



# **Making project data available through eNanoMapper database: NANoREG, Nanoreg2, caLIBRAte and Gracious**

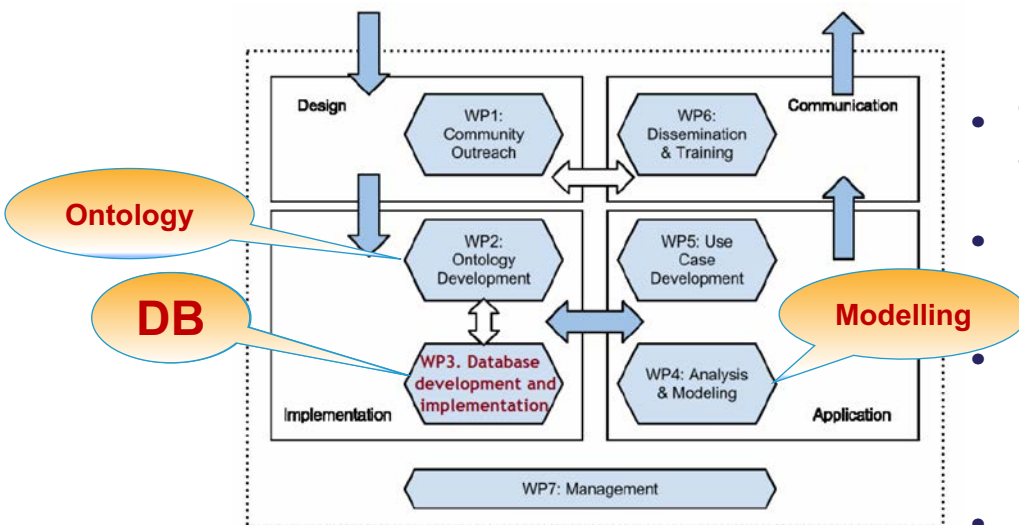
Nina Jeliaskova, Ideaconsult Ltd., Sofia, Bulgaria

Presented by Georgia Tsiliki, ATHENA Research Center



# ENM Summary & data solutions:

- FP7 eNanoMapper - A Database and Ontology Framework for Nanomaterials Design and Safety Assessment
- Grant Agreement: 604134
- Duration: 1 Feb 2014 – 31 Jan 2017; 8 partners
- Open source database and web application
  - Builds upon a Chemical structure database with support for substances
  - The data model supporting experimental data is capable of representing all endpoints of regulatory interests and other types of data.
- eNanoMapper ontology; developed by an experienced team at EBI. Existing ontologies are reused;
- Tools to process and import data. Export in various formats
- Searchable; Free text search based on ontology
- eNanomapper modelling; Integration of data analysis tools via API led by NTUA. WEKA, R python routines uploaded to Jaqpot platform
- Flexible data hosting architecture



# Organising the nanosafety data

- Challenges

- Diverse data sources
- Diverse data input formats
- Different data organization
- Diverse modelling tools

- Approach:

- Enable mappings!
- i.e. eNanoMapper

- **Physico-chemical identity**

Different analytic techniques, manufacturing conditions, batch effects, mixtures, impurities, size distribution, differences in the amount of surface modification, etc.

- **Biological identity**

Wide variety of measurements, toxicity pathways, effects of ENM coronas, modes-of-action, interactions (cell lines, assays).

- **Processes requiring information**

From raw data (science) to study summaries for regulatory purposes; linking with experimental protocols; risk assessment; grouping, safety-by-design

- **Support for data analysis**

Requires “spreadsheet” or matrix view of data. The experimental data in the public datasets is usually not in a form appropriate for modelling (merging multiple values, conditions, similar experiments into matrix form is a challenge).

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## Public eNanoMapper database

- <https://data.enanmapper.net>
- Mostly literature data + partial content provided by MODENA and MARINA projects; links to external DB
- Free text search <https://search.data.enanmapper.net/enm>

HOME > ARTICLES > VOLUMES > VOLUME 6 > 10.3762/BUNANO.6.165

The eNanoMapper database for nanomaterial safety information

Nina Jeliaskova<sup>1</sup>, Charalampos Chomenidis<sup>2</sup>, Philip Doganis<sup>2</sup>, Bengt Fadeel<sup>3</sup>, Roland Grafström<sup>3</sup>, Barry Hardy<sup>4</sup>, Janna Hastings<sup>5</sup>, Markus Hegi<sup>4</sup>, Vedrin Jeliaskov<sup>1</sup>, Nikolay Kochev<sup>1,6</sup>, Pekka Kohonen<sup>3</sup>, Cristian R. Munteanu<sup>7,8</sup>, Haralambos Sarimveis<sup>2</sup>, Bart Smeets<sup>7</sup>, Pantelis Sopasakis<sup>2,9</sup>, Georgia Tsiliki<sup>2</sup>, David Vorgrimmler<sup>10</sup> and Egon Willighagen<sup>7</sup>

eNanoMapper

Showing 9 bundles (1 to 9)

