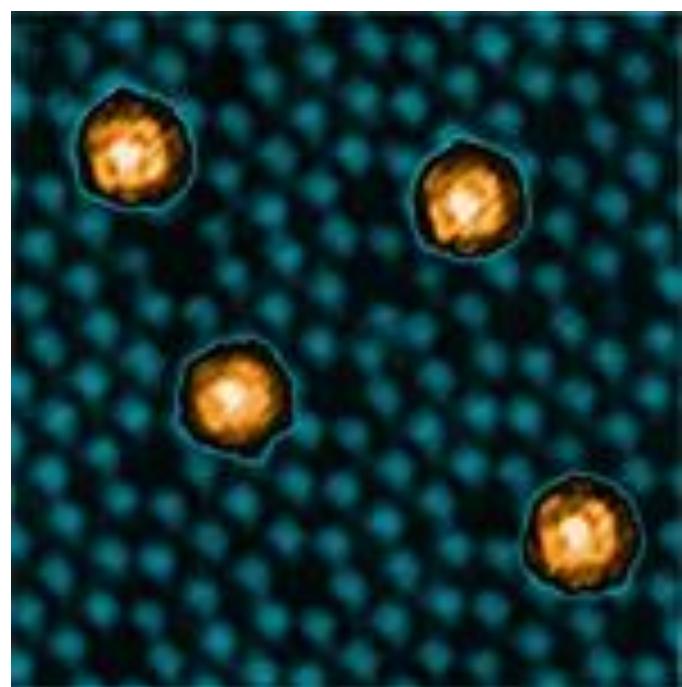
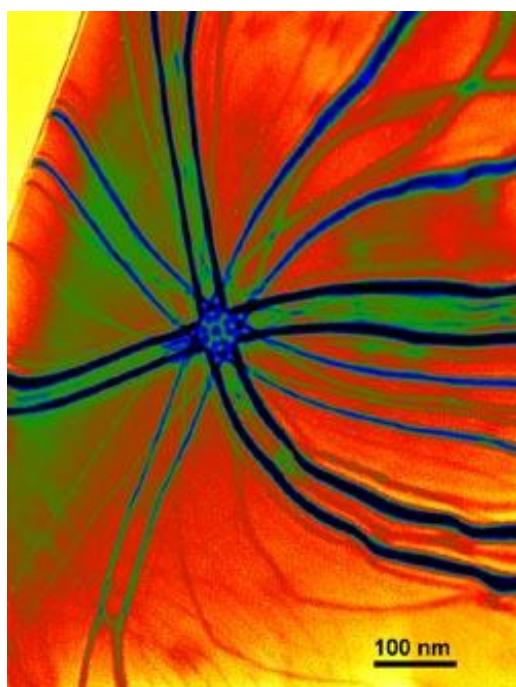
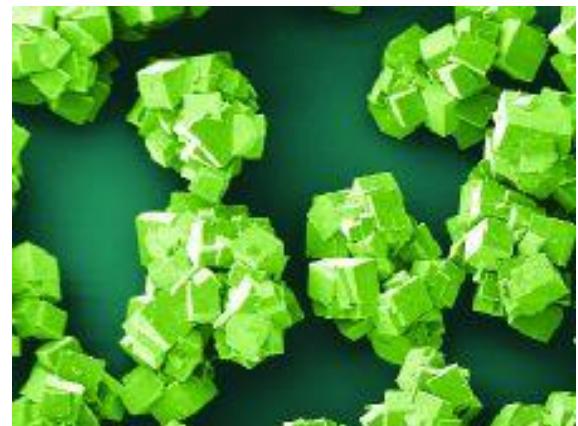
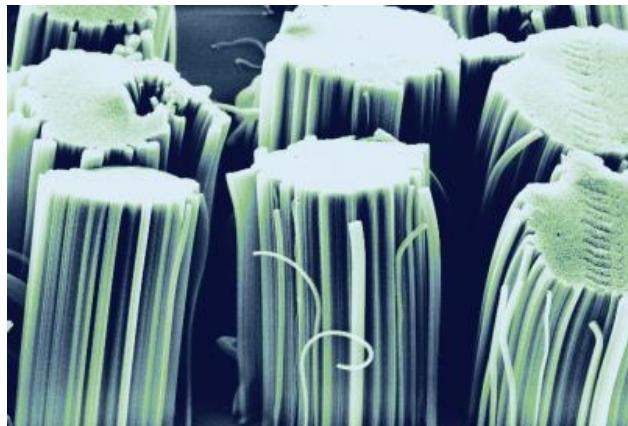


