NanoFATE
Nanoparticle Fate Assessment and Toxicity in the Environment

NEWSLETTER
SUMMER 2011 /#2

Our work
Our people
Our calendar and status

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our work

In the first year, NanoFATE has:

Identified and prioritised specific properties that need principal consideration during the development, adaptation and validation of environmental fate models for nanoparticles. **Del. 2.1**

Improved standard ecotox exposure protocols, principally adjusting properties of test media, media renewal frequencies and soil and food spiking methodologies, to ensure relevant and homogenous presentation of nanoparticles during toxicity testing. **Del. 3.1**

Identified which environmental factors have the greatest effect on the bioavailability and toxicity of nanoparticles to organisms living in soil and water. **Del 4.1**

About NanoFATE

editorial

by Coordinator Claus SVENDSEN

Learning in Our First Year

Welcome - NanoFATE had its first annual meeting in Genoa in May 2011, with more than a dozen enthusiastic PhD's and Post Docs linked to NanoFATE presenting and discussing their work with our senior scientists. As you can see inside this Newsletter they are an inspiring group of researchers to be working with. I am looking forward to presenting you with highlights from their work, on our website and in coming publications.

One year into the project, there are already lots of great results to pick from. By clicking on the links throughout our Newsletter, you will learn how NanoFATE has started addressing our goal: To examine post-production life cycles of key nanoparticles, from their entry into waste streams or directly into the environment as 'used products'. To this end NanoFATE is working with commercial versions of ZnO, Ag and CeO2 particles in direct collaboration with industry. We have made a strong start in developing the tools and understanding needed to follow the fate of key nanoparticles, through the full range of waste treatment and environmental processes, to their final destinations in the environment and potential uptake and toxic effects in water and soil organisms.

The first Open Workshop and Training Course organised by NanoFATE successfully brought together more than 50 scientists from 13 nations in January 2011 to share knowledge on nanoparticles' characteristics and their fate and toxicity to aquatic and terrestrial organisms.

Our second open forum, organized by NanoFATE along with sister projects ENNSATOX and NanoRETOX, will gather researchers interested in environmental fate and ecotoxicology from across the EU NanoSafety Cluster and other international projects, in an Open Workshop at the Natural History Museum in London (22 Sept. 2011).

We will look forward to interacting with you around these topics. If you enjoy this Newsletter, please subscribe to future issues!

Claus Svendsen
CEH (NERC)

our people

PhDs and Post Doctoral Fellows

Here you'll meet the young people who are doing the work. Follow the links to learn more about their NanoFATE research. NanoFATE has created 14 PhD or Post Doctoral positions at 7 universities.

NanoFATE Research Component 1

Particle Chemistry and Fate

This component is centred on the development and production of engineered nanoparticles and the use of advanced analytical and image analysis techniques for tracking of these particles in different environmental compartments. It includes research within WP1 and WP2.

Component Leader: Alison Crossley, UOXF.DJ.

Julián Gallego from Colombia is investigating the fate of nanoparticles in environmental samples at UGOT.

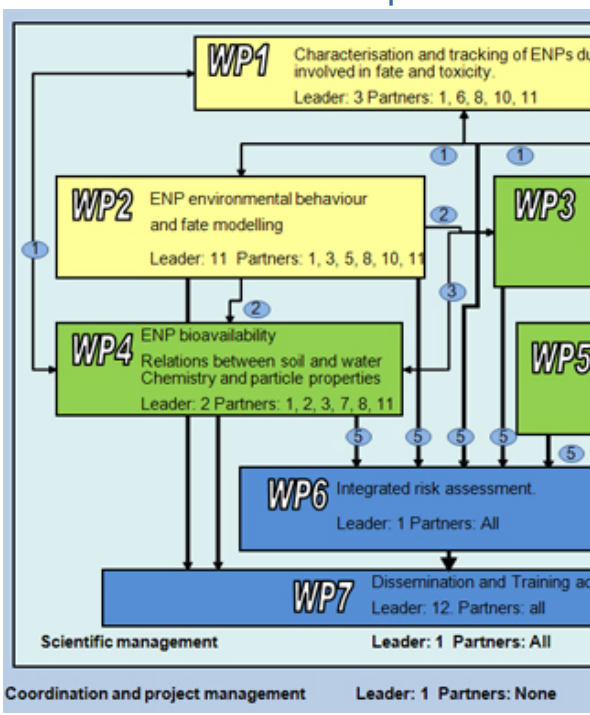
Agnieszka Opalinska from Poland is working on synthesis and characterization of nanoparticles of ZnO doped with Co and Gd at IPPH.

Cameron Taylor from Scotland is working at U. of Oxford on general characterisation of NanoFate samples.

Jacek Wojnarowic from Poland is working at synthesis and surface modification of nanoparticles of ZnO doped with Co and Gd at IHPP.

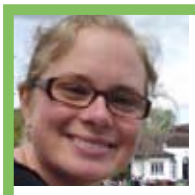
Filipa Calhôa from Portugal assesses potential trophic transfe through subcellular partitioning of ENPs in aquatic and terrestrial organisms at UAVR.

