th**

Where? Krems, Austria

For more information please visit the event website.

AAL-Marktchancen in der Schweiz

When? 5 April 2016

Where? Graz, Austria

For more information please visit the event website.

BIO NANONET on site

BioNanoMed 2016

When? 6 – 8 April 2016

Where? Krems, Austria

For more information please visit the event website.

Aus dem Nähkästchen geplaudert: Österreichs Erfahrung mit dem KIC Raw Materials

When? 7 April 2016

Where? Vienna, Austria

For more information please visit the event website.

7th International Technology Transfer Days "Biomaterial 2016"

When? 7 – 8 April 2016

Where? Erfurt, Germany

For more information please visit the event website.

6th Virtual Nanotechnology Poster Conference

When? 11 – 17 April 2016

For more information please visit the event website.

Innovation in Medtech 2016

When? 12 – 14 April 2016

Where? Dublin, Ireland

For more information please visit the event website.

Workshop zur Förderung der Produktentwicklung in der Medizintechnik

When? 12 April 2016, 1:00 – 7:00 p.m.

Where? Linz, Austria

For more information please visit the event website.

14th European Symposium on Controlled Drug Delivery

When? 13 – 15 April 2016

Where? Egmond aan Zee, Netherlands

For more information please visit the event website.

Crash-Kurs Vertragsmanagement und Produkthaftung

When? 14 April 2016, 2:00 – 6:00 p.m.

Where? Nürnberg, Germany

For more information please visit the event website.

LAB for Open Innovation Science

When? 15 April 2016

Where? Vienna, Austria

For more information please visit the event website.

Österreichisch-Tschechisches Nanotechnologie Forum

When? 20 April 2016

Where? Vienna, Austria

For more information please visit the event website.

Vernetzungstreffen "Wearable Computing im Gesundheitswesen"

When? 20 April 2016

Where? Berlin, Germany

For more information please visit the event website.

NANOTECH 2016 - Global Nanotechnology Congress and Expo

When? 21 – 23 April 2016

Where? Dubai, United Arab Emirates

For more information please visit the event website.

Koordination von EU-Forschungsprojekten: Mehr-Wert oder nur Mehr-Arbeit?!

When? 25 April 2016

Where? Vienna, Austria

For more information please visit the event website.

Kurs Risikomanagement für Medizinprodukte nach ISO 14971

When? 28 April 2016

Where? Nürnberg, Germany

For more information please visit the event website.

Up-Date Wirtschaftsstandort Oberösterreich - Intelligente Spezialisierung als regionale Standortstrategie

When? 3 May 2016

Where? Linz, Austria

For more information please visit the event website.

Analytica 2016

When? 10 – 13 May 2016

Where? Munich, Germany

For more information please visit the event website.

BIO NANONET on site

KETs: Nanotechnologies and Advanced Materials, Biotechnologies, Advanced Manufacturing and Processing

When? 12 May 2016

Where? Mainz, Germany

For more information please visit the event website.

Symposium Substitution of Critical Raw Materials

When? 12 – 16 May 2016

Where? Lille, France

For more information please visit the event website.

3rd NANOSMAT-USA 2016

When? 18 – 20 May 2016

Where? Arlington, Texas

For more information please visit the event website.

SETAC Europe 26th Annual Meeting

When? 22 – 26 May 2016

Where? Nantes, France

For more information please visit the event website.

18th Annual Nanotech 2016

When? 22 – 25 May 2016

Where? Washington DC, United States

For more information please visit the event website.

International UPCON'16 Conference

When? 23 – 25 May 2016

Where? Wroclaw, Poland

For more information please visit the event website.

International UPCON'16 Spring School

When? 25 – 27 May 2016

Where? Wroclaw, Poland

For more information please visit the event website.

NanoDiode Working Conference: Opening up Research and Innovation to Society

When? 31 May 2016

Where? Brussels, Belgium

For more information please visit the event website.

Nano in Bio 2016

When? 31 May – 5 June 2016

Where? La Creole Beach Hotel, Guadeloupe, France

For more information please visit the event website.

International Nanotoxicology Congress 2016

When? 1 – 4 June 2016

Where? Boston, United States

For more information please visit the event website.

NanoMatEn 2016

When? 1 – 3 June 2016

Where? Paris, France

For more information please visit the event website.

Nanotech France 2016

When? 1 – 3 June 2016

Where? Paris, France

For more information please visit the event website.

From Solid State to Biophysics VIII - From Basics to Life Sciences

When? 4 – 11 June 2016

Where? Cavtat, Croatia

For more information please visit the event website.

