Information Booklet

Life cycle Assessment (LCA) & Risk Analysis in Nanomaterials-related NMP projects

Specialist Brainstorming and Coordination Meeting
March 2, 2011, Brussels (Belgium)

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Brussels/Stuttgart
March 2011

This booklet contains brief description of some of the projects presented at the meeting. The booklet will be also available on-line, together with the meeting presentations, at

http://www.must.risk-technologies.com.

User name and password will be communicated after the meeting by a separate e-mail.

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www.eumat.eu www.risk-technologies.com

EuMaT
European Technology Platform for Advanced Engineering Materials and Technologies

Steinbeis Advanced Risk Technologies

3rd Information about a joint dissemination event

Life cycle Assessment (LCA) & Risk Analysis in Nanomaterials-related NMP projects

(http://lct.jrc.ec.europa.eu/)

Specialist Brainstorming and Coordination Meeting

March 2, 2011, Brussels, Belgium

Attention: New venue!

Venue: ENEA building (4th floor), Rue de Namur 72, 1000 Brussels, Belgium
NOTE: The meeting will take place in conjunction with the EuMaT Executive Board meeting of March 3, 2011 Brussels

MUST — Multi-Level Protection of Materials for Vehicles by "Smart" Nanocontainers

A joint dissemination and coordination action targeted on risk/LCA issues initiated by the EU NMP Project MUST (www.must-eu.com) (respective responsible partners IST and Steinbeis Advanced Risk Technologies), supported by EU-VRi EEIG, KMM-VIN and EuMaT (WG5)
Coordination (MUST project): A. Jovanovic; Contact: M. Cordella lcanano@risk-technologies.com

Participating FP7 projects (see http://cordis.europa.eu for details)

- **iNTeg-Risk**: Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related Risks
- **MATRANS:** Micro and Nanocrystalline Functionally Graded Materials for Transport Applications
- **M-RECT:** Multiscale reinforcement of semi-crystalline thermoplastic sheets and honeycombs
- **MUST:** Multi-level protection of materials for vehicles by smart nanocontainers
- **Nanofate:** Nanoparticle Fate Assessment and Toxicity in the Environment
- **NANOFOL:** Folate-based nanobiodevices for integrated diagnosis/therapy targeting chronic inflammatory diseases
- **NanoGEM:** Nanostructured Materials - health, exposure and material properties
- **NanoHex:** Enhanced nano-fluid heat exchange
- **Nanohouse:** Life Cycle of Nanoparticle-based Products used in House Coating
- **Nanopolytox:** Toxicological impact of nanomaterials derived from processing, weathering and recycling of polymer nanocomposites used in various industrial applications
- **Nanosustain:** Development of sustainable solutions for nanotechnology-based products based on hazard

Basic idea and objectives

Analyzing life cycle behavior (i.e. performing a LCA – Life Cycle Analysis) and potential risks of new technologies and products are becoming an ever increasing factor of sustainable success of these technologies and products. This applies also to the technologies and innovation being developed in many EU FP7 NMP (Nanosciences, Nanotechnologies, Materials and new Production Technologies) projects. Main goal of the meeting is to explore the possibilities for coordination, alignment and liaison among the running projects, coordination between the EU and industry for future research, possibilities for cross-project activities, possibilities for data and tools sharing and horizon mapping – all for LCA and risk analysis related to nanomaterials. The idea was initiated in the MUST project ("let's discuss the issue with a couple of most adjacent NMP projects") and it was arising from the interest to achieve results which are:

- Comparable among different projects
- Providing a good basis for development of future common solutions in the area of LCA and risk analysis/ management.

Correspondingly, the most important expected outcomes are:

(1) coordination and alignment among solutions in different running projects;

(2) inputs for the priorities of future calls in the area LCA/risk such as self-healing materials;

(3) ensuring that the research and technology related interests of RTD projects are well matching the interest to ensure environmental and general sustainability of the results of this research.

Target participants / audience

Target number of participants is approx. 50; their expected profile ranges from material scientists, over LCA specialists and risk professionals, to legislators. In particular, are expected to take part:

- the project coordinators;
- the partners which are responsible for LCA and/or risk analysis n the respective projects.

Participation by invitation and public announcement.

Fees / Financing / Registration

No participation fees are foreseen, the meeting room is offered as a courtesy of ENEA, catering offered by Steinbeis Advanced Risk Technologies and MUST project. The participants will finance their own, travel and other costs e.g. as a part of their dissemination/liaison activities.

Life cycle Assessment (LCA) & Risk Analysis in Nanomaterials-related NMP projects - Specialist Brainstorming and Coordination Meeting - March 2, 2011, Brussels, Belgium

characterization and LCA

Nanovalid: Development of reference methods for hazard identification, risk assessment and LCA of engineered nanomaterials

NEPHH: Nanomaterials-related environmental pollution and health hazards throughout their life-cycle

Particoat: New multipurpose coating systems based on novel particle technology for extreme environments at high temperatures

Plasmanice: Atmospheric plasmas for nanoscale industrial surface processing

Prosuite: Development and application of standardized methodology for the PROspective SUstaInability assessment of Technologies

Venue:

Attention: New venue!

ENEA building (4th floor), Rue de Namur 72, 1000 Brussels

Public transportation: Take the metro Line 1 direction STOCKEL - STOKKEL or Line 5 direction HERMANN-DEBROUX and get off at ARTS-LOI - KUNST-WET (two stops). Take the metro Line 2 direction SIMONIS (LEOPOLD II) or Line 6 direction ROI BAUDOUIN - KONING BOUDEWIJN and get off at PORTE DE NAMUR - NAAMSE POORT (two stops). From there to the Office it's only 50 mt.

Tentative agenda

09.30 – 10:00 Coffee, getting together	
10.00 – 12:45	**Part I**: Principles, Methods and Tools (Chair: A. Jovanovic)
10.00 – 10:15	1. Welcome from the EU DG RTD NMP (A. Stalios) & EuMaT (M. Basista) & MUST (Th. Hack, A. Jovanovic)
10.15 – 10:35	2. EU DG ENV (M. Galatola): EU concepts and activities in the area of impact assessment, in particular LCA (ILCD handbook, ELCD database etc.)
10.35 – 10:55	3. Introduction to LCA (principles, ISO 14044, ...), extension of LCA to Risk Assessment, overview of projects and position of EuMaT (A. Jovanovic)
10.55 – 11:15	4. Technology impact assessment (A. Ciroth, example from Prosuite project and openLCA Initiative)
11.15 – 11:35	5. Possibilities and limits of conventional LCA methods and tools when applied to nanotechnologies (L. Breedveld, example of Plasmanice project)
11.35 – 12:15	6. Precautionary principle in the development of new technologies – (Th. Hack & M. Zheludkevich, example of MUST project) and need to develop new solutions for analyzing respective risks (A. Jovanovic, N. Filipovic, example from project MUST - Use of advanced modeling in impact assessment and risk analysis of nanosystems)
12:15 – 12:45	7. Discussion
Lunch break	
13:45-15:00	**Part II**: Running and future projects (Chair: F. Montemor)
13:45 – 15:00	8. Short presentations of relevant projects and role of LCA/RA in them: • iNTeg-Risk (G. Klein) • MATRANS (M. Basista) • M-RECT (A. Wood) • Nanofate (R. Williams) • NANOFOL (B. Affeltranger) • NanoGEM (M. Voetz) • NanoHex (S. Scalbi) • NanoHouse (C. Som) • Nanopolytox (S. Vazquez-Campos) • Nanosustain (M. Steinfeldt) • NANOVALID (R. Reuther) • NEPHH (M. Blazquez) • Particoat (V. Kolarik)
Coffee break	
15:15-16:00	**Part III**: Sample applications (Chair: A. Ciroth)
15:15 – 15:30	9. Applications: LCA for Advanced materials in car industry (M. W. Henriksson, Volvo (M-RECT))
15:30 – 15:45	10. Applications: HSE risks of Nanomaterials (G. Klein, TÜV (iNTeg-Risk project))
15:45 – 16:00	11. Applications: LCA of FGM and new coating materials (M. Cordella, R-Tech (Particoat and MATRANS))
16:00-17:00	**Part IV**: Conclusions & outlook (Chair: A. Jovanovic)
16:00 – 16:30	12. Conclusions related to applications: • Common issues to all projects, open issues & and possible remedies in the area of LCA (A. Ciroth) • Common issues to all projects, open issues & and possible remedies in the area of risk analysis (G. Klein)
16:30 – 16:45	13. Possibilities of interaction: Current projects, future calls/projects (e.g. joint ENV-RTD calls, self-healing materials, mechanisms and effects of engineered nanomaterial interactions with living systems and/or the environment, ...) and other activities (A. Jovanovic)
16:45 – 17.00	14. Final discussion and closure

