



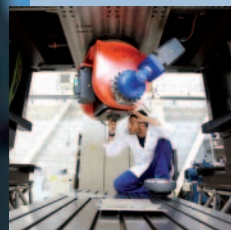
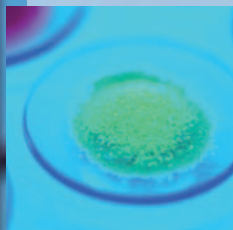
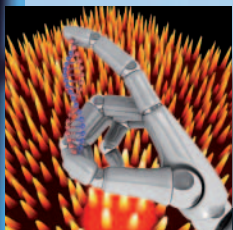
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Industrial Research



Partnerships
for sustainable
prosperity



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The European Industrial Research magazine provides information and research results in the field of Industrial Technologies – a key element in the EU Seventh Framework Programme (FP7) for research and technological development. Priority 4 focuses on Nanosciences, nanotechnologies, materials and new production technologies. It promotes the transition to a knowledge-based society in Europe.

Visit the Industrial Technologies website at http://europa.eu.int/comm/research/industrial_technologies/index_en.html for more extensive coverage of the issues discussed in this magazine and to discover many more themes and articles on Commission-funded industrial research, updated on a regular basis.

Specific questions on Theme 4 can also be addressed to the FP7 Enquiry service: <http://ec.europa.eu/research/enquiries> which has replaced the previous Help Desk e-mail service.

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[Picture 2] Inspiring interest in science: The best way to inspire children about science is by conducting scientific experiments © *Suschem – European Technology Platform for Sustainable Chemistry – www.suschem.org*

[Picture 3] Novel materials in a petri dish: new solutions for and from the chemical industry © *Suschem – European Technology Platform for Sustainable Chemistry – www.suschem.org*

[Picture 4] 5-axis Friction Stir Welding machine © *FATRONIK – Tecnalía*

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Highlights

Nanotechnology day highlights sustainability issues Brussels, 12 November 2009

On completion of the term of the European Commission's 'Nanosciences and nanotechnologies: An action plan for Europe 2005-2009', nearly 100 delegates met in Brussels under the auspices of the Swedish EU Presidency to consider the way ahead, with particular regard to the issues of nanotechnologies in relation to sustainable development.

The conference acknowledged the enormous potential contribution of nanotechnologies to a competitive and eco-efficient European economy. In many cases, however, the of industrial-scale production and commercialisation needs to be verified and demonstrated.

Presentations by representatives of industry, academia and the Commission highlighted the complexity of the scene and the need to strengthen the 'integrated, safe and responsible' (ISR) development approach proposed under the Action Plan.

A key conclusion was that, with increasing availability of nano-enabled products, safety must be at the heart of any nanotechnology-based innovation strategy. This should take full account of potential threats to health and environment, while dedicated research on possible risks should be linked to existing and future applications. More comprehensive information should also be gathered regarding current products and those entering the marketplace.

There was general agreement that significant knowledge gaps need to be closed, particularly in understanding of how nanomaterials interact throughout their life cycles with living organisms. Especially important are standardised and validated test methods, based on clearly defined criteria to identify and classify such materials.

The proceedings closed with an announcement by the Commission of its intention to develop a new nanotechnology action plan for the next five years, which are seen as crucial in shaping Europe's future nanotechnology development.

Research central to Spanish EU Presidency programme

Spain's Minister for Science and Innovation, Cristina Garmendia, cited R&D and innovation as high priorities for her country's EU Presidency term (January-June 2010). The objective was to ensure that European research is better able to respond to major challenges such as new energy sources, climate change, health, ageing – and particularly economic recovery and growth.

Three core areas that Garmendia's department worked on are: integration, to progress the creation of the European Research Area (ERA); involvement, to provide answers to the biggest challenges facing society; and inclusion, to ensure that science tackles poverty and social exclusion. Specific improvements were sought in research mobility, management of the European Roadmap for Research Infrastructures, and simplification of the rules for taking part in the Framework Programmes.

In terms of the ERA, the minister expressed her wish for this to operate as a single, integrated space, and to be given institutional importance that would not involve setting up any new bureaucratic structures, but would rather introduce mechanisms to help align the priorities of the Member States and avoid duplication of effort.

'Factories of the Future' to underpin recovery

The Manufacture 2009 conference, held in Gothenburg, Sweden, on 30 November-1 December, was the seventh in a series charting progress since the formal launch of the European Technology Platform in 2003. Focussing on 'Implementation of a sustainable manufacturing industry' the event attracted an audience of 500, representing industry, universities, research institutions and government. Two days of keynote presentations, workshops and industrial visits addressed the inter-related economic, ecological and social aspects of sustainability.

Heinrich Flegel, Chairman of the Manufacture High Level Group and Member of the Daimler Supervisory Board, maintained that the deflation of the global economic bubble should not be allowed to result in a loss of the key skills that will be necessary to underpin the longer-term emergence of Europe as a strong player on the world stage. Competitive sustainable manufacturing is capable of generating wealth, jobs and a better quality of life, he said. It is also important to the environment, to the development of healthy SMEs and to the strength of the service economy. But success in this field will depend on focusing available resources on Europe's strengths, and on taking timely actions to pave the way for a prosperous future.

Herbert von Bose, Director of Industrial Technologies, noted that the previous year had been an exciting time for Manufacture. Good progress was made towards implementation of the 'Factories of the Future' public-private partnership (see page 4), and an industrial advisory group was created in March 2009, representing the private side of the partnership. This is liaising with the Commission to determine the optimal areas for investment.

NMP spreads the net of research collaboration

The main articles in this edition of *European Industrial Research* describe the evolution of two kinds of research collaboration in which the NMP Theme plays a prominent role.

First, we explore the nature of the new Public-Private Partnerships, established within the framework of the European Economic Recovery Plan. These unite industry, academia and the public sector in speeding the transition from research to innovative products and services capable of underpinning a strong European resurgence from the global downturn. Results to date show that the PPPs are helping to streamline procedures and build lasting relationships that will make the EU more competitive, create employment and meet longer-term commitments to environmental sustainability.

We also examine Europe's cooperation with the wider world in tackling issues of global importance – such as climate change, health and resource conservation. Long established as key EU policy, it has been given added impetus by the recent creation of a Strategic Forum for International Scientific and Technological Cooperation. As well as aiming to strengthen the European Research Area, this is intended to help less-developed countries build their own national capabilities to contribute in tackling local and world-scale problems.

