Anexa 5.2.2. Proiecte FP7-NMP finantate

Development of Nanotechnology-based High-performance Opaque & Transparent Insulation Systems for Energy-efficient Buildings (NANOINSULATE)

NANOINSULATE will develop durable, robust, cost-effective opaque and transparent vacuum insulation panels (VIPs) incorporating new nanotechnology-based core materials (nanofoams, aerogels, aerogel composites) and high-barrier films that are up to four times more energy efficient than current solutions. These new systems will provide product lifetimes in excess of 50 years suitable for a variety of new-build and retrofit building applications.
Initial building simulations based on the anticipated final properties of the VIPs indicate reductions in heating demand of up to 74% and CO2 emissions of up to 46% for Madrid, Spain and up to 61% and 55% respectively for Stuttgart, Germany for a building renovation which reduces the U-value of the walls and roof from 2.0 W m-2 K-1 to 0.2 W m-2 K-1. This reduction could be achieved with NANOINSULATE products that are only 25 mm thick, giving a cost-effective renovation without the need of changing all the reveals and ledges. Similarly, significant reductions in U-values of transparent VIPs (3 W m-2 K-1 to 0.5 W m-2 K-1) are shown by substituting double glazed units in existing building stock. Six industrial & four research based partners from seven EU countries will come together to engineer novel solutions capable of being mass produced. Target final manufacturing costs for insulation board (production rates above 5 million m2/year) are less than 7 m-2 for a U-value of 0.2 W m-2 K-1.
NANOINSULATE will demonstrate its developments at construction sites across Europe. A Lifecycle Assessment, together with a safety and service-life costing analysis, will be undertaken to prove economic viability.
NANOINSULATE demonstrates strong relevance to the objectives and expected impacts of both the specific call text of the Public-Private Partnership Energy-efficient Buildings topic New nanotechnology-based high performance insulation systems for energy efficiency within the 2010 NMP Work Programme and the wider NMP & Energy Thematic Priorities.

New Advanced iNsulatiOn Phase Change Materials (NANOPCM)

The overall objective of NANOPCM is the development, implementation, production, and demonstration of low cost and improved Phase Change Materials for new high performance insulation components in existing buildings. For this purpose, different technical innovations will be carried out during this project:
New low cost stable thermal storage component based on the anchorage at nanoscale of organic PCMs between the polymeric chains of selected polymers. The PCMs will be based on by-products of different industries.
New thermal insulation inorganic nanofoam with thermal storage capacity by the impregnation with inorganic or organic phase change materials. The nanoporous material will help to improve the thermal behavior of the PCM and the innovative use of hydrated salts (inorganic PCM) in construction materials.
Improve the thermal behavior of the materials developed with the introduction of high thermal conductive nanomaterials, CNT or CNF inside their structures.
Improved organic phase change microcapsules with the incorporation of high thermal conductive nanomaterials, CNT or CNF in the shell which will provide better thermal transfer to the organic paraffin inside.

The objectives of this project will be achieved through 8 WP/s. WP1 is dedicated to project management, WP2-WP3 are related to the experimental development of the new materials and its characterization, WP5 to the study of the Life Cycle, the recycling possibilities and the minimization of the process cost. Finally, in WP4, WP6, WP7 and WP8 will be dealing with the validation, demonstration and dissemination of the results.

Development of a novel and cost-effective range of nanotech improved coatings to substantially improve NIR (Near Infrared Reflective) properties of the building envelope (COOL-COVERINGS)

Recent work has shown the possibility to drastically increase the reflection performance of the building envelop, using nanotechnologies. Standard metal oxides are already known for their solar reflection properties, but latest developments identified that nanotechnologies can improve Index of Reflectance from an average of 0,35 to 0,85 because of their effectiveness on Near Infrared wavelengths, even on non white surfaces.
The NIR reflective COOL-Coverings Project aims to develop an easy to use and cost-effective range of coatings that can be rapidly offered in the market of retrofitting and new constructions:
on the external walls;
on facades ceramics;
on the roofs, for which an already existing new generation membrane will incorporate a nanotechnological-based NIR reflecting coating;
on the internal walls and tiles, since the NIR-Reflecting nanocrystalline oxides can be developed in such a reflection range that may also cover the radiation from indoor heating systems.
Glazed envelops and windows have not been considered in the scope of the project since several players are already active with a considerable amount of scientific papers. First simulations showed that NIR reflective solutions allow interesting savings in cooling and heating bills, and pay off rapidly the initial investment. The more competitive target will be air-conditioned buildings with flat roof in hot Mediterranean coast, while there is a clear evidence that also buildings in northern continental climates will payoff the additional investment in the NIR technology, due to reflective properties of the internal walls.

New µ-CHP network technologies for energy efficient and sustainable districts (FC-DISTRICT)

The overall objective of the FC-DISTRICT project is to optimize and implement an innovative energy production and distribution concept for sustainable and energy efficient refurbished and/or new energy autonomous districts exploiting decentralized co-generation coupled with optimized building and district heat storage and distribution network. The concept is based on dynamic heat exchange between the building(s) (fitted with Solid Oxide Fuel Cells (SOFCs) for energy production collaborating with improved thermal storage and insulation building systems), the distribution system (optimized piping and district heating with or without a heat buffer) and the consumer (new business and service models), aiming to achieve energy balance at district level. Advanced insulation materials will be developed and implemented for the improvement of building and pipe thermal response. The energy reduction will originate from improved efficiency and cost effective high temperature (SOFC), to act as micro heat and power cogeneration (?-CHP) systems providing demand-flexible electricity and heat to the building and district, coupled with optimised energy and power distribution networks that will optimally control heat storage at building and/or district

level. FC-DISTRICT integrates a proven innovative mid-term energy technology (SOFC) with heat management at building and district level (building thermal storage coupled with intelligent distribution networks) to serve the consumer needs for economy-ecology-sustainability. It introduces a new paradigm in energy efficiency by developing materials, technologies, methodologies and systems specifically intended for integration at district level.

Plug-and-produce COmponents and METhods for adaptive control of industrial robots enabling cost effective, high precision manufacturing in factories of the future (COMET)

Yesterday s, today s and tomorrow s challenging and dynamic economic environment forces European high-end manufacturing industry to focus on high flexibility, high quality, reliability and low life-cycle costs and to respond quickly to changes in this environment. The high-end manufacturing industry requests production systems that can quickly switch between diverse machining operations with short changeover, programming and set-up times without compromising quality, reliability or life-cycle costs. From a conceptual point of view, industrial robot technology could provide an excellent base for machining being both flexible (due to their lay-out) and cost efficient (robots cost 2-5 times less then machine tools). However, industrial robots lack absolute positioning accuracy (1), are unable to react in real time to changing process conditions (2) and lack reliable programming and simulation tools to ensure first time right machining once production commences (3). These three critical limitations prevent industrial robots from being integrated in high-end machining processes. The COMET consortium will provide a revolutionary Plug-and-Produce solution enabling the use of industrial robots for high end machining processes, appreciating the needs from the manufacturing industry for cost effective, flexible and reliable manufacturing solutions. The proposed solution will be on the average 30% more cost effective than dedicated machine tools whilst delivering absolute positional accuracy of at least 50 µm. Due to the sense of urgency in Europe s manufacturing industry the COMET consortium defined an ambitious work plan of only 30 months to develop and demonstrate the innovations planned and meet the objectives set. These ambitious goals and the planned dissemination and training activities encourage a quick uptake by the manufacturing industry. Over a 5 years period, the estimated impact is 45M to 50M justifying the investment from the EC and the COMET partnership.

Plug and Produce Joint Interface Modules (POPJIM)

PoPJIM identifies critical performance limiting problems in machine tool design and use. The project idea is based on two crucial innovative solutions: i) replacing conventional machine tool structural joint interfaces by a self configuring and optimising mechatronic module called Joint Interface Module, JIM, made of functional materials and ii) a wireless network consisting of these modules and a machining process proxy to enable adaptive control and plug and produce capability to the JIMs. JIMs are designed to adapt the dynamic behaviour of a machine-tool during its interaction with the cutting process. Traditionally dynamic instability in a machining process is controlled by tuning the process parameters to match with the inherent dynamic characteristics of the machine tool structure which often results in lowering the rates of production.
The novelty of the JIM concept is instead of changing the process parameters; dynamic stiffness of the machine tool is controlled to maintain the process stability. The Distributed Wireless Configuration and Control Network enables plug and produce capability and decentralised control of JIMs through a wireless communication network. This development is essential for achieving modularity and plug and produce capability for JIM-based machine

tools. Controlled design of JIMs allows the dynamic behaviour of the machine tool to be predictable with more accuracy. The mechatronic design of the JIM includes an integrated control system and embedded intelligence which enable to be self-adaptive for optimising the dynamic stiffness within its design range during a machining process. The results of research and development work will be demonstrated in industrial context and there is a dissemination and exploitation activity to reach out potential stakeholders.

Advanced Intelligent Machine Adaptive Control System (AIMACS)

Current machining technologies and practices have many inefficiencies. Numerous unpredictable machining variables often cause overload and unstable conditions and catastrophic damage to the machine tool system. In addition, this results in frequent disruptions in production that can often be excessive, leading to considerable losses in productivity, capital and energy resources. In an effort to prevent these occurrences, process planners, programmers and operators are forced to adopt a conservative approach and they program for the worst case scenarios - resulting in considerable inefficiency in machine tool utilization. The objective of the project is to develop active, self-optimizing intelligent adaptive control systems which will continuously analyse a wide range of monitored parameters of the machining process and automatically adapt the machine operation in real-time to its optimal performance in order to account for continuously varying machining conditions, production disruptions and anomalies, plant performance variations and random changes in production plans.
AIMACS will develop reliable techniques for monitoring the most critical machining parameters such as cutting load, vibrations and energy consumption. Based on this information and taking into account the costs for tools machining time, maintenance time, energy, etc. AIMACS will optimise in real time the overall production process based on productivity/cost criteria in order to ensure effective adaptive and sustainable machining As a plug-and-produce system, AIMACS will be applicable to newly built machines and also for retrofit to the installed base of existing machines in the European manufacturing industry. Since the installed base of machines in Europe is estimated to be more than 1,000,000 machines, the impact of AIMACS on the efficiency, productivity and competitiveness of the European domestic manufacturing industry should be very substantial.

Toolkit for building low cost robot co-workers in assembly lines (LOCOBOT)

The European automotive industry and their component manufacturers are facing the biggest shift in their history. The transition from combustion engines to electric drives (e-vehicle) requires pro-duction facilities that can initially deal with low and varying production volumes and can quickly be up-scaled to large numbers at need. LOCOBOT provides a solution to this problem by developing a flexible robotic assistant platform to support manual production processes and increase the produc-tivity and precision of such tasks. LOCOBOT does not only include the robot itself but also the en-gineering tools that are required for quickly building the robot, setting up its control structure and defining its tasks. Facing the demographic change, a further goal of LOCOBOT is the improvement of ergonomics in industrial production processes. A group of key players in the automotive industry, in automation components, advanced robots and engineering software will be supported by a group of excellent researchers to solve the technical and scientific challenges in LOCOBOT.
The results will be demonstrated by setting up 3 typical and highly relevant use cases in a pilot production line of Audi AG. The automotive industry will benefit from LOCOBOT by having a robot assistant that can be quick-ly reconfigured in terms of its kinematic structure as

well as its tasks. This allows them to make manual production processes much more efficient, to quickly up-scale a production process if re-quired and to improve working conditions by reducing the need to lift heavy objects (such as wheel hub drives for the e-vehicle). This will enable the industry to achieve a leading position in the the e-vehicle market and to keep up with the expected customer demand. The immediate impact (2-5 years) of LOCOBOT will be about 150 MEur in savings due to increased flexibility and efficiency, and will be 10 times as much in the following years depending on how the production numbers of the e-vehicle evolve.

Hierarchical and Adaptive smaRt COmponents for precision production systems application (HARCO)

The primary goal of HARCO project is to achieve cost-effective structural solutions consisting of a new class of Smart Components (belonging to machine tools applications) based on plug-and-produce Modular Adaptronic devices which integrate smart and multifunctional actuators/sensors capable of performing a wide array of multiple functions, ranging from high and adaptable damping and stiffness characteristics to more demanding new requirements, such as active structural measurement and control function to achieve extremely high dynamic/thermal stability required in fast and precision machining. The approach followed by HARCO is the hierarchical combination of lower level units (named here Functional Bricks to generate higher level modules (named here Adaptronic Modules) which in turn are used and integrated into machine parts to generate the master component (named Adaptive Smart Components). Then the basic idea is to design and develop a sort of fractal and hierarchical elements (not only mechanical hardware but also controllers and software) that can be easily put together (plugged-in) to form/produce higher level modules/components (modules that build modules!) for active vibration control, thermal compensation and adaptive fixturing in precision machine tools applications.

Plug and Produce Components for Optimum Dynamic Performance Manufacturing Systems (DYNXPERTS)

Self-sufficient intelligent plug-and-produce components with advanced sensing and actuating functionalities, e.g. based on smart materials. Able to adapt their range of properties, depending on the changing process conditions. Use vibration for energy harvesting to drive the intelligent system. Smart materials: compensation of static and / or thermally induced dislocations, vibration damping and decoupling of oscillations. High accuracy in production systems under different conditions and to overcome the traditional limitation of dynamics versus precision. Active participation of industrial partners, including SMEs, covering demonstration activities including pilot implementations in industrial settings.

Customised Wearable Functionality and Eco-Materials Extending the limits of Apparel Mass customisation (MICRO-DRESS)

The Micro-Dress project aims to extend the limits of feasible garment customisation for men s, ladies and kids garments, to include for the first time user-configurable wearable functionality, as well as user-selectable degree of material eco-friendliness.
The challenges related to both added value aspects will be researched in order to prove these concepts within a pragmatic framework based on two distinct business/supply chain models:
Extension of existing mass customisation model of an International Brand (Ermenegildo Zegna),

Expansion of an innovative mass-customisation model (micro-factories), targeting innovative SMEs. The
Objectives are:
Development and deployment of direct-write rapid manufacturing techniques for the production of portable garment integrated microelectronics components.
Derivation of eco-efficiency and eco-logistics related prediction algorithms and web-tools enabling user configurable eco-certification, based on materials and processes information along the supply chain (yarn to garment).
Development of a new biosensor-based screening test which can revolutionise the process of consumer health related garment components screening (fabrics, accessories, etc).
Development of an e-supply chain management platform to model the sourcing of e-devices and the concept of configurable eco-certification along the two supply chains (vertical brand chain, supply network of micro-factories).
The platform will be built on the principle of Software as a Service, to maximise it s exploitation potential. The results will be demonstrated by two pilots, one focussing on the user configurable eco-certification, the second on the customisable attachment of safety e-devices. The project brings together a multidisciplinary Consortium of 9 partners, of which 5 are SMEs, two are prominent EU Institutes and two are leading Textile and Clothing Groups.

Distributed Cloud product specification and supply chain manufacturing execution infrastructure (MANUCLOUD)

The objective of the ManuCloud project is the development of the service-oriented IT infrastructure...

Customer-oriented and eco-friendly networks for healthy fashionable goods (CORENET)

The objective of CoReNet is to address consumer needs and expectations of wide range of European citizens as well as specific target groups - such as elderly, obese, disabled, or diabetic persons -by supplying small series of functional and fashionable clothes and footwear of high quality, affordable price and eco-compatibility. Therefore the European Textile, Clothing and Footwear Industry will be able to provide customised health fashionable goods for relevant social niches, so improving its market shares. In order to to design, develop, produce and distribute the related small order quantities in a cost- and eco-efficient way a new framework and components for new collaborative networking will be developed, enabling to stay as long as digital and to produce on-demand.
This includes: a) consumer integrated collaborative eco-oriented design, and configuration of 'healthy' wearables using web-enabled virtualisation and 'green' materials, b) a radical renewal of critical value creation steps by the adoption of Rapid Manufacturing technologies for optimised digital printing and laser engraving; and c) the overall integration and co-ordination of business processes and information exchange by a set of new (web)services for network design and ad-hoc (re-)configuration, for real-time planning, forecasting and replenishment, and for tracking and tracing of ecology and quality. Within COReNet framework, all partners of the value creating sectors will become able to co-ordinate value creation processes, with the end consumer as driving actor. CoReNet will be collaboratively tested and demonstrated within industrial plants, thus showing the full potential of the new sustainable collaborative cross-sector networking approach.

Photopolymer based customized additive manufacturing technologies (PHOCAM)

Lithography based additive manufacturing technologies (AMT) are capable of fabricating parts with excellent surface quality, good feature resolution and precision. With recent developments in the field of ultra-short-pulse lasers and light engines based on light emitting diodes, robust and economical light sources have become available. This project aims at developing integrated lithography-based additive manufacturing systems which will, for the first time, facilitate the processing of photopolymer-based materials for the factory of the future. The focus of the project is to unite industrial know-how in the field of supply chain management, software development, photopolymers and ceramics, high-performance light-sources, system integration and end-users in order to provide a fully integrated process chain at the end of the project.
The consortium will rely on two core-technologies:
Digital light processing (DLP) based processes will be used to process ceramic-filled photopolymers, leading to fully dense ceramic parts at the end of the process chain.
Two photon polymerization (2PP) will be used to fabricate high-resolution structures with features in the range of 100-200nm. Both processes will be tuned to reduce system cost, and significantly increase throughput and reliability at the same time. Goal is to deliver 'first-time-right' strategies for the involved end-users.
This necessitates the development of supply chains with integrated quality sensors. Targeted applications include thread guides for textile machinery, ceramic moulds for the fabrication of high-performance turbine blades and microstructures for computer tomography equipment.

Sustainable Mass Customization - Mass Customization for Sustainability (S-MC-S)

The S-MC-S project aims at supporting European manufacturing to adapt to global competitive pressures by developing methods and innovative enabling technologies towards a customer oriented and eco-efficient manufacturing. To this end, S-MC-S vision is to define and research a new production paradigm, Sustainable Mass-Customization, while also presenting Customization as one of the main driving forces behind the future success of Sustainability.
Nowadays, companies still fail to profit from mass-customization because of:
there is no real networked environment, based on a common strategy and appropriate Supply Chain, meant to empower mass customization along the entire value chain, nor specific methodologies and tools to handle Mass Customization (MC) implementation. Current industrial MC solutions are focused on single companies, thus far behind from the implementation and exploitation of the concept of multi site multi nation factory (and the related logistic, legislative, organizational aspects);
the evaluation of Mass Customization implementation must move beyond the mere assessment of economic aspects, steering towards the integration of Environmental and Social consequences into the assessment of the value chain. S-MC-S addresses these issues by promoting 4 RTD Pillars: 1)Design Tools: defining methodologies and tools capable to manage growing complexity of product, production and supply chain configurations imposed by MC implementation in a networked environment. 2)Assessment model: defining the assessment model needed to evaluate the impact of production systems and different supply chain configurations 3)Business Model: defining the framework and strategies for creating economic, social and ecological value through the systematic implementation of S-MC-S paradigm. 4)New specific MC technology: researching pilot MC enabling technology in 3 different sectors, to support manufacturing transition towards sustainable MC (leather; furniture; stone)

A Web-based Collaboration System for Mass Customization (E-CUSTOM)

Mass production no longer seems suitable for today s market and is being replaced by mass customization. The need for satisfying the individual customers requirements is now stronger than ever. Customers require that the product they buy fulfils their personal requirements in an individualized manner. New technologies can now make it possible to prepare unique designs of products, manufacture these products and communicate on a mass basis. The first objective of the proposed research is to engage customers in the design and development of personalized products from the initial product design up to the after market segment. A web-based system can now tailor information or products to the customer.
Specifically, potential customers will be given the opportunity to modify a set of characteristics, including the choice of materials as well as the modification of the standard geometry and appearance specifications of parts belonging to a carefully chosen, personalization-enabling, series of components of different models and variants. The second main objective is to reach an efficient level of decentralized manufacturing. The project aims to develop tools that will support the manufacturing and/or assembly of selected parts outside the central manufacturing site.
Depending on the selected customization options certain manufacturing processes will be possible to be carried out by the material/parts suppliers or by the local distributors and/or service providers in a coordinated manner. Additionally, the project aims to measure the environmental footprint of the possible solutions in order to be considered when deciding on the most appropriate manufacturing solution (where, how, who and when). In order to facilitate this process, a multi-layer data exchange infrastructure will be built in order to ensure interoperability between all users.

WaferLevelOptics - Specific Technological Developments to Create an Intelligent and Scalable Production Platform for Glass Optics Manufacturing (WAFERLEVELOPTICS)

To meet the future market needs by innovative approaches using state of the art machining equipment the overall goal of the project WaferLevelOptics is the development of a new production platform for wafer scale moulded glass optics.

Flexible Compression Injection Moulding Platform for Multi-Scale Surface Structures (IMPRESS)

IMPRESS targets the development of a technological injection moulding platform for serial production of plastic components incorporating micro or nano scale functional features. The platform will be based on the gathering of up to date and most advanced facilities based on three main modules, each of them being a tool box including several building blocks: - a tool manufacturing module involving different technologies of micro- nano direct manufacturing, from top-down to bottom-up such as self-assembling, - an injection moulding module including equipments fitted with up to date hardware to improve replication quality and capability, - an intelligence module dedicated to advanced process control and online metrology integration. Beside this large panel of facilities, three case studies have been selected (biology, health and energy), each of them requiring a specific and well defined surface micro-nano texturation.
These case studies cover a very large range of nano-feature (from 100 nanometer up to 1 micrometer) and component size (from 1 cm2 up to 1000 cm2). They will serve to qualify the capabilities of the different building blocks and will allow (i) to select the most suitable

building blocks as of application requirements (ii) to learn about the platform working and (iii) to anticipate the technological future of the platform. Finally, a technico-economic tool for decision making will be developed based on the IMPRESS case studies and thus to allow end-users to select the most appropriate configuration regarding the end product manufacturing requirements. Further to the IMPRESS case studies, the performances of the platform will be validated through a satellite group. IMPRESS technological platform will accelerate the production and the time to market of micro nano-scale functional feature on multi-component devices in order to obtain an important reduction of needed supply chain space, technological risk and manufacturing costs of next generation plastic part products.

Self-learning modular manufacturing platform for flexible, patient-specific cell production (CYTOFAB)

Personalized medicine (e.g. regenerative, such as cell therapy or patient-specific tested and composed pharmaceuticals) has huge potential. But to exploit this potential, it is necessary to produce human cells patient-specific in industrial scale. Nowadays, personalized cell production is only executed by means of manual processing on laboratory scale. In Order to make patient-specific production of cells available for a wide range of applications, CytoFab focuses on the development of an intelligent, modular manufacturing platform for flexible, patient-specific cell production which will increase efficiency of personalized cell production in quality and throughput. This objective will be reached by combining several high-sophisticated technologies such as a modular and scalable plug-in concept for the setup of cell production platforms, the application of a clean room and sterilization concept to keep cell cultures cross-contamination free, a micro-fluidic component for customized cell culture medium composition, inline monitoring methodologies to enable the evaluation of cell status within the production process, and a manufacturing execution system which includes a self-learning knowledge-based cell behavior and advanced cell process control functionalities for self-optimization of cell production processes. The latter is needed due to the individual nature of cells which makes it impossible, to process each cell with the same parameters without considerable variations in quality. With this high grade innovations, CytoFab will set a new standard in automated manufacturing technologies for personalized medicine applications.

Femtosecond laser printer for glass microsystems with nanoscale features (FEMTOPRINT)

FEMTOPRINT is to develop a printer for microsystems with nano-scale features fabricated out of glass. Our ultimate goal is to provide a large pool of users from industry, research and universities with the capability of producing their own micro-systems, in a rapid-manner without the need for expensive infrastructures and specific expertise. Recent researches have shown that one can form three-dimensional patterns in glass material using low-power femtosecond laser beam.

This simple process opens interesting new opportunities for a broad variety of microsystems with feature sizes down to the nano-scale. These patterns can be used to form integrated optics components or be developed by chemically etching to form three-dimensional structures like fluidic channels and micro-mechanical components. Worth noticing, sub-micron resolution can be achieved and sub-pattern smaller than the laser wavelength can be formed. Thanks to the low-energy required to pattern the glass, femtosecond laser consisting

simply of an oscillator are sufficient to produce such micro- and nano- systems. These systems are nowadays table-top and cost a fraction of conventional clean-room equipments.
It is highly foreseeable that within 3 to 5 years such laser systems will fit in a shoe-box. The proposal specific objectives are:
Develop a femtosecond laser suitable for glass micro-/nano- manufacturing that fits in a shoe-box
Integrate the laser in a machine similar to a printer that can position and manipulate glass sheets of various thicknesses
Demonstrate the use of the printer to fabricate a variety of micro-/nano-systems with optical, mechanical and fluid-handling capabilities.
A clear and measurable outcome of Femtoprint will be to be in a situation to commercialize the femtoprinter through the setting-up of a consortium spin-off. The potential economical impact is large and is expected in various industrial sectors.

Efficient and Precise 3D Integration of Heterogeneous Microsystems from Fabrication to Assembly (FAB2ASM)

FAB2ASM tackles a major problem in 3D integration that currently limits industrial take-up: high throughput and high accuracy 3D integration of miniaturized dies onto dies or substrates. This issue is extremely important for 3D integration of microelectronics and microsystems. 3D integration will take off in the next 5 years in all measures including total number of devices, the market share, as well as the density of the connections. The state-of-the-art integration technology for 3D microsystems relies on robotic pick-and-placing machines and machine vision, which cannot achieve simultaneously high-speed and high-precision. If high precision e.g. a micron is needed, either the cycle time of integration can be very long, from e.g. over ten seconds to minutes, or even not achievable.
The objective of the FAB2ASM is to develop highly efficient and precise die-level component integration technology based on hybrid assembly technology that joins robotic tools and self-alignment and corresponding interfacing methods for multi-functional microsystems. In contrast to most explorative self-assembly technology developed to-date, FAB2ASM attempts to develop a highly industry relevant technology that reuses most of the industrial process steps, but on the other hand dramatically improves the performance of the integration process in the precision and efficiency chart. FAB2ASM will allow handling small (100 µm) and/or thin dies (20 µm), ultra high speed assembly (40,000 UPH), and flip-chip capabilities, while ensuring industry proven reliability.
Led by AALTO, this consortium of 5 research centers and 3 industries (ST, NXP, BX) will join force to fulfil this urgent and important need of industry in 3D integration, and will demonstrate the merits in three industry led demonstrators: one manufacturing equipment demonstrator, one photonic IC demonstrator and 3D microelectronics demonstrator.

Development and analysis of polymer based multi-functional bactericidal materials (EMBEK1)

90% of bacteria are found attached to solid surfaces forming structures (bio-films) that are inaccessible to drugs and antibiotics. These bio-films represent a major problem in European society in both industry and health care. Currently, however, we understand little about how these bio-films form and, more importantly, how they can be prevented.
This lack of understanding means that patients often suffer unnecessary and painful infections following the formation of such films on surgical implants and catheters. With the growing problem of MRSA and C. difficile in hospitals, and the cost of policing and hygiene

measures, an understanding of how to prevent bacterial persistence in the hospital environment is critical to the sustainability of European healthcare. A multi-disciplinary group of European experts have the common aim to understand exactly how bacteria attach to, and persist on both biological and inert surfaces.
We will use a range of biological and physio-chemical techniques to study several fundamental aspects of bacterial attachment. We will employ new molecular microbiology techniques to understand the genetic components governing the interaction of a bacterial biotic cell surface with the novel antimicrobial surfaces we create.

Biofunctionalized metal and magnetic nanoparticles for targeted tumour therapy (NANO3T)

The cause of diseases is often unknown, but their origin can frequently be found at the biomolecular and cellular level situated on nm-scale. Early diagnostics combined with early intervention on that nanoscale is one of the holy grail of modern medicine. Inorganic nanoparticles are very promising agents in that respect. One of the promising biomedical applications of these nanoparticles is their use as agents for tumour hyperthermia. Hyperthermia is a form of cancer treatment that uses an elevated temperature to kill the tumour tissue. Compared to the more conventional surgical procedures, it is hailed as a less invasive approach that could be used for small, non-defined tumours.
Well-designed instrumentation in combination with engineered inorganic nanoparticles that (a) possess the desired physical properties to generate a local heat and that (b) can specifically target the tumour offer immense potentials for targeted hyperthermia therapy. The overall objective of the present multi-disciplinary project is to develop and to explore various metal/magnetic nanoparticles as agents for targeted tumour therapy. To strive for this overall objective, a successful integration and convergence of different technologies at the nanoscale is indispensable.

Enhanced sensitivity nanotechnology-based multiplexed bioassay platform for diagnostic applications (NANO-MUBIOP)

Currently, there is strong interest in the development of new bioassay techniques for gene identification, gene mapping, DNA sequencing and medical diagnostics. There are three main families of methods: Polymerase Chain Reaction, Enzyme-Linked Immunosorbent Assay and nano-particles agglutination techniques. All these methods suffer from several disadvantages as they are time-consuming and expensive, they are not quantitative and exclude multiplexing, i.e. the detection of different genotypes simultaneously. The need of a new multiplexing and quantitative bioassay technique is evident. The aim of this project is to develop a high sensitivity multiplexed platform based on a bio-non bio nanostructure able to enhance diagnostic capabilities by exploiting the dimensional shift from bio-systems to nanometric particles, thus overcoming many of the limitations of the existing methods.
This method could be adapted to the detection of many kinds of bio-systems, but the project will focus on Human Papilloma Virus (HPV) responsible for cancer. The project idea is based on the development of nanoparticles functionalised with probes complementary to HPV DNA conservative region and an array of specific bio-probes for the different HPV genotypes deposited on a solid substrate.

NanoTools for ultra fast DNA sequencing (NANODNASEQUENCING)

The demand for a next-generation of technologies for DNA sequencing that will provide fast and affordable DNA decoding is pressing. Present bio-chemical schemes are time consuming and expensive, thus cheap and fast alternatives for DNA reading are of great need. This is now internationally recognized. For example, the US NIH recently awarded 40M$ in grants overpiloting projects to spur development of these innovative technologies.
The goal of this project is to investigate a novel single-molecule DNA se-quencing nanotechnology protocol (gene sequencer) that has potential to sequence a molecule of genomic dimensions in hours without expensive and fault sensitive DNA copying steps and chemical reactions. The gene sequencer is based on the electrical characterization of individual nucleo-bases, while DNA passes through a nanopore with integrated nanotube side-electrodes. The research proposed here will provide a unique combina-tion of state of the art capabilities for cutting and usage of single wall carbon nanotubes as electrodes forming a lithographically fabricated nanogap with single-nanometer precision. In addition, the synergy of consortium resources for electrical characterization and leading theoretical skills for nanotransport will provide new solutions and information for an answer on the proof-of-principle question: is it possible to detect different types of DNA bases by their electrical properties?
The overall objective of our collaborative research is to develop cheap and high-speed DNA sequencing technology. This will be achieved trough the following steps:
Fabrication of single wall carbon nanotube junction-gate for molecular recognition;
Exploring the interaction and conduction mechanisms between DNA and nanotube-electrode and DNA-nanopore;
Electrical characterization of the DNA nucleobases;
Development of model nano-electronic device for single-base DNA electrical characterization and decoding.

Understanding interactions between cells and nanopatterned surfaces (NANOSCALE)

The study of biological processes occurring at the nanoscale is becoming a new discipline at the border between Physics and Biology with major scientific challenges and new technological applications. In fact, interactions at the nanoscale between cells/neurons and surfaces with specific nanopatterns appear to control several major biological processes, such as cell proliferation and differentiation.
The aim of the present NanoScale proposal is therefore to explore interactions between stem cells, neurons, neuronal networks and surfaces with specific geometrical nanopatterns and nanoprints of specific proteins and molecules. In order to do so, we have formed an interdisciplinary consortium consisting of five major European research centres (SISSA, TASC-INFM, DTU, NMI and ENS) with two SMEs (MCS, Promoscience) gathering biological knowledge and expertise in the fabrication of nanostructures and of their manipulation. The NanoScale proposal will produce and develop a variety of nanodevices for growing, guiding, manipulating cells, neurons and neuronal cultures.

Electrically modified biomaterials surface (BIOELECTRICSURFACE)

According to the World Health Organisation (WHO), cardiovascular diseases cause half the deaths in the EU. It is also the main cause of years of life lost (over 30 per cent) in early death thus causing huge pressure on the labour force and family earnings. The problem is becoming more acute in Central and Eastern European countries. Due to the ageing population in the EU, osteoporosis related bone fractures have almost doubled in the last decade. It is estimated

that 40 percent of women over 50 years in age will suffer from fractures due to low density bone.
The European Commission considers the application of nanotechnology an important research strategy to address these problems. For this, design and control of biomaterial at the nanometre scale is set as a strategic research priority. Europe is, however, seriously under-represented in the global market for nanotherapeutics, where the United States dominates with three-quarter of the market share. While the drive for nanoscale understanding of biological interaction can be high, the application of this knowledge in marketable devices should also be prioritised. Here, we propose electrical modification of biomaterials surface to manipulate surface charge that will mediate bio/non bio interactions in vivo.
We propose novel nanoscale techniques to probe this surface charge at the nanometre scale so that we have a quantitative insight to biological interaction at the biomedical device surfaces. Such an approach will help us to scale up electrical modification in cardiovascular stents, urological stents, orthopedic implants and photosterilisation devices. The research proposed here will not only provide nanoscale understanding of biological interactions on biomaterials surface but also result in novel applications and devices, which will penetrate into the market in short to medium term.

Bio-inspired self-assembled nano-enabled surfaces (BISNES)

Advanced nanofabrication can produce now nano-structures similar in size with single biomolecules or their self-assembled architectures. Capitalising on this strategic opportunity, BISNES focuses on the design, fabrication and implementation of biomimetic nanostructures which complement biomolecular surfaces and modulate the biomolecular activity.
The BISNES project will
develop software products for the representation and quantification of bimolecular surfaces, especially those that self-assemble in long-range nano-aggregates, interacting with artificial nanostructures;
design and fabricate nanostructured surfaces and objects that complementary replicate biomolecular surfaces; and
design, fabricate and implement novel hybrid bio-devices which exhibit quantum-leap increase in capabilities (e.g., sensitivity, response time, cost) or entirely new ones.
The project will deliver demonstrated technical solutions with impact on a wide range of applications and products: ultra-sensitive bio-diagnostics and drug discovery devices; inherently bactericidal surfaces, medical devices for the in vitro study of amyloid and cytoskeleton proteins central to critical disease (e.g., neurodegenerative diseases, cancer); and hybrid nanodevices that exhibit new electromagnetic properties useful for future IT devices.

Exploring cellular dynamics at nanoscale (EXCELL)

EXCELL is a novel innovative approach to explore interaction mechanisms between biological materials and systems/nanostructures. It involves a forward-looking cross-disciplinary and design-based research to generate an integrated, biologically inspired technological platform of high complexity, able to monitor cell dynamics at nano-scale. Expertise in cellular and molecular biology, nanosciences, material engineering, biophysics, biotechnology, modelling, and analytical chemistry, are combined to address the targeted goals, which go beyond the state of the art methods used in traditional biotechnology and systems biology.
EXCELL will provide a complete Lab-in-a-Cell (LIC) sensor and actuator platform, which is capable of:

studying single cells in their natural environment surrounded by other cells or a complex mixture of different cells/tissue,
following the dynamics and interdependence of single cell processes from gene, protein, metabolite to compound secretion, exocytosis and cell-to-cell communication,
testing how and where various stimuli affect the different levels of the molecular machinery and finally
programming cells to be able to differentiate into a particular phenotype.
A major task is the design of suitable biocompatible nano/bio interfaces that ensures a sustainable cellular environment.
EXCELL provides a unique opportunity for developing advanced, novel experimental tools to address fundamental problems of stem cell research and poses a potential for possible diversification and modulation of developmental programs of stem cells to differentiate them into specific phenotypes. EXCELL has the capacity to drive new discoveries having a significant impact not only in the field of stem cell research and clinical use, but also on molecular engineering, nanosciences, sensor development, diagnostics, therapeutics, biotechnology and industry (smart materials, medical diagnostics, pharmaceutical companies, start-ups)

Functional assays for membrane protein on nanostructured supports (ASMENA)

More than 50% of all drug targets are membrane proteins; new research tools to screen function of membrane drug targets are therefore expected to open up new avenues for original drug development. The proposed project addresses the need of the pharmaceutical industry for new technologies for reliable and efficient screening of membrane proteins as drug targets.
Most critical current aspects of membrane protein assays are
the lack of reliable procedures to immobilize membrane proteins on sensor surfaces in a format suitable for label-free high-throughput screening of drug candidates;
the need for downscaling assay formats to accelerate functional screening; and
the feasibility of reading out the diverse functions of membrane proteins.
The partners with highly complementary expertise and experience of working together will develop platforms for functional membrane protein assays by integration of the most recently gained knowledge and techniques.
The key concepts of the platforms include
exploitation of nanoporous substrates to enhance the stability of supported proteolipid membranes and their integration in a sensor chip format;
nanoscale surface modifications for directed self-assembly of proteolipid structures on chip; and
self-assembly of proteolipid membranes onto nano-sized sensor structures from proteoliposomes, and demonstration of the functionality in quantitative drug candidate screening assays suitable for commercial applications.
The project is expected to make a substantial contribution to improved understanding of lipid membrane and membrane protein interaction with designed nanoenvironments;
development of prototype products and intellectual property related to membrane protein sorting and handling;
new compounds for functionalization of biosensor applications;
cost-effective array-based concepts for nanoplasmonic and electrochemical sensing; and
functional assays for membrane protein drug targets.