AMT 2016 - Advanced Materials and Technologies

When? 5 – 8 June 2016

Where? Rawa Mozewiecka, Poland

For more information please visit the event website.

5th Annual World Congress of Advanced Materials-2016 (WCAM-2016)

When? 6 – 8 June 2016

Where? Chongqing, China

For more information please visit the event website.

U.S.-EU: Bridging NanoEHS Research Efforts joint workshop

When? 6 – 7 June 2016

Where? Arlington, Texas

For more information please visit the event website.

NANO 2016

When? 13 – 16 June 2016

Where? Atlanta, United States

For more information please visit the event website.

Materials Congress-2016

When? 13 – 15 June 2016

Where? Alicante, Spain

For more information please visit the event website.

Projektentwicklung und Antragstellung in Horizon 2020

When? 14 – 15 June 2016

Where? Vienna, Austria

For more information please visit the event website.

Nanofair 2016 – New Ideas for Industry

When? 14 – 16 June 2016

Where? Dresden, Germany

For more information please visit the event website.

InterNanoPoland 2016

When? 14 – 15 June 2016

Where? Katowice, Poland

For more information please visit the event website.

Inaugural Cancer Immunotherapy and Combinations meeting

When? 15 – 16 June 2016

Where? Boston, United States

For more information please visit the event website.

IDDST-South Korea 2016 - 14th Annual Congress of International Drug Discovery Science & Technology

When? 16 – 18 June 2016

Where? Gyeonggi, South Korea

For more information please visit the event website.

7th World Nano Conference

When? 20 June 2016

Where? Cape Town, South Africa

For more information please visit the event website.

3rd International Conference on Occupational & Environmental Toxicology (ICOETox 2016)

When? 21 June 2016

Where? Porto, Portugal

For more information please visit the event website.

NANOTECH Poland

When? 21 June 2016

Where? Poznan, Poland

For more information please visit the event website.

Industrial Technologies Conference

When? 22 – 24 June 2016

Where? Amsterdam, Netherlands

For more information please visit the event website.

12th International Conference on Diffusion in Solids and Liquids - DSL2016

When? 26 – 30 June 2016

Where? Split, Croatia

For more information please visit the event website.

CLINAM 2016

When? 26 – 29 June 2016

Where? Basel, Switzerland

For more information please visit the event website.

12th International Conference on Diffusion in Solids and Liquids - DSL2016

When? 26 – 30 June 2016

Where? Split, Croatia

For more information please visit the event website.

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nanoFIS 2016

When? 27 – 29 June 2016

Where? Graz, Austria

For more information please visit the event website.

9th Nano Congress for Future Generation

When? 27 – 29 June 2016

Where? Valencia, Spain

For more information please visit the event website.

5th European Biosimilars Congress

When? 27 – 29 June 2016

Where? Valencia, Spain

For more information please visit the event website.

7th International Nanomedicine Conference

When? 27 – 29 June 2016

Where? Sydney, Australia

For more information please visit the event website.

5th European Biosimilars Congress

When? 27 – 29 June 2016

Where? Valencia, Spain

For more information please visit the event website.

9th World Drug Delivery Summit

When? 30 June – 2 July 2016

Where? New Orleans, United States

For more information please visit the event website.

ISSON 2016 - 10th International Summer Schools on Nanosciences & Nanotechnologies, Organic Electronics & Nanomedicine

When? 2 – 9 July 2016

Where? Thessaloniki, Greece

For more information please visit the event website.

10th International Conference on Advanced Computational Engineering and Experimenting - ACE-X 2016

When? 3 – 6 July 2016

Where? Split, Croatia

For more information please visit the event website.

BIO NANONET on site

Nanotechnology in Medicine: From Molecules to Humans

When? 3 – 8 July 2016

Where? Herrnstein, Austria

For more information please visit the event website.

Faraday Discussion: Nanoparticles with Morphological and Functional Anisotropy

When? 4 – 6 July 2016

Where? Glasgow, Scotland

For more information please visit the event website.

NN 16 - 13th International Conf. on Nanoscience and Nanotechnologies

When? 5 – 8 July 2016

Where? Thessaloniki, Greece

For more information please visit the event website.

Kurs Qualitätsmanagement für Medizinprodukte nach ISO 13485

When? 6 July 2016

Where? Nürnberg, Germany

For more information please visit the event website.

5th International Symposium on Graphene Device -ISGD-5

When? 11 – 14 July 2016

Where? Brisbane, Australia

For more information please visit the event website.

NANO KOREA 2016

When? 13 – 15 July 2016

Where? Kintex, Korea

For more information please visit the event website.