In parallel with these initiatives, the mainstream activity of NMP in FP7 continues. Our story on page 10 summarises progress in the evaluation of the 2009 Calls for Proposals, which have met with an excellent response in terms of the number and quality of submissions.

Here too, cooperation is the linking thread: bringing together the widest possible diversity of experience and talents is vital in generating the new knowledge that must form a foundation for Europe's successful emergence from the economic crisis.

Herbert von Bose
Director of Industrial
Technologies Directorate
Research DG,
European Commission



Public-private research partnerships on target to aid economic recovery

A series of Public-Private Partnerships (PPPs) set up as part of the European Economic Recovery Plan is funding research and innovation to revitalise the manufacturing, construction and automotive sectors, all of which suffered severe downturn in the wake of the 2008 global financial crash. The initiatives will also foster a longer-term transition to a more competitive and sustainable EU economy.



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The European Economic Recovery Plan

The European Economic Recovery Plan, adopted by the European Commission on 26 November 2008 and endorsed by the European Council on 11-12 December 2008, initiated urgent action to restore confidence and bolster demand following the global financial crisis.

The Plan provided a major injection of purchasing power into the economy, with Member States and the EU agreeing to an immediate budgetary stimulus amounting to €200 billion (1.5 % of GDP).

A key part of the package was a comprehensive programme to direct 'smart investments' in directions designed to reinforce Europe's long-term competitiveness. This means investing in 'the right skills for tomorrow's needs; investing in energy efficiency to create jobs and save energy; investing in clean technologies to boost sectors like construction and automobiles in the low-carbon markets of the future; and investing in infrastructure and inter-connection to promote efficiency and innovation'. (*Commission Communication COM(2008) 800*)

■ Since the launch of the European Economic Recovery Plan in December 2008, considerable progress has been made in the implementation of three Public-Private Partnerships (PPPs) targeting support for research and innovation in the manufacturing, construction and automotive sectors, all of which are major components of Europe's overall industrial landscape.

All share the common goal of mobilising public and private resources for research activities to stimulate a strong resurgence of the hard-hit sectors. Based on matched funding from the Seventh RTD Framework Programme (FP7) and the private sector, the targeted budgets for the period 2010-2013 are €1.2 billion for the 'Factories of the Future' PPP (FoF), and €1 billion each for 'Energy-Efficient Buildings' (EeB) and the 'European Green Cars Initiative' (EGCI).

In addition, the Plan included an immediate injection of €220 million for the Risk-Sharing Finance Facility (RSFF), a loan resource for investment in RTD and innovation under FP7. Total RSFF lending in 2009 provided by the European Investment Bank and supported by the European Commission amounted to almost €3 billion, and continuing high demand is expected in 2010. For the period 2011-2013, further RSFF lending of around €5 billion could be available.

The PPPs in brief

Factories of the Future (FoF) is intended 'to help EU manufacturers, especially SMEs, to adapt to global competitive pressures by increasing the technological base of EU manufacturing through development and integration of the enabling technologies of the future, such as engineering for adaptable machines and industrial processes, ICT, and advanced materials'.

Before the crisis, manufacturing represented approximately 21 % of the EU's GDP and 20 % of its employment, providing more than 30 million jobs in 230,000 enterprises, mostly SMEs. Moreover, each job in industry is considered to be linked to two more in related services. European manufacturing is also a dominant element in international trade, leading the world in areas such as automotive, machinery and agricultural engineering.

However, already threatened by both the lower-wage economies and other high-tech rivals, the situation of EU companies was made even more difficult by the downturn. The output of many manufacturing sectors experienced the sharpest decline in decades, with production declining by 20 % in 2009, resulting in a significant rise in unemployment.

Restoring growth and achieving sustainability require a strategic shift from cost-based competition to an approach based on the creation of high added value. ICT-enabled intelligent machines will play a major part in improving processes, raising productivity and simplifying operation. Competitiveness also depends on achieving the flexibility to adapt to fast-changing market demands in terms of products and volumes, while making factories safer, more attractive places to work.

At the same time, there is growing demand for greener, more customised and higher quality products. Innovation in manufacturing must address the challenge of producing more, while consuming less material, using less energy and creating less waste.

Energy-efficient Buildings (EeB) aims 'to promote green technologies and the development of energy-efficient systems and materials in new and renovated buildings with a view to reducing radically their energy consumption and CO₂ emissions'.

The construction sector accounts for around 30 % of Europe's industrial workforce – but it is localised and fragmented, with 16.4 million people directly employed in almost 3 million enterprises, 95 % of which are SMEs with less than 20 employees. In 2008, its output amounted to some 10 % of EU GDP, in the form of buildings and infrastructure serving a very wide range of other industries and services.

Due to its largely traditional nature, the overall investment in research is very low. Yet there is a pressing need for improvements in energy-efficiency to meet the European Council's 2020 targets: a reduction of 20 % in total energy use (below 2005 levels); 20 % contribution of renewable energies; and 20 % reduction of greenhouse gas generation compared with 1990 levels.

At present, construction, including the transport of building materials and products, accounts for around 40 % of all energy consumption in Europe – giving rise to 36 % of the CO₂ emissions. Furthermore, the contribution of renewable power remains below 1 %. But, as new construction adds only 1-2 % annually to the current stock of around 160 million residential and commercial buildings, innovation in the renovation and refurbishment of existing properties holds out a far greater potential to solve the problems.

The EeB PPP devotes specific attention to the development and integration of design and simulation tools, new materials, building systems and equipment and ICT for energy efficiency in both new and older buildings. One notable innovation is addressing the concept of 'Geoclusters', focusing on cooperation between regions with strong similarities in terms of climate, geography, economy, culture, building practices, energy/resource pricing policies, etc. The Geoclusters will add value in tackling the challenges at EU level, allowing globally optimised technical solutions and policy tools to be adapted to local specificities.

'European Green Cars Initiative' (EGCI) involves 'research on a broad range of technologies and smart energy infrastructures essential to achieve a breakthrough in the use of renewable and non-polluting energy sources, safety and traffic fluidity'.

Road transport is one of the major sectors of European industry, generating 11 % of GDP and contributing €33 billion of external trade prior to the crisis. The EU is also a major force in the global automotive industry, manufacturing over a quarter of all vehicles (and almost a third of all passenger cars) produced worldwide.