Workshop material

Workshop material will be made available (in protected mode) to workshop participants at: http://www.eumat.eu/

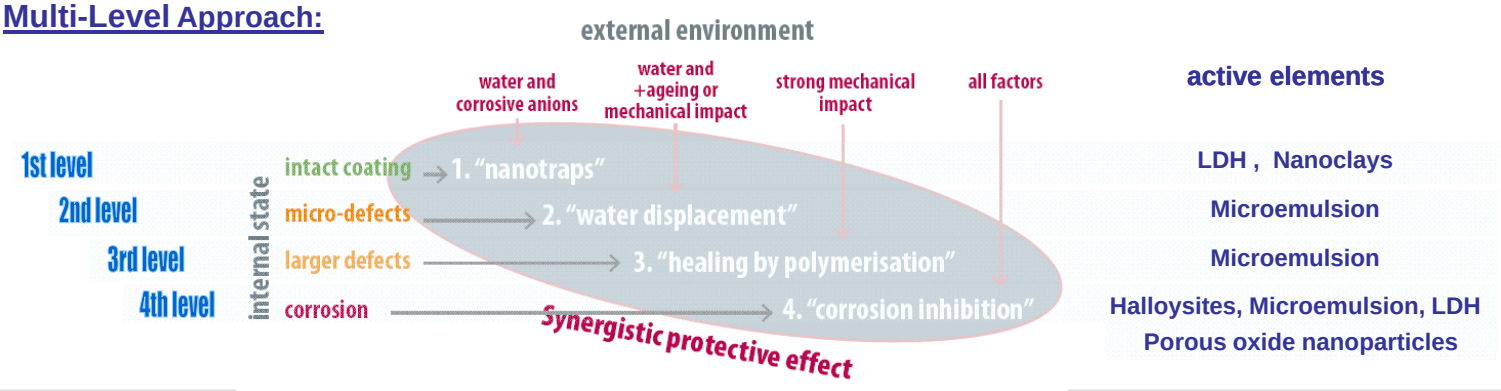
Multi-Level Protection of Materials for Vehicles by "Smart" Nanocontainers

Contract No. NMP3-LA-2008-214261

Objective:

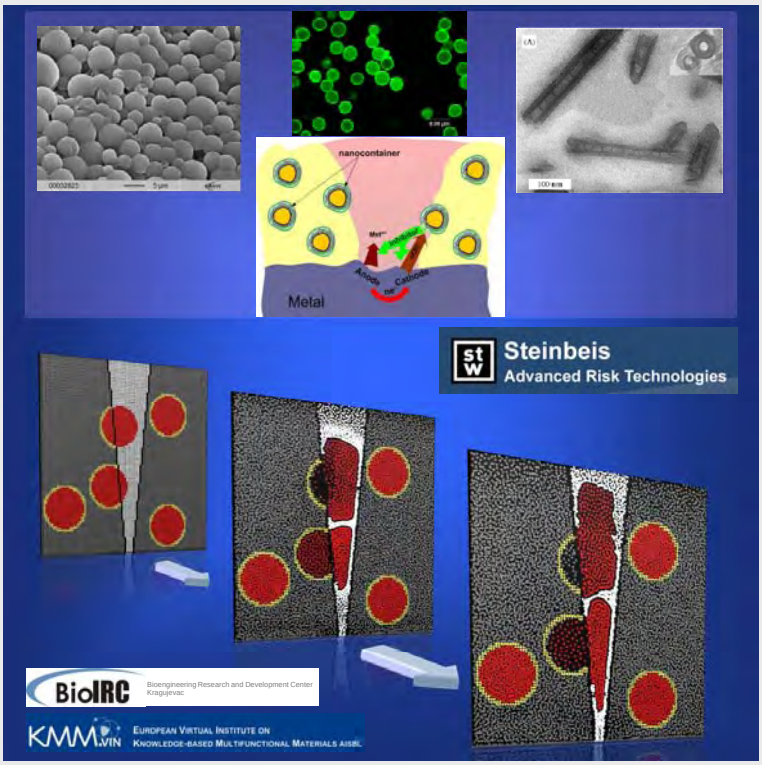
The **main objective** of the project is the design, development, upscaling and application of novel multi-level protection systems like coatings and adhesives for future vehicles and their components to improve radically the long-term performance of metallic and polymeric substrates and structures. The utilisation of current well known polymer matrixes will avoid extended development cycles; provide fast demonstration of emerging products, accelerating the replacement process of hazardous protective compounds currently in use.

Multi-Level Approach:



Nanotechnology application offers a large spectrum of possible improvements in a great number of applications and areas of industry. In the field of corrosion protection this can be the use of nanocontainers as carriers of polymerization agents to provide the self-healing effects in case of external damage. However the use of his technique may lead to various types of risks which broadly belong to two main categories: the risk of non-performance (e.g. the coating not providing the desired self-healing feature) and the risk of adverse or other possible undesirable impacts.

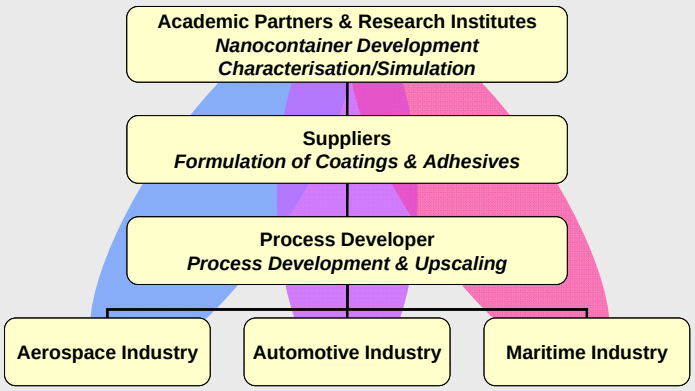
Steinbeis Advanced Risk Technologies considers risks associated to the project MUST. The risk management plan has been prepared in the beginning of the project containing a list of possible risks associated to the completion of MUST objectives, a critical analysis of the risks described and a strategy on how to keep the project on tracks.



The computational algorithm for the simulation of the selfhealing action is based on the Monte-Carlo method. The boundary condi ions for the modelling and simulations are set according to choice of matrix material, healing agent size and release proper ies of nanoreservoirs. The simulation algorithms determine the optimal size range of reservoirs and their spatial distribution in the coa ing.

The alternative innovative models of self-healing process is developed based on the Discrete Particle Deposition (DPD) model in order to allow for 2-level modelling: one for the rough estimation on the large component scales, and one for the local phenomena in the case of localized damage on the coating. The second model is the one based on "intelligent agents", assuming that the additives in the surrounding fluid can act as the intelligent agents leading to the targeted deposition of the repair material on the damaged place.

P r n r :



Acknowledgement:
The project MUST is a col aborative project funded by the European Commission in FP7 (NMP) in the area of Mult functional Materials for Future Vehic es .

Coordinator:
EADS Innovation Works
theo.hack@eads.net

Management of emerging risks in future nanocoating applications

7th Framework Programme
EU Project "MUST"
MULTI-LEVEL PROTECTION OF MATERIALS FOR VEHICLES BY "SMART" NANO-CONTAINERS

1. R-Tech at a glance

Steinbeis Advanced Risk Technologies Group (R-Tech) is the cluster of units belonging to and/or linked to Steinbeis (www.stw.de). Over 700 Steinbeis units present in 50+ countries worldwide act today as a global player in the area of innovation management and technology transfer. The group of Steinbeis units working in the area of "Advanced Risk Technologies" deals with multiple aspects of risks, risk engineering and risk management appearing, for instance, in:

- Petro-chemical and process plants
- Power plants and energy supply
- Material technologies, especially advanced material technologies
- New & alternative technologies (CO2, H2, nano, ...).

In order to provide the optimal service and results, the R-Tech group has dedicated units for specific area of "advanced risk technologies" such as technology transfer, education, R&D, industrial services ("business-oriented"), and other EU-related issues.

main competence of the center is in the area of assessment, analysis and management of business and technical risks. The center has large experience in co-ordination of European and national stakeholders, promotion of the transfer of technology, introduction of new approach to the risk management. Participation in many EU and international collaborative and purely industrial projects, in both as participant and as coordinator/project manager.

