

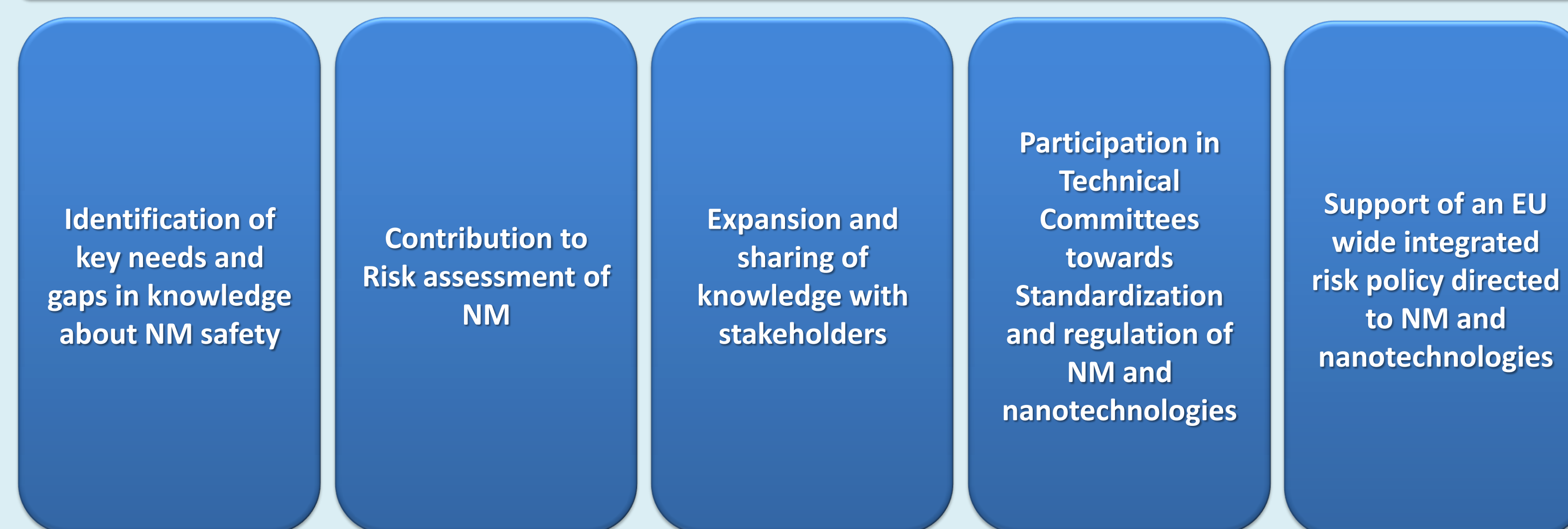
Nanomaterials safety assessment: contribution from the Portuguese National Institute of Health (INSA) research

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The National Health Institute Doutor Ricardo Jorge (INSA) is a public organization of the Portuguese Ministry of Health, which develops a triple role as State Laboratory in the health sector, National Reference Laboratory and National Health Observatory. All operative units composing the departments develop multidisciplinary programs in problem areas of Public Health, namely performing R&D, health monitoring, training, laboratory external quality assessment and general health services.

INSA has been successful in leading and being partner of national and transnational research projects and initiatives in the nanosafety field.

INSA – NANOSAFETY ACTIVITIES



EU Funded Projects



NANOREG – A COMMON EUROPEAN APPROACH TO THE REGULATORY TESTING OF NANOMATERIALS

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NANOREG is an international multi-stakeholder collaborative project that combines the questions and needs of regulatory and legislation authorities with the science community and the industry, thereby prioritizing, transferring the knowledge and delivering the required information to the decision makers.

Main objectives:

- Help filling the gaps in the safety evaluation of NM and develop standards and good practice guidelines in hazard assessment to improve the knowledge-base regulation of NM and nanotechnologies;
- Provide a tool box of relevant instruments for risk assessment, characterisation, toxicity testing and exposure measurements of MNMs;
- Develop, for the long term, new testing strategies adapted to innovation requirements;
- Establish a close collaboration among authorities, industry and science leading to efficient and practically applicable risk management approaches for MNMs and products containing MNMs.



