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H2020-NMP-2015-two-stage

Deadline Date

Stage 1: 26-03-2015 17:00:00

Stage 2: 08-09-2015 17:00:00

Budget: €148,370,000

Link:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-nmp-2015-two-stage.html

Nanomedicine therapy for cancer NMP-11-2015

Specific challenge: Promising pre-clinical nano-medicine proof-of-concepts have been developed for the therapy of cancer, but their translation into clinical therapies remains a major challenge. An important bottleneck is up-scaling under Good Manufacturing Practice (GMP) conditions for the production of the nanomedicines from the pre-clinical laboratory scale to the quantity needed for clinical testing.

Scope: The aim is to **translate promising novel nano-technology enabled therapies for cancer with pre-clinical proof-of-concept, from a pre-clinical lab stage up to Phase I clinical testing**. The project shall start from an established pre-clinical proof-of-concept, with relevant efficacy and toxicity data. The project shall be focused on the translation process, so that ultimately new effective therapies can be introduced to the European healthcare market. An important aspect is the development of a pilot line for scaling-up the production of the nanomedicines and the quality control, taking into account GMP and medical regulatory requirements. Projects may include the later stages of pre-clinical testing and Phase 1 clinical testing, but the latter is not a requirement. Nanopharmaceuticals may be manufactured with either a top-down or a bottom-up approach, using for example self-assembling technology. Applicants must describe, according to industrial criteria, how the various barriers for advancing their new therapy to clinical application will be overcome, including technical, IPR, competitive, commercial and regulatory criteria, with efficacy and toxicity. Attention must be paid to clinical trial design and the foreseen research and commercial path to market introduction has to be well outlined.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

The research is to be implemented from TRL 4/5 and target TRL 6/7.

Implemented as cross-KET activities.

Budget: between EUR 6 and 9 million

Expected impact:

- Potential major improvement in clinical cancer therapy, thereby providing enhanced quality of life for patients (taking gender and other diversities into account).
- Potential reduced direct and indirect healthcare costs linked to the disease and its treatment.
- Accelerated introduction of new nanotechnology enabled cancer therapy, through robust manufacturing and quality control procedures for new nanotechnology enabled drugs.

Type of action: Research & Innovation Actions

Biomaterials for treatment and prevention of Alzheimer's disease NMP-12-2015

Specific challenge: An estimated 7.3 million Europeans between 30 and 99 years of age suffered from different types of dementias in the EU27 in 2006 (14.6 per 1 000 inhabitants), most of these being of the Alzheimer's variety. Innovative approaches based on biomaterials can improve the treatment and prevention of neurodegenerative disorders such as Alzheimer's disease.

Scope: Proposals should **develop new multifunctional biomaterials**, as part of eventual Medical Devices and Advanced Therapies, which aim **to create, optimise, enhance, substitute or support preventive and therapeutic interventions in Alzheimer's disease**. They can include: biocompatible and biodegradable biomaterials as part of minimally invasive treatments, theragnostic materials, and biocompatible materials that are easily degraded/cleared after completing their roles. The development of new drug candidates for Alzheimer's and clinical trials are excluded.

The development of new integrated experimental and computational approaches aimed to describe interface processes and their determinants should be considered as the key step for the design of safe and performing materials. Experimental protocols should be planned taking due account of current good laboratory practice (GLP) and ISO guidelines. Standardisation and manufacturing processes can be addressed, including upscaling, good manufacturing practice (GMP), process analytical technology (PAT), and regulatory work in respect of relevant regulations as appropriate.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Activities expected to focus on Technology Readiness Level 5.

Budget: between EUR 6 and 8 million

Expected impact:

- Improved quality of life due to minimally invasive action;
- Reduced direct and indirect costs linked to the disease and its treatment;
- Implementation of relevant objectives of the European Innovation Partnership on Active and Healthy Ageing (COM (2012) 83).

Type of action: Research & Innovation Actions

Materials innovations for optimisation of cooling in power plants NMP-15-2015

Specific challenge: Currently, power generation requires enormous amounts of cooling water, ranking second to the volume of water used for agriculture. As an example, a typical 500 MW thermal electricity plant equipped with a cooling tower evaporates 26 million litres of water per day (the equivalent of the daily water consumption of more than 43 000 EU families). Once-through cooling systems consume less water but withdraw significantly more: the same plant equipped with a once-through system would withdraw typically 1.4 billion litres of water per day, returning it to the water source about 10-15°C warmer. Such systems not only impose serious burdens on the local water management and the environment, but also limit the development of distributed power generation (foreseen by the SET plan) by their stringent requirements concerning cooling. The lack of adequate cooling water may even lead to power plant shutdowns.

Scope: Proposals should develop **robust materials solutions for optimising cooling in thermal power** plants by

- Allowing their functioning at higher temperatures, thus increasing their efficiency and reducing the amount of water withdrawn or consumed;
- Allowing the use of alternative cooling fluids (including air-based or hybrid coolants); and
- Increasing the available effective water supply, either by permitting to upgrade the quality of the water (e.g. using membranes) or by improving the robustness of the cooling equipment. Proposals should include activities to test the proposed solutions in relevant existing pilot plants.