Multi-scale formation of functional nanocrystal-molecule assemblies and architectures (FUNMOL)

Recent developments in the design and synthesis of nanoscale building blocks as active elements in opto- or bio-electronic devices with tailored electronic functionality have the potential to open up new horizons in nanoscience and also revolutionise multi-billion dollar markets across multiple technology sectors including healthcare, printable electronics, and security.
Ligand-stabilised inorganic nanocrystals (~2-30 nm core diameters) and functional organic molecules are attractive building blocks due to their size dependent opto-electronic properties, the availability of low-cost synthesis processes and the potential for formation of ordered structures via (bio) molecular recognition and self-assembly. Harnessing the complementary properties of both nanocrystals and functional molecules thus represents a unique opportunity for generation of new knowledge and development of new classes of high knowledge-content materials with specific functionality tailored for key applications, e.g., printable electronics, biosensing or energy conversion in the medium term, and radically new information and signal processing paradigms in the long term. Self-assembly and self-organisation processes offer the potential to achieve dimensional control of novel multifunctional materials at length scales not accessible to conventional top-down technologies based on lithography.

It is critical for European industry to develop new knowledge and low-cost, scaleable processes for assembly and electrical interfacing of these multifunctional materials with conventional contact electrodes in order to produce into tailored devices and products, in particular on low-cost substrates. The FUNMOL consortium will deliver substantial innovation to European industry via development of cost-effective, scaleable processes for directed assembly of high-knowledge content nanocrystal-molecule materials into electrically-interfaced devices at silicon oxide, glass and plastic substrates.

Bio-inspired self-assembled nano-enabled surfaces (BISNES)

Advanced nanofabrication can produce now nano-structures similar in size with single biomolecules or their self-assembled architectures. Capitalising on this strategic opportunity, BISNES focuses on the design, fabrication and implementation of biomimetic nanostructures which complement biomolecular surfaces and modulate the biomolecular activity.
The BISNES project will
develop software products for the representation and quantification of bimolecular surfaces, especially those that self-assemble in long-range nano-aggregates, interacting with artificial nanostructures;
design and fabricate nanostructured surfaces and objects that complementary replicate biomolecular surfaces; and
design, fabricate and implement novel hybrid bio-devices which exhibit quantum-leap increase in capabilities (e.g., sensitivity, response time, cost) or entirely new ones.
The project will deliver demonstrated technical solutions with impact on a wide range of applications and products: ultra-sensitive bio-diagnostics and drug discovery devices; inherently bactericidal surfaces, medical devices for the in vitro study of amyloid and cytoskeleton proteins central to critical disease (e.g., neurodegenerative diseases, cancer); and hybrid nanodevices that exhibit new electromagnetic properties useful for future IT devices.

Engineered self-organized multi-component structures with novel controllable electromagnetic functionalities (ENSEMBLE)

Growth of eutectics is recognized as a paradigm for pattern-forming. Self-organised structures of size scales reaching down to submicron and nano scale regime emerge due to the interplay of chemical diffusion and capillarity. The fundamentally novel CONCEPT of the present proposal is to utilize - for the first time - the eutectic self-organisation mechanism for preparation of multi-component and multi-scale structures with controlled physicochemical and structural properties, with geometrical motifs capable of generating novel, predictable and controllable electromagnetic functionalities. This requires a deeper understanding of factors influencing eutectic self-organisation mechanism on a submicron/nanoscale.
Accordingly, the main topic and activity of the present proposal is to generate new knowledge of the mechanism of eutectic self-organisation on this scale, by combining state-of-the-art experimental and modelling techniques. This new understanding of the underlying processes of eutectic self-organisation will then be used for the prediction and design of self-organised multi-component and multi-scale structures with controlled physicochemical and structural properties.

Toolbox for directed and controlled self-assembly of nano-colloids (NANODIRECT)

The proposed research aims at developing a toolbox for direct self-assembly of nano-colloids. Different methods to drive and modulate self-assembly in nano-colloids will be developed, compared and evaluated.
The toolbox will consist of the following elements:
Building blocks: model particles with varying shape, functionality and directional interactions will be synthesized
Directing Tools: Electric and Flow fields, surfaces and interfaces
Test and development methods: Experimental platforms adapted at nano-particle research and simulations methods, capable of dealing with a range of length scales.
The proposal specifically aims to study these methods which are prone to scale-up. The research consortium consists of leading groups in the filed of colloid science and engineering and soft matter research. The seeds of this toolbox are clearly present in the consortium including methods for production of model (field responsive) nanoparticles, unique experimental tools, theoretical skills and mesoscale simulation methods. The key idea is to gradually evolve in the research to be able to deal with smaller length scales and a wider range of directing fields.

Bottom-up resolution of functional enantiomers from self-organised mono-layers (RESOLVE)

The high throughput identification of resolution systems for industrially important chiral chemicals will be approached using the bottom-up hierarchical assembly from self-organised chirally nanostructured surfaces and the Dutch resolution family method to isolation of enantiomers. Molecular modelling, surface science, supramolecular chemistry and the critically important resolving library design will be used in synergy to develop systems which separate enantiomers and which can be patterned and miniaturised.
The preparation of chiral surfaces and the knowledge of chiral discrimination phenomena at the nanoscale will be exploited to use them to template the formation of diastereomers, which in turn will lead to the formation of crystals (whose composition will be determined) containing pure enantiomers. The project s end goal is a rapid method for the identification of resolving systems for optically active compounds, and would constitute a leap forward for the area.

A web-based repository of nanoscience and nanotechnology publications, database of researchers and online forum, to inform and facilitate networking between EU and ICPC RTD (ICPCNANONET)

The ICPCNanoNet project aims to provide an electronic archive of nanoscience and nanotechnology research publications and support the networking of researchers in the EU and ICPC. The electronic archive will be based on open-source software (EPrints) that is widely used by scientific institutions across the globe, and allows the incorporation of full-text open access publications (submitted by authors themselves) and the incorporation of entries from other publicly available sources (including other open-access repositories, electronic tables of contents and abstracts).
This will facilitate researcher access to new data and the identification of groups that are performing complementary research for potential collaboration. ICPCNanoNet will also establish a database of researchers and organizations in the EU and ICPC, which will include contact details, research interests and expertise. This database will be available to all registered users of the website, allowing researchers to search for individuals that have specific expertise and organizations that have desired instrumentation and capacity.

Transnational call for collaborative proposals in basic nanoscience research (NANOSCI-EPLUS)

NanoSci-E+ aims at launching, managing and carrying out the follow-up of a transnational call for collaborative projects in the field of basic nanoscience research, with a thematic focus on the interfacing of functional nano-objects . In the first phase of the proposed project, the call itself will be implemented, following modalities similar to those used for the first call run by NanoSci-ERA in 2006, while procedures will be amended in order to cope with identified weaknesses. The call will be based on a two-stage submission / evaluation procedure. The funding scheme will rely on a real (although partial) common pot to which a majority of countries will contribute. Mutualizing part of the budget permits to avoid trade-offs where the selection of projects would be determined by the availability of funds, in a manner detrimental to the objective of supporting the highest quality research.
The second phase of the project will deal with the management of the call budget, the follow-up activities and the monitoring of the call impacts. Because of the direct involvement of national agencies, NanoSci-E+ should contribute to blur further the distinction between national and European programmes. It is expected to encourage researchers to think European since their agencies give them the opportunity to finance indifferently national or transnational projects. The class of projects that can possibly fit within the scope of the planned call is clearly transverse to many disciplines of nanoscience and therefore accessible for the researchers of all the participating countries. In the same time, the topic is ambitious enough and resolutely forward-looking to make necessary a circulation of ideas, competencies and talents as well as a dialogue between different scientific approaches (inter-disciplinarity).

Innovative switchable shading appliances based on nanomaterials and hybrid electrochromic device configurations (INNOSHADE)

INNOSHADE is concerned with an innovative, nanocomposite-based switchable light transmittance technology developed previously for small sized objects (eyewear). It constitutes a breakthrough in smart shading technology by overcoming common limitations of state-of-the-art electrochromic devices. INNOSHADE enables the low cost production of electrochromic shading appliances with lower energy consumption and faster response.

The overall objective of the proposed project is to scale up and study the underlying nanotechnology-based processes from laboratory to pilot line production, with the major goal to explore and extend the application potential by creating interest in several prospective user groups across sectors. In three interrelated sub-projects dedicated to I. Ophthalmic lenses, II. Domestic appliances, and III. Aircraft and vehicle applications, procedures shall be implemented to establish pilot production lines for the individual device components as well as for their assembly to run-capable devices up to a size of 45 x 80 cm2 (automotive sunroof dimensions). Cost reduction will be accomplished via high through-put manufacturing methods such as continuous roll-to-roll processing to achieve demonstrators meeting essential market and consumer requirements. The work will be performed by a highly complementary, well-balanced consortium of 17 partners from 8 member states, 1 candidate state, and 1 third country, representing the entire value chain.
The proposed research closely addresses main S&T, socio-economic and policy objectives of the NMP work programme (integration of disciplines, transformation to knowledge-intensive industry, improvement of competitiveness, high added value products), shows clear environmental benefits and contributes to Sustainable Development. Strong industrial participation (4 SMEs, 1 large enterprise, 5 partly multinational global players) reflects the high economic development perspectives of the project.

Atmospheric plasmas for nanoscale industrial surface processing (PLASMANICE)

Atmospheric plasma techniques as processing methods have a number of advantages which include their ability to tailor the surface chemistry at the nanometre level. As such, the plasma treatments are energy efficient, reproducible and environmentally clean. In-line, continuous reel-to-reel processing equipment has been developed in the last 5 years. The wide scale application of this nano-processing technology in the pre-treatment of packaging materials in reel-to-reel processing has however been severely limited.
One of the main reasons for this is the relatively slow processing velocity for coating depositions. In general, the velocities need to be increased by 2-5 fold in order to fully exploit the new nano-processing techniques. This proposal will address these issues in order to assist in the transfer of atmospheric plasma processing technology from the laboratory scale to industrial level in the packaging industry. Special attention will go out to the very promising combination with sol-gel technology. A method and equipment for in-line plasma deposition of high-barrier bio-based coatings to be applied in conjunction with extrusion coating at industrial line speeds will be developed. The approach will exploit sol-gel coatings applied on the substrates by plasma deposition. The substrates include paper, cardboard and plastic films. Renewable, biobased and biodegradable materials will be used as extrusion coatings.
The project aims at replacement of fluoropolymer based grease barrier materials with sol-gel coated bioplastics and substitution of non-renewable barrier packaging films with renewables based materials in general. To achieve these objectives, several leading European institutes and universities in atmospheric plasma deposition technology (VITO and TUE), sol-gel development (FhG-ISC and VTT) and extrusion coating and analytics development (TUT and JSI) together with a range of industrial participants are incorporated in the proposal.

Nanomedicine ethical, regulatory, social and economic environment (NANOMED ROUND TABLE)

The fundamental objective of this Round Table exercise is to respond substantially to the need for genuine engagement and involvement of all the key stakeholders (public and private) in

the nanomedical field in preparing the groundwork for optimised and collective decision-making at the European level.
Although very promising, nanomedicine may add new dimensions to many ethical, social and economic issues. It is of primary importance to understand its possible impacts and provide for stakeholders a well-organised forum. The Round Table will bring together representatives from the nanomedical sciences and technologies involved, industry, patient groups, regulatory bodies, health insurance and policy making, and experts on the ethical, regulatory, social, economic and public engagement and communication and issues.
The goal will be to:
collect the most relevant information to be discussed of:
actual achievements and, separately, promises of nanomedical innovation - recommendations issued by the European Commission, Member States and exercises carried out by various national and international bodies
present these in a user-friendly format appropriate for each of the main stakeholder groups with questions to be discussed
carry out a consensual debate concluding with agreed recommendations between various positions
The Round Table will have important impacts by:
establishing a clear set of recommendations to support decision making at the European level
identifying priority areas for research and development and for societal actions
significantly enhancing the flow of knowledge reciprocally between each of the key stakeholder groups along the chain from research to patient
helping to reduce fragmentation in nanomedical research across Europe
contributing to mobilising additional public and private investment in nanomedical R&D in Europe
and overall thereby stimulating innovation in nanobiotechnologies for medical use.

Single molecule workstation (SMW)

This proposal aims at the development and application of an innovative single molecule workstation, enabling advances in the research happening throughout Europe and the rest of the world around the investigation of living cells. By combining three most advanced microscopic techniques into a single workstation, we aim at reaching a new quality level in the study of the molecular biology of living cells. The proposed single molecule workstation will be composed of three key elements:
inverted light microscope (ILM);
atomic force microscope (AFM); and
optical tweezers (OT).
A true virtue of this initiative is that by combining several ultra-sensitive microscopy techniques into a single workstation completely new horizons for molecular biology related studies are opened. The aim of this combined ILM-AFM-OT setup is to look at the surface topography using high-resolution AFM, to study the distribution of cellular molecules using high sensitive fluorescence and contrast enhanced light microscopy (ILM), and to measure molecular interaction forces with ultra-sensitive optical tweezers.
As a complementary method, photo-thermal nano-spectroscopy (PTNS) will be used to investigate spectroscopic properties of cellular material with a spatial resolution down to sub-100 nm which will enable chemical analysis of sub-cellular components. The combined setup will provide a qualitatively new level in microscopic studies, giving unprecedented versatility in the detection and monitoring of cellular events with highest spatial and temporal resolution.

The proposed single workstation will be used for the study of the correlation between structure and function of living cells with applications in immunology and cancer research.

Multi-functional analytical focussed ion beam tool for nanotechnology (FIBLYS)

The project FIBLYS aims at developing an innovative nanostructuring, nanomanipulation and nanoanalysis instrument: a hybrid scanning probe (SPM) and dual beam focussed ion beam (FIB) instrument (including scanning electron microscopy (SEM) capabilities). In addition to an instrument based on conventional dual beam FIB(SEM) technology, an SPM/FIB(SEM) microscope will use both techniques, integrated in a compact setup offering capabilities that not only combine the techniques but allow for nanoanalysis and nanostructuring/-manipulation options that the single instrument or sequential use of the techniques is unable to achieve.
This FIBLYS hybrid device will allow to use all FIB capabilities while imaging the procedures with the integrated SEM. The SEM has the options of chemical analysis through Energy Dispersive X-ray analysis (EDX) and structural analysis through Electron Backscatter diffraction (EBSD). The combination of SEM and SPM provides for the combination of nano-scale chemistry and crystallography imaging via electron-matter interactions (EDX, EBSD) with the information from tip-sample interactions like topography or magnetic/electrostatic force imaging.

Equipment and methodology for multi-dimensional scanning probe microscopy (MDSPM)

The ability to perform scanning tunnelling spectroscopy simultaneously with a measurement of the vertical and lateral tip-sample interaction force and energy dissipation on selected atomic or molecular sites is the next revolution in scanning probe microscopy and will revolutionise entire areas of surface science. The aim is to develop, manufacture and commercialise a new UHV low temperature multi-dimensional scanning probe microscope (MDSPM). The two dimensional force and energy dissipation measurement is performed via micro-fabricated cantilevers with relatively high spring constants (200-2000N/m) which are simultaneously driven on their flexural and torsional oscillation modes with sub-Angstroem amplitudes.
The deflection sensing is achieved by a focussing Fabry-Perot sensor with an up to 100 MHz bandwidth and an unprecedented sensitivity down to 1 fm/sqrt (Hz). The high bandwidth allows the detection of higher oscillation modes and harmonics. While high resonance frequencies are favourable to measure local energy dissipation processes arising from stochastic force fluctuations the detection of higher harmonics may be used to directly reconstruct the force field from a site-specific measurement performed at a selected surfaces site at one fixed tip-sample distance.

Combined SIMS-SFM Instrument for the 3-dimensional chemical analysis of nanostructures (3D NANOCHEMISCOPE)

The objective of this project is to develop an innovative and novel combination of a new TOF-SIMS with substantially improved lateral resolution and sensitivity, combined with a new metrological high resolution SFM. The two techniques provide complementary information on nanoscale surface chemistry and surface morphology. In combination with a layer by layer removal of material using low energy sputtering, quantitatively measured by SFM, this combined ultra-high vacuum (UHV) instrument will be unique for the 3-

dimensional chemical characterisation of nanostructured inorganic as well as organic materials with down to at least 10 nm lateral resolution and down to 1 nm depth resolution. Joint by a novel software for the calculation and display of 3-dimensional distributions of all chemical species, this leads to a totally new 3D NanoChemiscope.

Coordination of nanometrology in Europe (CO-NANOMET)

Nanotechnology has the ability to become the most promising technology advance for the 21st Century. It offers a huge potential of applications and economic benefits, which may contribute to the European economy. Scientifically and economically, nano-metrology is an indispensible part for nanotechnology which must develop hand in hand with the developments of nano-science and

Novel concepts, methods, and technologies for the production of portable, easy-to-use devices for the measurement and analysis of airborne engineered nanoparticles in workplace air (NANODEVICE)

Due to their unique properties, engineered nanoparticles (ENP) are now used for a myriad of novel applications with great economic and technological importance. However, some of these properties, especially their surface reactivity, have raised health concerns, which have prompted scientists, regulators, and industry to seek consensus protocols for the safe production and use of the different forms of ENP
There is currently a shortage of field-worthy, cost-effective ways - especially in real time - for reliable assessment of exposure levels to ENP in workplace air. In addition to the problems with the size distribution, a major uncertainty in the safety assessment of airborne ENP arises from the lack of knowledge of their physical and chemical properties, and the levels of exposure. A special challenge of ENP monitoring is to separate ubiquitous background nanoparticles from different sources from the ENP. Here the main project goal is to develop innovative concepts and reliable methods for characterizing ENP in workplace air with novel, portable and easy-to-use devices suitable for workplaces.
Additional research objectives are
identification of relevant physico-chemical properties and metrics of airborne ENP; establishment of reference materials;
exploring the association between physico-chemical and toxicological properties of ENP;
analyzing industrial processes as a source of ENP in workplace air;
developing methods for calibration and testing of the novel devices in real and simulated exposure situations; and
dissemination of the research results to promote the safe use of ENP through guidance, standards and education, implementing of safety objectives in ENP production and handling, and promotion of safety related collaborations through an international nanosafety platform.

Comprehensive assessment of hazardous effects of engineered nanomaterials on the immune system (NANOMMUNE)

Engineered nanomaterials (ENs) present tremendous opportunities for industrial growth and development, and hold great promise for the enrichment of the lives of citizens, in medicine, electronics, and numerous other areas. However, there are considerable gaps in our knowledge concerning the potential hazardous effects of ENs on human health and the environment. Our EU-US partnership is committed to filling these knowledge gaps through a comprehensive assessment of ENs, with particular focus on effects on the immune system.

The immune system is designed to respond to pathogens and foreign particles, and a core concept underpinning the current project is that the recognition versus non-recognition of ENs by immune-competent cells will determine the distribution as well as the toxicological potential of these materials. Our multidisciplinary consortium will focus on the procurement, synthesis and detailed physico-chemical characterization of representative categories of ENs, and the monitoring of potential hazardous effects using an array of in vitro and in vivo systems, as well as transcriptomic and oxidative lipidomic testing to determine specific nanotoxic profiles (signatures) of these materials. The final and integrative component of our research project is risk assessment of potential adverse effects of ENs on human health, and the dissemination of our findings.
Through our comprehensive approach, which combines analytical procedures from many different disciplines and leading experts from several national institutes devoted to occupational and environmental safety, we aim to establish a panel of read-out systems for the prediction of the toxic potential of existing and emerging ENs, thus enabling a continuous and sustainable growth of the nanotechnologies. Overall, the results generated through this international program will contribute to the understanding and mitigation of possible adverse effects of nanomaterials.

The reactivity and toxicity of engineered nanoparticles: risks to the environment and human health (NANORETOX)

NanoReTox will identify the potential risks to the environment and human health posed by free engineered (i.e. manmade) nanomaterial by comprehensively addressing five key questions:
How does the environment into which nanoparticles are released affect their physicochemical properties and their bioreactivity?
How does this impact on their ability to interact with and/or penetrate mammalian and aquatic cells and organisms (bioavailability) and will bioavailability result in toxicity?
Is there a pattern of cellular reactivity and/or toxicity related to physicochemical properties, i.e. a hierarchy of activity?
What combination of conditions discovered in (1-3) above are most likely to pose a risk to human health and the environment?
How can this information be incorporated in a risk assessment model?
We have assembled a team of experts from across the EU and the US whose combined expertise can address these questions in depth, and therefore comprehensively cover the scope of research topic NMP-2007-1.3-2 Risk assessment of engineered nanoparticles on health and the environment.

Do nanoparticles induce neurodegenerative diseases? Understanding the origin of reactive oxidative species and protein aggregation and mis-folding phenomena in the presence of nanoparticles (NEURONANO)

As the use of nanoparticles becomes more prevalent, it is clear that human exposure will inevitably increase. Considering the rapidly ageing European population and the resulting increase in the incidence of neurodegenerative diseases, there is an urgent need to address the risk presented by nanoparticles towards neurodegenerative diseases. It is believed that nanoparticles can pass through the blood-brain barrier. Once in the brain, nanoparticles have two potential major effects. They can induce oxidative activity (production of Reactive Oxygen Species), and can induce anomalous protein aggregation behaviour (fibrillation).

There are multiple disease targets for the nanoparticles, including all of the known fibrillation diseases (e.g. Alzheimer s and Parkinson s diseases).
The factors that determine which nanoparticles enter the brain are not known. Nanoparticle size, shape, rigidity and composition are considered important, and under physiological conditions, the nature of the adsorbed biomolecule corona (proteins, lipids etc.) determines the biological responses. The NeuroNano project will investigate the detailed mechanisms of nanoparticle passage through the blood-brain barrier using primary cell co-cultures and animal studies. Using nanoparticles that are shown to reach the brain, we will determine the mechanisms of ROS production and protein fibrillation, using state-of-the-art approaches such as redox proteomics and isolation/characterisation of the critical pre-fibrillar species. Animal models for Alzheimer s diseases will confirm the effects of the nanoparticles in vivo. At all stages the exact nature of the nanoparticle biomolecule corona will be determined.

Engineered nanoparticles: review of health and environmental safety (ENRHES)

The overall aim of the ENRHES project is to perform a comprehensive scientific review of the health and environmental safety of fullerenes, CNTs, metal and metal oxide nanomaterials. The review will consider sources, pathways of exposure, the health and environmental outcomes of concern, in the context informing the regulation of the potential risks of engineered nanoparticles. We will employ a standardised information management strategy and a matrix approach to maximise the gain to partners and beneficiaries involved with the review.
The specific objectives will be to review information on:
production, use and exposure to the target engineered nanomaterials
persistence, bioaccumulation and interactions of the engineered nanoparticles in living & environmental systems;
differences in toxicity posed by variations in size, type and chemical composition.
On the basis of the review, prioritised recommendations on each of the above points will be developed and set in the context of informing policy makers in the development of methods to address exposure as it relates to the potential hazards posed by engineered nanoparticles, and in the development of appropriate regulation.

Nano health-environment commented database (NHECD)

We propose to use our recent advanced research results and build a novel and useful automatic database on the impact of nano-particles on health and environment, which will be hosted and maintained by a expert software company based in Europe. The strength and innovation is double folded: primarily in automatic extraction and understanding from free text, which is in particular suited to create a comprehensive database in the nano-particles area; and secondly creating automated tools for appropriate evolving ontology assisted by leaders in toxicity in Europe. The team has proven mathematical and computerized world level skills in the general area of Information Technology pertained to database, data warehouse and text mining on one hand, and in toxicity of nano-particles in particular on the other hand.
The proposed database will be automatically and manually updated with state-of-the-art information, which will be automatically understood and extracted into a relational database and data warehouse that can be accessed by the public and agencies through the internet. These three tiers (information gathering, deep analysis, and presentation) will keep the database updated and easily used for complex queries. The database will serve a variety of communities, from regulators to scientists, companies, new activities and the general public

with all aspects of toxicity from nano particles. The database and the internet site will also serve for expert information cooperation and exchange and for dissemination of information in this evolving domain, which has huge potential applications, where toxicity should be considered in advance.

Setting up research intensive clusters across the EU on characterization of polymer nanostructures (NAPOLYNET)

NaPolyNet is a 36-month project involving 16 partners from 10 European countries. The objectives are: 1. to network at regional, national and international level with experts on the characterization of polymer nanostructured materials in the field of packaging, textiles and membranes, bridging the gap between scientific and engineering approaches for the improved understanding of the structure-performance correlation in polymer devices; 2. to facilitate transnational access to important and unique equipment and to train young scientists and SMEs technologists; 3. to harmonize the work necessary for new standards in the field of characterization of polymer nanostructures for packaging, textiles and membranes. NaPolyNet will also focus on latest findings for managing the safety implications of polymer nanostructure along the life-cycle of those products. The activities are grouped into 7 work-packages (WP): After setting up the procedures for managing the project (WP1), the team will map the competences in the different fields of characterization of polymer nanostructures and will set up an European Open Laboratory (EOL) open to outside the consortium partners (WP2) incorporating the best and novel characterization methodologies and expertises. The EOL will be the base of the demonstration activities planned in WP3 and for the activities reported in WP4 that aims at making soon available experimental and theoretical strategies and routines in developing stage at the EOL location. This will allow average trained users of equipment for thermal, structural, morphological, mechanical characterization to produce reliable data on nanostructured materials and correctly interpret them. An International Workshop is planned on processing-structure-dynamics and properties of polymer nanostructures (WP5) in order to further support development and design of intrinsically safe nanomaterials. WP6 is completely dedicated to harmonize the work for preparation of new standards for polymeric nanomaterials characterization. WP7 aims at disseminating, knowledge-transfer and reporting with the purpose of giving the project a significant impact beyond the consortium participants and contributing to overcome barriers to the industrial application of polymer nanostructured materials especially in SMEs.

European network on the health and environmental impact of nanomaterials (NANOIMPACTNET)

Recent technological advances allow the targeted production of objects and materials in the nanoscale (smaller than 100 nm). Nanomaterials have chemical, physical and bioactive characteristics, which are different from those of larger entities of the same materials. Nanoparticles can pass through body barriers. This is interesting for medical applications, but it raises concerns about their health and environmental impact. The objective of the NanoImpactNet is to create a scientific basis to ensure the safe and responsible development of engineered nanoparticles and nanotechnology-based materials and products, and to support the definition of regulatory measures and implementation of legislation in Europe. It includes a strong two-way communication to ensure efficient dissemination of information to stakeholders and the European Commission, while at the same time obtaining input from the stakeholders about their needs and concerns. The work plan shows six work packages (WPs: Human hazards and exposures, Hazards and fate of nanomaterials in the environment, Impact

assessment, Communication, Integration and nomenclature, and Coordination and management). The work plan will be implemented over four years. Discussions about strategies and methodologies will be initiated through well-prepared workshops covering the WP topics. External researchers and stakeholders will be invited to participate. After these workshops, the researchers will collaborate to produce thorough reports and sets of guidelines reflecting the consensus reached. All of the leading European research groups with activities in nanosafety, nanorisk assessment, and nanotoxicology are represented in NanoImpactNet. All exposure routes, major disease classes and impact assessment approaches are represented within the network. It will coordinate activities within Europe. It will help implement the EU Actionplan for Nanotechnology and support a responsible and safe development of nanotechnologies in Europe.

Microcellular nanocomposite for substitution of Balsa wood and PVC core material (NANCORE)

The project objective is to design a novel and cost-effective microcellular nanocomposite foam, with mechanical properties comparable to or better than Balsa wood and PVC foam, allowing for a substitution of these as core materials for lightweight composite sandwich structures. The material will be applicable for widespread industrial use, e.g. within Wind Power, rail, shipbuilding and automotive industries. The project addresses the call objective of developing polymer nanocomposites exhibiting radically enhanced properties and will involve scientific/technological tasks related to the development of microcellular nanocomposites, the structural scale of sandwich structures as well as the structural and mechanical analysis of the new material. Demonstration activities within the project will aim to validate the potential of the material for industrial use within different industries, with special emphasis on Wind Power through the full-scale static testing of a demonstrator blade.

Carbon nanotube confinement strategies to develop novel polymer matrix composites (POCO)

Light composite materials for load bearing applications can be made using different type reinforcements and polymer matrices. Carbon nanotubes (CNT) have been studied extensively because of their exceptional mechanical and electrical properties, yet their practical and extensive use in commercial materials is missing. The utilization of CNTs as reinforcement to design novel composites is a quite old idea. However, there is a lack of a knowledge based approach to achieve the nanostructuration level required to optimize the CNT/polymer composite performances.
The main objective of POCO is to get innovative polymer composites filled with CNT in order to obtain nanostructured materials with tailor made properties. The CNT/polymer interface is, together with the CNT and the polymer, the third and most important element that will determine the final properties. Hence the chemical functionalization of CNT surfaces is of utter importance to achieve not only a proper dispersion and anchorage of the nanotubes into the polymer matrix during processing, but also to optimize the performance itself in solid state. Our approach involves the development of different CNT confinement strategies to develop novel polymer matrix nanocomposites. Several polymers have been selected as representative of thermosetting and thermoplastic materials. This ensures that the output of POCO could be applied in a wide range of applications: automotive, aeronautics, building, aerospace, wind power generation (blades), ship building, biomedicine
This project will be focused on four fundamental properties:
high strength for structural and mechanical components,

tuneable electrical properties,
low wear under fretting (low amplitude reciprocating movement) and
superhydrophobicity.

Nanostructured toughened hybrid nanocomposites for high performance applications (NANOTOUGH)

Motivation: Nanocomposites are emerging new materials that promise improved properties. Their applicability, however, is presently limited by the cost of manufacture and product reproducibility. Literature shows that on the bench scale, dramatic improvement in polyolefin mechanical properties can be obtained by intercalation and exfoliation of nanoparticles in the matrix. However, when materials produced using conventional equipment are tested, their performance does not meet expectations nor live up to the claims (e.g. the impact strength too low).
Project Goals: To remove technical barriers to producing high performance polymer nanocomposites on the industrial scale, fundamental insight into the dispersion of particles within the matrix is needed. The goal of this project is to gain this insight through a series of carefully designed studies, using the most advanced experimental techniques, theoretical modeling, carried out by very experienced and skilled partners working together in a targeted and interdisciplinary fashion. The basic objective is to obtain a deeper understanding of the interfacial structure of nanocomposites within a polyolefin matrix. This knowledge will enable realization of the great performance potential of these materials through development of novel multiphase and hybrid nanocomposites.
This knowledge will facilitate commercialization of polymer nanocomposite materials with superior properties that will lead to development of new products. To meet this objective, we aim to improve the stiffness of polyolefin nanocomposites while not only maintaining but also improving the toughness of the matrix considerably. The technological objective is to optimize and, through novel interface design, to develop new cost efficient hybrid (nanofiller fiber) nanocomposites as an alternative to heavily filled polymers and expensive engineering polymers and fulfil industry requirements for high performance materials in high tech applications.

Surface functionalisation of cellulose matrices using cellulose embedded nano-particles (SURFUNCELL)

The projects main R&T objective is to create new, smart and bio-based surface nanostructured polymer composites showing exceptional surface functionality (mechanical, chemical, selective interaction properties). These new materials will be composed of nano-scaled polysaccharides layers with embedded nano-particles, coating different celluloses matrices. The compounding is restricted to the biopolymers surface and outer layers, providing the filler to the area where it is required and avoiding the deterioration of the matrix materials mechanical properties. The project will investigate these new effects - cellulose dissolution, structuration with nano-particles and irreversible coating will develop their understanding and mastering and exploit their applicability.
Several routes will be opened to prepare a completely new class of high-value biobased materials with tailored functions and properties applicable in many different fields: Separation technologies: providing selective interaction properties tuneable by environmental properties Technical fibres and foils: Specific surface modifications (strength, abrasion, thermal and chemical stability, hydrophilicity/hydrophobicity) Improved properties as flame resistance, conductivity, antimicrobial activity, barrier properties Medical and hygienic devices:

Formation of depots for humidity, drugs (controlled release), antimicrobial compounds. Sensors, displays, electronic devices: performing structural changes under the influence of an external field. The project will have impact to Nanoscience by the development of knowledge and new strategies to handle nanoparticles and to design multifunctional nanostructured composite materials based on renewable resources. Nanotechnology by the development of technologies to design new materials based on the elaborated scientific knowledge.

High aspect ratio carbon-based nanocomposites (HARCANA)

High aspect ratio carbon-based nanoparticles (nanotubes (CNT), nanofibres (CNF), and nanosheets or exfoliated graphite (CNS)) will be introduced into bulk polymers, into polymeric foams and into membranes. It is expected that such nanofillers will tremendously improve and modify the properties of these families of materials, allowing them to reach new markets. However, a common and fundamental problem in polymer-based nanocomposites is the large extent of agglomeration of the nanoparticles due to their high surface to volume ratio. Therefore, techniques to control deagglomeration and possibly further organization of these high aspect ratio nanoparticles in polymeric materials remain a challenge.
This project under industrial leadership will therefore aim at mastering, at the nanometric and mesoscale level, the spatial organization of carbon-based nanoparticles (CNP) with various surface functionalities, sizes and shapes having large aspect ratios in bulk, foamed and thin film (membranes) polymers by using industrially viable processes. More precisely, the aim of this proposal consists in generating polymer-based nanocomposites with a percolating nanoparticle structure that is reinforcing the material and imparts it with improved electrical and thermal conductivity at a minimum of nanoparticle loading.

Corrosion protection with perfect atomic layers (CORRAL)

The aim of this project is to develop high density defect-free ultra-thin sealing coatings with excellent barrier properties and improved corrosion resistance. Their successful functioning will be provided by the synergy of the coating

Development of wear resistant coatings based on complex metallic alloys for functional applications (APPLICMA)

The project aims at the development of a new type of coatings based on Complex Metallic Alloys (CMA). This is a family of ternary and quaternary alloys which exhibit unexpected properties. The CMAs Al61.5Cu25.3Fe12.2 B1 and Al59.5Cu25.3Fe12.2 B3 consist only of metals, which show not metallic- but ceramic-like behaviour. Moreover, the bulk versions of these quasicrystals have proven outstanding properties as extremely low surface energy (wetting) and highest fretting wear resistance.
The CMA AlMgB14 is known to be the hardest material after diamond. However, until now these outstanding properties could not be realised as coatings. First trials to develop coating processes were not successful, but showed reasonable concepts to solve the problems. The appliCMA project will focus on the development of PVD deposited coatings based on these three well-specified compositions. Following the mentioned outstanding properties of the three CMAs, the project is driven by applications for which they offer a remarkable step forward: tools for cutting, forming, extrusion dies, moulds for injection moulding, coated cooker s oven for less sticking, fretting resistant coatings for aeroplanes, but also coatings of stamps for Nano-Imprint-Technology (NIL).
The project includes 9 researchers and 8 industries (including SME) in 8 member and

associated state of the EU. They will deal with the fine tailoring of coatings and the processing of surface layers by PVD processes. Measurements of the micro/nano topography, electronic structure, phase transformations, microstructure and adhesion of the CMA coatings will be realized. The project will start with lab samples tested in lab facilities and will end with demonstrators tested in application related tests by end users. The project studies also fundamental mechanisms of the phase transitions in the manufacturing process of the targeted coatings, friction on these materials and simulation of friction in the forming

Multiscale modelling for multilayered surface systems (M3-2S)

It is recognised that more than 90% of failures in engineering components are surface related. Thus, a large variety of different multilayered surface systems (MSSs) with thickness ranging from nanometre to millimetre scales have been developed. However, the design of multilayered surfaces is normally based on experience and no currently available surface modelling technique can deal with MSSs. The aim of this programme is to address an urgent scientific, technological and market need for consistently reliable high performance MSSs, by developing generic, robust multiscale materials and process modelling techniques for the design, optimisation and performance prediction of MSSs.
The S&T objectives are:
to develop molecular dynamics techniques to model atom deposition processes and the atomic structure and interfaces to achieve optimal coating microstructures;
to develop multiscale modelling and corresponding experimental techniques to determine nano and crystal behaviour of each layer of a surface coating and the macro behaviour of MSSs;
to develop an integrated multiscale modelling approach to link molecular dynamics (nano), crystal plasticity (micro) and continuum mechanics (macro) modelling activities for the applications;
to develop modelling techniques and software systems for design, processes and applications of multiscale MSS and
to develop modelling-based design methodology for optimised MSSs for high performance components aiming for improved lifetimes and reduced market lead time by 60%.
The consortium consisting of 5 SMEs, 4 universities and 2 research organisations from 5 EU member states and 1 third country incorporates all the necessary elements for the research. Potential impact includes:
economic impact
enhance the competitiveness of European coating specialists and manufacturers;
eco-impact
reduced consumption of energy and materials and S&T impact
strengthen S&T excellence in modelling & surface engineering

Electrically modified biomaterials surface (BIOELECTRICSURFACE)

According to the World Health Organisation (WHO), cardiovascular diseases cause half the deaths in the EU. It is also the main cause of years of life lost (over 30 per cent) in early death thus causing huge pressure on the labour force and family earnings. The problem is becoming more acute in Central and Eastern European countries. Due to the ageing population in the EU, osteoporosis related bone fractures have almost doubled in the last decade. It is estimated that 40 percent of women over 50 years in age will suffer from fractures due to low density bone.

The European Commission considers the application of nanotechnology an important research strategy to address these problems. For this, design and control of biomaterial at the nanometre scale is set as a strategic research priority. Europe is, however, seriously under-represented in the global market for nanotherapeutics, where the United States dominates with three-quarter of the market share. While the drive for nanoscale understanding of biological interaction can be high, the application of this knowledge in marketable devices should also be prioritised. Here, we propose electrical modification of biomaterials surface to manipulate surface charge that will mediate bio/non bio interactions in vivo.
We propose novel nanoscale techniques to probe this surface charge at the nanometre scale so that we have a quantitative insight to biological interaction at the biomedical device surfaces. Such an approach will help us to scale up electrical modification in cardiovascular stents, urological stents, orthopedic implants and photosterilisation devices. The research proposed here will not only provide nanoscale understanding of biological interactions on biomaterials surface but also result in novel applications and devices, which will penetrate into the market in short to medium term.