Bundle ID	Name	Ver	Description	Source	License & Maintainer
00000000-0000-0000-0000-0000000001	<b>NanoWiki</b>	v2	Nanomaterials, physicochemical characterisations and toxicity data, imported via NanoWiki RDF dump	NanoWiki <a href="http://dx.doi.org/10.6084/m9.figshare.1330208">http://dx.doi.org/10.6084/m9.figshare.1330208</a> <a href="#">cf</a>	<a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/4.0/</a> <a href="#">cf</a>
00000000-0000-0000-0000-0000000002	<b>OECD Harmonized Templates import test</b>	v1	Demonstrate import of a nanomaterial and endpoints data form IUCLIDS *.isz file (OECD HT)	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape <a href="http://www.echa.europa.eu/registered/data/dossiers/D155-b281d1a0-c6d8-5dcf-e044-00144f67d031/AGGR-cd35254a-7b90-4a1f-842d-7700c6a210e9-D155-b281d1a0-c6d8-5dcf-e044-00144f67d031.html">http://www.echa.europa.eu/registered/data/dossiers/D155-b281d1a0-c6d8-5dcf-e044-00144f67d031/AGGR-cd35254a-7b90-4a1f-842d-7700c6a210e9-D155-b281d1a0-c6d8-5dcf-e044-00144f67d031.html</a> <a href="#">cf</a>	<a href="http://www.ideaconsult.net">www.ideaconsult.net</a> <a href="#">cf</a>
00000000-0000-0000-0000-0000000003	<b>Protein Corona Fingerprinting Predicts the Cellular Interaction of Gold and Silver Nanoparticles</b>	v1	Demonstrates import, display and search of coated Ag and Au nanoparticles with large number of physicochemical characterisations data and biological responses. Serves as a test case for NanoQSAR (eNanoMapper WP4) modelling activities.	10.1021/nn406018q <a href="http://pubs.acs.org/doi/abs/10.1021/nn406018q">http://pubs.acs.org/doi/abs/10.1021/nn406018q</a> <a href="#">cf</a>	NTUA <a href="#">cf</a>
91ce054-4de8-4dc9-a0e4-20264e7eada7	<b>In Vitro data from FP7 MARINA project (KI)</b>	v1	Publicly released data from publication 10.1371/journal.pone.0127174	Comprehensive In Vitro Toxicity Testing of a Panel of Representative Oxide Nanomaterials: First Steps towards an Intelligent Testing Strategy <a href="http://dx.doi.org/10.1371/journal.pone.0127174">http://dx.doi.org/10.1371/journal.pone.0127174</a> <a href="#">cf</a>	P32 - KI <a href="#">cf</a>
13e147c3-ccb5-11e5-946b-80ee7350bf7	<b>Sigma-Aldrich Products</b>	v1	List of nanomaterials that you can buy with Sigma-Aldrich.	NanoWiki <a href="http://dx.doi.org/10.6084/m9.figshare.1330208">http://dx.doi.org/10.6084/m9.figshare.1330208</a> <a href="#">cf</a>	<a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/4.0/</a> <a href="#">cf</a>
646ab3e4-ccb5-11e5-946b-80ee7350bf7	<b>JRC Representative Nanomaterials</b>	v1	Repository of representative nanomaterials with the purpose that many laboratories can measure physicochemical and biological properties on them.	NanoWiki <a href="http://dx.doi.org/10.6084/m9.figshare.1330208">http://dx.doi.org/10.6084/m9.figshare.1330208</a> <a href="#">cf</a>	<a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/4.0/</a> <a href="#">cf</a>
804608b3-ccb5-11e5-946b-80ee7350bf7	<b>Crystallography Open Database</b>	v1	List of nanomaterials in the Crystallography Open Database.	NanoWiki <a href="http://dx.doi.org/10.6084/m9.figshare.1330208">http://dx.doi.org/10.6084/m9.figshare.1330208</a> <a href="#">cf</a>	<a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/4.0/</a> <a href="#">cf</a>
ae0cd8c-cce1-11e5-946b-80ee7350bf7	<b>ArrayExpress</b>	v1	ArrayExpress	NanoWiki <a href="http://dx.doi.org/10.6084/m9.figshare.1330208">http://dx.doi.org/10.6084/m9.figshare.1330208</a> <a href="#">cf</a>	<a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/4.0/</a> <a href="#">cf</a>
62b0a56b-cd01-11e5-a67e-80ee7350bf7	<b>MODENA</b>	v1	MODENA TD1204 COST ACTION dataset	MODENA TD1204 COST ACTION <a href="http://www.modena-cost.eu/">http://www.modena-cost.eu/</a> <a href="#">cf</a>	<a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/4.0/</a> <a href="#">cf</a>

- 
- The screenshot displays the eNanoMapper database website. At the top, the 'eNanoMapper' logo is visible. Below it, the 'FP7 MARINA : Managing Risks of Nanomaterials' section is highlighted, featuring the ENM logo and a release date of 27.11.2017. The 'NanoGenotox' section is also visible, with a release date of 01.02.2015. The 'NANOTEST' section is partially visible at the bottom, with a release date of 01.02.2015. A search bar is located at the bottom left, and a navigation menu is at the top right.

# NANoREG – eNanoMapper database

**search.data.enanomapper.net/nanoreg**



## Nano safety data

### NANoREG Results Repository Experimental data

In NANoREG over 85 institutional partners from EU member states, associated states, the Republic of Korea and Brazil collaborated in developing reliable, reproducible and relevant methods for testing and assessing the effects of nanomaterials on human health and environment in a regulatory context.

The duration of the project was 48 months; the end date was 28 February 2017. The budget was approximately fifty million euro. Ten million was provided by the EU (FP7 programme) and forty million by member states, regions, partners and other sources.

As - probably the first- nanosafety project, all the information and knowledge generated under the umbrella of the NANoREG project has been made available for other parties directly after the ending of the project. The NANoREG Results Repository serves as a central point of access to all the results of the project by providing links to all relevant documents, datasets and other information of interest.

A large part of the NANoREG experimental nano- EHS data is available via the **NANoREG - eNanoMapper database**. It contains data gathered via TNO Data Entry Tool (snapshot as of 19.05.2017). The coming months more data will be added. An **user guide** is available.

For NANoREG partners It was mandatory to carry out the experiments with NANoREG core materials. For all these core materials a complete state-of-the-art physicochemical characterization was done considering key end-points in the OECD WPMN sponsorship program.

Dispersion SOPs and minimum requirements for characterization were established and laid down in a Guidance Document thus supporting reliability and comparability of data. Experiments had to be performed in accordance with the Guidance Document. During the course of the project, those fundamental requirements were further refined.

The data in the data base can be further analyzed by various tools.

#### License

If not indicated otherwise, the information in the NANoREG Results Repository is available under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Information on commercial use and attribution can be found here.

