



Welcome and overview:

Welcome to the latest issue of the NanoSafety Cluster Newsletter. The response to the call for news has been fantastic, and on behalf of WG7 Dissemination, THANK YOU to everyone who contributed. If you still have news pending, you can submit it via the news submission page http://www.nanosafetycluster.eu/newsletter/submit_news.html

This issue focuses on updates and developments arising from the recently held NSC meeting at the OECD Paris, which also gave two of the large scale projects, NanoValid and Marina, a valuable opportunity to convene, discuss, and share outcomes. The NSC community revisited tasks and appointments for the Working Group chairs and turned its attention to tools, frameworks and databases in NanoSafety. A key presentation on “Developing a European Consortium of Expertise to Inform the Public and Private Sectors on Risk Management for the Safe Design and Implementation of Nanotechnology” and all other presentations can be downloaded here:

www.nanosafetycluster.eu/nsc-meetings/nanosafety-cluster-meeting-paris-2015.html

A number of articles report on the output from current projects, introduce new initiatives NanoFase, NanoLEAP and NanoREG2, and provide updates from the flagship project NanoValid as it approaches completion.

Some of the projects have been prolific in their publication output, and you can find out more about their research results as you read further on. This is followed by our regular feature of events, conferences and training schools, which offers you some key dates for your diaries.

Finally, if your dream of retiring to a palm-fringed Caribbean island or sailing round the world in a 12-birth yacht is still some way off in the future, have a look at the Situations Wanted and Job Opportunity links on the last page.

We hope you find this issue informative. There is no newsletter without your contributions, so please let the community know about your project, activities, events and continue to submit your articles and items.

On behalf of WG7 Dissemination
Lesley Tobin



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Highlights from the NSC meeting on 30th September 2015 in Paris

By Iseult Lynch (NanoMILE, WG7 Dissemination) and Elina Dravvik (NanoSOLUTIONS, WG7 Dissemination)

In conjunction with the final meetings of EU FP7 projects MARINA and NanoVALID, the 14th NanoSafety Cluster (NSC) meeting was held at the OCED offices in Paris on the afternoon of the 30th September 2015.

Our key goals were to:

- Allow Working Groups to elect their Steering Committee representative and (new) Chairs/co-Chairs
- Provide the advanced draft of the “Closer to Market roadmap” for final remarks from NSC members. This roadmap, available to view via the [NSC website](#), focuses on new “boutique” nanomaterials production and on how nanosafety will be moderated for this scale of production.
- Discuss the calls for 2016-2017, including the Coordination Support Action on *Networking of nanosafety centres and strengthening the European nanosafety cooperation*, and the subsequent rounds of calls for 2018-2020.
- Discuss databases and data management – an ongoing issue for the community.

Some highlights from the meeting are presented below. Agenda, presentations and full minutes will shortly be available via the [NSC meetings](#) section of the NSC website.



Image: Group photo taken evening of 30th September 2015 at the OECD in Paris.

Nanosafety in Horizon2020

Nanosafety represents 10% of total nanotechnology funding in H2020 (15% in 2015). Going forward nanosafety progress might be implemented via different strategies – changing the face of research from safety *per se* to real life challenges, i.e. in products.

Based on the reviews of proposals so far: IMPACT is the killing field in H2020. The Commission reviewers read it first and the IMPACT section does not score highly the rest of the proposal is not even read! Pay more attention to the IMPACT statement and don't leave it to last. Horizon2020 is impact-oriented!

The 2016/2017 calls are pre-published as the submission timelines are tight. Expect formal publication 14/15 October 2015, with stage 1 deadlines pre-Christmas and 1-stage deadlines mid-January 2016.

2018-2019 calls: These are being drafted at present. Expect calls for input to drafting of the call texts shortly. Some will be aligned with US activities and will be run as parallel calls for proposal – these will be developed with joint input from the NSC WGs and Communities of Research (CoRs) and based on roadmapping exercises. From needs identified, the plan is to work backwards and publish calls so that complementary projects start approximately at the same time. The foreseen scope is nanobio-informatics and systems biology, but there may be other items.



Nanosafety databases

H2020 project ProSafe coordinated a meeting to discuss harmonisation of risk assessment for nanosafety with GuideNano, SUN, eNanoMapper etc. in September 2015. The outcome was identification of the critical need for

- (1) agreement on ontology and tools, and
- (2) queryable databases / tools (not just data dumps), which are sustainable beyond individual project lifetimes.

The suggestion from the community was that sustainability funding be externally sourced monies backed by the stakeholders needing the data longer term – thus, e.g. ECHA could potentially sponsor it. The European Commission Project Officer's viewpoint was that a single repository is not feasible, and that tools to link datasets are needed. Future nanosafety projects will have to respect the agreed ontology (being developed today within eNanoMapper and other projects) and will be obliged to provide access to their data via the Open Access Pilot (obligatory from 2016).

The outcome of this somewhat contentious discussion was an agreement that the Commission representatives would initiate a call for a discussion meeting in Brussels gathering the operational and coordination representatives of all projects in order to reach agreement on this issue. [Note: the date / place for this meeting is **23 November 2015** at DG RTD, Covent Garden, Place Rogier, Brussels].

NanoSafety Cluster Working groups (WGs)

Due to the short time available, the WGs were not able to provide detailed updates - these will be posted to the NSC website instead.

A new WG is proposed: **Safe by design** WG. NanoREG II, which started 1st September 2015, pointed to the need for this new working area, enjoying contributors from both running and ended projects.

Contact person: Eva Valsami-Jones. Email to join if interested: e.valsamijones@bham.ac.uk

WG on Nano-Safety Pilots:

The initiative needs to mature. Meanwhile, the contact person is Andreas Falk: Andreas.Falk@bionanonet.at

In the table below is a summary of *decisions* regarding WG Chairs and Steering group representatives (taken on 30th September 2015). Some WGs will also function with chaired sub-groups. The names and details will be provided on NSC website.

WG	Chair and WG contact person	SG representative
WG1 Materials	Sergio Moya (NanoSolutions)	Stefan Weigel (NanoDefine)
WG 2 Hazard	Flemming Cassee (NanoMILE) and Teresa Fernandes (Nanosolutions)	Flemming Cassee (NanoMILE)
WG3 Exposure	Claus Svendsen (GuideNano) and co-chairs	Claus Svendsen (GuideNano)
WG4 Database	Not yet decided	
WG5 Risk	Danail Hristozov (SUN)	Lang Tran (Nanosolutions)
WG6 Modelling	Not yet decided	
WG7 Dissemination	Claire Mays (NanoFASE)	Iseult Lynch (NanoMILE)
WG8 Systems Biology	Bengt Fadeel (NanoSolutions)	Bengt Fadeel (NanoSolutions)

The presentations and final version of the minutes of the NSC meeting in Paris are now available on the NanoSafety Cluster website:

<http://www.nanosafetycluster.eu/nsc-meetings/nanosafety-cluster-meeting-paris-2015.html>



Images from events at OECD Paris—with thanks to Marcus Hank (GAT)





Dates for diaries

- **Next NSC meeting:** April 2016. Exact date to be confirmed. The meeting will be held in conjunction with NanoMILE-
- NanoSOLUTIONS joint workshop on High content and “omics” approaches for nanomaterials safety evaluation and regulation.
- **Next EU-US CoRs meeting:** 30-31st May 2016 in Washington DC or Boston, aligned with the 8th International Nanotoxicology Conference, Boston, June 2016. <http://nanotoxcongress.net/index.html>
- “Systems Biology in Nanosafety Research” Conference, 9-10 November 2015 in Stockholm, Sweden. Few places might be available, register at: <http://goo.gl/forms/1aTdAvorp4>
- **Global Summit on Regulatory Science - Regulatory Bioinformatics, October 12-13, 2015, Parma, Italy.** <http://www.fda.gov/AboutFDA/CentersOffices/OC/OfficeofScientificandMedicalPrograms/NCTR/WhatWeDo/ucm442169.htm>
- **2nd Sustainable Nanotechnology School, 24-29 January 2016, Venice, Italy** http://www.unive.it/nqcontent.cfm?a_id=66712
- **2nd NanoSafety Forum for Young Scientists, to be organized in Visby, Sweden in September 2016**
- **NANOSAFE 2016 Conference, 7-11 November 2016, Grenoble, France.**



WG4-Database ToxBank Public Forum

Barry Hardy PhD, Managing Director, of Douglas Connect GmbH

An excellent programme has been planned for the **ToxBank Public Forum** 26, 27 October in London. The forum is a chance to hear about and discuss the leading progress in the alternative testing field as advanced over the past five years on SEURAT, ToxBank and related projects, and to get a preview of the next exciting chapters going forward in the OpenTox and ToxBank stories.

Virtual proceedings have been made available.

For full programme information download the brochure from:

http://www.toxbank.net/ToxBank-PublicForum-brochure_page-by-page.pdf

or http://www.toxbank.net/ToxBank-PublicForum-brochure_spreads.pdf

WG7 Dissemination Training Subgroup First teleconference summary

By Judith Friesl, The REACH Centre, The Sun Project
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The NSC Training Subgroup meeting was an excellent start for discussion among NSC project Coordinators and Training and Disseminations Work Package Leaders.

The main points discussed during the meeting:

- Identification of all contact persons for training activities in each projects is still missing
- There is a need for PTA colleagues to “motivate” more projects to contribute.

Actions to be taken in order to further engage NSC projects:

- Require direct input from the projects and identify their contact persons for training and document their training activities (courses, schools, PhD theses, etc.) through the means of a joint form
- Circulation of the summary of the 1st NSC Training Subgroup meeting;
- Present the group, explain the objectives and require direct input from the projects and during the NSC Meeting in Paris.

Future actions:

After collecting full contact list of projects, the actual coordination process will start.
Bimonthly meetings among NSC Training Subgroup Core members

Problems and Suggestions:

An issue that we are facing is that many projects do not have appointed contact persons for training. In order to avoid this in the future projects contact persons should be specified and person months for training should be granted. Requirements regarding the training activities and their management could be specified in the call texts as this would most effectively ensure their specification in the projects, which would facilitate their coordination.

If you would like to contribute to the subgroup, please contact Judith Friesl on j.friesl@thereachcentre.com



News from the NanoDefine Project

NanoDefine engages a captive audience in public workshop on project outcomes

A warm welcome by Nicolas Segebarth, EU DG Research Programme Officer, launched a highly informative NanoDefine project workshop in Brussels on the 17th June 2015. The event aimed to update a wide-ranging audience of key stakeholders from European and National institutions including industrial sector organisations, individual companies and potential end-users, on the methods and tools under development in NanoDefine as well as the progress and first outcomes of the project. Andrej Kobe (EC-DG Environment) provided the context of the project by offering insight into the EU Recommendation 2011/696 on the definition of Nanomaterial and the current revision process, prior to a succinct summary on NanoDefine objectives and concepts delivered by Stefan Weigel, Project Coordinator (RIKILT). Leading scientists from the partner organisations highlighted the developments in each of NanoDefine's thematic areas:



- **Technique evaluation and method developments**
- **Innovation: New Instruments and Software**
- **New Standards and Reference Materials**
- **Guidance for the implementation of the definition**

Participants engaged in question and answer sessions prior to a general plenary, which generated valuable feedback on stakeholder needs and requirements. A lunch-time poster session with handouts and brochures complemented the lecture themes. The event highlighted the urgent need for information on the analytical possibilities and tools required for the implementation of the proposed EC nano-definition.

ENF 2015 Accolade for NanoDefine as One of Ten Best Projects

NanoDefine held its first large-scale dissemination drive at Europe's most significant nano networking conference, EuroNanoForum 2015, from 10-12 June 2015 in Riga, Latvia, enabling the project partners to present NanoDefine's activities in a high-profile seminar and poster presentation.

In recognition of the project's substantial activities in supporting the implementation of the EC recommendation for the definition of nanomaterial, NanoDefine was selected as one of the 10 best projects and given a booth at the Nanotech Europe exhibition. Visitors were able to find out more about the project from Stefan Weigel (RIKILT), the Project Coordinator and other Consortium members.

A full day was dedicated to a joint seminar co-organised by NANoREG, SIINN and ProSafe to highlight the achievements of EC nano projects in regulatory and EHS issues. Stefan Weigel culminated NanoDefine's representation with his talk entitled "Efficient characterisation and classification of materials according to the EC nano-definition: The EU FP7 NanoDefine project". Despite being the final conference presentation of the day, it was well-attended and triggered a vibrant discussion during and after the event.

For more information contact: coordinator@nanodefine.eu

New NanoDefine Scientific Workshop on "Evaluation and Selection of the most suitable Measurement Techniques for Characterization and Classification of a nanomaterial according to the EC definition", 17-18 November 2015, Berlin

NanoDefine experts will meet on the 17-18 November 2015 at the Federal Institute for Materials Research and Testing (BAM) in Berlin to discuss the scientific progress of the ongoing work and results achieved after the first two project years. Project partners will come together to assess critical science related topics in the light of regulatory demands, such as measurement uncertainties, real-world testing or robustness of the planned 2-tiered classification and "NanoDefiner" eTool. This non-public workshop will also serve as mid-term evaluation, to help to identify stop/go decisions within the project implementation strategy. Also concepts for further dissemination of the developed methodology will be discussed. Scope, applicability and limits of the most promising screening and confirmatory techniques developed and selected within the project will be reviewed against the latest scientific findings for future validation, integration and classification.

For information: coordinator@nanodefine.eu.



