



## Welcome to the 3rd NanoSustain Newsletter

Dear Readers,

Nanomaterials are increasingly involved in hundreds of new consumer and industrial products ranging from socks to suntan lotion or solar panels. Due to their small scale (100 nanometres or less) they can significantly enhance and change the properties of these products to become more effective, durable or energy-saving. However, the same properties that make them so unique mean that these materials are more likely to pass through biological membranes, circulate through the body, and enter cells. Their novel properties may pose novel risks to human and the environment, which are still unknown. Although millions of tons of nanoparticles are now manufactured every year, their associated risk has not been adequately addressed by science, industry and regulators.

As for other high-tech sectors, transparency and social acceptance will also play a crucial role for nanotechnology to be successful. Indeed public acceptance requires transparency, which will help the wider community to perceive this new technology in an unbiased way.

A recent study showed that the public does not fear risks associated with nanotechnology more than any other risks, but rather perceives nanoparticles as a comparatively low risk. The study concluded that this new technology is not a major public concern, despite the fact that safety issues still remain unclear (*Berube et al., 2011, Journal of Nanoparticle Research*).

One of the main objectives of NanoSustain, and of about 30 other similar projects initiated by the European Commission during the last 10 years and now organized under the umbrella of the EU Nanosafety cluster, is to establish not only the basic scientific data and know how we need to safeguard manufacture, use and disposal of nanomaterials, but also to communicate our research efforts and results to all main stakeholders. We researchers, engineers, technicians and manufacturers involved in these projects will only succeed in building up a safe and sustainable nanotechnology if we also allow our fellow citizens to actively engage in this process. Only if we, the nano-community, take it serious that science and technology are no independent variables but closely interact with societal factors and actors, will we receive the input, trust and guidance from society we need to recognize, in good time, the contents and directions that our research must take to produce beneficial results and minimize risks associated with nanotechnology.

During our 3<sup>rd</sup> regular consortium meeting, which will take place on 10th-11th May 2011 in Glasgow (UK), NanoSustain will present brand-new results on hazard and occupational exposure of selected engineered nanomaterials (ENMs). These newly generated results will be discussed and shared with relevant stakeholders during the 1<sup>st</sup> NanoSustain dissemination event on the 12th May following the consortium meeting, to obtain their early feedback and to guide our ongoing research, in particular concerning the question of how the produced new data can be used for proper risk management and measures that can help to control exposure to ENMs.

This dissemination event will be just a starting point of more activities that will follow to ensure that the research we do can be shared with the wider community. In this way, NanoSustain will not only contribute to establish the necessary data and knowledge we need to ensure safe commercialization of nanotechnology based products, but also to create an atmosphere of mutual trust among all stakeholders, including manufacturers, regulators and consumers/users.

With this in mind, I hope you enjoy our 3<sup>rd</sup> NanoSustain Newsletter and find some inspiration to engage with us and the research we do.

Best wishes

**Rudolf Reuther**

NanoSustain coordinator

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**WP1: Project management and scientific and technical coordination**

NanoSustain has reached the end of the first year of the project and work is developing smoothly, in line with the work plan. Critical technical deliverables and milestones, such as the production and delivery of selected test materials or the set up of a project-specific database, have been achieved and first scientific results produced on the measurement and characterization of test materials. Biological tests have been started, which will also include characterized LCA-relevant test samples, and an internal inter-laboratory comparison is in preparation to validate achieved analytical and biological results. All necessary resources have been properly mobilized during these first 12 months including the scientific expertise, personnel staff, technical equipment and financial budget required to achieve project objectives.

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**WP2: Data gathering, generation, evaluation, and validation**

As scientific literature is continuously evolving, the NanoSustain Literature Database has now reached more than 50 scientific papers reviewed, analysed, and made available through the project intranet. There could have been more, but NanoSustain has decided that a quality assessment process must be incorporated into literature review; only sources following a scientifically sound, experimental design and approach are considered, and a thorough physico-chemical characterization is mandatory for papers to be considered, in line with the recent recommendations of the vast majority of the high impact nanosafety journals. Furthermore, NanoSustain has recently started the organisation of a framework for the validation of its scientific output, including inter-laboratory comparison of results, and the definition of statistical parameters to assess the validity of the results, with the aim to have only well validated results to be included within the Project Results Database. This database is being designed to be well harmonised with the other projects collaborating in the NanoSafety Cluster, towards the creation of a EU wide nanosafety database. All these steps will be performed with the help of internal expert groups, the Project Internal Committees, that will promote a sound scientific discussion in their areas of expertise.

