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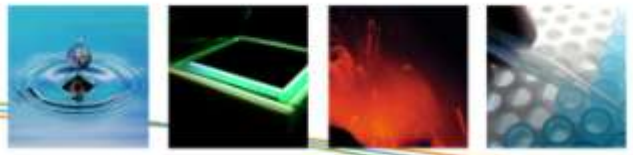
vision on technology



11/06/2010

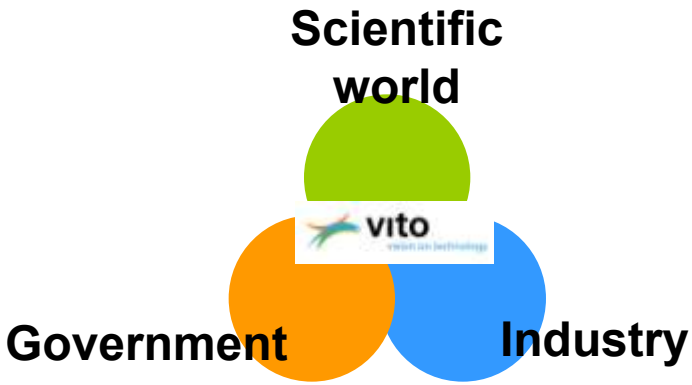
Project Idea Presentation

VITO – Flemish Institute for Technological Research

Mol, Belgium

Introduction to VITO

- Established in 1991
- Split off from the Belgian nuclear research centre
- Autonomous public research organisation
- 600 people (10 nationalities) with an overall budget over 80 MEUR
- Support sustainable technological development
- Bridge between scientific knowledge, industrial applications and governmental policy



VITO- Business units

Environmental Modelling

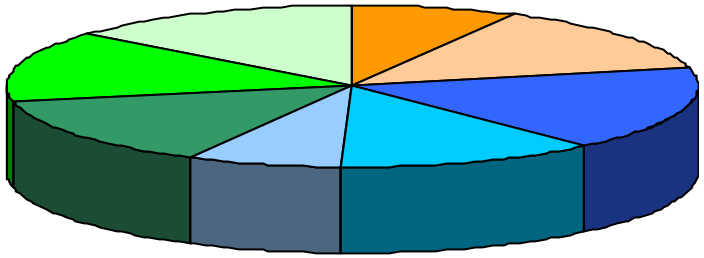
Energy Technology

Environmental Risk and Health

Quality of the Environment

Transition Energy and the Environment

Energy



Earth Observation

Industrial Innovation

Separation and Conversion Technology

Environmental Analysis and Technology

Materials technology

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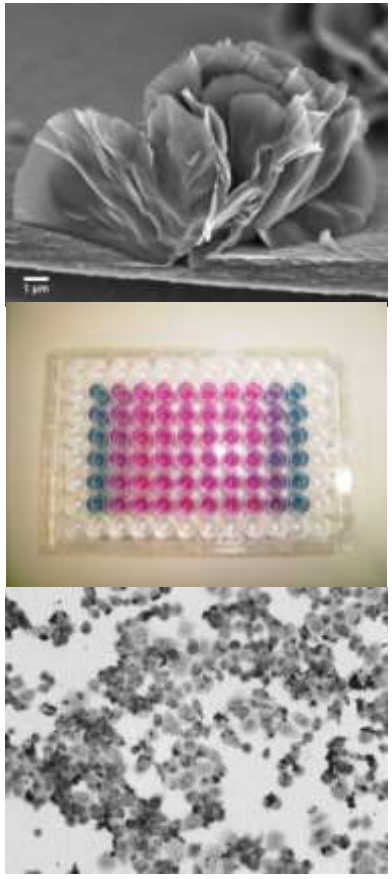
Relevant expertise for new NMP call



Development of nanostructured materials and surfaces

Environment, Health & Safety

Characterisation of materials at the nano-scale

VITO expertise on Nanomaterials

» Low cost, dry atmospheric plasma technology for sustainable and economic surface processing

NMP2011.1.1-1	**Smart and multifunctional packaging concepts utilizing nanotechnology**
NMP.2011.1.4-1	**Large-scale green and economical synthesis of nanoparticles and nanostructures**
FoF.NMP.2011-6	**Manufacturing chains for nano-phased components and coatings**

» Different wet and dry processing techniques for dense or porous ceramic and metallic materials (+ extra coating techniques)

NMP.2011.2.1-1	**Research and innovation for advanced multifunctional ceramic materials**
NMP.2011.2.2-3	**Materials for solid state lighting**
NMP.2011.3.2-1	**Modelling and control of intensified process systems**
FoF.NMP.2011-1	**The Eco-Factory: cleaner and more resource-efficient production in manufacturing**

VITO expertise on Nano-scale characterisation

- Physico-chemical and mechanical analysis at the nano-scale
  - XPS, FEG-SEM, AFM, tensiometer, FTIR…
  - Nanoindentation, Nanoscratch testing

- New research fields in nano chemical characterisation
  - *inorganic : (Field Flow Fractionation) coupled to ICP-MS*
  - *organic : Direct analysis in real time exact mass spectrometry*