2. Background and introduction to "MUST"

The huge economic impact of environment aggressiveness and corrosion of metallic structures is a very important issue for Europe, which lost more than 200 billion of € for investments every year due to corrosion degradation. Transportation is one of the most important industries with high demand for corrosion resistance. On this demand, application of organic coatings is introduced as a cost effective method of improving the corrosion protection and, therefore, the durability of metallic structures.

Since 2008, the EU project "MUST" is established with high European concerns to advance the protection against corrosion and similar defects is the design, development, upscaling and application of novel multi-level protection systems like coatings and adhesives. The strategy is to respond to destructive conditions with self-healing reactions. This ability is expected to be most effective if it is reacting at certain stages of degradation with different healing processes. A significant improvement of the durability of protective coatings is evident if early stage degradation phenomena are recovered and, for example, decrease of the barrier properties of the coating is postponed to longer exposure times.

3. Advanced material protection

The idea in "MUST" is an extended multi-level protection approach combined within one system, where the protective systems not only reacts adequately to external impacts, but also responds to changes in their internal structure and combine in the same system different damage prevention and reparation mechanisms, depending on the nature and the degree of impact from external environment. The multi-level self-healing concept is based on 4 levels of gradual active feedback to the environmental conditions:

- Incorporation of nanotraps and nanocontainers to absorb aggressive/corrosive species
- Use of water displacing compounds to be released from nanocontainers as soon as the first micro-defect appear in the coating polymer matrix.
- Release of polymerizing precursors entrapped in nanocapsules in order to form a new thin polymer film covering the damaged area and repair the layer by preventing crack propagation.
- Encapsulation of organic and inorganic corrosion inhibitors acting on demand, suppressing corrosion and delaminating processes occurring in open defects.

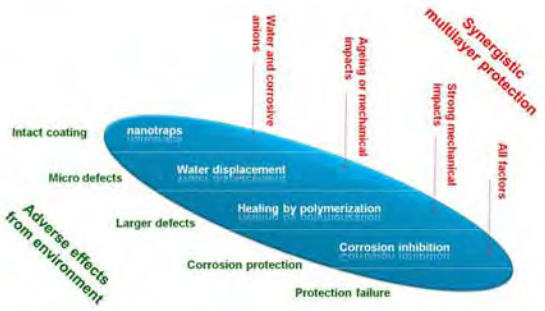


Fig. 1. Gradual feedback of the protective coating to the adverse environmental effects

4. What do we do here?

R-Tech, as one of the main beneficiaries of "MUST", manages the associated risks with the project activities. Main aspects of risks dealt with are:

- Risks in/of innovation (e.g. risks of unexpected side-effects)
- Risk of non- or poor performance (e.g. risks of system or component failures)
- Risk of adverse/unexpected effects and impacts (e.g. public health and environment)
- Project risks, especially in innovation, R&D and new technologies oriented projects.
- Risks over the life-cycle of products/technologies (e.g. unexpected problems in recycling)

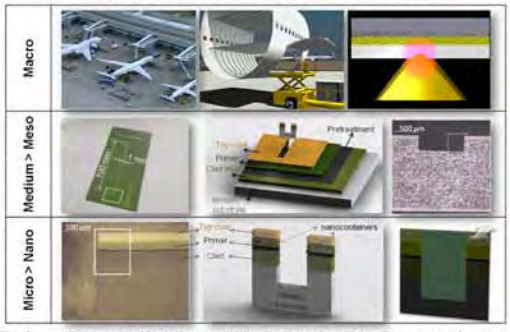


Fig. 2. Multi-scale Modeling and Simulation of self-healing protective coatings

Risk assessment provides an understanding of risks, their causes, consequences and probabilities. Different aspects of risks are assessed by qualitative, semi-quantitative and quantitative methods in order to understand and rank different risks for further analysis and treatment decisions. Furthermore, R-Tech provides dynamic risk treatment techniques by relevant options for reducing the probability of occurrence, or mitigating the effect of risks.

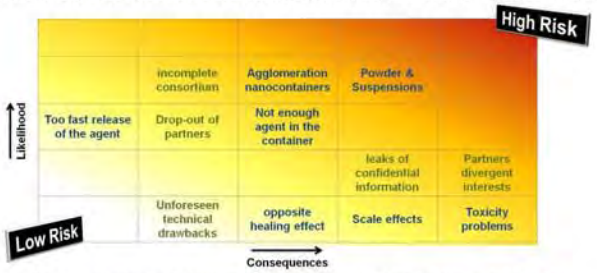
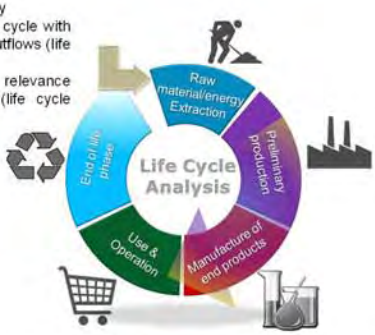


Fig. 3. Multi-scale Modeling and Simulation of self-healing protective coatings

R-Tech offers Life Cycle Assessment (LCA) of new products and technologies. This analysis significantly assists in investigation and evaluation of the environmental impacts of product or service caused by all activities in the project "MUST". R-Tech provides the LCA on innovative products and technologies based on standards ISO 14040 and ISO 14044. This methodology consists of four steps:

1. Defining the goal and scope of study
2. Making a model of the product life cycle with all the environmental inflows and outflows (life cycle inventory, LCI stage)
3. Understanding the environmental relevance of all the inflows and outflows (life cycle impact assessment, LCIA stage)
4. Interpretation of the results



5. "MUST" & future

The main specific target groups for the proposed solution are automotive, aerospace and maritime industries. A high industrial interest is well represented by the participation of main European industrial End-users and suppliers of coatings and adhesives for vehicles. "MUST" will increase considerably the life cycle of materials and therefore boost the competitive strength of the European transport industry. The Multi-level protection approach will also open new opportunities for the application of modern light materials (magnesium and aluminum alloys) in transport industries.

Acknowledgement:
The project MUST is a collaborative project funded by the EU Commission in FP7 (NMP) in the area of "Multifunctional Materials for Future Vehicles".

Coordinator:
EADS Innovation Works

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Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related, Risks
iNTeg-Risk
Grant agreement number: CP-IP 213345-2

iNTeg-Risk Info Sheet (September 2010) (ver 18)

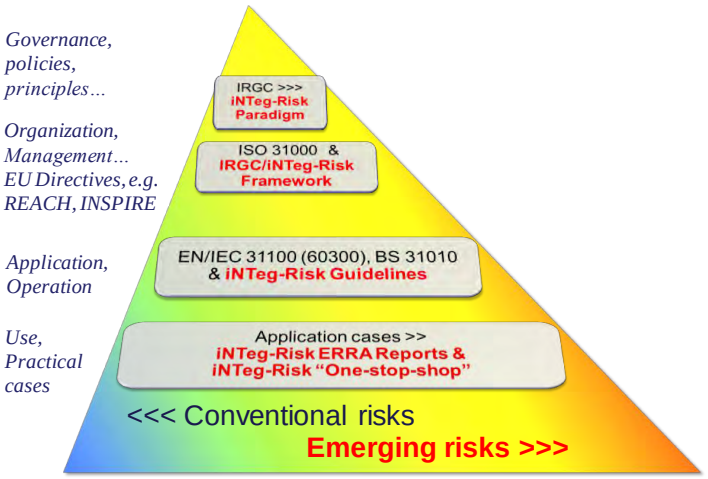
iNTeg-Risk

Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related Risks

FP7/NMP – Nanosciences, Nanotechnologies, Materials and new Production Technologies:
Grant no. CP-IP 213345-2

Coordination: EU-VRi EU-VRi European Virtual Institute for Integrated Risk Management EEIG, A. Jovanovic
Contact: integrisk@eu-vri.eu / www.integrisk.eu-vri.eu
Start/End: Dec. 1, 2008 to May 31, 2013
Budget: ~ 19.3 million €

iNTeg-Risk Paradigm & Framework



Partners

Main Beneficiaries" (59, EU-VRi indicates an EU-VRi member):

