Code Number and Title:

LRI-N4: Grouping nanomaterials and establishing criteria for Safe by Design

Background

Guaranteeing that products containing nanoparticles or nanomaterials are fundamentally safe, with minimal risk of hazardous exposure to man or the environment is clearly in the interests of all manufacturing industries. A lack of reliable (validated?) data on the effects of physico-chemical parameters on EHS means that regulators tend to over-rely on the results of toxicologists. The costs of validating individual nanomaterials are currently too high for most SME innovators. On the one hand there is a need for cost effective, high throughput screening methodologies, while on the other, manufacturers would greatly benefit from implementing those criteria which can be derived from Safe by Design practices. This RfP aims to position the industry in the process of developing criteria for safe by design, while setting up a multidisciplinary, science-based approach to EHS and nanomaterials.

Objectives

The scientific and technical objectives of the topic are:

1. To develop science based criteria for grouping nanoparticles and nanomaterials taking account of their behaviour and mode of toxicological action.
2. To develop state of the art modelling of both nanoparticles and *in-silico* behaviour as a tool supporting grouping strategies.
3. To evaluate the Mode of Action (MoA) of in vitro versus in vivo tox testing as tools towards the principles of Safe by Design.
4. To address barriers for the application of Safe-by-Design as standard industry practice.

Scope

Current practice is that Regulators evaluate the risk from nanoparticles along the whole value chain, from manufacture through application in products to end of life disposal. This project must provide clear input to the evaluation of nanomaterial value chains. Two examples will be used which are industrially important, nano-silica (SiO2) and nano-titania (TiO2). Cross cutting research must look at theoretical modelling studies as well as practical, laboratory investigations.

Dedicated theoretical work will develop nanoparticle model systems, as well as *in-silico* (QSAR) modelling, both of which will lead to an initial grouping of the nanoparticles. Models that will predict the interaction of NM with biological matrices (e.g. "clustering models") should result.

The different data obtained from in vivo and in vitro testing will be evaluated. While the direct Mode of Action of a nanoparticle on different cell cultures can be assessed through in-vitro studies, the ability of particles to cross barriers is also key to understanding the potential toxicological impact of a nanomaterial. Grouping of particles based on in vivo or in vitro studies will result.

A major result of the project will be the prediction the behaviour of nanoparticles in different matrices, defining the important divisions or steps along a value chain. This fundamental knowledge will lead to a better control on the engineering and manufacture of nanoparticles and materials, as well as supporting safer use in the application of Safe by Design.

Deliverables

The results of the project will feed into the ongoing EU FP7 Flagship project NANoREG, where regulatory issues are central. The multidisciplinary research of this project will provide results which will support the value chain studies of NANoREG, while at the same time helping to define the minimum requirements for the NANoREG SOPs.

The final report shall contain an executive summary (2 pages max), a main part (max. 50 pages) and a detailed bibliography. It is expected that the findings will be developed into at least one peer reviewed publication, following production of poster(s) and presentation(s) at suitable scientific conference(s).

Cost and Timing

Start 1st January 2014, duration 24 months maximum

Budget in the order of 400.000 €

Explanation of costs

The 24-month project is divided into four key objectives which in combination will lead to a practical strategy for grouping nanomaterials on the basis of physico-chemical properties, toxicological and behavioural criteria. These form the four tasks of the project and the budget is divided between the tasks as indicated below. The results will provide a deeper insight into the important concept of Safe by Design.

The costs are divided into labour costs and other costs. Tasks 2, 3 and 4 do not involve any experimental work or measurements, so the costs are only for labour. Task 1 on the other hand aims to develop science based criteria for grouping nanomaterials. In addition to labour costs, there is significant budget for other costs. These are the costs of measuring parameters of some nanomaterials, using EM, TEM, SEM and other techniques. Half of the budget is allocated to task 1. The in-silico and other modelling studies (Task 2) are computer studies requiring a lower budget for labour costs only. Task 3 looks at the effects of MoA (Moe of Action) and relates to the in-vivo and in-vitro studies, and require only labour costs. The results of the first 3 tasks come together in Task 4 where the results will be interpreted in the framework of Safe by Design. €40.000 is reserved for coordination costs for the two-year duration of the project.

The estimated budget breakdown is shown in the table below:

Task	Description	Duration (months)	Labour	Other
Task 1	To develop science based criteria for grouping nanoparticles	1 to 24	80000	120000
Task 2	To develop state of the art modelling of both nanoparticles and *in-silico*	1 to 12	40000	0
Task 3	To evaluate the Mode of Action (MoA) of in vitro versus in vivo tox testing	1 to 24	80000	0
Task 4	To address barriers for the application of Safe-by-Design	12 to 24	40000	0
Task 5	Coordination costs	1 to 24	0	40000
		subtotals	240000	160000
			total	400000

Partnering/Co-funding

Applicants should provide an indication of additional partners and funding opportunities that can be appropriately leveraged as part of their proposal. Partners can include, but are not limited to industry, government/regulatory organizations, research institutes, etc. Statements from potential partners should be included in the proposal package.

Fit with LRI objectives/Possible regulatory and policy impact involvements/ Dissemination

Applicants should provide information on the fit of their proposal with LRI objectives and an indication on how and where they could play a role in the regulatory and policy areas. Dissemination plans should also be laid down.

References

If applicable

DEADLINE FOR SUBMISSIONS: 1 September 2013

Please see www.cefic-lri.org for general LRI objectives information, project proposal form and further guidance for grant applications. For further assistance do not hesitate to contact lri@cefic.be.