Design and development of an innovative ecoefficient low-substrate flexible paper packaging from renewable resources to replace petroleum based barrier films (FLEXPAKRENEW)

The objective of this project is to design and to develop an innovative ecoefficient low-substrate flexible paper for packaging from renewable resources to reduce the packaging industry s reliance on barrier films derived from petroleum. The challenge of this project is to develop a flexible packaging paper, with barrier properties (grease, water, oxygen and water vapour barrier) competitive with those of untreated plastic films (medium barrier) or to treated plastic films (high barrier). This paper will be developed using renewable materials, beyond state-of-the-art barrier coatings and innovative surface treatment processes.
The main scientific advances concern: 1-The development of a substrate with significantly enhanced barrier properties via knowledge-led improvement and innovation such as the use of selected materials in the bulk and the deposition of a thin film of renewable materials during the paper forming. 2-Development of water borne coatings made from renewable materials (starches, functionalised starches, starch derivatives or modified hemicelluloses) and reinforced by (low eco-footprint) minerals or renewable nanoparticles to optimise the desired properties. 3-Development of high barrier paper arising from innovative surface treatments: Solvent free chemical grafting and vacuum coating.
These two techniques, although based on very different principles, enable the deposition of nanolayers (a few molecular layers) that drastically improve the barrier properties. 4-Development of a new type of antibacterial coatings to prolong food quality. Particular attention will be paid to sustainability assessment and life cycle analysis throughout the project. A substantial reduction in the amount of packaging going to landfill is envisaged, together with speedier environmental degradation of the packaging materials. This project will make a significant contribution to reduce the reliance on petroleum resources during packaging production.

Coordination of nanometrology in Europe (CO-NANOMET)

Nanotechnology has the ability to become the most promising technology advance for the 21st Century. It offers a huge potential of applications and economic benefits, which may contribute to the European economy. Scientifically and economically, nano-metrology is an

indispensible part for nanotechnology which must develop hand in hand with the developments of nano-science and

Electromagntetic characterization of nanostructured materials (ECONAM)

Nanostructured electromagnetic materials are rapidly maturing and become increasingly employed for design of the electronic and optical components, integrated circuits and functional devices.
A broad class of applications is based upon the specialised electromagnetic materials that provide the necessary functionality for electronic devices and constitute the physical layer of the technologies dealing with electromagnetic signals. For such applications, the electromagnetic parameters of materials are of the primary concern. Characterisation and metrology of the engineered nanostructured electromagnetic media have become the critical aspects of their development and utilisation in practical applications.
The main project objective of this project is to consolidate efforts and bring coordination in the European work towards development, testing, and dissemination of methods and tools for electromagnetic characterisation and metrology of nanostructured composite materials. The main novel characterisation approaches are focused on intrinsically interrelated developments and harmonisation of the material phenomenological models, standardisation of characteristic parameters and measurement techniques for evaluating the specified parameters.
The main impact will be in development and dissemination of novel techniques for electromagnetic characterization of nanostructured materials and preparation of standards in the field of nanomaterials characterisation. This will complement the known techniques for characterization in terms of particle and reactivity by developing unified approaches to characterization in terms of permittivity, permeability, chirality parameter, surface impedance, grid impedance and similar.

Creating and disseminating novel nanomechanical characterisation techniques and standards (NANOINDENT)

Our project aims to gather, improve, catalogue and present characterisation techniques, methods and equipment for nanomechanical testing. European-wide activities coordinated by a new virtual centre will improve existing nanoindentation metrology to reveal structure-properties relationship at the nano-scale. These methods are the only tools to characterise nanocomposite, nanolayer and interface mechanical behaviours in the nanometre range.
This work will also lay down a solid base for subsequent efforts for defining and preparing new standards to support measurement technology in the field of nanomaterials characterisation. Steps include development of the classical and the dynamic nanoindentation method and its application to new fields, application of modified nano-indenters to new fields as scratching and wear measurement, firm and uniform determination of instrumental parameters and defining new standard samples for the new applications. The virtual centre will disseminate information based on a new Nanocharacterisation database built on two definite levels: on a broader level partners will inventory and process all novel nanocharacterisation techniques and, in narrower terms, they will concentrate on nanomechanical characterisation. This will be achieved through the synchronisation of efforts set around a core of round robins but the database will include data of other channels as parallel research work and literature recherché.
Core activities comprise detailed dissemination activities. Indirect connections to the stakeholders by a webpage with a build-in interactive database will be complemented by direct events such as participation in workshops (oral and poster presentations), and regular

technical reports in international journals. Activities above will lead to detailed descriptions of novel characterisation techniques.

Multifunctional nanomaterials characterisation exploiting ellipsometry and polarimetry (NANOCHARM)

Ellipsometry and polarimetry have enormous capabilities for characterization of multifunctional materials, devices, processing and phenomena at the nanoscale, with consideration of the nanostructure-properties-functionality relationship, which can be addressed non-destructively, non-invasively, in non-contact, in-line and in real-time without any specific condition requirements for measurements and without any sort of environmental impact.
This Coordination action is aimed at expressing, assessing and spreading capability of ellipsometry/polarimetry in serving nanomaterial scientists, producers and end-users to address complexity of a large variety of multifunctional nanostructures, hybrid systems, interface behaviours, surface-related phenomena, molecular self-assembling: for all those systems, ellipsometry/polarimetry is beyond just dimension at the nanoscale yielding information on compositional, optical, electrical, magnetic characteristics associated to the specific nanostructure.
This CA identify European expertise and establish a platform for
coordination of research on ellipsometry for a large variety of nanomaterials, devices and technologies
dissemination and development of actions to allow nanomaterials scientists, students, SMEs and end-users approaching and exploiting ellipsometry and polarimetry for designing nanomaterials and nanodevices with unexplored functionalities and for controlling/implementing related production technologies.
Advantages that this CA include improvement of knowledge of chemical and physical properties of nanomaterials, new controlled procedures of production, and more sustainable products. The technological impact is huge involving the major production areas and industries of a developed economy such as health-(medicine, biotechnology), environment-(hazardous gas sensing-monitoring), energetics-(photovoltaics), components-(semiconductor, coating industries), which all produce and use multifunctional nanostructure.

Setting up research intensive clusters across the EU on characterization of polymer nanostructures (NAPOLYNET)

NaPolyNet is a 36-month project involving 16 partners from 10 European countries. The objectives are: 1. to network at regional, national and international level with experts on the characterization of polymer nanostructured materials in the field of packaging, textiles and membranes, bridging the gap between scientific and engineering approaches for the improved understanding of the structure-performance correlation in polymer devices; 2. to facilitate transnational access to important and unique equipment and to train young scientists and SMEs technologists; 3. to harmonize the work necessary for new standards in the field of characterization of polymer nanostructures for packaging, textiles and membranes. NaPolyNet will also focus on latest findings for managing the safety implications of polymer nanostructure along the life-cycle of those products. The activities are grouped into 7 work-packages (WP): After setting up the procedures for managing the project (WP1), the team will map the competences in the different fields of characterization of polymer nanostructures and will set up an European Open Laboratory (EOL) open to outside the consortium partners (WP2) incorporating the best and novel characterization methodologies and expertises. The

EOL will be the base of the demonstration activities planned in WP3 and for the activities reported in WP4 that aims at making soon available experimental and theoretical strategies and routines in developing stage at the EOL location. This will allow average trained users of equipment for thermal, structural, morphological, mechanical characterization to produce reliable data on nanostructured materials and correctly interpret them. An International Workshop is planned on processing-structure-dynamics and properties of polymer nanostructures (WP5) in order to further support development and design of intrinsically safe nanomaterials. WP6 is completely dedicated to harmonize the work for preparation of new standards for polymeric nanomaterials characterization. WP7 aims at disseminating, knowledge-transfer and reporting with the purpose of giving the project a significant impact beyond the consortium participants and contributing to overcome barriers to the industrial application of polymer nanostructured materials especially in SMEs.

Organic nanomaterials for electronics and photonics: design, synthesis, characterization, processing, fabrication and applications (ONE-P)

The call 4.2.2-1

Magnetic nanoparticles combined with submicronic bubbles and dye for oncologing imaging (NANOMAGDYE)

The objective of NANOMAGDYE consists in developing tailored biocompatible magneto-optical nanosystems based on magnetic iron oxide nanoparticles. The project will comprise the elaboration of the nanosystems and the characterisation of their structural, optical and magnetic properties. In vitro and in vivo tests will be carried out to test their biocompatibility.
The combination of magnetic and optical properties will be achieved through hybrid nanoparticles made of a magnetic iron oxide core on which an organic layer (dye) will be grafted through a dendrimer molecule and a phosphate entity. This grafting strategy will be extended to bubbles on which magnetic nanoparticles will be attached. The grafting sites will be controlled in order to design new geometries and architectures from rings up to submicronic magnetic spheres. Magnetic nanoparticles with monodisperse size between 2 and 100 nm will be elaborated in order to increase the possibility range of achieved properties. The opto-magnetic nanoparticles will be tested in a medical application and a dedicated magneto-optical probe will be fabricated. Current methods for labelling the lymph node system use a dye (vital blue) or radio nuclide injection detected through optical or Gamma probes, respectively, or a combination of both types of markers.
Combining optical and magnetic labelling into a single biocompatible nanosystem will provide higher spatial resolution than presently and avoid using ionising radiation to improve patient safety and medical effectiveness. Stabilized submicronic bubbles labelled with the optical-magnetic nanoparticles will play the role of a contrast agent currently used in echography imaging and facilitate the uptake of the iron nanoparticle, and therefore improve node imaging.

Nanostructured active magneto-plasmonic materials (NANOMAGMA)

The development of a novel concept of nanostructured material is involved in this project: the proper combination of magneto-optical (MO) and plasmonic elements to produce a magneto-plasmonic material tailored on the nanoscale. The novel magneto-plasmonic materials will offer the unique ability to control their properties in more than one way, since the magneto-optical activity will be affected by the alteration of the plasmonic characteristics and the

optical response will depend on the magnetic ones. The latter puts an additional advantage over conventional materials, since the optical response can be actively tuned by means of an external agent: a magnetic field.
The project has two main goals; the first is to prepare active magneto-plasmonic materials with tailored properties in the nanoscale and understanding the interactions of the magnetic properties with the plasmonic and optical ones, linked to electric charge oscillations. The second goal is to develop prototypes of applications that can benefit of this coupling. Since it is expected that the optical properties of these materials can be driven by using a magnetic field, this will allow designing and developing novel magneto-plasmonic devices. In particular, as a proof of the applicability of this concept, we will design, fabricate and test a prototype of a new kind of surface plasmon resonance (SPR) biosensor with MO elements, i.e. a surface magneto-plasmon resonance (SMPR) biosensor, comparing its performance against standard biosensors.

Ultrafast all-optical magnetization reversal for magnetic recording and laser-controlled spintronics (ULTRAMAGNETRON)

The aim of the proposed research is to develop opto-nano-magnetism as a novel approach for future magnetic recording and information processing technology at the junction of coherent nonlinear optics, nanophotonics and magnetism. In particular, we are aiming to investigate effects of light on magnetic order at the nanoscale, to obtain highly efficient and ultrafast (10-12 seconds and faster) optical control of nanomagnets and thus initiate a development of novel technology for unprecedented fast (THz) magnetic recording and information processing, including spintronics.
To this aim we have formed a multi-disciplinary consortium of academic and industrial partners with complementary expertise in coherent nonlinear magneto-optics and ultrafast magnetization dynamics, spatially and time resolved magnetooptics, nanophotonics and X-ray nanoprobing of magnetism, atomistic simulations of subpicosecond magnetization dynamics for strongly nonequilibrium ensembles of spins, technology of magnetic nanostructures and their applications in spintronics. The project is directly relevant to NMP-2007-2.2-2 Section of the NMP Work Programme (Nanostructured materials with tailored magnetic properties).

Nanostructured magnetic materials for nanospintronics (NAMASTE)

We are proposing a Collaborative Project, NAMASTE, on nanostructured dilute magnetic semiconductor and metal materials. The key ideas are to control and manipulate the nanoscale properties of magnetic materials by local strain and electric fields making possible new types of magneto-electronic and spintronic devices. This is a co-ordinated programme of theoretical, experimental and technological research by a consortium of European academic and industrial research groups, each of which is internationally leading in the complementary, multidisciplinary research fields essential to the project delivery.
The proposal builds on recent advances in the state-of-the-art by the consortium members and is based on the design of materials whose specific nanostructure yields the required tailored properties. NAMASTE should significantly advance the understanding of nanostructured magnetic materials and magnetic phenomena at the nanoscale. The project has a high probability of major medium and long term impact on many aspects of spintronics, magnetic data storage and processing, and magnetic sensors.

Microwave amplification by spin transfer emission radiation (MASTER)

The intended aim of this project is to explore the application potential of novel Spin-Transfer Oscillators (STO) as tunable and ultra-narrow band microwave radiation sources for mobile and wireless telecommunication technology. The main technological interest of STO devices, which correspond to nano-structured magnetic multilayer pumped by a spin-polarized electrical current and emitting microwave radiation, is their compatibility with monolithic integration. Our proposal specifically addresses the bottleneck issue of power conversion efficiency between dc current pumping and microwave emission of radiation.
We propose to take advantage of the phase-locking mechanisms between coupled oscillators to increase significantly the device performance. Our primary objective is to engineer large arrays of coherently coupled oscillators. To achieve this goal, we shall investigate in detail 4 different types of coupling mechanism between neighboring oscillators which may induce phase-locking of the ensemble:
coupling through the self-generated microwave current,
coupling through the dipolar magnetic field,
coupling through the spin-diffusion of the conduction electrons,
coupling mediated by spin-waves.

Solid state energy efficient cooling (SSEEC)

We propose to develop a high efficiency heat pump and an air conditioner based on a magnetic refrigeration cycle. Both devices will operate at room temperature. The core materials research will centre around the identification, synthesis, modeling and production of low cost, environmentally friendly magnetic refrigerant materials that operate in low magnetic fields and the synthesis and production of inexpensive permanent magnets the two key materials components of a magnetic cooling engine. By involvement of an SME, a medium scale materials manufacturer and a major systems end-user, we will ensure industrially-guided feedback on materials design and performance. Furthermore, we will have the opportunity to integrate and assess our materials with the systems components (heat exchangers, motors and pumps) required to produce a heat pump and an air conditioner by completion of the project.

Superior energy and power density Li-Ion micro-batteries (SUPERLION)

On-board microbattery power is fast becoming essential in many of today s emerging technologies. Down-scaling in the micro-electronic industry has far outpaced advances in small-scale electrical power supplies. The absence of on-board power is a hinder to advances in many critical areas: micro-electronic devices and biomedical micro-machines. However, nano-materials and -structures provide new resources to attack the problem. MEMS devices will change our lives completely - given micropower sources.
These include microsensor arrays, micro-vehicles, identification cards, memory backup, and biomedical micro-machines (pacemakers, defibrillators, neural stimulators, drug delivery systems). Insufficient power from 2D-MB configurations inspires this search for a 3D-MB using cheap and light micro-/nano-fabrication materials. We also probe whether related techniques can improve the performance of conventional Li-ion batteries. Can multi-component assembly be replaced by a single interpenetrating nano-architectured anode/cathode element separated by an electrolyte? This would greatly cheapen conventional rechargeable Li-ion batteries for typically EV/HEV applications. Our major objectives are: Synthesis and fabrication of novel nano-architectured battery materials and MB components.

Architectures, materials, and one-dimensional nanowires for photovoltaics - research and applications (AMON-RA)

The proposed project AMON-RA (Architectures, Materials, and One-dimensional Nanowires for Photovoltaics Research and Applications) is intended to result in a new type of solar cell, combining advanced hetero- and nano-structures with silicon photovoltaic technology. By applying state-of-the-art photovoltaics design to semiconductor nanowires and nanotrees and assisted by tailor-made theoretical modeling and advanced processing, we aim to demonstrate high-efficiency multi-junction photovoltaic cells made from previously impossible materials combinations. The high degree of self-assembly and insensitivity to lattice parameters inherent in the nanowire growth process will also make it possible to produce such cell relatively cheaply and on inexpensive silicon substrates. In AMON-RA, we will also evaluate the solar cell designs on a systems level, with special attention to future industrialization and upscaling.

Bioactive highly porous and injectable scaffolds controlling stem cell recruitment, proliferation and differentiation and enabling angiogenesis for cardiovascular engineered tissues (BIOSCENT)

Congenital and acquired diseases of the heart are the leading causes of morbidity and mortality in the world today; 7.2 million people die each year due to coronary heart disease, being the first cause of mortality in population above 60 years old, and the second cause after HIV in world wide young population. There is an urgent demand for new methods to repair and replace damaged cardiovascular tissues. One of the most promising ways to achieve this goal is the development of regenerative therapies aided with novel intelligent nanobiomaterials such as bioactive scaffolds.
The overall objective of this project is the development of innovative bioactive polymeric scaffolds able to guide tissue formation from dissociated stem cells, for engineering autologous cardiovascular replacements, namely vascular tissues, heart valves and cardiac muscle. Two different strategies will be followed to approach creating new engineered tissue:
In vitro tissue engineering: according to the most frequent tissue engineering paradigm, cells will be seeded on a scaffold composed of synthetic polymer or natural material and the tissue will be matured in vitro in a bioreactor, in order to obtain a construct that can be implanted in the appropriate anatomic location as a prosthesis;
In vivo tissue engineering: unseeded scaffolds that attract endogenous cells and control cell proliferation and differentiation will be implanted to repopulate and remodel an altered cardiovascular tissue.
The strong innovative content of the project is in the realisation of multifunctional scaffolds which can guide complex cellular processes such as adhesion, proliferation and differentiation, processes fundamental for tissue regeneration. It is therefore necessary to design integrated material scaffolds and culture environments, which can appropriately confer biochemical, morphological, electrical and mechanical stimuli to a developing tissue.

Novel biofunctional high porous polymer scaffolds and techniques controlling angiogenesis for the regeneration and repair of the degenerated intervertebral disc (DISC REGENERATION)

30% of European workers experience back pain, and it is the most frequently reported work-related disorder. The proposed work seeks to provide a cure for lower back pain by developing porous scaffolds and technology which will repair a damaged intervertebral disc (IVD) by enabling its regeneration to a natural healthy state or better. Injectable acellular and cell-loaded bioactive polymer-based scaffolds will be developed. These will be designed to be

implanted into the patient by minimally invasive surgery. A biomimetic approach will confer the appropriate mechanical and biological properties and enable the inclusion of the requisite cell signalling factors to produce a bio-hybrid structure which closely resembles the human tissue in all its essential attributes. Particular attention will be paid to angiogenesis.In IVD tissue, vascularization must be carefully controlled, due to the unique anatomy and physiology of the intervertebral disc. There must be negligible vascularization in the annulus and nucleus regions and moderate vascularization at the vertebral body level. Work will therefore be performed on materials functionalization, and on growth factor incorporation and delivery, to enable this region-specific control of vascularization at different levels. Natural IVD tissue contains a relatively low number of cells, which are chondrocyte-like in character. Consequently, it will be necessary to devote some research to identifying and evaluating suitable and more readily available alternative cells for incorporation in the bio-hybrid substitutes produced. Modelling studies will identify the physical and mechanical properties of the natural IVD and the substitute materials, and provide an understanding of the physical aspects of the regeneration process. In vivo study on animal model will be performed the bio-functionality of both substitutes. Surgical methodology and protocol will be developed.

Magnetic scaffolds for in vivo tissue engineering (MAGISTER)

The main driving idea of the project is the creation of conceptually new type of scaffolds able to be manipulated in situ by means of magnetic forces. This approach is expected to generate scaffolds with such characteristics as multiple use and possibly multipurpose delivery in order to repair large bone defects and ostheocondral lesions in the articular surface of the skeletal system. The major limitations of the scaffolds for bone and cartilage regeneration nowadays available in the market are related to the difficulties in controlling cell differentiation and angiogenesis processes and to obtain stable scaffold implantation in the pathological site. . . Several attempts have been performed over the last years in order to provide scaffolds for tissue engineering, but nowadays there is no way to grant that tissue regeneration take place in the pathological site.
The provision in vivo of the scaffold with staminal cells or /and growth factors in order to drive the tissue differentiation process and parallel angiogenesis represents nowadays one of most challenging requests [Ref. Nanomedicine roadmap]. The Consortium aims to elaborate, investigate and fabricate new kind of scaffolds magnetic scaffolds (MagS) - characterized by strongly enhanced control and efficiency of the tissue regeneration and angiogenic processes. The magnetic moment of the scaffolds enables them with a fascinating possibility of being continuously controlled and reloaded from external supervising centre with all needed scaffold materials and various active factors (AF). Such a magnetic scaffold can be imagined as a fixed station that offers a long-living assistance to the tissue engineering, providing thus a unique possibility to adjust the scaffold activity to the personal needs of the patient.

Angiogenesis-inducing bioactive and bioresponsive scaffolds in tissue enginering (ANGIOSCAFF)

Angiogenesis underlies almost all biological processes of morphogenesis, including those in tissue repair and regeneration. Physiological angiogenesis is controlled by a complex interplay between cells and their environment: the extracellular matrix (ECM) provides signalling via numerous ECM adhesion molecules and growth factors bound to ECM polysaccharide components; and cells locally degrade and remodel the ECM to create pores into which angiogenic endothelial cells migrate.

This observation, that physiological angiogenesis proceeds in response to solid-phase cues motivates our approach, namely creating bioactive resorbable materials as scaffolds that contain bound molecular signals to induce physiological angiogenesis in situations of tissue repair and regeneration. In some of our scaffold materials, porosity is inherent by virtue of fabrication, and in others porosity is created by cell-associated proteolysis as it is in physiological angiogenesis. All materials will be designed so as to be injectable or implantable into the human body. In some work, the final injectable/implantable material will comprise only materials and bioactive biomolecular signals, and in other cases it will also comprise cells.
Thus, the concept of ANGIOSCAFF is to create materials that are bioresponsive (to environmental signals including pH and redox potential, and to cellular signals such as proteases), that are bioactive (by virtue of bound peptide or recombinant protein adhesion ligands and bound and releasable growth factors), and that are capable of carrying cellular therapeutics. To realize ANGIOSCAFF, we have assembled a team comprising both industrial and academic expert groups in biomaterials design and development, experts in the science and application of angiogenesis, in imaging in animal models, and in applications demanding biomaterials-based, angiogenesis-demanding tissue engineering therapies, including repair of bone, skin, cardiac muscle, skeletal muscle and nerve.

Resource-efficient self-reinforced plastic materials and processing (ESPRIT)

The aims of the Esprit project are to reduce the amount of plastic used to make a component by 30% and reduce component weight by 30%, by developing the next generation of lightweight, self-reinforced plastics and the energy-efficient manufacturing processes needed to produce components from this family of materials. Current forms of self-reinforced plastics typically offer typically 3-5 times the strength and stiffness of unreinforced plastics, but they are only available in sheet or fabric form.
This severely limits the range and types of components that can be manufactured and limits the commercial uptake of these important materials. The overall goal of this project is to develop materials and processes to allow flow moulding (injection moulding and compression moulding) of self-reinforced commodity polymers (polypropylene (PP), polyamide (PA) and PET). Key to this is the development of techniques that will allow the selective melting of the polymer matrix without causing adverse effects on the polymer fibre. This will therefore necessitate the development of energy-efficient microwave and induction-heating techniques to allow selective melting of the matrix polymer. High performance, commodity polymers will be used to develop self-reinforced plastics with significantly enhanced properties over existing plastic and, for the first time, the ability to be compression and injection moulded.
This topic is particularly relevant to the work programme, which calls for new processing methods for speciality polymers that are more resource-efficient. Self-reinforced plastics are more resource efficient because they are 3-5 times stronger and stiffer than conventional polymers, so less material is needed to manufacture components to reach a particular specification, but they require innovative new heating processes to form them into components, which include alternative energy sources.

Development of a flexible and energy-efficient pressurised microwave heating process to produce 3D-shaped renewable bio-polymer foams for a novel generation of transportation packaging (REBIOFOAM)

Expanded Polystyrene (EPS), Polyurethane (EPU), Polyethylene (EPE) and Polypropylene (EPP) represent the most popular moulded cushion packaging materials applied for transport

packaging applications. However, despite of their functionality, the widespread use of these polymer foams of synthetic origin implies considerable environmental concerns. The depletion of non-renewable fossil raw material resources associated with emissions of greenhouse gases, such as C5H12 and CO2 applied as blowing agents during processing, are the most direct impacts on the environment.
Moreover, their non-biodegradable / non-compostable nature associated with the short life of cushion packaging products rises up fundamental concerns regarding waste disposal. Recycling, which is the solely applicable solution for preventing those synthetic foams entering the waste stream, appears in fact to be rarely applied due to cost-ineffectiveness and lack of effective recycling system. With this in mind, bio-based plastics represent an emerging highly promising solution for protective transport packaging provided that they can be processed in foamed products resulting in adequate functional requirements. Within this framework, the project idea is to develop a flexible, energy-efficient and environmentally-sustainable manufacturing process enabling the production of biodegradable foamed 3D-shaped packaging originating from renewable raw materials (i.e. starch and water).
Within the proposed process, expansion and foaming of the bio-polymer will be driven by pressurized microwave technology, exploiting the inner water content of the material itself to generate vapour. The proposal is fully compliant with the targeted topic NMP-2007-2.4-1 Flexible efficient processing for polymers, as the proposed process offers a valid alternative to petroleum-based polymer processing, involving the use of renewable feedstocks, and involving microwaves as energy-efficient processing solution.

Development of electrochemical reactors using dehydrogenases for enantiopure synthon preparations (ERUDESP)

The aim of the project is the development of electrochemical reactors for the manufacture of fine chemicals with dehydrogenases as a process with almost zero waste emission. The production of enantio pure compounds with high EE s can be achieved by using dehydrogenases as biocatalysts, because they express high enantio selectivity in ketone reduction, combined with broad substrate spectra by some of these enzymes. These proteins will be engineered for improved catalytic performance using the tools of molecular evolution, modelling, structure prediction, and crystallography.
As these dehydrogenases typically require cosubstrate regeneration by aid of a second enzymatic reaction, we are looking for the alternative solution of an electrochemical approach for the regeneration of reduced cofactors. If all active compounds can be functionally immobilized on the electrode surface the constructed reactor would convert the educt in the input flow to the product in the output flow avoiding any contaminations. All necessary components like the mediator, the cofactor and the dehydrogenase will be bound to nano or meso structured electrodes (for increased active surface area) resulting in biofunctionalised surfaces with tailored properties at the nanoscale.

Hierarchically organized metal organic catalysts for continuous and multi-batch processes (HICAT)

Hierarchically organised metal organic catalysts shall be developed which can be easily recycled in multi-batch processes or which can be used in continuous processes without loosing the original advantages of the corresponding homogeneous soluble metal organic catalysts - high selectivity, activity and stability. The catalysts will be constructed using components at the nano-scale in a bottom-up approach. Hereby, catalytically active metal

complexes will be linked with nanoparticles such as polymeric microgels, hyperbranched polymers or hybrid systems consisting of silsesquioxanes attached to hyperbranched polymers.
Further hierarchical organisation of HiCat catalysts will be accomplished by interconnected networks formed from the assemblies of catalytic nanoparticles using end-functional T-responsive polymers that can interact with functionalities on the surface of the nanoparticles as binding agents. Recycling of the catalyst-nanoparticle entities in multi-batch operation will be studied utilizing the change of solubility of the polymer supported catalysts by external stimuli. Based on polymer-nanoparticles linked by T-responsive polymers, new types of films and membranes with graded porosity can be prepared by varying the size of the nanoparticles and the length of T-sensitive polymers. This opens new opportunities for integration of catalytic steps and separation within the hierarchically structured system and, hence for continuous reactor operation.
The proposal combines the superiority of homogeneous metal-organic catalysts often possessing nearly 100 % selectivity with the advantage of efficient separation by grabbing a new concept for building up hierarchically organised catalytic systems. Structural principles of tailor-made ligands will be transferred into tailor-made functional surfaces of nanoparticles. For proof of principle of the concept, three types of reactions will be studied: olefin metathesis, CX coupling and enantioselective hydrogenation.

Design and development of an innovative ecoefficient low-substrate flexible paper packaging from renewable resources to replace petroleum based barrier films (FLEXPAKRENEW)

The objective of this project is to design and to develop an innovative ecoefficient low-substrate flexible paper for packaging from renewable resources to reduce the packaging industry s reliance on barrier films derived from petroleum. The challenge of this project is to develop a flexible packaging paper, with barrier properties (grease, water, oxygen and water vapour barrier) competitive with those of untreated plastic films (medium barrier) or to treated plastic films (high barrier). This paper will be developed using renewable materials, beyond state-of-the-art barrier coatings and innovative surface treatment processes.
The main scientific advances concern: 1-The development of a substrate with significantly enhanced barrier properties via knowledge-led improvement and innovation such as the use of selected materials in the bulk and the deposition of a thin film of renewable materials during the paper forming. 2-Development of water borne coatings made from renewable materials (starches, functionalised starches, starch derivatives or modified hemicelluloses) and reinforced by (low eco-footprint) minerals or renewable nanoparticles to optimise the desired properties. 3-Development of high barrier paper arising from innovative surface treatments: Solvent free chemical grafting and vacuum coating.
These two techniques, although based on very different principles, enable the deposition of nanolayers (a few molecular layers) that drastically improve the barrier properties. 4-Development of a new type of antibacterial coatings to prolong food quality. Particular attention will be paid to sustainability assessment and life cycle analysis throughout the project. A substantial reduction in the amount of packaging going to landfill is envisaged, together with speedier environmental degradation of the packaging materials. This project will make a significant contribution to reduce the reliance on petroleum resources during packaging production.

Materials for robust gallium nitride (MORGAN)

The MORGaN project addresses the need for a new materials for electronic devices and sensors that operate in extreme conditions, especially high temperature, high electric field and highly corrosive environment. It will take advantage of the excellent physical properties of diamond and gallium nitride heterostructures. The association of the two materials will give rise to the best materials and devices for ultimate performance in extreme environments. Both materials possess durability and robustness to high temperature, radiation and electric field. Diamond material exhibits the best mechanical robustness and thermal conductivity, while GaN presents also high electron mobility, giving high power handling and efficiency. III-N systems have other desirable properties for sensor applications in extreme environments. It is the only highly polar semiconductor matrix that has ceramic-like stability and can form heterostructures. It has the highest spontaneous polarisation with a Curie temperature above 1000¦C for AlN: a lattice matched III-N heterostructure with a built-in polarisation discontinuity is expected to enable transistor action above 1000¦C. The packaging and metallisation of an electronic device or sensor are important elements in extreme conditions. Metal contacts must be stable and the package must be thermally compatible with the device requirements and chemically stable. MORGaN proposes a novel technological solution to electron device and sensor modules. Advanced 3D ceramic packaging and new metallisation techniques based on the emerging technology of MN+1AXN alloys will also be explored. As such, the vision of MORGaN for materials for extreme conditions is holistic, involving 2 large industrial partners, 2 industrial labs, 6 SMEs and 13 public research partners. The project includes research, demonstration, management, training and dissemination activities.

Novel technology for high-performance piezoelectric actuators (HIPER-ACT)

Piezoelectric multilayer actuators performance and reliability needs to be improved to meet the growing demand from end-users with many different types of applications. The high production costs and problems related to obtaining reliable components explain that the utilization of piezo actuators up to now is far from having reached its full potential. Noliac and its partners for the IP are proposing a radical innovation in the piezoelectricity field, based on an enhanced understanding of materials degradation.
This will greatly improve the properties of long actuators, and thereby allow end-users to use them for new industrial applications. The actuators shall be able to sustain extreme conditions, including high temperature, humid environment, and high pressure and will provide extreme long-term reliability. The activities are divided in 4 work areas: Research in materials degradation and the development of ceramics, which offer better resistance to crack initiation and propagation and are less sensitive to extreme conditions (WP2-WP4). Two parallel approaches are followed to improve the interdigitated electrode technology for deposition ultra-narrow electrode paths in the laminated piezo materials (WP5-WP6). The development of optimized final components will be insured by the combination of the new piezoelectric materials with the new electrode technology (WP7). Industrial applications for the automotive-, production- and wind power industries.
These applications require large size piezoceramic actuators, which can be produced efficiently at low cost with high manufacturing yield (WP8-WP11). The identification of the new piezoelectric actuators is expected to provide a radical innovation in terms of new possible applications in major industrial markets worldwide.

New multipurpose coating systems based on novel particle technology for extreme environments at high temperatures (PARTICOAT)

The overall objective of the project is to develop a novel, unconventional and cost efficient type of multipurpose high temperature coating systems on the basis of property tailoring by particle size processing of metallic source materials. It shall possess multi-functionality that will comprise thermal barrier effect, oxidation and corrosion protection, lotus effect, electrical insulation at elevated temperatures and fire protection.
The concept of the novel approach to protection of surfaces is a coating consisting in its initial state of nano- and/or micro-scaled metal particles with a defined size, deposited by spraying, brushing, dipping or sol-gel. During the heat treatment, the binder is expelled, bonding to the substrate surface achieved, the metallic particles sinter and oxidise completely resulting in hollow oxide spheres that form a quasi-foam structure. Simultaneously, a diffusion layer is formed below the coating serving as a corrosion protection layer and as a bond coat for the top layer. The structure of the coating system shall be adjusted by parameters like selection of source metal/alloy, particle size, substrate, binder and a defined heat treatment. For fire protection the formation of hollow oxide spheres will be processed in a separate step before deposition.
The flexibility of the new coatings integrates a wide field of application areas, such as gas and steam turbines in electric power generation and aero-engines, combustion chambers, boilers, steam generators and super-heaters, waste incineration, fire protection of composite materials in construction as well as reactors in chemical and petrochemical industry. A broad impact will thus be ensured increasing safety and the durability of components by an economic, multifunctional and flexible protection of their surfaces. The novelty will provide a real step change in the understanding of materials degradation mechanisms in extreme environments.

Tools for innovative product-service-systems for global tool and die networks (TIPSS)

Europe's tooling industry takes up key a position within the production industries of Europe and all other IMS countries as studies have shown. Each production ramp-up depends on the completion of the required tools and their integration into the existing production facilities; the product's quality is directly linked to the tool's quality. The tooling industry is facing challenges concerning their local and global performance. Regarding their local performance, there are no adequate interfaces and sporadic, undefined loops between the customers' product development process and the toolmakers tool development process.
Only few toolmakers offer product-services along the product development process, hardly any offer product-services along the production phase. Regarding their global performance only a little number of European toolmakers uses global cost potentials, markets and flexibility: they don't realise the chances of globalisation. As a result tool and die companies face the question on how to meet the customer's needs at best locally and globally in order to remain competitive. Ideal solutions to the customer's problems instead of a simple tool can be developed by an early integration of product and tool development processes.
Development of a clean and energy self-sustained building in the vision of integrating H2 economy with renewable energy sources (H2SUSBUILD)
More than 40% of the total energy consumed in the EU is used to cover the needs for heating, cooling and electricity of buildings. As the major part of this energy is produced from combustion of oil and natural gas, both the EU and the EU Building Sector are highly depended on imported fossil fuels. Moreover, the Sector is also a major contributor to Green-House Gas (GHG) emissions. To address issues concerning EU security of energy supply, EU contribution to climate change and in line with the Kyoto protocol and ongoing discussions in the European and International community, the EC has set the objectives of 30% reduction of its GHG emissions by 2020 and 20% increase of the share of renewable energy. The Building Sector, as a major industrial sector, has to significantly contribute to the realisation of these

objectives. Thus, the trend for the Building Sector is to move from fossil fuels based energy production to the use of renewable energy sources (RES) and clean fuels to produce the required energy to cover the building energy needs. However, in order to ensure continuous operation of energy systems based on RES it is necessary to find a proper way to balance the intermittent nature of RES. Currently, the solution is to store the excess of the produced electricity in large-scale storage batteries, which present several drawbacks. In this frame, our concept is the development of an intelligent, self-sustained and zero CO2 emission hybrid energy system to cover electric power, heating and cooling loads (tri-generation) of either residential/commercial buildings or districts of buildings. In the proposed system, the primary energy will be harvested from RES and directly used to cover contingent loads, while the excess energy will be converted to hydrogen to be used as energy storage material and to be further applied as a green fuel to cover the building heating needs through direct combustion or to produce combined heating and electricity by means of fuel cells

Continuous Annular Electro-Chromatography (CAEC)

Capillary electrochromatography (CEC) combines the high separation efficiency of capillary electrophoresis with high performance liquid chromatography (HPLC) and provides a powerful tool for the separation of a wide range of both neutral and charged components. The proposed integration of this technology and the rotating system of annular chromatography into a continuous annular electrochromatography (CAEC) would increase the throughput up to 20,000 times whilst maintaining an efficiency of more than 100,000 theoretical separation stages per meter.
This extends the range of applicability from analytical purposes towards safe and flexible ultra small-scale production of extremely high-value-added products early on in the development stages. The project is thus expected to significantly enhance the sustainability of pharmaceutical and chemical production by providing equipment for highly intensified purification processes. The development of CAEC units as a new generation of extremely flexible high-performance process equipment requires specialised engineering skills and high-precision manufacturing techniques. A wide range of applications will be offered by the development of tailored stationary phases while an improved understanding of the complex processes occurring at different scales is used to model the performance of the CAEC system.
An elaborated prototype including on-line sensors and a sophisticated process control concept will be developed and validated under industrial conditions during a demonstration phase. This will guarantee a fast uptake of the projects results and allow for an approved industrial production of the new process equipment within 1 to 2 years after the end of the project. The consortium includes an end user from pharmaceutical industry to ensure the relation to practice as well as highly innovative equipment manufactures capable of producing the required devices and standardised components at affordable costs.

