



Hardware

The Cell Biology Research Unit (URBC) has the facilities for most of the methods related to cell biology, biochemistry and molecular biology.

The equipment devoted to cell biology and biochemistry includes cell culture facilities, a confocal microscope, 1D-gel and 2D-gel platforms, two mass spectrometers, a radioactivity laboratory and several types of spectrophotometers, spectrofluorimeters and luminometers.

Molecular biology methods available in the laboratory include PCR, real time PCR, gene transfection, plasmid amplification, and gene expression analysis by DNA microarrays.

In the field of medicinal chemistry and pharmacology the following equipment and facilities are available at the Drug Design and Discovery Center : Classical and parallel organic, synthesis equipment, Preparative LC/MS equipment, LC/MS, LC/UV analyzer, GC/FID analyzer, ¹H-NMR (400 MHz), ¹³C-NMR (400 MHz), Elemental analyzer (C, H, N, S), UV-spectrophotometer, IR-spectrophotometer, X-ray diffractometer (powder + monocrystals), FPLC, Differential calorimetry analysis, X-ray diffractometer, Full automated titrator, Melting point apparatus, Animal housing, Organ bath for contractions measurement, Cages equipped with particle suspension generator.

Characterisation pole has several equipments for spectroscopic analysis and nanomaterial synthesis. One can cite a linear accelerator for nuclear reactions based spectroscopy (measure of nanomaterial traces in organs, pellets, ...), an ion implanter and several PVD machines for the synthesis of nanomaterials by vacuum based techniques, surface profilometry, FEG-SEM with EDX equipped with nanoparticles detection and analysis software (1 nm resolution) , SolidWorks mechanical design solutions (2D, 3D) to design animals related hardware, computational fluid dynamics programs to design suspension of nanoparticles in closed systems, ...

CES main equipments : 5 potentiostats for analysis, modifications and electrochemical depositions, 1 electrochemical impedance spectroscopy (EIS), 1 scanning vibrating electrode/scanning. Kelvin probe (SKP & SVET), 1 scanning electrochemical microscope (SECM), 1 FT-IRRAS with modulation of polarization coupled to an IR microscope, 1 contact angle measurement, 1 ball-mill and CNTs functionalisation, 1 oven for synthesis et modification of CNTs, 1 lyophilisation instrument.



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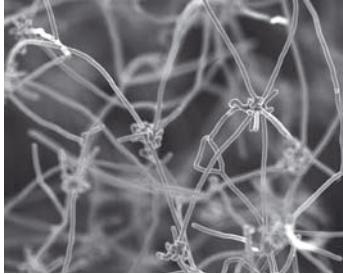


Toxicological risk assessment of manufactured nanoparticles on human health





Are nanotechnology products potentially unsafe ?



The toxicological study concern three types of nanoparticles including the carbon nanotubes

Nanosciences and nanotechnologies are highly promising areas for research and industrial innovation.

Due to their remarkable properties, nanomaterials (at least one dimension <100nm) are bearing many hopes, notably in materials engineering, in environmental sector and in medicine.

The risk assessment of engineered nanomaterials has become the focus of increasing attention.

To develop safe and sustainable nanotechnologies in Belgium, the Directorate General for Technology, Research and Energy of the Walloon Region trusted The University of Namur to develop in vitro tests for nanoparticle toxicity assessment.



The project

The Nanotoxico project involves several research teams including physicists, chemists, biologists and pharmacists.

Each team will fulfil a specific mission in order to obtain an integrated view of nanomaterials physico-chemical properties and interaction with biological systems.

Particularly, the biologists develop new in vitro engineered human tissues, while the pharmacists perform in vivo studies to confirm the results obtained from these in vitro models and therefore assess their scientific relevance.

The chemists and physicists contribute to the characterization of each type of nanoparticles. The physical and chemical properties of nanomaterials depend on their size, shape, surface properties, structure and chemical composition.

New relevant tissue models of reconstituted skin, respiratory epithelium and intestinal epithelium will be developed and validated to assess the toxicity related to nanoparticles using histology, cytotoxicity and genotoxicity tests.

Acute and subchronic toxicity studies will be investigated on animal models using different exposure pathways such as the skin, the respiratory and the intestinal

tracts. Histopathological examinations of several target organs and serum biochemical parameters will be performed to define potential hazard related to nanoparticles.

The project depends on cooperation and dialogue, not only across disciplines but also between the scientific community and the public it serves. That is exactly the scope of "Atout Sciences", the science communication unit of the University of Namur.

Conclusion

This project will identify potential implications of manufactured nanomaterials on human health and will develop in vitro technologies for nanotoxicity evaluation.

It will also help regulatory authorities to dress a risk assessment methodology applicable to engineered nanomaterials for their safe production and applications.

Acknowledgment

Nanotoxico (convention RW/FUNDP n° 516252) is supported by the Walloon Region of Belgium and the University of Namur. The project has started on January, 1st 2006 and will last five years.

www.nanotoxico.be