This provided direct employment for 2.3 million people, plus more than 12 million indirectly. However, as a result of the current economic downturn, total vehicle production (cars, trucks and buses) declined in 2009 by 23 % compared with the level of 2007.

In 2005, 19 % of total EU greenhouse gas emissions and 28 % of CO₂ emissions were linked to the transport sector. More than 90 % of all European transport emissions are due to road transport. And, while overall emissions have declined, those from transport rose continuously between 1990 and 2005 due to high growth in both passenger (28 %) and freight transport (62 %).

Continued reliance on conventional automotive technology will be inevitable over the next one or two decades. But future competitiveness will depend on Europe's ability to maintain

leadership in the drive to provide tomorrow's cleaner forms of transport. To meet this goal, EGCI covers a broad field of research and innovation, embracing not only passenger cars, but also heavy duty vehicles and the optimisation of infrastructure and logistics.

The initiative also includes a wider range of actions, comprising:

- EIB loans of up to €4 billion in the context of the new European Clean Transport Facility (ECTF) aimed specifically at emissions reduction and energy efficiency research in all transport sectors.
- Public procurement and other demand-side measures, such as scrapping schemes and the reduction of circulation and registration taxes for low-CO₂ vehicles.

The early focus under FP7 is on building a critical mass behind research into the electrification of cars and hybrid technologies, as the most attainable shorter-term solutions. Subsequently, coverage will extend to other areas: trucks, internal combustion engines, logistics and co-modality combined with intelligent transport systems.

Consultation process

In order to achieve the necessary fast start-up, the PPPs were launched using the established framework of FP7, building on the concept of Joint Technology Initiatives (JTI), originally introduced to support the implementation of the Strategic Research Agendas of certain European Technology Platforms.

To structure the dialogue between the private and public sides of the PPPs, the Commission invited representatives of the industrial and research stakeholders to take part in Ad-hoc Industrial Advisory Groups convened to determine the priorities for shared investment in research. Following wide-ranging cross-sectoral consultations, draft research roadmaps were prepared and research topics identified well in time for the publication in July 2009 of the first PPP Calls for Proposals, included in the 2010 Work Programme of FP7.

The manufacturing and construction sectors also set up non-profit associations – respectively the European Factories of the Future Association (EFFRA) and the Energy-efficient Buildings Association (E2BA) – to facilitate the liaison with the Commission in developing the partnerships and the multiannual research roadmaps for the remainder of FP7 and beyond.

Planning for FP8

Early experience with five existing JTIs had highlighted some difficulties in reconciling industry's desire for speed, flexibility low administrative overhead with the need to account fully for public spending in a structure that entails co-organisation between several Commission services and the alignment of European and national funding. Representatives of the PPPs were invited by the Commission to join with those from the current JTIs in a 'JTI Sherpas' Group', to propose ideas for a more streamlined structure that could be applicable from the start of FP8.

The Group's final report, published in January 2010, provides recommendations for building the 'ideal house' to accommodate future PPPs. It favours recognition of the actions as 'special bodies' – bringing the opportunity to develop a framework regulation allowing a more risk-tolerant and trust-based approach in governance, facilitating the efficient launch of new partnerships, and drawing on the best of what the public and private partners can provide.

This joint effort is acknowledged by the EU ministers, who pledged their continued support in the Competitiveness Council meeting of May 2010.

PPP	Proposals received	Countries represented in consortia	Success rate (%)	Funding allocation – industry (%)	Funding allocation – SME (%)
Factories of the future	98	25	26	54	31
Energy-efficient buildings	60	24	28	48	24
Green Cars	94	25	33	54	16

Rapid progress

Meanwhile, the first Calls for Proposals, launched in July 2009 and applicable to the Work Programme 2010, have proved very successful in meeting the PPP objectives. The submitting consortia showed a broad geographical spread, and the overall quality of proposals allowed high retention rates for further negotiation. A high level of Industrial and SME participation in the selected projects is reflected in the funding allocations (see table).

Thanks to the major efforts on all sides, negotiation of grant agreements are being completed in record time, as evidenced by the signature of the first FoF contracts at a major PPP conference in Valencia, Spain, on 13-14 April 2010. With more rapidly reaching agreement, and an average project duration of three years, concrete benefits in the form of exploitable products and services can be expected to emerge from the middle of the current decade.

Industry viewpoints

FoF – Massimo Mattucci, Comau, Italy (President EFFRA)

'Timing is crucial to industry, and we cannot afford unnecessary bureaucracy. A new form of JTI will not be introduced before 2013, but at least we have made some progress in speeding up the processes and presenting the industrial viewpoint. We look forward to extending our cooperation with the Commission, and to increasing our input in building new calls and assessing their outcomes.'

'I would like to see a greater industrial representation in the evaluation panels, to balance the current academic predominance. We are therefore assembling a database of specialists who can offer their expertise in the appropriate technologies and business areas, to increase the likelihood that the research will lead to useful innovations. This will make industry's contribution more real and visible. So far, the collaboration is proving effective; I am confident in the ability of DG Research to help us take it further.'

FoF – Dr Uwe Kubach, SAP, Germany

'We are very positive about the progress so far with FoF. It has been a lean process, with rapid decision-making. The Commission has invited broader industrial collaboration and been open to fresh ideas.'

'As a major supplier of business software, SAP is also involved in the ICT aspects of the other PPPs, as well as with many national programmes. In manufacturing, we at SAP Research are seeing the increasing willingness of organisations to share data across collaborative networks, in order to benefit from the resulting synergies.'

'The topics of the first FoF Calls for Proposals were closely in line to the priorities of the research roadmap developed under Manufuture; I am hopeful that the evolving PPP format will enable us to move ahead at an even faster pace.'

EeB – Ger Maas, BAM, the Netherlands

'I am not sure if the current form of PPP will prove to be the most appropriate instrument, but the construction sector certainly agrees with its aims.'

'The industry is aware of the urgent need for energy reduction, and willing to contribute to EU-wide solutions. In the past, the research focus has been on new buildings; but there is now general agreement on the need to target the improvement of the very large existing stock, mainly through the development of new insulating materials and improved solar energy technology. Even small gains in energy-saving here would have a huge cumulative impact.'

At the same time, consideration must be given to ways of designing new urban areas as integrated zero-energy – or eventually energy-positive – districts. It is no longer sufficient to consider individual properties in isolation. By looking more broadly at the infrastructure as a whole, we can also find new ways to reduce the reliance on cars and aircraft, creating a more sustainable economy for all.