#### NANoREG Results repository

[read more](#)

#### NANoREG Experimental data

NANoREG - eNanoMapper database



Data transfer agreement NANoREG-eNanoMapper (2016)

Publicly accessible since March 2017

Open data license

Content imported from

- TNO SQL database
- Excel files



NanoSafety data : top level view



<https://search.enanomapper.net>

A screenshot of a web browser displaying the eNanoMapper database homepage. The browser's address bar shows 'https://search.data.enanomapper.net'. The website has a navigation bar with links: Home, NanoMapper (highlighted with a red box), NANOREG (highlighted with a blue box), NanoReg2 (highlighted with a blue box), caLIBRAtE (highlighted with a yellow box), and GRACIOUS (highlighted with a purple box). The main content area is titled 'eNanoMapper database' and includes a description of the database as part of the EU FP7 eNanoMapper project. It features a 'Data content' section with a bulleted list of datasets, a 'Data access' section with a 'Public' link and a list of datasets, and an 'Acknowledgements' section with a bulleted list of funding sources.

Nanosafety data

Secure | <https://search.data.enanomapper.net>

Home NanoMapper NANOREG NanoReg2 caLIBRAtE GRACIOUS

## eNanoMapper database

The eNanoMapper database is part of the computational infrastructure for toxicological data management of engineered nanomaterials, developed within the EU FP7 eNanoMapper project. More information:

### Data content

- eNanoMapper
- NANOREG
- FP7 NanoTest
- FP7 NanoGenotox
- FP7 MARINA
- H2020 NanoReg2
- H2020 caLIBRAtE
- H2020 GRACIOUS

### Acknowledgements

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- FP7 NANOREG collaboration
- H2020 caLIBRAtE collaboration
- This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 646221 NanoReg 2

### Data access

Public

- eNanoMapper
- NANOREG

# Search data integration

<https://search.enanomapper.net>



eNanoMapper

NANoREG

caLIBRAtE

NanoReg2

Protection (User rights)

eNanoMapper  
db instance

enanomapper  
db instance  
(NR1 data)

enanomapper  
db instance  
MARINA

enanomapper  
db instance  
NanoTest

enanomapper  
db instance  
NanoGenotox

....

ENM data,  
caNanoLab

NANoREG /  
TNO DB,  
Excel files

MARINA  
files

NanoTest  
files

NanoGenotox  
files



How to retrieve the data ?



# Free text and faceted search

The screenshot shows the NanoReg2 database search interface. The browser address bar displays a URL with a search query. The page header includes navigation links: Home, Search, Summary, Data collections, Data templates, and Help. A search bar contains the text '[n10705013]'. Below the header, there is a section for 'Projects (23267)' with a filter bar and a list of categories: Study providers (23267), Nanomaterial type (92816), Nanomaterial (22829), Protocols (67978), Method (55885), TOX (59034), P-CHEM (8818), ECOTOX (462), Cell (55294), Species (8846), and Exposure route (310). The main content area displays a list of search results, each with a title, a core description, and a list of results. The results are: JRCNM01000a (NM-100 (TiO2 50-150 nm)) titanium oxide nanoparticle, JRCNM01001a (NM-101 (TiO2 6 nm)) titanium oxide nanoparticle, JRCNM01003a (NM-103 (TiO2 24.7 nm)) titanium oxide nanoparticle, JRCNM01004a (NM-104 (Titanium Dioxide)) titanium oxide nanoparticle, and JRCNM01003a (NM-103 (Titanium Dioxide)) titanium oxide nanoparticle. Each result has a 'more' link and a 'Material Composition Studies' link. Annotations include: a red box around the search bar with the text 'Search'; a red box around the filter bar with the text 'Facets or filters that permit easy refinement of search'; a red box around the search results list with the text 'List of data resources with direct links to DB'; and a red box around the 'Selected filters' section with the text 'Selected filters'.

NanoReg2 database

Home Search Summary Data collections Data templates Help [n10705013]

NanoReg2 database

License information: FP7 NANoREG | FP7 MARINA | FP7 NanoTest | FP7 NanoGenotox | About

Projects (23267)

Filter\_

NANoREG NanoGenotox NanoTest AND

Study providers (23267)

Nanomaterial type (92816)

Nanomaterial (22829)

Protocols (67978)

Method (55885)

TOX (59034)

P-CHEM (8818)

ECOTOX (462)

Cell (55294)

Species (8846)

Exposure route (310)

Hits list Selection Export

A549 titanium oxide Genetic toxicity in vitro

< 1 > displaying 1 to 17 of 17

JRCNM01000a (NM-100 (TiO2 50-150 nm)) titanium oxide nanoparticle

CORE (1): ...

Results: P-CHEM. Crystalline phase, P-CHEM. Surface chemistry, P-CHEM. Particle size distribution (Granulometry), P-CHEM. Aspect, P-CHEM. Batch Dispersion quality, P-CHEM. Specific surface area, TOX. Cell Viability, TOX. Immunotoxicity, TOX. Genetic toxicity in vitro, TOX. Toxicity - inhalation

more

Material Composition Studies

JRCNM01001a (NM-101 (TiO2 6 nm)) titanium oxide nanoparticle

CORE (1): ...

Results: P-CHEM. Surface chemistry, P-CHEM. Crystalline phase, P-CHEM. Particle size distribution (Granulometry), P-CHEM. Dustiness, P-CHEM. Batch Dispersion quality, P-CHEM. Specific surface area, TOX. Immunotoxicity, TOX. Genetic toxicity in vitro, TOX. Cell Viability, TOX. Barrier integrity, TOX. Oxidative Stress, ECOTOX. Short-term toxicity to aquatic invertebrates, TOX. Repeated dose toxicity - inhalation, P-CHEM. Zeta potential, P-CHEM. Aerosol characterisation

more

Material Composition Studies

JRCNM01003a (NM-103 (TiO2 24.7 nm)) titanium oxide nanoparticle

CORE (1): ...