Note: Thermal power plants include, inter alia, plants fired by coal, natural gas, liquid fossil fuels, as well as geothermal and solar thermal plants. Non-thermal power plants, such as wind turbines or PV plants/installations consume considerably less water during their operational life; projects should not focus on materials solutions to reduce the water consumption in such non-thermal plants.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Activities expected to focus on Technology Readiness Level 6.

Budget: between EUR 6 and 10 million

Expected impact:

- Significant reduction of the amount of water, in particular cleaner water, used in thermal power plants within one or more application areas;
- Implementation of relevant parts of the Materials Roadmap Enabling Low Carbon Energy Technologies (SEC(2011)1609); and relevant objectives of the SET-Plan (COM (2009)519).

Type of action: Innovation Actions

Extended in-service service of advanced functional materials in energy technologies (capture, conversion, storage and/or transmission of energy) NMP-16-2015

Specific challenge: Functional materials are enabling the large scale market penetration of secure, sustainable and affordable energy based on low-carbon, decentralised power generation. The benefits of using advanced functional materials can often be demonstrated in terms of, e.g., more efficient energy generation, storage or transmission, under controlled conditions. The high up-front investment costs of new power plants or decentralised sources requires lifetimes of the order of 20 to 25 years, with minimal down and service time. However, not enough is known about the degradation of such materials during long-term service. This can seriously hamper the industrial uptake of such materials, increase initial investment costs due to the over-specification of the material requirements; or increase the exploitation costs, either by increased downtimes due to materials related failure or because of more intensive maintenance schedules.

Scope: Proposals should investigate the **long-term in-service degradation of functional materials that have already demonstrated enhanced performance** in terms of energy capture, conversion, storage and/or transmission, and the capability of a production at a scale that could warrant an industrial uptake. Proposals must include relevant modelling and testing under realistic conditions at pilot level. They should focus on improving the practical understanding of long-term in-service degradation on the performance of the functional material and its impact on the overall performance of the technology components and systems. The development of improved materials solutions, as well as relevant roadmaps and a catalogue of good practices, should be included.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Activities expected to focus on Technology Readiness Level 6.

Budget: between EUR 6 and 10 million

Expected impact:

- Reduction of the capital (CAPEX) and/or operating (OPEX) expenditures in specific low carbon energy technologies;
- Implementation of relevant parts of the Materials Roadmap Enabling Low Carbon Energy Technologies (SEC(2011)1609); and relevant objectives of the SET-Plan (COM(2009)519).

Type of action: Innovation Actions

Materials for severe operating conditions, including added-value functionalities NMP-19-2015

Specific challenge: The need to develop materials which can perform well in severe operating environments is increasing with advances in technology and requirements for higher efficiency in all areas such as manufacturing, energy, transport and communications, deep-sea technologies etc. Another important driver for advanced functionalities, e.g. self-diagnosis and self-healing, comes from the incorporation of nanoscale and molecular materials components. This poses a major challenge for materials science, and requires a fundamental understanding of how the processing, microstructure, nanostructure and properties of such material interact in order to enhance their response under more severe conditions.

The general aim is to develop new products or components with a step change in efficiency or performance compared to existing ones, for operation in e.g. high radiation environments, highly corrosive environments, under high friction conditions, low temperature environments, deep sea or space environments, or other extreme climate conditions.

Scope: Projects should **develop bulk materials that can function within an aggressive environment** without property degradation, synthesise new structures with useful properties, and force chemical reactions that normally result in damage to proceed along selected pathways that are either benign or initiate the self-repair of damage.

Projects should include appropriate numerical tools (e.g. density functional theory, molecular dynamics) to capture the multi-scale evolution of damage (e.g. friction/corrosion or corrosion/irradiation synergies should be considered); and predictive modelling tools for materials operating in extreme environments. Standardisation and/or the production of (certified) reference materials may also be addressed as an integrated part of the proposal. Proof of concept in terms of product and/or process must be delivered within the project, excluding commercially usable prototypes, but convincingly demonstrating scalability towards industrial needs. The cost effectiveness and commercial potential of the innovative technologies compared to state-of-the-art solutions currently available on the market should be quantified during the project, with the involvement of end users. The environmental sustainability and end-of-life considerations of each proposed solution should also be assessed with special emphasis on efficient materials usage.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Activities expected to focus on Technology Readiness Level 5.

Budget: between EUR 6 and 8 million

Expected impact:

- Increase in competitiveness and sustainability of European industry through high value products and manufacturing processes in the application sector;
- Employment and training through engagement in cutting-edge technologies.

Type of action: Research & Innovation Actions

Fibre-based materials for non-clothing applications NMP-22-2015

Specific challenge: New approaches to improve the functionality of materials are important for the sustainable development of Europe's competitiveness. Fibre-based materials for technical, high -value, high -performance products at reasonable prices, with improved safety and functionality, represent a challenge for materials science and engineering.