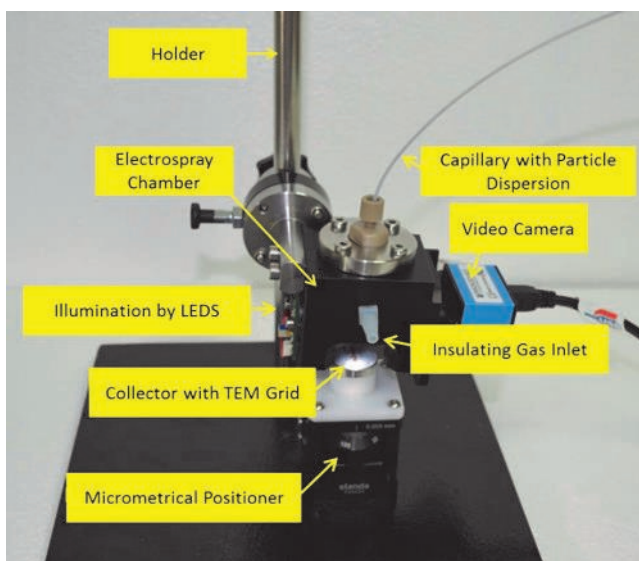
NanoDefine Synergy Workshop with NSC projects, 2 February 2016, Brussels

NanoDefine together with pigments and fillers industry stakeholders Eurocolours and VdMI, is preparing an innovative workshop to discuss project developments that will benefit industrial end-users implementing EC recommendations on the definition of nanomaterial. Launched in 2013, NanoDefine is establishing a novel 2-tiered approach including rapid, cost-effective screening and confirmatory measurement methods, and the "NanoDefiner": an eTool that will guide end-users, including enforcement laboratories, in reliably ascertaining whether a material is nano or not. The one-day workshop will enable stakeholders to identify critical issues and future priorities for size-related classification and standardized measurement of real-life materials. They will also discuss limitations and applicability of the developed methods as well as addressing key questions such as: "What methods seem most promising and feasible from an industry perspective?"

For more information contact: events@nanodefine.eu.

RAMEM reports on the "Electrospray Deposition Method for TEM Sample Preparation"

Pavla Dohányosová: p.dohanyosova@ioner.eu



The prototype of Electro Spray Deposition System (EDS) for TEM sample preparation was developed by RAMEM. The system consists of two main parts: electro spray chamber and collector. The video camera, illuminating elements and distributor of insulating gas are implemented in the electro spray chamber. The collector was optimised for TEM grids supporting and its distance from capillary tip can be gradually adjusted during operation by Z-axis micrometric positioner. Gold nanoparticle of 5 nm and 20 nm, NanoDefine size standard NP liquid dispersion and 9 of NanoDefine priority materials were used to test the system. Therefore, it was proved that the EDS is very versatile and can be used for a large variety of samples.

The Prototype of Electro spray Deposition System for preparation of TEM samples

A poster entitled 'Electrospray Deposition Method for TEM Sample Preparation' was presented by Ramem at Aerosol Technology 2015 when RAMEM attended the Aerosol Technology 2015 Conference in Tampere, Finland, 15 – 17 June 2015 <http://www.tut.fi/at2015>.

Electrospray Deposition Method for TEM Sample Preparation

P. Dohányosová, P. Balcerus, J. G. Lincetania and S. Lopez-Vidal

NanoDefine Project Aims

- Establish measurement tools to implement EC recommendation on nanomaterial definition.
- Comparative evaluation of existing techniques.
- Development and improvement of instrumentation and methods.
- Validation/standardization of key methods.
- Characterization of real world test materials (industrial low materials, products).

Sample Preparation for TEM

- TEM is one of most important nanoparticle characterization methods.
- Sample preparation is a crucial aspect of TEM measurement.
- Traditional sample preparation methods have important limitations:
 - Particle agglomeration.
 - Non-homogeneous deposition.
- For these reasons one task of NanoDefine Project is to develop and evaluate Electro spray Deposition System for TEM sample preparation.

Electrospray Deposition Method

- Compact and portable.
- Video camera and electric current lecture for monitoring of spray production.
- Hose barb for insulating gas supply to avoid corona discharge.
- Collector vertically adjustable by micrometric positioner.
- Collector designed for easy manipulation with TEM grids.

Performance Tests

- Performance of Electro spray Deposition System was tested with aqueous dispersions of various nanoparticles:
 - Gold NP of 5 and 20 nm.
 - Mono and Trimodal Silica.
 - Mono and Trimodal Polystyrene.

Further Work

- Comparison of traditional sample preparation methods and ES deposition.
- Real world samples containing nanomaterial to be studied:
 - Inorganic: CaCO₃, BaSO₄, TiO₂, kaolin, zeolite.
 - Organic: yellow pigment, basic methacrylate polymer.
 - Products: Cosmetics (TiO₂, Al₂O₃), food (SiO₂).

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This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 594342.

A Final (Technical) Note from NanoDefine Partner: Malvern

Patrick Hole, Malvern, recently delivered two talks on the following topics:

- Using Nanoparticle Tracking Analysis (NTA) for Accurate and Complete Nanosuspension Characterisation, Clinam, Basel, Switzerland, 28 June – 1 July 2015 (<https://www.clinam.org/>)
- Improving repeatability and reproducibility of size and concentration measurements using nanoparticle tracking analysis, QualityNano Conference and Training Workshop, Heraklion, Greece, 15 – 17 July 2015 (<http://www.qualitynano.eu/conference/welcome.html>)

The Technical Note can be downloaded here:
<http://www.nanodefine.eu/files/news/TN150515NTAConcentrationUpgrade.pdf>



NanoValid Reports:

'Nano to go!' now distributed to NanoValid partners

Katharina Niesmann, BAuA, Germany



The German Federal Institute of Occupational Safety and Health (BAuA, *Bundesanstalt für Arbeitsschutz und Arbeitsmedizin*) conducts research on health and safety in the occupational environment and promotes the transfer of scientific knowledge into policy and practice. Our contribution to NanoValid is a guide on safe handling of nanomaterials at workplaces. The objective was to provide practical support based on the EU directive 98/24/EC on the protection of health and safety of workers from chemical risks, taking into account a comprehensive state of knowledge from more than 10 years of international nanosafety research. The outcome is 'nano to go!', a comprehensive manual that supports risk assessment and risk management.

Nano to go! contains the brochure 'Safe handling of nanomaterials and other advanced materials in the workplace'. Based on a grouping approach for nanomaterials from the announcement 527 'Manufactured Nanomaterials' of the German Committee on Hazardous Substances, it provides decision criteria for determination and assessment of risks from nanomaterials and other advanced materials and the selection of appropriate safety measures. The criteria consider the physical condition of the nanomaterial in use (powder, bound in a matrix or dissolved in a liquid), its solubility in water and the potential for release of respirable particles. Special attention is given to fibrous materials which may release asbestos-like fibres and therefore may pose a significant risk to human health. The guideline provides risk-related control strategies and practical solutions for safe work which follow the STOP principle: substitution, technical measures, organisational measures and personal protection measures. The recommendations are supplemented by advice for storage, disposal and transport, placing on the market, prevention of risk from fire and explosion, and for checking the effectiveness of protective measures.



A flash drive contains additional documents to supplement the brochure. Four field study reports present expert assessment of safety and health at different workplaces in pilot plants and laboratories. They comprise detailed description of methods, sampling strategies and measurement devices. They summarise and discuss measurement results and additional (non-measurement) impressions from risk assessment. The reports are complemented by an exemplary standard operation procedure (SOP) for good laboratory practice in OSH, by blank forms for operating instructions and for a sampling protocol, and by a dialogue guide for risk assessment at the workplace. Moreover, the flash drive provides documents for training: a short introduction on 'Safety management and nanomaterials' and seven presentations in a train-the-trainer format illustrate current knowledge on nanomaterials, toxicology, information gathering, risk assessment and management, as well as basics on EU regulations for chemical safety.

Nano to go! particularly addresses research institutions and SMEs in micro- and nanotechnology and those involved in the development of advanced materials. It supports researchers and safety experts, but also consultants and regulators in occupational health and safety. The manual is a contribution to approach the *known unknowns* of nanomaterials and presents one way of managing risks in the absence of sufficient data on hazard and exposure.

Nano to go! was presented during the final NanoValid/MARINA conference in Paris on Sept. 29/30, 2015. Printed copies are now being shipped to all NanoValid partners for further dissemination.

The brochure and all additional documents are also available for download:

- ✓ on the BAuA website (www.baua.de/nanoToGo),
- ✓ on the NanoValid website (www.nanovalid.eu/nanoToGo), and
- ✓ on the NanoSafety Cluster website (www.nanosafetycluster.eu/nanoToGo).



Nanoparticles and the immune system, a meeting report

By Albert Duschl and Diana Boraschi



It is inevitable that nanoparticles and the immune system meet. A major task of the immune system is to recognise non-self entities that are present within the body, and if such entities are discovered, to decide whether they are dangerous and warrant defensive action. Most non-self is not dangerous (think about food, clothes, commensal bacteria, etc.), so being recognised as non-self by the immune system does not mean that an inflammation is automatically triggered. The default of the immune response is in fact to initiate active mechanisms of tolerance. Only when there are clear signs of danger, like toxins or materials released from necrotic cells, defensive actions start.

Engineered nanoparticles are about as non-self as it gets, so we would expect that the immune system recognises them as such. The question is now whether immune cells consider these entities dangerous or harmless. Since this is the same question that nanosafety researchers are trying to answer, the immune system should have direct relevance for us: immune cells are professional in evaluating risk and safety! A benefit for the immunological community is increased knowledge about toxic nanoobjects, which may, in the right circumstances, be eligible as therapeutics.



Still, the contacts between mainstream immunology and nanotechnology are not very well developed. In an attempt to improve this, the **ESF-EMBO Symposium on Interaction between the immune system and Nanomaterials: safety and medical exploitation** took place at Polonia Castle, Pultusk, Poland from 4th to 9th October 2015.

It was chaired by Diana Boraschi (chair of the sub-group on immunosafety within NSC WG 2) and co-chaired by Albert Duschl (WP leader for case studies within FP7 NanoValid). The meeting was attended by around 40 experts from all career levels and from different fields, including immunology, nanotechnology, nanomedicine, materials sciences, pharmacology, biochemistry and biotechnology.

The event was very international; in terms of continents only Australia was not represented. The meeting included talks by Albert Duschl and Ineke Malsch on the job market in nanotechnology, an aspect of obvious interest to the younger participants, but important also to senior scientists, who should provide training that is in line with job skill requirements.

While it is not possible to summarize a 4-day meeting in a brief note, some aspects that were discussed should be mentioned, to give a flavour of what types of questions are hot in this interdisciplinary field. Dose emerged – as so often – as crucial factor. Diana Boraschi pointed out that cell death is a normal event and immune cells like neutrophils or monocytes die normally within a few days or less. For this reason, cytotoxicity induced by nanoparticles in such short-lived cells is not necessarily damaging, unless it occurs at a massive scale. Moein Moghimi emphasized risks associated with nanodrugs, like adverse reactions up to anaphylactic episodes. The response is triggered by innate immune receptors like those of the complement system, which interact with particle surface, so surface characteristics have to be controlled to prevent them. Víctor Puentes focused on trafficking and recycling of NPs, in which size is an important factor that can determine routes and uptake, and thus influences persistence and effective dose in the body. Albert Duschl called for more studies on nanoparticles that are not clean and thus closer to factory or consumer products, citing three studies from NanoValid, that used on-site collected materials, and particles intentionally mixed with allergens or with bacterial compounds. Only the last of these three studies gave data mostly as expected.



Cornelia Keck contributed to highlighting the importance of complement, pointing out that coating with opsonins or dysopsonins (i.e., proteins that activate or suppress complement) can be used in targeting nanocrystals to the brain. Related to targeting, but also to toxicity, Donald Tomalia introduced the concept of the “periodic table” of nanomaterials, which, like the periodic table of elements, allows predictions about elements in advance. This concept, which he has developed originally for dendrimers, but which was now extended to include other particle types, has been successfully applied to engineer efficient “stealth” coatings to nanodrugs that escape immune detection. The concept of “stealth” was further elaborated by Moein Moghimi, who pointed out that pathogenic bacteria use nanosized protein structures to escape the immune system, so they provide an example that facilitates targeting of nanodrugs especially to liver and spleen. Coming up in several talks was targeting to the brain, still the most challenging goal in nanomedicine, with several good approaches but generally low efficiencies.

Diana Boraschi discussed *in vivo* vs. *in vitro* models. It is a general consensus that all models have weaknesses, but they have different ones and thus can complement each other. Selection of appropriate endpoints is critical, as illustrated by her for a model of induction and resolution of inflammation in the gut. Laura Canesi presented a less familiar model, which is the marine mussel *Mytilus*. Since many responses of the body, including central parts of innate immunity, are conserved in invertebrates, these organisms can be compared to humans. Mussel hemocytes may thus be used to compare environmental impacts with effects in human monocytes. Lea Ann Dailey talked about her work on nanodrug delivery to the lung, highlighting the critical role of hydrophobicity, which correlates with local lung toxicity, as shown for different experimental nanoparticle carrier models. In-Hong Choi presented studies on mouse models of atopic dermatitis and of allergic asthma. While nanosilver had an influence on the phenotype of the dermatitis model, nanosilica had no effect during the acute phase of allergic asthma in the mouse. Rob Vandebriel addressed the issue of crystal structure of titania nanoparticles in determining effects on inflammasome activation and on the capacity of dendritic cells to present antigen, using both *in vitro* cell cultures and *in vivo* inhalation models. The bottom line is that, while both anatase and rutile particles increase allergic inflammation *in vivo*, anatase nanoparticles are more active in augmenting dendritic cell maturation and specific IgE production. It was underlined that, since the mouse model used (BALB/c mice) is genetically prone to developing Th2 responses, these data do not imply that titania nanoparticles can induce allergic reactions in humans.