Results: P-CHEM. Surface chemistry, P-CHEM. Crystalline phase, P-CHEM. Particle size distribution (Granulometry), P-CHEM. Batch Dispersion quality, P-CHEM. Specific surface area, TOX. Cell Viability, TOX. Genetic toxicity in vitro, TOX. Toxicity - inhalation

more

Material Composition Studies

JRCNM01004a (NM-104 (Titanium Dioxide)) titanium oxide nanoparticle

CORE (1): Titanium dioxide

Results: P-CHEM. Specific surface area, TOX. Repeated dose toxicity - oral, P-CHEM. Crystallite and grain phase, P-CHEM. PC\_THERMAL\_STABILITY\_SECTION, TOX. Cell Viability, P-CHEM. IMPURITY\_SECTION

more

Material Composition Studies

JRCNM01003a (NM-103 (Titanium Dioxide)) titanium oxide nanoparticle

CORE (1): Titanium dioxide

Results: TOX. Repeated dose toxicity - oral, TOX. Cell Viability, TOX. Genetic toxicity in vitro, P-CHEM. Particle size distribution (Granulometry), P-CHEM. Crystallite and grain phase, P-CHEM. Specific surface area, P-CHEM. PC\_THERMAL\_STABILITY\_SECTION, P-CHEM. IMPURITY\_SECTION

more

Material Composition Studies

Selected filters

List of data resources with direct links to DB

How to retrieve and download the data ?



## Export example

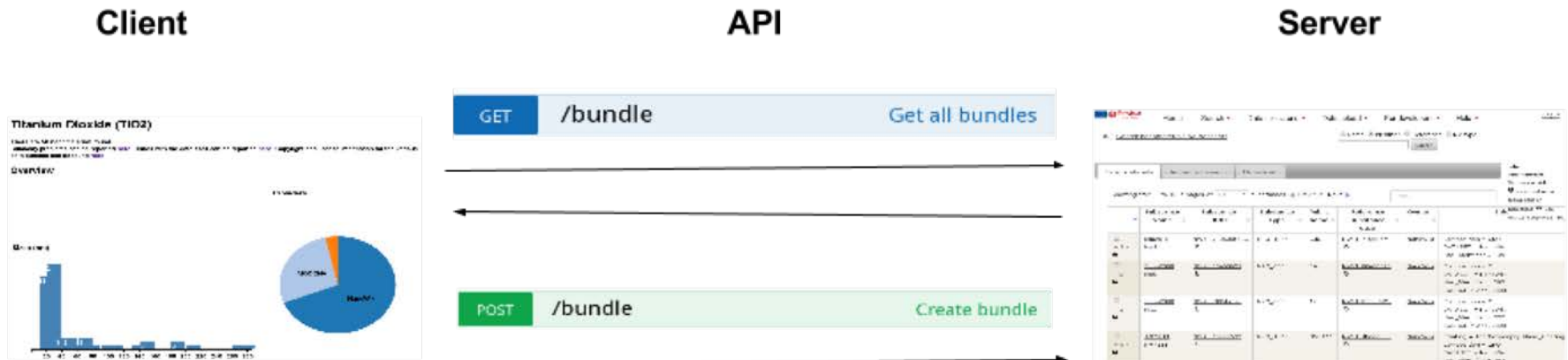
A screenshot of the GRACIOUS database web application. The browser address bar shows a URL from apps.ideaconsult.net. The page has a navigation bar with links like Home, Data collections, Summary, Data templates, and Help. A search bar is on the right. On the left, there's a sidebar with a tree view of categories like Projects, Study providers, Nanomaterial type, etc. The main content area is titled "GRACIOUS database" and "H2020 GRACIOUS project | About". It features a "Hits list" and "Selection" tab. Under "Selection", there are buttons for "Filtered entries" and "Selected entries". Below these, a "Select export type" section has tabs for "Materials and all study results", "Study results", "Material identifiers", and "Material composition". The "Study results" tab is selected. Underneath, a "Select output format" section shows icons for JSON, CSV, TXT, XML, XLSX, RDF, and ISA. The "TXT" icon is highlighted with a red box. Below the format selection, a button reads "Download filtered entries as TSV", also highlighted with a red box. An "Export" button is in the top right corner of the main content area.

- To download the search results specify “*Filtered entries*” and “*Study results*”.
- Click on the TXT icon. The download button caption will change to
  - “***Download filtered entries as TSV***” (tab separated values)
- Note that only limited set of fields are exported in the TXT format.
- The JSON and XML formats contain the full set of fields.

How to retrieve and analyse the data?



# Mapping internal database functions to the external world



- *Application Programming Interface (API): a way computer programs talk to one another. Can be understood in terms of how a programmer sends instructions between programs.*
- Access the database via any programming language , Workflow systems , Data analysis tools (*R, JavaScript, Java, Ruby used by eNanoMapper partners*)
- eNanoMapper Tutorials:  
<http://www.enanomapper.net/enm-tutorials>  
<https://github.com/enanomapper/tutorials>

How the data is imported?



## Data entry issues

- Input data files: >1,000 Excel files **roughly** following
    - IOM templates (most projects except NANoREG)
    - NANoREG / JRC *ISA-TAB-logic* files
      - *NANoREG / JRC are NOT ISA-TAB-NANO compliant*
  - Assays naming : multiple names per assay
    - Colony Forming
    - Colony Forming Assay
    - Colony Forming Efficiency Assay
    - CFE
    - Cell viability - Colony Forming Efficiency Assay
  - Naming materials, cells , methods, etc
-