Scope: Proposals should aim to develop engineered **fibre-based materials for novel, smart, high-value and high-performance non-clothing parts and products for technical and industrial use**. New approaches and production technologies will enable a broader spectrum of industrial applications, taking into account, as appropriate, issues of sustainability, recycling, safety, energy, and self-cleaning or other functionalities. Portable final products may also be considered.

In order to ensure the industrial relevance of the research, the cost effectiveness and commercial potential of the innovative technologies compared to state-of-the-art solutions currently available on the market should be quantitatively monitored during the project. A market estimate should be outlined in proposals and developed in projects, with recommendations for future industrial uptake.

Proof of concept in terms of product and/or process must be delivered within the project, excluding commercially usable prototypes, but convincingly demonstrating scalability towards industrial needs. Dedicated multiscale modelling and characterisation, and standardisation or the production of (certified) reference materials may also be addressed.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Activities expected to focus on Technology Readiness Level 5-6.

Budget: between EUR 6 and 8 million

Expected impact:

- Increase in competitiveness and sustainability of European multiple sectors industry through innovative high value products and manufacturing processes;
- Employment and training through engagement in cutting edge technologies in various sectors, e.g. transport, construction, sport and leisure etc.

Type of action: Innovation Actions

Novel materials by design for substituting critical materials NMP-23-2015

Specific challenge: Many technologies with significant socio-economic benefits face material requirements that are, or may be, problematic due to their instable, insecure or price-volatile supply. Research is needed in particular to improve our fundamental understanding of the development of **new material solutions with a reduced or completely eliminated critical content**, while maintaining or enhancing the performance of the materials, components and products. Examples may be the critical raw materials (see COM(2011)25 and related documents) or those materials which may be hazardous or pose a risk to human health and/or the environment.

Scope: Proposals are called for to investigate the development of such materials by rational design, with focus on the **combination of theory with large-scale computational screening**. Validation by experimental methods should be included.

In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation according to the current rules of participation is encouraged, in particular with Japan and the United States of America. The quality of the international cooperation will be rewarded in the evaluation of the proposal.

Activities expected to focus on Technology Readiness Level 3-4.

Budget: between EUR 3 and 5 million

Expected impact:

- Reduced use or substitution of critical materials for well-defined technologies;
- Improved performance of industrial products in the longer term;
- Safer and/or more sustainable materials, components and products;
- Contribute to achieving the EU policy COM(2011)25: Tackling the challenges in commodity markets and on raw materials; and other relevant EU policies.
- Contribute to achieving the objectives of the EIP on Raw Materials.

Type of action: Research & Innovation Actions

Low-energy solutions for drinking water production NMP-24-2015

Specific challenge: Low-energy solutions are badly needed for water softening and especially for water desalination. The present technologies for large scale desalination of seawater are stuck at energy consumption rates around 3 kWh/m3 whilst the target has been set at 1 kWh/m3 years ago.

Scope: Approaches that may bring better performance and lower energy use may be based on (but are not limited to) a combination of membrane filtration (reverse osmosis, ultrafiltration incl. micro-nano filtration) and applying electric potential, electrochemical membrane processes, membrane distillation, selective ion conducting materials, or crystallisation of clathrates. Projects should develop integrated solutions or combinations of technologies that come closer to the mentioned target.

Projects should aim at developing pilot plants demonstrating the low energy consumption as well as the overall competitiveness of the technology.

The implementation of this proposal is intended to start at Technology Readiness Levels 4-5, target Technology Readiness Levels 6-7.

In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with developing countries.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Wherever possible, proposers could actively seek synergies, including possibilities for funding, with relevant national / regional research and innovation programmes and/or cumulative funding with European Structural and Investment Funds in connection with smart specialisation strategies. For this purpose the tools provided by the Smart Specialization Platform, Eye@RIS3 may be useful[1]. The initial exploitation and business plans will address such synergies and/or additional funding. Exploitation plans, outline financial arrangements and any follow-up will be developed further during the project. The results of these activities as well as the envisaged further activities in this respect should be described in the final report of the project.

Budget: between EUR 5 and 8 million

Expected impact:

- Contribution to one of the main global societal issues – access to safe and pure water;
- Improved performance, energy efficiency and usability of high-performance water purification systems;
- Benefit the European water purification industry through new product developments in this important growth market.

Type of action: Innovation Actions

Increasing the capacity to perform nano-safety assessment NMP-29-2015

Specific challenge: Systems biology, high throughput screening and toxicogenomics approaches have the potential to revolutionise how chemical substances, including nanomaterials, are assessed for regulatory and risk management purposes. A paradigm shift in toxicology using innovative techniques such as High Thoughput Screening (HTS) approaches, Toxicogenomics and High Content Analysis (HCA) is being established. With such approaches it is possible to identify underlying affected pathways (so called 'toxicity pathways'). The challenge is to develop and demonstrate a mechanism-based understanding of toxicity, which will enable improved toxicity testing by identifying novel endpoints essential to tailor-made first tier hazard and risk assessment of novel and emerging materials.

