

## The NanoSost project: towards to a sustainable, responsible and safe nanotechnology

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Nanotechnology is in total expansion, and every week hundreds of new nanostructured materials are prepared. Most of them are nonexistent in the nature. It is usually not known which can be the effects of those new materials on the human health or the environment. In the same way, not very often legal regulations or norms exist on the controls that must be applied on technological processes in order to allow the use of nanomaterials in safe form. It is urgent to acquire knowledge in the indicated areas.

The great hopes put by the scientific community and the industry in the use of nanotechnology are beginning to take shape in new materials of innovating and, in many cases, surprising characteristics. It is enough with watching the public funds devoted to R&D in the nanotechnology field which are investing the different EU states and the European Commission to understand the relevance that they hope that nanotechnologic products will acquire. Spain is not an exception, having created diverse options of financing of projects in the area of the nanotechnology defined in its national plan of investigation. Nanotechnology is no more a scientific promise to become a mercantile reality. In 2007 the market of nanotechnologic products was of 135,000 million of dollars (*Lux Research*). The same source estimates a 2014-15 market above the trillion ( $10^{12}$ ) of dollars, and that the nanotechnologic products will represent the 15% of the manufacturing industry with sales up to 10 times greater than biotechnological products. The *nano* number of products grows to a vertiginous rate. If in November of 2006 about 300 products *nano* were available in the market (Maynard, *Nature*, 444, 2006), that number practically duplicated only 8 months later (*estimation of the Woodrow Wilson International Center*).

It is necessary to create the knowledge bases for the development of new technologies that allow that expected sustainable development of nanotechnology, guarantying new clean and safe productive processes, preserving the occupational health and safety and the health of consumers and environment. This constitutes an unavoidable requirement to assure that the immense effort in R&D that is being carried out not sees frustrated by unknown emergent or little valued risks.

The **NanoSost** project persecutes as general objective creating the knowledge and establishing the scientific bases necessary to guarantee as possible the safe use of nanoparticles (metallic, ceramics, polymeric, etc.) and nanostructured materials in general, and its behaviour both in isolated form or as ingredients in the production of end goods. The whole life cycle of the material from its production until its elimination is taken into account with the purpose of favouring a sustainable industrial development corresponding to the social expectations and providing guarantees to the health and safety of workers and consumers.

**NanoSost** is organized in seven subprojects oriented to the next objectives:

1. (*Standards*) Preparing, selecting and characterising references and standards of different engineered nanoparticles, measuring them under conditions which mimic those of the industrial processes.
2. (*Chemical Risk*) Adapting the existing or developing new measurement techniques for the determination of the chemical safety of nanomaterials and the materials including them.
3. (*Biological Risk*) Using techniques, fundamentally *in vitro*, for the test of effects of nanoparticles on people and the environment.
4. (*Environmental Measurement*) Preparing methods for the evaluation of the risk, including suitable technologies of simulation for the design of systems of prevention and protection for the manipulation of nanoparticles and establishing their dispersion in the working place and the environment. With preference, the work will be oriented to measurement techniques that can be applied in movable equipment.
5. (*Risk Control*) Development of advanced techniques of measurement allowing the design of systems of protection, both collective and individual.
6. (*Barrier Materials*) Preparing new barrier materials and evaluating the effectiveness of existing materials to guarantee the prevention and protection against hazards produced by nanomaterials in all the stages of their processing.
7. (*Risk management*) To establish what types of tests and which are the techniques of measurement more adapted to audit and certificate the safety of manipulation, use and elimination of nanomaterials and of compounds containing them.

The **NanoSost** consortium is formed by 21 Spanish organisations drawn from universities, technological centres, and industrial companies.

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**Figures:**