A round table and a foresight discussion concluded the meeting, both conducted by Moein Moghimi. The round table was opened by Shadi Farhangrazi, an expert in economics of nanotechnology, who introduced us to the nanomedicine market and explained the ways and rules of business in this area. She provided many tips and suggestions for those who plan to create a company. The ensuing discussion led to defining a series of issues that the audience wanted to address more in depth. These included the application context of the nano-immune interaction studies (pharmaceuticals, diagnostics, vaccination, detection of environmental exposure), the structure-activity relationship, and the important fact that most of the studies currently performed seem to ignore a wealth of studies and data of 30-50 years ago that had practically already described and analysed in great detail many of the problems that we are addressing. The general recommendation of the senior faculty members, who were aware of those studies, to the younger researchers, was that reading and studying the data of the past will allow them to move forward their research, rather than staying blocked re-inventing the wheel.

The foresight discussion focused on the possible future directions in which research on nano-immune interaction should go. The audience identified two major focus areas, human diseases and environment, in which studies on nano-immune interaction would find applicability and exploitability in the future. The discussants underlined the necessity of introducing the issue into the more general context of safety and efficacy of nanomedicine and nanotechnology in general, and examined the various possibilities of obtaining dedicated funding. All agreed that global networking is required, and immediately started to discuss possible collaborations, exchange of materials, and harmonisation of characterisation procedures. The audience also discussed on the feasibility of funding a European Nano-Immune Characterisation Lab, based on the US experience of the NCL but specifically focusing on the nano-immune interaction. While everybody thought the concept was excellent and exciting, the participants entered into a lively discussion on various aspects of its practical implementation.

The overall conclusion of the meeting was that research on nano-immune interaction is emerging as a key element in both the nanomedicine and nanosafety areas, with an increasing number of researchers becoming aware of its importance. Based on this, the scientific community is getting ready to face the future challenges that imply evaluating the effects of nanomaterials on immune responses in the new strategies for improving human health (therapy, diagnosis, prevention) and for protecting the environment (biota fitness, bioremediation).



Parallel Futures for NanoSolutions and NanoMILE

By Benoît Hazebrouck: bh@eu-vri.eu

A core group from the EC funded projects NanoSolutions and NanoMILE met in Brussels on the 24th of August, to discuss future synergies between the two projects. The meeting was also attended by Nicolas Segebarth, the NanoSolutions project officer. Both projects were initially conceived to address the same call and it was anticipated that similarities and differences between approaches could be leveraged to maximise use of resources and data from each project.

This gathering in Brussels also served as the planning meeting for a future joint activity, part of the NanoMILE-JRC Brussels Series of consensus meetings on Nanosafety science (see specific article in this issue), focussing on the theme of “Alternative test methods – high throughput & “omics” approaches to nanosafety assessment”.

As anticipated the core research topics in each project were found to be similar, and were used as the theme for five breakout groups:

- 1) Material characterization;
- 2) In-vitro and phenotypes;
- 3) High-throughput screening (HTS);
- 4) In-vivo; and
- 5) Omics, modelling, data management.

Discussions from the breakout groups were then presented to the whole group and a plenary discussion followed. Some key commonalities between the projects include the selection of certain materials (titanium dioxide, silver, copper oxide, carbon nanotubes), test organisms (*Daphnia*, Zebrafish, mice and *C. elegans*) and ultimate development of a model (QSAR for NanoMILE and a nanomaterial classifier for NanoSolutions).

Major deviations included the range and type of materials used, with NanoMILE using a more extensive library of “designer” particles whereas NanoSolutions using a smaller selection of more basic and industrially relevant particles. The two projects also have different approaches and timings when it comes to HTS. NanoMILE has HTS upfront to screen materials of interest for detailed *in vitro/in vivo* investigation, whereas NanoSolutions would use HTS as a validation tool towards the end of the project.

The day ended with everyone feeling that a lot of progress was made, and with a number of important joint activities planned, specifically: discussions are to continue to ensure that the projects find a common “language” to describe their materials, to enable data flow from each project to the other whilst ironing out data incompatibilities; ultimately it is hoped that materials from each project will serve as a test set in the modelling of the other project.

Other common activities included:







- joint papers: a white paper on policy, a paper on Materials, Models and Methods and one focusing on the use of systems biology in nanotoxicology.
- Sharing and testing of each project’s tools (omics, cell models, ENMs etc)
- More concrete plans on the joint workshop, planned for April 2016.



The NanoMILE-JRC Brussels Series of Consensus Meetings on Nanosafety Science Goal and Ambition

Eva Valsami-Jones (UoB) / Contact Email: Mr. Tom Carney, email: t.carney@bham.ac.uk

10 years of investment in nanosafety science by the European Commission via Framework Programmes 6 and 7 has led to an enormous body of data and expertise on nanosafety science in Europe. To ensure continuity of effort, and facilitate the translation from nanosafety science to standardisation, industry and regulation within Horizon2020, the ending nanosafety flagship projects NanoVALID and MARINA, working jointly with the ongoing flagship projects NanoMILE and NanoSOLUTIONS and the Joint Research Centre, will develop a series of consensus papers on scientific best practice and approaches for nanosafety assessment in *three key areas* as indicated below:

Dates	Topics	Organising projects
Autumn-Winter 2015 - 2016	Methodologies for physicochemical / bio-physicochemical characterisation of nano-materials	 
Autumn-Winter 2015 - 2016	Tools for nanomaterials data curation, data interrogation and risk assessment	 
April 2016	Alternative test methods – high throughput & “omics” approaches to nanosafety assessment (see “Parallel Futures for NanoSolutions and NanoMILE” in this issue)	 

Location

University of Birmingham Brussels office, 22-28 Avenue d’Auderghem / Oudergemselaan, B-1040 Brussels, Belgium. <http://www.greaterbirmingham.eu/>.

Format and outputs

Each workshop will consist of keynote presentations followed by break-out discussion groups to reach consensus on selected topics, based around a prepared discussion document. Summaries from the discussion break-out groups will be presented back to the group in plenary for final discussion.

Outputs from each workshop will be:

- White paper & associated summary publication
- Agreed terminology for the topic and agreed protocols and approaches
- Agreed understanding of current limitations of the methods / approaches in terms of their applicability to different NMs classes
- Plan for benchmarking activities and securing buy-in of projects with capabilities to achieve this.

Further information / to express interest in participating:

NanoMILE Project manager: Mr. Tom Carney, email: t.carney@bham.ac.uk



eNanoMapper Updates and its Collaborations with the Community

Authors: Egon Willighagen, Friederike Ehrhart, Linda Rieswijk, Nina Jeliaskova, Chris Evelo, Lucian Farcas, Barry Hardy, Haralambos Sarimveis

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February this year marked the completion of the first draft versions of three key components of the eNanoMapper platform: the database, ontology and modelling software. This update highlights these three contributions to the community and some of their applications to solve community challenges. Furthermore, we briefly discuss our new Associate Partner program and other outreach and dissemination activities.

Database - software and demonstration server: <http://data.enanomapper.net/>

The database software was recently described in detail in a publication in the Beilstein Journal of Nanotechnology (Jeliaskova et al., 2015), extending on the conference paper for the nanoinformatics symposium in Belfast in 2014 (Jeliaskova et al., 2014). These papers describe the database functionality, demonstrate the default graphical user interfaces (see Figure 1), focusing on the data formats supported to import nanosafety data, and the Application Programming Interface (API). The import and upload functionality currently supports a variety of NanoSafety cluster Excel templates, OECD HT (IUCLID .i5z files) and a custom RDF format for importing NanoWiki. ISA-Tab-Nano import and export is under active development. Furthermore, the importer can easily be extended to support more spreadsheet formats and templates, using the configurable parser with specific JSON configuration developed in the past six months (see <https://github.com/enanomapper/nmdataparser/>).

The API (whose interactive documentation can be found at <http://enanomapper.github.io/API/>) supports the automated listing of nanomaterials and their physicochemical and biological properties, searching, and automated upload of data. The API is based on REST and JSON and can be used by any programming language. Various client libraries are currently released in development versions for JavaScript (<https://github.com/enanomapper/ambit.js>) and the R statistical environment (being internally tested). The software can be downloaded from <http://ambit.sourceforge.net/enanomapper.html> and installation instructions can be found at the same location.

Substance Name	Substance UUID	Substance Type	Public name	Reference substance UUID	Owner	Info														
1 - Limbach2005 NM1	NWKI-7998492c...	ENM_9000006	CeO2 I	NWKI-7998492c...	NanoWiki	Composition = CeO2 DATASET = NanoWiki Has_Identifier = 161 SOURCE = Limbach2005														
Composition name: Composition UUID: NWKI-7998492c-3902-3cc2-9f92-cdfe53cfc02 Purity of IUC Substance: <table border="1"> <thead> <tr> <th>Type</th> <th>Name</th> <th>EC No.</th> <th>CAS No.</th> <th>Typical concentration</th> <th>Concentration ranges</th> <th>Structure</th> </tr> </thead> <tbody> <tr> <td>Core</td> <td>CeO2</td> <td></td> <td>1306-38-3</td> <td>0 % (w/w)</td> <td>0 % (w/w)</td> <td></td> </tr> </tbody> </table>							Type	Name	EC No.	CAS No.	Typical concentration	Concentration ranges	Structure	Core	CeO2		1306-38-3	0 % (w/w)	0 % (w/w)	
Type	Name	EC No.	CAS No.	Typical concentration	Concentration ranges	Structure														
Core	CeO2		1306-38-3	0 % (w/w)	0 % (w/w)															
2 - Antisari2013 M1	NWKI-6d5462cc...	ENM_9000006	CeO2	NWKI-6d5462cc...	NanoWiki	Composition = CeO2 DATASET = NanoWiki Has_Identifier = 300 SOURCE = Antisari2013														
Composition name: Composition UUID: NWKI-b4bd899e-c57e-3aaa-bf6f-54ec8ebd6ab5 Purity of IUC Substance: <table border="1"> <thead> <tr> <th>Type</th> <th>Name</th> <th>EC No.</th> <th>CAS No.</th> <th>Typical concentration</th> <th>Concentration ranges</th> <th>Structure</th> </tr> </thead> <tbody> <tr> <td>Core</td> <td>ZnO</td> <td>215-222-5</td> <td>1314-13-2</td> <td>0 % (w/w)</td> <td>0 % (w/w)</td> <td></td> </tr> </tbody> </table>							Type	Name	EC No.	CAS No.	Typical concentration	Concentration ranges	Structure	Core	ZnO	215-222-5	1314-13-2	0 % (w/w)	0 % (w/w)	
Type	Name	EC No.	CAS No.	Typical concentration	Concentration ranges	Structure														
Core	ZnO	215-222-5	1314-13-2	0 % (w/w)	0 % (w/w)															
3 - Kim2012 NM2	NWKI-b4bd899e...	NPO_1542	ZnO	NWKI-b4bd899e...	NanoWiki	Composition = ZnO DATASET = NanoWiki Has_Identifier = 140														

Figure 1. Search functionality in the eNanoMapper database software, showing the results for a search on nanomaterials with a size between 50 and 60 nm



Supported Community Data Sets: the eNanoMapper database server can be set up by NSC projects to host data from their project (please contact us if you would like to try this option). Currently, the platform has been tested for reading templates and data from (partners of) the FP7-ModNanoTox, FP7-MARINA (see the next section), COST Action MODENA and FP7-NANoREG projects.



Updates on the data.enanmapper.net instance: in the past six months a new 'bundle' has been added, containing experimental data from *in vitro* experiments performed at Karolinska Institutet within FP7-MARINA (see Bundle 4; http://data.enanmapper.net/ui/assessment?bundle_uri=https://apps.ideaconsult.net/enanmapper/bundle/4).

Ontology: <http://purl.enanmapper.net/onto/enanmapper.owl>

The first eNanoMapper ontology was released initially in March 2015, consisting of more than 4500 terms. It was downloaded 500 times from BioPortal alone (<http://bioportal.bioontology.org/ontologies/ENM>). In September 2015 we released the second version of the ontology, adding almost 2000 classes from new ontologies (e.g., EFO, CCONT and OAE) to the eNanoMapper ontology. Regular updates are planned at six month intervals (*Hastings et al., 2015*).

Community uptake of the ontology: the usability of the ontology has been tested against FP7-NANoREG data. Specialized terms used in NANoReg schema were mapped to existing URIs from the eNanoMapper ontology. Currently, a limited number of the terms can be mapped one-to-one to URIs present in the eNanoMapper ontology. One reason for this limited overlap is the lack of exact matching terms found in the ontology sources re-used within the eNanoMapper ontology. Therefore, additional ontology sources are being explored to be added to the next version of the ontology. Moreover, in some cases, specialized terms originating from the database schema need to be mapped to multiple URIs. Different approaches are currently being explored to solve this problem.

Other community interactions, where the ontology is practically being tested, include collaborations with the UDS and the ISA-Tab communities. eNanoMapper co-organized (*Rumble et al., 2015*) and participated in workshops with these communities in the past months.

Modelling

The first draft version of the eNanoMapper modelling web application has been completed in accordance with the modelling APIs which are documented with swagger at <http://enanmapper.ntua.gr:8080/jaqpot/swagger/>. The current version of the web application is fully integrated with the eNanoMapper database, the R and Python programming languages and the Weka library of data mining algorithms. It consists of tools for calculating nano-specific descriptors (image, quantum mechanical, gene ontology and Chemistry Development Kit descriptors for nanomaterials), software packages and web services for importing, merging and creating datasets and for building nanoQSAR models (implementations of statistical and machine learning algorithms such as PLS, LASSO, Decision trees, Linear regression, SVM, Clustering etc.) and methods for analyzing biological data. The eNanoMapper computational infrastructure also includes an independent web application for calculating image descriptors (<http://enanmapper.ntua.gr:8880/imageAnalysis>) and an R package that automates the generation of optimal and fully validated QSAR models (<https://github.com/enanmapper/RRegrs/tree/master/RRegrs>) (*Tsiliki et al., 2015*). The involvement of users outside eNanoMapper is supported, and they can enrich the toolset available by integrating their own algorithms and nanoQSAR models. eNanoMapper is actively participating in the MODENA COST Action and is engaged with the NSC Harmonisation Initiative project group activities on computational modelling and on modelling requirements and standards.