# **PORUGAL-SPAIN INTERNATIONAL RESEARCH LABORATORY**

## **INTERNATIONAL IBERIAN NANOTECHNOLOGY LABORATORY (INL)**



**Technical Committee Report  
November 2006**

**NOTICE:** The creation of the Portugal-Spain International Research Laboratory was decided at the XXI Portugal Spain Summit of the 19<sup>th</sup> of November of 2005 and was publicly announced that day by the Prime Minister of Portugal – José Sócrates – and the President of the Government of Spain – José Luis Rodríguez Zapatero.

The Technical Committee was established in the Memorandum of Understanding (MoU) signed at the Summit by the Minister of Science, Technology and Higher Education of Portugal and the Minister of Education and Science of Spain. According to the MoU, a bilateral Technical Committee was created to prepare the necessary elements for implementation of the decision, including the definition of the initial areas of scientific and technical activity, the model of operation and funding, possible partnerships to be considered and the modalities and calendar of installation. The Technical Committee was also charged of analysing the opportunities and advantages of concentrating activity of the Institute in specific scientific and technological areas, such as Nanotechnology, GRID Computing, Biotechnology and Biomedicine, Energy, Risk Management, or other areas of common interest. The Technical Committee met four times in 2006 involving representatives of the following organizations: Knowledge Society Agency (UMIC), Science and Technology Foundation (FCT), International Relations Office for Science and Higher Education (GRICES) on the part of the Ministry of Science, Technology and Higher Education of Portugal, and Directorate-General of Research (DGI), Directorate-General of Technological Policy (DGPT) on the part of the Ministry of Education and Science of Spain. The coordination of the Technical Committee was assigned in Portugal to the President of the Knowledge Society Agency (UMIC), Luis Magalhães, and in Spain to the Secretary-General of Scientific and Technological Policy, at the beginning Salvador Barberà and afterwards Francisco Marcellán.

*Front cover:* The pictures, from top to bottom and left to right, are:

- (1) Carbon nanotubes; courtesy of Christian Schönenberger, National Center of Competence in Research University of Basel, Switzerland.
- (2) Electron microscope view of hydrogen-storage metal-organic nanocubes; courtesy of BASF, Germany.
- (3) Plan view bright-field transmission electron micrograph of a germanium/silicon quantum dot in a silicon matrix, grown by molecular beam epitaxy and coherently strained due to the Ge/Si crystal lattice mismatch, giving rise to strain-induced bend contours; courtesy of Diana Zhi, Paul Midgley, Rafal Dunin-Borkowski, Don W. Pashley and Bruce A. Joyce of the Department of Materials Science, University of Cambridge, UK.
- (4) Scanning tunnelling microscope view of carbon-60 buckyballs sitting on a silicon surface; courtesy of Hou, University of Science and Technology of China.

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# **Introduction**

This report was prepared by the Technical Committee established in the Memorandum of Understanding signed by the Minister of Science Technology and Higher Education of Portugal and the Minister of Education and Science of Spain at the XXI Portugal-Spain Summit of November 2005 regarding the preparation of decisions to be taken on the implementation of the Portugal-Spain International Research Laboratory at the forthcoming Portugal-Spain Summit of 2006.

# Decision to Create the Portugal-Spain R&D Laboratory

## Leading on New Institutional Partnerships in Science and Technology in Europe

The decision to create the Portugal-Spain International Research Laboratory was announced in the 19<sup>th</sup> of November of 2005 by the heads of Government of both countries – the President of the Government of Spain José Luis Zapatero and the Prime Minister of Portugal José Sócrates – at the end of the XXI Portugal-Spain Summit that took place in Évora, as the major decision taken at this summit.

With this decision, **the Governments of Portugal and Spain made clear their commitment to a strong cooperation of both countries in ambitious science and technology joint ventures for the future, opening a new cycle in the relationships between both countries in the construction of knowledge based economies and giving an example to other European countries by creating a joint research laboratory to work together for the future of modern international science.** The decision led the President of the Government of Spain to call Research, Science and Technology the star of the Summit, expressing the will of both countries to work together towards the future.

