

# Potential contribution of the JRC Nanobiotechnology Laboratory to NFFA project

Pascal Colpo  
NFFA Nanosafety Workshop  
Lund 9-10/01/2020



# The Joint Research Centre – a Directorate General in the European Commission

Ursula  
von der Leyen

EC - President

Mariya  
Gabriel

Innovation,  
Research,  
Culture, Education  
and Youth

Charlina  
Vitcheva

Director-General  
Joint Research Centre  
(Acting)

Strategy  
& Coordination

Knowledge  
Production

Knowledge  
Management

Support

# JRC's Mission

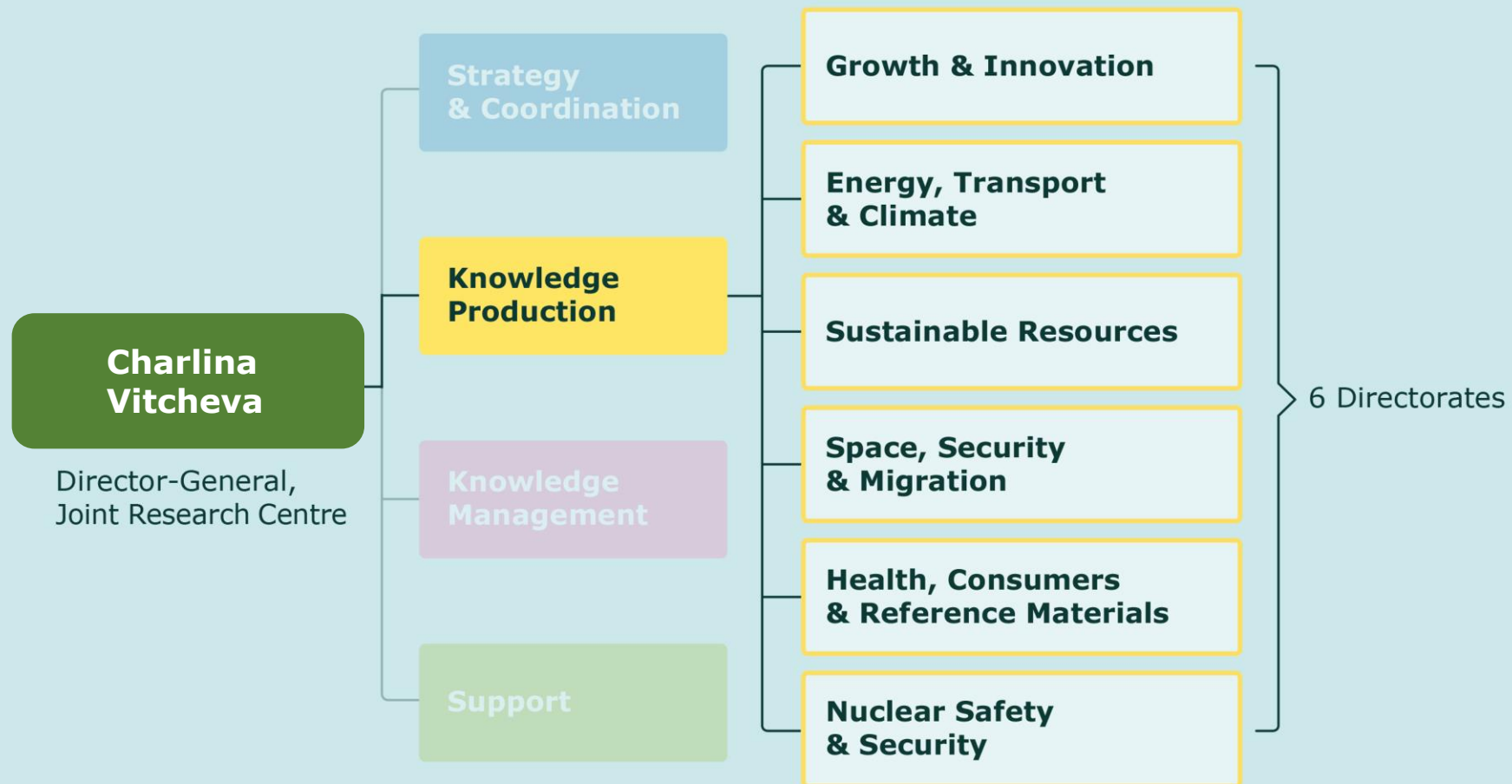
***“ As the science and knowledge service  
of the Commission our mission is to support  
EU policies with independent evidence  
throughout the whole policy cycle ”***



