

ACTION PLAN “FOSTERING KNOWLEDGE BY FUNDING RESEARCH PROJECTS WITH THE POTENTIAL TO YIELD MAJOR INNOVATIVE APPLICATIONS ”

RESEARCH INVESTIGATING THE IMPACT OF ULTRAFINE PARTICULATE MATTER AND ENGINEERED NANOPARTICLES ON HUMAN HEALTH

BACKGROUND

Ultrafine particulate matter (UFPM) made up of poly-dispersed, chemically-complex, nano-sized particles is broadly present in the atmosphere, in everyday life and the workplace environment. UFPM is the result of high-temperature combustion in a variety of industrial activities such as energy generation, residential heating, motor vehicles. These nanoparticles remain in the air much longer than faster-depositing larger-sized particles becoming a serious risk of human health.

Engineered nanoparticles, together with nanotechnologies, are probably the major advance of the twenty-first century and great strides have been done in their development in recent years. Their clear-cut chemical structure and solid form make them ideal candidates for the development of highly-innovative materials featuring novel or refined chemical and physical properties which set them apart from their larger-sized counterparts. Engineered nanoparticles are used in a variety of industrial fields, such as the chemical, cosmetic and food industries, and more recently also for diagnostic and therapeutic purposes.

The general population, and its subsets of workers, consumers, patients, as well as the natural environment (air, soil, sediments, water) interact with these new materials in the various stages of their life cycle (development, production, use, waste disposal).

Considering the broad presence of ultrafine particulate matter in the human environment and, as it seems, the limitless potential applications of nanoparticles and nanotechnologies, exposure to them is estimated to be ever growing. Scientific data suggest that exposure to ultrafine particulate matter and engineered nanoparticles pose a hazard to human health, as due to their specific chemical and physical properties they easily spread in the workplace and the outdoor environment, interacting with the human body, namely with human cells, and causing biochemical damage.

To promote safe development of nanotechnologies and best monitor the various processes involved in the formation of nanoparticles, it is fundamental to identify any risk arising from the use of engineered nanoparticles and the presence of ultrafine particulate matter through a clear definition of the related hazard, knowledge of potential adverse effects, measurement and control of exposure. Hence the need in-depth analysis of risks related to toxicity of these particles and of risks related to human and environmental exposure.

GOALS

Considering the background, Fondazione Cariplo intends to support research projects designed to determine the impact of ultrafine particulate matter and engineered nanoparticles on human health, by investigating the toxicity and risks associated with exposure for the general population, consumers, patients and workers.

More specifically, the goals pursued are to:

- identify new methods for the detection and measurement of ultrafine particulate matter and engineered nanoparticles
- assess human exposure to ultrafine particulate matter through the measurement of its presence in the workplace, in indoor and outdoor spaces
- assess human exposure to engineered nanoparticles and nanomaterials through the measurement of their presence in the workplace, in indoor and outdoor spaces, as well as in complex matrices such as medicines, foods and consumer goods
- improve understanding of the interactions of ultrafine particulate matter and nanomaterials with the biological systems at tissue, cell and sub-cell levels, using *in vivo* experimental models and *in vitro* cellular models, investigating biological pathways, take-up and build-up mechanisms, passage through epithelial barriers, bio-distribution, intracellular localization and persistence
- investigate the cellular mechanisms of toxicity of ultrafine particulate matter, engineered nanoparticles and materials obtained from nanotechnologies by analyzing changes in morphological, physiological and genetic parameters in relation to the size, shape, active surface, chemical and physical properties of particles and routes of exposure.

The achievement of these research priority objectives will enable the scientific community in Fondazione Cariplo's constituency to participate in a more insightful way in the international debate on the risk of exposure to ultrafine particulate matter and nanoparticles and ultimately provide more balanced information to the public as well as contribute to the development of adequate regulations for engineered nanoparticles.

GUIDELINES

Eligible organizations

In agreement with the *Guidelines for projects' presentation*, this call for proposal is addressed to organizations engaged in scientific research in the subject area set out. These organizations will have human resources, equipments and infrastructures directly at their disposal.

To be eligible for funding the lead organization shall have project operational facilities within Fondazione Cariplo's reference area (provinces of Lombardy and the Piedmont provinces of Novara and Verbano-Cusio-Ossola) this requirement does not apply to partners.