The Prime Minister of Portugal emphasized this orientation in the joint press conference at the end of the Summit by stating<sup>1</sup>:

"Posso dizer que o tema mais importante e o tema de maior novidade nesta Cimeira é a vontade de cooperar entre Portugal e Espanha no domínio da construção das economias do conhecimento, no domínio da ciência, da investigação, da inovação e do conhecimento. Trata-se de um novo domínio que ocupa agora as preocupações do Governo de Portugal e do Governo de Espanha e que, ocupando as nossas agendas domésticas, consegue uma vida própria no esforço de cooperação."

Nesta Cimeira permanece clara a ambição de Portugal e Espanha quererem competir na economia global e quererem afirmar as suas valências e competências no domínio da ciência e da investigação. Isto fica bem claro no esforço que fizemos neste domínio. Está bem claro, desde logo, que os acordos e memorandos de entendimento que acabámos de assinar e que os ministros da Ciéncia Portugués e Espanhol assinaram agora mesmo perante vós, são protocolos muito especializados, mas que expressam a nossa vontade de cooperar no terreno científico de modo a afirmar os dois países como países cuja ambição é ter neste domínio uma nova presença internacional.

Mas não são apenas estes protocolos. O que fica desta Cimeira é o simbolizar a vontade de apostar neste terreno da fronteira tecnológica e

é a criação do primeiro centro Luso-Espanhol, um centro de investigação e desenvolvimento, um centro tecnológico que queremos que funcione com uma ambição de desenvolver a investigação nos domínios mais específicos, mais ambiciosos, da moderna ciéncia internacional. Os dois países decidiram levar a cabo esse centro e construí-lo em conjunto. Por proposta do Presidente do Governo Espanhol, esse centro localizar-se-á em Portugal, em Braga.

Esse centro simboliza a vontade e ambição dos dois países para incentivar a cooperação neste domínio e construir sobre essa cooperação benefícios para os nossos povos, mas também simboliza a vontade e ambição de dar cumprimento ao que são as orientações da Agenda de Lisboa, que orienta hoje toda a política no espaço Europeu."

On the same occasion, the President of the Government of Spain stated<sup>1</sup>:

"Como saben, Portugal y España son países con mucha historia en su relación; pero, ante todo, son países jóvenes, son países democráticos, progresistas, europeos; que tienen, ante todo, ambición de futuro para sus pueblos. En eso nos hemos centrado en esta Cumbre. No sólo nos hemos dedicado a repasar, a profundizar y a incrementar los campos tradicionales de la cooperación en materia de infraestructuras o en materia del objetivo del Mercado Ibérico de Electricidad, sino que hemos ampliado a nuevos campos, especialmente en materia de seguridad, con el convenio que se ha firmado; en materia de Trabajo, Seguridad Social y Empleo; en materia de Medio Ambiente con la comisión bilateral España-Portugal de prevención y lucha contra incendios, y, ante todo, porque sin duda alguna ha sido la estrella de esta Cumbre, estrella que es expresión de la voluntad de futuro, la Investigación, la Ciencia, la Tecnología; es decir, el futuro.

Puedo decir que para España y para Portugal es una gran satisfacción saber que ambos países, de manera conjunta, vamos a poner en marcha un centro internacional de Investigación, Desarrollo e Innovación; un centro hispano-luso que tiene vocación internacional y de excelencia, que se va a situar en Braga; que va a ser dirigido por un español, José Rivas, Catedrático de Electromagnetismo de la Universidad de Santiago; que va a ser un centro de colaboración pública y privada, destinado fundamentalmente a la investigación en materia de Tecnologías de la Información y de la Comunicación, y de la Nanotecnología; que va a contar – ése es el objetivo – con doscientos investigadores españoles, portugueses y también de otros países, y que sitúa un modelo, un ejemplo, de colaboración entre dos países europeos que no sólo proclaman la Agenda de Lisboa como el gran objetivo para el crecimiento, para la competitividad y para el bienestar de los ciudadanos europeos, sino que además lo traducen en hechos conjuntos y en una acción común. En definitiva, hoy Portugal y España hablan con dos ideas fundamentales: unión y futuro."

<sup>1</sup> Available at <http://www.la-moncloa.es/Presidente/Intervenciones/>.