# JRC Role: facts & figures



- 6 locations in 5 Member States: Italy, Belgium, Germany, The Netherlands, Spain
- Policy neutral: has no policy agenda of its own
- 42 large scale research facilities, more than 110 online databases
- 1500 core research staff, 3000 total staff
- 83% of core research staff having a PhD
- Over 1,400 scientific publications per year



# Directorate Health, Health, Consumers & Reference Materials



*Acting Director: G. Van den Eede*

~ 300 Staff Members

~ 50 % female

Located in Geel, Belgium & Ispra, Italy

F.1  
Health in  
Society



*C. Nicholl*  
Ispra Site

F.2  
Consumer  
Products  
Safety



*A. Hoeveler*  
Ispra Site

F.3  
Chemical Safety  
and Alternative  
Methods



*M. Whelan*  
Ispra Site

F.4  
Food Fraud  
Detection



*F. Ulberth*  
Geel Site / Ispra Site

F.5  
Food and Feed  
Compliance



*H. Emons*  
Geel Site / Ispra Site

F.6  
Reference  
Materials



*D. Florian*  
Geel Site

F.7  
Knowledge  
for Health  
and Consumers



*G. Van den Eede*  
Geel Site / Ispra Site



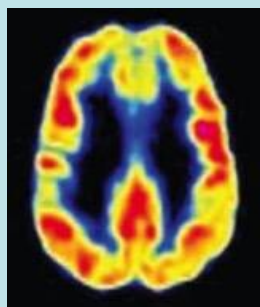


# OUR ACTIVITIES

## Health Technology

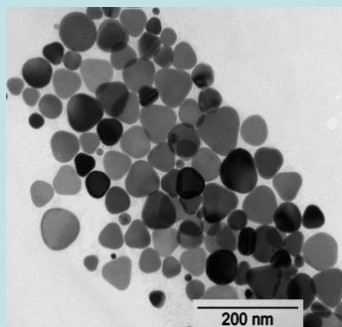


medical devices

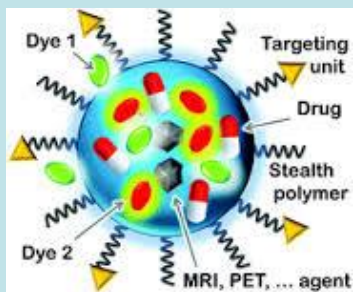


in vitro diagnostics

## Nanotechnology Nanomaterials



safety assessment



nanomedicine



food & consumer products



quality assurance tools

## Products Safety



PAHs in plastic and rubber

## Microplastics



# Nanotechnology/nanomaterial activities

## **Safety assessment of nanomaterials:**

Harmonisation of test protocols and risk assessment methodologies

**Analysis of nanomaterials in food and consumer products:** development of methods for detection, characterisation

**Micro/nanoplastic detection and identification**

**Method development & validation**

**Training and Capacity building**

**Support to EU regulation**  
**Support to Innovation**

**Quality assurance tools**

**Open Access to laboratory**



# Collaborations in the field of nanomaterials

## Interaction with the EU regulators

COM DG's ENV, GROW, EMPL,  
ECHA, EFSA, EMA

## Open Access to Nanobiotechnology Lab

## Partner in European Research consortia

GRACIOUS, Gov4Nano



NanoReg<sup>2</sup>



## Exploratory and pre-normative

Develop/adapt methods  
to investigate nanomaterials  
(JRCs multidisciplinary competences)



# OPEN Access to JRC Nanobiotechnology Laboratory

- To provide Technical and scientific support to research projects from European institutions (Academia, Research Centres, SMEs) with :
  - A wide range of facilities and cutting-edge instrumentation for interdisciplinary studies, with a special emphasis on **characterisation of nanomaterials, microplastics, nanomedicine and advanced materials** and their **interactions with biological systems**.
  - Expertises in biology, material sciences, chemistry, physics, nanobiotechnology.