Associate Partner Program

The eNanoMapper consortium has started its Associate Partner Program (<http://www.enanmapper.net/associate-partner-program>) to extend its routes to engage with third parties (companies, projects and individuals), an approach picked up from other projects where such programs helped spread solutions. Our current associate partners are represented on the eNanoMapper website <http://www.enanmapper.net/tags/associate-partners> and include a small and large industrial organization and a academic partner. Please, do not hesitate to contact any of our partners if you are interested in our work and this program.



Application Overview

We have recently started to summarise specific solutions, such as outlined in the above section on our website. This section of our website is a useful place to continue to explore the solutions we offer to the community. You can view this overview at <http://enanomapper.net/applications> and you will find three categories, matching the ontology, database and modelling work done in our project.



Upcoming Webinars

29 October 2015 (4:00 pm, CET) “Enriching protein corona fingerprints using gene ontology information - an integration technique”

See <http://www.enanomapper.net/library/webinar-announcement>

Recordings of previous eNanoMapper webinars: <http://www.enanomapper.net/library/webinars>

Recent component releases

Hastings et al. eNanoMapper ontology v2.0,

<http://purl.enanomapper.net/onto/enanomapper.owl>

Jeliazkova et al. ambit2 2.7.4, 2015. <http://ambit.sourceforge.net/downloads.html>

Willighagen et al. NanoWiki v1, 2015, doi:[10.6084/m9.figshare.1330208](https://doi.org/10.6084/m9.figshare.1330208)

Tsiliki et al. RRegrs 0.0.4. 2015 doi:[10.5281/zenodo.21946](https://doi.org/10.5281/zenodo.21946)

Willighagen et al. ambit.js 0.0.2. 2015 doi:[10.5281/zenodo.16517](https://doi.org/10.5281/zenodo.16517)

Abbreviations

- **API** Application Programming Interface

A way computer programs talk to one another. Can be understood in terms of how a programmer sends instructions between programs. The API specifies how software components should interact. A good API makes it easier to develop a program by providing all the building blocks. A programmer then puts the blocks together.

- **JSON** JavaScript Object Notation

JSON is a lightweight data-interchange format (<http://json.org/>). It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the JavaScript Programming Language, Standard ECMA-262 3rd Edition, December 1999. JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others.

- **OECD HTs** The OECD Harmonized Templates

The OECD HTs are structured (XML) data formats for reporting safety-related studies on chemical substances. The OECD HTs (<http://www.oecd.org/ehs/templates/>) and the supporting IT tool (IUCLID5, <http://iuclid.eu>) are used in a regulatory context, for preparation of substance dossiers for REACH and for other regulatory frameworks operating in Europe; as well as by the JRC NanoHub database

- **RDF** The Resource Description Framework

RDF is one of the core common standards and data exchange formats of the Semantic Web. RDF it is based upon the idea of making statements about resources (in particular web resources) in the form of subject–predicate–object expressions. These expressions are known as triples in RDF terminology.

- **REST** Representational state transfer

REST is an abstraction of the architecture of the World Wide Web; more precisely, REST is an architectural style consisting of a coordinated set of architectural constraints applied to components, connectors, and data elements, within a distributed hypermedia system. REST ignores the details of component implementation and protocol syntax in order to focus on the roles of components, the constraints upon their interaction with other components, and their interpretation of significant data elements. OpenTox web services are based on the REST architecture.

- **URI** Uniform Resource Identifier

The URI is an identifier for a term in an ontology using the Web Ontology Language (and any other RDF-based system). It typically looks like a URL, such as used for a common website address.



References

Tsiliki G, Munteanu CR, Seoane JA, Fernandez-Lozano C, Sarimveis H, Willighagen E. RRegrs: an R package for computer-aided model selection with multiple regression models, *Journal of Cheminformatics*, **2015**, 7:46 [doi:10.1186/s13321-015-0094-2](https://doi.org/10.1186/s13321-015-0094-2)

Hastings J, Jeliaskova N, Owen O, Tsiliki G, Munteanu CR, Steinbeck C, Willighagen E. *eNanoMapper: harnessing ontologies to enable data integration for nanomaterial risk assessment*, *Journal of Biomedical Semantics*, **2015**, 6:10 [doi:10.1186/s13326-015-0005-5](https://doi.org/10.1186/s13326-015-0005-5)

Jeliaskova N, Chomenidis C, Doganis P, Fadeel B, Grafström R, Hardy B, Hastings J, Hegi M, Jeliaskov V, Kochev N, Kohonen P, Munteanu CR, Sarimveis H, Smeets B, Sopasakis P, Tsiliki G, Vorgrimmler D, Willighagen E. The eNanoMapper database for nanomaterial safety information. *Beilstein J. Nanotechnol.* **2015**, 6, 1609-1634 [doi:10.3762/bjnano.6.165](https://doi.org/10.3762/bjnano.6.165)

Jeliaskova, N., Doganis, P., Fadeel, B., Grafstrom, R., Hastings, J., Jeliaskov, V., Kohonen, P., Munteanu, C. R., Sarimveis, H., Smeets, B., Tsiliki, G., Vorgrimmler, D., Willighagen, E., The first eNanoMapper prototype: A substance database to support safe-by-design. In: *Bioinformatics and Biomedicine (BIBM)*, 2014 IEEE International Conference on. IEEE, pp. 1-9. [doi:10.1109/bibm.2014.6999367](https://doi.org/10.1109/bibm.2014.6999367)

Rumble J, Willighagen E. Comparing Approaches to the Description of Nanomaterials. *CODATA Blog*, Ed. S. Hodson, **2015**, <http://codata.org/blog/2015/08/07/comparing-approaches-to-the-description-of-nanomaterials/>

Fadeel B, Fornara A, Toprak MS, Bhattacharya K. *Keeping it real: the importance of material characterization in nanotoxicology*. *Biochemical & Biophysical Research Communications*. **2015**, [doi:10.1016/j.bbrc.2015.06.178](https://doi.org/10.1016/j.bbrc.2015.06.178)

eNanoMapper Deliverable Reports <http://www.enanomapper.net/library/reports>

eNanoMapper Meetings

eNanoMapper held two virtual meetings on 16 and 20 October, to discuss developments on eNanoMapper deliverables, and also discuss progress and needs on other projects requiring input from eNanoMapper e.g., on data, templates, ontology, etc.

As a result, the consortium were able to develop concrete common view on harmonisation and interoperability supporting a knowledge infrastructure for the cluster and specific actions between projects: supporting linked data exchange between databases and providing data with a common ontology to applications. The outcomes of the meeting will contribute towards a concrete statement and commitment plan for the eNanoMapper meeting in November in Brussels.

eNanoMapper Meeting in Brussels

The eNanoMapper project is convening a meeting in Brussels on 23rd November DG RTD, Covent Garden, Place Rogier, Brussels. This is a key meeting, at which the consortium plan to present and discuss the progresses made by the project selected under the call "NMP.2013.1.3-2 *Nanomaterials safety assessment: Ontology, database(s) for modelling and risk assessment.*" eNanoMapper has reached mid-term and now needs feedback from the Community.

It is expected that a maximum of 2 representatives per project (ideally people dealing with data production or data analysis and dealing with data storage) will attend.





Innovative strategies, methods and tools for occupational risk management of manufactured nanomaterials (MNMs) in the construction industry

Guides, tools and reports now available!

By Benoît Hazebrouck, EU-VRI – V01 – 17.09.2015

The Scaffold project (2012-April 2015) provides a practical, robust, easy-to-use and cost effective set of guidance and tools to support safety at work with Manufactured Nanoparticles in the construction sector: prevention and protection, exposure measurement, risk assessment and risk management, training.

Scaffold's guides, tools and reports are available on Scaffold's website: <http://scaffold.eu-vri.eu/home.aspx?lan=230&tab=2633&itm=2633&pag=1566>.

Main Guides & Tools

Scaffold's **best practice guides**:

- [Risk prevention.](#)
- [Risk protection.](#)
- [Risk assessment..](#)
- [Risk management.](#)

Scaffold's **Toolkit** for the Risk Management of manufactured nanomaterials (MNMs) in the construction sector:

- [Operating manual.](#)
- **Toolkit** (software): link coming by end of September 2015.
- **Handbook** : expected release:31/12/2015.

Other Guidance

Risk Protection

Guidance on **health surveillance** in relation to MNMs for workers in the construction industry.

Exposure register model for MNMs in the construction industry.

Risk Management

Guide for the **implementation of a Risk Management Model** in relation with MNMs in the construction sector.

Guide for the **initial review, the monitoring and the audit** of Scaffold's Risk Management Model in relation with MNMs in the construction sector.

Guide for the implementation and the audit of Scaffold's **Risk Management Model for SMEs** in relation with MNMs in the construction sector.

Background Reports

General

Life Cycle Analysis of project-selected MNMs.

Background information on exposure, use, and hazard of manufactured nanomaterials in the construction sector.

Risk Assessment

Formulating Occupational Exposure Limits Values (**OELs**) (Inhalation & Dermal).

Review on the toxicity of manufactured nanomaterials applied in the construction sector.

Emission of toxic gases and MNMs during a **fire of construction products containing nano-objects.**

Applicability of the **DREAM model in estimation of dermal exposure** to MNMs during several construction related tasks.

Risk Protection

Results of application of the **Stoffenmanager Nano-tool** in the construction work area.

Risk Management

Customized **control banding** approach for potential exposure to MNMs in the construction industry.

Training & Info

Info Leaflet by FIOH: Nanomaterials in the construction industry - Guidance for protecting and monitoring health of workers.

Training modules for the Risk Management of manufactured nanomaterials (MNMs) in the construction sector. Coming end of September 2015.

Workshop "**Operational occupational Risk Management Models and tools** for MNMs in the industry". With Nanomicex & SanoWork.

Prospective

Roadmap for occupational safety in relation with manufactured nanomaterials (MNMs) in the construction sector.

Proposal for a **European strategy** on MNM occupational risk management in the construction industry

Standard

CEN/TC 352/WG 3/PG 5 Scaffold "Manufactured nanomaterial (MnMs) in the construction industry – Guidelines for occupational risk management" (Future EN TS, under development)

Project partners: Tecnalia (Sp, Coordinator), CEA (Fr), Demokritos (Gr), CIOP-PIB (PI), Acciona (Sp), AENOR (Sp), Mostostal (PI), Rossal (Ro), Tecnan (Sp), Netcomposites (UK), ICECON (Ro), EU-VRI (De), FIOH (Fi), UMN-PTL (USA). This research has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement number 280535.



Scaffold's results: a summary



Innovative strategies, methods and tools for occupational risks management of manufactured nanomaterials (MNM) in the construction industry

The FP7 project Scaffold came to an end on 30.04.2015. We present here a summary of its results. More details are provided in Scaffold's final newsletter and in 20 Scaffold's Public Documents (www.scaffold.eu-vri.eu).

Context and objectives

The construction industry is the biggest industrial employer in the EU, with 13,9 million jobs, representing 6,4 % of total employment and 29 % of industrial employment. The use of MNMs and nano-enabled products (NEP) in construction is an increasing reality, mostly in cement or concrete products, coatings or insulation materials and to a lesser extent in road-pavement products, building glass, flame retardant or textiles. Most workers and employers in the construction sector (~75%) are not aware of working with MNMs and NEP. Detailed information about product composition and possible nano-specific health and safety issues is generally lacking: the information available for the raw MNM is often lost while stepping down the user chain. As a consequence, it is very difficult for average construction companies to conduct a proper risk assessment and organize a safe workplace for its employees.

The SCAFFOLD research aimed at providing practical, robust, easy-to-use and cost effective solutions for the European construction industry, regarding occupational exposure to MNMs.

Prevention – safety by design

Scaffold has developed innovative strategies for Risk Prevention in selected scenarios and products of the construction sector, as reported in Table 1 below :

Table 1: MNMs applications and risk prevention strategies proposed by Scaffold

MNMs	Application	Strategy
TiO ₂	Self-cleaning and depolluting mortar	Use concentrated and stable dispersions Use n-TiO ₂ supported on sepiolite microfibers (Figure 1)
SiO ₂	Self-compacting concrete	Use concentrated and stable dispersions
Nanoclay	Fire resistant polymeric panels	The thermal treatment led to a reduction of the smoke and slight reduction in heat release from the panels in case of fire Low energy mixing processes were found to result in equivalent fire performance to high energy mixing processes. Therefore low energy processes could be selected in order to reduce the particle release
Cell NFs	Insulating polyurethane foam	Achieve good dispersions-MNM bounded to the matrix (to reduce the likelihood to release free MNMs from solid matrix)
CNFs	Composite materials for electromagnetic interference shielding	

Release and exposure, assessment

The Scaffold project measured particle release and occupational exposure (inhalation, dermal) at pilot scale, lab scale and in real scenarios, considering: 5 MNMs (TiO₂, SiO₂, carbon nanofibres - CNF, cellulose nanofibres – CeNF, and nanoclays), 6 applications (depollutant mortars, self-cleaning coatings, self-compacting concretes, fire-retardant panels, coating laminates and insulations) and 5 scenarios (manufacture of NMs, manufacture of products containing MNMs and application, machining (drilling, sawing), demolition and fires).