**Contact:** Stefano Pozzi Mucelli [stefano.pozzimucelli@venetonanotech.it](mailto:stefano.pozzimucelli@venetonanotech.it)

**WP3: Hazard characterisation and human health & environmental impact assessment**

During the last 3 months the following work has been completed within WP3:

- Physical-chemical characterization of particles is ongoing;
- Development of a sanding device is completed and the generation of sanding dusts from nanoparticle containing materials will be generated over the next months;
- ZnO coated glass sheets and epoxy materials with CNT are ready for weathering and abrasion test;
- The first animal experiment has been performed and tissues are ready for toxicological analysis;
- Characterization of the composition of bronchoalveolar lavage cells from the exposed mice is ongoing;
- Histological evaluation of lung and liver tissue from ZnO exposed mice is ongoing; and
- A draft report on risk assessment has been completed.

**Contact:** Anne Thoustrup Saber [ats@arbejdsmiljoforskning.dk](mailto:ats@arbejdsmiljoforskning.dk)

**WP4: Life cycle assessment**

Over the last few months work in WP4 has been focused on the development of specific process models for the selected nanomaterials and their applications: nanocellulose as paper additive, industrial thickener, rheology modifier; nano-TiO<sub>2</sub> paint application; nano-ZnO glass coating as UV-Barrier; and MWCNT in epoxy plates. On the basis of an evaluation of the published literature process models for the production phase, use phase, end-of-life and recycling phases (re-use, recycling and/or final treatment and disposal) has been developed in the LCA-Software tool, Umberto. These life cycle models include all relevant material flows of the selected nanoproducts. In the next stage we will start with the detailed information collection for the process models.

**Contact:** Michael Steinfeldt [mstein@uni-bremen.de](mailto:mstein@uni-bremen.de)

**WP5: Development of technical solutions for use, recycling & final treatment**

WP5 has recently shown that the EN ISO 14593 biodegradability test in liquid environment requires modification when biodegradability of nanofibrillated materials like nanocellulose are evaluated. Currently experiments with a modified test, for example with different sample concentrations and dispersion additives, are being carried out. Further in WP5, the experiments to study the possible release of particles from glass coated with nanoparticle containing coating during glass melting have been finalised. The analyses of the interesting results are under way and are expected to be available by the next newsletter.

**Contact:** Ulrika Backman [ulrika.backman@vtt.fi](mailto:ulrika.backman@vtt.fi)

**WP6: Dissemination and exploitation of project results**

Work has continued on improving the project website to provide more information and a more dynamic project portal, and this will continue in future months with input from the project partners. WP6 has also been concentrating on the First Dissemination Event, which will take place in Glasgow on the 12th May (further details on p3), and future planning for a training working on life cycle analysis at the University of Bremen (further details on p5).

**Contact:** Eleanor O'Rourke [eleanor.orourke@nano.org.uk](mailto:eleanor.orourke@nano.org.uk)



## Post-doctoral research fellowship 'Sustainable Nanotechnology' at Joint Research Centre (JRC)

JRC will advertise a 3-year post-doctoral research fellowship on "Sustainable Nanotechnology" in the last week of April. The ideal candidate should have a PhD in Chemistry, Physics, Computer Science, Materials Science, Environmental Science or related field (or a University degree and 5 years of research experience after the university degree giving access to doctoral studies). Experience in the field of nanomaterials is required and knowledge of materials characterisation techniques and environmental chemistry related issues is essential. Good knowledge of spoken and written English is required. The knowledge of another community language would be an advantage. The Joint Research Centre is an equal opportunity employer and is committed to increasing the diversity of its staff. It welcomes nominations of and applications from women and minority groups. Further information will be available from the end of April 2011 at <http://ec.europa.eu/dgs/jrc/index.cfm?id=3720>