1 EU-VRi **EU-VRi** European Virtual Institute for Integrated Risk Management, Germany
2 EU-VRi **EDF** Electricité de France, France
3 **GDF SUEZ** France
4 **Definiens AG** Germany
6 EU-VRi **MERL** Materials Engineering Research Lab. Ltd, UK
7 EU-VRi **TÜV** SÜD Industrie Serv ce GmbH, Germany
9 EU-VRi **R-Tech** Steinbeis Advanced Risk Technologies GmbH, Germany
10 **Iberdrola** S.A., Spain
11 **Atos Origin** Sociedad Anónima Española, Spain
12 **Eni Norge** Eni Group, Norway
13 EU-VRi **D'Appolonia** S.p.A., Italy
14 EU-VRi **MIT** Management Intelligenter Technologien GmbH, Germany
15 EU-VRi **DNV** Det Norske Ver tas AS, Norway
16 **COWI** A/S, Denmark
17 **Pöyry** Forest Industry Oy, Finland
18 **MOL Plc.** MOL Hungarian Oil and Gas Publ c Ltd Company, Hungary
19 **VSH Hagerbach** Test Gallery Ltd, Switzerland
20 EU-VRi **Swiss Re** Swiss Reinsurance Company, Sw tzerland
21 EU-VRi **NIS** Petroleum Industry of Serbia, Serbia
22 **Saipem** Energy Serv ces S.p.A., Italy
23 EU-VRi **Technologica** Group - European Joint Venture cv, Belgium
24 **Eurogas-GERG** The European Association of the Natural gas Industry, Belgium
26 **Enagás** S.A., Spain
27 EU-VRi **INCDPM** Alexandru Darabont, Nat onal Research and Development Institute on Occupational Safety, Romania
28 EU-VRi **SWISSI** Swiss Institute for the Promotion of Safety and Security, Sw tzerland
29 EU-VRi **KMM-VIN** European Virtual Institute on Knowledge-based Multifunct onal Materials AISBL, Belgium
30 EU-VRi **INERIS** Institut National de l'Environnement Industriel et des Risques, France
31 EU-VRi **CEA** Commissariat à l'Energie Atomique, France
32 EU-VRi **BAM** Ba. für Materialforschung und -prüfung, Germany
33 EU-VRi **USTUTT** Univers tät Stuttgart (ZIRN), Germany
34 EU-VRi **LEIA** Fundación Centro de Desarrollo Tecnologico, Spain
37 EU-VRi **TU Crete** Technical Univers ty of Crete, Greece
39 EU-VRi **SINTEF** Stiftelsen, Norway
40 EU-VRi **DTU** Technical Univers ty of Denmark, Denmark
41 EU-VRi **VTT** Technical Research Centre of Finland, Finland
42 EU-VRi **BZF** Bay Zoltan Foundat on for Applied Research, Inst tute for Logistics and Product on Systems, Hungary
43 EU-VRi **Demokritos** National Center for Scientif c Research, Greece
44 EU-VRi **IVF** Swerea IVF AB, Sweden
45 EU-VRi **VSB-TUO** Sc. Technicka Univerz ta Ostrava , Czech Republ c
46 EU-VRi **JSI** Jozef Stefan Inst tute, Slovenia

Basic idea and objectives

iNTeg-Risk is a large-scale integrating project aimed at improving the management of emerging risks, related to "new technologies" in European industry. This will be achieved by building new management paradigm for emerging risks as a set of principles supported by a common language, agreed tools & methods, and Key Performance Indicators, all integrated into a single framework. The project aim is to reduce time-to-market for the lead market EU technologies and promote safety, security, environmental friendliness and social responsibility as a trademark of the EU technologies. The project will improve early recognition and monitoring of emerging risks, seek to reduce accidents caused by them (estimated 75 B€/year EU27) and decrease reaction times if major accidents involving emerging risks happen.

Project structure and main planned achievements

The "EU response" proposed by the project will be based on 17 individual applications of new technologies like nano, H_2 technologies, underground storage of CO_2, new materials (ERRAs - Emerging Risk Representative Applications in EU Industry). The solutions will be generalized and used for the framework, which will be validated in a second application cycle. Overall solutions will be made available to the users in the form of the iNTeg-Risk "one-stop shop" for EU solutions addressing emerging risks. The solution will include issues of early recognition and monitoring of emerging risks, communication, governance, pre-standardization, education & training, dissemination, as well as new tools such as Safetypedia, Atlas of Emerging Risks, Reference Library, etc. The project involves leading EU industries and renowned R&D institutions. It is coordinated by the European Virtual Institute for Integrated Risk Management, the dedicated EEIG guaranteeing the sustainability of results after the project.

The project structure is a bottom-up one starting from the problems identified as representative (iNTeg-Risk ERRAs), over the development of the integrated/common approach and methods, towards the "one-stop-shop" containing solutions for different groups of stakeholders: from interested citizen, over students and concerned SMEs, to the scientists at academia or researchers in industry (each of them finding the information matching their respective interests). The subprojects in iNTeg-Risk, listed below, reflect the approach described above:

Subproject 1: Technology CASES: Identifying specific emerging risks and developing solutions to enter into the unifying framework, concept of ERRAs - Emerging Risk Representative industrial Applications

Subproject 2: CREATING AN INTEGRATED SCIENTIFIC & TECHNOLOGY FRAMEWORK: Emerging Risk Management Framework (ERMF): iNTeg-Risk New Paradigm, Methods & Tools for dealing with emerging Risks

47 **HSE-HSL** Health and Safety Executive, UK
48 **JRC** Commiss on of The European Commun ties Directorate General Joint Research Centre, Belgium
49 **CEN** European Comm ttee for Standardizat on , Belgium
50 **RIVM** Rijksinst tuut voor Volksgezondheid en Milieu, The Netherlands
52 **vfdb** German Fire Protection Association, Germany
53 **ARPC** Agenzia Regionale Protenzione Civile - Emilia Romagna, Italy
55 **ARMINES** Association pour la Recherche et le Développement des Méthodes et Processus Industriels, France
57 **TUKE** Techn cal University of Kosice , Slovakia
58 **FTN** University of Novi Sad, Serbia
59 **EKON** Modeling Software Systems Ltd., Israel
62 **SP** Technical Research Institute of Sweden , Sweden
63 **STUVA** Studiengesellschaft. für unterirdische Verkehrsanlagen e. V., Germany
64 **UNIBO** Alma Mater Stud orum Univers tà di Bologna, Italy
65 **UNIPD** Univers ty of Padua, Italy
66 **POLIMI** Politecn co di Milano, CMIC Dpt, Italy
67 **UNIRM** Dipartimento Ingegneria Chimica Materiali e Ambiente, Sapienza Università di Roma, Italy
68 **CNR-IRC** CNR Istituto di Ricerche sulla Combustione, Italy
69 **UNIPI** Univers ty of Pisa, Italy
70 **IQS**, Institut Químic de Sarrià, Spain

"Article 10 partners" (18):

2B, 2B Consulenza Ambientale, Italy; **SHB**, Steinbeis Hochschule Berlin GmbH, Germany; **EUR**, Erasmus University Rotterdam, Netherlands; **OttoUNI**, Otto-von-Guericke-Univers tät Magdeburg, Germany; **BristolUNI**, University of Bristol, UK; **STC**, Steinbeis Technologie-transfer GmbH & Co. KG, Germany; **ELITE**, European Laboratory for intelligent Techn ques Engineering, Germany; **DIN**, German Inst tute for Standardizat on e. V., Germany; **CrisisTox**, CrisisTox Consult, Netherlands;**IMIM**, Institute of Metallurgy and Materials of Polish Academy of Sciences, Poland; **IPPT**, Instytut Podstawowych Problemow Techniki Polskiej Akademii Nauk, Poland; **IMR SAS**, Institute of materials research, Slovak Academy of Sciences, Slovakia; **MCL**, Materials Centre Leoben Forschung GmbH, Austria; **UK HPA**, UK Health Protection Agency, UK; **FOI**, Swedish Defense Research Agency, Sweden; **FIOH**, Finnish Institute of Occupational Health, Finland; **BfR**, Bundesinst tut für Risikobewertung, Germany; **ENSMP**, Ecole Nat onale Supérieure des Mines de Paris, France