WP Structure and Component Desc

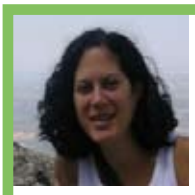


Maja Halling from Sweden is working on effects of engineered nanoparticles on microbial communities at UGOT.

Marianne Matzke from Germany analyses effects of Ag and ZnO nanoparticles on e.g. aquatic microbial communities at UGOT.



Laura Heggelund from Denmark is working on toxicity to earthworms of ZnO nanoparticles in natural soils at NERC (CEH).



Maria Diez Ortiz from Spain studies the toxicity to soil invertebrates and kinetic of ZnO and Ag nanoparticles at NERC (CEH).

NanoFATE Research Component 2

Ecotoxicology and Bioavailability

This component focuses on assessing the ecotoxicity of selected ENPs including toxicokinetic and toxicodynamic aspects. It comprises research within WP3, WP4 and WP5. **Component Leader: Kees van Gestel, VUA**

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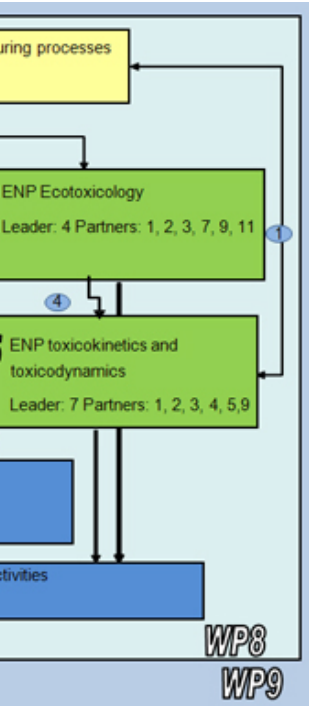
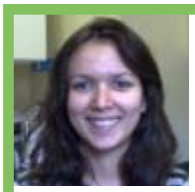
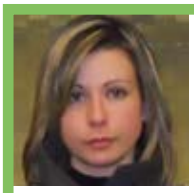




Fabianne Ribeiro from Portugal will perform ecotoxicity testing and bioaccumulation tests with daphnids at UAVR.



Ilenia Saggese from Italy studies ecotoxicology, toxicokinetics and toxicodynamics of ENPs in seawater organisms at UNIPMN.

Pauline Kool from The Netherlands studies ecotoxicity of ZnO and Ag nanoparticles to F. candida at the VU University in Amsterdam.

William Tyne from the UK explores the mechanisms of toxicity at a molecular level using nematodes at NERC (CEH).

Paula Tourinho from Brazil studies effects of Ag and ZnO nanoparticles on woodlice at UAVR.

our people

Supervisors

First Annual NanoFATE Meeting in Genoa, May 2011

Some noted individuals supervise the NanoFATE PhD and Post Doc candidates. We asked a few of these leaders to talk about working with the young scientists. They highlight the multidisciplinary approach fostered by NanoFATE, and the cutting edge research carried out in our partner institutes.

Click on the links to go to the full document of short interviews with our PhD Supervisors.

Component 1 leader Dr. Alison Crossley is a Surface Scientist and a Senior Research Fellow in the Department of Materials at Oxford University, UK. Alison manages Oxford Materials Characterisation Services, a facility based at Oxford University Begbroke Science Park.

I am supervising the post doc work of Dr. Kerstin Jurkschat. Kerstin was already a member of our team having joined us in 2007 as a specialist in TEM (transmission electron microscopy).
I am also supervising the DPhil thesis of Cameron Taylor. Cameron started his DPhil in October 2010 specifically to work on the NanoFATE project. Cameron is my first DPhil student and the first geologist in our multidisciplinary team of chemists, physicists and material scientists so he brings a new perspective to our nanotechnology research.
"NanoFATE is allowing us to determine which characteristic attributes of nanoparticles make them suitable for ecotoxicology studies as well as to study the fundamental science of interactions of nanoparticles in different environments.
"The focus of our work ...

Read more...

Dr. Witold Łojkowski, Professor at Institute of High Pressure Physics, Polish Academy of Sciences, Head of Nanostructures Laboratory, is supervising the work of Jacek Wojnarowicz and Agnieszka Opalinska. They are developing the synthesis technology for doped ZnO nanoparticles and improving the characterization methods.

"We are achieving the synthesis of ZnO doped with gadolinium (a rare element) and with cobalt to be delivered to the NanoFATE consortium members (the colleagues will introduce them in soil and water, and then try to detect the added ions in the tested animals). I expect that the toxicity will depend on the degree of agglomeration.
"Jacek has brought insight into ...


Dr. Susana Loureiro collaborates with Prof. Amadeu Soares at University of Aveiro, Department of Biology & CESAM. She is supervising the PhD work of Fabianne Ribeiro and Paula Tourinho and the post doc work of Filipa Calhôa.