# Mapping terms: ontology

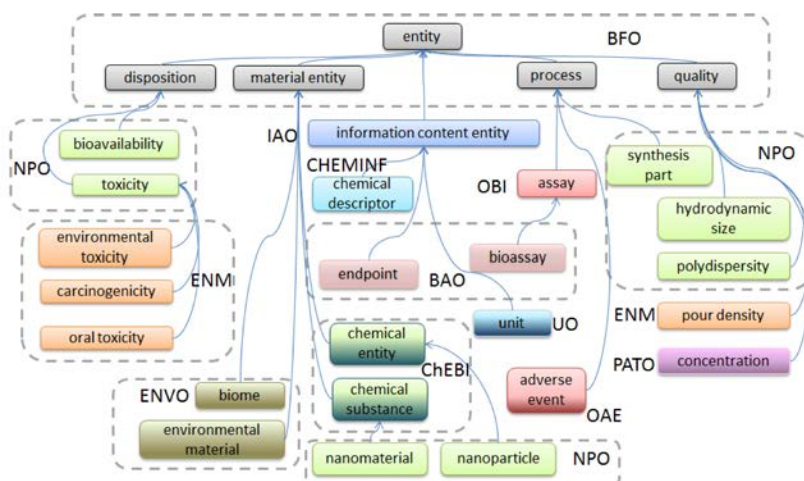
**An ontology is a controlled vocabulary enhanced with relationships between terms.**

### Usage

- Harmonize data from several sources
- Analysis (logical inference, semantic search)

### Examples:

- Is Cytotoxicity an endpoint, or EC50 is also an endpoint?
- Is TEM a protocol, or a technology?
- “Water - Fish - D. Rerio” assay – is it the same one as “Zebrafish Embryo Toxicity Test” ?



Hastings et al. *Journal of Biomedical Semantics* (2015) 6:10  
DOI 10.1186/s13326-015-0005-5



RESEARCH

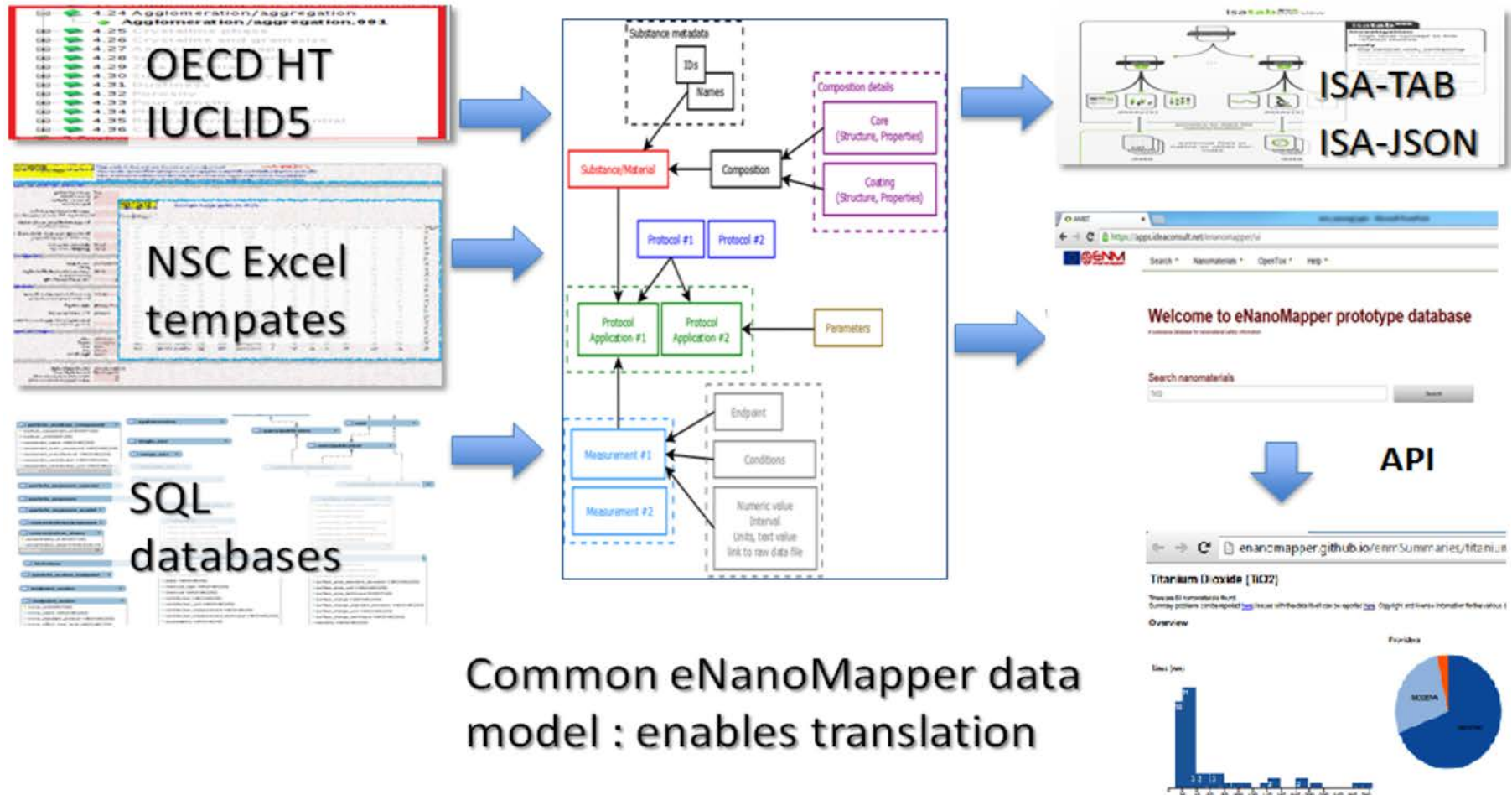
Open Access

eNanoMapper: harnessing ontologies to enable data integration for nanomaterial risk assessment

Janna Hastings<sup>1\*</sup>, Nina Jeliakova<sup>2</sup>, Gareth Owen<sup>1</sup>, Georgia Tsiliki<sup>3</sup>, Cristian R Munteanu<sup>4,5</sup>, Christoph Steinbeck<sup>1</sup> and Egon Willighagen<sup>5</sup>