## • TOPICS :

- ✓ Nanomaterial characterisation
- ✓ Detection of nanomaterials /nanoplastics in complex matrices
- ✓ Characterisation of interactions of nanomaterials nanomedicines with biological systems

- ✓ Bio-interfaces characterisation
- ✓ Surface modification and nano-fabrication
- ✓ Environmental and bio-sensors

- ✓ Biocompatibility studies
- ✓ In vitro assays, uptake studies.

- ✓ Advanced material characterisation for non-bio-applications (energy, transport ..)

# Development of methodologies and protocols for particle size distribution measurements applicable to nanomaterials (pure ingredient level or extracted from complex matrixes).



Disc centrifuge (CLS)



Analytical ultracentrifuge



FFF Chromatographic separation

AF4



CF3

Size Separation  
+ detector (various)



Direct Imaging-FIB-  
SEM/TEM



BET

Methods applicable to  
particle detection and  
sizing

Ensemble Optical  
(DLS/MALS)



PTA-Optical Detection



Electrical detection



Sp-ICP-MS

Single  
particle  
counting

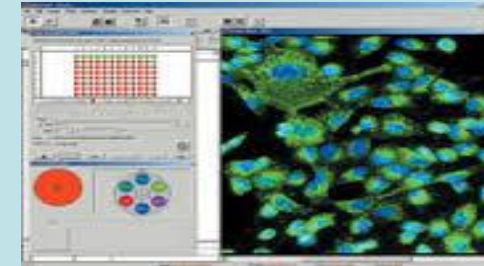


European  
Commission



## ***Investigation of mechanisms involved in NPs toxicity***

- Imaging and labelling techniques: adaptation of the *in vitro* test battery for High Content Imaging systems for NMs testing, miniaturisation/automation of assays