As announced by the heads of Government of both countries, the Portugal-Spain R&D Laboratory will be located at Braga, Portugal, will have as first director the Spanish professor José Rivas and will count with two hundred researchers from Spain, Portugal and other countries, aiming at international excellence. It was also declared to the press that the Portuguese and Spanish public investment for operational costs would be around 30 million euros per year, and the installation of the facilities would amount to an additional investment of 30 million euros.

The decision was received with special interest in the European Union by the Commission and several of the other member states. It was selected as one of the best practice cases that were presented in the first workshop of best practices on the Lisbon Agenda that took place in the 6<sup>th</sup> of October in Lisbon, with the presence of the Lisbon Agenda coordinators of all the member states and the President and Vice-President of the European Commission.

## Internationally Attractive Conditions

### A Favorable Setting for Working at the Forefront of Knowledge

The Portugal-Spain International Research Laboratory results from an ambitious decision of both countries to create specially attractive conditions for top researchers to work at the forefront of knowledge in a challenging environment, namely:

- The openness, special visibility, stability and flexibility of the decision making process brought by the statute of an international research organization.
- The guarantee of a long-term financial commitment of two Governments assuring, on equal parts, public funds on the order 30 million euros of 2006 for the operational budget of each year plus 30 million euros of installation investment.
- The commitment of the two Governments to assure a Laboratory with a scientific staff of about 200 researchers.
- The commitment to recruit the scientific staff globally, based on merit.
- The guarantee of assuring internationally competitive salaries and benefits.
- The assurance of immigration and family regrouping facilitation provided by the international organization status.
- The prospect that about 30% of the scientific positions be tenure track.
- The provision of a permanent pool of young talent through post-doctoral positions and PhD student fellowships to be awarded on a globally competitive basis.
- The liveliness of permanent contact with the advancements in other laboratories worldwide through an ambitious visitors program.
- The challenge of working competitively in a highly interdisciplinary area of research at the frontier of knowledge in a community of people from different disciplines, institutional settings and nationalities in an explicit international setting.
- A facilitated framework for a close relationship with the industrial and other economic sectors due the flexibility provided by the international organization status, allowing for innovative networking with industrial and economic actors.
- The possibility of directly establishing international relations with other States and other International Organizations, most valuable to strengthen international scientific cooperation at the forefront of knowledge.
- The guarantee of oversight of strategy and activities by an international committee of the highest standing.

## The Technical Committee

### Concentration on Nano Science and Technology

According to the Memorandum of Understanding (MoU) signed at the Summit by the science ministers of Portugal and Spain, the details of the implementation and operation of the Portugal-Spain International Research Laboratory should be defined in the period of one year after November 2005, following a study to be realized for the purpose.

The MoU established that a Technical Committee would be created to prepare a detailed proposal, including the definition of the initial lines of scientific and technical activities, the Laboratory operation model, its funding, as well as possible partnerships and the installation modalities and calendar. In particular, the Technical Committee should analyze the opportunities and advantages of concentrating the Laboratory research activities in areas such as Nanotechnology, GRID Computing, Biotechnology and Biomedicine, Energy, Critical Infrastructures Risk Management or other areas of common interest.

The responsibility of implementation of the MoU was assigned to Knowledge Society Agency (UMIC), the Science and Technology Foundation (FCT), the Science and Higher Education International Bureau (GRICES) and the Associated Laboratories Council (CLA) on the part of the Ministry of Science, Technology and Higher Education of Portugal, and to the Directorate General of Research (DGL), the Directorate General of Technological Policy (DGTP) and the Directorate General of the Universities (DGU) on the part of the Ministry of Education and Science of Spain.

The first meeting of the Technical Committee took place in Madrid on the 8<sup>th</sup> of February of 2006. This meeting established an agreement on the terms of reference for the Portugal-Spain International Research Laboratory, and adopted a calendar and a methodology of work.

**It was agreed that the Laboratory should concentrate on Nanotechnology and advanced computing, and consider applications to several other areas, following a truly interdisciplinary approach. The scientific scope of its activities should include both fundamental and applied aspects, both experimental and theoretical approaches. Besides, the Laboratory should be conceived to:**

- assure world class research excellence in all areas of activity;
- develop partnerships with the industry and foster the transfer of knowledge into economic value and jobs;
- train researchers and contribute to the development of a skilled workforce for the nanotechnology industry;
- prevent and mitigate nanotechnology risks.