# Mapping data organisations



<http://ambit.sourceforge.net/enanomapper/templates/converto how.html>



## Mapping spreadsheet content into the data model

	A	B	C	D	E	F	G
1	<b>TEST RESULTS</b>						
2							
3							
4		Replicate 1			Replicate 2		
5		T1	Titanium Dioxide	Average (ng/ml)		T1	Titanium Dioxide
6			0	1.8925			
7			1	19.6985			
8			5	18.5207			
9			10	18.0280			
10			25	18.4153			
11			50	19.2965			
12			75	20.8867			
13			100	22.6964			
14							
15							
16							



through JSON configuration

```
{
  "TEMPL": {
    "DATA_": {
      "PARAL": {
        "SUBSTANCE_RECORD": { ... }, // 7 items
        "PROTOCOL_APPLICATIONS": [
          {
            "PROTOCOL_TOP_CATEGORY": { ... }, // 2 items
            "PROTOCOL_CATEGORY_CODE": { ... }, // 2 items
            "PROTOCOL_GUIDELINE": { ... }, // 1 item
            "PROTOCOL_ENDPOINT": { ... }, // 4 items
            "RELIABILITY_STUDY_RESULT_TYPE": { ... }, // 2 items
            "CITATION_TITLE": { ... }, // 2 items
            "CITATION_YEAR": { ... }, // 2 items
            "CITATION_OWNER": { ... }, // 4 items
            "PARAMETERS": { ... }, // 12 items
            "EFFECTS_BLOCK": {
              "LOCATION": {
                "ITERATION": "ABSOLUTE_LOCATION",
                "IS_ARRAY": true,
                "TRIM_ARRAY": true,
                "SHEET_INDEX": 3,
                "COLUMN_INDEX": "B",
                "ROW_INDEX": 4
              },
              "ROW_SUBBLOCKS": "= TimePoints.size()",
              "COLUMN_SUBBLOCKS": "= Replicates",
              "SUBBLOCK_SIZE_ROWS": "= C.size() + 3",
              "SUBBLOCK_SIZE_COLUMNS": 4,
              "VALUE_GROUPS": [
                {
                  "NAME": "=Assay_endpoint",
                  "UNIT": "=Outcome_metric",
                  "START_COLUMN": 3,
                  "END_COLUMN": 3,
                  "START_ROW": 3,
                  "END_ROW": "=3 - 1 + C.size()",
                  "PARAMETERS": [
                    {
                      "NAME": "Time point",
                      "ASSIGN": "ASSIGN_TO_SUBBLOCK",
                      "COLUMN_POS": 1,
                      "ROW_POS": 2,
                      "MAPPING": "Time",
                      "UNIT": "h"
                    },
                    {
                      "NAME": "Replicate",
                      "ASSIGN": "ASSIGN_TO_SU",
                      "COLUMN_POS": 1,
                      "ROW_POS": 1
                    },
                    {
                      "NAME": "Concentration",
                      "ASSIGN": "ASSIGN_TO_VALUE",
                      "COLUMN_POS": -1,
                      "ROW_POS": 0,
                      "UNIT": "µg/ml"
                    }
                  ]
                }
              ]
            }
          ]
        ]
      }
    }
  }
}
```



← → C <https://apps.ideaconsult.net/enanomapper/ui/uploadsubstance1>

ENM eNanoMapper Search ▾ Nanomaterials ▾ OpenTox ▾ Help ▾

⌕ Substances ▸ Import ▸ Single file upload

Import new substance(s)

File (.i5z ⓘ or .i5d or .xls or .xlsx ⓘ)  No file chosen

JSON map for XLS/XLSX file ⓘ  No file chosen

What is in a eNanoMapper database instance:

# Composition



eNanoMapper x

Secure | https://data.enanomap.net/substance

ENM eNANO MAPPER

Home Search Data collections Data upload For developers Help



Search nanomaterials by identifiers ☐ Name ☒ Identifier ☐ Reference ☐ NM type  Search

Nanomaterials Advanced search Download

Showing from 1 to 10 in pages of 10 substances Previous Next Filter...

	Substance Name	Substance UUID	Substance Type	Public name	Reference substance UUID	Owner	Info
- 1 -	<a href="#">Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape</a>	<a href="#">IUCS-5f313d1f-...</a>	mono constituent substance	Multi-Walled Carbon Nanotubes (MWCNT), synthetic graphite in tubular shape		<a href="#">Ideaconsult Ltd. / Sofia / Bulgaria</a>	
- 2 -	G15.AC	<a href="#">FCSV-bc77c03d-...</a>	NPO_401	G15.AC	<a href="#">FCSV-50cca421-...</a>	<a href="#">Protein Corona Fingerprinting Predicts the Cellular Interaction of Gold and Silver Nanoparticles.csv</a>	Classification = Anionic
- 3 -	G15.AHT	<a href="#">FCSV-8f5cd32a-...</a>	NPO_401	G15.AHT	<a href="#">FCSV-50cca421-...</a>	<a href="#">Protein Corona Fingerprinting Predicts the Cellular Interaction of Gold and Silver Nanoparticles.csv</a>	Classification = Cationic

Composition name:  
Composition UUID: FCSV-8f5cd32a-3350-300b-91d0-87000ee5d7ee  
Purity of IUC Substance:

Type	Name	EC No.	CAS No.	Typical concentration	Concentration ranges	Also contained in...	Structure
Coating	<a href="#">6-Amino-1-Hexanethiol</a>			0 % (w/w)	0 % (w/w)	0 % (w/w)	<a href="#">Also contained in...</a> 
Core	<a href="#">Au</a>		7440-57-5	0 % (w/w)	0 % (w/w)	0 % (w/w)	<a href="#">Also contained in...</a> 

Coating

Core

What is in a eNanoMapper database instance:

# Tox/Ecotox/Env fate



eNanoMapper x

Secure | https://apps.ideaconsult.net/nanoreg1/substance/NNRG-a51b2e58-4105-9643-3016-3f4b431171e2/study