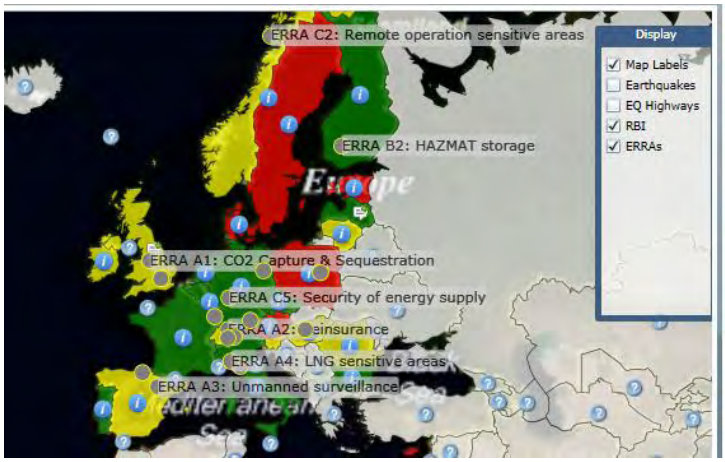
Subproject 3: APPLICATION, VERIFICATION & VALIDATION: European Network of Industrial Systems and Facilities for exploration of Emerging Risks (ENISFER); verifying SP2 results and validating the whole method

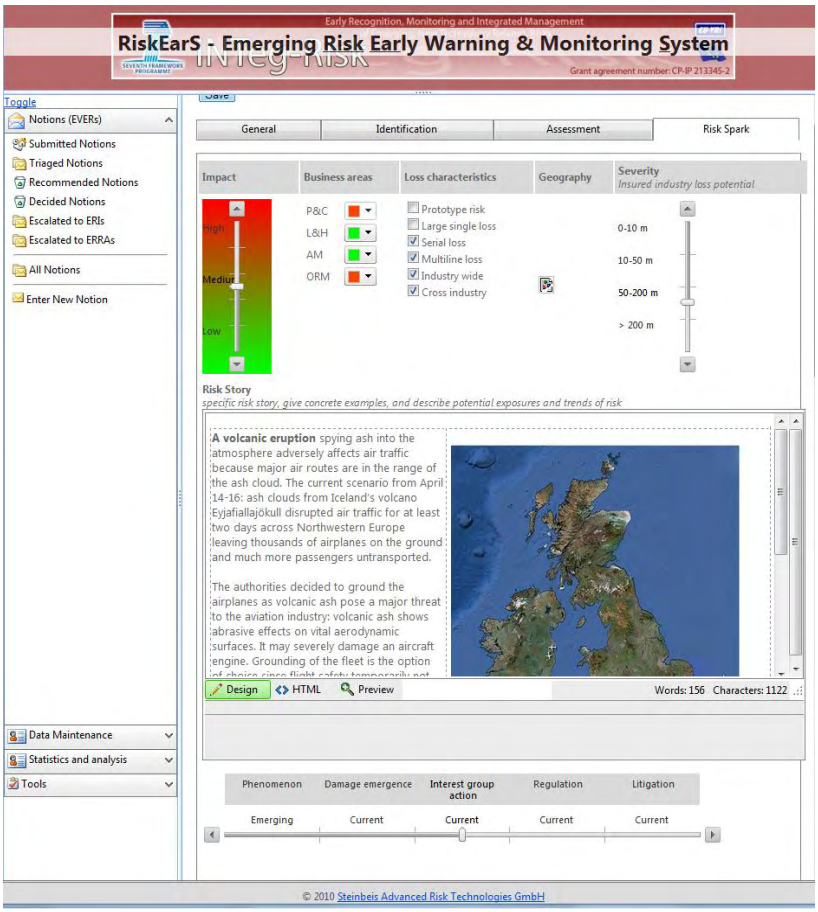
Subproject 4: DISSEMINATION ONE-STOP-SHOP: iNTeg-Risk integrated EU solution, the "iNTeg-Risk one-stop-shop" for solutions addressing emerging risks

Subproject 5: MAKING IT HAPPEN & ASSURING SUSTAINABILITY; MANAGING A LARGE COLLABORATIVE PROJECT – PROJECT MANAGEMENT & MORE: Managing iNTeg-Risk and creating its IT and "post-project" infrastructure

Main achievements so far

Currently the project approaches the end of the 2nd year of work by accomplishing the work on 17 ERRAs and entering the phase of their comparison and search for common features, as well as the integration in the 1-Stop-Shop of SP4 (below: ERRAs in Risk-Atlas).





In SP2 the iNTeg-Risk work has fully integrated the results of some recent and/or still running activities and projects such as standardization work ISO related to integrated risk management (ISO 31000), the IRGC Risk Governance Framework, the risk management systems developed in the financial world, in particular Basel II and Solvency II, the work done in/for World Economic Forum, the EU directive INSPIRE and the EU projects in the area of LCA (Life cycle Assessment).

According to the plan, SP3 is scheduled to start in 2011.

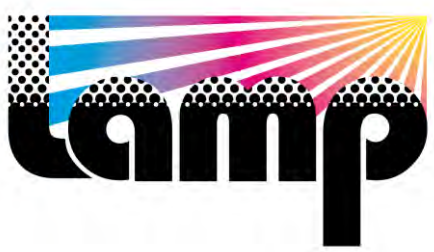
In SP4, the project has shown that already at this stage it can handle interesting issues like for instance

- the volcanic ashes and
- Gulf of Mexico spill

in 2010. The volcanic ashes were dealt with primarily within the RiskEarS module of 1-Stop-Shop (the Emerging Risk Early Warning & Monitoring System – see left figure). The system allows to collect notions of emerging risks (currently almost 600) coming from different sources, usually persons and/or organizations "of confidence", registered as the so-called iNTeg-Risk sentinels, i.e. professionals rated as credible sources of notions about emerging risks. Apart from storing data in the system, RiskEarS allows monitoring of the evolution of risks (e.g. from early notion to a litigation case), e.g. in the form of the so-called RiskSparcs.

LAMP

LASER INDUCED SYNTHESIS OF POLYMERIC NANOCOMPOSITE MATERIALS AND DEVELOPMENT OF **M**ICRO-**P**ATTERNED HYBRID LIGHT EMITTING DIODES (LED) AND TRANSISTORS (LET)



Project reference: *247928*
Instrument: *CP-STREP*

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Web site
http://www.lamp-project.eu

Timeline
Start Date: 01/06/2010
End Date: 31/05/2013

Budget

Project Partners

- *Italian National Agency for New Technologies, Energy and Sustainable Economic Development, IT*
- *University of Wuppertal (Institute for Polymer Technology), DE*
- *Centro Ricerche Fiat, IT*
- *Ekspla UAB, LT*
- *National Research Council, IT*
- *Organic Semiconductor Centre (School of Physics and Astronomy University of St. Andrews), UK*
- *Joanneum Research Forschungsgesellschaft mbH, AT*

Vision & Aim

The overall goal of the LAMP project is to develop a new method for making light-emitting devices, using laser micro-patterning to generate quantum dots (QDs), giving new high performing materials for organic light-emitting transistors (OLET) and diodes (OLEDs).

The LAMP project proposes a new method to apply nanotechnologies in the field of low energy consumption light production. Currently OLEDs are made either by depositing, small organic molecules by evaporation through a shadow mask, or by depositing polymers from solution by processes such as inkjet printing. However, these techniques have several drawbacks, e.g. material wasting (evaporation), expensive apparatus (vacuum chambers for evaporation), use of lithographic processes or masks for patterning (inkjet or evaporation). New methods avoiding or reducing all the aforementioned disadvantages will be of outmost importance for the LED industry.

The LAMP project will demonstrate how OLEDs containing QDs can be produced without the use of any shadow mask or inkjet methodology decreasing the industrial costs and improving the light-emitting efficiency. During the final phase of the project the laser system material processing demonstrator OLED vs OLET prototypes comparison and LCA evaluation will be carried out.

The potential impact of the project in scientific and industrial terms is based on the innovation for the production of QD-LEDs. QDs are already used mixed with polymer, but their selective direct formation on the polymer matrix can enhance the efficiency and lifetime of the device. In addition the use of the laser technology will be a real step ahead for industry because it applies laser technology, which is a well established technological platform in industry.

The LAMP consortium gathers 7 groups belonging to five different countries, and it has been built with the scope to cover not only the expertise needed for the project, namely materials synthesis, materials laser processing teams and device developers, but also to recruit research groups actively working in the field of LED research and manufacturing.

NanoFATE

Nanoparticle Fate Assessment and Toxicity in the Environment

ANNOUNCEMENT

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our work

The NanoFATE project will:

Identify and address analytical and technical problems in undertaking environmental risk assessment for engineered nanoparticles (ENPs).

Address how best to perform realistic assessments of effects of ENPs on organisms in soil, freshwater and marine environments. Our data and research will help develop more realistic exposure protocols.