VITO expertise on Nano Safety for Health

- Hazard assessment of nanoparticles:
  - Alternative non-animal tests (development, validation & implementation)
  - Health endpoints : immuno- & genotoxicity, endocrine disruption, neurodevelopmental toxicity
  - Relevant cell model(s) and exposure system(s), particularly for air-borne nanomaterials
  - Innovative tools: toxicogenomics (gene expression) studies (e.g. applied in EU-FP6 DIPNA) for contribution in NMP.2011.1.2-2 and NMP.2011.1.4-4.
  - GLP lab, regulatory tests (OECD): www.cardam.eu
- Human & environmental biomonitoring
  - Effect-based monitoring of air, water, soil, waste, food
  - Biomarkers of exposure and early biological effects in man
  - Involved in Flemish & European cohort studies (e.g. EU-FP7 Cophes)
- Exposure measurements:
  - Nano aerosol exposure measurements (number concentration, size distribution, surface area, charge);
  - Sampling airborne nanoparticles for physico-chemical characterization (microscopic and chemical analysis) and toxicological testing;
  - Assessment of spatial and temporal variation of number concentration and size distribution in occupational settings;
  - Characterization of airborne nanoparticle emission near different sources.

Project idea 1
Dry functionalisation of (nano)particles

- **Fields:**
  - Cross-cutting and enabling R&D (**Topic 1.4-1** on Nanoparticles)
  - Innovative Materials for advanced applications
  - New Production Technologies

- **Objectives:**
  - Development of technology for plasma treatment of nano(powders)
  - Surface functionalisation of (nano)powders to control the interaction between the particles and their environment (to improve adhesion with matrix, stabilisation of dispersions, reduce agglomeration etc.)
  - Increase added-value and applicability of (nano)powders by engineering the surface

Project idea 1
Dry functionalisation of (nano)particles

- **Competences offered:**
  - Process know-how and facilities for atmospheric plasma processing
    - Dry technology vs wet chemical techniques
    - Cold plasma surface engineering technique → enabling treatment of temperature sensitive particles (polymers)
    - Atmospheric process → can be integrated in continuous production processes
- **Looking for:**
  - Industrial and R&D partners interested in added-value (nano)powders
  - Partners active in nanoparticle synthesis
- **Contact:** Annick.Vanhulsel@vito.be
+32 14 33 56 19

Project idea 2

Low cost biofunctionalization of surfaces / Immobilization of biomolecules

- **Fields:** Nanotechnology for benefiting environment-energy-health, Materials and Micro-Nanotech, New Production Technologies

- **Objectives**
  - Development of biofunctional surfaces for any kind of applications.
  - Inducing biological recognition sites for sensing or capturing specific or complex compounds
  - Inducing biocatalytic sites at surfaces

Project idea 2

Low cost biofunctionalization of surfaces / Immobilization of biomolecules

- **Competences – Expertise offered :**
  - Low cost, dry atmospheric plasma process for
    - generating biological recognition sites at surfaces
    - generating bioactive surfaces for biocatalytic conversions,
  - applicable on any kind of surface,
  - for applications related to
    - biosensing
    - biofunctionalisation
    - ....
- Contact: Sabine.Paulussen@vito.be
  +32 14 33 57 38

Project idea 3

NMP.2011.1.3-1	New methods for measuring, detection and identification of nanoparticles in products and/or in the environment
Field	Safety of Nanotechnology
Objective	Development of innovative, cost-effective techniques and equipment for the identification, detection and measurement of engineered nanomaterials
General idea	Development of **systems/methods for detection and identification** of ENPs in complex matrices, based on ENP-induced **fingerprints for biological endpoints**.
Main expected results	• Innovative methods for ENP identification and detection • Dataset containing established relationships between biological effects and nanomaterial structure

Project idea 3

NMP.2011.1.3-1	New methods for measuring, detection and identification of nanoparticles in products and/or in the environment
VITO's expertise	Test battery for safety assessment, including –omics technology and *in vitro* toxicity screening tests, to allow ENP classification Involvement in EU-FP7 QNano
Looking for	SMEs with R&D capacities for: ▪ Development of hypersensitive **detection/identification systems**, e.g. biosensors ▪ **(ultra)structural methods** (e.g. EM) for characterization of ENPs in complex matrices
Contact	Dr. Inge Nelissen inge.nelissen@vito.be +32 14 33 52 11 

Project idea 4

NMP.2011.1.3-2	Worker protection and exposure risk management strategies for nanomaterial production, use and disposal
Field	Safety of Nanotechnology
Objective	Development of strategies for mitigation of the risk of workers dealing with nanomaterials (production, use and disposal)
General idea	Assessment of current workers exposure, development of new methods and strategies for exposure reduction, implementing these methods and determination of the effectiveness
Main expected results	• Dataset (exposure and epidemiological effects) • Evaluation of effectiveness of currently used risk management strategies • Method for reducing worker exposure by manipulating nanopowders and by development of nanoparticle air cleaning technique; •Effectiveness of risk reduction using new methods and strategies

Project idea 4

NMP.2011.1.3-2	Worker protection and exposure risk management strategies for nanomaterial production, use and disposal
VITO's expertise	• Test chamber for aerosolization of (manipulated) nanoparticles/agglomerates • Exposure measurements at SME's / Industries • Evaluation of risk management strategies • Human biomonitoring of exposed workers
Looking for	• SME's producing/handling nanopowders (small scale) • Industries producing/handling nanopowders (large scale) • Materials technology institute(s) for - Manipulation/treatment of nanopowders (e.g. stable aggregate formation) - Characterization - Exploiting functionalities of nanomaterials (magnetic, optical, electrical, electrochemical, physical) for NP air cleaning device
Contact	Evelien Frijns evelien.frijns@vito.be +32 14 33 53 67