Mechanisms and Barriers in Nanomedicine

When? 14 – 16 July 2016

Where? Breckenridge, Colorado

For more information please visit the event website.

"Application driven advances in additive manufacturing technologies" at ICQNM 2016

When? 24 – 28 July 2016

Where? Nice, France

For more information please visit the event website.

NANO ENERGY 2016

When? 27 – 29 July 2016

Where? Liverpool, United Kingdom

For more information please visit the event website.

9th Nano Congress for Next Generation

When? 1 – 2 August 2016

Where? Manchester, United Kingdom

For more information please visit the event website.

ICANM 2016: International Conf. & Exhibition on Advanced & Nano Materials

When? 1 – 3 August 2016

Where? Montreal, Canada

For more information please visit the event website.

252nd American Chemical Society Meeting

When? 21 – 25 August 2016

Where? Philadelphia, United States

For more information please visit the event website.

IEEE Nano - 16th International Conference on Nanotechnology

When? 22 – 25 August 2016

Where? Sendai City, Japan

For more information please visit the event website.

9th conference Interfaces Against Pollution (IAP2016)

When? 4 – 7 September 2016

Where? Lleida, Spain

For more information please visit the event website.

21st European Symposium on Quantitative Structure-Activity Relationship

When? 4 – 8 September 2016

Where? Verona, Italy

For more information please visit the event website.

11th NANOSMAT 2016

When? 6 – 9 September 2016

Where? Aveiro, Portugal

For more information please visit the event website.

BIO NANONET on site

BioNanoNet Strategy Meeting & 10th Anniversary *(for members only)*

When? 15 September 2016

Where? Laßnitzhöhe, Austria

Save the date! We will keep you informed as soon as further details are available.

BIO NANONET on site

BioNanoNet General Meeting *(for members only)*

When? 15 September 2016

Where? Laßnitzhöhe, Austria

Save the date! We will keep you informed as soon as further details are available.

4th Conference on Innovation in Drug Delivery: Site-Specific Drug Delivery

When? 25 – 28 September 2016

Where? Antibes-Juan-les-Pins, France

For more information please visit the event website.

11th International Conference and Expo on Nanoscience and Molecular Nanotechnology

When? 26 – 28 September 2016

Where? London, United Kingdom

For more information please visit the event website.

MICRONORA 2016

When? 27 – 30 September 2016

Where? Besancon, France

For more information please visit the event website.

4th International Conference on Competitive Materials and Technology Processes (ic-cmtp4)

When? 3 – 7 October 2016

Where? Miskolc-Lillafured,Hungary

For more information please visit the event website.

CPhI worldwide

When? 4 – 6 October 2016

Where? Barcelona, Spain

For more information please visit the event website.

FFG Akademie Training: AntragstellerInnen KMU Instrument

When? 5 October 2016

Where? Vienna, Austria

For more information please visit the event website.

Nanoforum 2016

When? 11 – 13 October 2016

Where? Milano, Italy

For more information please visit the event website.

NANOCON 2016

When? 19 – 21 October 2016

Where? Brno, Czech Republic

For more information please visit the event website.

BIT`s 6th Annual World Congress of NanoScience & Technology

When? 26 – 28 October 2016

Where? Singapore, China

For more information please visit the event website.

BIO NANONET on site

5th International Conference NANOSAFE 2016

When? 7 – 11 November 2016

Where? Grenoble, France

For more information please visit the event website.

ISACS21: Challenges in Nanoscience

When? 10 – 12 November 2016

Where? Beijing, China

For more information please visit the event website.

BIO NANONET on site

NANoREG final conference

When? 29 November – 1 December 2016

Where? OECD/Paris, France

Save the date! We will keep you informed as soon as further details are available.

BIO NANONET on site

World Congress on Clinical Trials in Diabetes (WCTD2016)

When? 30 November – 1 December 2016

Where? Berlin, Germany

For more information please visit the event website.

ICI Meeting 2016

When? 4 – 6 December 2016

Where? Tel Aviv, Israel

For more information please visit the event website.

ICNSNT-2016 - 3rd Annual International Conference on Nanoscience and Nanotechnology

When? 7 – 8 December 2016

Where? Bangalore, India

For more information please visit the event website.

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7. NRW Nano-Konferenz

When? 7 – 8 December 2016

Where? Münster, Germany

For more information please visit the event website.

Finally

We would like to thank the following persons for their contributions for this BioNanoNet newsletter:

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Please do not hesitate to contact us if you would like to give us any suggestions or feedback!

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