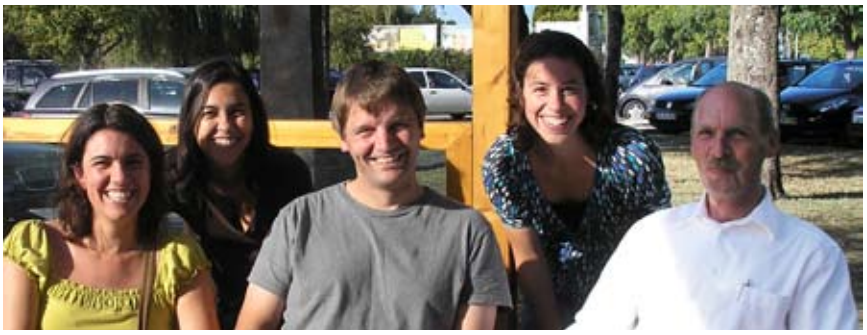
Fabianne and Filipa have been in our research group for some years now but Paula has joined us as part of the NanoFATE team, as she has already worked with nanomaterials.

"NanoFATE is allowing us to develop skills on nanoparticle issues, mainly those related to other research fields than ours. This includes techniques and know-how from chemistry or physics research areas or even microscopy techniques that are not of regular use in our working days as ecotoxicologists. This collaboration with all the NanoFATE partners will make us understand how nanoparticles affect woodlice and/or water fleas, how stressful are those effects and how to take them into account in risk assessment strategies.

"We have been making progress on ...

Read more...

Component 2 leader Dr. Kees van Gestel is Associate Professor of Ecotoxicology at the Dept of Animal Ecology, Faculty of Earth and Life Sciences of VU University in Amsterdam. NanoFATE PhD or Post Doc students who have come under his supervision are Pauline Kool (VU) Paula Tourinho (Aveiro) and Maria Diez Ortiz (CEH/NERC). As well, Kim Klein joined the VU team for a 6-month internship within the framework of her MSc study Ecology



We are working on the toxicity of ZnO and Ag nanoparticles to soil invertebrates. Pauline and Kim are using Collembola as test organisms, while Paula and Susana work with isopods. By focusing on metal-based nanoparticles, we can build on our expertise on metal toxicity and bioavailability in soils."

"It is great fun supervising young scientists, on one hand because it allows me to bring across my experience, on the other hand it is very inspiring to trying to tackle and solve, as a team, problems related with nanoparticles. A recent example concerned a difficulty Kim and Pauline encountered when trying to detect silver in soils; by adjusting the analytical method we managed to solve most of the problem."

Dr. Francesco Dondero, senior scientist, Department of Environmental and Life Sciences, University of Piemonte Orientale, is supervising the PhD thesis of Ilenia Saggese. Within NanoFATE, they are looking at the toxicity and hazard of metallic engineered nanoparticles (ENPs) in marine organisms such as the Mediterranean edible mussel *Mytilus galloprovincialis*.

"I was eager to bring in ENP localization techniques that we needed to address whether or not ENP conform to the ecotoxicology paradigm, i.e. is toxicity linked to internal ENP tissue concentrations? Ilenia will develop this part of the research.

"In the past months we have ...

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our calendar

Click on titles to download summaries of the public deliverables produced as part of NanoFATE.

Summer 2011

OUR STATUS

MILESTONE

First annual progress meeting

PUBLIC DELIVERABLES

Deliverable 2.1 : Issues for consideration during development and refinement of fate models

Deliverable 3.1 : Standard operation procedures for ecotoxicity testing: Collating a set of standard operating procedures detailing best practice (exposure conditions, test media, biological endpoints) for assessing toxic effects of ENPs, each established following a detailed review of published literature, consultation with labs involved in ENP texting (including those taking part in the OECD programme for ENPs) and on the basis of experimental confirmations.

Deliverable 4.1: Factors affecting ENP bioavailability: Collate and review sets of results from published and other accessible ENP toxicity studies detailing available information on particle characterisation, species selection, test conditions, and media properties and patterns of measured endpoint responses.

Milestones
Public Deliverables

Click on our timeline to review past project milestones.

September 2011

meet us here

Join us to link Environmental fate and Ecotoxicology aspects within EU NanoSafety Cluster projects

Key European and US Environmental Nano-ecotoxicology and environmental fate projects, Regulators and the Industry end user community are invited to join NanoFATE members at an exceptional one-day event.

22nd Sept. 2011 - Natural History Museum, London, UK

EU NanoSafety Cluster : Environmental fate and Ecotoxicology

In conjunction with the 6th International Conference on the Environmental Effects of Nanoparticles and Nanomaterials - The Royal Society, London, 19th-21st Sept. 2011, NanoFATE and other EU NanoSafety Cluster projects will get together to discuss the environmental context of our research, our specific methodological needs and ways forward.

Register now!

Please e-mail your registration request and details to us at nanofate@ceh.ac.uk. As seats are limited to 50 persons, some are pre-allocated to projects and the rest will be on first come, first serve basis.

Download the announcement/abbreviated programme here.