Micro fabrication production technology for MEMS on new emerging smart textiles/flexibles (MICROFLEX)

This proposal concerns flexible materials in the form of high added value smart fabrics/textiles which are able to sense stimuli and react or adapt to them in a predetermined way. The challenge for the European textile industries is to add advanced functions to textiles and the recent progress of new technologies such as electronic inks provide an opportunity for a breakthrough by incorporating MEMS on flexible textiles/fabrics.
The project will exploit microfabrication to produce, using custom printing processes, active functions cost efficiently. We propose to develop fundamental micro fabrication production

technologies for MEMS on fabrics/textiles using flagship demonstrator applications. This will result in a cheap, easy to design, flexible, rapid, way to manufacture multifunction smart textiles/garments for a large set of multi-sectorial applications. The processes will be based on thick film printing and sacrificial etching for the MEMS structures. Subsequent inkjet printing will be used to deposit thinner structures on the thick film printed layers incorporating for example active nanoparticles to add further functionality. These printing processes have many benefits including low-cost, repeatability, flexibility, suitability for high throughput production, relatively inexpensive equipment, short development time and the capability of depositing a wide range of materials.
All the novel printed inks will be electrically activated sensors and actuators and we will use standard electronic devices for power supply/storage, signal processing and communications offering low price and mass production. The project will undertake a number of initial demonstrators of the underlying basic technology. These will be based on: light emission, cooling/heating, anti-static effect, energy harvesting, micro-encapsulation and actuation. MICROFLEX is a perfect example of the transformation of a resource-intensive to a knowledge-intensive industry.

Service oriented intelligent value adding network for clothing-SMEs embarking in Mass-Customisation (SERVIVE)

SERVIVE net proposes the enlargement of the assortment of customizable clothing items currently on offer, the enhancement of all co-design aspects (functionality and fun) and the development and testing of a new production model based on decentralized networked SME cells. The Servive net will not only seamlessly link critical Mass-Customisation (MC) enabling services, but more important it will adapt these services to the specific needs and preferences of well-defined target customer groups. It will also enable all necessary interactions of customers with value-chain actors in transparent ways, thus enabling and encouraging the active participation of end consumers in the configuration of the customised items.
The selected product configuration will in turn influence the production scenario (see the extended Micro-Factory concept below). Central to this scenario is the concept of Virtual Customer Advisor (VCA), which, depending on the profile of the customer will recommend the optimum product configuration, based either on style preferences (Style Advisor), functional requirements (e.g. for protective clothing/ sportswear) or body morphology and physical disability or problem figure related issues. On the upstream part of the chain, the Servive net will introduce the innovative organisational concept of the Networked Micro-Factory, directly linked to the concept of User-centred Production Configuration.
The MF concept promotes the idea of decentralized production close to retailers and consumers (proximity advantage). MFs can range from networked small size but high-tech MC production sites, to sites equipped with automatic knitting machines, or even semi-automatic 3D assembly centres (single-ply cutter + sewing robots). Knowledge-based web services will relate to style expertise, human body expertise and data, material and specific manufacturing knowledge.

Stone conservation for the refurbishment of buildings (STONECORE)

STONECORE is a project dealing with the development and application of nano materials for consolidation and conservation of natural and artificial stone. Six SMEs, four universities, one public research organisation and one public body from seven countries have jointed together in order to find a new approach for refurbishment. The idea is to develop and test nano

materials compatible to the components originally used during construction together with non destructive stone assessment methods. Colloidal sols of calcium hydroxide, calcium / barium carbonate, calcium sulphate or related compounds will be in the centre of interest. These materials will be used also as new, biozide free agents for mildew removal.
The project will lead from laboratory investigations and small scale applications on trial areas to the use of the developed materials on selected real objects. It is a project that aims on knowledge based refurbishment of buildings as well as monuments of cultural heritage and that combines natural sciences and the art of conservation. Thus, main subjects of STONECORE are: The development of nano materials compatible to natural and artificial stone for refurbishment of buildings, monuments, fresco, plaster and mortar, The development and test of suitable technologies for their application and The development and test of non destructive assessment methods (such as georadar) in combination with traditional assessment methods (SEM, XRD, drilling resistance and other). The project will have duration of three years. The results will be presented to the public and interested companies in three workshops, in which interested parties are invited to test the developed materials and techniques on own objects.

Nanopatterning, production and applications based on nanoimprinting lithography (NAPANIL)

The NaPANIL project aims to develop processes, materials and tools, both for manufacturing and for control, for truly 3-dimensional nanosurfaces with feature dimensions ranging from 50 nm to several m. The nanosurfaces will be realised using various variants of nanoimprinting lithography. The dedicated application is to control light at nanostructured surfaces and a few potential high impact products have been identified by the end-user partners in the consortium. Design, demonstration and prototyping these applications will act as test-bench for the new manufacturing paradigm. The manufacturing processes possess generic aspects for production of any kind of topographically 3-dimensional nanostructured surfaces. In the R&D of nanoimprinting Europe has a leading position. The NaPANIL consortium combines the best expertise and know how in field to reach the goals in the project.

Novel approaches for the development of customized skin treatments and services (test case: dead sea minerals and conventional drugs) (SKIN TREAT)

Economical and health interests of skin problems are fast growing issues in Europe, following the remarkable extension in life expectancy in western countries, together with the increased awareness of UV radiation risks. Personalized health care approach has been discussed over the past few years and had been accompanied by developing innovative technologies capable of identifying specific biomarkers, supporting a personalized diagnosis and treatments, especially concerning bio-compatibility of drugs. Skin Treat intends to develop and validate nano-chemical and bio- technologies to achieve an accurate matching of drugs, and drug delivery vehicles, to skin diseases and sub pathogenic skin conditions in their individual context.
The project will design novel generation of pharmaceutical products, as well as consumer personalized service, in order to fit customers tailored needs with a support of strategic consortium based on partnership among SMEs and research organizations. The development of personalized skin therapy protocols requires achieving an accurate diagnostics of skin condition and an extensive analysis of biological markers. Non invasive methods as well as minimal invasive skin sampling, will support the establishment of a range of biological profiles corresponding to skin diseases and skin sub pathologic conditions. Statistical

processing of these data will allow defining biomarkers patterns specifically associated with given clinical conditions.
A bio-informatics data mining protocol will be elaborated, together with multifunctional biomarker analysis software, to build a refined, personalized diagnosis method. Finally, the computer data analysis will yield a decision support system (DSS) to assist dermatologists, chemist and clients for prescription of personalized treatment. Skin Treat concept will be evaluated by a wet pilot study of the whole ervice chain on a few, selected skin disorders like psoriasis, contact dermatitis, and UV skin photo-aging.

Multi-level protection of materials for vehicles by smart nanocontainers (MUST)

The project MUST will provide new technologies based on active multi-level protective systems for future vehicle materials. Smart release nanocontainers will be developed and incorporated in commercial paints, lacquers and adhesive systems to prepare new products exhibiting self-healing properties. A multi-level self-healing approach will combine - in a same system - several damage prevention and reparation mechanisms, which will be activated in response to environmental conditions. The main objective of the project will cover design, development, testing and application of coated materials and adhesives used as novel multi-level protection systems for future vehicles. The new active protection systems will be based on different types of smart nanocontainers incorporated in polymer matrixes and adapted to the level of protection. These systems will result in a radical improvement of the long-term performance of metallic or polymer substrates.
To achieve the objectives, MUST has been configured in four main activities (WP): WP2 is divided in 6 sub-projects (SP) where SP1 is technology-oriented, and concerns the production of nanocontainers.SP2 and SP3 are directed to basic research, and consider fundamental studies on self-healing mechanisms and development of simulation models. SP4, 5 and 6 consider exploitation, costs and upscaling of the most promising systems in automotive, aerospace and maritime sectors, respectively. The demonstration of the technologies will be performed together with continuous risk management in WP3. WP4 also will manage dissemination of the results and training activities and WP1 will consider the whole coordination of the project. MUST will increase considerably the life cycle of materials and therefore boost the competitive strength of the European transport industry.

Virtual collaborative design environment (ENVIRO-TEX-DESIGN)

Eco-Tex-Design has for overall objective to develop a platform supporting a [...]

Radio frequency identification tags linked to on board micro-electro-mechanical systems in a wireless, remote and intelligent monitoring and assessment system for maintenance of constructed facilities (MEMSCON)

Advances in Radio Frequency Identification (RFID) technology, in Micro-Electro-Mechanical Systems (MEMS), in lower-power wireless networking and in computation give hopes for a new generation of tiny, cheap, networked sensors that can be sprayed on buildings to provide quantitative information on the structure s physical state while in service. This can be used to assess the structural condition and aid decision making on retrofit, refurbishment and maintenance so that safety can be attained and material use and costs can be reduced.
The objectives of this work are:

To integrate MEMS-based sensors and a RFID tag in a single package of small size that will be attached to concrete buildings to measure acceleration and/or strain that will be transmitted to a remote base station using a wireless interface.
To develop a Decision-Support-System (DSS) for proactive remedial measures under operating conditions and rehabilitation after an earthquake damage.
To evaluate the system in 1 and the DSS in 2 in a structural laboratory.
To field test an integrated package of the system in 1 and the DSS in 2 on an actual building.
The proposed system will be used in concrete buildings like schools where information will be sent wirelessly, to a central location (e.g. ministry of education), to be processed. It will result in lower maintenance cost, since problems are cheaper to fix when they first appear, and an increase in safety. The impact on safety will be greater after an earthquake where it is essential to have a quick estimate of the building structural condition. Moreover, it will transform the SME dominated building rehabilitation sector into an advanced knowledge sector, enhance the competitiveness of European SMEs, reduce time to assess the structural condition of a building in service and decide on remedial measures, promote sustainability.

CompoLight: rapid manufacturing of lightweight metal components (COMPOLIGHT)

The project proposes to solve identified shortcomings of Rapid Manufacturing (RM) by addressing five areas, all of which are related to design and production of lightweight metal parts. These deficiencies are:
lack of design rules¨for RM, which could guide the designer,
lack of guidelines and simulation software to support to the user in the work preparation prior to RM processing and predict quality features and mechanical properties of the part,
CAD application software to augment partly automate the design of internal structures of a part,
research in the effective use of RM integrated in a process chain jointly with conventional processes, and
lack of ways to define and effectively control surfaces quality.
CompoLight is addressing these problems by means of experiments, applied research and software development. The work is centred on 3 archetypes of lightweight metal products, all of which are parts with internal structures, respectively 1) channels (as in hydraulic valves), 2) hollow zones (to decrease weight of the component) and 3) porosities (as in filters). The proposing consortium comprises 12 partners from six EU member states: 4 RTD, 5 end user SMEs, 1 SME provider, and 2 large industrial companies. Projected impact from the project originates from a larger industrial utilization of lightweight components in many industries, including automotive, aerospace, medical, and electronics.
For each of the participating SMEs, the opportunity to strengthen their market position is the crucial argument for taking part in the project. Societal impact is exemplified in terms of potential reduction of CO2 emission from cars and equivalent savings in fuel consumption. Dissemination of project results involves all partners in activities ranging from demonstration events in each of the participating companies via RM cluster building, seminars and exhibitions to special training courses and the integration of RM curriculum in university studies

Ensuring advancement in sandwich construction through innovation and exploitation (EASIE)

Sandwich panels are modern lightweight building components used to cover walls and roofs of buildings and to isolate spaces inside buildings. They are typically made of two thin metal

sheets with an insulating core between the faces. The use of sandwich panels is continuously increasing and new application areas are opened in industrial, residential and office buildings. The European Standard for sandwich panels EN 14509 has a lack of rules or requirements for many important areas like fastening of the panels, openings in panels, axially loaded panels and panels stabilizing frame structures. Despite there is a lot of knowledge in different countries on these subjects, no common rules have been developed, thus putting a hinder to the standardisation and leading to barriers for some of these applications.The aim of this project is to overcome these problems and develop solutions and technical guidelines ready for implementation for the revision of the standard EN 14509 which is expected to be finished in 2010. The second goal of the project is to implement the new information in the use in practice, which will be carried out through seminars and practical guidelines as well as e-learning modules. The subjects are of high industrial and user interest. The project introduces guidelines for topics not included in the present version of the standard but will on the base of this research be implemented in a later revision of the standard. The subjects are very important in practice. Practical guidelines and seminars will help and broaden the correct and safe use of sandwich panels in Europe and ICPC. The innovative parts of the project are new applications like the in-plane shear and axial resistance and new fastening systems, which open and broaden the market of sandwich panels.

Integration of novel nanoparticle based technology for therapeutics and diagnosis of different types of cancer (NANOTHER)

The breakthrough objective of NANOTHER is to develop & characterise a novel nanoparticle system that will be used as a therapeutic agent or diagnosis tool for breast cancer, colorectal cancer & bone metastasis. Theranostics, the development of nanoparticles with both functionalities, will also be carried out using the hyperthermic effect to kill tumour cells or to release the selected drug. The nanoparticles used in NANOTHER will be selected based on previous studies. Therefore, only polymeric micelles core-shell nanoparticles and magnetic nanoparticles will be included in the study.
The nanoparticles will be functionalised by attaching targeting molecules, depending on the type of cancer to be treated or diagnosed. Labels for diagnosis will include fluorescent or contrast phase probes, which will later be imaged and analysed with the appropriate equipment optimised during the project. Therapeutic agents will be loaded on to the nanoparticle, including drugs like doxorubicin, and new marine pharmacological compounds already in clinical trials. One of the most innovative aspects of this proposal is the use of siRNA as the therapeutic agent. The use of magnetic nanoparticles as a theranostic mechanism is also an innovative aspect of the proposal, as these nanoparticles can be activated to kill tumour cells detected depending on a positive or negative diagnostic.
The project has been structured in seven different sub-projects including aspects like toxicology, biocompatibility of the nanodevices, and also efficacy and biodistribution of the system. In vitro (cellular models) & in vivo assays (small animals; mice) will be used for the study of diagnosis & therapy. The latter will be kept to the minimum necessary to study the efficiency & biodistribution and always taking into account the three Rs & national / EU norms. The NANOTHER consortium includes 18 top-level partners from 8 EU countries as the critical mass required to achieve ambitious project objectives.

Step up in polymer based RM processes (STEPUP)

An innovative mechano-chemical approach (based on the high energy ball milling) will be used for the development of innovative nanopolymers to be used in Rapid Manufacturing (RM) based on Selective Laser Sintering (SLS),by:
Structural modification (up nanopolymers stage) using a currently widely used polymer like Polyammide PA (a nanoPA will be produced);
Alloying (at nanoscale) with different polymers to tune mechanical properties;
Nanocharging of polymers (development of nanocomposites).
Moving from this background, the project will make a real, LARGE, step up in polymers and composites properties by including nano features into the base materials and the final products. The final products will benefit from radically extended performances (i.e. operating temperatures, increased strength). In this way it will be possible, using existing prototyping machines, to realize freeform manufacturing technologies for the direct automated and customised production of parts and products from small to medium size batches for a wide range of possible applications (from vehicle applications to biomedical devices).
The following are the project S/T objectives of SLS materials and parts produced using the modified PA -New nanostructured materials based on Poliammides (PA)
Agglomerated (scale of 20-50 micron) nanophased (scale of 10-20 nm) particles suited for RM via SLS
Properties improvements in materials and RM/SLS parts properties (referred to conventional PA) of more than 200%.
Parts having improved properties and wider application window for automotive sector, consumer goods and medical instrumentation.
For these reasons STEPUP responds quite well to the call topics by: introducing new concepts for the micro/nano fabrication (usage of nanoplymers); enabling transition of RM to customised solutions integrating materials design and simulations.

Novel temperature regulating fibres and garments (NOTEREFIGA)

The objective of the project is to develop novel temperature regulating fibres and innovative textile products for thermal management, selected by the SME segment of the textile industry in Europe. The temperature regulating effect is achieved by novel methods of incorporating large amounts of phase changing materials (PCM) in textile fibres. When the body temperature increases, the PCM melts and absorbs the heat from the body in the form of latent heat. Then, when the temperature drops, the PCM crystallizes and the stored heat is released again.
Clothes with built-in thermo-regulating properties provide maintained thermal comfort in difficult thermal environment and physical activity situations, without putting on or taking off clothes. Such smart clothing would reduce discomfort caused by accumulation of sweat/moisture in the clothing, and also shivering during varying activity levels and ambient conditions. The innovative concepts to be developed will outperform presently available materials for thermal management in garments. The concept is based on two main ideas. One idea is based on processing concepts that rely on compounding/mixing steps to provide suitable rheological properties of complex mixtures of polymers and PCMs followed by bi-component melt spinning to fibres with a core/sheath structure confining the PCM to the core. New bio-based (PLA) and conventional synthetic polymers for fibres (PP, PET, PA) are here addressed.
The second idea is based on a new concept for incorporating PCMs in wet spun cellulose fibres based on direct addition of free PCM to a cellulose solution. A large and intense part of the project will be devoted to product related research, lead by the SMEs in the project. In particular, specific, value-added products are targeted within underwear, sports, leisure and

home textiles. The work will aid in the transformation of the European textile and clothing industry from commodities into specific, value-added high-tech products.

Consumer open innovation and open manufacturing interaction for individual garments (OPEN GARMENTS)

The overall objective of Open Garments is the Manufacturing Service Provider (MSP) Business Model enabling individual garments. This model will enable a new way of design, production and sales of consumer designed and configured garments, based on the provision of individualised services and products to customers and partners. This will lead to new product designs, to a much more customer satisfaction, and to an improvement of the stability and competitiveness of SMEs. Applying this the European Textile and Clothing Industry will be able to create and provide individual garments with a very high degree of customisation in terms of fit, fashion and function at a comparable price in typically 72 hours.
The idea is to empower the consumer as designer, producer and retailer for individual garments by
taking the creativity and the willingness of consumers by means of web-based virtual communities of individuals,
adopting and integrating (mainly) existing digital technologies for design and production of individual garments in a framework of Open Innovation and (a new concept of) Open Manufacturing, and
turning this into a new MSP concept for SMEs with an appropriate business model and tools, which coordinates, supports and manages the Open Innovation community and the Open Manufacturing network.
Targeted results are
the concept of Open Innovation for individual garments together with free tools and working virtual communities,
the concept of Open Manufacturing for flexible and quick manufacturing of individual garments, together with tools and working micro-plants in micro-enterprises,
adopted technologies for digital fabric printing and Rapid Manufacturing of accessories, and a business model for the knowledge based MSP together with design and production tools and services for Open Innovation and Open Manufacturing.
The MSP business model will be developed, implemented and tested in real industrial environments.

Future industrial model for SMEs (FUTURESME)

The primary concept of this project is to research, develop, validate and valorise an architecture and set of tools, methodologies and structures which will assist European companies attain a competitive position in world markets in the mid to long term horizon. The target group is SMEs and specifically those from the 50 150 employee level. Within this target group, those organisations with high growth potential will be prioritised. The primary development focus will be on operation models which reflect the High Mix Low Volume (HMLV) manufacturing environment which companies must migrate towards in order to survive and compete.
The project will address competitiveness issues relating to European SMEs, the lack of take up of productivity methodologies such as Lean and Six Sigma and the changing nature of the business environment in which SMEs operate. A comprehensive response will be generated which will deliver and demonstrate solutions for SMEs in relation to strategic planning, cultural and structural issues preventing adoption of best practices, modified lean and six

sigma tools tailored for SME businesses, virtual manufacturing and collaboration methods, value chain enhancement methods, process modelling and simulation tools, implementation methodologies within SME organisations, design for environment support tools and workflow process development tools for SMEs.
In addition, a special task will pilot and test how lean, six sigma and environmental philosophies can be integrated into school curricula in order to influence the mindset of future employees towards best practice business philosophies. The manufacturing model will be thoroughly tested through application in SMEs and other companies across a number of manufacturing sectors and also within several countries. Results will be disseminated widely across the EU and the outputs will be exploited for the benefit of SMEs across Europe.

Multi-source energy storage system integrated in buildings (MESSIB)

The overall objective of MESSIB is the development, evaluation and demonstration of an affordable multi-source energy storage system (MESS) integrated in building, based on new materials, technologies and control systems, for significant reduction of its energy consumption and active management of the building energy demand.
This new concept will reduce and manage smartly the electrical energy required from the grid favouring the wider use of renewable energy sources . It will reduce raw material use for thermal performance and improve the indoor environment, the quality and security of energy supply at building and district level, including Cultural Heritage buildings. Furthermore, a significant reduction of the energy unit cost for end-users will be achieved. MESS is composed by two thermal and two electrical storage systems, integrated with the building installations and a control system to manage the building energy demand.
The MESSIB basic principles are:
Rational use of thermal energy for primary energy savings and for increasing the indoor comfort.
Improvement of electrical energy storage in combination with RES to shift the demand with the production and to optimise the use of low cost off peak power from the grid.
Integration of the technologies in the building. Each of the technologies developed in the project will be integrated with conventional installations optimizing their functionality.
An active control system will manage the profile of use of each storage system and their interactions.
This will contribute to the intelligent management of building energy demand and to ensure its security, quality and reliability.

Towards a low carbon energy : The European strategic energy technology plan (EBC2008)

Renewable Energies and Energy Management are major issues for France which supports the European Commission energy/climate policy. To realize this commitment, we propose to organize under the French Presidency of the European Union, a major event to prepare the launch of the SET-Plan, named "Towards a low carbon energy: The European Strategic Energy Technology Plan". It will take place on October 28th 2008 in Paris at the Carrousel du Louvre. Based on the work launched by the European Summit in spring 2008, this major event, which will include a conference and an exhibition, will be a place for expression on the issues and challenges faced to industry and society by the European climate/energy policy, and the fundamental role of technology to solve them.
The objectives are: to remind the background and the objectives of this policy, to agree on the objectives of low carbon energy technologies and rally the European players around a

common strategy, to draft the agenda of the advances of these technologies, to include them in a common frame of reference in order to compare periodically their results to conduct a coherent change in the energy mix, to encourage managers to acquire and use the instruments provided by the SET Plan in their strategic choices, to enhance recent European technological achievements, to enhance the work of technology platforms and to support the implementation of the Joint Technology Initiatives. As active component of the SET-Plan, the event will also provide an opportunity to promote coordination of research organizations in the energy sector through the launch of the Alliance, to promote European industrial new initiatives and to prepare the work of the Steering Group for the Prague Summit in 2009.

Production of DME from biomass and utilisation as fuel for transport and for industrial use (BIODME)

The overall project objective is to demonstrate production of environmentally optimised synthetic biofuel from lignocellulosic biomass at industrial scale. The final output of this demonstration is dimethylether (DME) produced from black liquor through the production of clean synthesis gas and a final fuel synthesis step. In order to check technical standards, commercial possibilities and engine compatibilities the bio-DME will be tested in a fleet consisting of 14 Volvo trucks. Research, development and demonstration will be made of improved fuel production systems and conversion technologies for the sustainable production and supply chains of DME from biomass. DME produced from black liquor can be considered as an added-value product considering a pulpmill as a biorefinery

Development of a bionic solar collector with aluminium roll-bond absorber (BIONICOL)

The aim of the project is to develop solar collectors with absorbers which feature bionic channel structures ("FracTherm®" structures), which are multiply branched in a fractal way in order to obtain a uniform flow distribution, a low pressure drop as well as a high thermal efficiency. The absorbers will be built of aluminium using the so-called roll-bond process. Small solar absorbers have already successfully been built in a previous research work.
It is now necessary to develop collectors with typical dimensions needed for the market up to a prototype stage and demonstrate their efficiency and functionality as a basis for a following series production. It is expected that high-efficiency collectors at low costs can be obtained as a result of the project. The collectors are to be investigated for a wide temperature range in order to cover various applications. To reach the mentioned aims, the FracTherm® algorithm is to be developed further and the obtained designs have to be produced, evaluated and optimized. Moreover, the possibilities and constraints of the roll-bond production process have to be investigated in order to find out the best possibilities to produce a solar absorber with maximum efficiency and minimum costs. One of the very important tasks of the project will be the coating of the absorber after its channels are produced.
Finally, the absorber has to be mounted into a collector casing and thus also has to fulfil a number of requirements. The target of a prototype and small-series production is to demonstrate the possibilities of manufacturing FracTherm® solar collectors with variations of the absorber. In order to prevent corrosion, it is necessary to work on appropriate heat transfer fluids. It is intended to build demonstration systems in various sites in Europe which are operated for more than one year within the project. The final objective is to evaluate the competitiveness of the developed solar collectors with state-of-the-art products.

Advanced ground source heat pump systems for heating and cooling in Mediterranean climate (GROUND-MED)

GROUND-MED project will demonstrate geothermal heat pump (GSHP) systems for heating and cooling of measured SPF>5,0 in 8 demonstration sites of South Europe.
As the SPF is determined not only by the heat pump unit, but by its operating conditions imposed to the heat pump by the ground heat exchanger and the heating/cooling system of the building as well, integrated systems incorporating the following technological solutions will be demonstrated and evaluated:
- new water source heat pumps of improved seasonal efficiency; key technologies include use of the next generation of compressors, heat exchangers and automation;
- borehole heat exchangers and heating/cooling systems operating with minimum temperature difference between them, which also follows the corresponding heating/cooling demand from the building; design aspects, thermal storage and system controls are important;
- minimum power consumption to system components; key parts are the fan-coil and air-handling units.
GROUND-MED has a duration of 5 years and a budget of around 7,3 million euros, comprising 25% research and 75% demonstration and other activities. The GROUND-MED consortium comprises 24 organizations mainly from South Europe, including a wide diversity of GSHP actors, such as research and educational institutes, heat pump manufacturers, national and European industrial associations, energy consultants and works contractors.

Nanostructured photoelectrodes for energy conversion (NANOPEC)

To address the challenges of photon capture and energy conversion, we will investigate solar-driven hydrogen production via photoelectrochemical water splitting. Although the concept is extremely attractive as a method of sustainable fuel production, no single material with acceptable performance, stability, and cost has been found, despite decades of investigation. To address this significant challenge, we will use new concepts and methods, afforded by nanotechnology, to design innovative composite nanostructures in which each component performs specialized functions.
These novel nanocomposites will decrease the number of criteria that any single component must meet, thus overcoming the basic materials limitations that have hindered development. Computational studies will be used to assist in the selection of optimal material pairings and a wealth of advanced analytical techniques will be employed to improve the understanding of structure-composition-property relationships. As a final objective, we will use NanoPEC s innovations to develop a 1 square-centimeter test device that converts solar energy to hydrogen energy with a sustained 10% efficiency and a maximum performance decay of 10% over the first 5,000 hours of operation and a 100 square-centimeter test device with a sustained 7% efficiency and similar stability, representing a performance standard that goes well beyond the state-of-the-art. NanoPEC s innovative research will redefine the field of photoelectrochemistry and place Europe at the forefront of nanoscience and nanotechnology research by contributing to leadership in this strategically important area.

Development of advanced biorefinery schemes to be integrated into existing industrial fuel producing complexes (BIOREF-INTEG)

The overall aim of BIOREF-INTEG is to develop advanced biorefinery schemes to be integrated into existing industrial fuel producing complexes. S&T project objectives are: to make the production of biofuels more competitive, to identify and develop the optimal

integrated biorefinery schemes for the production of best suited "building blocks" in terms of processes and bioproducts, and to identify opportunities of various biomass-based sectors to produce fuels while increasing their market competitiveness by co-producing added-value products.
Sectors dealt with are: sugar/starch (bioethanol), biodiesel, pulp/paper, conventional oil refinery, power production, food industry, agrosector. The project is performed by 7 separate but strongly interrelated workpackages dealing with: mapping of existing industrial fuel complexes in Europe (reference-cases); definition most promising added-value bioproducts; knowledge import from outside the EC; integral technical, economic and ecological system assessments to select most promising market specific integrated biorefineries; technology deployment; knowledge dissemination and training, and project management. The project is co-ordinated by ECN (The Netherlands).

Barriers for energy changes among end consumers and households (BARENERGY)

The main objective in this proposal is to develop methods to identify the relevance and strengths of various barriers for energy behaviour changes among end consumers and households, and to discuss how activities from political authorities, energy producers and NGOs can overcome these barriers.
We will address changes in consumer behaviour along two dimensions. The first is energy saving and improvement of energy efficiency within households, the second is changes toward more sustainable and renewable energy technologies. We are also concerned about the relationship between these three strategies; turn down and switch off, the purchase of energy-efficient appliances, and shift to (more) sustainable energy carriers.
Based upon the state of art we have identified six barriers to energy change among end consumers, ranking from macro to micro perspectives.
- Physical and structural barriers.
- Political barriers,
- Cultural-normative or social barriers,
- Economic barriers,
- Knowledge based barriers and
- Individual-psychological barriers We will combine an individual and institutional approach. This means that individual and household energy behaviour - and changes in this behaviour - can only be understood by considering individual values, attitudes, norms and knowledge among individuals together with the context in which this behaviour takes place. We have developed a methodological triangulation with three main empirical approaches. - Qualitative interviews with strategic stakeholders in the involved countries - Representative quantitative surveys among consumers in the countries involved in the project.
However, we will also include Greece in this survey in order to focus on energy related questions in the climate of SE Europe - Qualitative strategic focus groups among targeted consumer groups in the same countries. With strategic groups we mean people with different windows of opportunities and people with different social background, identified in the call text.

Risk of energy availability: common corridors for europe supply security (REACCESS)

The implementation of the present Project aims at: Analysing present policies concerning EU MS and Community targets for energy import. Evaluating technical, economical and environmental characteristics of present and future energy corridors within Europe and among Europe and the supplying regions of the World, taking into account the different typology of

infrastructures and technologies (railways, pipelines, cables, terminals, ships and other carriers, ..), the flows and the distances involved for oil, natural gas, coal, electricity, uranium, biomass and hydrogen (reference to the work done within the ENCOURAGED Project and other research activities).
Introducing suitable parameters and indicators (including technical and socio-economical reliability) and cost components (investment, O&M, externalities) incorporating the above mentioned information, which may help a global evaluation of supply options (energy vectors, infrastructures, origins of the sources) and their impacts on economy, society, energy and environment toward sustainability. Identifying main corridors for primary and secondary energy carriers to EU27+ Implementing these energy corridors into an adapted version of the pan-EU TIMES model (PEM) built in the framework of the NEEDS IP or into other modelling tools.
Analysing scenarios, in which for the fulfilment of the EU27+ energy needs, the import strategies of primary (and secondary) energy carriers compete with the evolution of energy efficiency policies (i.e. white certificates for the energy saving), the introduction of new energy schemes and the development of renewables, in the framework of the EU environmental targets for 2030-2050. Some hypotheses related to the energy supply and demand strategies of regions outside of Europe will be also assumed, given their potential impacts on the international energy prices (e.g. China, India, OPEC, Russia etc.)

Open public extended network metering (OPEN METER)

New smart multi-metering or multi-functional Advanced Metering Infrastructure (AMI) is capable of creating value for energy consumers, network operators, metering operators and retailers. AMI will provide better services for customers in various ways: not only by more accurate metering and billing, but also by easing the supplier switching process and also by facilitating demand response to price and network signals that eventually will reach the consumer. With AMI technology, consumers can be aware of prices and CO2 emissions associated with their consumption.
Although there are some commercial systems capable of supporting AMI, there is great lack of interoperability among systems, preventing the large-scale adoption of the smart multi metering. The main problem for the large-scale adoption is the lack of a set of widely accepted open standards capable of guaranteeing the interoperability of systems and devices produced by different manufacturers. The main objective of the OPEN meter project is to specify a comprehensive set of open and public standards for AMI, supporting electricity, gas, water and heat metering, based on the agreement of all the relevant stakeholders in this area. Partners will carry out activities resulting in identifying and filling the knowledge gaps necessary to enable relevant industries to agree, implement and embrace the new set of international standards specified.
The project will take advantage of the existing International and European standards, technologies and solutions, adapting them to the specific needs of AMI where possible, and carrying out the research and technological development activities where necessary. The OPEN meter consortium comprises world-wide leading electricity, water, gas and heat meter manufacturing industry, alongside with some of the largest multi-utilities in Europe, and the official standardization body CENELEC, so the support of the majority of the relevant stakeholders in the area is ensured.

Zero Emission Platform supPOrt Secretariat (ZEPPOS)

ZEPPOS (Zero Emission Platform supPOrt Secretariat) is the secretariat for the European Technology Platform for Zero Emission Fossil Fuel Power Plants (ETP-ZEP) for the period May 2009- October 2011. It is the continuation of the previous secretariat that operated from 2006 onwards under the name ZEST.
The objective of ZEPPOS is to provide the level of support to ETP-ZEP that it needs for achieving its own goal: to enable commercial availability of technologies for CCS (Carbon Capture and Storage).
Primarily ZEPPOS provides process support. This includes administrative activities but also organizational activities (initiate and structure ZEP-activities), networking activities and input for the discussions) and, if needed, fund raising and financial management. The process support is provided to the various bodies that make up the ZEP platform (the advisory council, coordination group, taskforces etc.).
ZEPPOS also provides communication activities for the intra-platform coordination of activities and the dissemination of information and supports the ZEP communications director whose responsibility is the external communications.
ZEPPOS provides limited desk research support at request of the taskforces. An example of that could be data collection and analysis regarding progress of individual member states in the field of policy, technology and public communication for which attempts have been made to develop country profiles.
ZEPPOS is staffed by 3 people, all of which have worked for the ZEP secretariat during its first years of existence.
ZEPPOS and its staff members are independent from participating organizations and constituent groups (industry, NGO s, research)and is therefore without vested CCS-related interests. The home base of ZEPPOS is The Hague, Netherlands. Additionally it has facilities in Brussels.
ZEPPOS uses advanced tools for its activities such as internet supported teleconferencing.

High efficiency consolidated bioprocess technology for lignocellulose ethanol (HYPE)

Lignocellulosic bioethanol has the potential of contributing to a sustainable and secure European energy supply for the transport sector. European research and industry is presently among the forerunners in developing lignocellulosic bioethanol. Although a number of technical breakthroughs have been achieved during the last decade, some key technical issues especially concerning the hydrolysis and fermentation still remain to be solved.
In the HYPE project, a combined approach is used to develop a novel integrated concept for hydrolysis and fermentation of lignocellulosic feedstocks. Improved enzymatic hydrolysis, fermentation of all carbohydrates, process development as well as high flexibility to feedstocks and technical robustness are among the goals of HYPE. The technologies included in HYPE will be combined into a one unit continuous consolidated bioprocessing reactor including hydrolysis, fermentation and ethanol recovery. The consolidated bioprocessing developed in the HYPE project is expected to significantly improve the overall process economy through a reduced process time, improved enzyme efficiency and high yield of all carbohydrates.

Pan European grid advanced simulation and state estimation (PEGASE)

PEGASE is a four year project dealing with the High and Extra High Voltage transmission and sub-transmission networks in Europe (designated as ETN) and implemented by a Consortium composed of 20 Partners including TSOs, expert companies and leading research centre s in power system analysis and applied mathematics. Its overall objectives are to define

the most appropriate state estimation, optimization and simulation frameworks, their performance and dataflow requirements to achieve an integrated security analysis and control of the ETN.
The heart of the PEGASE project will involve advanced algorithmic, build prototypes of software and demonstrate the feasibility of real-time state estimation (SE), multi purpose constrained optimization (OPF) and time domain simulation of very large model representative of the ETN, taking into account its operation by multiple TSOs. Project R&D ambitions: The first ambition is to relieve all knowledge barriers to provide all TSOs with a synchronous display of the state of the ETN, very close to real time (typically each 5-10 seconds). The second ambition is to develop OPF programs determining realistic system operating points that include TSO operating rules but also optimal preventive or corrective actions, typically for real-time congestion management.

PROcedures for testing and measuring wind energy systems (PROTEST)

One of the major causes of failures of mechanical systems (e.g. drive trains, pitch systems, and yaw systems) in wind turbines is insufficient knowledge of the loads acting on these components. The objective of this pre-normative project is to set up a methodology that enables better specification of design loads for the mechanical components.
The design loads will be specified at the interconnection points where the component can be "isolated" from the entire wind turbine structure (for gearboxes for instance the interconnection points are the shafts and the attachments to the nacelle frame). The focus will be on developing guidelines for measuring load spectra at the interconnection points during prototype measurements and to compare them with the initial design loads. Ultimately, the new procedures for the mechanical components will be brought at the same high level as the state-of-the-art procedures for designing and testing rotor blades and towers which are critical to safety.

Understanding of degradation mechanisms to improve components and design of PEFC (DECODE)

The main objective of the planned project DECODE is to increase the life-time of fuel cells for automotive applications. It is well-known that liquid water plays a crucial role in the degradation processes of fuel cells. However, this specific degradation influence is not addressed sufficiently in the present research and development efforts. Therefore, DECODE aims at identifying characteristic behavior regarding degradation and malfunctions with special emphasis on liquid water interactions. The work will quantitatively elucidate fundamental degradation mechanisms with PEFC under steady-state, cycling and start-up/shut-down conditions. The elucidated mechanisms will be used to improve PEFC durability. The project plan is spitted into three phases: In the first short phase, - the specification and definition phase -, materials, components as well as testing and opera¼ting conditions will be specified. In the second phase, - the analysis phase - the individual degradation processes of the components and their interactions will be investigated. This includes the fundamental investigation of membrane and electrodes in work package 3, the analysis of porous media in work package 4 and the investigation of degradation of bipolar plates in work package 5. The investigations in these three work packages involve novel methodology, sophisticated characterization of components, and modeling of water transport and water interactions with components. In the third phase the knowledge of the degradation processes and mechanisms will be use to generate technological progress. It includes

development of novel fuel cell operating strategies to mitigate degradation phenomena and to improve components and single cell design (also by moderate modification of materials).