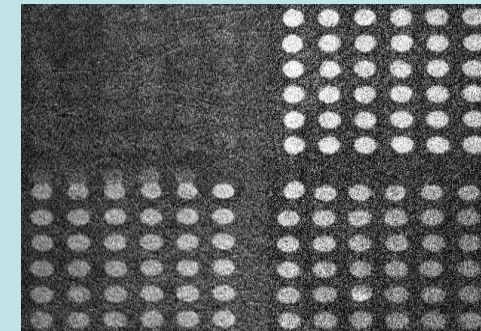


## ***Surface Characterisation***



- XPS-ToF SIMS, X-Ray diffraction

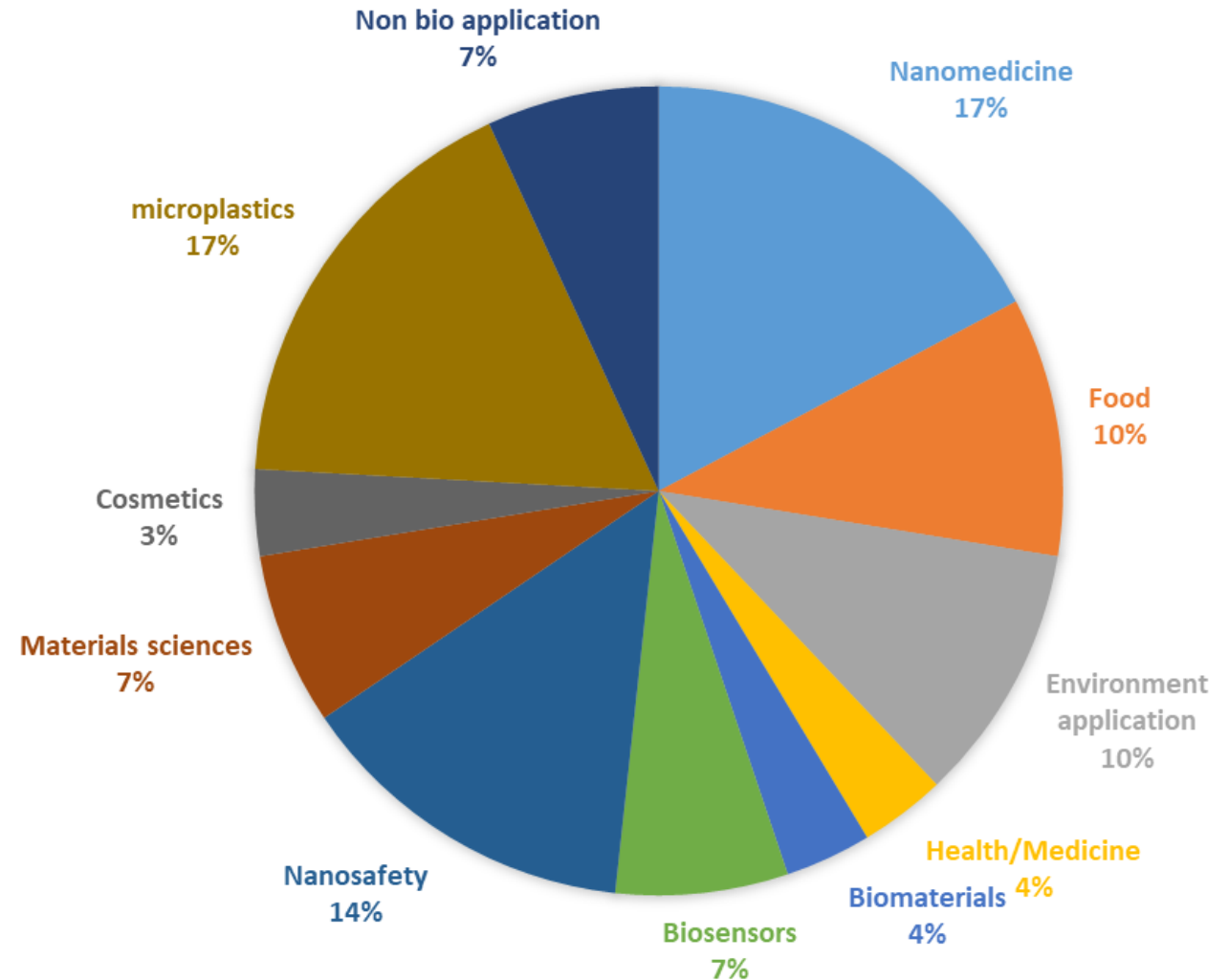
## ***Bio-interactions studies.***



- SPR, QCM, Circular dichroism

## FROM 2017 ...

- 3 calls published up to now
- ~ 80-100 days of access/year
- ~ 12 projects /call on average
- Proposals from 9 MS
- 3-4 instruments used by project





# Suggestions ...

- Nano-projects are often multidisciplinary requiring different steps of characterisation with different instruments :
- Phys-chem characterisation of pristine nanoparticles, NPs interactions and behaviour in culture medium (agglomeration dissolution), dosimetry, cells interactions
- Techniques of characterisation are associated with expertise i.e. optimised protocols
- Laboratories working in the nanosafety area are very often integrated laboratories

New NFFA Nanosafety facilities could be presented as 'platform' associated to a 'list of instruments'



## 360° Virtual tour of Nanobiotechnology Lab

<https://visitors-centre.jrc.ec.europa.eu/virtual-tour/nano/en/index.html>

## Open Access to JRC Infrastructure Nanobiotechnology Laboratory

<https://ec.europa.eu/jrc/en/research-facility/open-access/calls/relevance/2019-1-RD-NanoBiotech>

## Video Open Access to Nanobiotechnology Lab

[OpenLab HD.mp4](#)