ENM eNanoMapper

Home Search ▾ Data collections ▾ Data upload ▾ For developers ▾ Help ▾ Log in

Search nanomaterials by identifiers NNRG-a51b2e58-4105-9643-3016-3f4b431171e2 Study

☐ Name ☒ External identifier ☐ Experiment reference  Search

IUC Substance Composition Tox (130) P-Chem (157) Eco Tox (4)

Filter...  Expand all Collapse all

JRCNM01001a

NPO\_1339 Immunotoxicity (22) ▾

7.5.2 Repeated dose toxicity - inhalation (12) ▾

7.6.1 Genetic toxicity in vitro (30) ▾

ENM\_0000044 Barrier integrity (3) ▾

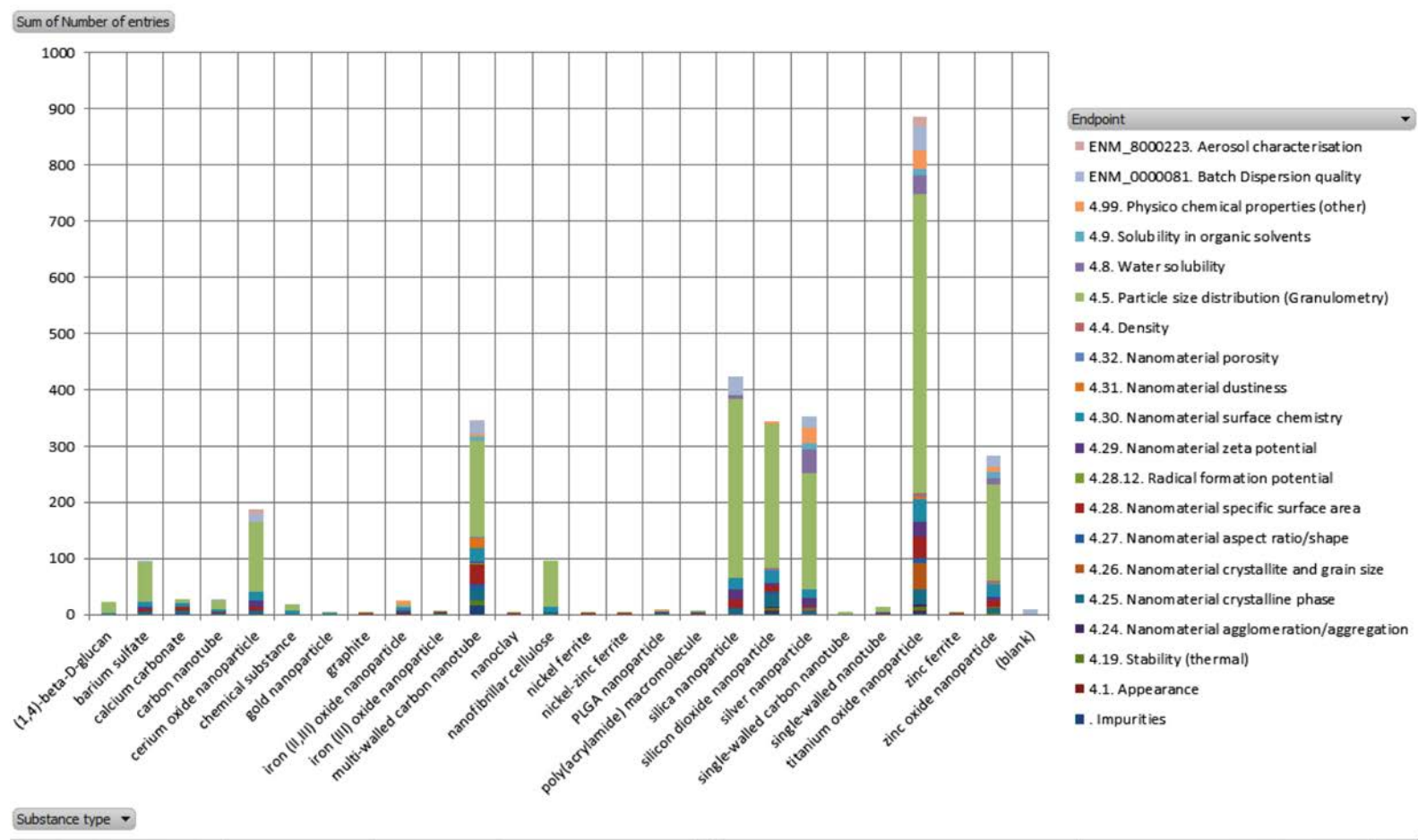
ENM\_0000037 Oxidative Stress (7) ▾

ENM\_0000068 Cell Viability (56) ▾

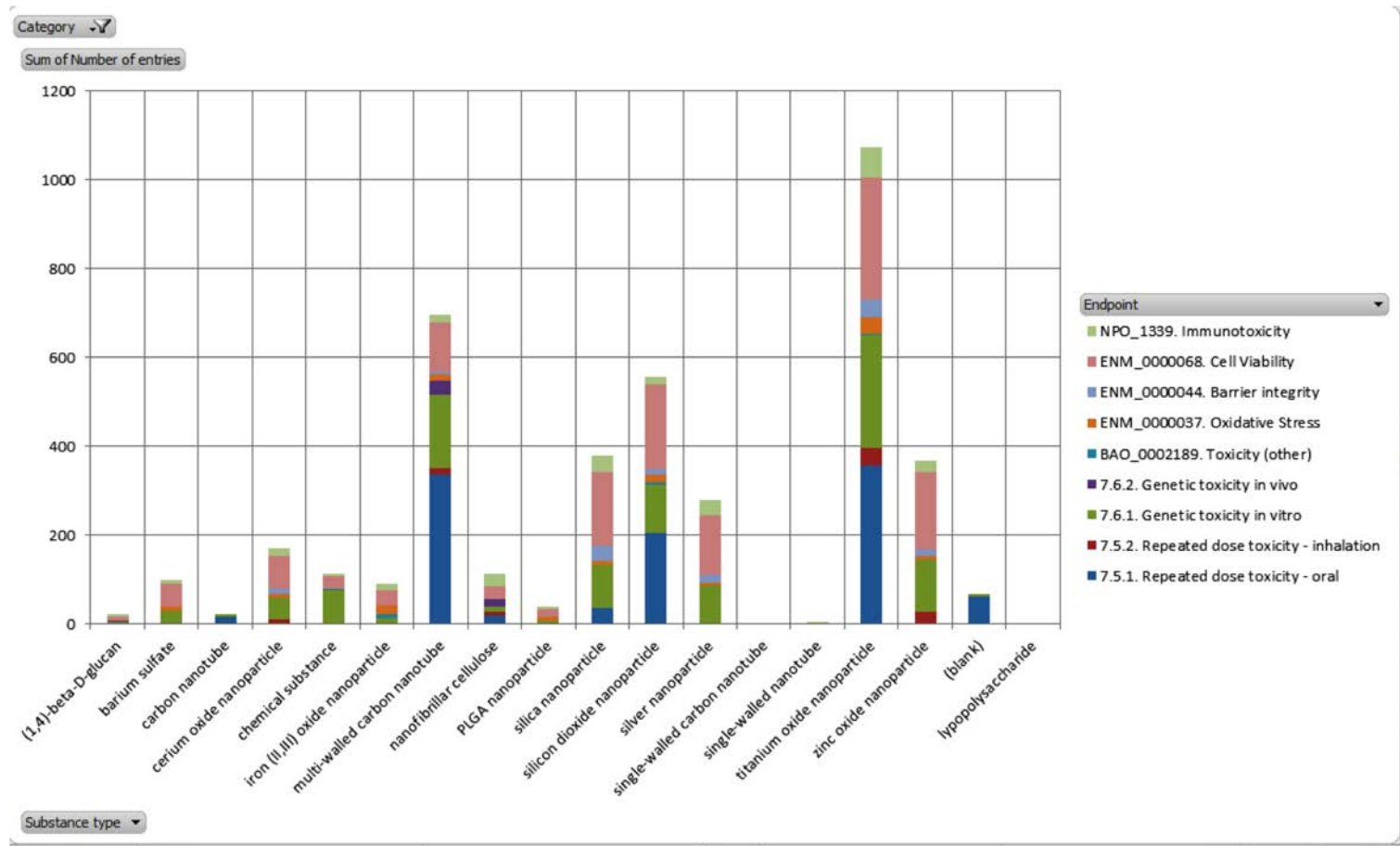


## All projects data statistics

# Physchem characterisation



# Bioassays



## Future plans





# Future plans



# Future plans

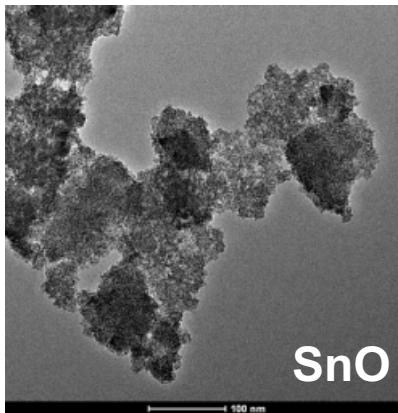