Workers were not overexposed to MNMs in the processes monitored and the measured exposure was below limits (OELs) selected or proposed by Scaffold for the five MNMs (Table 2 below). The highest mass concentration of MNM was measured in tasks where nano-powders were handled directly and in significant quantities e.g. cleaning of the reactor and of filters in the nano-TiO₂ manufacturing process, or spraying dispersions of self-cleaning coatings.

The highest total particle concentrations were measured while machining hard materials like self-compacting concrete and laminates filled with CNF, with no clear difference between conventional and nano-enabled materials and with no observation of free nano-object. Dust peaks were also observed during e.g. manual adding of powder additives or demolition tasks, with average 8-hour exposure still below the limit value, and a large and complex variety of particles of all sizes, mainly bound in the matrix.

In construction, exposure to mixed types of dust and to chemical compounds (including carcinogenic asbestos, crystalline silica, and solvents), is common and may often be of higher relevance than the exposure to MNMs, which are typically included in the products at concentrations below 1,5 %.

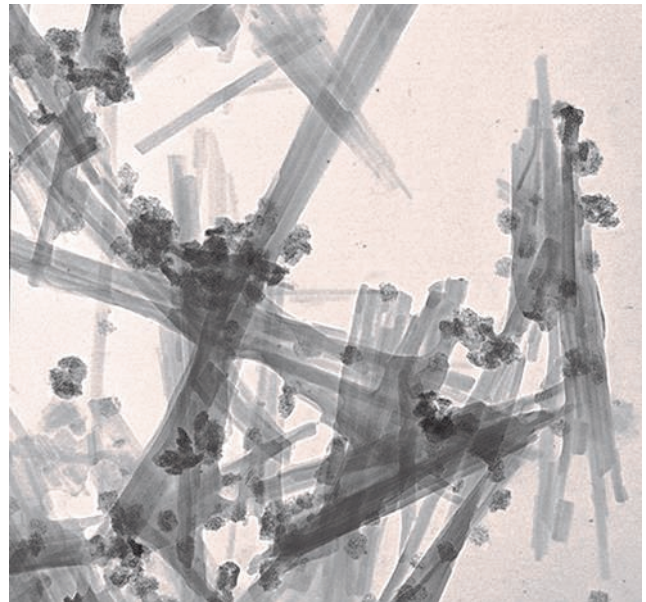


Figure 1: Spherical TiO₂ nanoparticles supported on sepiolite microfibers. Scale is 100 nm.

Table 2: OELs proposed by Scaffold

Nano-object	OEL (mg/m ³) or fibers/cm ³ (1)	Reference Values particles/cm ³ or fibers/cm ³ (1)
nano-TiO ₂	0.1	40.000
nano-SiO ₂	0.3	40.000
nano-clay	0.3 (respirable) & 4 (inhalable)	40.000
Low toxicity dust	0.3 (respirable) & 4 (inhalable)	
nano-cellulose	0.01 (1)	0.01 (1)
Carbon nano-fiber	0.01 (1)	0.01 (1)

Fire tests performed with conventional and nano-enabled materials showed differences in fire behaviour in the presence of the nano-objects. However, none of the nano-objects introduced in the materials was identified in the combustion effluents, with the possible exception of nano-clays from the fire retardant panels.

Protection equipment

Experimental investigations of collective protection were carried out in nine rooms with different ventilation systems. Particles from the processes were prevented from reaching the room air only when works were conducted in the glove box or with positive pressure room ventilation.

The efficiency of different types of current respiratory protective devices intended for use in construction industry and of three types of clothes generally used by workers on construction sites were tested with different nanoaerosols in to enable a proper selection for different workplaces and hazards. The Total Inward Leakage (TIL) of nanoparticles was measured with a breathing manikin simulating natural human movements and speech. The highest TIL was found for simulation of speech and of up and down head movement. The highest effectiveness of protection was recorded for the full-face mask used with P3P3 filters and the TH2 powered filtering device incorporating a hood.



The observation of PPEs involved in real scenarios at industrial partners' workplace showed that the current gloves, masks and Tyvek clothes are efficient towards NPs incorporated in a material at realistic concentrations (between 0,4 and 1,7%). Whether in powder form (synthesis of NPs, manufacturing of the mortar) or in solid state (mortar with water, applying on a wall) or in sol-gel state (liquid mortar), we never observed SiO₂, TiO₂, nanoclay or nanocellulose inside PPEs. Regarding the nature of the clothes, the rain coating was the most efficient material, with no diffusion observed at all (aerosol and liquid). The polyester 65%/cotton 35% material was efficient only for SiO₂ aerosol and the fleece jacket for SiO₂ aerosol and TiO₂ aerosol.

Table 3: Examples of protective devices investigated

<p>Enclosure/containment systems used by Scaffold partners, from natural ventilation to the glove box.</p> <p>Pictures: Natural Ventilation (left) Closed reactor with regular opening (right)</p>	
<p>Most commonly used respiratory protective devices:</p> <p>FFP2 and FFP3 filtering half masks (left picture) Half masks FFA1P2 and FFA2P3 filtering half masks against (among others) particles Full face masks Powered filtering device with hood (right picture)</p>	
<p>Gloves (A, B, C, D)</p> <p>Pictures: B (left) and D (right)</p>	
<p>Clothes:</p> <p>Fleece jacket 100% polyester (left picture) Jacket composed of 65% polyester and 35% of cotton (picture in the middle) Rain jacket composed of polyamide coated with polyurethane Chemical protective clothing category 3, type 5 and 6 (right picture)</p>	

Case studies

One of the integral parts of project was to test Scaffold's risk management model in real work with manufactured nanomaterials (MNMs) in five Industrial Use Cases (IUC) in real companies for different steps of the life cycle of construction products. After the implementation, an external audit was carried out in each of the company. This allowed to check and improve the versatility of solutions proposed by the Scaffold project. In addition during the audits a monitoring of the presence of nanoparticles was made through the above selected processes for case studies. It allowed to check if the assumptions of exposition for MNMs obtained during the pilot works in the previous work packages were appropriate for the real work with MNMs. The results of the audits is used not only for companies in the successful implementation of the new system, but also served in the further improvement of the developed risk management system.



Figure 2: Workers in Romania and Poland performing various works involving materials with MNMs, with simultaneous measurement of the NP concentrations in air.

Library of Solutions, management

As a main outcome, the project SCAFFOLD has released a Library of Solutions including:

- ✓ 4 **quick guides** (risk prevention, risk assessment, risk protection and risk management) for **OSH managers** in construction,
- ✓ a **Toolkit** (software) to facilitate the diagnosis, implementation and audit of nanorisk management in large and small construction companies.
- ✓ a **handbook for risk management** (new deliverable in preparation).

Besides, Scaffold developed a **customized Control Banding approach** for the construction sector, implemented in a fully functional XML-based macro-enabled **Microsoft Excel workbook**.

Standardization

CEN/TC 352 "Nanotechnologies" (WG3/PG5) is preparing a Technical Specification (TS) based on Scaffold's results: "Manufactured nanomaterials (MNMs) in the construction industry. Guidelines for occupational risk management".

European strategy

Considering the state of the art and of the praxis and the regulatory and research context at the end of the project, Scaffold proposes a European strategy to further improve the management of occupational risks related to MNMs in construction.

Disclaimer – stakeholder consultation in Scaffold

Scaffold's guides, toolkit, roadmap & strategy were prepared following extensive consultation with a range of stakeholders in workshops, meetings, surveys, interviews and document reviews):

- Representatives of the construction sector, including:
 - European Construction Industry Federation (FIEC);
 - European Federation of Building and Wood Workers (EFBWW);
 - OHS Managers from several construction companies.
 - Manufacturers of construction products;
 - European and Spanish agencies for occupational safety;
 - Manufacturers of personal protection equipment;
 - Experts in nanosafety;
 - Policy makers at European and national (Spain) levels.



The Consortium

Scaffold research received funding from the European Community's Seventh Framework Programme (FP7/20072013) under grant agreement number 280535.



The SUN Project reports

The SUN project has successfully hosted the first meeting of the newly created **NanoSafety Cluster Training Subgroup** (NSC TSG). The aim of the group is to align the training agendas of the NSC projects in order to ensure high level of skills and consistency within the projects, transfer the generated knowledge to external stakeholders and enhance the training offerings through collaboration and sharing of experience.



More information about the first meeting can be found [here](#). If you are interested in joining this subgroup, please contact NSC TSG coordinators: Danail Hristozov (Ca' Foscari University of Venice) & Judith Friesl (The REACH Centre) at info@sun-fp7.eu.

A key objective of SUN project is to build software **Decision Support System (DSS)** to facilitate safe and sustainable manufacturing and risk management of nanomaterials. The SUN Decision Support System (SUNDS) will integrate tools for ecological and human health risk assessment, lifecycle assessment, economic assessment and social impact assessment within a sustainability assessment framework.



We are currently developing the Technological Alternatives and Risk Management Measures (TARMM) inventory and are looking for companies to fill in a short survey. We would appreciate responses from personnel of companies involved in nanotechnology-related activities who are familiar with the risk management practices. You can take the survey [here](#).

Results from SUN 2nd annual meeting show great advancement of the project

Venice, 20 October 2015

During their second annual meeting, held in Venice, Italy on 8-9 October 2015, SUN project partners presented the results obtained during the second 12 months of the SUN – Sustainable Nanotechnologies Project.

SUN is a three and a half year EU project, running from 2013 to 2017, with a budget of about €14 million. Its main goal is to evaluate the risks along the supply chain of engineered nanomaterials and incorporate the results into tools and guidelines for sustainable manufacturing.

The SUN project is based on the idea that the still limited knowledge about environmental and health risks of manufactured nanomaterials (MN) can nevertheless guide nanomanufacturing to avoid liabilities if risk analysis is complemented by a sound socioeconomic analysis in an integrated approach addressing the complete product lifecycle. This is the main rationale behind developing the SUN user-friendly, software-based Decision Support System (SUNDS) for managing the environmental, economic and social impacts of nanotechnologies.

The main highlight of the 2nd annual meeting was the release of SUNDS beta prototype. The SUN beta prototype has been presented and discussed during the second SUN stakeholders workshop held on 7 October in Venice, Italy aimed at representatives of industry, regulatory and insurance sectors. The design and implementation of the SUNDS is proceeding according to the work plan. The outlook for the upcoming months include refining the methodology, modules implementation and testing the decision support system on selected case studies (i.e. copper oxide and organic pigments).

“The SUN Decision Support System represents a blend of most advanced models for human health and ecological risk assessment and for the first time compares the risks from nanotechnologies to their economic and social benefits in order to effectively support risk management decision making by the European nanotechnology industry” explained Dr. Danail Hristozov, the Principal Investigator of SUN.



About SUN

SUN – Sustainable Nanotechnologies Project - is an EU FP7 project, aiming to develop strategies for safe production, handling and disposal covering the complete lifecycle of nano-enabled products and to include the results into practical guidelines for industries.

The Consortium



Project start date: 1st October, 2013 - Duration: 42 months

Project Website: <http://www.sun-fp7.eu/>

Contact: Judith Friesl
Marketing Manager & SUN Dissemination Coordinator
info@sun-fp7.eu.





Introducing NanoFase

Nanomaterial FATE and Speciation in the Environment



Fate and Exposure models for you - www.nanofase.eu

A new H2020 – NanoSafety Cluster Project

Grant Agreement no. SEP-210187494

Sept. 2015 – Aug. 2019

Coordinated by Claus Svendsen, NERC

NanoFASE@ceh.ac.uk

Scientists, regulators and industry stakeholders recognize the need for progress in predicting the distribution, concentration and form of nanomaterials in the environment. Better predictions of **fate** and **speciation** will improve estimates of how much the environment and people are exposed to nanomaterials and sharpen assessments of potential risks. This knowledge will shape European and national regulation, and foster safe product design.

The overarching objective of **NanoFASE** is to deliver an integrated Fate and Exposure Assessment Framework (protocols, models, parameter values, guidance...) that;

- allows all stakeholders to assess the full diversity of industrial nano-enabled products,
- is acceptable in regulatory registrations, integrable in EUSES model for REACH assessment,
- allows industry a cost-effective product-to-market process, and
- delivers the understanding at all levels to support dialog with public and consumers.

NanoFASE groups scientists from 34 institutes across Europe with a total project budget of 11.3 M€ (EC contribution 10M€). Our ambition is to bring the state-of-the-art of ENM exposure assessment to a level equal to that currently available for conventional chemicals.