Scope: Projects should enhance the understanding of the mechanisms underlying any observed adverse effects from engineered nanomaterials, and ultimately link the potential for such adverse effects to specific physical or chemical nano scale properties.

They should establish and demonstrate the basis for the development of appropriate tools to maximise read across (taxa and nano properties) and assess which tools or endpoints may not necessarily be applicable across the board. These approaches should aim to support the grouping of nanomaterials, to help in developing intelligent testing strategies and identifying "nanomaterials or properties of concern" that need to be tested more thoroughly.

Activities expected to focus on Technology Readiness Level 4.

Budget: between EUR 4 and 8 million

Expected impact:

- New screening tools to enhance the efficiency of end-rate at which nanomaterial hazard profiling can be performed
- Facilitate faster definition of nanomaterials toxicity mechanisms
- Enable "safer by design" approaches, tailored to stakeholders' needs (modellers, industry and regulators)
- Data in a recognised and accessible database for use beyond the lifetime of the project
- Provision of solutions to the long-term challenges of nanosafety and nanoregulation

Type of action: Research and Innovation Actions

Next generation tools for risk governance of nanomaterials NMP-30-2015

Specific challenge: The conventional risk assessment approach, i.e. deriving no-effect levels or limit values from dose-effect relationships is inadequate for enabling safe use for newly developed materials in the fast moving market of nanomaterials. The challenge is to build a state-of-the art and flexible risk banding tool to keep pace with developments in innovation and risk research by harvesting and implementing results from concluded, ongoing and planned research in next generation risk governance frameworks. For nanotechnology, as with any new and rapidly evolving technology, analysis of risk is technically and methodologically limited, and thus associated with a high degree of uncertainty which should be understood and quantified. Stakeholders' concerns, including those of the insurance sector, and risk perception should be understood and communicated. Risk acceptance is strongly affected by a clear understanding of the risks, the benefits and the uncertainties perceived on equity and trust.

Scope: Research should focus on the testing, the calibration and the further development of risk prioritisation (or banding) tools for both human and environmental risks, with emphasis on:

a) the use of inputs from computational toxicology and/ or 'high concern grouping approaches' in risk banding tools to identify potential hot spots for risk,
b) Scientific foundation of the 'risk bands', by linking the hazard based with 'dose' relevant exposure banding,
c) Inclusion of data and monitoring strategies on the efficacy of risk mitigation measures and
d) Alignment with user capacities and needs, including ensuring the ability of the nanomaterial sector to avail of risk transfer/insurance.

The selected project should identify the major processes of individual and societal decision making, placing particular attention on the aspect of uncertainty. To ensure the highest possible quality in regulatory decision making, emphasis should be given to the development of guidance for important issues in Risk Assessment, based on in-depth analysis of the current scientific basis concerning the addressed hazards and the possible exposure, and joining forces with other projects

Activities expected to focus on Technology Readiness Level 5.

Budget: between EUR 6 and 8 million

Expected impact:

- A framework for the risk governance of nanomaterials entering the market by developing tools for risk appraisal, risk transfer and guidance for risk communication;
- Demonstration in specific industrial settings or industrial sectors of the feasibility of the developed approaches and tools through worked examples as case studies and pilots with outcomes as guidance, good practices and tools for risk management and risk communication;
- Leveraging and building on current knowledge related to hazard mapping, exposure and control banding and risk prioritization as well on inter/national and company level risk governance and risk dialogue efforts with key stakeholders including regulators and insurers.

Type of action: Research & Innovation Actions

H2020-NMP-PILOTS-2015

Deadline Date: 26-03-2015 17:00:00

Budget: €64,430,000

Link:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-nmp-pilots-2015.html

Integration of novel nano materials into existing production lines NMP-02-2015

Specific challenge: Nanomaterials are intended to improve the performance of existing production technologies, and to give new functionalities to products, such as lightweight solutions for transportation and construction, enhanced properties for packaging materials and processes, decreased wear and friction of yarns, enhanced electrical performance and reliability and high-performance thermal insulation and UV shielding fibrous materials (e.g. hollow fibres). However, such new nanomaterials need to be introduced into production and the correct controlled conditions need to be created and maintained in industrial processes.

Scope: Development and demonstration in operational environments; the integration of technologies and processing for using novel nanomaterials in production; to improve the control and monitoring of the conditions required for the use of nanomaterials in industrial processes; to increase the level of robustness and repeatability of such industrial processes; to optimize and evaluate the increased performances of the production lines in terms of productivity and cost-effectiveness; to assess the functionality and performance of the produced component/product.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Wherever possible, proposers could actively seek synergies, including possibilities for funding, with relevant national / regional research and innovation programmes and/or cumulative funding with European Structural and Investment Funds in connection with smart specialisation strategies. For this purpose the tools provided by the Smart Specialization Platform, Eye@RIS3 may be useful[1]. The initial exploitation and business plans will address such synergies and/or additional funding. Exploitation plans, outline financial arrangements and any follow-up will be developed further during the project. The results of these activities as well as the envisaged further activities in this respect should be described in the final report of the project.