It was also decided to request the preparation of a scientific report under the responsibility of Professor José Rivas from the Spanish side and Professor Paulo Freitas from the Portuguese side.

**Legal, governance and administration requirements would be prepared by people to be assigned by each one of the ministries.** They should take into account the principle that the Laboratory Director will be alternatively nominated by Spain and Portugal, based on merit criteria, for periods of duration to be established in the statutes.

**At the same time, an International Advisory Board of top international scientific standing should be formed on the basis of suggestions from both sides.**

**It was emphasized that the Laboratory should set a clear example of a new type of research collaboration between European Union member states, and foster the international cooperation with other regions, namely North America, Latin America, Asian and others.**

**The scientific and implementation plans should be developed in such a way that scientific activity should begin while the new facilities of the Laboratory are being designed and constructed to anticipate as much as possible the beginning of relevant research activities.**

**It was also emphasized that the recruitment of human resources should be done carefully and ambitiously to assure top class level of the researchers team from the very beginning, in order to assure immediate high reputation and enhance the capability of further attracting top scientists and talented graduate students.**

Due to the need of preparing a detailed document for consideration and approval at the XXII Portugal-Spain Summit of 2006, a progress report should be available by the end of July to be transmitted to the Governments of both countries.

There was also agreement on the idea of preparing a major International Iberian Nanotechnology meeting to be held in Braga in 2007, bringing together top world nanotechnology scientists to build momentum for the Laboratory activities and to profit from wider discussions on its strategy.

The Portuguese Minister of Science, Technology and Higher Education – José Mariano Gago – participated in the first part of the Technical Committee meeting. In declarations to the press afterwards, in Madrid, he said that “**the ambition of both countries is to create a research site with world scale relevance, capable of attracting scientists and technicians from all points of the world**”. He referred that when in full operation the Laboratory can be an attractor of many nanotechnology enterprises to settle and develop in the Iberian Peninsula. He said:

“It will be a Laboratory where many specialists will pass through who will be chased by enterprises for working with them; many of them will leave the Laboratory to create companies and this will bring an enormous competitive advantage to Portugal and Spain in this sector.”

The second meeting of the Technical Committee, on the 28<sup>th</sup> of July 2006 in Lisbon, complying with what had been decided before, was dedicated to present a progress report to be transmitted to the Governments of Spain and Portugal. In this meeting, the Technical Committee welcomed the Portuguese proposal of creating an Iberian Capacity Building Program in Nano Science and Technology, to be initiated after the XXII Portugal-Spain Summit of 2006.

In the third meeting, on the 20<sup>th</sup> of October 2006 in Madrid, all the proposals of specific localization sites for the Laboratory were analyzed, leading to a selection among the alternatives. This selection led to the formal transfer, in a public session on the 17<sup>th</sup> of November 2006, of a land parcel of about 47,000 m<sup>2</sup> in Braga, close to the university campus of Gualtar, from the Câmara Municipal de Braga to the Portuguese State, represented by the Ministry of Science, Technology and Higher Education. In the same day the University of Minho formally made available space at one of its historic buildings in the center of Braga for the Laboratory Installation Committee. Besides the analysis and selection of localization sites, the Technical Committee also welcomed the idea of installing a Ciência Viva Center to be built next to the Laboratory for the promotion of the public awareness of nano science and technology, and considered practical aspects of the launching of a joint call for proposals for cooperation research projects in specific areas of Nano Science and Technology, within the Iberian Capacity Building Program in Nano Science and Technology, to be announced in both countries in the second day of the XXII Portugal-Spain Summit, and addressed the preparation of a fourth meeting, to be mostly concentrated on the revision of the legal documents and other instruments necessary for formalizing the creation of the Laboratory as an international research organization.

The fourth meeting of the Technical Committee, on the 14<sup>th</sup> of November 2006, was mostly dedicated to legal and organizational matters and to the revision of documents and other elements for the XXII Portugal-Spain Summit scheduled for the 24<sup>th</sup> and the 25<sup>th</sup> of November 2006, in Badajoz.

## The Importance of Nanoscale Science and Technology

### A Natural Area of S&T for Innovative International Cooperation Ventures

In June 2005, the European Commission adopted the Communication *Nanosciences and Nanotechnologies: An action plan for Europe 2005-2009*. In the background section of this Communication we can read (emphases in bold are ours):

"Nanosciences and nanotechnologies (N&N) are new approaches to research and development (R&D) that concern the study of phenomena and manipulation of materials at atomic, molecular and macromolecular scales, where properties differ significantly from those at a larger scale.