'In construction, it is usual to work in an open fashion, but the sector must learn to become even more ready to share new knowledge, rather than being protective. In this respect, it could be useful to review the contractual framework for what can be a very complex supply chain.'

'Support from the Commission is important to raise public awareness of the need for savings, and to create a sense of urgency among building owners and users. It could also inspire local authorities to harmonise their guidelines and provide incentives for responsible behaviour.'

'The investment of €1 in construction generates €3 in economic activity. And this is real investment in the EU, with no export leakage and providing local employment among the SMEs that carry out most of the work. In the longer term, the value could be multiplied by as much as 20 times.'



Global issues demand international cooperation

Research cooperation with countries beyond the EU itself is a central element of Community policy to tackle global problems and reinforce the European Research Area (ERA). Partnerships established under the NMP Priority are contributing strongly to this international sharing of knowledge and best practices.

■ The EU has fostered international scientific cooperation over the past 25 years, to address the needs and opportunities of an interconnected world, and to contribute to peace and prosperity for European citizens. While this is not a new direction, its growing importance is highlighted by the Commission's adoption of a 'Strategic European Framework for International Science and Technology Cooperation' in 2008, and the establishment by the EU Council a new 'Strategic Forum for International S&T Cooperation' (SFIC).

Working together in large-scale multinational partnerships helps to focus research on critical issues such as climate change, health and the need for energy conservation, and to build the critical mass of resources and effort necessary to solve them. This, in turn, allows speedier closure of knowledge gaps and earlier translation of promising results into exploitable innovation.

The following is a notable example of the kind of activity stimulated by these incentives:

Water for a growing world population

Ensuring adequate provision of safe drinking water for a growing population is a major world challenge and one of the United Nations' Millennium Goals for sustainable development. Its achievement will require the development of more efficient and affordable industrial technologies, able not only to make use of surface waters, but also of sea, brackish and waste waters. A lack of suitable materials for this purpose raises a barrier to progress, which prompted the Industrial Technologies Directorate to issue a SICA call for research proposals in 2009.

Three submissions successfully passed the peer-review evaluation process. Bringing together scientists from Europe, Africa and the Mediterranean partner countries, their aim is to develop new materials and membranes for water purification. Negotiation to turn them into grant agreements is underway. Together they represent a total budget of some €14 million.

'The breadth of science included in the proposals is impressive, with topics ranging from novel materials for coated membranes to

Scientific and economic drivers

The report 'Drivers of international collaboration in research', published by DG Research in 2009 notes that there are both science-based and more general reasons for this trend.

Drivers originating from within the S&T community include the need to obtain access to new knowledge and expertise that may only be available from abroad, as well as to attract competent researchers to the 'home' region. Particularly in Europe, general demographic developments and the decreasing share of graduates in science and engineering have made it urgent to redress the shortage of research talent, the report observes. The ambition to promote the reputation of the ERA as a highly attractive centre for research adds further motivation.

innovative membrane reactors,' said Renzo Tomellini, Head of the Materials Research Unit at the Commission's Research DG. 'The three selected proposals balance applied and fundamental science, drawing on the potential of European, African and Middle-Eastern scientists and research-intensive companies.'

'Breakthroughs are expected in the implementation of water technologies and purification plants. As well as helping to secure the wellbeing of millions of people, this will bring promising opportunities to businesses in Europe and Africa. The joint involvement of European organisations with partners from Egypt, Ghana, Tunisia and South Africa and from Israel, Jordan, and Syria, demonstrates the scope for such cross-border multidisciplinary collaborations to unite behind one common mission.'

The value of 'going global' in materials research is becoming more and more apparent, particularly for those technological areas where there is clear mutual benefit for all participants in terms of knowledge generation for sustainable growth.

External developments such as the globalisation of both markets and R&D, together with the rapid emergence of large economies having expanding science, technology and innovation capacities, also have a major bearing. Moreover, another sound reason for international cooperation is to assist less developed countries' in building up their own national capabilities, so that they are able to take a more active part in tackling local and world-scale problems.

NMP active

The Cooperative programme of the Seventh R&D Framework Programme (FP7), which includes the NMP Priority, employs several mechanisms designed to ensure participation by third countries and regions:

- **Opening of the thematic areas to all third countries**, including dedicated actions and calls for third countries;
- **Specific International Cooperation Actions (SICA)**, applicable to designated International Cooperation Partner Countries (ICPC), where there is mutual interest on the basis of both the S&T level and the needs of the countries concerned; and
- **Coordinated calls**, for which FP calls for proposals are coordinated with similar calls issued by funding agencies in third countries, with a view to generating joint or closely related projects.

> Opportunities in 'intelligent manufacturing'

The Intelligent Manufacturing Systems (IMS) initiative offers another important avenue for international cooperation. This industry-led, global, collaborative R&D programme encourages the formation of international consortia to develop the next generation of manufacturing and processing technologies.

IMS members currently include the EU, Norway and Switzerland, Korea, and the United States of America. After 15 years of active participation, Japan decided to withdraw at the end of April 2010 due to changes in its government's strategy on international research collaboration in manufacturing. One new country, Mexico, has formally requested to join IMS and is expected to become member.

Collaborations mainly take the form of 'MTP' (Manufacturing Technology Platform) actions. MTPs are knowledge-sharing platforms for researcher groups engaged in specific R&D domains addressing the global manufacturing challenges of today and the future.

Five MTPs have been established, respectively focused on the areas of sustainable manufacturing, energy-efficient manufacturing, key technologies, standards, and education. IMS envisions that, as well the stimulation of new collaborative R&D, likely outcomes will include the creation of new networks and global-level recommendations on standards, skills, and policy.

European R&D projects launched under the ICT or NMP theme of FP7 can 'internationalise' their activities by forming an IMS project, the basic requirements for which are:

- partners from at least three IMS regions;
- mandatory participation of industry;
- an agreed list of goals and objectives in the context of one of the above five platforms;

- a recommended minimum resource level of USD 1 million per IMS project, with resources brought in by each participant through (government) funds or in-kind contributions, covering travel, research activities, information dissemination, management, facility and equipment use, and other costs; and
- a minimum duration of 12 months;
- partners are expected to meet at least twice per year, and a public version of the final project report must be submitted to IMS.

A Memorandum of Agreement with signature from all partners and IMS Regional Secretariats forms the legal basis for IMS projects.