## JRC call for tender on "Electron Microscopy Analysis of Nanoparticulate Materials"

JRC will publish a call for tender on "Electron Microscopy Analysis of Nanoparticulate Materials" in the Official Gazette of the European by mid-April. The technical specification of this call relates to structural and chemical analysis using field emission scanning electron microscopy (FESEM) and scanning transmission electron microscopy (STEM), with energy dispersive X-ray spectroscopy (EDS), electron energy loss spectroscopy (EELS), high angle annular dark field (HAADF) and nano-diffraction, for physico-chemical characterisation of organic and inorganic nanomaterials based on the following nanoparticles: nanocellulose; carbon nanotubes, zinc oxide, titanium dioxide. For further information go to <http://web.jrc.ec.europa.eu/callsfortender/index.cfm?action=app.homepage&institute=5&type=1>

## Presentations by NanoSustain Partners

NanoSustain partner, David Rickerby of JRC, made the following presentations in recent months;

### "Optimisation of Titanium Dioxide Nanoparticles for Photocatalytic Water Treatment"

Nanotechnology for Water Conference (London, 15th February 2011)

### "Sustainable Use of Nanotechnology for the Environment"

ObservatoryNano Workshop on Nanofiltration and Nano-enhanced Filtration  
(Zurich, 18th-19th January 2011)

Michael Steinfeldt, of University of Bremen, will present the following lecture at "Safety issues of nanomaterials along their life cycle" Symposium in Barcelona (4th-5th May).

[www.leitat.org/nanoLCA](http://www.leitat.org/nanoLCA)

"Environmental relief effects of nanotechnology-based applications by the example of CNT composite materials and films and nanoscaled polyaniline"

## NanoSustain Coordinator's new personnel

The NanoSustain coordinator NordMiljö AB Sweden has recently recruited Rune Karlsson, who started in April 2011, to assist in the scientific coordination of the project. Rune is a US experienced senior researcher specialised on aerosol and occupational exposure measurement, and holds a PhD from Chalmers Technical University Gothenborg.



## First NanoSustain Dissemination Event

Thursday 12<sup>th</sup> May, 9.30-14.30, Premier Inn, 187 George St, Glasgow

This event will provide an insight into the current nanosafety research and coordination efforts on both the UK and European levels and offer a chance for attendees to learn about the exciting preliminary results of the EU FP7 NanoSustain project. Speakers will include representatives of the UK Health & Safety Executive, UK University Safety and Health Association, and NANO futures initiatives, and NanoSustain Work Package leaders will report on their initial findings. Attendees will be encouraged to participate through a panel discussion on the current status of European nanosafety research and coordination and its future development. If you would like to attend the event please contact Eleanor O'Rourke [Eleanor.orourke@nano.org.uk](mailto:Eleanor.orourke@nano.org.uk)