Enabling advanced pre-combustion capture techniques and plants (DECARBIT)

DECARBit responds to the urgent need for further research and development in advanced pre-combustion capture techniques to substantially reduce emissions of greenhouse gases from fossil fuel power plants. The project will accelerate the technology development and contribute to the deployment of large scale carbon capture and storage (CCS) plants in line with the adopted European policies for emission reductions. DECARBit- short for 'Decarbonise it', is established by 16 legal entities constituting the core group of the project. These encompass 5 leading industrial technology providers, 2 technology end-users (1 utility and 1 oil&gas company) and 9 highly ranked RTD providers representing in totality 8 countries. The project focus is to pursue the search for improved and new pre-combustion technologies that can meet the cost target of 15Euro/ton CO2 captured as stated in the Work Programme. DECARBit is designed as a Collaborative Large-scale Integrating Project.
The RTD activities are structured in 5 sub-projects directly responding to the objectives of the Work Programme:
- SP1 System integration and optimization
- SP2 Advanced pre-combustion CO2 separation
- SP3 Advanced oxygen separation technologies
- SP4 Enabling technologies for pre-combustion
- SP5 Pre-combustion pilots

The project activities comprise theoretical and experimental investigations leading to extended pilot testing.
Key expected impacts of DECARBit, all complying with the Work Programme are:
- Cost reduced pre-combustion capture of CO2 promoting the development and deployment of large-scale CCS plants (10-12 by 2020). Further industrial uptake is strengthened through an Industrial Contact Group established within the project framework
- Strengthen the competitiveness of the European industry and economy by maintaining and reinforcing the leading position in CCS technologies, also exploring the potential impacts for other energy intensive industries.

Intermediate band materials and solar cells for photovoltaics with high efficiency and reduced cost (IBPOWER)

This proposal pursues the manufacturing of intermediate band materials and solar cells according to the following main strategies:
- Insertion of transition elements into III-V semiconductor matrices;
- use of quantum dot systems to artificially engineer intermediate band solar cells;
- development of intermediate band materials and solar cells based on InGaN;
- Insertion of transition elements into thin film polycristalline hosts;

Approaches 'a' to 'c' rely on the use of concentrated sunlight to achieve cost competitive goals. Approach 'd' relies on low cost materials.
Increasing efficiency of wind power plants for the production of energy (WINGY-PRO)
The aim of Wingy-Pro is to demonstrate the first ever large size transversal flux generator in an existing wind turbine. A determining factor for increasing the profitability of an offshore wind farm is the installation of wind turbines with a significantly high power capacity and low weight.
Until now, the designs of large capacity turbines for offshore applications have been an up

scaling of the existing smaller models. This has led to the construction of wind turbines with huge physical dimensions (e.g.: The E-112 has a hub height of 124 m and a rotor diameter of 114 m). Consequently, the weight of the turbines has increased considerably and the material-resistance of the blades, has been taken almost to its limits (rotor blades can reach a length of up to 61 m). These large dimension and weight have a negative influence on the economic efficiency of those offshore applications, because of the high costs for the foundation, transport and installation of the wind turbines.
The objective of the project is to carry out the design and development of an improved generator technique through the transverse flux generator (TFG) with permanent magnets in the rotor. There are single-, two- or multi-phase machines, depending on the number of independent stator windings, which are mounted axially on the machine shaft.
This technique has been known in the electro-field for years, but due to its strong vibrations and high noise emissions, it has been hardly used. Nowadays however, thanks to new and innovative manufacturing methods and to the development in modern micro-processing controls, the TFG can be used in practical applications.

New applications for cpv's: a fast way to improve reliability and technology progress (NACIR)

The main goal of this proposal is to join together the owners of the most advanced CPV technology, with respect to the state of the art, in order to research from its leading position new applications for CPV systems. In addition to opening up new markets, it will unveil possible sources of failure in new environments outside Europe, in order to assure component reliability. The proposed project will also try to improve the current technology of the industrial partners (ISOFOTON and CONCENTRIX) by accelerating the learning curve that CPV must follow in order to reach the competitive market, and lowering the cost under the current flat panel PV significantly within 3-4 years.

The use of CPV systems in remote areas, together with harsher radiation, ambient and infrastructure conditions will help to increase the rate of progress of this technology. In addition, the ISFOC s contribution, which brings together seven power plants from seven CPV technologies up to 3 MWpeak, will allow creating the most complete database of components and systems performance to be generated as well as the effects of radiation and meteorology on systems operations. Finally, regarding the new applications for CPV subject, the project will use a CPV system sized 25 kWp in a stand-alone station in Egypt (NWRC) for the first time for water pumping and irrigation purposes.
In a similar way ISOFOTON will connect up to 25 kWp CPV to the Moroccan ONE utility grid. From the research content point of view of this project, which is directly addressed by the scope of the call, the cooperative research between UPM, FhG-ISE and the two companies will be favoured by the fact that all are progressing in similar directions: developing two-stage optics CPV systems. In addition to these technology improvements the UPM is very interested in developing a new concept of module, recently patented, which will fulfil all required characteristics of a good CPV with less components and reducing cost.

Solar up-scale gas turbine system (SOLUGAS)

The SOLUGAS project consists in the demonstration of a solar-hybrid power system with direct solar heating of a gas turbine s pressurized air. In combination with highly efficient combined cycle systems or in cogeneration applications significant cost reductions for solar electric power generation can be achieved. The demonstration project will be the first

commercial-scale system that can later be offered to customers in several configurations (combined cycle, cogeneration, etc). The project will prove the technological feasibility, performance and cost reduction potential of such power plants.
A complete solar-hybrid gas turbine demonstration system will be designed and erected in the project. Major new developments include a tube receiver and a solar-adapted commercial gas turbine. The solar concentrator field and tower are laid out and built. Software tools will be used and extended to allow simulation of the components and system performance. The tools will be verified by comparing performance predictions with measured data. Later the tools will be applied to allow predictions for other commercial systems. This project will reduce the water consumption of CSP power plants and land usage by increasing the efficiency, this will reduce the investment and O&M costs and improve the environmental profile of CSP power plants.

Ultra thin solar cells for module assembly -tough and efficient (ULTIMATE) (ULTIMATE)

The overall objective of the current project is to make a significant contribution to the dissemination of PV in order to improve the sustainability of the European energy supply, to reduce environmental hazards such as global warming and to strengthen the economical situation of the European PV industry. The main project objective is the demonstration of PV modules using solar cells which are substantially thinner than today s common practice. We will reduce the current solar cell thickness from typically 200-250 µm down to 100 µm. Assuming a projected kerf loss of 120 µm for 2010, this will enable more than 50% additional wafers to be cut from each silicon ingot. Additionally, by using advanced solar cell device structures and module interconnection technology, we target to increase the average efficiency for these thin cells up to 19% for mono-crystalline and 17.2% for multi-crystalline silicon and to reach a module-to-cell efficiency ratio above 90%. The processing and handling of wafers and cells will be adapted in order to maintain standard processing yields. Including scaling aspects, this corresponds to a module cost reduction of approximately 30% until 2011 and 1.0 /Wp extrapolated until 2016. Furthermore Si demand can be reduced from 10 to 6 g/Wp providing a significant effect on the eco-impact of PV power generation.
The partners of this project form an outstanding consortium to reach the project goals, including two leading European R&D institutes as well as five companies with recorded and published expertise in the field of thin solar cells. The project is structured in 5 work packages covering the process chain from wafer to module as well as integral eco-assessment and management tasks. The expected impact of the project is a PV energy cost reduction of approximately 30%, a significant reduction of greenhouse gas emissions and an improved competitiveness of the European solar cell, module and equipment manufacturers.

Olefin metathesis as a practical synthetic tool (EUMET)

Catalysis is a well-established area that is well known for shortening molecular assembly protocols. The beneficial overall environmental impact emerging from catalytic uses is also well understood. Making use of catalysis, we plan to develop a program focusing on a very important reaction in organic and homogeneous catalysis that has not yet reached its potential; Olefin Metathesis. The 2005 Nobel Prize was awarded to three pioneers in this area for their seminal contributions but the area

Rolled multi material layered 3D shaping technology (MULTILAYER)

Various emerging markets in the field of non silicon multimaterial micro devices offer a huge potential for commercialisation in the near future. However, solutions for mass-production for most of them have still to be developed. The objective of the MULTILAYER project is to develop a set of solutions for the large-scale production of micro devices based on a technology we call Rolled multi material layered 3D shaping technology and using the concept of tape casting and advanced printing techniques.
This technology will enable to manufacture complex multifunctional 3D-micro parts on a layer by layer manner and in a high-throughput context. Each layer can be given a specific structure. They will be printed and contain channels and cavities that are open or filled in a very high precision manner. The microsystems will have as basic building material ceramics, which is a clear advantage in applications that require high temperature, corrosive environments and long time reliability. Furthermore, it will allow spatial resolutions under 10 µm and the ceramics tapes developed will be down to 10 µm thin.
The Rolled multi material layered 3D shaping technology will have several advantages:
- it will be an efficient mass production method - the fabrication series can attain over a million units
- it will offer a good flexibility for a wide variety possible component designs,
- it will allow the integration of different materials as different layers enabling to manufacture multimaterial multilayered packages with a high degree of integration,
- the process will be very reliable, indeed, every single layer can be advantageously inspected and controlled

Strategic networking of RDI programmes in construction and operation of buildings (ERACOBUILD)

ERACOBUILD aims at strengthening and enlarging the strategic networking of RDI programmes in the field of construction and operation of buildings initiated in the previous ERABUILD coordination action. ERACOBUILD gathers 34 programme owners or managers coming from 17 EU Members States, 4 Associated Countries and 1 European Region.
The new countries will benefit from the experience and results of the 15 programmes owners/managers (10 countries) which already launched 6 joint calls in ERABUILD and agreed on two future trans-national programmes on Sustainable renovation of buildings and Value driven construction process to be implemented in ERACOBUILD. New topics for joint activities will also be developed in ERACOBUILD, such as the identification of other RTD priorities especially, but not only, in relation to industry needs, pre/co-normative research and the optimal use of existing research facilities and the development of new ones. Joint activities (studies, clustering, calls for proposals) will be implemented in these new fields in parallel to the trans-national programmes.
ERACOBUILD is organised around 6 Work Packages.
- WP1 deals with the strategic guidance of the project and offers a platform to national funding bodies to share strategies. It is the core for improving cooperation and setting the basis for long-lasting cooperation in the field of construction and operation of buildings.
- WP2 focuses on the preparation of the joint activities (including a future ERA-NET+) and thus supports the creation of a strong trans-national RDI community in the field.
- WP3a and WP3b implement the joint activities, respectively in the two trans-national programmes and the new topics.
- WP4 continuously supports the improvement of the joint activities through a well structured learning and improving process.
- WP5 deals with communication and dissemination aspects, while contributing to improving the research culture in the sector.

Business models for user centred products (MADE4U)

Recent research results by one of the partners have shown that human beings display unique behaviour (visual strategy), in the way they look at objects. Thus it has been (2006) possible to create spectacles with Progressive Addition lenses which were personalized to a subject

Converging technologies for micro systems manufacturing (COTECH)

The objective of the project COTECH is to investigate new approaches of ¦-manufacturing based on advanced technology convergence processes and to propose hybrid solutions for high added value cost effective ¦-manufacturing emerging applications. The main goals of COTECH are to develop: (1) ¦-replication technologies underpinned by emerging tool-making technologies for processing multi-material components and creating: a) 3D ¦-components using high throughput multi-material ¦-injection moulding with sub-¦m resolution; b) 2D ¦-components using direct multi-material hot or UV embossing with a sub-200nm resolution. (2) Radically new replication convergent technologies combining the capabilities of ¦-injection or embossing to a complementary activation step to create intelligent devices in a single process step: a) Hybrid processes based on ¦-injection moulding using modules of e.g coating and compression injection moulding, to provide functionality to ¦-devices, such as active coatings and combination of micro and nano features in a single step; b) Ultimately the hybrid processes based on ¦-injection with embossing will be validated. This will offer a very high throughput multimaterial ¦-injection that will enable the fabrication of 3D high aspect ratio ¦-parts, complemented by an embossing step to allow ultra precise 2D features. (3) Global process chains with increased MTBF (50%) and fabrication of high quality products. This requires innovative non-destructive inspection solutions and simulation models. (4) High added value ¦-devices with advanced functionalities. COTECH proposes to validate industrially the new technology convergence processes with 8 demonstrators representing the most emergent industrial sectors (transport, biomedical, energy). The expected market for the industry exceeds 1 Billion

Intelligent manufacture from powder by advanced laser assimilation (IMPALA)

IMPALA will develop flexible and efficient Rapid Manufacturing processes of custom parts or small batches. SME end users will be at the forefront of this project, helping them increase their annual turnover by 20-50%, by producing a diversified range of high value components. Currently, manufacturing custom products such as artificial teeth can take several days or weeks and is very expensive. This project will reduce the time between conception and product delivery as well as reduce manufacturing costs. It will transform part of the resource intensive European Industry to that of knowledge intensive and will be a key enabling tool for European Innovation, vital for maintaining the EU as a world leader in Rapid Manufacturing. The consortium is composed of companies and research institutions with expertise in different domains such as automation, laser processes, materials, modelling and will seek to develop the following: an automation system which will shorten the process time by implementing an Imaging system, a CAD/CAM system and a CNC system laser sintering and direct metal deposition processes for rapid manufacturing of producing 3D complex structures with enhanced properties, graded structures or composite structures from very small to large scale a control process system to ensure good product quality and good reproducibility a simulation tool based on modelling and experiments, to allow predetermining parameters for the production of high quality parts, right from the first time. It is environmentally friendly as

there is no waste material and no need for solvent. It will also be used for repairing expensive parts, also reducing waste. Society will directly benefit from this process as it will support the generation of high value knowledge based jobs and will have the ability to produce health care benefits, from custom orthopaedic implants to components for improved drug delivery systems.

Flexible production technologies and equipment based on atmospheric pressure plasma processing for 3D nano structured surfaces (N2P)

Outstanding progress has been made in recent years in developing novel structures and applications for direct fabrication of 3D nanosurfaces. However, exploitation is limited by lack of suitable manufacturing technologies. In this project we will develop innovative in-line high throughput technologies based on atmospheric pressure surface and plasma technologies. The two identified approaches to direct 3D nanostructuring are etching for manufacturing of nanostructures tailored for specific applications, and coating.
Major impact areas were selected, demonstrating different application fields. Impact Area 1 focuses on structures for solar cell surfaces. Nanostructured surfaces have the potential to improve efficiencies of cells by up to 25% (rel), having dramatic impact on commercial viability. Impact Area 2 focuses on biocidal surface structures. Increasing concerns about infections leading to the conclusion, that only multi-action approaches for control of infection transfer can be effective. We plan to combine such surfaces with 3D nanostructures, which will both immobilise and deactivate pathogenic organisms on surfaces. Impact Area 3 is the direct growth of aligned carbon nanotubes on electrode surfaces.
The material is under investigation for use in high load capacitors which are seen as key components for energy storage systems, e.g. for Hybrid Electric Vehicle. Impact Area 4 focuses on tailored interfaces to achieve durable adhesion on polymer surfaces by 3D nanostructuring and coating. Target is to reduce energy consumption by introducing lightweight materials. The N2P partners have been chosen to ensure a strong capability to exploit and disseminate the outcomes. Involved end-user industries represent high market value segments: photovoltaics, aeronautics, automotive, steel. The consortium includes 7 technology leading SMEs and 4 multi-national industries, cooperating with 9 institutes for industrial research and a public body from 8 European countries.

Integrated synthesis and purification of single enantiomers (INTENANT)

Several industries have an increasing interest in improving their access to pure single enantiomers of biologically active substances. The latter often form the basis for valued added products relevant for, among others, the pharmaceutical, cosmetic, and food industries. Up to now there exist two generally rivalling concepts for producing pure enantiomers. One approach is based on developing and applying enantioselective synthesis techniques, which often consist of a large number of reaction steps. Alternatively, simple non-selective synthesis can be applied in combination with advanced downstream separation techniques and recycling strategies.
These two competing approaches have been up to now hardly combined and considered in a holistic way. It is the goal of the proposed project to combine the available chemical and physical methods to effectively and efficiently produce single enantiomers at high purity. For this a strong consortium of academic and industrial experts in various fields of synthesis and separation technologies will work together on several well selected model systems as well as industrially relevant components.

Aligned natural fibres and textiles for use in structural composite applications (NATEX)

Biocomposites manufactured from natural materials such as fibres and bioderived polymers offer a sustainable alternative to traditional ones, but at present they are not available for use in structural applications. NATEX will develop aligned textiles from natural fibres suitable for use as high strength reinforcing fabrics to produce structural composite parts using bio and oil based thermoplastic and thermoset resins. This will include the use of orientated woven natural fibres in bioderived thermoplastics and thermosets, to produce high-tech products with high added value from entirely renewable resources.
The main innovations will be: New chemical/enzymatic treatments to tailor the fibre surface chemistry and to modify its cell wall polymers, to obtain the desired interface properties when combined with the polymer matrix New chemical/natural treatments for the yarn during the wrapping process, new method for low twist yarns production, film stacking and commingling development for natural fibres, to increase the mechanical properties of the yarns Development of new weaving techniques to improve impregnation and to obtain innovative 3D textiles Resin viscosity control using thermal conductive additives, increasing their compatibility with natural fibres by using coupling agents and surfactant additives Besides, a large range of resin processing methods will be adapted to suit them to the characteristics of the modified fibres: Vacuum Bagging, Vacuum Consolidation, Compression Moulding, Continuous Compression Moulding, Infusion and Resin Transfer Moulding. Basic research on joining technologies as hot welding over natural fibre composites will be also performed. As result, aligned natural fibres with improved properties will be combined with thermoplastics and thermosets, increasing the mechanical properties of biocomposites and introducing them in structural applications in different sectors: transport, energy, agricultural machinery.

Development of new agrotextiles from renewable resources and with a tailored biodegradability (BIOAGROTEX)

Increasing oil-prices, a growing threat of oil-shortages, Kyoto agreements on green house gases, environmental effects and climate changes, are all elements that contribute to the concern for the future of our oil based economy. Not only the search for biofuels but also for bio-based polymers and a more extensive use of the natural resources by upgrading the value of natural fibres and side products will be needed to cope with these problems. Techno-economic studies predict an important growth for the bio-based polymer industry in the coming decennia. This will only be possible if new high end applications are developed. Textiles and especially agrotextiles offer a very attractive end market. Volumes in this market area are high and fast growing. At present, products are mainly based on Polyolefin

Resource- and cost-effective integration of renewables in existing high-rise buildings (COST-EFFECTIVE)

The use of renewable energy in the building sector is today dominated by the application of solar domestic hot water and PV systems in single-family houses. In order to significantly increase the use of renewable energy in the building sector, concepts have to be developed for large buildings. In these buildings high fractions of the energy demand can only be met with renewable energy sources, when the façade is used for energy conversion in addition to the roof.
This is especially true for buildings with a small roof area compared to the floor area (high-rise buildings) and for existing buildings which generally have a higher energy demand than

new buildings. Therefore the main focus of the project is to convert facades of existing high-rise buildings into multifunctional, energy gaining components. This goal will be achieved through the - development of new multi-functional façade components which combine standard features and the use of renewable energy resources and the - development of new business and cost models which consider the whole life cycle of a building and which incorporate the benefits from reduced running costs and greenhouse-gas emissions.
The new components will in particular profit from the application of nano-structured coatings and films which will enhance their performance and durability due to antireflective, anti-soiling and seasonal shading functionality. In order to achieve a successful development and implementation of these new technologies and concepts European key actors from construction industry and energy research have agreed to collaborate within this project. The project results will be an important support for the European technology platforms ECTP, ESTTP and PV-platform in which the project partners have a leading role.

Image-controlled ultrasound-induced drug delivery (SONODRUGS)

The demographic changes in Europe towards an aging society will coincide with increasing morbidity of the population. European citizens need improved access to state-of-the-art medical care especially in oncology and cardiology, while keeping expenditures on healthcare affordable. New therapeutic options such as externally triggered local drug release at the diseased area hold promise to solve urgent medical needs: improved treatment with reduced side effects, fewer burdens to the patient and faster recovery after intervention.
Nanomedicine, the application of nanomaterials and nanotechnology to healthcare, will enable breakthroughs in clinical practice. SONODRUGS addresses clinical needs by developing novel drug delivery technologies for localised treatment of cardiovascular disease and cancer. SONODRUGS develops drug delivery concepts where drug release can be triggered by focused ultrasound induced pressure or temperature stimuli within the diseased tissue. New drug loaded nanocarriers will be designed for tailored drug delivery systems that respond to either of the two stimuli. Medical imaging, i.e. magnetic resonance imaging and ultrasound imaging, will be used to guide, follow and quantify the drug delivery process. Therapy efficacy using different drug delivery systems will be assessed in vitro and subsequently in preclinical studies.
Starting form research on a broad range of materials and drugs, two nanocarriers will be finally selected, optimized and produced on a pilot scale in combination with image-guided delivery tools and methods. SONODRUGS binds expertise in materials research (Philips, TUE, GhentRGN, HBBG); material production (Nanobiotix, Lipoid); clinical knowledge in oncology (UTours, HBBG) and cardiology (UKB); in vitro and preclinical validation (UTours, ErasmusMC, UKB); research on imaging techniques (UCY, Philips, IMF); pharmacokinetics, toxicology and biodistribution (ULSOP, IPT).

Radiochemistry on chip (ROC)

The aim of this project is the design, fabrication and implementation of a microdevice able to synthesise radiopharmaceuticals for Positron Emission Tomography (PET) analysis, a technique usually employed in medicine for its unsurpassed sensitivity and specificity. We propose to develop a modular microfluidic architecture which can be used for standard synthesis protocols as well as for R&D of new radiopharmaceuticals. In order to achieve this target, emerging technologies in the field of micro reactors and micro total analysis systems (¼ TAS) have to be applied to the synthetic pathways typical for radiopharmaceuticals, thus improving the traditional approach in terms of efficiency and safety. A deep knowledge of the

chemical processes and of the separation techniques involved in radiosynthesis is needed to define the features of the modules to be fabricated as well as state of art techniques in the field of micro fabrications and microfluidics for the implementation of high performance micro devices. Standard synthesis protocols and new radiopharmaceuticals will be carried into the micro devices thus evaluating their efficiency and versatility. The yields and the purity of the products produced into micro devices will be compared with those obtained with traditional methods and tested in vivo for Positron Emission Tomography (PET) analysis. To ensure the success of the overall project, we will take advantage of a strict collaboration between chemists, physics and engineers in an interdisciplinary approach. For this purpose, we built an international network collaboration between academic partners dealing with the technological side, an industrial partner for checking the system robustness and a physiological clinical institute able to evaluate the end-user outcome.

Multiscale modelling for multilayered surface systems (M3-2S)

It is recognised that more than 90% of failures in engineering components are surface related. Thus, a large variety of different multilayered surface systems (MSSs) with thickness ranging from nanometre to millimetre scales have been developed. However, the design of multilayered surfaces is normally based on experience and no currently available surface modelling technique can deal with MSSs. The aim of this programme is to address an urgent scientific, technological and market need for consistently reliable high performance MSSs, by developing generic, robust multiscale materials and process modelling techniques for the design, optimisation and performance prediction of MSSs.
The S&T objectives are:
- to develop molecular dynamics techniques to model atom deposition processes and the atomic structure and interfaces to achieve optimal coating microstructures;
- to develop multiscale modelling and corresponding experimental techniques to determine nano and crystal behaviour of each layer of a surface coating and the macro behaviour of MSSs;
- to develop an integrated multiscale modelling approach to link molecular dynamics (nano), crystal plasticity (micro) and continuum mechanics (macro) modelling activities for the applications;
- to develop modelling techniques and software systems for design, processes and applications of multiscale MSS and
- to develop modelling-based design methodology for optimised MSSs for high performance components aiming for improved lifetimes and reduced market lead time by 60%.
The consortium consisting of 5 SMEs, 4 universities and 2 research organisations from 5 EU member states and 1 third country incorporates all the necessary elements for the research.
Potential impact includes:
economic impact
- enhance the competitiveness of European coating specialists and manufacturers;
eco-impact
- reduced consumption of energy and materials and S&T impact
- strengthen S&T excellence in modelling & surface engineering

Integrated european industrial risk reduction system (IRIS)

Current practices in risk assessment and management for industrial systems are characterized by its methodical diversity and fragmented approaches. In retrospect these risk and safety paradigms resulted from diverse industries driven and limited by available knowledge and

technologies.
A change based on industry driven R&D work is needed.
At present the European Industry recognised their obligation to reconsider their risk and safety policies, having a more competitive industry and more risk informed and innovation accepting society in vision. Therefore the large collaborative project IRIS is proposed to identify, quantify and mitigate existing and emerging risks to create societal cost-benefits, to increase industrial safety and to reduce impact on human health and environment.
The project is led and driven by the industry to consolidate and generate knowledge and technologies which enable the integration of new safety concepts related to technical, human, organizational and cultural aspects.
The partnership represents over 1 million workers.
The proposed project relates to strategic research topics defined by ETPIS and ECTP and is underpinning relevant EU policies on industrial safety.

Adaptive Control for Metal Cutting (ADACOM)

The project ADACOM will address main industrial sectors. automotive (DC, LOLA, CRF), electronics (BOSCH) and printing machine sector (HDM). Next to those OEM s, OEM s supplier and especially sensor manufacturer suppliers (Kistler) will participate in this project in order to reach the following goals: Core development will be an Adaptive Machining Systems for metal cutting operations (milling, turning, gun-drilling, grinding), which consists of a sensor and actuator systems for online manufacturing control related to the part quality. The major aim is to achieve an Online Quality Control systems within the mass production of the above mentioned industrial sectors. In ADACOM this aim will be achieved by separating the single components of such an adaptive machining system into a modularised monitoring system. This modularisation will first of all give the possibility to adapt the different modules in this way that a flexible use of the adaptive system for different machining operations is possible. Next goal of the development within this project will be the realisation of one central system for different processes, which incorporates the flexibility towards changing production situations, different machine tools and different work piece materials.
This flexibility of the ADACOM-System will be reached by developing a standardisation of the Adaptive System components. Issues like standardised interfaces, which guarantee Plug and Produce -production, will be achieved by standard data formats throughout the whole production sequence. This implies a connection of manufacture to design and should give the possibility use the same data in the design, production and quality assurance of a mass product.

Lean product and process development (LEAN PPD)

The proposal is addressing the need of European manufacturing companies of a new model that go beyond lean manufacturing to ensure the transformation of the enterprise into lean environment. This is to response to the customers and market demands of value creation incorporating sustainability, culture and customisation. A significant change in enterprise performance can come from the adoption of lean thinking throughout the entire product life cycle. The aim is to develop a new model based on lean thinking that will consider entire product life cycle, providing a knowledge based environment to support value creation to the customers in term of innovation and customisation, quality as well as sustainable and affordable products. This will be called Lean Product and Process Development (LeanPPD) paradigm.
The required knowledge for value creation in LeanPPD model will be developed based on the

European standard and open architecture to ensure data and knowledge integrity and to provide a lean environment across the product life cycle and the supply chain. The project proposes to develop novel set-based lean design tools that ensure the concurrent consideration and development of lean product design as well as it associated lean manufacturing system. The user driven approach will be ensured by the six business cases (BC) provided by the end-users from different sectors in the consortium. These BCs will serve to derive requirements upon the tools, methodology and models being developed, to test the solutions developed and will serve as industrial demonstrators of the proposed concept.

Design of customer driven shoes and multi-site factory (DOROTHY)

Shoe Manufacturing in Europe faces an intense and growing competitive pressure brought forth by low-wage countries. To maintain competitiveness DOROTHY promotes a response based on the transformation of shoe industry and related business model meant to strengthen Europe s ability to compete in terms of high added value for the customer (as cost-based competition is not compatible with the goal of maintaining the Community s social and sustainability standards).
This transformation relies, on one hand, on the development of tools for the design of customer driven adding value shoes and, on the other hand, on the realization of tools for the design, configuration and reconfiguration of flexible multi-site multi-nation production plants, meant to manufacture those customer driven shoes. DOROTHY mission is to design customer driven shoes everywhere, manufacture them intelligently anywhere as a crucial challenge for shoe industry to gain competitiveness in the global markets, also through better cooperation (and not only to compete) with low-wage countries.

Innovative advanced wood-based composite materials and components (WOODY)

Currently the world of polymeric composite materials is almost exclusively based on fossil derived components. This fact represents a strong issue, as the non-renewable global oil resources are being exploited year after year, also as a consequence of the ever growing demand for plastics engineering materials. WOODY Project goal is to develop new composite panels and laminates from wood derived renewable materials, providing performances competitive with respect to traditional composites. WOODY Project is aimed at introducing a fully innovative paradigm in the composite industry, thanks to development of materials derived from natural resources, enabling to cover the whole necessities of components: fibre, matrix and core. Enzymatic processing is developed in parallel to chemo-thermo-mechanical treatments, for achieving the maximum throughput and eco-sustainability.
The breakthrough innovation in materials is backed by an innovative approach in design of composite products, the so called Composite Thinking , starting from the phase of conception, to the production and installation, enabling to rethink products and fully exploiting the potentialities of composites. Quality of the approach is based on multidisciplinary research and on the target oriented to the redefinition of the whole processing value-chain for wood derived cellulose nano fibrils and resins deriving from natural raw materials, and the related manufacturing processes for advanced composite components. The Project is aimed to set the basis for the development of a new class of products optimising the use of the natural resources. Such approach is therefore expected to increase the tendency for wild forest areas recovery, and to promote the culture of wooden species dedicated to the extraction of compounds finalized to the production of renewable composite materials.

Clean buildings along with resource efficiency enhancement using appropriate materials and technology (CLEAR-UP)

Clear-up presents a holistic approach to the reducing operational energy use in buildings. By development and novel use of nano-materials it aims to increase energy performance in heating, ventilation, air conditioning (HVAC) and lighting systems, and to improve indoor air quality using catalytic purification. Clear-up...

Fluorine substituted high capacity hydrides for hydrogen storage at low working temperatures (FLYHY)

At present there is no solid state hydrogen storage material available fulfilling all requirements for practical use in mobile applications. These are 1. high storage density, 2. temperatures and heats of operation compatible with PEM fuel cells, 3. high hydrogen loading and unloading speeds in the range of a few minutes and 4. low production costs. FlyHy focuses especially on the first three points while using commercially upscalable materials preparation processes. High hydrogen capacity materials like alane or borohydrides as well as so called Reactive Hydride Composites (mixtures of borohydrides with selected other hydrides), nowadays suffering from too high or too low reaction temperatures and heats, shall be modified by substituting halogens for part of the hydrogen or hydrogen containing complexes.
The project partners IFE, GKSS and AU have shown that by this approach novel mixed hydrido-halogenide compounds can be prepared. Fluorine substituted Sodium Alanate exhibited drastically increased desorption pressures at the same reaction temperature or lowered reaction temperatures at the same pressure resp. Targets of the FlyHy project are:
(i) to exploit these findings on materials destabilisation and stabilisation resp. by halogen substitution for alane, borohydrides and Reactive Hydride Composites , in order to achieve a breakthrough in the thermodynamic properties of these materials exhibiting the highest hydrogen capacities known at present,
(ii) to obtain an in depth scientific understanding of the sorption properties of the substituted materials by extended structural and thermodynamical characterisation and modelling, for materials optimisation,
(iii) determine tank relevant materials properties like e.g. densification behaviour and heat conductivity, and, if applicable, do first tests in a prototype tank.

All-inorganic nano-rod based thin-film solarcells on glass (ROD-SOL)

Thin film solar cells, based on non-toxic, abundant and air-stable silicon (Si) will probably, based on forecasts, dominate the photovoltaic market in the future and thus replace bulk Si from its leading position. This prognosis is fostered by the strong cost reduction potential due to highly effective materials utilization at low energy consumption. However, thin film Si suffers from inherently small grains, which limits efficiencies to ~10% due to carrier recombination at grain boundaries.
A radical innovation of the Si thin film materials synthesis route is needed to circumvent this problem. ROD_SOL aims at the synthesis of Si nano-rods, densely packed at sufficiently large diameters (few 100 nm's) and lengths (>1µm for sufficient carrier absorption in indirect semiconductors) directly on cheap substrates like glass or flexible metal foils. The idea is to grow Si nano-rods from the gas phase that are inherently defect free, with a wrapped around pn-junction that bares the potential to decouple absorption of light from charge transport by allowing lateral diffusion of minority carriers to the pn-junction, which is at most a few

hundred nm away, rather than a few µm as in conventional thin film solar cells. That way, efficiencies as in bulk Si are expectable, however, with the advantage that the 'nano-rod carpet' layer, is at most a few µm thick. A 'nano-rod carpet' that thin shows a strongly increased optical absorption.
Thus, the 'nano-rod carpet' is not only the active solar cell element but at the same time its own light trapping structure. For synthesis of the nano-rods, development of suitable contact materials and characterization of physical and structural properties four experienced research institutes have joined forces. Despite the fundamental materials research to be in focus, three companies joined the consortium to directly test and implement the novel materials and processes in a well proven, industrially viable thin film solar cell concept.

Organisation of Manufuture implementation conferences 2008-2009 (MANUCONF08-09)

Promoted by the MANUFUTURE platform and the DG research of the EC, an annual conference is hosted since 2003 by the country of the EU presidency. The event objective is to report on the progress of the Manufuture activities and debate the future of the European manufacturing industry and the conditions for its sustained development. These events are fundamental contributions to the governance of research and innovation in manufacturing with a real added value to the industry through a progressive selection of complementary themes.
These conferences have become a vital event for strengthening the programmes and actions by contributing to effectively identify and fill in the gaps in the R&D programme support in a multi-annual strategy. This project objective is to organise two events, in 2008 and 2009, in the direct continuation of previous ones. The 2008 conference will be held under the French presidency with a focus on how European SMEs and regional developments can efficiently contribute to the industrial implementation of Manufuture roadmaps. The 2009 conference under the Swedish presidency will highlight how this implementation should lead to a sustainable European manufacturing industry taking into account environmental and social issues. The project proposes follow-up activities to link the two events organised with an active involvement of the competent National Authorities.
In France the Ministry of Economy Industry and Employment MEIE has labelled the 2008 event as an event of the French presidency and delegated FIM and CETIM to organise it. In Sweden, VINNOVA, the Governmental Agency for Innovation Systems, is directly involved in the organisation of the 2009 event. This reflects the strong commitment and support of national authorities in this project. The EC, the Manufuture community (high level and support groups, 22 national and regional platforms) and the national key players in manufacturing will be deeply involved in the conference.

Enhancing public awareness on the results of European research actions on Nanosciences and Nanotechnologies through the professional use of television media and the internet (NANO-TV)

The strategic objective of NANO-TV is "TO CONTRIBUTE TO THE DEVELOPMENT OF PUBLIC AWARENESS ON EUROPEAN RESEARCH ON NANOSCIENCES AND NANOTECHNOLOGIES IN ALL EUROPEAN COUNTRIES THROUGH THE PROFESSIONAL USE OF TELEVISION MEDIA AND THE INTERNET".
The project will: Highlight the key results from the Nanotechnologies Theme. Create a series of 14 high-quality free-of-rights Video News Releases (VNRs) for the general public on the basis of the key results of the research. Include all 14 released VNRs into the broadcasting

mainstream of the European TV stations by implementing a consolidated communication model involving the totality of the national European TV media. Establish a sound science-based dialogue on nano issues by introducing all released VNRs and the associated written materials (articles, press releases, etc.) into a series of highly references internet platforms. Monitor the results of the project and assess its achievements and success, by assessing the overall impact of the project and collecting actual broadcasts made by European TV stations and include them on a DVD at the end of the project, for future use and exploitation.
The expected measurable results of NANO-TV are: To have each of its audiovisual production broadcast by at least 10 major national TV stations throughout Europe. To reach an overall public TV audience of several tens of millions people. To track as many broadcasts as possible and to retrieve, for each broadcast, broadcasters edit. To provide a measure of the overall media impact of the project.

Plasmons generating nanocomposite materials (PGNM) for 3rd Generation thin film solar cells (SOLAMON)

The objective of the SOLAMON project is to develop high potential Plasmon Generating Nanocomposite Materials (PGNM) which will pave the way to the generation III solar cells (high efficiency & low cost). The objective is an augmentation in the External Quantum Efficiency resulting in an increase of 20% in the short circuit current density of the thin film solar cells. To achieve such an ambitious goal, the project will focus on the development of fully tailored building block nanoparticles able to generate a plasmon effect for enhanced solar absorption in thin film solar cells. Such nanoparticles designed for an optimum absorption will be integrated in solar cells matrix using a recently developed room temperature deposition process.
This step will result in the specific design of PGNM for solar cells using a knowledge based approach coupling modeling at both scales: nanoscopic (plasmonic structure) and macroscopic (solar cells). SOLAMON will address three different classes of solar cells: a-Si:H thin films, organics and dye sensitised. Developing the PGNM on these three classes aims at maximizing the project impact and not to compare them because scientific background acquired on these technologies could be easily transferred to other ones. As a matter of fact, a-Si:H technology targets mainly the BuiIding Integrated PV (BIPV) market (large surfaces) whereas the two others are most suitable for the consumer good market (nomad applications). The project workprogram, the critical path and the contingencies plans are designed to maximize both social and economic impact. For this reason, the BIPV applications (i.e. a-Si:H based technology) will be firstly considered when a strategic choice occurs, keeping in mind that, even of large economic importance, the two other technologies do not have the same key BIPV environmental and social impact.