Identify the ways in which ENPs present a new challenge for current risk assessment systems and what modifications are needed to make these work better.

About NanoFATE

New Project

Nanoparticle Fate Assessment and Toxicity in the Environment

NanoFATE is a collaborative project with 12 partners from 9 European countries working together to investigate the fate and effects of engineered nanoparticles (ENPs) in the environment. This project is supported by the European Commission jointly under the Environment (including climate change) and NMP Themes of the 7th Framework Programme for Research and Technological Development.

The **aim** of NanoFATE is to examine post-production life cycles of key nanoparticles, from their entry into the environmental as 'used products', through the full range of waste treatment processes to their final fates (destinations in the environment or in organisms) and potential toxic effects.

The NanoFATE **newsletter** keeps stakeholders, scientific communities and the interested public up to date with aims and progress of the project.
Furthermore, NanoFATE dissemination events will be announced.

Please visit our new project website: **www.nanofate.eu** where you will find a large store of information and links.

Our first Newsletter, published in Dec. 2010, focuses on the goals of the project and the partners invoved. It can be downloaded from our website. I hope that you will **subscribe** to and enjoy the future issues of the NanoFATE newsletter.

Claus Svendsen
Coordinator
Centre for Ecology & Hydrology (Wallingford,UK)

NANOFOL

diagnosis/therapy nanobiodevice

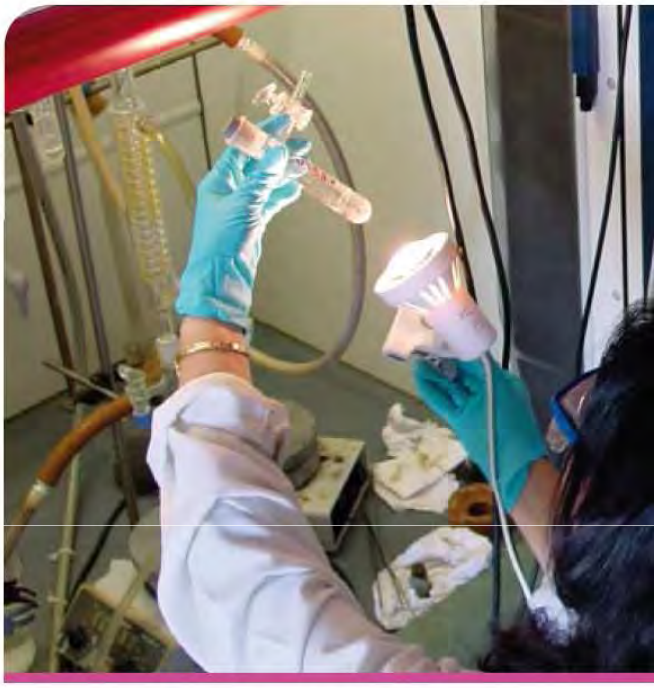
Folate-based nanobiodevices for integrated diagnosis/therapy targeting chronic inflammatory diseases

Context

It is estimated that **inflammatory diseases** affect more than **80 million people** worldwide leading to **untold suffering**, **economic loss** and **premature death**. Considering life expectancy in Europe, these **numbers** are **expected to increase** in the next 20 years. Moreover, studies have shown that disorders such as **rheumatoid arthritis (RA)** can **shorten life span** by 10 years.

The treatment of chronic inflammatory disorders, including RA, remains a challenge for the medical and scientific community. The emergence of new drugs creates new options though it also entails **high costs, complicated drug administration, allergic reactions** and potentially **fatal side effects**.
Therefore more efficient strategies have to be identified in order to **improve inflammatory disease treatment** while **decreasing the side effects** with an **improved cost-benefit ratio**.

Nano-enabled drug delivery systems will take therapy of chronic inflammatory disorders to a new level by creating a new, highly specific and efficient strategy, with reduced treatment costs.



Investigation on new therapeutic agents for chronic inflammatory diseases

NANOFOL concept for nano drug delivery in activated macrophages promoting inflammatory disorders treatment

- **Nano drug delivery systems and design of stable nanobiodevices**
  Nano drug delivery systems are promising tools to specifically deliver drug molecules to the inflammatory site.
- **Selectively targeting activated macrophages in inflammatory diseases through Folate Receptors**
  Recent studies have shown that **the β isoform of the Folate Receptor** is highly expressed by activated macrophages and thus has become an interesting marker for inflammation diagnosis and therapy.
- **Antibody based approaches to ensure high specificity**
  With the aim of increasing therapeutic success without side effects, selective activated macrophage recognizing antibodies will be designed and used.
- **Therapeutic agent for high treatment efficacy**
  The ultimate goal of this project is to deliver specifically drugs (pharmacological compounds) or **siRNA** (small interfering RNA) to activated macrophages, inhibiting signalling pathways that are elicited in the continuous inflammatory process.

A European Large-Scale Project supported through the Seventh Framework Programme for Research and Technological Development

Description and complementarities of the consortium

The consortium formed to fulfil NANOFOL's objectives is composed of 13 partners from 8 European countries.

Small and Medium size Enterprises: Suanfarma SA (ES), Synovo GmbH (DE), Exbio Praha AS (CZ), ALFAMA - Investigação e Desenvolvimento de Produtos Farmacêuticos, Lda (PT).

Research centers or universities: Universidade do Minho (PT), Technische Universitaet Graz (AT), Netherlands Organisation for Applied Scientific Research - TNO (NL), Instituto de Biologia Molecular e Celular - IBMC (PT), Institut National de la Santé et de la Recherche Médicale - INSERM (FR) / Institut Cochin – COCH (FR), Medizinische Universitaet Wien (AT), "Aurel Vlaicu" University of Arad (RO), Institut National de l'Environnement et des RISques - INERIS (FR).

Consulting Company: ALMA Consulting Group SAS (FR).

Acknowledgement

The NANOFOL Project adresses the area "Development of nanotechnology-based systems for diagnosis and/or therapy for diabetes, musculo-skeletal or inflammatory diseases", started on the 1st of December 2009 and will have a total duration of 48 months.

The research led in this project has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° NMP4-LA-2009-228827 NANOFOL.

Contact

NANOFOL
diagnosis/therapy nanobiodevice

www.nanofol.eu

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With the support of: ALMA Consulting Group SAS,
Julie de Chefdebien, +33 1 41 49 13 23, jdechefdebien@almacg.com

NanoHex

Transforming the Future of Heat Management

The world's largest collaborative nanofluids project, NanoHex is funded by an €8.3M Framework Programme Seven grant and involves 12 organisations from Europe and Israel.

NanoHex aims to develop and optimise safe processes for the production of an innovative nanofluid coolant for use in industrial heat management.

"Cooling is an issue facing many industries such as microelectronics, transportation, manufacturing and power generation," Said David Mullen Project Director for NanoHex.

"Nanofluids have shown significantly enhanced thermal properties in comparison to traditional cooling fluids and the project hopes to develop a nanofluid that can be safely manufactured, applied and recycled."

If successful such a nanofluid could help to extend product reliability, reduce energy consumption and enable the development of more sustainable products and processes within industry.

Partners will work together to produce large volumes of operational nanofluids for the industrial markets and develop working demonstrators of the nanofluids' application in both power electronics and data centres.

The three year long project began in September 2009 and is lead by UK based company Thermacore Ltd.

Health, Safety and LCA by ENEA

Responsible for the project's Health, Safety, LCA and Economics, ENEA will establish the life cycle assessment (LCA) for the use of nanofluid coolants in industrial applications, specifically for traction power electronics and data centres. They will also conduct a risk assessment (RA) to characterise any hazard and quantify potential exposure to nanofluids.

ENEA will also investigate the relevant aspects and impacts of the coolants on the environment, and health and safety across their entire life cycle, in order to develop and produce nanofluid using safe standards.