The implementation of this proposal is intended to start at TRL 5-6, target TRL 7, Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Accelerated market uptake of nanomaterials and products in one or more of the following sectors: fibre, yarn and textile; biomedical products, packaging products; energy; construction and building; and transportation. This non-exhaustive list does not preclude submission and selection of proposals addressing other sectors.
- Improvement in existing manufacturing processes and equipment through integration of nano materials, demonstrating better resource efficiency, safety, sustainability and recyclability of a wide variety of components and final products.
- Improvement in technical knowledge on the integrated manufacturing processes for nanomaterials in terms of productivity, environmental performance and cost-effectiveness.

- Contribution to development of business plans that encourage private sector investment for future business growth.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[2].

Type of action: Innovation Actions

[1] http://s3platform.jrc.ec.europa.eu; the relevant Managing Authorities can be found at http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm

[2] EU Nano-safety strategy 2015-2020 and NanoReg project

Manufacturing and control of nanoporous materials NMP-03-2015

Specific challenge: There is a constantly growing interest in nanostructured porous materials, thanks to the many applications that can benefit from controlled porosity at the nanoscale. Nanoporous materials can have many kinds of pore geometries, structures and chemical compositions and possess unique surface, structural, and bulk properties that underline their important uses in various fields. While various methods are available for creating nanoporous materials in a laboratory environment, scaling-up and meeting the industrial demands in terms of quality and costs remain a challenge.

Scope: Proposals should address the development and demonstration in relevant industrial environments of reliable processes control and manufacturing routes, to obtain nanoporous materials with controlled porosity distribution or gradient aiming at improved mechanical properties, reliable permeation rate, different electrical properties, anti-fouling or other bio-, photo- or thermo-chemical/physical properties.

Proposals should demonstrate the effectiveness of the developed approaches and technologies, through a pilot line aimed at the production of semi-finished products. The process and the material proposed should support and reflect developing guidance and standards relating to nanomaterials aspects.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Wherever possible, proposers could actively seek synergies, including possibilities for funding, with relevant national / regional research and innovation programmes and/or cumulative funding with European Structural and Investment Funds in connection with smart specialisation strategies. For this purpose the tools provided by the Smart Specialization Platform, Eye@RIS3 may be useful[1]. The initial exploitation and business plans will address such synergies and/or additional funding. Exploitation plans, outline financial arrangements and any follow-up will be developed further during the project. The results of these activities as well as the envisaged further activities in this respect should be described in the final report of the project.

The implementation of this proposal is intended to start at TRL 4-5, target TRL 6. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Supporting European competitiveness through accelerated market uptake of nanoporous materials in one or more of the following application fields: transport; energy; construction and building; biomedical; catalysis; sensors; filtration, purification and chromatography; This non-exhaustive list does not preclude submission and selection of proposals addressing other application fields;

- Improvement in cost-effectiveness and sustainability of nanoporous materials with a verified market viability of the pilot line;
- New market opportunities through introduction of novel products enabled by nanoporous materials;
- Demonstrated scaling-up of production of nanoporous materials, leading to higher production volumes, improved reliability and repeatability of products with lower production cost;
- Improvement in technical knowledge concerning manufacturing processes of nano porous structuring of materials with innovative methods and solutions.
- Contribution to on-going and future standardisation work in the field[2]
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[3].

Type of action: Innovation Actions

[1] http://s3platform.jrc.ec.europa.eu; the relevant Managing Authorities can be found at http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm

[2] See Mandate M/461 addressed by the European Commission to CEN/CENELEC and ETSI. http://www.cen.eu/cen/Sectors/Sectors/Nanotechnologies/Documents/M461.pdf

[3] EU Nano-safety strategy 2015-2020 and NanoReg project

Novel nanomatrices and nanocapsules NMP-06-2015

Specific challenge: Encapsulation technologies have been widely used for a long time in the pharmaceutical industry for drug delivery applications. The emergence of nanotechnology and the availability of novel tools have paved the way for a new type of nanomatrices and nanocapsules, which can be used for targeted delivery and can carry payloads for localised action in many application fields.