> Successful approach

The MTP approach is proving to be very successful, especially with respect to NMP projects. At the IMS event held in Geneva on 9 and 10 November 2009, seven running actions and 11 new ones based on NMP projects were presented: IMSA, INTERCOATINGS, NIDIATA, MY-CAR/FUTURA, TIPSS, VFF. GIPP, MS2020, TAILORCRETE, NANOBOND (with two different actions), ECOFIT, TRANS-IND-E, ieNET, FIT4U, A-FOOTPRINT, SSHOES and DOROTHY.

The EU took over the IMS chair and the IMS Inter-Regional Secretariat as of 1 May 2010 for 30 months. During this period, it will aim to achieve a number of challenging goals, including expansion of the membership; participation in important events in each of the IMS regions; raising the IMS image and visibility; making the programme more attractive to manufacturing industry; increasing the number of projects/actions; and defining new services, such as training, demonstration and technology transfer.

Several key events have already been planned:

- MTP workshop, November 2010, EU (to be confirmed);
- IMS Forum, Spring 2011, Italy;
- IMS Conference by end October 2012, EU.

> China-EU workshop among latest bilateral initiatives

The European Community has bi-lateral S&T agreements with a number of individual countries, supporting and encouraging the participation of their organisations in the priority thematic areas of FP7. The first wave of funded projects targeted South Korea, Russia, New Zealand, South Africa, Chile, Ukraine, Tunisia, Morocco, Australia, Mexico, India, China and Brazil.

As China is now a major global player in economic terms – and a large-scale R&D investor in terms of funding and researchers – cooperation with the EU can be of great value to both regions in tackling the shared demographic, environmental and sustainability problems. In this context, the EC (Research DG) and China's Ministry of Science and Technology (MOST) organised the first 'China-EU Workshop on Clean Production Technologies' in Beijing, China, on 17-18 March 2010.

Clean production technologies, which are of growing importance in minimising the environmental impacts of all industrial sectors' activities, are already covered in a number of FP7 projects launched under the NMP Theme. The objectives of the Beijing workshop were twofold:

- to present recent research progress, and to exchange views and information about the S&T aspects and future goals in this field;
- to enhance Chinese participation in forthcoming FP7 calls, including exploration of the possibilities for twinning relevant European and Chinese research programmes.

Three sessions, including presentations by high-level EU and Chinese researchers, examined innovation in clean mining technologies, production processes for a low-carbon economy and enabling technologies for greener chemistry.



Good response to third

Assessment of the latest Calls for Proposals under the Seventh Framework Programme is well underway. The two-step evaluation of Collaborative Projects has been completed, while NMP projects under the new Public-Private Partnerships have already reached an advanced stage of contract negotiation.

■ The third round of FP7 Calls for Proposals was launched on 30 July 2009. In addition to topics covered by the Public-Private Partnerships of the European Economic Recovery Programme (see page 4), the NMP Theme (Nanosciences, Nanotechnologies, Materials and New Production Technologies) was represented by a series of 'Large', 'Small' and 'SME' Collaborative Projects (CP) plus Coordination and Support Actions (CSA).

Two coordinated Calls involving NMP were also announced: with Mexico on 'adding value to mining at the nanostructure level'; and with the USA on 'modelling the toxicity behaviour of engineered nanoparticles'.

PPP projects fast-tracked

Given the urgency of the European Economic Recovery Plan, the Calls under the PPPs were processed using a fast-track single-stage procedure, which resulted in a shorter proposal preparation period. With priority also given to contract negotiations, many are close to conclusion – and in some cases, already completed. They involve a number of the FP7 Themes, but those concerning NMP are summarised in the tables below:

Factory of the Future – CPs-NMP

Activity	Proposals	Recommended for funding	Pass rate
Adaptive control	19	8	42%
Supply chain	24	6	25%
Micro-manufacturing	18	9	50%
Totals	61	23	39%

Energy-efficient Buildings – CPs-NMP

Activity	Proposals	Recommended for funding	Pass rate
Insulation	11	7	64%
District efficiency	8	3	38%
Totals	19	10	52%

Green Cars – CPs-NMP

(joint with Environment, Energy, Sustainable Surface Transport)

Activity	Proposals	Recommended for funding	Pass rate
Electrochemical storage	25	11	44%

Recommended for funding are considered by the experts as good and reach the thresholds of the evaluation criteria. But funding limitations meant that discussions could be only opened with 17 FoF consortia, 7 for EeB and 7 for Green Cars, representing final success rates of 27%, 37% and 28%.

Two-stage evaluation for regular Collaborative Projects Calls

In order to minimise time wastage on inappropriate full proposals for the normal Collaborative Projects, submissions are evaluated in a two-stage process. The first step requires only a short-form summary document describing the expected S&T excellence of the project and its envisaged economic, social and environmental impact.

For the three categories, a total of 453 first-stage proposals was received by the 8 December 2009 deadline, together seeking EU funding of €2.1 billion.

Results of the initial assessments were announced in February 2010, enabling the successful consortia to proceed to the second stage, at which they are required to present more comprehensive descriptions of their plans and objectives, backed by detailed tables showing budget, work packages, milestones, lists of deliverables, etc., as well as an explanation of the plans for implementation. The closing date for Stage 2 proposals was on 18 May 2010. These were evaluated during June 2010, which will enable contract negotiation for the retained projects to be completed by the end of the year.

The **Large CP** category drew 182 proposals, of which seven did not meet the required standards. The remaining 175 were spread over the seven activity areas, with the highest response rates attracted by health-related topics. Together, they sought funding contributions of €1.3 billion.

After expert evaluation, 38 consortia were invited to submit second-stage proposals. This reduced the requested funding amount to around €310 million.

Stage 1

Activity	Proposals	GO proposals	Pass rate
Nano risk	10	3	30%
Scaffolds	46	7	15%
Catalysts	9	4	44%
Flexible materials	30	6	20%
Cancer systems	49	8	16%
Nano sensors	32	7	22%
Formulated products	6	3	50%
Totals	182	38	21%

Given the available EC budget of €105 million, the competitive second-stage evaluation identified 12 projects to be retained for negotiation, plus a reserve list of 2.