Visit **www.nanohex.eu** for more information

nanopolytox

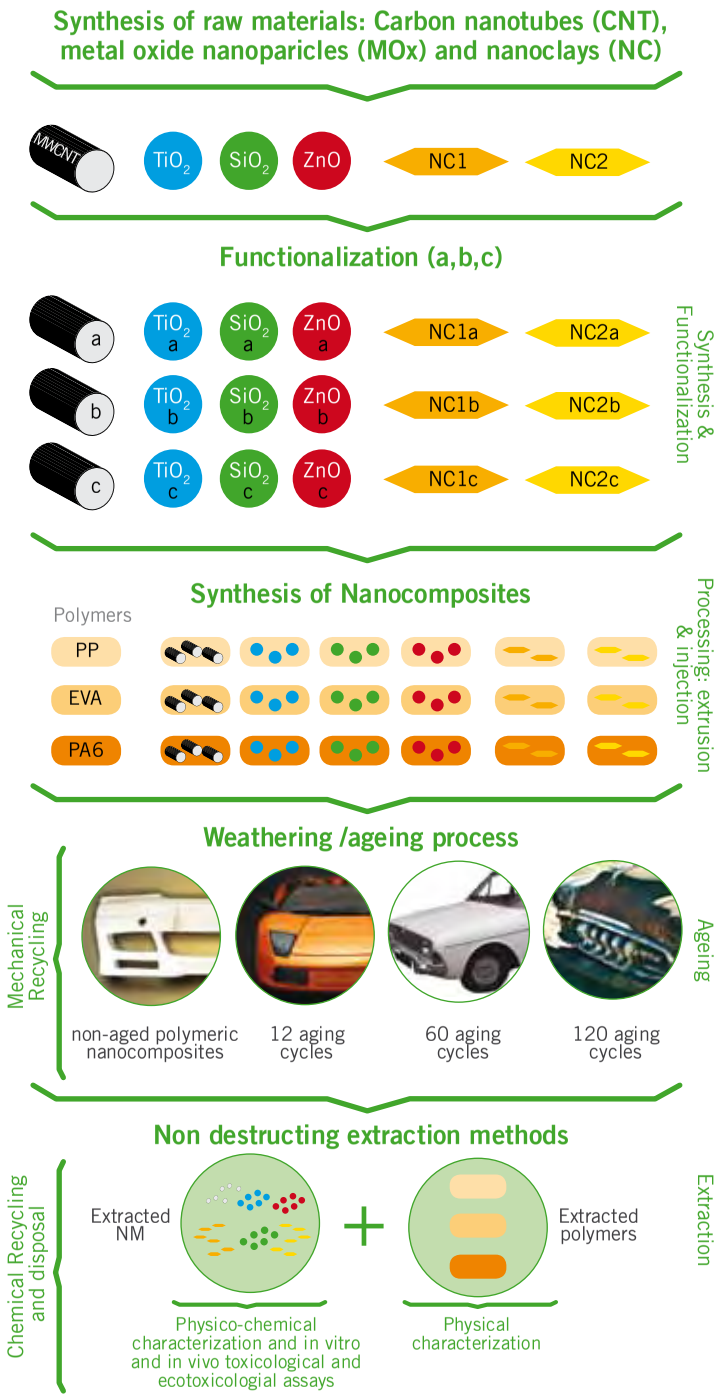
Objectives

The main goal of **NANOPOLYTOX** is to improve the understanding of the potential environmental & health impact of nanotechnology-based products (polymer nanocomposites) during their life cycle: use, re-use, recycling and/or final treatment and disposal of products containing engineered nanomaterials (NM). Carbon nanotubes, nanoclays and metal oxide nanoparticles will be studied as fillers in polymeric matrices (PP, EVA, PA6) that have a wide range of applications in the plastic industry.

The project addresses the following issues:

- **Physical and chemical characterization of NM at different stages of their life cycle**
- **Toxicological characterization (human toxicity and ecotoxicity) of nanomaterials at different stages of their life cycle**
- **Transformation, migration and release of NM when included in polymer nanocomposites**
- **Environmental and biological fate of released nanomaterials**
- **Life Cycle Impact Assessment (LCIA) analysis of NM as fillers in polymer products**
- **Technological solutions for recycling and final treatment of NM included in polymeric matrices**

visit: **www.nanopolytox.eu**

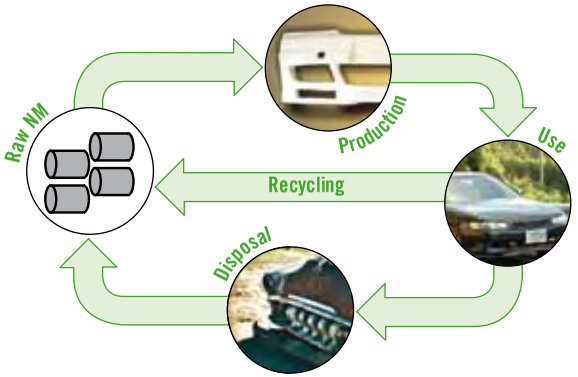


Work plan and methodology

NANOPOLYTOX will initially be focused on the **synthesis of** highly pure and uniform **NM** with potential or actual applications in nanocomposites at industrial levels. The developed NM will be functionalized for their compatibility with polymeric matrices and fully characterized. **Polymer nanocomposites** will be developed by industrial processes (extrusion and injection) and their physical properties will be evaluated. Then, the **nanocomposites** will be submitted to accelerate **aging/weathering** conditions in order to simulate their use. The release and migration of NM from the polymeric matrices will be quantified.

Research on novel **recycling/disposal** systems will be performed. Nanofiber-based filters are proposed as novel membranes for filtration of NM from the dissolved polymer solution. These nanofiber-based filters will constitute the base for immobilization of toxic NM and subsequent disposal or for the recycling of non-toxic NM.

Toxicological data will be collected during the NM life cycle as nanofillers in polymeric nanocomposites to assess their potential **human health and environmental** impact. Predictive models will be developed to provide the necessary information about the evolution of NM properties (physico-chemical and toxicological) along their life cycle. A novel methodology for the **Life Cycle Impact Assessment (LCIA) of NM** will be developed modifying existing methods.



NanoSustain

Developing innovative solutions for the sustainable design, use, recycling and final treatment of nanotechnology based products

The production of nanomaterials is increasing rapidly; however, our knowledge concerning the possible health & environmental effects associated with these materials remains poor.

The objective of the EU FP7 funded NanoSustain project (247939) is to develop innovative solutions for the sustainable design, use, recycling and final treatment of nanotechnology-based products by addressing the following two questions:

- How, and to what degree, will society and the environment will be exposed to nano-materials and associated products; and
- Where do these particles end up?

Expected results will improve our present knowledge on the impact and fate of these particles after entering economic and natural cycles.

The NanoSustain Workplan (2010-2013)

WP1
Project Management and scientific and technical coordination
Leader: Nordmiljo

WP2
Data gathering, generation, evaluation and validation
Leader: Veneto Nanotech

WP3
Hazard characterisation and human health & environmental impact assessment
Leader: NCRWE

WP4
Life Cycle Assessment
Leader: University of Bremen

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

WP6
Dissemination & exploitation of project outcomes
Leader: Institute of Nanotechnology

The NanoSustain Consortium

NanoSustain has mobilised the critical mass of expertise, resources and skills needed to tackle the complex nature of the various project tasks. The consortium includes many leaders in the field of hazard characterisation, exposure analysis, and life cycle assessment from across Europe.

For further information on the project go to www.nanosustain.eu or contact Rudolf Reuther Rudolf.reuther@nordmiljo.se

SEVENTH FRAMEWORK PROGRAMME

NanoSustain

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.