Mark your calendars:

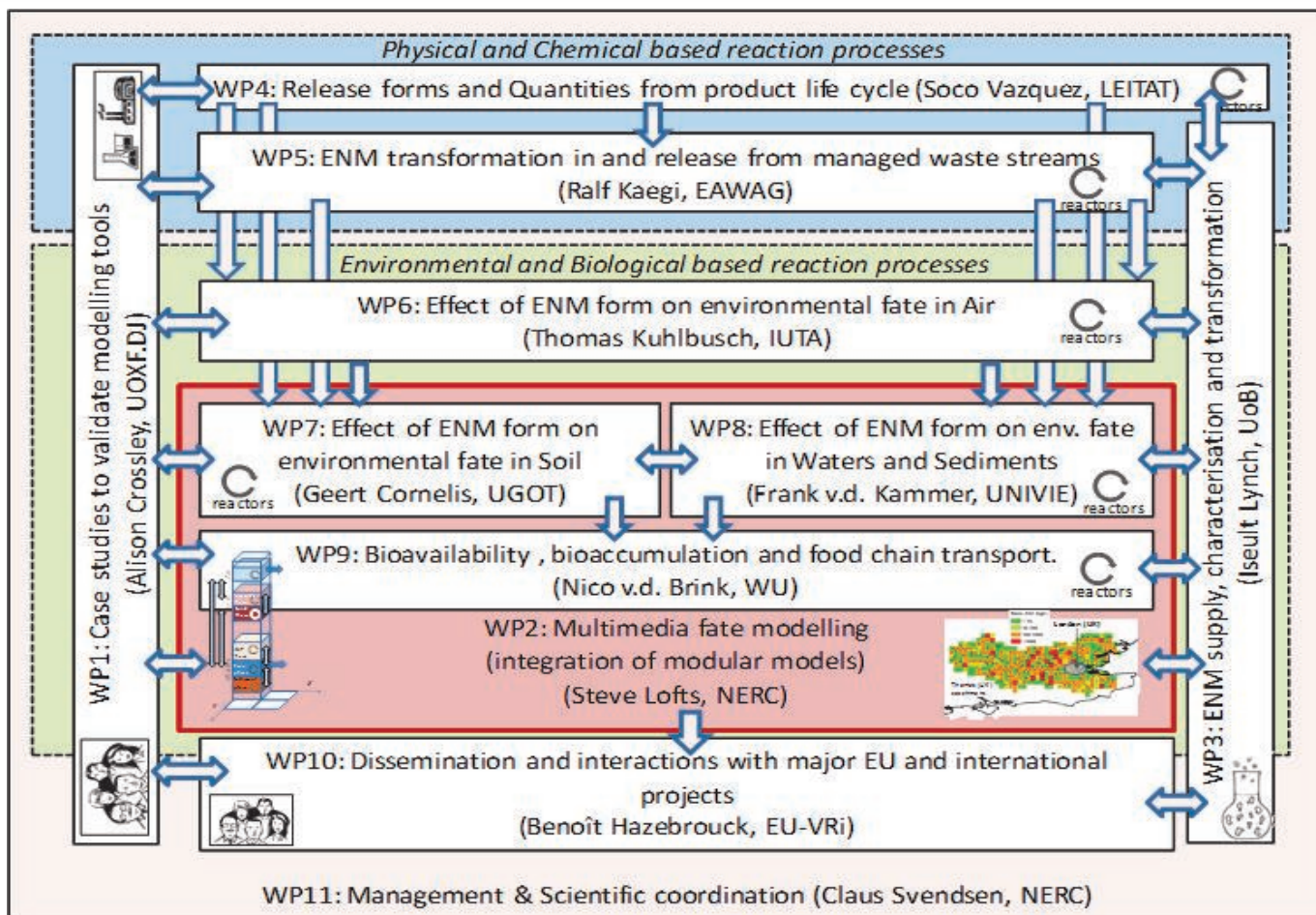
Our first NanoFASE Open Training and Dissemination Event will take place in **September 2017** – it will include relevant collaborations and joint sessions with sister projects from the Cluster

From current, mainly mass-based lifecycle and release flow approaches, towards systems that can account for spatial and temporal variability of ENM release, environmental transport and fate.

NanoFASE outcomes in brief will be:

- A fit-for-purpose, road-tested and future-proofed exposure assessment framework for ENMs.
- A state-of-the-art, flexible and future-proof set of models employing Functional Fate Groups, environmental 'reactors' and dynamic multimedia modelling.
- A fully nano-enabled version of the existing screening model SimpleBox4Nano.
- A novel, practical and future-proofed approach to classification of ENMs for fate assessment purposes.

Methods, parameter values and model catalogues supporting the derivation of individual process models, describing transformation and transport processes in waste streams, air, soil and water/sediment and uptake and accumulation in biota.



Some links with our successfully completed NanoFATE project

Nanoparticle Fate Assessment and Toxicity in the Environment

NanoFATE (2010-2014), also coordinated by C. Svendsen (NERC - Center for Ecology and Hydrology CEH) focused on developing a systematic understanding of fate and mechanisms of effects for a core set of commercial engineered nanoparticles (ENPs), investigating how current ecological risk assessment tools and practices perform with ENPs and which refinements could improve their applicability.

NanoFATE output one of the most detailed spatial risk assessments of nanomaterials in surface waters and soils conducted to date.

The new project NanoFASE will benefit from previous developments and learning as NanoFATE and other NSC projects (e.g. NanoPolyTox, GUIDEnano and NanoMILE) help to:

- Source the "research and training" set of ENPs;
- Track samples, using NanoFATE 'Handlebar for Nano' software systems;
- Inventory ENM and nano-enabled products production, use, and recycling and ENMs emission rate during the value chain.

Visit www.NanoFATE.eu which is still live and archives reports, regulatory advice notes, and formidable ENP images.

As this Cluster newsletter goes to press we are **developing our website www.NanoFASE.eu** and gearing up for our kick-off meeting in Barcelona. We'll also meet virtually with our **International Advisory Board chaired by Prof. Peter Dobson** (Academic Director, Begbroke Science Park, University of Oxford). Our advisors represent industry, policy and academia in several **European Countries, Canada, the United States and Australia**. We'll get their views on not only what is needed in the field of exposure and fate assessment, but also the most useful format for delivery of our end products

Stay tuned for the first NanoFASE Newsletter!





NanoReg2 Project Launches

<http://www.nanoreg2.eu>

By Alex Rinkus, Nanotechnology Industries Association

alex.rinkus@nanotechia.org

This September, the NanoReg2 project held its official kick-off meeting in Paris to commence essential work on developing innovative approaches for nanotechnology development and regulation. Over the next three years, NanoReg2's thirty six partners from across the nanotechnology value chain will create new principles and ideas, rooted in robust data, that can establish 'Safe by Design' as a fundamental pillar in the validation of a new manufactured nanomaterial. A regulatory system underpinned by Safe by Design would provide oversight for manufactured nanomaterials in a cost-effective and efficient manner, while providing flexibility in addressing new targets and requirements over the long-term.

In addition, NanoReg2 will develop new, reliable and accepted group concepts for nanotechnology that can fill the current information gap that exists. This will support industries aiming to bring a new product to market as well as regulators across the world.

Consortium Partners met for two-days in Paris to review and discuss strategies for the various work packages. These include:

- Regulatory orientated activities establishing a framework of grouping approaches
- Nanomaterials for industrial markets and their corresponding value chains
- Safe by Design
- Demonstration and verification of Safe by Design concepts
- Liaisons and network activities
- Knowledge management, dissemination and exploitation
- Project management and scientific coordination

With nearly 1400 person months allocated across its seven packages, NanoReg2 has established ambitious objectives for the partners that will shape the nanotechnology development and regulation landscape when complete. The NanoReg2 website will launch in November at www.nanoreg2.eu to keep stakeholders up to date on progress throughout the three-year duration.



Image: NanoReg2 Consortium Partners at the Kick-off Meeting in Paris



Nanocomposite for Building Constructions and Civil Infrastructures: European Network Pilot Production Line to Promote Industrial Application Cases

<http://www.nanoleap.eu/>

Simon Clavaguera, CEA

Contact Email: simon.clavaguera@cea.fr

Abstract:

The NANOLEAP project aims at the development of a coordinated network of specialized pilot lines for the production of nanocomposite based products for different civil infrastructure and building applications.

The goal of this infrastructure is to support the research activities of European SMEs in the Construction sector in nanocomposite products enabling the progress of the product to next steps of technology deployment such as installation of industrial lines and enter in the commercialization stage.

Project description:

NANOLEAP project brings together a European Network of pilot production facilities focused on scaling up nanocomposite synthesis and processing methods. This Network of pilot plants properly equipped and skilled will be available to companies active across the European Construction value chain and for new players who are considering entering the market. Thus, through this focus on a near-industrial scale, NANOLEAP project will effectively support manufacturing SMEs in the implementation of research results for the development of innovative products and processes.

For the creation of the network, ten pilot plants dealing with the most promising applications of polymeric nanocomposites in the construction and engineering sector have been selected. This project will support these pilot lines for the scaling up and production of these nanocomposite based products in order to facilitate their further adoption by the entire construction chain:

- Coated nanoparticles with improved compatibility with the matrix providing a wide range of functionalities and leading to high quality products and important saves of energy when processed;
- Antiweathering and anticorrosion nanocomposite coatings for the protection of structures exposed to aggressive environments such as wind turbines, offshore, marine infrastructure;
- Multifunctional polymeric nanocomposites providing environmental resistance (antimicrobial, UV protection) and smart applications to traditional construction materials such as concrete and coatings including self-cleaning, hydrophobicity, early warning crack and water leak alarm;
- Prefab lightweight elements such as aerogels mechanically reinforced with nanoparticles for high thermal insulation applications in building.



In order to enable the development of the NANOLEAP network of Open pilots, the following scientific and technical objectives will be pursued:

- Development of an Ecosystem for the Pilot network set up and governance
- Integration of novel technology and tailored processing in existing pilot production lines to enable the use of nanofillers in Industrial manufacturing process in a sustainable and cost-effective way.
- Integration of quality control and process verification to increase the level of robustness and repeatability of the industrial processes aimed at nanocomposite production.
- To develop a Business plan for enabling Open pilot lines access.
- Ensure the success of the Nanoleap Network during and after the project through the Constitution of a Cluster Expert Group

NANOLEAP will help to road-map nanosafety aspects associated with the production of nanocomposite for building constructions and civil infrastructures. To reach that goal,

- 1) the environmental impact and the performance of the pilot plant will be assessed and optimized in terms of productivity in an actual environment;
- 2) guidelines for production, use and handling of nanopowders and nanocomposites as well as risk minimization procedures will be prepared in the work packages dedicated to the life cycle assessment and nanosafety activities in close relation with the other pilot projects and the NanoSafety Cluster.



<http://www.nanoleap.eu/>



AEROSOL AKADEMIE

By Dr. Marcus Hank (Director of Academy)
info@aerosol-akademie.com | www.aerosol-akademie.com

By creating an 'Aerosol Wiki Space' the Aerosol Akademie has just started a long-term project to spread knowledge and results of the expert community to multisectoral partners and the wider public.

Dissemination is a major task in research and development projects and cannot be overestimated in its relevance. Knowledge is nothing without application. The famous German poet Bertolt Brecht stated wisely that 'knowledge and awareness can occur at another place than where is need for it'. Therefore the Aerosol Akademie has been founded as an active network for transfer of technology and knowledge. Targeting this, the Aerosol Akademie has sprung into action for dissemination activities in the NanoValid project by organizing a workplace safety symposium in Salzburg last June and produced video clips to bring out the results of nanosafety research to all relevant stakeholders and the wider public. Currently the Aerosol Akademie is working on a clip about the NanoValid-MARINA conference at OECD in Paris. Further activities (trainings, dissemination) will take place in collaboration with the NanoSafetyCluster.



AEROSOL AKADEMIE
Transfer of Technology and Knowledge

YOUR ACCESS POINT TO THE WORLD OF
AEROSOL TECHNOLOGY AND AEROSOL
RESEARCH

WWW.AEROSOL-AKADEMIE.COM

ABOUT US

Aerosol Akademie is a regional, national and international contact point for individuals and organisations with scientific, economic and administrative background.

Aerosol Akademie provides and runs an interdisciplinary network for projects and support of cooperations, communication and knowledge related to aerosol technology and aerosol research.

Aerosol Akademie therefore forms an institutionalized interface to connect different objectives and policies of organisations. This way, synergetic effects will appear well beyond how they could be generated by the agents themselves in daily business.



CREATING AND MANAGING PROJECTS

Transfer of technology and knowledge means theoretical and practical exchange about fundamentals in science of nature, economic and scientific use of measurement technology and about all tasks related to development (research) and manufacturing (production) of aerosol technology.



To reach the goals, Aerosol Akademie organizes meetings, conferences and trainings. The academy coordinates scientific and engineering projects (R&D/Validation) and takes care of functional presentation and application of aerosol technology for expert communities and the wider public (Dissemination).



DATABASE OF KNOWLEDGE


Interdisciplinary database for projects and knowledge around the world of aerosols

The wiki pages of Aerosol Akademie are a crowd sourcing project and contain links to fundamental and specific knowledge of partners and experts as well as knowledge generated by the Aerosol Akademie itself.


This database is intended to become a helpful searchtool for all aspects of aerosols and is going to be developed and updated permanently.
<http://wiki.aerosol-akademie.de>

All experts and organisations are invited to contribute and to benefit of presented projects, links and know-how.

BRING YOUR KNOWLEDGE TO THE DATABASE!



MEMBER NETWORK




Members have the opportunity to meet and connect to other experts and to present themselves and their own projects (database of knowledge, projects and links).

Aerosol Akademie supports you for making your CAREER and helps to find missing links and contacts. The academy is an interface to announce job opportunities for young scientists as well as for enterprises to recruit their needed expert for daily tasks of manufacturing, measurement, data evaluation and product maintenance.

The supporting association consists of stakeholders and supporters representing science, economy and administration.

BENEFIT FROM A MEMBERSHIP!

CONTACT



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 Dr. Hans Grimm
 Vice-President:
 Prof. Dr. Gerhard Kasper
 Prof. Dr. Adam Gessler

Responsible Office or Association:
 Science Policy
 Nano-Phase 2
 98774 Pouch

Sponsoring/Cooperating:
 MR 11403
 Arbeitsgemeinschaft
 Gesundheitsratium, 25. Oktober 2007

You are all invited to contribute and to benefit from this.