FP7 Calls



© European Union 2010

Stage 2

Activity	GO proposals	Recommended for funding	Reserve proposals
Nano risk	3	1	1
Scaffolds	7	2	1
Catalysts	4	2	
Flexible materials	6	3	
Cancer systems	8	2	
Nano sensors	7	1	
Formulated products	3	1	
Totals	38	12	2

For **Small CPs**, 232 of the 234 received submissions were eligible for first-stage evaluation. Covering five topical areas, they represented €0.7 billion of requested funding. The evaluation panels whittled this number down to 43 – requesting some €133 million of funding – for passage through to stage two.

Stage 1

Activity	Proposals	GO proposals	Pass rate
Green nanotech	36	7	19%
Thermoelectric converters	28	5	18%
Hybrids	77	12	16%
Crystalline materials	50	9	18%
Industrial models	42	10	23%
Totals	234	43	18%

Assessment of the second-stage proposals led to the retention of 15 for contract negotiation, with a further seven held in reserve, based on an overall Call budget of €50 million.

Stage 2

Activity	GO proposals	Recommended for funding	Reserve proposals
Green nanotech	7	3	2
Thermoelectric converters	5	2	2
Hybrids	12	3	1
Crystalline materials	9	3	1
Industrial models	10	4	1
Totals	43	15	7

Just two topics were announced for the **CP-SME** category, producing 37 proposals – only one of which was ineligible. Evaluation of the remaining 36 preliminary submissions resulted in the selection of 13 for advance to stage two, reducing the funding request total from an initial €109 million to around €45 million.

Stage 1

Activity	Proposals	GO proposals	Pass rate
Nano characterisation	24	8	33%
Fibre-based products	13	5	38%
Totals	37	13	35%

With an available budget of €20 million, approximately half of second-stage bidders were able to be retained for negotiation.

Stage 2

Activity	GO proposals	Recommended for funding	Reserve proposals
Nano characterisation	8	2	1
Fibre-based products	5	3	
Totals	13	5	1

Other calls

All of the 14 **CSA** proposals received were evaluated as eligible for funding in the single-stage process conducted in February 2010. However the requested funding total of around €12 million was almost double the €6.5 million Call budget. Eight of the projects were thus able to go forward for contract negotiation.

Activity	Proposals	Recommended for funding	Pass rate
Nano acceptance	4	1	25%
ETP support	8	5	63%
Presidencies	2	2	100%
Totals	14	8	57%

However the requested funding total of around €12 million was almost double the €6.5 million Call budget. Eight of the projects were able to go forward for contract negotiation.

For the **EU-Mexico** Joint Call, one proposal was deemed ineligible during evaluation in January 2010. With a heavily oversubscribed funding request of about €18 million, negotiations are in hand for four of the 11 submitted projects to share in the available €6.5 million.

Activity	Proposals	Recommended for funding	Pass rate
Nano mining	11	4	36%

Similarly, for the **EU-USA** Joint Call, one proposal was deemed ineligible during EU evaluation in January 2010. Of the 15 submitted proposals, amounting about €14 million requested funding, five passed all thresholds. Final decision is pending until the US evaluation results are published (not available at the date of preparation of this brochure).

Activity	Proposals	Recommended for funding	Pass rate
Nano toxicity	15	5	33%

Industrial Roundup

Car-burning cars: the ultimate in recycling?

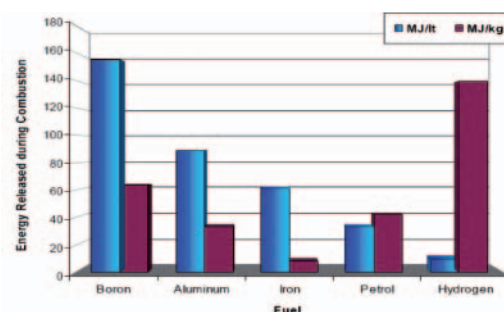
Technology being investigated in the **COMETNANO** project for the use of metal nanoparticles as high-energy fuels holds out the prospect of conventionally-engined cars being able to run on the products of scrapped cars, which can then be recycled as re-usable metals.

More information: www.cometnano.org

■ The energy obtainable by combusting one litre of metals such as boron, aluminium or even iron, is several times higher than that for an equivalent volume of petroleum. Moreover, the process produces no CO₂, CO, unburned hydrocarbons or sulphur oxides – while tuning of the combustion parameters could also eliminate nitrogen oxides. Ideally, the only by-product obtained would be the respective metallic oxide, which is recyclable.

COMETNANO, coordinated by the Greek Centre for Research and Technology, is exploring the use of metal nanoparticles as fuel for modified internal combustion engines, followed by reclamation of the oxide residue by means of renewable energy.

This three-year project follows an integrated approach, focusing not only on the feasibility of the combustion process, but also on the synthesis of suitable metallic nanoparticles and the recycling of the combusted particles using solar-generated hydrogen.



Although hydrogen itself is a 100% renewable energy carrier, it is difficult to transport and store in adequate quantities. The main goal is thus to transfer the energy to a carrier that is easily handled, transported and stored without requiring special conditions. This could be more environment-friendly than conventionally generated electricity, and more robust than fuel cells.

The aim is to provide a detailed 'well-to-wheels' analysis that will be based on realistic data and processes covering the full life-cycle of the novel fuels.

Micro-robots may become tomorrow's industrial tools

Mimicking methods used by nature, **GOLEM** led to the introduction of revolutionary high-precision manipulators able to handle objects as small as biological cells and carbon nanotubes.

More information: www.golem-project.eu

■ In the GOLEM project, an 11-partner consortium coordinated by Eindhoven University of Technology in the Netherlands explored bio-inspired bonding as an approach to the assembly of micro/nano-scale objects. The resultant process exploits the property of molecular recognition, as exhibited in antibody/antigen and DNA hybridisation reactions, to serve as selective 'smart glue' for attaching organic and inorganic items at specific locations on substrates such as glass, silicon or ceramics. Initially conceived for R&D activities in nanotechnology and life sciences, this could ultimately find application in industrial fields, such as micro-optics or the batch production of organic electronic circuits.

The principle is that, after surface functionalisation, parts are floated onto the substrate in a micro-fluidics assembly chamber, where they are positioned for self-assembly with the aid of micro-robots or laser trapping. Industrial components could then be attached permanently using conventional means such as gluing or soldering.