This project has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 310584

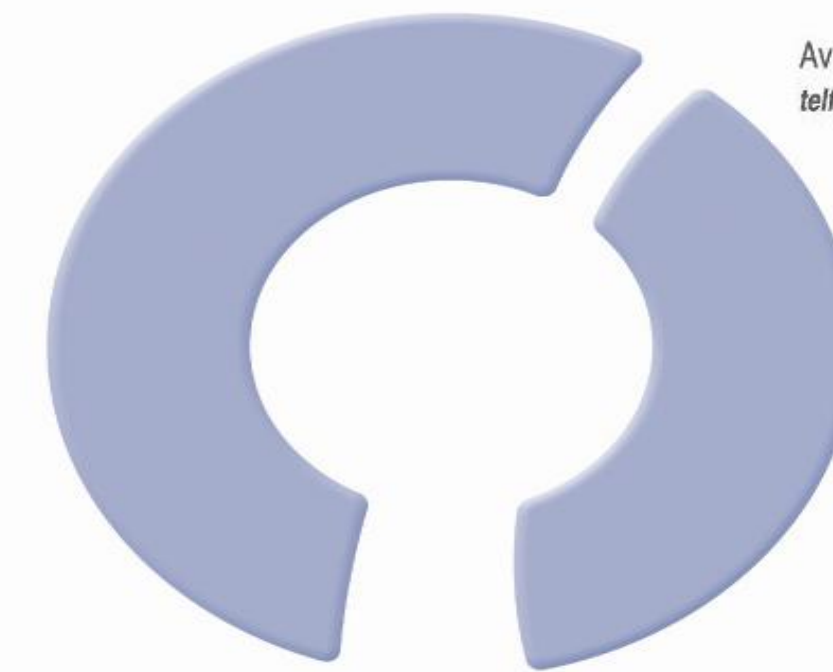


Maria Joao Silva and Nadia Vital benefited from fully funded access to the Health Effects Laboratory of NILU for training and technology transfer of exposure methods and characterisation of nanomaterials genotoxicity. The following projects were developed:

- Air-liquid interface exposure of alveolar cells to airborne nanomaterials: an *in vitro* approach to inhalation nanotoxicity
- An approach to the genotoxicity evaluation of nanomaterials using the combination of the *in vitro* Comet Assay and the *hprt* mutation assay



The SIINN ERA-NET is funded under the ERA-NET scheme of the Seventh Framework Programme of the European Commission, Research Directorate-General, Grant Agreement No. 265799



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A Joint Action launched in March 2010 at the initiative of the French Ministry of Health and coordinated by ANSES, this programme lasted for 3 years. The work allowed 14 manufactured nanomaterials to be tested for genotoxicity from the 3 groups - titanium dioxide, silicon dioxide and carbon nanotubes - chosen based on their wide use in consumers products and potential exposure routes (oral, dermal, and inhalation).

Main objectives:

To promote the establishment of robust methodologies (sensitive and specific) for genotoxicity assessment of NM to be used by the European regulatory control bodies and industries

Outputs:

- The JA demonstrated that the tests used for chemical genotoxicity testing (i.e., OECD TG 487 Guideline for the testing of chemicals *in vitro* mammalian cell micronucleus test) are applicable for nanomaterials but may need some adaptation in order to provide predictive results *in vivo*.
- The JA demonstrated the need to conduct a complete and reliable physico-chemical characterisation both of the bulk and the dispersed material. The JA demonstrated that it is not possible to classify as "monosubstance" the families of MN studied (TiO₂, SAS and MWCNTs) as non negligible differences were observed in the physico-chemical characterisation, in the results of the *in vitro* and *in vivo* genotoxicity as well as in the toxicokinetic behaviour.



Co-funded by the Health Programme of the European Union

NANOTOXCLASS

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NanoToxClass will develop grouping principles for NM based on their physico-chemical properties under consideration of their toxicity and toxicity mechanisms on the basis of a set of selected industrially relevant NM. As far as possible we will use existing data. However, a major pillar of this project will be the targeted generation of new data based on modern system biology based techniques in combination with established toxicological endpoints. We will perform transcriptomics-, metabolomics- and proteomics analysis of *in vitro* and *in vivo* samples. Thus, toxicity mechanisms of the NM will be considered for the establishment of the grouping approaches. In parallel this project will enhance our understanding of *in vitro* and *in vivo* correlation. In addition a few selected NM will be tested as well after thermal aging and release from a nanocomposite. Grouping criteria and principles will be verified and validated with a few additional NM.

In order to achieve these goals NanoToxClass combines expertise from basic science, regulatory agencies and industry and integrates knowledge from German and European experts.

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OTHER ACTIVITIES:



Portuguese multidisciplinary platform representative of different areas of interest in the field of nanotechnology, including science, industry, metrology and regulation towards a responsible and sustainable development of nanotechnology in Portugal and in the EU



Member of the management committee of the Cost Action TD1204 Modelling Nanomaterial Toxicity (MODENA); 2012-2016



INSA is a member of the National Technical Commission on Nanotechnologies