Dana Kühnel and Steffi Böhme from UFZ provide an overview of their recent online publication—a result of the NanoValid project:

Effect propagation after silver nanoparticle exposure in zebrafish (*Danio rerio*) embryos: a correlation to internal concentration and distribution patterns

Steffi Böhme,^a Hans-Joachim Stärk,^b Thorsten Reemtsma^b and Dana Kühnel^{*a}

Helmholtz Centre for Environmental Research - UFZ, Department of Bioanalytical Ecotoxicology, Permoserstrasse 15, 04318 Leipzig, Germany

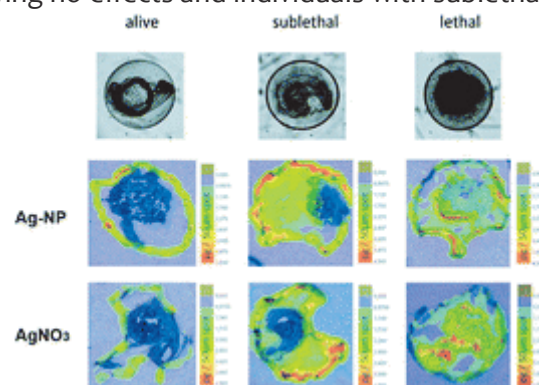
E-mail: dana.kuehnel@ufz.de

Environ. Sci.: Nano, 2015, Advance Article

DOI: 10.1039/C5EN00118H

The zebrafish (*Danio rerio*) embryo (ZFE) is an established ecotoxicological test organism used to investigate the hazardous potential of chemicals. It has been frequently used to test nanoparticles (NPs) for adverse effects. Beyond the assessment of the effects, information on real exposure concentrations, particle uptake and distribution patterns as well as the determination of internal effect concentrations contributes to a deeper understanding of NP–organism interactions. The AgNP and AgNO₃ dose–response curves recorded for different ZFE developmental stages were corrected to real exposure concentrations measured by ICP-MS within this study. Effective concentrations of silver exerting toxic effects were determined by this approach. Organisms showing no effects and individuals with sublethal or lethal effects were compared with regard to silver distribution patterns and internal uptake concentrations in order to allow a more exact correlation.

As a result, the internal silver dose per organism differs around 0.5–1 ng Ag per organism irrespective of the developmental stage. However, for earlier developmental stages (2 hours post fertilisation) the ZFE chorion was found to effectively adsorb silver, leading to an up to 20-fold increase in total silver concentrations compared to the later chorion-free stages of the ZFE. Finally, a correlation between increased internal silver (particulate and ionic) concentrations and the occurrence of sublethal and lethal effects was observed.



<http://pubs.rsc.org/en/content/articlelanding/2015/en/c5en00118h#!divAbstract>

NanoPUZZLES ISA-TAB-Nano article and associated resource

Dr Richard Marchese Robinson, Post-Doctoral Research Fellow in the Development of Cheminformatic Approaches for Predicting Toxicity of Nanoparticles, School of Pharmacy and Biomolecular Sciences, Liverpool John Moores University has sent details of the following article and associated resources.

Please note that the 'myExperiment' and 'Github' sites allow for feedback on these resources to be provided in order to facilitate improvements and they are licensed such that they may be improved by other researchers in the area if anyone is so inclined.

[1] Article An ISA-TAB-Nano based data collection framework to support data-driven modelling of nanotoxicology Beilstein J. Nanotechnol. 2015, 6, 1978–1999.

doi:10.3762/bjnano.6.202

<http://www.beilstein-journals.org/bjnano/single/articleFullText.htm?publicId=2190-4286-6-202>

[2] Templates <http://www.myexperiment.org/files/1356.html>

[3] Software <https://github.com/RichardLMR/xls2txtISA.NANO.archive>

Contact: R.L.MarcheseRobinson@ljmu.ac.uk



Flemming Cassee, on behalf of NSC Working Group 2: Hazard Identification, has submitted details of the following open-access publication:

A perspective on the developmental toxicity of inhaled nanoparticles

Karin Sørig Hougaard^{a,*}, Luisa Campagnolo^b, Pascale Chavatte-Palmer^{c,d}, Anne Tarrade^{c,d}, Delphine Rousseau-Ralliard^{c,d}, Sarah Valentino^{c,d}, Margriet V.D.Z. Park^e, Wim H. de Jong^e, Gerrit Wolterink^e, Aldert H. Piersma^{e,j}, Bryony L. Ross^f, Gary R. Hutchison^g, Jitka Stilund Hansen^a, Ulla Vogel^{a,h}, Petra Jackson^a, Rémy Slamaⁱ, Antonio Pietroiusti^b, Flemming R. Cassee^{e,j}

a National Research Centre for the Working Environment, Copenhagen, Denmark

b University of Tor Vergata, Dept. Biomedicine and Prevention, Rome, Italy

c INRA, UMR1198 Biologie du Développement et Reproduction, Jouy-en-Josas, France

d Fondation PremUp, Paris, France

e National Institute for Public Health and the Environment RIVM, Bilthoven, The Netherlands

f Institute of Occupational Medicine, Edinburgh, Scotland, UK

g Edinburgh Napier University, Edinburgh, Scotland, UK

h Technical University of Denmark, Lyngby, Denmark

i Inserm and Univ. Grenoble-Alpes, Team of Environmental Epidemiology applied to Reproduction and Respiratory Health, Grenoble, France

j Institute for Risk Assessment Sciences, Utrecht University, Utrecht, The Netherlands

Abstract

This paper aimed to clarify whether maternal inhalation of engineered nanoparticles (NP) may constitute a hazard to pregnancy and fetal development, primarily based on experimental animal studies of NP and air pollution particles. Overall, it is plausible that NP may translocate from the respiratory tract to the placenta and fetus, but also that adverse effects may occur secondarily to maternal inflammatory responses. The limited database describes several organ systems in the offspring to be potentially sensitive to maternal inhalation of particles, but large uncertainties exist about the implications for embryo-fetal development and health later in life. Clearly, the potential for hazard remains to be characterized. Considering the increased production and application of nanomaterials and related consumer products a testing strategy for NP should be established. Due to large gaps in data, significant amounts of groundwork are warranted for a testing strategy to be established on a sound scientific basis.

[Access the full article here](#)

http://ac.els-cdn.com/S0890623815001069/1-s2.0-S0890623815001069-main.pdf?_tid=1e38c0aa-7a7d-11e5-9d33-00000aab0f27&acdnat=1445711530_890f6efaoe89020066975e57a68b982b

For more information, contact: Flemming.cassee@rivm.nl

<http://www.nanosafetycluster.eu/working-groups/2-hazard-wg/reprotoxicology-focus-group-2.html>



ELSEVIER

Contents lists available at [ScienceDirect](#)

Reproductive Toxicology

journal homepage: www.elsevier.com/locate/reprotox



Sandra Verstraelen from VITO NV, Environmental Risk and Health, Mol, Belgium, reports on a publication from WP6 work in the NanoValid project. NanoValid partners VITO, PLUS, and GAT are working on a publication titled “Development and validation of an air-liquid interface (ALI) cell exposure system for measurements of CuO nanoaerosol-mediated immune effects’. These data were highlighted at the Marina and NanoValid International Conference, OECD Conference Center, Paris, France, Sep 29-30, 2015.

Development and validation of an air-liquid interface cell exposure system for measurements of nanoaerosol-mediated immune effects

Evelien Frijns (1), Sandra Verstraelen (1), Inge Nelissen (1), Pierre Madl (2), Linda Stoehr (2, 3), Matthew Boyles (2), Markus Pesch (3), Martin Himly (2), Albert Duschl (2)

- (1) VITO NV, Environmental Risk and Health, Mol, Belgium
- (2) Universität Salzburg (PLUS), Salzburg, Österreich
- (3) Grimm Aerosol Technik GmbH & Co KG (GAT), Ainring, Germany



The main objective of the FP7 NanoValid project (2011-2015) is the development of new reference methods and certified reference materials, including methods for characterization, detection/quantification, dispersion control and labelling, as well as hazard identification, exposure and risk assessment of ENPs (<http://www.nanovalid.eu>).

Several (real-life or simulated) case studies were performed to assess the feasibility of validated methods for hazard identification and exposure assessment developed in the project. One is related to the validation of a newly developed air-liquid interface (ALI) exposure module. Partners PLUS and GAT developed a new prototype ALI exposure module allowing for parallel physical and *in vitro* biological and immune effect assessment of engineered nanoparticles (ENPs). Using CuO ENPs, VITO optimized and validated the technical specifications of this ALI module in a simulated on-site setup, as well as the conditions for ENP generation and cell exposure, online ENP characterization and effect measurements using reporter cell lines.

The challenges and solutions for on-site determination of ENP-derived immune effects at the ALI will be discussed.

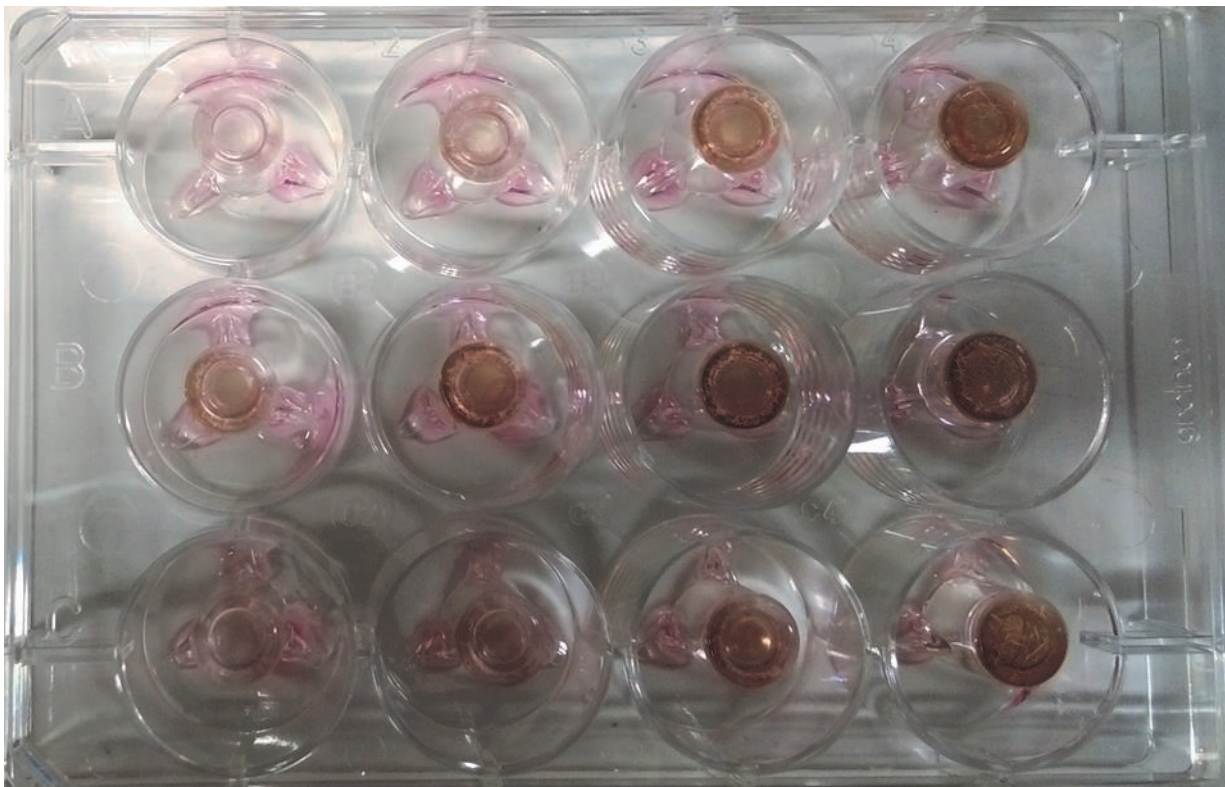


Image: ‘CuO-NP deposition onto A549 pIL8-luc cells in Navetta’.



European Commission Policy on Open-Access to Scientific Publications and Research Data in Horizon 2020

Authors: David Guedj; Celina Ramjoué

Source: Biomed Data J, Volume 1, Issue 1, p.11-14 (2015)

Keywords: data management, Horizon 2020, OA model, Open Access, Open Research Data, Open Science

Abstract:

This paper briefly presents the main lines of the European Commission's policy on Open Access to Scientific Publications and Research Data in the Horizon 2020 programme. The respective pilot on open research data is presented in detail. The pilot covers approximately 20 percent of the H2020 funding in 2014 and 2015 in the areas of future and emerging technologies; e-Infrastructures; leadership in enabling and industrial technologies – ICT; societal challenges related to smart cities and communities, climate action, environment, and resource efficiency, inclusive, innovative and reflective societies; and science with and for society, thus extending the move from open access to research results towards OA to research data. A next step will be to consider a more global open science approach encompassing a change of culture towards more openness, accessibility, re-usability, multidisciplinary, participatory collaboration, and an approach driven by what is of benefit for society.

Full text: EC Policy on OA to Scientific Publications and Research Data in Horizon 2020

http://www.biomed-data.eu/system/files/bmdj.01102_ec_oa_policy_horizon2020.pdf?download=1

<http://www.biomed-data.eu/node/106>

David Rickerby (JRC) has provided the link to a paper that may be of interest to those involved in (eco)toxicity testing: <http://pubs.acs.org/doi/pdf/10.1021/acs.est.5b00997>



Adapting OECD Aquatic Toxicity Tests for Use with Manufactured Nanomaterials:

Key Issues and Consensus Recommendations

<http://pubs.acs.org/doi/pdf/10.1021/acs.est.5b00997>

The unique or enhanced properties of manufactured nanomaterials (MNs) suggest that their use in nanoenabled products will continue to increase. This will result in increased potential for human and environmental exposure to MNs during manufacturing, use, and disposal of nanoenabled products. Scientifically based risk assessment for MNs necessitates the development of reproducible, standardized hazard testing methods such as those provided by the Organisation of Economic Cooperation and Development (OECD). Currently, there is no comprehensive guidance on how best to address testing issues specific to MN particulate, fibrous, or colloidal properties.