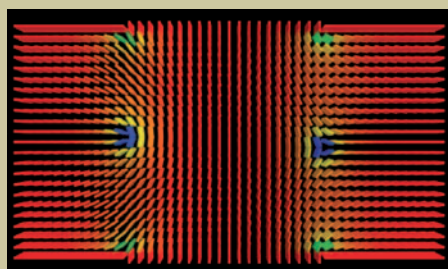
A test platform developed to characterise and test the self-assembly process is now marketed through a spin-off company, Imina Technologies. Its flagship miBot product, claimed to be the world's smallest commercial micromanipulator, can be employed in conjunction with both optical and electron microscopes. It accepts a wide range of plug-in microtools for various functions such as electrical probing, pick and place, and force measurements on samples as small as cells and carbon nanotubes.

EU-America cooperation advances liquid crystal biosensing

Teams from the EU, USA and Mexico collaborated in **MNIBS** to model a remarkable characteristic of liquid crystals that enables them to function as powerful biosensing 'amplifiers'.

More information:

www.complexfluids.ethz.ch/cgi-bin/mnibs



■ The arrival of a single protein molecule at the exposed surface of a liquid crystal (LC) triggers a reorganisation whereby LC molecules are reoriented around the protein molecule, forming a 'seed' that grows rapidly to macroscopic dimensions. This 'amplifying' effect is readily visible when observed between crossed polarisers, making it possible to detect the presence of peptides, proteins and even complete viruses.

While early studies of LC sensing applications focused on solid surfaces, more recent studies suggested that liquid-liquid interfaces could also be used for sensing, thereby paving the way for development of more versatile devices and technologies for interrogating the structure of interfaces, with nanometre-level resolution.

To improve understanding of the complex underlying processes, the MNIBS partners developed a multi-level hierarchical modelling technique covering both the initial molecular-scale events and their subsequent propagation.

The successful outcome of the multidisciplinary effort was to mesh three description levels into a practical simulation and design tool, using a combination of techniques suited to the different length and time scales while maintaining thermodynamic consistency. Its predictive power has attracted the attention of companies interested in large scale manufacturing of liquid crystal sensors by low cost processes such as inkjet printing.

A number of collaborations are currently being pursued in follow-up projects funded by industry.



Oxide interfaces form nanoscale electronic devices

NANOXIDE investigated the remarkable properties of interfaces between isostructural functional oxides, which permit the realisation of new kinds of nanosized electronic and optoelectronic devices.

More information: www.nanoxide.infim.it

■ Interfaces between transition metal oxides can exhibit a rich spectrum of properties ranging from superconductivity, ferromagnetism and ferroelectricity, to semiconductivity and metallic behaviour.

Such compounds, which share with the same crystal structure, allow the engineering of new epitaxial multifunctional devices. These are very complex due to the collective nature of electronic behaviour, offering new application possibilities with respect to conventional semiconductors. They are under investigation for devices integrating silicon and oxide technologies, and in the emerging field of all-oxide electronics.

The project studied a range of bilayers and heterostructures made from oxides with mainly perovskite-type structure, produced by thin film techniques that permit growth control at atomic level. The interfaces act as high temperature superconductor (HTS)/dielectrics, semiconductor/dielectrics, piezoelectric/piezoelectrics (with different polarisation states), piezoelectric/magnetics, magnetic/magnetics and HTS/HTS.

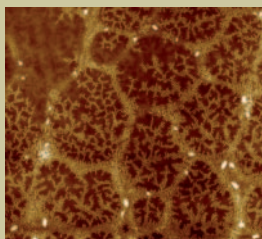
Results included the development of advanced methods for materials deposition, characterisation and nanopatterning, plus an etching procedure for all-oxide MEMS. Low temperature switching from the superconducting state to the insulating state in HTS and quasi-2D electron gases was demonstrated, as was the production of a YBCO single electron transistor to probe the symmetry of the HTS order parameter.

Industrial Roundup

Targeted drug delivery combats killer diseases

The FP6 Integrated Project **NANOBIOPHARMACEUTICS** is developing novel combinations of biocompounds and nanocarriers for targeted delivery to treat diabetes, cancer, Alzheimer's and other neurodegenerative diseases.

More information:
www.nanobiopharmaceutics.org/

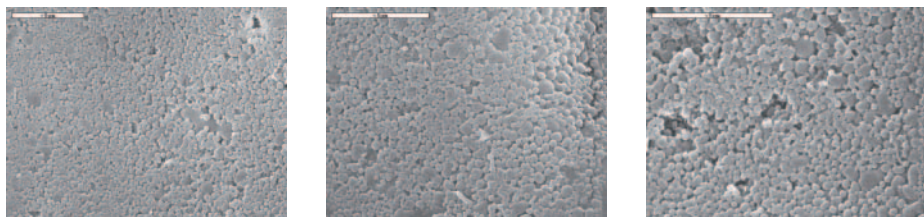


■ The 13-nation **NANOBIOPHARMACEUTICS** consortium is constructing nanoparticle-based carrier systems to transport protein or peptide drugs safely across physiological barriers, for release at specific target sites within the body. The aim is to design delivery mechanisms whereby, for example, drugs for the treatment of Alzheimer's disease are able to cross the blood-brain barrier, and diabetes sufferers can replace insulin injections by oral intake.

The developed nanocarriers are subject to toxicological screening, the release profile of drugs is investigated under various conditions, as well as an assessment of the biocompatibility and biodegradability of the new formulations takes place. A clean bill of health for the most promising candidates permitted progress towards in-vivo testing.

The project, due to be completed in September 2010, is investigating new cell-culture systems to compare results with those obtained from animal trials. A long term goal is to find methods for the reduction – and possible eventual replacement – of the animal experiments currently required for the evaluation of new medications.

By the end of the third project year, a broad range of nanocarrier systems had been designed. These are currently being optimised and investigated for their suitability to transport drugs via oral or nasal uptake, or for their ability to overcome the natural defences of the blood-brain barrier.

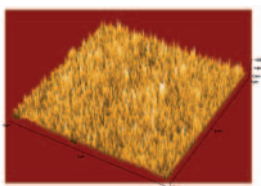


Plasma etching innovations ready for MEMS applications

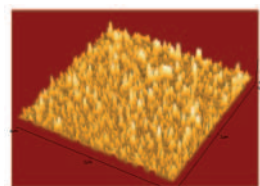
By acquiring better understanding of the fundamentals of plasma etching, the **NANOPLASMA** project opens the door to reproducible industrial production of new micro/nano-devices.