Fondazione Cariplo shall not accept applications by PIs (lead PIs or partners' PIs) of a project funded within the same call if still ongoing. A project is considered ongoing until the final grant report has been sent following the Foundation procedures. To be allowed to apply to this call, the final grant report shall be sent by the deadline.

Eligible projects

Fondazione Cariplo – with the advisory of an International Scientific Committee, which ensures transparency and the application of objective scientific criteria in the assessment process – will select a limited number of projects that respect the scientific priorities set out in the call for proposals.

At the end of the process of assessment of the project merit the judgment of the International Scientific Committee shall be notified to the applicants.

The request of grant shall be of no less than € 100,000 and no more than € 300.000. Anyway the requested grant shall be no more than 80% of the total cost.

As to the project budget, the total cost shall relate to the proposed project and meet eligibility requirements, within the limits set out below:

- "Equipment and software"
This item of expense shall not exceed 20% of total project costs. It shall relate exclusively to newly acquired equipment or software programs to be used for more than one year, according to their effective use
- "Other amortizable costs"
Expenses in this category shall relate exclusively to patenting costs, where applicable.

- "Permanent staff (salary)"
This item of expenses shall relate exclusively to research staff. It shall not include administrative staff. This item shall be covered by the applicants' co-funding only.
- "Temporary staff"
This item of expenses shall relate exclusively to research staff. It shall not include administrative staff.
- "Sub-contractors and Consultants"
This item of expenses shall include audit costs, where applicable.
- "Materials and supplies"
Expenses in this category cannot include office stationary and copies
- "Other operating expenses"
This item of expense shall not exceed 10% of the total cost. It shall relate exclusively to travel expenses, participation to congresses by the project staff, meeting between project partners and publication costs.

Please note that under this call for proposals the following items of expenses shall be judged ineligible for funding:

- "Acquisition of property"
- "Property renovation, maintenance, restoration"
- "Overheads"

Evaluation criteria

In addition to scientific quality, the project proposals shall be judged on merit against the following targets:

- the state of the art knowledge;
- the clarity with which the objectives are formulated and the effectiveness of the strategies adopted;
- the adequacy of proposed methods to the project goals, especially with respect to the toxicological protocols that are going to be used;
- expected results in terms of evaluation of the risk of exposure to ultrafine particulate matter and engineered nanoparticles to be broadly disseminated and of key interest for the industrial world;
- potential impact in terms of human health;
- potential impact in terms of improvements in the workplace environment, indoor and outdoor conditions;
- the originality and innovativeness of the proposed research project;
- the adoption of multidisciplinary approaches;
- the scientific authoritativeness and competence of the applicants;

- the curriculum vitae of the principal investigator and research team involved;
- the involvement of young investigators in the team and/or as project leaders;
- the presence of training actions for the young investigators involved in the project team;
- the structuring of the project partnership and the collaboration between research centres on the national or international level;
- the adequacy of the project's duration and budget;
- the extent and nature of the applicants' co-funding;
- the level and forms of scientific communication and dissemination of results.

Ineligible projects

Projects with the following characteristics will be considered ineligible for assessment:

- Financing requests for the set up of new research centers
- Financing requests for the fit out of laboratories
- Projects that entail the participation of businesses
- Research projects that investigate exposure to particles that are not nano-sized.

Applicants are invited to read carefully the following papers at the website www.fondazioneccariplo.it:

- *Guidelines for projects' presentation*;
- *Grant Management and Reporting Guide*;
- *Policy on Intellectual Property Rights*
- *Policy on Open Access*.

Applicants agree that the grant will be subjected to the irrevocable acceptance of the *policy*.

Moreover, applicants are invited to:

- fill out entirely the on line forms, as follows:
 - Organization form (main applicant);
 - Project form (Italian language);
 - Complementary data (English language);
 - Budget form.
- upload the required documents, as stated in the *Guidelines for projects' presentation*:
 - Project¹;
 - Budget¹;

- Official submission letters;
- Partnership agreement;
- Organization related documents.

BUDGET AVAILABLE

The budget available for this Call totals 2 million euro.

¹ A dedicated template has been provided. It is downloadable at the Complementary data Section.