Scope: Proposals should address applications for safe, controlled and reliable novel nanomatrices and nanocapsules containing active ingredients (e.g. drugs in nanomedicine, vitamins or anti-oxidants for cosmetic and personal care products, or cleaning and antimicrobial agents for housecleaning products), as well as their manufacturing processes. Different types of nanomatrices and nanocapsules are required, depending on the nature of the material (hydrophobic or hydrophilic) to be incorporated. Technical challenges relate to the production techniques involved (such as coacervation or phase separation) for improving the stability of the nano formulation and the active ingredients (payload) involved; development of novel mechanisms for the release of the payload (e.g. in response to changes in temperature or pH) is a further challenge. Nanomatrices or nanocapsules as carriers for targeted delivery could also be addressed. Safety considerations and contribution to standardization should be an integral part of the projects.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Activities expected to focus on Technology Readiness Level 4-5. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Supply of safe, energy- and resource-efficient manufacturing systems for nanomatrices and nanocapsules, with the potential for radical improvements in therapy and/or quality of life;
- Benefit the European healthcare and/or consumer sectors through novel new systems and improved collaborations between the key actors in the value chain;
- Paving the way for the future commercialisation of such products, based on an analysis of the efficacy, safety and cost-benefit of products utilising nanomatrices/nanocapsules for the end-users or patients.
- Identification of gaps in standards, paving the way for future pre-normative activities in the field.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[1].

Type of action: Research & Innovation Actions

[1] EU Nano-safety strategy 2015-2020 and NanoReg project

Additive manufacturing for tabletop nanofactories NMP-07-2015

Specific challenge: Additive manufacturing (AM) delivers a new manufacturing paradigm: it makes the rapid, distributive manufacture of complex objects possible, and has the potential to reduce waste. What is truly transformative about additive manufacturing is the potential to manufacture individual products anywhere in the world, and to customise each of them. Rather than make manufactured goods in one place and ship them around the world, additive manufacturing technologies, such as 3D printing makes it possible to send design blueprints instantaneously via the internet, and manufacture them when and where they are needed.

3D printers are growing in sophistication, and can create increasingly complex objects, including those with different component parts. Breakthroughs in techniques such as metal sintering and processing of ceramic materials mean that 3D printers are no longer restricted to generic plastics. The use of nanoparticles in 3D printing is progressing rapidly, and could vastly increase the range of products that can be manufactured in this way.

Scope: As a part of a wider initiative towards nano-manufacturing, the objective of this topic is to advance the state-of-the art of AM materials through modification of their fundamental material properties using nanotechnology and to develop novel additive manufacturing techniques that incorporate new functionalities and/or significant performance increase, e.g. by utilising printable high-strength materials in the manufactured components. For example, carbon nanotube or other functional nano-structures could be embedded and combined with the printing process to perform electronic functions such as sensing and communications, or bio materials, such as flexible polymers or ceramics could be used to create bio-inspired structures.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Activities expected to focus on Technology Readiness Level 4-5. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Enabling Europe to compete at the forefront of the additive manufacturing revolution, which in the long term will lead into entire new production and consumption paradigms;
- Enabling manufacturing activities by SMEs to enter markets with innovations that were not possible before;
- Widening the range of available AM materials and functionalities in products will accelerate the transition of AM from mere prototyping towards production and use;
- Enabling functionality embedded in AM parts displaces the need for multiple manufacturing operations, making AM processes even more cost effective, including for small series production;
- Enabling the identification of future development needs in related fields, e.g. in seamless design-to-manufacturing software and standardization for material and process quality.

- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[1].

Type of action: Research & Innovation Actions

[1] EU Nano-safety strategy 2015-2020 and NanoReg project

H2020-LEIT-BIO-2015-1

Deadline Date

Stage 1: 26-03-2015 17:00:00

Stage 2: 08-09-2015 17:00:00

Budget: €28,840,000

Link:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-leit-bio-2015-1.html

New bioinformatics approaches in service of biotechnology BIOTEC-2-2015

Specific challenge: One of the greatest challenge facing the biotechnology community today is to be able to make use of the vast and dynamic influx of "omics" data. The synchronised development of bioinformatic concepts and related computational tools for prediction and modelling is a prerequisite to enable the exploitation of this wealth of biological data as a source of new biotechnological applications. These can range from industry and health to the environment and agriculture. Ethical aspects such as those related to confidentiality, sensitive data and data property are relevant to some bioinformatics applications.

Scope: Proposals should develop innovative bioinformatics approaches to close the gap between data availability and the discovery of new biotechnological applications. Proposals should in particular address the needs of SMEs active in the bioinformatics sector and should take into consideration international activities with the objective of fostering global solutions, standards and interoperability. Practical testing for validation of bioinformatics approaches should be considered.

Ethical aspects are to be addressed if relevant to the targeted research. Activities will span between Technology Readiness Levels 3 and 5. Key challenges in this endeavour are:

- Development and/or integration of application-oriented databases taking into account the physical distribution, semantic heterogeneity, co-existence of different computational models and data and, as a consequence, of different interfaces.
- New efficient statistical approaches for increased interpretative and predictive capacity of data, which are taking into account of the molecular complexity of living systems.
- Innovative visualization methods, dedicated to an integrative and synthetic representation of large and heterogeneous datasets involving intuitive tools for visualising and examining data.

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Facilitated access, handing and exploitation of existing databases paving the way for new biotechnological applications.
- Bridging existing information from various application areas.
- Accelerated process design and reduced time-to-market enabled by bioinformatics tools such as modelling and prediction.