## Type of NPs:

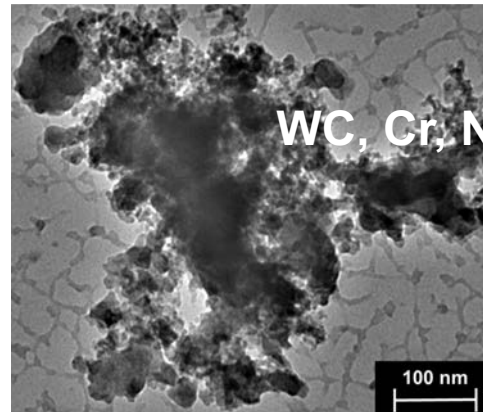
- Engineered NPs ( $\text{ZrO}_2$ ,  $\text{CeO}$ ,  $\text{Sb-Sn Ox}$ ,  $\text{SnO}$ )
- Process-generated NPs (atmospheric plasma spraying)

## Type of data:

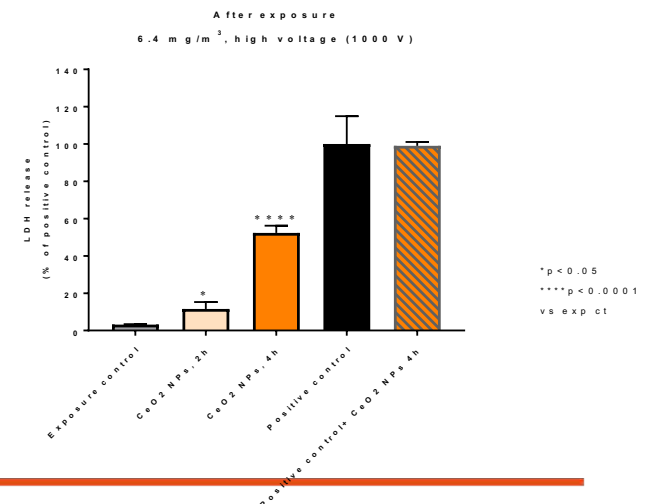
- Physical-chemical characterisation: particle size, distribution, solubility, zeta potential...
- Toxicological characterisation: ALI, submerged-cell, simulated body fluid, ROS generation.



Engineered NPs



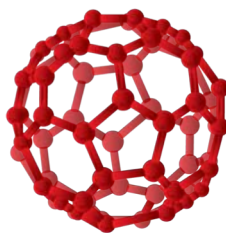
Process-generated NPs





# Thank you!

Questions?



**ENNM**  
eNanoMapper

NanoReg<sup>2</sup>



**gracious**

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