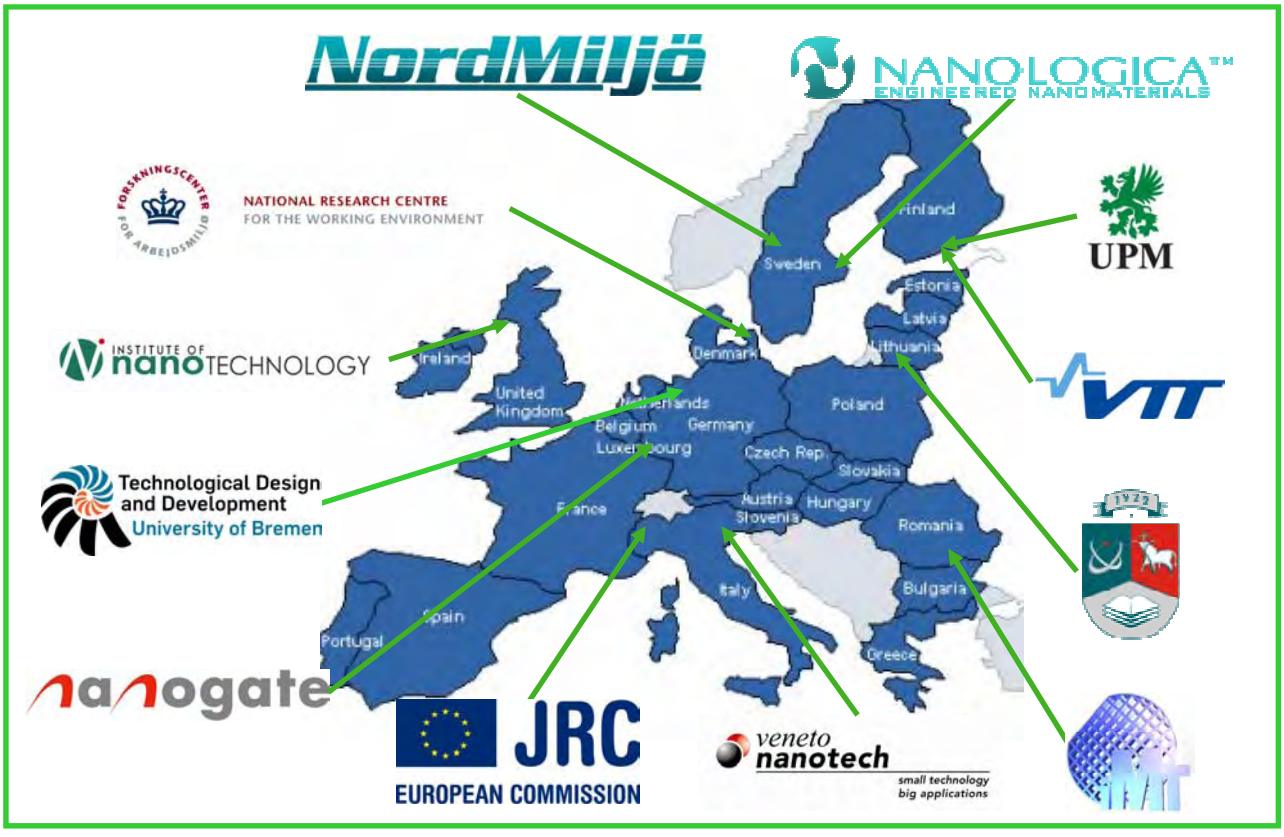
Kaunas University of Technology (KTU) will participate in the physico-chemical characterization and analysis of the selected test nanomaterials and products, and will develop and test an analytical method appropriate to detect and quantify engineered nanoparticles in various environmental matrices.

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.



www.nanosustain.eu

SEVENTH FRAMEWORK PROGRAMME

NanoValid at a Glance

Project acronym: NanoValid

Project title: Development of reference methods for hazard identification, risk assessment and LCA of engineered nanomaterials

Project number: 263147

Instrument: EU FP7 Large-scale integrating collaborative project

Total budget: 13.9 mio. €

EC financial contribution: 9.6 mio. €

Duration: May 2011 – April 2015

Consortium: 33 partners from 19 countries

Coordinator: Rudolf Reuther, NordMiljö AB (NOMI), Sweden, rudolf.reuther@nordmiljo.se

Project Web Site: http://www.nanovalid.eu

Key Words: nanomaterials, toxicology, reference methods, reference materials, exposure assessment, risk management, hazard identification, monitoring, LCA

The growing development, production and use of engineered nanomaterials and associated products will increase exposure of men and ecosystems to these new materials. However, current knowledge is still incomplete and established test methods inappropriate to reliably assess exposure and risk of materials at the nano-scale. As a result, there is an urgent need to further develop these methods to overcome limitations of current hazard and risk assessment schemes and to generate the data needed for regulative requirements and for safeguarding production, application and disposal of nanomaterials along their life cycle.

NanoValid has mobilized the critical mass of international scientific knowledge and technical expertise required to address these questions. Current analytical and toxicity test methods and models will be put to test and subjected to rigorous intercalibration and validation. Where necessary, methods and materials will be modified, adapted and validated, and new reliable reference methods developed, in cooperation with relevant standardization bodies and the concerned industry, to support pre and co-normative activities and to make existing risk and life cycle assessment schemes applicable to ENPs.

The feasibility of validated measurement, characterization and test methods will be assessed by selected case studies to help to improve performance of existing exposure monitoring systems as well as risk reduction and life cycle management strategies.

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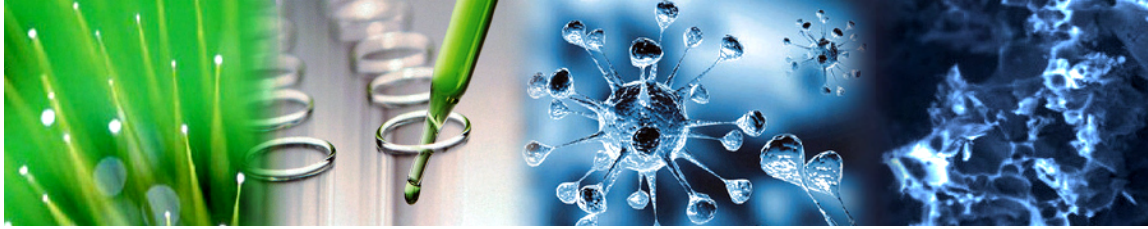


NANOMATERIALS RELATED ENVIRONMENTAL POLLUTION AND HEALTH HAZARDS THROUGHOUT THEIR LIFE CYCLE

Project Acronym: NEPHH

Project Reference: 228536-2

Start Date: 01/09/2009

Duration: 36 Months

Contract Type: Small or medium scale collaborative Project

Project Funding: 2.496.277€

Subject Index: Nanosciences, nanotechnologies, materials & new production technologies

SEVENTH FRAMEWORK PROGRAMME

NEPHH - NANOMATERIALS RELATED ENVIRONMENTAL POLLUTION AND HEALTH HAZARDS THROUGHOUT THEIR LIFE-CYCLE is a medium scale collaborative Project partially funded by the European Commission under Cooperation Theme 4; Nanosciences, Nanotechnologies, Materials & New Production Technologies (NMP), in the specific Area 4.1.3: Health, Safety and Environmental Impacts, under Call Identifier NMP-2008-1.3.2: Impact of Engineered Nanoparticles on Health and the Environment.

Why NEPHH?

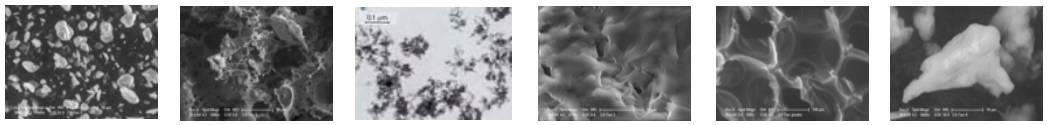
Engineered nanoparticles with unique, size-dependant physicochemical properties, constitute a new basis for a number of technologies. In fact, an increasing number of industrial and commercial consumer applications incorporate engineered nanoparticles which improve the technical and economic performance of those.

However, despite great benefits, initial research has indicated that engineered nanoparticles can have a **negative impact on human health and environment**, being currently available knowhow on the environmental and human health hazards associated with the **manufacture**, **use**, **distribution** and **disposal** of certain manufactured nanomaterials still limited.

For the acceptance of this emerging technology, the perceived safety of nanotechnolgy by the public is fundamental. As activity shifts from research to the development of applications, there exists an urgent need to understanding and managing the associated risks.

Where do we go to?

NEPHH Project aims to **identify** and **rate** important forms of nanotechnology-**related environmental pollution and health hazards** that could result from activities involved throughout the **life cycle** of Silicon-based polymer nanocomposites and to suggest means that might **reduce** or **eliminate** these impacts.



NEPHH has received funding from the European Community's Seventh Research Framework Programme (FP7) under grant agreement number 228536-2. The European Community has no responsibility for the content of this flyer.

How will we get there?

⇒ **Silicon based nanoparticles** including nanosilica, layered silicates, glass nanofibres and foam-glass crystal materials will be used in combination with three engineering matrixes: polyamide-6, polypropylene and polyurethane. 12 different nanocomposites will be produced.

⇒ From these nanocomposites **macro-scale structures** will be fabricated and **physically processed** in order to replicate different stages of product's **Life-Cycle**.

⇒ **Human health** and **environmental impact** of samples obtained will be evaluated under a **holistic** and **integrated** approach.

⇒ Guidelines for the **minimisation of occupational risks** and for the **responsible management of nano-waste** in nanotechnology related facilities will be developed and disseminated.

Main Innovations

NEPHH accounts that nanoparticles can be **surface modified** and are generally **embedded in currently commercialized nanomaterials -nanocomposites-** going well beyond current research as it focuses on human health and environmental implications of **nanotechnology-based materials and products** under a holistic **Life-Cycle perspective**.