Type of action: Research & Innovation Actions

Metagenomics as innovation driver BIOTEC-6-2015

Specific challenge: Metagenomics has the potential to provide unprecedented insight into the form and function of heterogeneous communities of microorganisms and their vast biodiversity, without the need for isolation and lab culture of particular organisms. Microbial communities affect human and animal health, support the growth of plants, are critical components of all terrestrial and aquatic ecosystems and can be exploited to produce fuels or chemicals. However, in order to expand their potential further, the metagenomic methodologies need to overcome a number of challenges such as those related mainly to standardisation of experimental design, screening, sequencing technologies and bioinformatics relevant techniques.

Scope: Proposals should address the development of technologies that form the metagenomic toolkit to guide future developments in the field with view to enable metagenomic approaches responding to societal and industrial needs. Similarly, epigenetic modifications and the RNA and protein data (e.g. on cell-cell level) could be addressed to elucidate functional dynamics of communities of microorganisms. Activities will span between Technology Readiness Levels 3 and 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Metagenomic methodologies to enabling enhanced understanding of communities of living organisms and empower agricultural, industrial, medical and other applications. This should bring significant and measurable improvements in productivity, yields, quality and functionality, as well as reduction of costs for the end-users.
- Reduced time-to-market thus strengthening competitiveness of European industry and SMEs.
- Identification of, for instance, human drug targets, commercially useful traits in agricultural plants, genes in microorganisms with industrial applications or unravelling pathogens, as well insights into microbial biodiversity for environmental applications.
- Contribution to the standardisation work in the field at European and international level.

Type of action: Research & Innovation Actions

H2020-ICT-2015

Deadline Date: 14-04-2015 17:00:00

Budget: €561,000,000

Link:
http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-ict-2015.html

Generic micro- and nano-electronic technologies ICT-25-2015

Specific Challenge: The objective is to keep Europe's position at the forefront of advanced micro- and nano-electronic technologies developments. This is essential to maintain Europe's global position in the area and to ensure strategic electronic design and manufacturing capability in Europe avoiding dependencies from other regions. Advanced micro- and nano-electronics technologies enable innovative solutions to societal challenges.

Scope: The focus will be on the grand technological challenges in information processing and communications based on memory and logic devices, circuits and architectures for advanced CMOS technologies. It will also be on the exploration of new alternative information processing devices and microarchitectures for existing or new functions. The objective is to sustain the historical integrated circuit scaling cadence and reduction of cost/function into future decades.

a. Research & Innovation Actions

Extending MOSFET to the end of the ITRS roadmap and making "Beyond and Extended CMOS" devices compatible with CMOS (integration, systemability and manufacturability). Focus will be on **high mobility substrates for performance improvement, new switch architectures for reduced energy dissipation, 3D approaches, new information carriers, emerging memory devices and on interconnecting nanoscale objects and novel interconnect architectures**. The projects may include activities related to **modelling and simulation: e.g. quantum and atomic scale effects**. Exploratory research on Graphene devices will be handled under the Graphene Flagship and therefore not included under this objective.

Integration of functionalities in a system-on-chip (SoC) or system-in-package (SiP) by using nanostructures and/or nanodevices.

New computing paradigms like quantum computing and neuromorphic computing with a focus on their future integration with Si technologies.

Design for advanced nanoelectronics technologies. Focus will be on design-technology solutions for energy efficiency, high reliability and robustness.

b. Innovation Actions targeted to provide access for academia, research institutes and SMEs to advanced design tools and IC fabrication, including access to technology platforms for piloting small series of advanced products. Actions should include training. Assessment for technology suppliers in nano-electronics to evaluate novel equipment, processes and building blocks with potential customers, including tools and methods for metrology and characterisation. This last area is open to international cooperation.

c. Coordination and support actions

International cooperation with USA and Asia in the areas of standardisation including in manufacturing (450 mm wafers); improved assessment of the potential impact on workers of the manipulation of nano-materials in the semiconductor fabrication process.

Development of common roadmaps; early technology benchmark/identification on promising novel technologies.

Awareness actions targeted at young students.

Expected impact:

- Regain market shares of the European electronic sector and reverse the declining EU market share in electronic components. Maintain the European manufacturing base and prepare the industry for future developments of the electronic landscape.
- At the economic level, secure the availability of essential parts in the value chain in Europe to design and manufacture innovative electronic components and systems.
- At technological level, sustain the historical integrated circuit scaling cadence and reduction of cost/function and strengthen the interaction between design and technology development; continue to increase the number of devices per mm2, with minimum features approaching 10 nanometers or per mm3 by developing 3D approaches, to maintain the industry pace of a doubling of transistor density every 18 months.
- At innovation level, facilitate the easy access to design tools and advanced IC manufacturing for academia, research institutes and SMEs, and for European equipment industry to validate their innovative equipment.
- Improved coordination in identified areas. Ensure that young people understand the fundamental nature and the importance of micro and nano-electronics technology for our future and want to work in this area.