This paper summarizes the findings from an expert workshop convened to develop a guidance document that addresses the difficulties encountered when testing MNs using OECD aquatic and sediment test guidelines. Critical components were identified by workshop participants that require specific guidance for MN testing: preparation of dispersions, dose metrics, the importance and challenges associated with maintaining and monitoring exposure levels, and the need for reliable methods to quantify MNs in complex media. To facilitate a scientific advance in the consistency of nanoecotoxicology test results, we identify and discuss critical considerations where expert consensus recommendations were and were not achieved and provide specific research recommendations to resolve issues for which consensus was not reached. This process will enable the development of prescriptive testing guidance for MNs. Critically, we highlight the need to quantify and properly interpret and express exposure during the bioassays used to determine hazard values.

Sustainable Nanotechnologies (SUN)

<http://www.sun-fp7.eu/>

Stella Stoycheva, The REACH Centre

s.stoycheva@sun-fp7.eu



The SUN project is co-organizing the 2nd Sustainable Nanotechnology School: 24-26 January 2016

A practical approach for understanding the environmental, health and safety implications of manufactured nanomaterials to foster their sustainable applications

The achievement of safe nanoproducts requires an understanding of the properties, biological interactions, fate, risks and environmental impacts of manufactured nanomaterials (MN).

The Sustainable Nanotechnology School aims to transfer the state of the art knowledge on these aspects from key experts to the new generation nano environmental, health and safety (EHS) professionals. In order to do so the school will highlight the best available experimental and modeling approaches and practices for physicochemical characterization, (eco)toxicity testing, exposure, risk, life-cycle impact assessment and decision support for sustainability of nanotechnologies and risk governance, taking various stakeholder perspectives and ethical issues into account.

The course is structured to balance breadth and depth in these diverse topics, as well as build an integrative understanding of them, while providing an interactive learning environment and direct access to key experts from Europe. The Sustainable Nanotechnology School is organized in the frame of the major EU FP7 projects SUN, the MODENA Cost Action and ECONANOSORB.



www.sun-fp7.eu/2nd-nanoschool | Email: trainingschool@sun-fp7.eu

CompNanoTox 2015 Conference : 4-6 November, Malaga

Five years after announcing the first call for modelling toxicity of nanoparticles in EU FP7, four years after the COST-sponsored exploratory workshop in Maastricht that resulted in launching of MODENA action, more than two years after starting the five "modelling projects" (NanoPUZZLES, ModENPTox, PreNanoTox, MembraneNanoPart, MODERN) within EU NanoSafety Cluster, and a year after starting eNanoMapper project we are at the stage of collecting first conclusions from developing the models.



Therefore, we are jointly organizing CompNanoTox 2015 conference to disseminate the results and integrate the European projects focused on developing computational methods for toxicological risk assessment of engineered nanoparticles. Hopefully, the conference would provide as well an opportunity for discussing further needs and perspectives in this area.

Since both calibration and validation of computational models were impossible without utilizing high quality experimental data, close collaboration between the computational chemists and experimentalists from different areas (i.e. toxicologists, specialists on characterization) would be crucial for the success.

As such, the formula of the event is open. We are inviting not only modelers, but also researchers from all areas of nanoscience and nanotoxicology to participate.

Tomasz Puzyn, Conference Chair

Conference website: <http://www.compnanotox2015.eu/>



Joint Public Workshop of the FP7 Projects SMARTNANO, Nanodetector and INSTANT 17th November 2016, Brussels



On the 17th of November the public workshop on Nanoparticle analysis will be held in Brussels. The workshop will be jointly coordinated by the three projects addressing the FP7 topic "New methods for measuring, detection and identification of nanoparticles in products and/or in the environment".

The outcomes of Nanodetector, SmartNano and Instant will be illustrated and discussed during the workshop among with the joint project activities and the round robin tests results.

Nanodetector will present its device for detection of nanoparticles, based on surface plasmon resonance microscopy, the application scenario and the results on the test campaign made on the seven devices delivered within the project.

SmartNano will present its cost-effective technology platform that provides total solution "from sample-to-result" for the detection, identification, and measurement of engineered nanoparticles in a wide range of matrices, as explained in the section "Project".

Instant will present its integrated tool for the extraction of ENPs from complex matrices and their subsequent detection and identification.

The participants are also invited to actively participate to the closing discussion panel on future needs in nanoparticle analysis.

For more information, contact Ing. Paola Bazzoni: paola.bazzoni@abich.it

Global Advanced Materials and Surfaces 2015

December 7 - 9 2015

<http://www.setcor.org/conferences/GAMS-2015>

Dr Malika Ardhaoui, SETCOR

info@setcor.org



The Global Advanced Materials & Surfaces Forum (GAMS 2015) is a three day International event organized between December 7 - 9 2015 at JW Marriot Marquis Hotel - Dubai- United Arab Emirates.

The goal of this international event is to provide a global platform for researchers, engineers, students and decision makers coming from academia and industry to present their research results and activities in the field of fundamental and interdisciplinary research of Advanced Materials and Surfaces Science and Processing Technology through Oral Presentations and Posters Sessions.

<http://www.setcor.org/conferences/GAMS-2015>



SETAC Conference in Nantes— 22-26 May 2016

<http://nantes.setac.eu/?contentid=851>

Mark your calendar and save the date!

Environmental contaminants ignore boundaries and ecosystem limits. Under the general theme **Environmental contaminants from land to sea: continuities and interface in environmental toxicology and chemistry**, experts from academia, government and industry will share the most recent advanced knowledge in environmental sciences in order to improve chemical risk assessment and support current and future policies. Among the keynotes approached, *Plastic waste in the aquatic environments*, *Fate and effect of cosmetics and personal care products - Regulatory perspectives*, and *Climate change and environmental contamination by chemicals: do they combine to modulate ecological and health effects?* will put frames of debates of international interests.



We warmly welcome you to Nantes, in the Loire estuary, where history meets modernity. In this inventive and daring city, you will appreciate art deco style, cruises on the River Erdre, traditional music, and, of course, delicious French gourmet food and regional wines. Being the birthplace of Jules Verne, Nantes has kept the inspiration of the famous novelist to surprise visitors. Nantes is also an appropriate starting point to discover the Loire valley, with some of the finest royal castles and well-known vineyards, the sea shore with fishermen and salters villages, the Mont Saint Michel and beautiful long beaches. We promise you an exciting scientific programme, surprising entertainment and great social events in a truly French atmosphere.

[You are invited to submit abstracts for oral and/or poster presentations for the SETAC session below:](#)

Detection, identification and quantification of engineered (nano)materials in complex matrices

Engineered (nano)particles are ubiquitous in environmental matrices, however their identification and quantification is still very challenging, due to the complexity of environmental samples and the vast diversity of these particles. They differ in size and shape, and also their elemental composition is variable. Engineered (nano)particles include inorganic particles, such as nano-TiO₂ and nano-Ag, carbon based nanoparticles, such as fullerenes and carbon nanotubes and organic microplastics. Especially the analysis of carbon-based and organic particles can be an intricate problem, as there is an almost unlimited number different variations. Fullerenes can carry various functionalities, carbon nanotubes can be multi-walled or single-walled and microplastics can be made up from for instance polyethylene, polystyrene or polypropylene. Such engineered (nano)particles are already used in many consumer products, such as sunscreens, paints, mouth wash, textiles, food packing materials and food additives and may thus be released into the aquatic environment as already documented by several research reports. However, to develop a scientific understanding of i) the release patterns, ii) the transformation reactions in the environment and iii) the environmental distribution of such pollutants, analytical tools that are capable to detect, identify and quantify these particles in complex matrices are urgently needed.

Recently developed and/or substantially improved analytical techniques such as Orbitrap MS, flow cytometry, pyrolysis GC/MS, field flow fractionation (FFF) coupled mass spectrometry, dynamic and static light scattering as well as single particle ICP-MS and analytical electron microscopy have opened a new research front in analytical chemistry. Using sophisticated analytical tools and combinations thereof, engineered (nano)particles in both their pristine and transformed state after being exposed to different environmental conditions have been investigated in unprecedented detail. Due to the enormous progress recently made in this research field particles can be accurately quantified in simple matrices. The next challenge is to make these highly sophisticated techniques compatible with complex matrices, which ultimately will allow their detection and quantification in complex matrices. This session aims to integrate contributions focussing on latest developments for nanoparticle and microplastics analysis including explicitly sample preparation techniques to provoke a discussion about most pressing research questions in that field. We invite researchers from academia, government, industry and research institutes to share their latest findings and experiences on methods used for the detection and characterisation of engineered (nano)particles in complex matrices, including food, soil, surface- and wastewater.

Submission is possible only via the website, <http://nantes.setac.eu>, by 25 Nov 2015

For more information, contact: ralf.kaegi@eawag.ch | www.eawag.ch



Industrial Nanocomposites Conference

24–25th November 2015, Stuttgart, Germany



INC 2015 Registration Now Open!

Topics will include:

- market overview
- nano additive manufacturing
- upscaled production
- material formats
- health and safety
- standardisation

INC 2015 will explore the current and future uses of nanocomposites in a variety of applications; defining the challenges being faced in mass production, use, and future innovations.

The event attracts an audience from a wide range of industries including research, manufacturing, and end users with representation confirmed from the aerospace, automotive, space and consumer goods sectors.

Conference Dinner

The INC conference dinner will be held at the Mercedes Benz Museum following day 1 of the conference.

Places are limited so book now to avoid disappointment. Meet and network with other industry professionals at this social event.

Sponsorship & Exhibition

Our sponsorship and exhibition packages promote you to a worldwide audience at the event and online. Take advantage of basic, enhanced, premium or deluxe stands, poster placement, personalised lanyards and delegate pack inserts.

Venue

Industrial Nanocomposites Conference 2015 will be hosted at SpOrt Stuttgart, Germany. More than a house of sport, it is the ideal place for education, meeting and events with its open architecture and glass-covered atrium.

Speakers include:

- BAE Systems
- Queen Mary University of London
- Nanocyl
- Imerys Graphite & Carbon
- Thales Alenia Space Italia
- Fiat
- D'Appolonia
- Institute of Occupational Medicine
- Haydale Composite Solutions
- Carbodeon
- and many more.....



<http://industrialnanocomposites.com/>



ICANM 2016: International Conference & Exhibition on Advanced & Nano Materials

August 8-10 2016

<http://icanm2016.iaemm.com/>

ICANM IAEMM

icanm2016@iaemm.com



The ICANM2016 organizing committee warmly invite you to attend the ICANM 2016 conference. ICANM2016 takes place in Montreal, Canada. Montreal is the first North American city to have been designated UNESCO City of Design by the Global Alliance for Cultural Diversity in 2006 .

The objective of the conference is to explore the innovations and latest accomplishments in the areas of Advanced & Nano Materials. The conference will also focus on the latest developments in processing of different advanced and nano materials.

ICANM 2016 is an opportunity to network with some of the world's leading scientists, and to experience the vibrant culture and to explore the natural wonders of Montreal.

Nanotech France 2016—June 1-3

Dr Malika Ardhaoui, SETCOR

info@setcor.org

Nanotech France 2016 brings together leading scientists, researchers, engineers, practitioners, technology developers and policy makers in nanotechnology to exchange information on their latest research progress and innovation.



Participants from the top international academic, government and private industry labs of different disciplines participate in Nanotech France 2016 to identify new technology trends, development tools, product opportunities, R&D collaborations, and commercialization partners.

It is an excellent event for students to meet and discuss with lead researchers. The conference provides an unprecedented opportunity to discover innovation in the area of nanotechnology and new business opportunities. It is among the most important events in terms of international regulatory policies and it is open to the participation of private companies.

The conference covers all frontier topics in nanotechnology. The conference includes plenary lectures, Keynote lectures and invited talks by eminent personalities from around the world in addition to contributed papers both oral and poster presentations.

<http://www.setcor.org/conferences/Nanotech-France-2016>



Situation Wanted

Do you need an expert in environmental science to develop, organise or run your projects, and communicate effectively with academia, government, and industry?

With a recent doctorate in environmental chemistry and toxicology (fate and effects of nano-metals in soils), working on projects such as **NanoValid** and the **Canadian Environmental Risks of Engineered Nanoparticles in Municipal Wastewater Treatment Plants**, 3 years as a **Scientific Advisor for Environment Canada**, and 18 years' experience as an **International Project Manager** in industry with clients including **Air Canada**, and the **Fiji Trade and Investment Board**, I have strong understanding of **environmental risk assessment** and a proven track record in organising and running multiple projects.

I understand the drivers for the various sectors and can bridge communications between stakeholders with differing technical or scientific awareness. My flexible, resourceful, and calm approach, and ability to solve problems enable me to manage even the most challenging projects, and my determination ensures their success.

If you think I would be an asset to your team in either the European Union or Canada, please contact me:

Dr Heather McShane:

heather.mcshane@mail.mcgill.ca

Available from January 2016.

Job Opportunities

Are you looking for a new opportunity? Check out these links:

<https://www.linkedin.com/job/nanotechnology-jobs/>

<http://jobs.sciencecareers.org/jobs/>

<http://www.nanowerk.com/nanocareer/homepage.php>

<http://www.eurosciencejobs.com/jobs/nanotechnology>

<http://www.tinytechjobs.com/>

Don't forget to advertise your vacancies on the NanoSafety Cluster website

Tell us about it...

If you have any news, announcements, events, resources, research positions, updates, comments, opinions, publications, bulletins, blogs, workshops, ideas, jobs, proposals, partnership opportunities, that you want the nanosafety community to know about, here's how you can inform everyone...



EventsCalendar



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NewsLetter



NSC Compendium2014