■ Based on new knowledge about the so-called 'gas chopping' technique for plasma etching of nano-dimensioned surface features on silicon, the **NANOPLASMA** project has introduced industry-ready technology for the fabrication of micro-systems and nano-scale devices. The consortium, led by industrial partner Oxford Instruments, UK, adopted a multi-level approach – exploring innovative processing concepts, and using simulation and experiments to determine the key parameters governing tool: substrate interaction. A novel architecture was also developed for closed-loop control, permitting process optimisation for both nano-textured surfaces and deep-etched features with high aspect ratios. By the close of the three-year initiative, plasma simulation software had been tested and validated in beta format, and is now undergoing further development in collaboration with the Lawrence Berkeley National Laboratory in the USA.

Prototypes of a plasma etch tool, incorporating a new plasma source and the control system realised within the project, have also been shipped to the USA for cooperative testing and refinement. These also include an integrated broad spectrum optical emission spectroscopy facility that markedly reduces the cost of plasma diagnostics. Yet another immediately exploitable result is a plasma resonance probe for more accurate measurement of density in reactive plasmas. In addition, the team generated extensive academic output, and filed four patent applications. Partners are actively being sought to build on the promising outcomes to date.



Roughness for inorganic (Poly(dimethyl-Siloxane)) polymer etching in SF6 plasmas. Photoresist Az5214 covers the ring and in the dome (all the cylinder of the Adixen Prototype reactor). RMS is now only 8nm for 2min etch instead of 100nm see above when no polymer covers the dome.



Roughness for inorganic (Poly(dimethyl-Siloxane)) polymer etching in SF6 plasmas in the OIPT plasma reactor. RMS for 2min etching is only 1.6nm demonstrating further reduction of the nanoscale roughness. Similar results were obtained for organic polymers and for Silicon.

Having identified the causes by simulation careful experiments were designed for the control of roughness. The reactor walls were covered with polymer, which reduced significantly roughness. Experiments were also performed in the OIPT prototype reactor having an electrostatic shield and minimal roughness was observed (see below). Thus, design of the wall interaction with the plasma is the key to nanoscale roughness control.

Smart textiles monitor earth movements

Multifunctional textiles developed in **POLYTECT**, an Integrated Project for SMEs, play both reinforcement and monitoring roles in the protection of buildings and earthworks against natural disasters.

More information: www.polytect.net



■ Textile materials are used extensively in the reinforcement of roadways and earthworks, as well as in the non-intrusive repair of masonry structures damaged by events such as earthquakes. By embedding various types of sensor into such materials, POLYTECT has added the capability to monitor stresses and displacements during construction, under in-service conditions, and to assess the safety level of the structure after an unexpected loading event.

Such measurements make it possible to carry out continuous or periodic assessments of the integrity and safety of structures, and to implement predictive maintenance procedures in a life cycle context. They can be used to track changes over time, allowing for maintenance and repair actions when appropriate. Chemical sensors can also be employed to detect environmental contamination or control chemical reactions in landfills.

The broad research conducted by the 27-member consortium embraces the creation of innovative sensing devices and materials, development of techniques for embedding sensors into textiles, and the design of systems for data acquisition and interpretation. This has produced valuable new knowledge across the whole field of wide area reinforcing textiles and their combination with embedded sensors, coatings and mortars.

Following extensive laboratory testing, field trials are underway in a number of locations at a time when major natural disasters have struck in several countries around the world. Even before the project's end (August 2010), new products for both masonry and geotechnical applications were ready for commercial exploitation.



Hydraulic cylinders made cleaner and safer

Knowledge-based design methods and manufacturing processes developed in **PROHIP** have produced a new generation of hydraulic cylinders for use in high pressure fluid power systems.

More information: www.prohipp.com

■ The research objective of PROHIP, an Integrated Project including 12 SMEs in its 22-member consortium, was to produce cleaner, safer and cost-efficient fluid power components with wide-ranging industrial application. Focussing on hydraulic cylinders and accumulators, which are the principal elements in high pressure systems, the work encompassed all stages from initial design, through manufacture, to testing and quality control.

As well as introducing life-cycle oriented design procedures using advanced computational methods, the partners employed probability-based risk assessment to achieve greater reliability and safety.

Advanced materials such as ceramics, thermoplastics, and enhanced ductile iron castings, together with new seals and surface treatments, improved all-round performance and eliminated the use of chromium-based coatings. Innovative production processes and the adoption of environment-friendly oils add further to the green credentials of the new products.

Computerised laboratory testing and monitoring, plus field testing under different working conditions, was employed to establish strength and fatigue characteristics for various applications, permitting more reliable fatigue life prediction.

Another important goal was to encourage the take-up of knowledge-based practices through training activities targeting the technical staff of fluid power industries, machinery manufacturers and end-users.



Industrial research briefing

Events

Industrial technologies Conference

7-9 September 2010, Brussels, Belgium
www.industrial-technologies2010.eu

Euronanoforum 2011

9-10 June 2011, Budapest, Hungary
www.industrial-technologies2010.eu

Advances in materials under EU Framework Programmes under the Polish EU Presidency

22-23 September 2011, Warsaw, Poland

Manufuture 2011

October / November 2011, Wroclaw, Poland

Support

Research Participant Portal

The Participant Portal is the single entry point for interaction with the Research Directorates-General of the European Commission. It will host a full range of services that facilitate the monitoring and management of proposals and projects throughout their lifecycle.

<http://ec.europa.eu/research/participants/portal/appmanager/participants/portal>

NMP TeAm

The NMP TeAm project provides an improved service from the National Contact Points across Europe for the scientific and industrial community engaged in European research and technological development. It offers help in accessing FP7 calls, lowering the entry barriers for newcomers and raising the quality of submitted proposals.

<http://www.nmpteam.com/>

Enquiry service

A service provided by the Europe Direct Contact Centre answers questions about any aspect of European research in general, and the EU Research Framework Programmes in particular – including NMP. This replaces the former Help Desk e-mail service. Log on at: <http://ec.europa.eu/research/enquiries>

New literature

Find all the latest brochures and previous issues of this magazine on the **Industrial Technologies website** (see below).

Useful links

Industrial Technologies on Europa

For information about FP7 Theme 4, Nanosciences, nanotechnologies, materials & new production technologies and other news about Industrial Technologies: http://ec.europa.eu/research/industrial_technologies/index_en.html

The nanotechnology homepage of the European Commission

This portal presents information on nanotechnology-related activities and funding throughout the Commission. It also provides links to other organisations active in nanotechnology. See: <http://cordis.europa.eu/nanotechnology/>

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