Organization of the Conference EURONANOFORUM 2009 "Nanotechnology for Sustainable Economy" (ENF 2009)

The conference EuroNanoForum 2009 will be established as a foremost European congress in Nanotechnology within the framework of the Czech presidency. The conference will address the impact of nanotechnologies on sustainable economy focusing on their applications in resource- and eco-efficient industrial production, environmental protection and remediation, and energy production and conservation in the coming years. It aims to:
- present the nanotechnology state of the art in the realm of sustainable economy;
- facilitate intensive exchange of views, information and experience between researches and representatives of industry, investors as well as policy makers and representatives of civil

society;
- foster networking and knowledge transfer between different national and European stakeholders; and
- promote responsible governance in nanotechnology.

Communicating nanotechnology to European youth (NANOYOU)

NANOYOU will design and undertake a communication and outreach program in nanotechnology (NT) aimed at European youth. The project will reach 11-18 year olds through school programs to take place in at least 20 EU Member States and Associated States. Additional programs aimed at young adults aged 19-25 will be offered in science centres. The school programs are planned to involve at least 400 schools and reach more than 25,000 students. The science centres program is expected to reach an initial 4,000 young adults during NANOYOU and many more subsequently as more science centres adopt the program. Recent surveys show that most European citizens have poor understanding of NT, its potential and risks. This needs to be rectified if the European public is to contribute positively to future decision-making about the use of NT. In focusing on ages 11-25, NANOYOU recognizes that effective programming needs to be tailored to the educational capabilities and interests of the target population. Programming specialization will be provided for subgroups within this youth population. While some FP6 programs have made an excellent start in informing the public about NT, they have not focused on youth nor have their activities taken places in the schools. NANOYOU will combine temporary exhibitions, innovative computer games, experiments and other online content, with workshops aimed at promoting dialogue that will raise participants' awareness of ethical, legal and societal aspects of NT.
NANOYOU's content will be balanced and up-to-date, and teacher training materials will be prepared to equip science teachers and other personnel to present the NANOYOU programs. NANOYOU has assembled a strong consortium with partners experienced in nanotechnology, educational methodology and science communication, as well as organizations highly suited and experienced at arranging outreach/communication activities in schools and science centres

TIME for Nano - tools to increase mass engagement for nanotechnology (TIME FOR NANO)

The TIME for Nano Project aims at engaging the general public, with a special attention to young people, on benefits and risks related to nanoscale research, engineering and technology, through specific informal education products, namely the nano-kit and the organisation of a web contest each year that will be the basis for the realisation of events and debates for the public and collecting opinions and feedbacks from the participants.
The products will use an inquiry-based learning approach, specifically developed in science centres/museums, where people understand by doing.
The nano-kit could contain e.g. small exhibits, nano-objects and materials, scripts for experiments and role/team game cards. It is a tool for stimulating the participation of youngsters in the nano-olympics and for engaging in debate scientists, stakeholders and the public in general.
The web platform will be a resource centre and an attractor for the whole community of N&N communicators, through its contents (continuous addition of new information etc), its innovative tools (web contest) and the artistic approach, the online feedback collection.
A great added value of the project is that of growing a community of people engaged in N&N communication, through the realisation of training courses in each of the participating Science

Centres (at national level) and by Ecsite (at European level) intended to reach a number of at least 450 multipliers (experts working in outreach and education efforts), carefully chosen among three main groups: explainers in science centres and PhD students in science communication; teachers from primary and high schools.
The public participation to the web-contest is ensured by the organisation of many events in science centres of 9 countries each year: launch event, nano days, final event with award prizes, intended as occasions for informing/educating, on one hand, and for engaging youngsters, collecting perceptions and opinions, on the other.

Nanosciences live in science centres and museums (NANOTOTOUCH)

The NANOTOTOUCH proposal aims to create innovative environments for the broad public to learn about and to discuss nano research by directly involving the actors of research themselves.
We propose to do this by taking the laboratory environment and the research work out of enclosed academic campuses and relocating them right in the midst of the public in science museums and science centres.
Three science museums and three science centres will closely cooperate with local university partners to create three permanent Open Nano Lab locations (in Munich, Milan and Gothenburg) and three Nano Researcher Live areas (in Mechelen, Tartu and Naples). In these places the visitors will experience live the day-to-day practices and processes of nano research conducted by young scientists.

This peer-to-peer dialogue on an equal basis between lay public and nano-researchers not only creates a bidirectional feedback, it also minimises the expert-to-lay bias (top-down" approach) inherent present science communication processes with authoritative top researchers.
In order to prepare the young scientists for this novel method of communication, NANOTOTOUCH also includes a strong communication skills training component.
NANOTOTOUCH will also establish new role models for choosing science as a career: young adults thinking of entering science will be able to discuss various aspects with young researchers who themselves made this decision recently, whilst upcoming researchers will learn that communication is a self-evident part of their professional identity. Thus, NANOTOTOUCH pushes science communication to its extreme, merging communication and research in a powerful way and responding to the need for more transparency and accessibility in science. Furthermore, the strong synergetic network approach of the project enables contents and models to be developed for further distribution and implementation in educational and scientific communities.

Advanced theories for functional oxides: new routes to handle the devices of the future (ATHENA)

Transition metal oxides are the building blocks of future microelectronics, due to outstanding properties such as, e.g. colossal magnetoresistivity and electroresistivity. Envisioned applications are countless, from spintronic devices to multiferroics, to non-volatile magnetic memories.
Despite the huge amount of work already accomplished, a deep and complete understanding of these systems is still lacking. This is due on the one hand to the complexity inherent to the physics of strong-correlated electrons, which includes a plethora of fascinating but overtly complex phenomena (e.g. charge and orbital ordering, polaronic formation, spin-charge

separation, non-Fermi liquid behavior, to name just few). On the other hand, there is an unquestionable lack of coordinated effort devoted to share, integrate, and develop the most advanced and powerful computational techniques nowadays available.
With the present project we aim to close this gap by gathering in a synergic collaboration some of the most experienced groups in the subject, equipped with the most advanced methodologies for the theoretical study of strong-correlated phenomena in transition metal oxides.
Specifically, the European units assemble a vast competence on methodologies that are at the developmental forefront of First-Principles methodologies, whereas the Indian partners are worldwide recognized experts on both First-Principles and model many-body (e.g. Hubbard Hamiltonian (HH)) techniques.
In the project we plan to develop an unprecedented fusion of these two different but complementary viewpoints, applied to the study of the most fascinating and technologically promising class of systems candidates to be employed in the devices of the future.

Single or few molecules detection by combined enhanced spectroscopies (SMD)

Future breakthroughs in the understanding of fundamental biological processes causing major diseases are expected from the development of miniaturized probes or microscopes able to detect and identify a single or a small number of molecules.
The SingleMoleculeDetection (SMD) proposal will develop a unique device able to perform simultaneously and in a dynamic way force and spectroscopic measurements. We will design and fabricate novel devices for the generation of plasmon polaritons as well as combine photonic crystals and plasmonic nanolenses.
These new devices will be able to detect few/single molecules through Raman, InfraRed and Terahertz (THz) signals and in combination with Atomic Force Microscopy and Optical Tweezer force spectroscopy with a spatial resolution in the sub-10 nm for Raman and IR and sub-100 nm for the THz region.
The complete characterization of single unknown molecule will be demonstrated through:
* investigations on the chemical and physical properties of membrane receptors, such as rhodopsin, odorant receptors and ionic channels
* identification of new molecules involved in cancer development and metastasis.
The new devices will allow the acquisition of THz images and we will explore the possibilities of this new spectral region for biomedical scanning.
The SMD proposal is based on an original idea of the coordinator, prof. E. di Fabrizio and will be exploited thanks to the complementary expertise present in the different sites and to a tight coordination between the various groups.
The design, fabrication and testing will be performed at UMG, TASC and CBM Integration in a single instrument will be carried out at TASC, CBM, IIT Nanotec, RUB.
Validation activities will be performed by all the partners taking advantage of the world leading expertise of the TUDO and the STRATH- AC in spectroscopy of natural and artificial biological systems. The SME NANOTEC and CBM will provide the commercial exploitation of the obtained results.

Modelling of interface evolution in advanced welding (MINTWELD)

Welding is the most economical and effective way to join metals permanently, and it is a vital component of our manufacturing economy. In welding, work-pieces are mixed with filler materials and molten, to form a pool of metal that upon solidification becomes a strong, permanent joint. Our ability to weld a metal to itself and to other materials is determined by

the chemistry at the interface and by the complex morphology of the individual crystals at the weld centre. These boundaries are the critical regions where most catastrophic failures occur. Our project will establish the capability to design and engineer welding processes with a multi-scale, multi-physics computational modelling approach. An integrated suite of modeling software will be developed and validated, able to describe the key phenomena of the welding process at all relevant length scales, with a special emphasis on the solid-liquid interface evolution, including the description of macro-scale mass flow and thermal profiles, meso-scale solid/liquid interface movements, micro/nano-scale grain boundary and morphology evolution, mechanical integrity, and service life of the welded product.
A unique aim of this project will be the prediction of interface evolution in industrially relevant systems, such as steel/steel and steel/Ni-based alloys.
Validation will be ensured by state-of-the-art experimental techniques, including real-time synchrotron X-ray imaging, to observe morphological evolution of the interfaces, and electron microscopy and atom probe measurements to characterise chemistry in grain boundaries.
This project will deliver an accurate, predictive, and cost-effective tool that will find widespread application in the relevant European industry for penetrating novel markets of high economic and strategic importance enabled by a new capability for intelligent design of high performance welded systems and interfaces, an essential task to ensure that Europe maintains its competitiveness.

Framework of integrated technologies for user centred products (FIT4U)

Ongoing social and economic globalization processes will offer major challenges on the global market for consumer oriented manufacturing sectors. In particular, the shoes and gloves markets are expected to grow by more than 25% within the next 5 years, and the market niches for high value added shoes and gloves are expected to grow even faster.
As a consequence there is today a unique opportunity for the European Footwear and Sport Industries to improve their competitiveness on such market segments. To face such a challenge the present project will develop a new engineering framework for both products and processes integrating: new technologies and devices to integrate the consumer in shoes and gloves conception, specification and design; innovative 3D knowledge based integrated design tools; micro and nano devices providing shoes and gloves with innovative sensing and actuating functionalities; innovative high-performing materials with self-adaptive capabilities; adaptive production processes and technologies; new bio-materials and clean production processes.
The expected outcome of the proposed project will be an integrated technology framework for the engineering of fully personalized shoes and gloves based on a 3 to 5 days time-to-market criterion. Such a framework will be validated and assessed on pilot production lines, and new differentiated consumer-centered shoes and gloves will be delivered as fully engineered prototypes.
Main objectives of present project proposal are to raise competitiveness of the European Footwear and Sport Industry on the shoes and gloves high value added global market niches, so giving the opportunity to many European companies along the considered value chains to grow by more than 25% in the next 5 years; and to improve consumers satisfaction and well being through differentiated, comfortable, safe, healthy, affordable and sustainable user centered high value added shoes and gloves.

Network in advanced materials and nanomaterials of industrial interest between Europe and Latin American Countries of MERCOSUR (Argentina-Brazil-Uruguay) (EULASUR)

A key thrust of FP7 is to promote international collaborative research with third countries. The EULASUR project will address the Call for Co-ordination Action in Materials by creating a cooperation platform for forming strategic research partnerships between scientists, policy makers, technology transfer and industrial experts in the EC and 3 Latin-American countries belonging to MERCOSUR: Brazil, Uruguay and Argentina (BRAU).
Research topics will be identified within the fields of:
i) advanced functional ceramics and
ii) hybrid materials and nanomaterials where significant opportunities exist for mutually beneficial actions between the two regions.
The goals are designed to gain first hand knowledge of the state of the art research in these fields through summer schools, exchanges and partnership actions. The project will also address the social, political and cultural factors impacting technology transfer and collaboration between the EU and BRAU countries.
The core activities of EULASUR are based on some research Groups of Excellence that already cooperate bilaterally and will integrate them with additional groups to generate a stable, integrated scientific platform of international excellence interested to collaborate in the development of materials research in specific topics of interest to both regions. The EULASUR partnership is composed of 15 research centers, 8 from Europe and 7 from BRAU countries selected on the basis of: excellence in research, complementary skills and access to national and international R&D policy makers. Government representatives will participate in the EULASUR Advisory Board.
Industrial companies and technological centers are expected to take part in the project activities. EULASUR has 5 WPs. 3 designed to build contacts and identify opportunities, 1 to disseminate results to key stakeholders and policy makers and 1 management and progress measures. Each WP has two WP Leaders: one from BRAU and the other from the EU.

Technology for wafer-scale carbon nanotube applications (TECHNOTUBES)

Carbon nanotubes are materials with a set of unique electrical, mechanical, surface and thermal properties. Yet their adoption in mainstream applications has been limited by mass production and device integration. This project develops the first 300mm wafer-scale equipment for production of carbon nanotubes on surfaces.
The project will cover the design, engineering, process control, quality assurance, qualification and process development. It will develop applications in cathodes for time resolved X-ray sources for X-ray tomography, cathodes for high power microwave amplifiers, interconnects for VLSI, thermal management surfaces, low stiction surfaces for micro-fluidic channels and filters, wafer scale fabrication of spin valve devices, and sensor surfaces for integrated sensors on CMOS.

Innovative networks of SMEs for complex products manufacturing (NET-CHALLENGE)

European SMEs will have to adopt new business models and to establish dynamic and non-hierarchical networks to respond to market opportunities, assuring quick response, fast time to market, differentiated offerings and competitive prices. Sustainability for SMEs will be found in high-variety low-volume businesses, related with complex products manufacturing. However, there are currently no proven, effective methodologies, approaches or tools to support SMEs in creating, managing and dissolving this type of dynamic and non-hierarchical networks. Net-Challenge covers this gap with the design and development of effective

methodologies, processes and ICT decision support tools.
The project outcomes will be:
- a methodology to help SMEs in the qualification, formation and operation of dynamic networks (able to quickly respond to market opportunities characterized by low volume, high variety and customer centered products);
- reference collaboration processes for non-hierarchical networks, to be used in promoting and facilitating real collaborative business processes;
- distributed decision support tools to help companies to manage, manufacturing and logistic processes, including: aggregate collaborative planning with dynamic capacity management and real-time order promising; real-time monitoring with event management and performance management;
- real industrial demonstration of the new methods and tools in three business cases from the following industrial sectors: textile and apparel, footwear, and machine tools;
- training materials to promote the project concepts and to train key users in pilot companies;
- wide dissemination of the project results in industrial companies, technology suppliers and the scientific community; and preparation of their exploitation;
- creation of links with standardization activities and relevant international research and business communities.

In Vivo imaging of beta cell receptors by applied nano technology (VIBRANT)

Currently, around 30 million people in the enlarged Europe suffer from diabetes, with a prevalence of 7.5% in member states. In recent years the emergence of type 2 diabetes in children and adolescents is a new and serious health challenge to the youth of Europe, their families and society. By 2025, the number of people with diabetes is expected to rise to around 50 million in Europe, thus increasing prevalence to 10.9%.
This devastating disease is ranked among the leading causes of fatal cardiovascular diseases, kidney failure, neuropathy, lower limb amputation and blindness. Estimates of annual direct cost of diabetes care in Europe are currently EUR 50 billion. The indirect costs of diabetes i.e. the cost of lost production are as high as direct costs or even higher. Diabetes results from an absolute or relative decline in pancreatic²-cell function and/or mass.
Although of ultimate importance for diabetes management and the development of new therapies, hitherto, no clinically established methodology for non-invasive in vivo imaging and quantification of ²-cell mass (BCM) exists. VIBRANT proposes super-paramagnetic fluorous phase nanocontainers (FPNC), which are functionalized with ²-cell specific ligands for in vivo MRI. This combines ²-cell specific targeting with the unrivalled MRI sensitivity of super-magnetic particles and the high resolution power of 19F-containing contrast agents, and hence will outperform existing MRI technology.
Furthermore, target specific drug-loaded nanocontainers will offer high potential for ²-cell directed therapies. VIBRANT will offer theranostic solutions to the utmost urgent problems in the health care management of diabetes, substantially improving the early diagnosis, thus preventing distressful and costly complications, contributing to the development of new therapies for the regeneration of ²-cell mass, and thus directly impacting health status and life quality of patients, health care budgets and economies within the EU.

Risk assessment of engineered nanoparticles (ENPRA)

Engineered Nanoparticles (ENP) are increasingly produced for use in a wide range of industrial and consumer products. Yet it is known that exposure to some types of particles can cause severe health effects. Therefore it is essential to ascertain whether exposure to ENP can

lead to possible health risks for workers and consumers. We have formed a consortium of well-known scientists from European Universities and Research Institutes, with over 100 publications in the field of Nanotoxicology. Our aim is to develop an approach for the Risk Assessment of ENP (ENPRA).
Our objectives are:
(i) to obtain a bank of commercial ENP with contrasting physico-chemical characteristics and measure them;
(ii) to investigate the toxic effects of ENP on 5 (pulmonary, hepatic, renal, cardiovascular and developmental) target systems and 5 endpoints (oxidative stress, inflammation; immuno-toxicity; fibrogenecity; genotoxicity) using in vitro animal/human models;
(iii) to validate the in vitro findings with a small set of carefully chosen in vivo animal experiments;
(iv) to construct mathematical models to extrapolate the exposure-dose-response relationship from in vitro to in vivo and to humans;
(v) to use QSAR like models to identify the key ENP characteristics driving the adverse effects;
(vi) to implement a risk assessment of ENP using the Weight-of-Evidence approach;
(vii) to disseminate our findings to potential stakeholders.
To harmonise the research activities between our EU group and the US, we have established links with scientists from US Universities (Duke, Rochester) and Government Agencies (NIH/NIEHS, NIOSH and EPA) with on-going research in Nanotoxicology.
Our objectives here are:
(vii) to share information and agree on experimental protocols;
(viii) to avoid duplication of work;
(ix) to further validate the findings of this proposed study.

Intestinal, Liver and Endothelial Nanoparticle Toxicity Development and evaluation of a novel tool for high-throughput data generation (INLIVETOX)

The InLiveTox project will form an interdisciplinary consortium at the European level, together with a key American research group to develop an improved in vitro model for the study of nanoparticle (NP) uptake, transport and cellular interaction, thus advancing our understanding of NP toxicity. Rather than repeat what has, or is being done in the field of aerosol NP and lung toxicology, InLiveTox will focus on the impact of NP exposure via ingestion, in the healthy and diseased gastrointestinal (GI) tract, vascular endothelium and liver.
The key questions in this study are:
(i) How do these tissues individually respond to NPs?
(ii) How do the interactions between the different tissues modulate their responses?
(iii) How does inflammation affect the toxicity of NPs and their ability cross the intestinal barrier?
(iv) Which physico-chemical characteristics of NPs influence their uptake by intestinal epithelial cells and their subsequent interactions with endothelial and liver cells?
The objective of InLiveTox will be to develop a novel modular microfluidics-based in vitro test system modelling the response of cells and tissues to the ingestion of NPs. Cell culture modules of target tissues such as the GI tract, the liver and the endothelium will be connected via a microfluidics system so that knock-on and cross talk effects between organs and tissues can be monitored.
A major innovative aspect of the InLiveTox project pertains to the implementation of biological tissue models in a microfabricated compartmental cell culture system that allows

multiple cell types to be addressed and investigated in combination. This system will be much easier, more convenient and ethically less questionable than animal testing, as well as more relevant than the in vitro single cell /co-culture models currently used. For this study, applications of the model will focus on NP toxicology, but the system could also be widely used in various applications of toxicology and pharmacology.

Nano-optical mechanical systems (NOMS)

Nano-optical mechanical actuation based on nanotube-enriched polymeric materials is a much sought-after technology. In this scheme, light sources promote mechanical actuation of the polymeric materials producing a variety of nano optical mechanical systems such as tactile displays, artificial muscles, and nano-grippers among others. The purpose of the NOMS project is to fabricate microsystems capable of light-induced mechanical actuation.
In particular, the team proposes to build a visual-aid tablet for the blind or partially-sighted. Accomplishing this ambitious project requires knowledge of basic and integrating research within the field. It also requires the contribution of expert neuropsychologists to study, in cooperation with end-users, the effectiveness of the tablet both as an assistive tool for the visually impaired and as a research tool in the field of neuropsychology.
The consortium is formed by experts in the areas of materials, optics, microsystems, neuropsychology, as well as end users, who will fabricate the first visual aid tablet. This well-balanced team possesses a unique combination of talent to guarantee achievement of the project objectives. The NOMS approach ensures that a solution (photo-actuated nanomaterials) will be provided to a particular problem (fast-refreshed portable visual-aid devices). NOMS will provide tactile screens for the visually impaired to read complex visual representations such as mathematical equations and graphical images. Everyday activities of such individuals will be greatly improved by including these devices in ATMs, personal computers, mobile telephones etc. This project is visionary with respect to some of the mainstream R&D directions, offering European industry a competitive advantage in the assistive technology marketplace worldwide.

Materials for high energy accumulators in traction and tools (MAHEATT)

A.1.2. Project summary
The overall objective of the MAHEATT project is to develop a prototype cost-effective lithium-ion high energy battery technology with electrode performances well beyond the current state-of-the-art, with automotive applications (hybrid vehicles and electric traction) and hand held tools as application target areas. This will be achieved by innovative synthesis and design of radically improved cathode materials and by optimizing kinetics and stability through nanostructuring of all electro-active materials (EAMs) and components.
Main objectives are:
To design synthesis routes and novel electro-active materials for the cathode and for the anode with a much higher specific capacity compared to present EAMs;
To design the EAMs in nanoscopic form to provide a faster kinetics;
To coat the EAMs by a porous conductive layer to suppress undesired (electro-)catalysis and to enhance electronic conductivity;
To optimize binding and assembly of the EAMs into a nanoporous network forming an excellent percolation system for Li-ions and for the electrolyte.
The approach is highly cross-disciplinary, with partnership of leading research institutions and leading European industry. The solution to the materials challenges will benefit from integrated feedback between advanced characterization, theory, modeling, synthesis and up-

scaling.
The key objective for our target materials and systems in relation to electric traction in the automotive sector is a battery that utilizes at least 1.5 times (i.e. 240mAh/g) larger charge density than current state-of-the art cathode materials.

ADvanced computational studies of dynamic phenomena in magnetic nano-materials (DYNAMAG)

The opportunity to modify the excitation spectra in materials with modulated properties has stimulated striving research activity in the area of artificial nanostructures with novel functionalities - so called metamaterials. Magnetic materials with modulated properties also possess properties that cannot be reduced to those of their constituents. The best example is the phenomenon of giant magneto-resistance (GMR), the discovery of which was marked by the Nobel Prize in Physics last year. Similar to photons in photonic crystals, the spectrum of magnons (spin waves) in periodic magnetic nano-materials shows a tailored band structure. The latter consists of bands of allowed magnon states and band gaps in which there are no allowed magnon states. By analogy to studies of other band-gap materials, the field of research is called magnonics.
Further development and application of magnetic nano-structures requires a thorough understanding of the relation between their physical and chemical structure and useful magnetic functionalities. The ability to accurately predict properties of fabricated magnetic nano-structures and complete devices theoretically would generate huge savings of resources, but remains illusive at present.
The goal of this project is to consolidate efforts of European and Indian researchers with a broad range of leading expertise to create, to validate and to implement a flexible computational framework for modelling of dynamics in realistic magnetic nano-materials and complete devices. The framework will be validated via comparison of computational results against those obtained experimentally or using analytical theories. We will model magnetic dynamics in topologically complex nanostructures, in view of applying them in design of realistic devices. This project will provide a computational foundation for creation of not only novel high speed magnetic technologies but also of those at interfaces with photonics, plasmonics, phononics, and electronics.

Water treatment by molecularly imprinted materials (WATERMIM)

The present WATERMIM proposal is focused on the advancement and optimization of the MIP technology in order to produce functional materials with well-defined morphologies with respect to pore structure and selectivity for water treatment applications. The project aims at the elimination of the random distribution and the uneven accessibility of receptor sites in the volume of the imprinted material that is crucial for its performance. Such novel materials will immediately gain practical relevance, especially, due to their increased selectivity and superior stability under long and harsh technical conditions.
The simultaneous optimization of the imprinting efficiency, polymer membrane morphology and separation conditions will enable the development of a truly molecular selective water purification process, based on affinity interactions that would have a large application impact on the water treatment industry. All types of synthetic organic compounds (i.e., triazines, pharmaceutical compounds and endocrine disruptors) are considered target compounds in the WATERMIM project.
More specifically, the present project aims at the following S&T objectives:
Selection of template molecules and synthesis of functional monomers.

Optimization of molecularly imprinted polymer (MIP) composition by computational design techniques and combinatorial screening.
Synthesis of well-defined MIP nanoparticles and microgels.
Production of novel composite membranes utilizing preformed MIP nanoparticles.
Production of composite filters both on organic and inorganic supports via novel grafting techniques.
Synthesis of molecularly imprinted membranes (MIMs) for molecular sensor applications.
Separation and catalytic decomposition of the pollutants.
Advanced monitoring of the target compounds.
Benchmark testing of the produced MIMs for water purification.

Modeling of nano-scaled advanced materials intelligently (MONAMI)

The proposed consortium focuses on a collaborative effort of developing novel techniques and paradigms concerning theoretical modeling of nano-scale advanced materials. The objectives are to identify novel methodologies and to identify appropriate approximations to successfully undertake simulations of the materials which are to be used in our future society. An important aspect here is to be able to carry out this development all the way from idea and concept to working computer soft-wares. In addition to this technical development we will focus on establishing knowledge concerning an emerging class of materials; nano-scaled materials with potential for tailored properties and potential for novel functionality. Training of younger scientists forms a natural aspect of this ambition, and is a strategically relevant outcome of our planned efforts. Finally, it is envisaged that the collaboration will enable an intensified collaboration between European and Indian research laboratories and universities.

Resilient multi-plant networks (REMPLANET)

The main concept of this proposal is the development of methods, guidelines and tools for the implementation of the Resilient Multi-Plant Networks Model in non-hierarchical manufacturing networks, characterized by non-centralized decision making.
A resilient organization effectively aligns its strategy, operations, management systems, governance structure, and decision-support capabilities so that it can uncover and adjust to continually changing risks, endure disruptions to its primary earnings drivers, and create advantages over less adaptive competitors. From an organizational point of view the concept "resilience has two fundamental acceptations: operational resilience, and strategic resilience. Nowadays, few organizations question the flexibility-agility operational resilience approach, but if renewal is to become continuous and opportunity-driven, rather than episodic and crisis-driven, then companies immersed in an accelerating pace of change also need to embrace an accelerating pace of strategic evolution.
REMPLANET research will consider and balance both key subjects in the context of machinery and equipment global manufacturing networks; operational flexibility-agility, and strategic innovation-renewal. REMPLANET model and tools will focus on the integration of the customer driven innovation influence in the products and manufacturing processes design, and the responsiveness to customized market demands of the related non-hierarchical global manufacturing networks processes under a real-time non-centralized decision making context. Theoretical research and related tools will be contrasted, validated, and enhanced through empirical cases (pilots) from different machinery and equipment enterprise networks which have multi-site and multi-nation manufacturing plants, as well as customers distributed around the globe.

Magnonics: Mastering magnons in magnetic meta-materials (MAGNONICS)

The opportunity to modify spectrum of excitations in materials with periodically modulated properties has stimulated striving research activity in the area of artificial periodic structures with aim to design novel materials with new revolutionary functionalities - so called meta-materials. Photonic, plasmonic, and phononic crystals and semiconductor superlattices are typical examples of exploitation of this concept for controlling light, acoustic wave and electron propagation and scattering in electronic and opto-electronic devices. Magnetic materials with periodically modulated properties are also known to possess properties that cannot be reduced to those of constituent layers.
The best example here is the phenomenon of giant magnetoresistance (GMR), discovery of which was marked by the Nobel Prize Award last year. Importantly, the spectrum of magnons in periodic magnetic materials has band structure. By analogy to other band-gap materials, periodic magnetic structures used as a medium for controlled propagation of magnons are called magnonic crystals, while the corresponding field of research is called magnonics. The objective of the proposed project is to bring together several European research teams with a broad of fabrication and characterization expertise in order to realize practically this new class of meta-materials magnonic crystals. We will create 1D, 2D, and 3D magnonic crystals with dynamical magnetic properties tailored at the nano-scale.
The created magnonic crystals will be then used to replace continuous magnetic materials within various devices ranging from electro-motors and actuators to nano-scale magnonic logic elements, in which magnons will be used as signal carriers. The experimental data obtained in the course of the project will be used to test existing and to create new theories of high-frequency magneto-dynamics in magnetic nano-structures.

Advanced materials as CO2 removers: A computational study of CO2 sorption thermodynamics and kinetics (AMCOS)

The proposed work aims at developing the tools required for the intelligent choosing and tuning of nano-porous materials with respect to a specific application. For this purpose, a combined computational theoretical and experimental study is envisaged in order to digitally reconstruct the porous matrix of selected advanced materials, mainly for applications involving sorption of carbon dioxide and methane by employing advanced Statistical Mechanics based computer simulation methods, both, in atomistic (Monte Carlo, ab initio and equilibrium and non-equilibrium Molecular Dynamics) and mesoscopic level (Kinetic Monte Carlo and Lattice Gas Cellular Automata).
The reasoning behind this strategy is that the structure of materials spans a wide range of length scales, making thus sorption and transport phenomena depend upon length and time scale.
As a consequence, the proposed computational methodology consists of many levels in order to address properly these phenomena. Moreover, a complementary approach to computer simulations is provided through direct comparison of two highly sophisticated methods for measuring motion of guest molecules inside porous materials, namely, quasi-elastic neutron scattering (QENS) and pulsed field gradient nuclear magnetic resonance (PFG NMR), carried out by the groups of Lyon and Leipzig respectively.
This type of combined studies can be perfectly utilized through the proposed work towards a fascinating insight of the relation of the material interior to the sorption and transport mechanisms of sorbates such as carbon dioxide and methane, both involved in the so-called greenhouse effect.

EUROpean scale infrastructure in NANOBIOtechnology (EURONANOBIO)

EuroNanoBio aims at defining the key features of the future EU capacity in nanobiotechnology and the roadmap to reach this goal. It will establish the features of the infrastructure, the role of the various stakeholders and the way to establish it.
This Support Action is divided into three phases:
1) An analytical phase where the existing data, published or not, will be scrutinized and analyzed to extract some success factors to be used for defining the EU infrastructure in nanobiotechnology. This analysis is conducted in four directions existing top class infrastructures or clusters inside and outside Europe modes of technology transfer from research to industry multidisciplinary education and training ancillary aspects of nanobiotechnology.
2) A building and consensus phase where many diverse stakeholders who play a role in the EU capacity in nanobiotechnology are invited to jointly defined and adopt the key features of the infrastructure, and the way to build it
3) A dissemination phase where the former results will be widely disseminated using Internet and a large dissemination event.
The EuroNanoBio partners are highly experienced in EU integration in nanobiotechnology in general as well as in specific aspects studied in the CSA. They have unrivalled access to a wide panel of stakeholders in governments, industry, education, regulation, ethics. The consortium will act as a catalyst for these stakeholders to collect their contribution and make them build together the roadmap for establishing the EU capacity in nanobiotechnology.

Collaborative communication driven decision management in non hierarchical supply chains of the electronic industry (CONVERGE)

The European electronic industry faces strong competition with far eastern and US manufacturers. European companies have to respond with improved flexibility to changing requirements and collaborate across the supply chain effectively capitalizing on collaborative decision making, shorter distances, high- skill levels and shared cultural understanding. To do so in the electronic industry a number of non-hierarchical networks are forming.
The new collaboration level requires a higher level of coordination on tactical and strategic management level and therefore a new level of data and information sharing with network partners. Managers have to distinguish in a new manner between shareable and non shareable information. As they weren t obliged to do this in the past tools and methods are missing. The CONVERGE project closes this gap by providing a framework and tools for exchanging tactical and strategic information for decision making in non-hierarchical supply chain networks.
CONVERGE delivers a de-centralized decision support system for production planning and resource optimization based on:
1) a new reference model for inter-organizational decision taking,
2) deployment methods to adapt the generic reference model to application fields, networks and companies and
3) existing software supporting customer and supplier relations.
Besides scientific and technological experts the CONVERGE consortium involves:
a) four manufacturing companies addressing directly their network problems and
b) a supply chain interest group (non funded) representing the companies network partners.
This ensures a high industrial impact and dissemination level. In about 5 years the expected cost saving is in the order of 180 Mio. Just assuming a diffusion rate of 10% of the 600 European Electronic Manufacturing Service companies.

Integrating nanomaterials in formulations (INFORM)

A coordination action is proposed to reinforce the international dimension of EU research on nanomaterials in formulations in the Asia-Pasific region.
Three mechanism will be implemented to reach the widest possible audience in the appropriate formats that are convenient to the different stakeholders:
* yearly major events, that will introduce a new concept to scientific gatherings and a departure from conventional meetings
* a researchers exchange program to seed new collaborations, facilitate joint projects and the realisation of future coordinated calls
* the creation of a website devoted to nanomaterials in formulations, that will include up to date and reliable information on the newest research developments, funding opportunities, regulations, events and links to other nanotechnology initiatives.

IMS2020: Supporting global research for IMS 2020 Vision (IMS2020)

IMS2020 aims at strengthening international co-operation and supporting global European-centric research under the IMS initiative, providing an effective interface to ongoing European road-mapping activities (such as European Technology Platform, etc.) and creating research synergies at international level through establishment of inter-regional manufacturing communities in the five Key Areas of Activity of IMS.
Thanks to the coordination action the following IMS2020 Objectives will be achieved:
1. To prepare a coherent roadmap for future (2020) manufacturing research in the five IMS Key Areas
2. To identify new schemes & frameworks to support IMS research by enhancing and favouring inter-regional cooperation projects
3. To identify specific SME-focused measures to increase SMEs participation in international R&D co-operative projects, within IMS initiative
4. To establish and consolidate international and inter-regional communities in the Key Areas of Activity of IMS, with effective exchange of results and knowledge
5. To prepare the ground for new IMS proposals, both paving the way for the legislation and creating a knowledge network, to discuss and inform about manufacturing projects.
The first objective will be achieved by mid of 2009, delivering the roadmap, structured into specific sections that address individually the five IMS Key Areas and addressing specific IMS level research topics. The IMS2020 Consortium combines together industries, industrial associations, research centers and universities coming from all IMS Regions (EU, Switzerland, USA, Korea, Japan). The IMS2020 project will benefit from the heritage of the successful initiative IMS NoE, coordinated by Politecnico di Milano.

Development of time-enabled mapping and dissemination tool for biofuels projects (BIOMAP)

This proposal involves the development of a time-enabled mapping tool to be used for dissemination activities for the projects supported (either completed or ongoing) in the European Union and Beyond. The time-enabled map would provide the user with various classes of contracts projects (bioethanol, biodiesel and second generation biofuels) and networks related to biofuels, indicating the location, status, methodology, tools and infrastructure, interrelationships amongst the various organizations or contractors and interrelationships between research working groups and universities.

This map could also be used to access summaries, reports, published results and site maps of the projects or networks. The successful development and use of this dissemination tool will provide the industry, market actors, researchers and individual users with full access to the state of the art on biofuels and will therefore facilitate the penetration of biofuels technologies into the market and subsequently the successful meeting of the targets on biofuels of the European Union. Although this time-enabled mapping tool will be originally developed for demonstration and industrial projects, it will be very easily expanded to include research projects developed in Europe.

Marine renewable integrated application platform (MARINA PLATFORM)

MARINA is a European project dedicated to bringing offshore renewable energy applications closer to the market by creating new infrastructures for both offshore wind and ocean energy converters. It addresses the need for creating a cost-efficient technology development basis to kick-start growth of the nascent European marine renewable energy (MRE) industry in the deep offshore a major future global market.
The project combines deep-water engineering experience from European oil & gas developments during the last 40 years, state-of-the-art concepts for offshore wind energy, and the most promising concepts in today s R&D pipeline on wave energy and other marine renewables. The MARINA project is designed to capitalise on the vast body of proven marine technological knowledge gained in one of the world's most hostile off-shore operating environments: the Northern European seas.

MARINA will bolt this practical technology skill set onto the research base of the emerging but still marginal EU MRE industry and ensure its continued world-leading role. The MARINA project is therefore of major strategic significance for Europe.

Distributed CHP generation from Small Size Concentrated Solar Power (DIGESPO)

The DiGeSPo project concept is a modular 1-3 kWe, 3-9 kWth micro Combined Heat and Power (m-CHP) system based on innovative Concentrated Solar Power (CSP) and Stirling engine technology. This CSP m-CHP will provide electrical power, heating and cooling for single and multiple domestic dwellings and other small commercial, industrial and public buildings. It integrates small scale concentrator optics with moving and tracking components, solar absorbers in the form of evacuated tube collectors, a heat transfer fluid, a Stirling engine with generator, and heating and/or cooling systems; it incorporates them into buildings in an architecturally acceptable manner, with low visual impact.
Four main themes have led to the development of this proposal:
- technical improvements in large scale, parabolic trough solar concentrators that can now be adapted for much smaller scale systems, down to the single domestic dwelling;
- recent studies on Cer.Met. coatings suggest that improved optical behaviour and material durability for absorbers inside evacuated tube collectors can be achieved at higher temperatures than previously possible, with very low costs achievable at high production volumes;
- modified Stirling cycles and new compact heat exchanger technology are improving the costs and performance of small heat engines, so that they can operate with higher proportions of Carnot efficiency on the intermediate temperatures (> 350 °C) from the new CSP collectors.
- increases in natural gas prices, both absolute and relative to electricity prices, can undermine the financial viability of gas-fuelled m-CHP. There is an urgent need for alternative m-

CHP systems, of which solar m-CHP, whether separately or as a hybrid, is an option with high potential.