09.00-09.20	<b><i>The need for research and coordination in nanosafety</i></b> <ul style="list-style-type: none"> <li>• Why is nanosafety research so important?</li> <li>• The aims and objectives of the NanoSustain project</li> <li>• Introduction to the wider European nanosafety coordination efforts</li> </ul>	Rudolf Reuther (NanoSustain Coordinator)
09.20-09.40	<b><i>The NanoSustain Database – a vital component</i></b> <ul style="list-style-type: none"> <li>• Why is creating a database so vital?</li> <li>• How this database is being created</li> <li>• The importance of cross-project coordination within the NanoSafety Cluster</li> </ul>	Stefano Pozzi Mucelli (Veneto Nanotech)
09.40-10.30	<b><i>Initial results from NanoSustain</i></b> <ul style="list-style-type: none"> <li>• Physico-chemical characterisation of ENMs (Roberto Hanoi, NLAB, Mihaela Miu, IMT, Valentinas Snitka, KTU)</li> <li>• Industrial environmental risk assessment (David Rickerby, JRC)</li> <li>• Hazard characterisation (Anne Thoustrup Saber, NRCWE)</li> <li>• LCA method, inventory and modelling of ENMs (Michael Steinfeldt, UniHB)</li> <li>• Technical solutions for sustainable reuse/recycling and final treatment/disposal of nano waste materials and products (Ulrike Backman)</li> </ul>	NanoSustain Partners (10 min each)
10.30-11.00	<i>Coffee break</i>	
11.00-11.20	<b><i>The Nanosafety Cluster</i></b> <ul style="list-style-type: none"> <li>• How the EC is bringing European nanosafety research together</li> <li>• The focus and aims of the NanoSafety Cluster</li> </ul>	EC representa- tive (to be con- firmed)
11.20-11.40	<b><i>The UK Health and Safety Executive perspective</i></b> <ul style="list-style-type: none"> <li>• HSE's review of ENM use in the UK</li> <li>• Preliminary results from manufacturer, importer and end-user survey</li> </ul>	James Wheeler (HSE)
11.40-12.00	<b><i>USHA: Promoting health and safety in higher education</i></b>	June Freeland (USHA)
12.00-13.00	<i>Lunch</i>	
13.00-13.45	<b><i>Engaging with industry – the way forward</i></b> <ul style="list-style-type: none"> <li>• The NanoFutures initiative</li> <li>• Ensuring industrial engagement in nanosafety research efforts</li> </ul>	Rob Aitken (IOM)
13.45-14.30	<b><i>Panel discussion 'The future of nanosafety research'</i></b> Discussion on the issues raised by the morning's presentations encouraging all participants to share their experience of nanosafety research and expectations for the future.	All



### Next NanoSafety Cluster Meeting, Barcelona, 6th May 2011

The organizers of the Symposium "*Safety issues of nanomaterials along their life cycle*", as active members of the Nanosafety Cluster initiative ([www.nanosafetycluster.eu](http://www.nanosafetycluster.eu)), give the opportunity to the scientific community working on Nanosafety related fields (including those attending the Symposium) to participate in the Nanosafety Cluster working group (WG) meetings on the 6th May (09:00 to 14:00 h). These meetings will consist of brainstorming on all aspects of nanosafety to identify the gaps in this area and to maximise the synergies among the specialists in the different areas. The proposed parallel meetings will be centered on the Nanosafety Cluster WGs: Materials; Hazards (SG1: Toxicology/ SG2: Ecotoxicology); LCA and Exposure; Database; Risk; Modelling; Dissemination. Further information can be found at <http://www.leitat.org/nanoLCA/meeting.php>

### Cluster meeting on linking Environmental related projects, London, 22 September 2011

This workshop will be organized in conjunction with the 6th International Conference on the Environmental Effects of Nanoparticles and Nanomaterials, London, 19-21st September 2011, to bring together researchers from EU projects that have a large true environmental / ecotoxicology component. NanoSustain will help to organise and implement this meeting to discuss potential areas of cooperation. Further information from Claus Svendsen, [csv@ceh.ac.uk](mailto:csv@ceh.ac.uk)

### OECD WGMN SG9 Workshop, Rome, September 2011

The OECD SG9 on Environmentally Sustainable Use of Manufactured Nanomaterials is planning to organise a workshop to be held in Rome in September 2011. The workshop is planned to become a public and international event dealing with issues from the field of life-cycle aspects of manufactured nanomaterials, potential positive and negative impact on the environment and health of certain nano-enabled applications at different stages of development. One main goal is to bring together the members of the OECD Working Party on Manufactured Nanomaterials (WPMN) as well as participants from national governments, European Community, institutes working on life-cycle assessments, industries and the scientific community. The results of the workshop will be documented and will be made publicly available. NanoSustain was asked to present a case study on one of the thirteen nanomaterials in the OECD sponsorship programme.