Types of action:

a) Research & Innovation Actions – Proposals requesting a Small contribution are expected
b) Innovation Actions – Proposals requesting a Small contribution are expected
c) Coordination and Support Actions

Photonics KET ICT-27-2015

Specific Challenge: Further major S&T progress and R&I investments are required for sustaining Europe's industrial competitiveness and leadership in photonic market sectors where Europe is strong. Europe needs also to strengthen its manufacturing base in photonics to safeguard the further potential for innovation and value creation and to maintain jobs. Finally, Europe needs to better exploit the innovation capacity of the more than 5000 existing photonics SMEs and the innovation leverage potential of the more than 40 existing innovation clusters and national platforms.

Scope:

a. Research & Innovation Actions

Application driven core photonic technology developments for a new generation of photonic devices (including components, modules and sub-systems). Focus is on the following topics:

Optical communication for data centres: **Low-cost, energy-efficient photonic devices** supporting radically new system and network architectures driven by the emergence of exa-scale cloud datacentres. Actions should focus on optical inter- and intra-data centre transmission, switching and interconnects facilitating Tb/s interface speeds and Pb/s network throughput.

High-throughput laser-based manufacturing: **High-power, high-efficiency laser sources** (both continuous wave and pulsed); novel technologies and devices for beam delivery and for processing of multiple beams from laser source arrays; **high-performance optical devices and systems**; fast synchronisation of laser source and high-speed scanning devices.

PIC technology: **Device, circuit and fabrication technology for PICs (Photonics Integrated Circuits)**, suited for cost-effective volume manufacturing on semiconductor or dielectrics based photonic integration platforms. Actions may cover also electronic-photonic integration, as well as heterogeneous and hybrid integration technologies for PIC-based high-performance or high-density modules.

All RTD actions should address also the related materials, manufacturability, validation of results for the target applications, and standardisation activities, as appropriate. They should demonstrate strong industrial commitment, be driven by user needs and concrete business cases supported by strong exploitation strategies, and cover the value/supply chain as appropriate.

b. Innovation support through public procurement actions[1]

Pilot deployment of software-defined optics in backbone networks: Equip the networks of Public network operators (e.g., NRENs) with novel Software Defined Optical Networking technologies (from component level to system and network level) using first commercial hardware and software to transport high traffic volumes to demanding customers in a dynamic way.

c. Coordination and Support actions

Actions driven by the key stakeholders in photonics and targeting:

Open access of Researchers and SMEs to advanced design, fabrication and characterization facilities fostering the development of novel photonics solutions through the use of new materials, unconventional approaches and light-matter interaction.

Cooperation of photonic clusters and national technology platforms to stimulate the innovation potential of SMEs, based on business cases demonstrating a clear potential for sales and deployment growth.

Actions should link with on-going support actions providing access to advanced R&I services and capabilities with the aim to make them also accessible to researchers or to establish a network of innovation multipliers providing a broader technological, application, innovation, and regional coverage of such services and capabilities in order to address the needs of SMEs.

d. ERA-NET Cofund action

A joint call for proposals on a photonics topic of strategic interest, to be funded through an ERA-NET Cofund action between national and regional grant programmes.

Expected impact:

a. Research & Innovation Actions

Improved business opportunities and value creation in Europe by reinforced cooperation along the value chain.

Secured and reinforced industrial technology leadership and substantially increased market presence in high-bitrate optical communications for data centres and in laser-based manufacturing of high-quality products.

At least 10-factor reduction of power consumption and cost in communication technologies for (exa-scale) data centres.

Significant productivity increase and substantial leverage effects to many industries using laser-based manufacturing.

Measurable productivity increase in the manufacturing of complex PICs and sustained break-through innovations in new photonic products fabricated in Europe.

b. Innovation support through public procurement actions

Faster and wider roll-out and deployment of software defined optical networking technologies and deployment of value-added services and applications in Europe.

c. Coordination and Support actions

Demonstrable value generation of novel photonics approaches by researchers and SMEs through enhanced access to advanced fabrication and characterisation facilities.

Reinforced innovation effectiveness of cluster networks in particular towards SMEs with measurable value creation for SMEs in terms of number of business collaborations stimulated, penetration of new markets and/or new application areas close to the market, etc.

d. ERA-NET Cofund action

Closer cooperation and greater pooling of resources between regional, national and EU-wide research programmes in strategic photonics R&I areas.

Types of action:

a) Research & Innovation Actions – Proposals requesting a Small contribution are expected
b) Public Procurement of Innovation (PPI) Cofund actions; any remaining funds will be transferred to action type a. above.
c) Coordination and Support Actions
d) ERA-NET Cofund Action, any remaining funds will be transferred to action type a. above.

[1] Wherever appropriate, actions could seek synergies and co-financing from relevant national / regional research and innovation programmes, e.g. structural funds addressing smart specialisation. Actions combining different sources of financing should include a concrete financial plan detailing the use of these funding sources for the different parts of their activities.