Research, methodologies and technologies for the effective development of pan-European key GRID infrastructures to support the achievement of a reliable, competitive and sustainable electricity supply (REALISEGRID)

The European electricity system is facing major challenges to implement a strategy for a reliable, competitive and sustainable electricity supply. The development and the renewal of the transmission infrastructure are central and recognised issues in this strategy.
Indeed the transmission system is a complex and strongly interconnected infrastructure that offers a wide range of benefits like reliability improvement, promotion of competitive electricity markets and of economic growth, support for development of new generation and for exploitation of renewable resources. Within this context, the objective of REALISEGRID is to develop a set of criteria, metrics, methods and tools (hereinafter called framework) to assess how the transmission infrastructure should be optimally developed to support the achievement of a reliable, competitive and sustainable electricity supply in the European Union (EU).
The project encompasses three main activity-packages:
- identification of performances and costs of novel technologies aimed at increasing capacity, reliability and flexibility of the transmission infrastructure;
- definition of long term scenarios for the EU power sector, characterized by different evolutions of demand and supply;
- implementation of a framework to facilitate harmonisation of pan-European approaches to electricity infrastructure evolution and to evaluate the overall benefits of transmission expansion investments.
The expected output of the project is fourfold:
- Implementation of the framework to assess the benefits provided by transmission infrastructure development to the pan-European power system.
- Preparation of a roadmap for the incorporation of new transmission technologies in the electricity networks.
- Analysis of impacts of different scenarios on future electricity exchanges among European countries.
- Testing and application of the framework for the cost-benefit analysis of specific transmission projects.

Demonstration of 2nd generation vegetable oil fuels in advanced engines (2NDVEGOIL)

Pure vegetable oil use as engine fuel has the potential for the most comprehensive ecologic, economic and social benefits of all biofuels. The production involves few process steps and can be done economically with small production units. The production process has only small energy losses and provides potential for additional income generation on farms, thereby strengthening rural economic structures. The challenges to be met by pure vegetable oil are engine adaptation, fuel quality control, emissions control and limits to overall production potential.
State-of-the-art concepts allow for achieving EURO3 emission levels for road vehicles in specifically adapted diesel engines for rape seed oil fitting to the German pre-norm DIN V 51605. However, advanced biofuels should allow that emissions keep within the limits of the forthcoming EURO6 norm for road vehicles and EU Stage 4 / US Final TIER4 for non-road vehicles. This proposal covers research and demonstration on 2nd generation vegetable oil

fuels in advanced engines. It follows a double strategy: engines as well as the fuel are adapted such that both match and the combination allows for achieving high engine performance at minimum fuel consumption fitting with most severe emission limits.
The objectives are
- to widen the range of considered oils,
- to research on and demonstrate additives for vegetable oils,
- to research on and demonstrate improved engine oils,
- to achieve EU stage 4 / US TIER4 emission levels in medium-scale demonstration fleets running in France, Austria, Germany and Poland,
- to transfer the engine and fuel concepts to hybrid engines, allowing to achieve forthcoming EURO6 emission levels,
- to prepare proposals for future fuel standards.
The outcome of the project includes advanced engine and fuel concepts for vegetable oil and the preparation of a European standard for 2nd generation vegetable oil.

Nanodesigned electrochemical converter of solar energy into hydrogen hosting natural enzymes or their mimics (SOLHYDROMICS)

Leaves can split water into oxygen and hydrogen at ambient conditions exploiting sun light. Prof. James Barber, one of the key players of SOLHYDROMICS, was the recipient of the international Italgas Prize in 2005 for his studies on Photosystem II (PSII), the enzyme that governs this process. In photosynthesis, H2 is used to reduce CO2 and give rise to the various organic compounds needed by the organisms or even oily compounds which can be used as fuels. However, a specific enzyme, hydrogenase, may lead to non-negligible H2 formation even within natural systems under given operating conditions. Building on this knowledge, and on the convergence of the work of the physics, materials scientists, biochemists and biologists involved in the project, an artificial device will be developed to convert sun energy into H2 with 10% efficiency by water splitting at ambient temperature, including: -) an electrode exposed to sunlight carrying PSII or a PSII-like chemical mimic deposited upon a suitable electrode -) a membrane enabling transport of both electrons and protons via e.g. carbon nanotubes or TiO2 connecting the two electrodes and ion-exchange resins like e.g. Nafion, respectively -) a cathode carrying the hydrogenase enzyme or an artificial hydrogenase catalyst in order to recombine protons and electrons into pure molecular hydrogen at the opposite side of the membrane The project involves a strong and partnership hosting highly ranked scientists (from the Imperial College London, the Politecnico di Torino and the GKSS research centre on polymers in Geesthacht) who have a significant past cooperation record and four high-tech SMEs (Solaronix, Biodiversity, Nanocyl and Hysytech) to cover with expertise and no overlappings the key tasks of enzyme purification and enzyme mimics development, enzyme stabilisation on the electrodes, membrane development, design and manufacturing of the SOLHYDROMICS proof-of-concept prototype, market and technology implementation studies

Efficient and robust fuel cell with novel ceramic proton conducting electrolyte (EFFIPRO)

EFFIPRO will develop electrolytes and electrodes for proton conducting fuel cells (PCFCs) based on novel LaNbO4-type and similar proton conducting oxides that, unlike earlier candidates, are chemically stable and mechanically robust. The transport of H+ makes water form on the cathode side, avoiding fuel dilution and recycling and reducing risk of destructive anode oxidation, even at peak power. Moreover, the high operating temperature (e.g. 600°C)

alleviates recycling of liquid water and coolants, and provides efficient heat exchange with heat grids or fossil fuel reformers. All these give PCFCs major benefits in fuel utilisation, overall efficiency, and system simplicity with reformed fossil fuels as well as hydrogen from renewables.
However, the proton conductivities of candidate materials are insufficient, and the project aims to improve proton conductivity through doping strategies and interface engineering, investigating new classes of stable proton conducting oxides, and developing technologies for thin film electrolytes on suitable substrates. Novel cathodes will be devised, all to bring area-specific electrolyte and interface resistances down to 0.2cm2 each within this first project. New production routes of precursors and materials are included, as well as surface kinetics research and cost reduction by mischmetal strategies. The project is accompanied by complementary national initiatives and projects e.g. on fundamental characterisation and interconnects. Novel PCFC technology involves high risk and long term research that needs concerted action from many actors including the emerging nano-ionics field.
It is the aim that PCFCs by 2020 will be available, accelerate the use of fuel cells, reduce CO2 emissions, and increase efficiency by 10% where applied, promote the hydrogen society, and be a dominating fuel cell technology. The project counts 7 partners in 5 countries, with leadership and PCFC dedication.

Combined solar power and desalination plants: technico-economic potential in Mediterranean partner countries (MED-CSD)

The growing economies in the southern and eastern Mediterranean area increasingly need affordable and efficient energy and water for sustainable development. Hybrid solar/fossil thermal power plants with combined sea water desalination based on concentrating solar power technology (CSP) offer a unique, cost efficient solution to the growing energy and water demand. Hybrid solar/fossil operation offers a smooth transition from the fossil fuel to a solar economy and provides firm power capacity to the grid with up to 8000 full load operating hours per year.
The main objective of the MED CSD project is the assessment of the technico-economic potential of CSP for electricity and desalination in Mediterranean region, particularly the Mediterranean Partners Countries (MPCs) (WP3) based on a technology review and considering the results of past and on-going studies and projects (Aqaba project as a reference) (WP1) and attained through the realization of feasibility studies in Mediterranean.

Reliability focused research on optimizing wind energy systems design, operation and maintenance: tools, proof of concepts, guidelines & methodologies for a new generation (RELIAWIND)

The EU Council of Ministers held 8 & 9th march 2007 examined theses issues and agreed: Renewable energy will cover at least 20 % of the EU s energy demand by 2020, amongst others. Wind power can make the most important contribution to these targets, if sufficient emphasis is established on technological R&D and market development. Because of the current European scenario and its forecasted evolution towards 2020, offshore wind energy is called to play a key role. Offshore maintenance costs in the current situation are still too high, requiring higher feed-in tariffs for the private investor's business case to reach the minimum profitability.
This project aims is to offset this paradigm, allowing offshore wind power to be deployed in the same way onshore has. RELIAWIND consortium, for the first time in the European Wind Energy Sector, and based on successful experiences from other sectors (e.g. aeronautics) will

jointly & scientifically study the impact of reliability, changing the paradigm of how Wind Turbines are designed, operated and maintained. This will lead to a new generation of offshore (and onshore) Wind energy Systems that will hit the market in 2015. The objectives of this research project are: To identify Critical Failures and Components (WP-1: Field Reliability Analysis)

Innovative dual membrane fuel cell (IDEAL-CELL)

IDEAL-Cell proposes to develop a new innovative and competitive concept of a high temperature Fuel Cell, operated in the range 600-700°C, based on the junction between a PCFC anode/electrolyte part and a SOFC electrolyte/cathode, through a mixed H2 and O2 conducting porous ceramic membrane. Protons created at the anode progress toward the central membrane to meet with Oxygen ions created at the cathode, to form water, which is evacuated through the interconnected porosity network.
Therefore, in our concept, Hydrogen, Oxygen and water are located in 3 independent chambers, which allows avoiding all the detrimental consequences linked to the presence of water at electrodes (low fuel and electrical efficiency, interconnect corrosion, need for a gas counter-flow'). The IDEAL-Cell concept brings a considerable enhancement of the overall system efficiency (fine-tuning of the catalytic properties of the electrode, possibility of applying a pressure on both the electrode sides, more simpler and compact stack-design with less sophisticated interconnects, more efficient pre-heating of gas, simplified heat exchange system for co-generation, availability of high quality pure water for vaporeforming).
This 4-year project, divided in 2 parts, is organized so that the risk is minimized at each step. The first 2 years will focus on the proof of the concept with routine materials; the last 2 years will be dedicated to the development of an optimized short-stack with advanced materials and architecture. The project work programme is based on extensive theory and modelling, material development, testing techniques development, benchmarking and dissemination of the knowledge acquired during the duration of the project.
The best European teams have been carefully selected according to their complementary expertises and skills, and so that the type of activities involved (academic research, applied research, materials supply) ensures the success of the IDEAL-Cell project.

European solar-fuel initiative - renewable hydrogen from sun and water; science linking molecular biomimetics and genetics (SOLARH2)

SOLAR-H2 brings together 12 world-leading European laboratories to carry out integrated, basic research aimed at achieving renewable hydrogen (H2) production from environmentally safe resources. The vision is to develop novel routes for the production of a Solar-fuel, in our case H2, from the very abundant, effectively inexhaustible resources, solar energy and water. Our multidisciplinary expertise spans from molecular biology, biotechnology, via biochemistry and biophysics to organo-metallic and physical chemistry.
The project integrates two frontline research topics: artificial photosynthesis in man-made biomimetic systems, and photobiological H2 production in living organisms. H2 production by these methods on a relevant scale is still distant but has a vast potential and is of utmost importance for the future European economy. The scientific risk is high - the research is very demanding. Thus, our overall objective now, is to explore, integrate and provide the basic science necessary to develop these novel routes and advance them toward new horizons. Along the first track, the knowledge gained from biochemical/biophysical studies of efficient enzymes will be exploited by organometallic chemists to design and synthesize bio-mimetic compounds for artificial photosynthesis.

The design of these molecules is based on molecular knowledge about how natural photosynthesis works and how hydrogenase enzymes form H2. Along the second track, we perform research and development on the genetic level to increase our understanding of critical H2 forming reactions in photosynthetic alga and cyanobacteria. These studies are directly aimed at the improvement of the H2 producing capability of the organisms using novel genetic and metabolic engineering. The project also involves research aimed at demonstrating the concept of photobiological H2 production in photobioreactors.

Quantitative failure consequence hazard assessment for next generation CO2 pipelines (CO2PIPEHAZ)

This project addresses the fundamentally important and urgent issue regarding the accurate predictions of fluid phase, discharge rate, emergency isolation and subsequent atmospheric dispersion during accidental releases from pressurised CO2 pipelines to be employed as an integral part of large scale Carbon Capture and Storage (CCS) chain. This information is pivotal to quantifying all the hazard consequences associated with CO2 pipeline failure forming the basis for emergency response planning and determining minimum safe distances to populated areas.
The development of state of the art multiphase heterogeneous discharge and dispersion models for predicting the correct fluid phase during the discharge process will be of particular importance given the very different hazard profiles of CO2 in the gas and solid states. Model validations will be based on both small scale controlled laboratory conditions as well as large scale field trials using a unique CCS facility in China. A cost/benefit analysis will be performed to determine the optimum level of impurities in the captured CO2 stream based on safety and economic considerations. The work proposed, carried out over a period of 36 months will embody the understanding gained within safety and risk assessment tools that can be used for evaluating the adequacy of controls in CO2 pipelines, with best practice guidelines also being developed.
The proposal addresses the main themes of the Collaborative Call in that it "has a predominant research component and its successful outcome would allow the safe and commercial deployment of large scale near zero emission power generation technology based on CCS. The project also enjoys strategic leadership from members the Carbon Sequestration Leadership Forum and highly relevant collaboration with the world s second largest and fastest producer of CO2, China.

Simple underwater generation of renewable energy (SURGE)

AW Energy Oy/s WaveRoller is the original concept to tame the surge in the nearshore areas. Although the major wave energy potential is clearly offshore in larger depths, apparently there still exist major drawbacks for the commercial-scale deployment of offshore devices, due to the necessity to rely on offshore maritime technologies, which on one hand are rather expensive and on the other hand are yet to prove their suitability for wave energy applications. For this reason, it shall be worth-while to assess the value of on- and near-shore devices in particular in the present development phase: it is possible to use lower-cost modular technology and the devices are also much easier to maintain due to the proximity to the shoreline.
WaveRoller is a unique, proven and patented product design for near-shore bottom wave (surge) energy conversion, and it was the first solution of its type (invented 1993 by Finnish professional diver). The detailed engineering, construction, deployment and monitoring of the simple and robust near-shore wave energy concept WaveRoller north of the Portuguese

coastal town Peniche is an important step towards the large-scale reality of submerged near-shore wave energy utilisation. In addition to of the robust component and structural design, easy manufacturability and assembly, extensive technical and environmental monitoring activities will assure the appropriate assessment of the demonstaration plant.

A multiple space and time scale approach for the quantification of deep saline formations for CO2 storage (MUSTANG)

The objectives of MUSTANG are to develop and disseminate a comprehensive set of methodologies and tools for the assessment and characterization of deep saline aquifers for CO2 storage, providing measures of performance and risk that are necessary for a cost-benefit analysis, ensuring public confidence and acceptance and promoting its deployment. Novel CO2 storage specific field investigation technologies and methodologies will be developed, allowing an improved determination of the relevant physical properties of the site and enabling short response times in the detection and monitoring of CO2 plumes during both the injection and storage phases.
We also aim at an improved understanding of the processes of CO2 spreading by means of theoretical investigations, laboratory experiments, natural analogue studies and field scale injection tests, including those relevant to the
1) seal integrity;
2) the negative impact of possibly conductive faults;
3) formation heterogeneities;
4) CO2 trapping mechanisms; and
5) effective treatment for the wide span of spatial and temporal scales of the coupled thermo-hydro-mechanical-chemical processes.
Based on the improved process models, conceptual and numerical models will be developed for analyzing CO2 injection and storage and implemented at six test sites representing different geological settings and geographical locations in Europe, also addressing the impact of the CO2 injection on seal integrity. The guidelines to be developed will be integrated into a decision support system, which will include a risk assessment component and liabilities consideration. The DSS will be tested and validated at the various project test sites. Special attention has been devoted to promote measures capable of enhancing public outreach and acceptance and dissemination of the methodologies and technologies to the wide public.

European value chains for CO2 (ECCO)

The main objective of ECCO is to facilitate robust strategic decision making regarding early and future implementation of CO2 value chains for Europe in the face of uncertainty. The project will provide recommendations enabling cost-effective use of the CO2 being produced from zero-emission power plants and other industries in Europe by exploring the assets and challenges of CO2 for enhanced hydrocarbon production (EOR/EGR) in a value-chain context.
ECCO responds to the need for a European joint effort towards overcoming the barriers to the deployment of CCS. The core group of the project is constituted by 18 legal entities, all of them committed to the execution of ECCO. These encompass 7 energy providers (oil & gas companies and utilities), 2 engineering companies, 1 NGO and 8 highly ranked RTD providers representing bordering countries around the North Sea basin and in Central and Eastern Europe. ECCO -short for European Value Chain for CO2 - is designed as a Collaborative Project (small to medium scale focused project).
The R&D activities are structured in four sub-projects (SP) directly responding to the

objectives of the Work Programme: SP1 ECCO dissemination and training SP2 CCS analysis and recommendations SP3 CO2 value chain methodology and tool development SP4 Reservoir technology for EOR/EGR The knowledge, methods, and tools developed in ECCO shall influence future CCS initiatives by enabling the industrial players and the authorities to analyse, understand, and make sound decisions within the topic of CO2 value chains. Key expected impacts of ECCO, all complying with the Work Programme are: Underpin the realisation of CO2 value chains for captured CO2 from large point sources for CO2 injection in petroleum reservoirs (EOR/EGR) and CO2 storage.

Engine and turbine combustion of bioliquids for combined heat and power production (BIOLIQUIDS-CHP)

The combustion of plant oils in diesel engines, whether or not after esterification to...

Towards a transport infrastructure for large-scale CCS in Europe (CO2EUROPIPE)

This project aims at paving the road towards large-scale, Europe-wide infrastructure for the transport and injection of CO2 from zero-emission plants. The project will prepare for the optimum transition from initial small-scale, local initiatives towards large-scale CO2 transport and storage that is to start around 2020, with key stakeholders in the field of carbon capture, transport and storage. This transition, as well as the development of CO2 infrastructure will be studied by developing the business case in a number of realistic scenarios. The project will result in a roadmap for CO2 transport infrastructure, with 2020 as the target year for start of large-scale CCS in Europe. The roadmap will be defined for all levels considered in the project, ranging from technical to organizational, financial and societal.

Thermoacoustic technology for energy applications (THATEA)

The objective of the THATEA project is to advance the science and technology behind the thermoacoustic energy conversion processes to such a level that would enable reaching conversion efficiencies at which the application of the technology becomes economically attractive. Based on the results obtained, the most promising application areas will be identified for further development. Thermoacoustic energy conversion is a generic cross-cutting energy technology that can be applied in a vast number of applications, requiring heating, cooling, or power both in industry and build environment.
Thermoacoustic is concerned with the thermodynamic conversion between heat and intense sound in the presence of a solid boundary. The working principles of thermoacoustic systems are quite complex. However, the practical implementations of these are relatively simple. This offers great advantages with respect to the economic feasibility of this technology. The systems lack moving parts, use environmentally friendly working media, and only ordinary materials. The development of thermoacoustic systems will lead to energy and cost savings and economically attractive renewable energy options. The attractive feature of thermoacoustic technology is that all the different applications can be developed based on the same technological principles.
This means that the components of such systems can be made in large quantities at low cost. This project will be dedicated to the exploration and the study of different conversion processes involved in the thermoacoustic systems and the potential they have for energy applications. This project is the first initiative on a European level, aiming to combine the efforts in the new research field of thermoacoustics in order to acquire a leadership position in this new promising and innovative technology.

Hydropower converters with very low head differences (HYLOW)

Small hydropower with very low head or pressure differences below 2.5 m and hydraulic power ratings of 50 to 1000 kW is a significant renewable resource, with an estimated unused potential in rivers alone of e.g. 600 to 1000 MW in the UK and more than 500 MW in Germany. The economically and ecologically efficient utilisation of this hydropower bracket still constitutes an unsolved problem since conventional turbines (Kaplan or Cross flow) are not cost effective, and since they are considered to have a negative ecological impact.
In order to open up this hydropower bracket for exploitation, an innovative solution - the hydrostatic pressure turbine - was developed. This novel hydraulic machine utilises differential hydrostatic pressures; with theory and initial model tests indicating high theoretical efficiencies for low head differences. It rotates at slow speeds and operates under atmospheric pressure with a continuous bed, thus minimising negative impact on fish.

Contextualising behavioural change in energy programmes involving intermediaries and policymaking organizations working towards changing behaviour (CHANGING BEHAVIOUR)

This project aims to support the shift toward end-user services in European energy policy. It will (1) develop a sophisticated but practical model of end-user behaviour and stakeholder interaction (2) integrate knowledge of context (e.g., national culture and institutions), timing and actors into demand management practice (3) pilot the transfer of context-tailored demand side programmes from one European country to another (4) create a toolkit for practitioners to manage the social and technical change involved in demand management programmes (i.e., energy efficiency and renewable-based end-user generation). This toolkit will be sensitive to the influence of context, timing and actors, and will thus facilitate the cross-country transfer and adaptation to local context of European best practices. The toolkit will in particular address the diversity of conditions and behaviour patterns in old and new EU Member States. This project will work through intensive co-operation between researchers and intermediary organisations in the field of demand management (i.e., informative instruments, pilot projects, auditing and investment support, voluntary agreements, third-party financing schemes and the like). Such organisations include governmental or semi-governmental energy agencies, non-governmental organisations, consultancies and energy service companies. Together with these organisations, the project will evaluate and analyse behavioral responses to demand side measures, and test the transfer of demand side programmes from one European context to another. This collaborative project will create new knowledge on energy related end-user behaviour and will ensure that this knowledge is useful for practitioners and policy makers in different parts of Europe.

Water electrolysis at elevated temperatures (WELTEMP)

Hydrogen has the potential to provide a reliable, secure, and clean source of power. The barrier is the challenge of getting hydrogen economically to the point of use. Water electrolyser offers a practical way of hydrogen production in association with renewable energy sources. Compared to the conventional alkaline electrolyte electrolyser, the polymer electrolyte membrane (PEM) electrolyser can operate at high current densities and pressure with compact design. The main challenges for PEM electrolysers are high capital cost of key materials, components and the overall system as well as insufficient long-term durability. The strategic development of the WELTEMP project is an elevated operating temperature of the

PEM electrolyser. In this way the energy efficiency will be significantly improved because of the decreased thermodynamic energy requirement, enhanced electrode kinetics, and the possible integration of the heat recovery. Key issues to achieve this strategic target are breakthroughs of fundamental materials developments, including catalysts, membranes, current collectors, bipolar plates, and other construction materials. The WELTEMP will start with developing active and stable anodic catalysts based on mixed metal oxides, temperature-resistant PEM based on composite PFSA, sulfonated aromatic and/or acid-base cross-linked polymers, and highly conducting and corrosion-resistant tantalum thin surface coatings as current collectors and bipolar plates. Based on these materials, a 1 kW prototype electrolyser will be constructed for demonstration and evaluation. It is aimed to reach operational temperature above 120C and a hydrogen production of 320 NL/h at 80% efficiency (LHV basis) at system level. These innovative developments need trans-national efforts from European industries and R&D groups. The expertise and know-how of the consortium in the field of refractory metals, electrocatalysts, polymers and membranes, MEA fabrication, and most importantly the constr...

Smart light collecting system for the efficiency enhancement of solar cells (EPHOCELL)

The main objective of this project is the study of the various intra and intermolecular energy transfers with the aims to modify the solar spectrum by means of an adequate molecular system. This will permit to improve the similitude between the solar radiation and the absorbance of the photovoltaic materials. This change of spectrum must be realized without significant loss of energy by means of energy up and down-conversion cascades supported by a photoluminescent compound able to emit in the maximum absorption band of the photovoltaic material.
The concentration of the solar light wavelength in the absorption band of the photovoltaic material may determine an increase in the number of photons able to excite the photovoltaic compound. This will result in an improvement of the electrical energy delivered by the solar cell. The research and development to be realized during this project will be essentially centred on the studies of molecular mix able to generate adequate energy cascades and their evaluation in terms of efficiency and chemical stability. Another part of the work will consist in the development of coatings or plastics containing such molecular systems to be directly applied on the solar cells superficies for an in situ evaluation of the results and for a quick emergence of such light concentrating devices.

Support of the activities of all stakeholders from the PV sector to collaborate together to achieve the 2020 targets (PV TP - SEC)

The proposed action, PV TP SEC, will foster the cooperation among all the relevant stakeholders of the PV sector and therefore optimise the coordination of the research work in various technology areas in line with the R&D targets of the Strategic Research Agenda (SRA) developed by the European Photovoltaic Technology Platform (EU PV TP).
The Implementation plan of the SRA will lead the European research towards the development of the most promising technologies and as a consequence it will improve the competitiveness of the European research in the world. Moreover, the proposal PV TP SEC will give a fundamental contribution in carrying forward the proposal for the Solar Europe Initiative (SEI), which is driven by the PV industry in the framework of the Strategic Energy Technology (SET) Plan, and its implementation plan in order to reach the following targets: the 12% of PV electricity produced by 2020 the grid parity in most Europe by 2020 a competitive position of the EU PV industry by 2020 For the achievement of the R&D targets

set in the SRA and the 2020 targets of the SEI it is necessary to continue in supporting, with the appropriate tools, all stakeholders from the PV sector. The main idea which led this consortium to propose this work is based on the need to provide an appropriate support to the stakeholders committed to achieve these ambitious targets.
This consortium including all partners was involved in the previous project PV Sec (secretariat of the European Photovoltaic Technology Platform, EU PV TP) which is in operation since 2005. With the work performed this consortium is building up on this experience and using tools and contacts already available. Therefore with this proposal the consortium will continue in providing the appropriate administrative and communication tools to ensure the cooperation of the different entities of the EU PV TP with the experience of the work performed within the last three years.

Active solar panel initiative (ASPIS)

The Active Solar Initiative targets development of a fundamentally new, multi-disciplinary photovoltaic technology that will enable meeting and exceeding the year 2015 cost targets of the EU Photovoltaic Strategic Research Agenda, driving European consumer premises power generation to cost parity with grid electricity. The basis of Active Solar is a novel Parallactic Tracking technology concept that supports flat, fixed solar panels with internal concentration and dynamic sun-tracking. Active Solar panels will be a direct replacement of the ubiquitous photovoltaic solar modules. By means of a ten-fold reduction of amount of polycrystalline silicon, costs of the Active Solar panels will be reduced by up to 3 times compared to conventional PV modules. Unlike existing silicon-reducing technologies such as thin film panels, Active Solar panels will enable cost reduction per installed Watt without sacrificing installation area efficiency. The goals of the project include prototyping and verification of the technology, as well as development and verification of cost-efficient manufacturing techniques and dissemination of knowledge among European manufacturers. The project will also lay the groundwork for the next generation of Active Solar technology that will enable a drastic additional increase in residential solar generation efficiency through use of the highly efficient multi-junction cells in flat, fixed rooftop-mounted panels.

Fast rechargeable zinc-polymer battery based on ionic liquids (POLYZION)

Current battery technologies for hybrid (HEVs) and small electric vehicles (EVs) have technological, cost or environmental limitations. Despite this, the global market for HEVs and EVs is growing rapidly and is expected to top $2billion by 2015.
The PolyZion project will create a new class of fast rechargeable zinc-polymer battery for hybrid and small electric vehicle applications. The research programme combines fundamental material and process advances in ionic liquids, rechargeable zinc electrodes, ultra-fast pulse charge injection techniques and conducting polymers, as well as constructing prototypes battery units for industry standard testing. The resulting battery device will be low cost, have low environmental impact and have the energy and power density necessary to compete will alternative battery technologies in the HEV and EV markets.
PolyZion is a European-led consortium combining world-class research organisations in ionic liquids, conducting polymers, zinc deposition, pulse charging and batteries, as well as SME partners with expertise in technology development and specialised materials, and large industrial partners with industrial experience of battery manufacture and state-of-the-art testing facilities. The consortium also includes 2 organisations with world-class research expertise from an Emerging Economy (Russia) and High Income (Canada) countries outside the EU.

Development of regional and Pan-European guidelines for more efficient integration of renewable energy into future infrastructures (SUSPLAN)

The overall impact from SUSPLAN is contribution to a substantially increased share of renewable energy sources (RES) in Europe at an acceptable level of cost, thereby increasing security of supply and competitiveness of RES industry. The results will ease PAN-European harmonisation and lead to a more integrated European energy market. The main objective is to develop guidelines for more efficient integration of RES into future infrastructures as a support for decision makers at regional as well as Pan-European level. The guidelines shall consist of strategies, recommendations, criteria and benchmarks for political, infrastructure and network decision makers and power distributors with a time perspective 2030-2050.
The guidelines will be established by:
- Performing comparative scenario analysis in selected representative regions and at a trans-national level based on real data, comprehensive multi-disciplinary knowledge and by using advanced quantitative models. The scenario studies will cover technical, market, socio-economic, legal, policy as well as environmental aspects.
- Application of a bottom-up approach by comparing regional and trans-national possibilities, challenges and barriers.
- Systematic evaluation and comparison of the future possibilities for development.
- Generalisation of the results.
Through this process SUSPLAN will contribute to:
- Improve and harmonise knowledge and consciousness in the different regions of EU regarding how to achieve more efficient integration of RES into future infrastructures
- Make information easily available for all interested actors regarding scenarios for a sustainable development of the European energy system.
The results will be disseminated by active participation of relevant actors from the representative regions in the project, by workshops, a web-page with open reports with results and a database with all data, which is possible to make open.

Polygeneration of energy, fuels and fertilisers from biomass residues and sewage sludge (ENERCOM)

The aim of this proposal is to demonstrate high-efficient polygeneration of electricity, heat, solid fuels and high-value compost/ fertilisers from sewage sludge and greenery waste mixed to biomass residues, thereby offering a new, safe, environmentally friendly and cost-effective path for the disposal of sewage sludge, maximising energy output, greenhouse gas reduction, cost-effectiveness and new chances for SME.
Compared to the existing routes of sewage sludge treatment, the proposed concept allows achieving a very high overall energy efficiency by
- use of low-temperature environmental heat and heat from the co-composting process for drying sewage sludge thereby replacing high temperature heat from a combustion process,
- a highly efficient gasification process,
- saving of transport energy due to a better overall material flow management.
Thus, the concept brings down disposal costs of sewage sludge. The polygeneration demonstration plant will be set up on an existing compost production facility. The latter will be able to process larger amounts of sewage sludge than at present, to produce less but higher quality compost as well as pellets and/or briquettes as storable substitute fuel and to deliver electricity to the grid. Heat will be used on site for drying processes and for a district heating grid of a neighbouring industrial park. CO2 emissions are reduced by replacement of fossil

fuels and directly in the composting process.
Minerals and nutrients will be recovered from the ash and used to enhance the fertilising value of the compost after removal of heavy metals and other harmful fractions. 5 out of the 8 consortium partners are SME. The exploitation plan includes the creation of a two further SME for heat delivery and worldwide planning and marketing of similar plants. Replication of the concept in the 3,000 compost plants in the EU would allow additional generation of at least 56 TWh of electricity, heat and solid fuels.

High effiency biodiesel plant with minimum ghg emissions for improved fame production from various raw materials (ECODIESEL)

The project will demonstrate a 200.000 t/year capacity flexible FAME production plant, starting from different kinds of raw material oils, with the aim of reducing 40% of the CO2 balance compared to the well to wheel emissions of a conventional fossil diesel plant, through the following measures: to develop an integrated transesterification process, linked to the neighbouring crushing process through pipeline connections for raw material and energy steam supply to the process, and creating a whole pipeline system for transport of all raw materials and final products, thus critically reducing transport costs and emissions, and boosting drastically the environmental performance of the plant in order to obtain higher energy and CO2 balances from the production process to develop a Sustainability Due Diligence Model for Jatropha oil production, well above the current state of the art, able to be applied to the production of this biodiesel crop outside and inside the EU.
The model will be applied to the study case of a Jatropha plantaion in Mexico. to demonstrate Jatropha cultivation in Southern EU, and to research on the selection of the mewest species - plants/genotypes- best appropriate for biodiesel production. Attention will focus on analyzing non-toxic/non carcinogenic versus toxic accessions including aspects of plant protection given the potential of multiple applications of the protein-rich by-products, such as animal feed and/or other valuable components. to develop an online analyzer for Biodiesel characterization at industrial scale, based on the integration of state of the art detection systems and process reaction control software. This will give immediate quantitative results to assist in the manufacturing process of biodiesl, by confirming that the transesterification process has reached the percentage yield required to research on the filtrability of biodiesel, in order to analyze the possibility that some compounds may reduce the fluidity of the biofuel through the car engine filters or other narrow components The obtained biodiesel will fulfil the highest quality standard levels, and will include the novelty of an environmental calculation on CO2 emission savings, by means of life cycle analyses (LCA) obtained through the real project data. This is an industry-driven project.

Active distribution networks with full integration of demand and distributed energy resources (ADDRESS)

ADDRESS will research, develop and deploy technologies and processes to increase usage of Distributed Generation and Renewable Energy Resources thereby engaging in a new relationship between customers, generators and network operators. ADDRESS aims to develop new innovative architectures for Active Distribution Networks (ADN) able to balance in real time power generation and demand allowing network operators, consumers, retailers and stakeholders to benefit from the increased flexibility of the entire system. Innovative use of communications, automation and household technologies will be combined with new trading mechanisms and algorithms providing ADN with low cost and reliable solutions. Customers will be encouraged into active participation enabling them to change their

consumption habits, adopting a smarter use of energy and saving money. A cost/benefit analysis of different solutions will be developed: the most promising will be tested in three sites with different geographic, demographic and generation characteristics. The consortium has a distinguished membership of Large, Medium and Small Enterprises with international experience. East and West European Utilities, Global Manufacturers (both power and appliances), Universities, Consultants, Communications Suppliers and R&D Specialists have been selected for their specific knowledge and experience providing a well balanced mix of technology, innovation and market orientation. Competencies cover the whole spectrum of the electricity supply chain making this consortium extremely well suited to acheive the project goals and to deliver flexible, reliable, environmentally friendly and economic solutions.
FP7 has provided the opportunity for this collaboration to take place completely meeting the Work Programme aims and enabling European Utilities and stakeholders to be on the cutting edge in worldwide network management.

Equitable testing and evaluation of marine energy extraction devices in terms of performance, cost and environmental impact (EQUIMAR)

EquiMar will deliver a suite of protocols for the equitable evaluation of marine energy converters (based on either tidal or wave energy). These protocols will harmonise testing and evaluation procedures across the wide variety of devices presently available with the aim of accelerating adoption though technology matching and improved understanding of the environmental and economic impacts associated with the deployment of arrays of devices. EquiMar will assess devices through a suite of protocols covering site selection, device engineering design, the scaling up of designs, the deployment of arrays of devices, the environmental impact, in terms of both biological & coastal processes, and economic issues. A series of protocols will be developed through a robust, auditable process and disseminated to the wider community.

Classification of European biomass potential for bioenergy using terrestrial and earth observations (CEUBIOM)

The main objective of the project is to develop a common methodology for gathering information on biomass potential using terrestrial and earth observations. This objective will be achieved by the implementation of a systematic assessment work plan and will result in the establishment of a harmonised approach and an e-training tool for dissemination. The e-training environment will be an important tool for reaching the much-needed European harmonisation, whereas a Stakeholder Platform will facilitate access to reliable and common datasets on biomass potential and as such it will offer a more efficient use of the available European biomass feedstock.
The project will:
- Develop a common methodology for gathering information on biomass potential using terrestrial and earth observations
- Use e-technologies for disseminating information, best practices on the use and applicability of developed harmonised methodology

Preparatory activities of the joint technology initiative for fuel cell and hydrogen (FCHINSTRUCT)

The project will carry out all the preparatory activities necessary to ensure a successful launch of the Joint Technology Initiative (JTI) as soon as possible once the Council Regulation has

been adopted. The main activities are to: - start the build-up of the resources and the support structure necessary to ensure the operational readiness of the Joint Undertaking's Programme office; - prepare the governance process of the JTI and the development of processes for co-ordination with other entities engaged in the Fuel Cells and Hydrogen field; -develop and prepare the strategic work programme and the first annual activity plan; -prepare the project management tools and procedures for reception, treatment, monitoring, reviewing and management of the JTI projects; -prepare for the transfer of knowledge gained and website run from the Hydrogen and Fuel Cells Technology Platform.

Security of energy considering its uncertainty, risk and economic implications (SECURE)

The SECURE project will build a comprehensive framework that considers all the issues related to the topic of security of supply, including geopolitics, price formation and the economic and technical design of energy markets inside and outside the EU. Tools, methods and models will be developed to measure and assess EU security of energy supply both outside the EU and inside the EU.
The objective is to evaluate the vulnerability of the EU to the different risks which affect energy supplies in order to help optimizing the Union's energy insecurity mitigation strategies, including infrastructure investment, demand side management and dialogue with producing countries. This project will develop energy security indicators for all the major energy sources in order to identify the risk factors and quantify the EU exposure to volume and price risks in the short and long terms, including impacts of severe accidents and terrorist threats.
Costs and benefits (both measurable and perceived) of energy security will be evaluated for different energy supply/demand scenarios to help policy makers providing the most appropriate institutional, political and industrial solutions. All major energy sources and technologies (oil, natural gas, coal, nuclear, renewables and electricity) will be addressed from upstream to downstream with both a global and sectoral analysis studying in depth issues such as technical, economic/regulatory and geopolitical risks.
The analysis will also integrate demand as a key issue related to energy security. The SECURE project has both a strong quantitative and qualitative component and will at the end not only provide a comprehensive methodological and quantitative framework to measure energy security of supply, but it will also propose policy recommendations on how to improve energy security taking into account costs, benefits and risks of various policy choices.