### ESF Conference Nanocarbons 2011

Carbon Nanotubes and Related Materials: From Physico-Chemical Properties to Biological and Environmental Effects, Hotel Villa del Mare, Acquafredda di Maratea Italy, 6th-11th September 2011. Application Form & Programme available from [www.esf.org/conferences/11363](http://www.esf.org/conferences/11363). Closing Date for Application 29th May 2011, European Science Foundation Email: [conferences@esf.org](mailto:conferences@esf.org) | [www.esf.org/conferences](http://www.esf.org/conferences)

### 6<sup>th</sup> International Conference on the Environmental Effects of Nanoparticles and Nanomaterials *The Royal Society, London, 19th - 21st September 2011*

This meeting is the sixth international meeting on this topic following the success of the 5th meeting held in Clemson, USA, last year. Presentations are welcome on all areas of nanoscience.

**Abstract submission deadline:** 20th May 2011 **Early registration deadline:** 30th June 2011. Scientific enquiries: Richard Handy [rhandy@plymouth.ac.uk](mailto:rhandy@plymouth.ac.uk), Registration/abstract submission enquiries: Talja Dempster [t.dempster@sebiology.org](mailto:t.dempster@sebiology.org)

### First NanoSustain Training Workshop

As already announced in our last Newsletter, NanoSustain is preparing a training workshop on LCA of ENMs in September 2011 at the University of Bremen, Germany. This 2-day workshop will give an overview of ongoing RTD activities in the field of nanotechnology and LCA and will include an introduction and demonstration of the modelling of the life cycle of ENPs using the 'Umberto' Software. Main target groups will be PhD and postgraduate students and young researchers, partners from NanoSustain and the Nanosafety cluster, relevant industries, and LCA experts. For further information please contact Eleanor O'Rourke [eleanor.orourke@nano.org.uk](mailto:eleanor.orourke@nano.org.uk)

**NordMiljö AB (NOMI)** is the project coordinator and mainly responsible for the operational management, administration and S/T coordination of the planned work, including progress control and reporting to the Commission.

The **Institute of Nanotechnology (IoN)** will be responsible as WP6 leader for the dissemination and exploitation of the project results through a regular newsletter, training workshops, and dissemination events. In addition, the IoN will also be providing coordination support.

**Veneto Nanotech (VN)** will lead WP2, build up the necessary project-specific database and ensure validation and access of already existing relevant data, and of newly generated data, to all project partners.

The **National Research Centre for the Working Environment (NCRWE)** is responsible as WP3 leader for the production of after-production materials for further testing, for producing human exposure data and for the toxicological testing of the materials in animals

**Universität Bremen (UniHB)** is the leader of WP4 and responsible for the Life Cycle Assessment on selected nanomaterials and nanoproducts and the development and operationalization of criteria and guiding principles for precautionary design of engineered nanomaterials.

**The Technical Research Centre of Finland (VTT)** will develop as WP5 leader innovative solutions for recycling, final treatment and disposal of selected nanotechnology-based materials and products, and carry out appropriate ecotoxicology studies

The **Joint Research Centre (JRC)** will help to fill knowledge gaps related to the behaviour of the selected manufactured nanomaterials in ecosystems. This will contribute to the development and implementation of testing methods and assessment of the distribution, transport, transformation and fate of selected nanomaterials, and their effects on human health and the environment.

**Kaunas University of Technology (KTU)** will participate in the physico-chemical characterization and analysis of the selected test nanomaterials and products, and will develop and test an analytical method appropriate to detect and quantify engineered nanoparticles in various environmental matrices.

**National Institute for Research & Development in Microtechnologies (IMT)** will participate in the physico-chemical characterization and analysis of the selected test materials and products, and in the development and design of new material & product properties and applications, or in new material synthesis for novel applications.

**Nanologica AB (NLAB)** will provide the CNT-composite materials and associated materials data, contribute to their physical-chemical characterization, and support the exploration of treatment and disposal technologies.

**Nanogate (NGAG)** will provide a ready-to-use nano-ZnO based test material and associated product data and contribute to the technical exploration and design of new solutions for sustainable use, recycling and final treatment of the provided test material.

**UPM-Kymmene (UPM)** will supply nano-fibres (nanocellulose) and associated product data, and contribute to the design and exploration of technical solutions for their recycling and final treatment.