Development of postcombustion CO2 capture with CaO in a large testing facility: CaOling (CAOLING)

This project is aiming at the scaling-up of one of the most promising concepts for CO2 capture from coal power plants: postcombustion carbonate looping systems. This project focuses on the experimental pilot testing and scaling up of the process at scales in the 1 MW range.
The 1 Mw carbonate looping pilot will be built in the Hunosa 50 Mwe CFB coal power plant of La Pereda, using a side stream of flue gases of the commercial plant. A parallel research program will be developed along the activities to design, build and test at the pilot, including research activities at lab-scale and fundamental knowledge on sorbent properties. This program will be developed by the scientific leaders in the development of this technology worldwide, and will help with the design of the pilot to a better understand of the results.
The scope of this project is the necessary step towards a possible pre-industrial demo plant

(10s of Mw scale).This is clearly in line with the expected level of development for this technology outlined in the European Technology Platform for Zero Emission Fossil Fuel Power Plants and also with wider targets to accelerate the development of breaktrough technologies for CO2 capture under the EU Strategic Enegy Technology Plan.

Analysing transition planning and systemic energy planning tools for the implementation of the energy technology information system (ATEST)

The present project aims at bringing together EU competence on a transition towards a sustainable and low carbon energy system through energy innovation, encompassing transition planning, energy modeling activities, and technology assessment. This will be achieved by creating a platform in which techniques and data are collected, shared and harmonized. The Objectives of the project are to: Review models/tools used in the European Countries, taking in mind what is used outside Europe; and what are the requirements of the SETPlan (WP1, WP2) Identify and recommend common tools to be used in all countries and in the Energy Technology Information System, and gain consensus on these models (WP3). Identify and recommend existing technology databases and provide a roadmap for the development of these databases on a European and on a regional basis (WP4). Demonstrate the ability of the recommended tools to be used for energy planning (WP5) Identify the roadmap for the improvement and development of the tools in order to cover the needs of the SETPlan implementation (WP6). To achieve these objectives the project consortium consists of Institutions with a long experience in the fields of energy planning tools development and use. In order to ensure the direct links with the SETPlan development and requirements, the JRC, Institute of Energy will be part of the Steering Committee of the project. The final outcome of the project is expected to be a concrete list of tools, that can be used on a Member State level and on a European level which will be generally accepted, an initial set of input data for these models, and a roadmap for the development of both data and tools, in the future.

Ceramic heat exchangers with enhanced materials properties (CEREXPRO)

Heat recovery at a high temperature level is essential in industrial thermal processing. The use of ceramic materials yields higher temperatures and subsequently a higher efficiency. The present project aims to develop a new generation of ceramic heat exchangers for high temperature heat recovery with the target of significantly reducing the size and weight as well as also the price of such components by simplifying the manufacturing process and allowing a higher flexibility in the heat exchanger geometry.
The use of precursors/template materials taken from the textile industries and a subsequent ceramic conversion is proposed as the main technological path for reaching the above objectives. Although this principal option is not new, there are no development efforts known, to utilize such a technological approach for industrial high temperature heat exchangers. The proposed route will lead to an increase in freedom of the geometric design at low costs for shaping. The development/refinement of the conversion process for such materials into a thermal-shock resistant gas-tight ceramic (e.g. silicon infiltrated silicon carbide) and the multi-objective optimization in terms of size, geometry, material and production costs is the major challenge of the proposed project. A complete ceramic heat exchanger component shaped by textile technologies is targeted.
The combination/junction of existing robust ceramic components already applied in industrial furnaces, like silicon infiltrated SiC tubes, with compatible ceramic heat enhancement elements, built through the textile technology based manufacturing process, allows a robust

construction in terms of application safety as an intermediate technology development step. At the same time a significant size reduction or increase of the heat recovery level can be achieved due to the higher heat transfer by the fine shaped and geometrically flexible heat enhancement elements.

Towards a low carbon energy : The European strategic energy technology plan (EBC2008)

Renewable Energies and Energy Management are major issues for France which supports the European Commission energy/climate policy. To realize this commitment, we propose to organize under the French Presidency of the European Union, a major event to prepare the launch of the SET-Plan, named "Towards a low carbon energy: The European Strategic Energy Technology Plan". It will take place on October 28th 2008 in Paris at the Carrousel du Louvre. Based on the work launched by the European Summit in spring 2008, this major event, which will include a conference and an exhibition, will be a place for expression on the issues and challenges faced to industry and society by the European climate/energy policy, and the fundamental role of technology to solve them.
The objectives are: to remind the background and the objectives of this policy, to agree on the objectives of low carbon energy technologies and rally the European players around a common strategy, to draft the agenda of the advances of these technologies, to include them in a common frame of reference in order to compare periodically their results to conduct a coherent change in the energy mix, to encourage managers to acquire and use the instruments provided by the SET Plan in their strategic choices, to enhance recent European technological achievements, to enhance the work of technology platforms and to support the implementation of the Joint Technology Initiatives. As active component of the SET-Plan, the event will also provide an opportunity to promote coordination of research organizations in the energy sector through the launch of the Alliance, to promote European industrial new initiatives and to prepare the work of the Steering Group for the Prague Summit in 2009.

Pilot demonstration of eleven 7MW-Class WEC at Estinnes in Belgium (7MW-WEC-BY-11)

This action focuses on demonstrating the development of a cost-effective large scale high capacity wind park using new state-of-the-art multi megawatt turbines coupled with innovative technology used to stabilize the grid. A key objective of the 7-MW-WEC-by-11 project is to introduce a new power class of large-scale Wind Energy Converters, the 7MW WEC, onto the market which has the potential to significantly contribute to higher market penetration levels for wind electricity in Europe. The new 7MW WEC will be designed and demonstrated at a large scale: eleven such WECs will be demonstrated in a 77 MW wind park close to Estinnes (Belgium).
The wind park will be the first large-scale on-shore wind park in Belgium and the first in the world that will consist of this mega turbine power class. Key challenges related to wind power will be addressed in this demonstration action ranging from technical issues (network stability and security), to financial aspects (cost effectiveness) to environmental issues (landscape pollution). First, the mega turbines will be developed and installed in series ; this is envisioned to significantly reduce costs and increase the market value. Second, new power electronics technology and improved wind forecasting will be used to stabilize the grid in the high capacity wind park.

Improved forecasting is envisioned to furthermore improve the cost-effectiveness of the high

capacity wind park (reduced imbalance costs, improved commercial value). Third, the 7MW turbines will be used to maximize wind energy capacity, while reducing landscape pollution and environmental impact: such a WEC generates more than double the energy in the same given area when compared to conventional 2MW turbines and requires the placement of fewer turbines when compared to conventionally used wind turbines. Lessons learned in developing the high capacity Estinnes wind park will be adapted to a different national context with a weak grid system, Cyprus.

Biomass energy Europe (BEE)

The objective of the project is to harmonise biomass resource assessments, focusing on the availability of biomass for energy in Europe and its neighbouring regions. This harmonisation will improve the consistency, accuracy and reliability of biomass assessments, which can serve the planning of a transition to renewable energy in the European Union.
The project activities will include
(i) the analysis of recently conducted biomass resource assessments,
(ii) the analysis of policy backgrounds, sustainability criteria and user requirements,
(iii) the analysis of currently applied methodologies,
(iv) an inventory of data sources and ongoing activities aimed at improved data quality and accessibility,
(v) a proposal for a harmonised biomass potential assessment methodology,
(vi) an illustration and validation of the developed approach in case studies at EU-27, the Pan-European level and for select countries,
(vii) an evaluation of the harmonised approach and if necessary the identification of priorities for further development.
The major focus will be (1) on methodological and dataset harmonisations fostered by ongoing research of a multidisciplinary team of project participants

Probabilistic long-term assessment of new energy technology scenarios (PLANETS)

The goal of PLANETS is to devise robust scenarios for the evolution of energy technologies in the next 50 years. This is achieved by means of an ensemble of quantitative and analytical tools that are designed to foresee the best technological hedging policy in response to future environmental and energy policies. Focused technological assessments will provide the necessary guidance for technology availability and competitiveness.

Given the long term nature of the analysis, not to mention the many uncertainties surrounding the natural, technological and socio-economic determinants, the scenarios development will be accompanied by probabilistic and stochastic modelling analysis to quantify the most determinant sensitivities. To this purpose, a suite of state-of-the-art energy-economy-climate models will be brought together.
The model portfolio spans varieties of regional coverage, technological detail and economic interrelations. Dedicated integrated assessments will explore the technological options that are most likely to play a role over the time horizon under investigation, and the critical issues that are needed for their competitive deployment. PLANETS will research the future of energy systems by examining environmental and energy policies at the European and global level in their capacity to influence the deployment of new technologies with respect to a mutually agreed Business-As-Usual scenario.
This project will also analyse the linkage between European and world perspectives of energy technology futures and forecasts, in particular in terms of issues like economic

competitiveness and the capacity to export clean technology adoption. Finally, PLANETS will aim to broadly disseminate EU energy technology futures, by setting up an informative scenarios website and acquainting a large number of stakeholders ' from science, industry, government and so forth ' with peer-reviewed publications and a final general-audience conference.

NANOSTRUCTURED ELECTROLYTE MEMBRANES BASED ON POLYMER-IONIC LIQUIDS-ZEOLITE COMPOSITES FOR HIGH TEMPERATURE PEM FUEL CELL (ZEOCELL)

The PEMFC represents one of the most promising technologies in the field of fuel cells. One of the keys to the success of the PEMFC technology is the development of improved electrolyte membrane materials which can be produced in mass and can operate within a temperature range of 130-200ºC. The ZEOCELL project will develop a nanostructured electrolyte membrane based on a new composite multifunctional material consisting of the combination of 3 materials: zeolites, ionic liquids and polymers integrating their beneficial characteristics. The membrane will have an innovative structure comprising a 2D polymer matrix and two zeolite layers, with the following properties: - High ionic conductivity: 100 mS/cm at 150ºC.; - Suitability for operating at temperatures between 130-200ºC; - Good chemical, mechanical and thermal stability up to 200ºC; - Durability (<1% performance degradation during the first 1000 hours working); - Low fuel cross-over (...

Development of a central information platform for ERA NETs under ERAWATCH: Preparatory phase, NETWATCH (NETWATCH)

This project is designed as a preparatory phase to explore and inform interested parties such as the European Commission and the Member States about opportunities to develop a central information platform for ERA NETs under ERAWATCH. The set up of a central information platform was one of the key recommendations of an expert group who evaluated the ERA NET scheme under FP6.
The concept of the project includes a three step approach:
- build a series of scenarios on how to present ERA NETs within ERAWATCH,
- provide an analytical framework about the role of the ERA NETs and joint initiatives stemming from ERA NETs for further implementation of the ERA, using ERA NETs as indicators of its development, and
- develop a participatory method by which a core group (advisory board) including ERA NETs coordinators, ERAWATCH Network Members, the EC and other relevant actors is closely attached to the project from its onset until its end, hereby ensuring that the needs of users are integrated and facilitating the implementation of the project from its preparatory to its potential operational phase.
The overall strategy of this project has been set up as a preparatory phase over 12 months. It will provide evidence on the necessary information to identify the most appropriate set-up and management scheme for a central information platform on ERA-Nets under ERAWATCH. The strategy of this project is to develop in a transparent and participatory manner potential scenarios for the set-up and management of a central information platform on ERA-Nets within ERAWATCH. The information platform will improve mutual learning among ERA-Net participants and provide R&D policy makers on EU and Member State level with relevant information about efficiency, effectiveness and impact of ERA-Nets and subsequent joint programming activities for the implementation of the ERA.

HERA Joint Research Programme (HERAJRP)

The HERA Joint Research Programme (HERA JRP) partners will launch a joint call for multilateral projects in two humanities research areas: Cultural Dynamics and Creativity and Innovation. By setting up a HERA JRP, the 13 national funding partners want to create collaborative, trans-national research opportunities that will derive new insights from humanities research in order to address major social, cultural, and political challenges facing Europe. In consultation with their national researcher communities, they have jointly defined and developed common research priorities, and created a new trans-national funding mechanism. They have also pooled a substantial amount of their funding in one common pot, thus increasing the efficiency and impact of public research funding.
The two HERA JRP themes Cultural Dynamics and Creativity and Innovation respond to the thematic priority issues defined in the FP7 Cooperation Work Programme for Socio-economic Sciences and Humanities. With the coordination of substantial research support mobilised by national funding agencies, the HERA JRP complements the existing FP7 research funding instruments by offering a more flexible suite of funding opportunities for both basic and policy-oriented trans-national collaborative research. The selection phase of the HERA JRP involves the final preparatory activities for the Call for proposals and a commonly-agreed two-stage evaluation process involving meetings of two independent, international Review Panels and remote assessments by expert referees. In the research phase, the HERA JRP will support scientific networking activities in order to foster new innovative research.
The HERA JRP knowledge transfer strategy will stimulate wider public awareness about the important contributions of new humanities research. It is expected that the procedures implemented here for the first time will make a significant change in the way European Humanities research is conducted.

ERA-AGE Extension (ERA-AGE 2)

The main aim of this proposal is to enable the continuation of the highly successful ERA-AGE ERA-NET in order to secure, for the long term, the European Research Area in the ageing field. The existing consortium has not only met but also exceeded all of its goals and is now committed to the joint funding of Europe...

Coordination of European research on ICT and robotics in agriculture and related environmental issues (ICT-AGRI)

This horizontal ERA-NET proposal is cutting across several themes in the Cooperation Programme: Theme 2 (Food, Agriculture and Fisheries, and Biotechnology), Theme 3 (Information and Communication Technologies) and Theme 6 (Environment including Climate Change). The overall strategic objective - also beyond the time frame of the ERA-NET proposal - is a contribution to increase quality, effectiveness and efficiency of national research programmes within Information and Communication Technology (ICT) and Robotics for a competitive, sustainable and environmentally friendly agriculture.
The goal of the ERA-NET is to enable the creation of a European-facing open network of mutually accessible and complementary research programmes which are able to respond to the rapidly developing needs of common European policy drivers. In the pursuit of this goal the ERA-NET will review existing research and future needs, develop instruments and procedures for transnational funding activities, create a strategic transnational research agenda and programme and establish linkages to related networks and disciplines. The ERA-NET will work closely together with the Collaborative Working Group in this research area. The

aim is to support the application of ICT and Robotics in the creation of environmentally efficient agro-technologies as a solution to an efficient implementation of new EU policies on mitigation and adaptation of climate changes, environmental regulations and legislation, traceability, food safety, agro-environmental and rural developments.
The ERA-NET will contribute significantly to the European Research Area by improving the coherence and coordination of ICT-AGRI research programmes across Europe and the development of joint research calls at an early date. It will also bring added value and leverage to the extensive research effort undertaken by Member States' own initiatives ensuring that the research undertaken is the best and also gives the best value for money.

Lead market European research area network (LEAD ERA)

The LEAD ERA project is aimed at fostering the coordination of a series of trans-regional programmes dedicated to research and innovation within the highly innovative and technology based themes of the EU Lead market initiative. Through a process of intensive knowledge sharing of the regional competences and programmes, LEAD ERA partners will develop a joint Scientific and Technological strategy and the mutual tools and methods to foster RTD cooperation amongst their regional RTD stakeholders.
The project is under the coordination of the experienced Walloon region and brings together the following innovative and science based regions, Veneto, Galicia, Franche-Comte, Lower Austria, Alsace, Basque Country; one country: Greece and with one associated partner : Västra Götaland.
During the 36 months of the project, the partners will focus on the topic of the 6 Lead Markets identified by the European Union. All of them are at the crossroad of a number of scientific and technological fields which are difficult for a single region to master. It is therefore economically and scientifically relevant to link the research competences from the various regions to achieve new technological and knowledge breakthroughs.
The current proposal LEAD ERA seeks to link the two initiatives (lead markets and ERANET) by adding the research dimension to the support provided to the lead markets. The regions will bring together a joint fund dedicated to the launch of ambitious RTD calls for proposals. These activities will provide new resources for their regional RTD actors to work at a European level and, trans-national projects involving RTD actors from the private or the public sector.
A common strategy of communication and dissemination system will pave the way to create other joint collaborations between the various regional actors and even beyond the scope of the LEAD ERA consortium.

Supporting the ERA-NET learning platform by creating a toolbox for the ERA-NET community (ERA-LEARN)

The ERA-LEARN action will support the urgently needed learning process by generating tools that will be made available to the whole ERA-NET community. The consortium members are themselves fully involved in this funding instrument, being partners in 66% of all ERA-NETs. Thus, this consortium is well qualified to tackle this challenge.
Based on a comprehensive analysis of existing and already validated procedures ERA-LEARN will facilitate the identification of recommended tools that are suitable for a broad use.
In particular, ERA-LEARN will facilitate mutual learning among ERA-NETs provide guidance in aligning and harmonising the structures and procedures needed for efficient and simplified joint call implementation and selection of proposals, with a view to the

development of a common framework for these activities provide guidance in choosing the most appropriate funding mode provide guidance in taking strategic decisions on which existing ERA-NETs to join and which new ERA-NETs to establish, thereby enabling optimum use of resources and instruments facilitate a structure for monitoring the long-term evolution of the ERA-NET scheme, helping to create a durable interaction between funding programmes.
Eventually, the outcome will be a limited set of well accepted and therefore widely used guidelines, serving as a helpful reference and easily accessible library. The ERA-NET community will be enabled to select the most appropriate methods for specific situations.

Lessons learnt from Nordic research coordination in the context of the ERA (NORDERA)

The aim of NORDERA is to support the coordination of national research programmes and encourage joint programming. By studying the experiences of the Nordic region in this field, the project will seek to identify best practice on research programme coordination and assess how the lessons learnt can be of value for the further development of the European Research Area (ERA) as well as the Nordic Research and Innovation Area (NORIA) as an integral part of ERA.
In particular, NORDERA aims to contribute to the Ljubljana process and the five initiatives launched by the Commission following the debate on the ERA Green Paper. Accordinlgy, the following specific objectives will direct the NORDERA project:
1. Produce an analysis of existing weaknesses as well as best practice regarding coordination in research and innovation in the Nordic region, formalised through the Nordic Council of Minsters structure.
2. Produce an analysis of existing weaknesses as well as best practice regarding coordination in research and innovation as expressed through more non-formalised bilateral and multi-lateral cooperation between national research and innovation agencies/councils in the Nordic countries.
3. Based on 1 and 2, benchmark with and analyse existing European research coordination initiatives with a view to proposing concrete recommendations on how the Nordic experiences can serve to encourage the further development of ERA. Equally, the analysis will look into how lessons learnt can be of value for the further development of NORIA
4. Ensure that that project findings are integrated into the continued process of developing ERA through the organisation of a large-scale conference.
Additionally, partners will explore the possibility of setting up a permanent strategic forum intended to function as a discussion arena for stakeholders on the further development of ERA.

European research network on sustainable tourism (ERNEST)

The ERNEST European Research Network on Sustainable Tourism project will address the issue of sustainable development in tourism through coordination and collaboration among regional research programmes. ERNEST will be a horizontal ERA NET action, not directly linked to one specific cooperation theme but with much European added value. The overall objective is to develop and strengthen a framework for coordinating regional research programmes on sustainable tourism. Within this platform regions will share and build on research work already underway at regional level, making it more productive and efficient through exchange and planning and implementation of joint activities.
The specific objectives are as follows: identify and exchange information and knowledge on

research programmes that regions wish to coordinate; identify within the research programmes elements related to social dialogue (participative processes for programming including all relevant stakeholders) and measurement of tourism impact; define and prepare joint research activities on tourism research; implement joint activities in these fields according to common needs, particularly concentrating on training, exchange and evaluation at an interregional level; fund joint interregional research on sustainable tourism through joint calls; promote productive cooperation and collaboration in research both in terms of interregional cooperation and cooperation at regional level, including public private partnerships; allow partners to define together long-term and ambitious strategies in line with the European Union policy of sustainable development that each region could not easily reach on its own.

The consolidation of systems biology research stimulating the widespread adoption of systems approaches in biomedicine, biotechnology, and agri-food (ERASYSBIO+)

Systems biology is still considered a young discipline in the field of life sciences. It integrates mathematics, chemistry, physics, informatics, engineering and other fields in biological research. The fragmentation of the discipline concerns all levels of the field:
- It confronts researchers with a new combination of knowledge, methods, skills and expertise from different disciplines.
- It challenges funders overcome obstacles hindering cross organisational funding - across national boarders.
- It dares policymakers set goals outside the limits of preconceived structures.
It is the interdisciplinary that makes collaboration imperative - on all levels. Therefore the ERASysBio+ partners firmly believe that systems biology offers the ideal vehicle to implement pan-European collaboration in order to overcome the still success limiting fragmentation within systems biology. The aim of this proposal is to implement a large transnational call enabling transnational, collaborative research projects in systems biology research. The funding organisations represented by this consortium are aiming to
- jointly pave the way for systems biology research to interact outside the boundaries set by national regulations,
- widen the landscape beyond that of well established groups and contribute to integrating groups from regions where the systems approach and its funding are only just emerging.
The ERA-NET-Plus instrument is the only instrument to effectively combine national and European funding efforts in a efforts in a joint funding measure achieve the abovementioned ambitious goals.

EUROpean programme for TRANS-national R&D&I cooperations of BIOtech SMEs (ETB-PRO)

ETB-PRO will reduce the fragmentation of ERA and support high quality R&D&I project cooperation of European biotech SMEs by building on success factors of the predecessor project and establish a sustainable joint program with high funding impact. This will be done in two steps thereby using four calls with a funding volume of 35 Mio each as an implementation tool.
First step:
Integration ETB-PRO will broaden the network through including at least 5 new partners into the current network of European biotech key players, thereby arranging for variable geometry. A particular focus will be on remaining key players and on CEE countries. ETB-PRO will actively avoid duplication of efforts through targeted cooperation with other EU programs and

position the program through unique combination of features to provide complementarities to other EU funding instruments. ETB-PRO will start joint programming, seek for compatibility among participating national programs, and implement the most suitable solutions when operating two joint calls. Immediate Impact: ETB-PRO bottom-up biotech program will enrich the ERA funding landscape for the benefit of European high-tech SMEs seeking a gateway to ERA or focusing on specific bilateral cooperation. ETB-PRO pilot program will become a sound basis to venture a global approach for international cooperation.
Second step:
Sustainability ETB-PRO will strengthen the operational efficiency of the program through streamlining procedures and optimizing processes, and test and improve operational performance in two more calls by implementing well defined and cost-efficient tools and processes. These applications and know-how will be transferred into the agencies daily routine before the launch of ETB-PRO sustainable joint program. Long-term impact: ETB-PRO will complement the ERA funding landscape through making optimal use of national/regional resources, and durably strengthen competitiveness of the European biotechnology.

Social sciences and humanities facing climate change challenges (SSHC)

The project is to organize an international scientific conference, joining together some of the best scholars in the social sciences and humanities field around the climate change issues. The public of the conference will be composed of decision makers, stake holders and media. The project plans a large dissemination effort from the conference: proceedings, website and policy summary report.

Associated European research and technology organisations (*Æ*RTOS)

*Æ*RTOs will network major applied research activities of four EU Member States (DE, FR, FI, and NL) and one Associated State (NO). Further countries will join the project later. The research activities to be networked are National Research and Technology Organizations (RTOs). These are programme organizations mandated by their national government to undertake strategic research in support of societal development including economic competitiveness and innovation. They receive dedicated programme funding sometimes referred to as core funding from their government for this purpose.
They are public research programmes targeted at fulfilling strategic national objectives. There are no supra-national RTOs in Europe, although some RTOs have limited extra-national activities within Europe, and inter-RTO cooperation is mostly limited to case-by-case project cooperation. Greater cooperation among RTOs would produce important efficiency gains by exploiting synergies and avoiding duplication of effort, and a stronger coordinated pan-European RTO infrastructure would enhance Europe s attractiveness as an R&D location and so help retain industrial R&D investment here at a time of increasing globalization.

Technology transfer and the European research area: past, present and future contributions from the EIROforum organisations (TT-ERA-EIRO)

Today, intellectual property, technology and knowledge transfer are concepts that can be seen as an integral part of the scientific and technological activities of the EIROforum Organisations. Those key concepts are clearly part of the European Research Area s agenda and fully recognised by the European Commission, the European Parliament as a major driver for Europe move towards a knowledge-based society.

Mostly because of their role in the European science, all EIROforum organisations have experience and expertise in the areas of intellectual property, technology and knowledge transfer. It will be important to confront those experiences, to try to understand where things could be done in different ways and in some cases propose changes that could help Europe to become more efficient in terms of translation of our research and technology development efforts into measurable added value (through increased cooperation with European industry or creation of jobs in spin-off companies).

Deepening and broadening of astroparticle physics European coordination (ASPERA-2)

Astroparticle Physics has become a mature and well accepted science discipline. Demonstrated by many world class projects currently developed and run by European Astroparticle physicists, Europe as a whole is the main promoter and leading the field. As a merit of ASPERA (AStroparticle Physics European Research Area network, http://www.aspera-eu.org), the ERA-NET in Astroparticle Physics funded in the context of FP6 for 3 years starting in July 2006, the community as well as the supporting funding agencies are becoming more and more organised. In order to allow a deepening and broadening of the successful ERA-NET work started with ASPERA in FP6, the extended consortium here presents a work programme for a second ERA-NET phase (ASPERA-2). Directly linked to the common action plan developed in ASPERA-1, the goals of ASPERA-2 are:
1. establish joint activities as the preferred way of funding R&D programmes and large projects,
2. establish sustainable procedures of mutual coordination and benchmarking,
3. create a sustainable structure for European Coordination in Astroparticle Physics,
4. extend the network to all European countries with interest in Astroparticle Physics,
5. increase the efforts towards global inter-regional coordination,
6. update the roadmap,
7. increase synergy with environmental sciences,
8. transfer knowledge and technology with SMEs, and
9. continue and extend outreach activities.

Support to the chair and vice-chairs of the ERC scientific council 2009 (ERCSC-CHAIRS-SUP2009)

The proposed project aims to support the ScC Chair and Vice-Chairs in the efficient and timely achievement of the ScC objectives in 2009. It will support and assist Professor F.C. Kafatos (Chair of the ERC ScC), Dr. D. Esteve (Vice-Chair of the ERC ScC) and Professor H. Nowotny (Vice-Chair of the ERC ScC) in their diverse responsibilities which include the achievement of efficient and effective functioning of the ScC as a policy making body, its integrated operation together with the ERC's Dedicated Implementation Structure (DIS), and effective interfacing with the scientific community, other funding agencies and the political institutions of the European Union and beyond.
The project will provide, for a period of one year, local administrative, operational and advisory support, ranging from secretarial tasks to assistance in developing policy papers and outreach material and analyzing the results from the funding calls, related to the mission of the Chair and Vice-Chairs of the ERC ScC. The impact of the project will be to ensure an efficient and well-managed operation of the ERC ScC.
By providing high-level local support for the EcC Chairman who is based at Imperial College London (UK), and the two Vice-Chairs who are based at Commissariat Energie Atomique

(CEA) in Saclay (France) and Wiener Wissenschafts Forschungs und Technologiefonds (WWTF) in Vienna (Austria) respectively, the project will complement the activities of and allow efficient interfacing with the DIS.
Overall, the project is expected to contribute significantly to the implementation of the Ideas specific programme. The proposed project will be a continuation and expansion of the ongoing project "ERCSC-CHAIR-SUP 2008 Support to the Chair of the ERC Scientific Council 2008" Project No. 225646.

Netwatch - development of a central information platform on transnational R&D programme collaboration (NETWATCH OPERATIONAL PHASE)

The objective of the NETWATCH project is to create a central information platform on European trans-national RTD programme cooperation. The aim is to support national researchers and research policy makers in Member States and the European Commission's Research Directorate-General by facilitating mutual learning among programme actors and providing research policy makers and administrations with relevant information and analysis to assess the efficiency and impact of trans-national RTD programme cooperation. In particular, the project will analyse the rationale, development paths and successes of the ERA-NET scheme, compare them with other examples of transnational RTD programme cooperation, assess the relevance of those instruments for the development of the European Research Area (ERA) and provide evidence and input for the current discussion on Joint Programming in the EU.

Mapping the NANOtechnology innovation system of RUssia for preparing future Cooperations between the EU and Russia (NANORUCER)

The EU is interested in obtaining a survey of main Russian research infrastructures active in nanotechnology and nano-structured materials as a basis for initiating future cooperations between the EU and Russia. In the NANORUCER activity two leading organization from the EU and Russia in the fields of innovation research and nantoechnology join forces to deliver this aim. Based on a performance analysis using bibliometrics and patent statistics and a careful in depth mapping of nanotechnology and nano-strucutured materials research activities in Russia, a strengths and weaknesses analysis of the Russian nanotechnology innovation system will be made.
A systematic comparison with respective EU R&D activities in nanotechnology and nano-structured materials will allow identifying opportunities for future cooperations between the EU and Russia. These will be specified by thematic fields in order to detect areas of common interests with most benefits for cooperating partners. Involving Russian and EU stakeholders during workshops, recommendations for supporting such cooperations between the EU and Russia will be developed, and concrete actions proposed. A particular strength of the proposed support action is that it can build on a broad experience of both participants in analysing nanotechnology innovation systems.
In previous projects the Russian partner has already developed databases of R&D organizations providing research on nanoscale and its staffs provided the expertise for the National Program of Infrastructure Development for Nanotechnology. In addition the participants will mobilize the in depth knowledge of their mother organizations, the Fraunhofer Society and in particular the Fraunhofer Alliance Nanotechnology, and the Russian Academy of Sciences, in nantotechnology R&D.

Surface acoustic wave wireless sensors for high operating temperature environments (SAWHOT)

Surface Acoustic Wave (SAW) technology has been applied for more than 20 years to develop sensors exhibiting unique capabilities with limited ageing effects resulting in long term stability properties. During the 90s, they have proved their capability to be wirelessly operated without any on-board power supply. In parallel, the long term development of advanced material, particularly in Russia, has yielded a new class of material, namely Langasite and its variant forms, that can be substituted to quartz and lithium niobate particularly when operating at high temperature. Our project will demonstrate wireless SAW sensors operating in an unprecedented temperature range. This sets extreme challenges to all parts of the sensor system since the developed wireless system will be suitable to operate in harsh environments.
The great progress brought by the project takes advantage of a consortium involving complementary major academics and industrial actors of SAW-sensor-based systems capable to successfully face the challenges of implementing a whole system allowing for physical metrology in harsh conditions. Substantial improvements will be provided for sensing physical parameters in a wide temperature range (-20°C to +650°C), in monitoring a nano-based production process and other applications. Significant knowledge will be generated in nano-sciences and nano-technologies linked to SAW physical sensors and materials for industrial applications. Demonstration of the system will be achieved at an industrial level for monitoring physical parameters under high pressures and high temperatures.
The SAWHOT project consortium is set up on the basis of a bilateral Russian-European partnership generating a unique workforce cooperating within the FP7 framework to address this challenge. Finally, this project will bring on sustainable high-tech socio economic prospects : new markets and standards, improved cooperation between EU and Russian organizations.

Innovative Nanostructured Optochemical Sensors (INGENIOUS)

Polycyclic Aromatic Hydrocarbons (PAH s) and VOCs like benzene, toluene and xylenes (BTX) are compounds of great social and environmental significance, are widely used in industry, in many different applications. However, they and can present serious medical, environmental, and explosion dangers. Because they are toxic even at parts per- billion concentrations, it is essential to know their concentration in the air, especially in industrial and populated areas. Measurement of these toxic compounds at trace levels in multi analyte mixtures is still a challenging task however, and involves the use of expensive laboratory bound equipment.
This severely limits risk analysis and timely initiation of preventive measures in a working environment. The main objective of the INGENIOUS project is the development, evaluation and validation of novel ultra-sensitive and selective nanostructured optochemical sensors for the detection of PAHs (polycyclic aromatic hydrocarbons) and BTX (benzene, toluene, xylene) from complex mixtures. Within the sensor concept, nanoparticle-based materials with high selectivity and sensitivity will be created by combining principles of molecular imprinting and plasmonic enhancement of molecular fluorescence. Silica and polymer core-shell nanoparticles with molecularly imprinted shells will be used as building blocks of self-assembling colloidal aggregates acting as chemosensing elements.
The sensing elements and microarrays of sensing elements will be obtained using modern printing technologies such as ink-jet and microcontact printing. The combined sensor elements will be implemented on a polymer foil format and validated as sensor transducers.

The technology will be incorporated into an in-plane optical read-out platform and demonstrated for specific end user applications. The suggested approach will be used to create sensor devices capable of detecting relevant analytes in industrial processes, occupational health and plants safety like PAH

Strategic targets for 2020 - Collaboration initiative on biorefineries (STAR-COLIBRI)

For the first time in Europe a real critical mass along the whole value-chain, and in all aspects of the biorefinery concept, will be achieved by the close collaboration of five industry-driven European Technology Platforms, five excellent research partners with complementary expertise, and the International Civil Society Organisation IUCN, who will validate the impact on the global sustainability of the results. The collaboration in this Coordination and Support Action is called Star-COLIBRI, and its main objectives are to promote coordination and work to overcome fragmentation in the field of biorefineries research; to facilitate information exchange and cross-fertilization; to support break-through innovations by speeding up and facilitate industrial exploitation of research results. The Star-COLIBRI project will accomplish these targets by working in two parallel but mutually dependant processes: The first process has longer term objectives and it will provide a framework for collaborations and information exchange, common vision and a roadmap for 2020. It will also directly contribute to policy initiatives such as the European Lead Market Initiative on Bio-Based Products. The second process has shorter term objectives and aims to the immediate support and coordination of ongoing biorefinery research projects with potential high impact. The new strategy developed for this is called StarClustering. Better coordination of national research funding through an ERA-Net Liaisons Office will also be achieved.

Surface ionization and novel concepts in nano-MOX gas sensors with increased Selectivity, Sensitivity and Stability for detection of low concentrations of toxic and explosive agents (S3)

The objective of S3 is developing breakthrough technologies in gas sensing that will provide higher sensitivity and selectivity at reduced cost. This objective will be pursued by bringing together excellence and complementary skills of ropean Union and Russian groups. Enhanced sensitivity and selectivity will enable toxic and explosive gases to be detected against a background of air constituents and ubiquitous air contaminants.
This task will be pursued by studying sensors and sensing principles based on semiconductor nanowires (NWs) molecularly engineered, in terms of doping level, the used additives and /or functionalization processes and heterostructures and deposited onto SiO2/Si and/or alumina MEMS heater platforms. These platforms will be configured in innovative ways to obtain multiple signals from one and the same sensitive layer. Signals recovered will include resistive, field-effect, ion emission and catalytic/thermal conductivity response of the NW materials. Low power operation and additional enhancements in selectivity will be obtained through pulsed-temperature operation and combined self-heated operation mode using dynamic and steady state responses and modulated optical excitation. Furthermore, the increased stability of NW-based sensing materials will positively affect the reliability of the developed sensors.
In order to meet application demands, S3 will further explore novel concepts of sampling, filtering and preconcentration of target substances based on nanostructured filter and enrichment materials. The development and the modelling of this new generation of nanostructured gas-sensing and ion emitting materials will be supported by a wide range of morphological and physico-chemical characterisation techniques. The cooperation between

EU Union and Russian groups will be improved and strengthened by short and long term exchanges of researchers, the organization of common workshops and tutorials and the establishment of joint doctoral degrees.

European industrial breakthrough leading towards an integrated competitive sustainable industry (NMP-MANUFUTURE)

The project focuses essentially on integration, aiming at bringing together stakeholders and visions in different dimensions among the NMP communities and the NMP and Manufuture research communities and industrial communities. It will materialise through the organisation of an NMP-Manufuture Conference in Belgium. It will address three major objectives: the interaction, complementarities and synergies between the sub-themes of the NMP theme in FP7, between the NMP and Manufuture communities and the research for integrated industrial implementation through the Manufuture Technology Platform and the related FoF under the EU Recovery Plan.
The conference will feature a common policy: oriented plenary session for both objectives, information day sessions integrating the NMP and FoF initiatives. It will also organize brokerage events for project participants and invite potential applicants, and more particularly SMEs. An integrated Research and Industries exhibition is also planned. The conference would gather an international forum to evaluate to what extent integration among the NMP components has been effectively realized and how this could further be materialised and amplified. It would present the preliminary results of the FP6 and FP7 projects, involve the related European Technology Platforms, and the three PPPs or the Recovery Plan, as well as the perspectives of the NMP programme to the scientific public and decision makers. It will promote integration through the Manufuture Technology Platform acting as the integrator of the enabling technologies in the FoF and acting as enabler of the production of the micro and nanotechnology-based products and products composed of new materials.
The event would be most timely since it will coincide with the mid-term of the 7th FP, the closure dates of the NMP 2011 Calls for proposals, the recent appointment of the EU Commissioner for Science and Research and the Belgian Presidency.

International Conference of the Spanish EU Presidency 2010. The European Framework Programme: from Recovery to Sustainability (EU2010_R2S)

The International Conference of the Spanish EU Presidency 2010. The European Framework Programme: from Recovery to Sustainability conference has two clear objectives:
¬- To raise awareness and to share and disseminate the information about the European Research Framework Programme contribution to the strategies for the economic recovery: the Recovery Plan launched by the European Commission with the aim of driving Europe's recovery from the current economic crisis.
¬- To provide recommendations for the EU competitiveness council in 2010.
The European Commission Recovery Plan, anounced by the President Barroso on the 26th November 2008, stated: The Recovery Plan includes detailed proposals for partnerships between the public sector using Community, EIB and national funding - and private sectors to boost clean technologies through support for innovation: these include a European green cars initiative with combined funding of at least 5 billion, a European energyefficient buildings initiative worth 1 billion; and a "factories of the future" initiative estimated at 1.2 billion. Beyond this there is an aspect of the Recovery Plan related to the High speed Internet for all or Future Internet.
The conference will focus in the just above mentioned smart investments of the Recovery

Plan: the energy efficient buildings initiative, the "factories of the future" initiative and the European green cars initiative, as well as on the future Internet.
This proposal is focused in the first day of the conference, devoted to plenary sessions led by high level representatives of the industry, research and public administration in the EU and Spain, as well as to parallel sessions dedicated to the Public Private Partnerships (PPPs) more closely related to NMP: Factories of the future and energy efficient building.