Advances across a wide range of sectors are being enabled through R&D and innovation in N&N. These advances can address the needs of citizens and contribute to the Union's competitiveness and sustainable development objectives and many of its policies including public health, employment and occupational safety and health, information society, energy, transport, security and space.

Products based on N&N are already in use and analysts expect markets to grow by hundreds of billions of euros during this decade. Europe must avoid a repeat of the European 'paradox' witnessed for other technologies and transform its world-class R&D in N&N into useful wealth-generating products in line with the actions for growth and jobs, as outlined in the 'Lisbon Strategy' of the Union.

Health, safety and environmental risks that may be associated with products and applications of N&N need to be addressed upfront and throughout their life cycle.

A better dialogue between researchers, public and private decision-makers, other stakeholders, and the public is beneficial for understanding possible concerns and tackling them from the standpoints of science and of governance, and to promote informed judgement and engagement.

On 12 May 2004 the Commission adopted the Communication *Towards a European Strategy for Nanotechnology* in which a safe, integrated and responsible strategy was proposed. This aims to reinforce the Union's leading position in N&N R&D and innovation while addressing any environmental, health, safety and societal concerns upfront. In this context, several needs were highlighted:

- increase investment and coordination of R&D to reinforce scientific excellence, interdisciplinarity and competition in N&N together with industrial exploitation;
- develop world-class competitive R&D infrastructure ('poles of excellence') that take into account the needs of both industry and R&D organisations;
- promote the interdisciplinary education and training of R&D personnel together with a stronger entrepreneurial mindset;
- provide favourable conditions for industrial innovation to ensure that R&D is translated into affordable and safe wealth-generating products and processes;
- respect ethical principles, integrate societal considerations into the R&D process at an early stage and encourage a dialogue with citizens;

- address public health, occupational health and safety, environmental and consumer risks of N&N-based products at the earliest possible stage;
- complement the above actions with appropriate cooperation and initiatives at the international level."

#### **"Nanotechnology is the builder's final frontier"**

**Richard Smalley**  
**Nobel laureate 1996**

This action plan was built on the basis of the European Commission Communication of May 2004: *Towards a European Strategy for Nanotechnology*. This communication section entitled "Why is nanotechnology important?" states:

"Nanoscience is often referred to as "horizontal", "key" or "enabling" since it can pervade virtually all technological sectors. It often brings together different areas of science and benefits from an interdisciplinary or "converging" approach and is expected to lead to innovations that can contribute towards addressing many of the problems facing today's society:

- **medical applications** including e.g. miniaturised diagnostics that could be implanted for early diagnosis of illness. Nanotechnology-based coatings can improve the biocompatibility of implants. Self-organising scaffolds pave the way for new generations of tissue engineering and biomimetic materials, with the long-term potential of synthesising organ replacements. Novel systems for targeted drug delivery are under development and recently nanoparticles could be channelled into tumour cells in order to treat them e.g. through heating;
- **information technologies** including data storage media with very high recording densities (e.g. 1 Terabit/inch<sup>2</sup>) and new flexible plastic display technologies. In the long-term, the realisation of molecular or biomolecular nanoelectronics, spintronics and quantum computing could open up new avenues beyond current computer technology;
- **energy production and storage** can benefit from, for example, novel fuel cells or lightweight nanostructured solids that have the potential for efficient hydrogen storage. Efficient low-cost photovoltaic solar cells (e.g. solar "paint") are also under development. Energy savings are anticipated via nanotechnological developments that lead to improved insulation, transport and efficient lighting;
- **materials science** developments using nanotechnology are far-reaching and are expected to impact upon virtually all sectors. Nanoparticles are already used for reinforcing materials or functionalising cosmetics. Surfaces can be modified using nanostructures to be, for example, scratchproof, unwettable, clean or sterile. Selective grafting of organic molecules through surface nanostructuring is expected to impact upon the fabrication of biosensors and molecular electronics devices. The performance of materials under extreme conditions can be

significantly improved and advance e.g. the aeronautics and space industries;

- **manufacturing** at the nanoscale requires a new interdisciplinary approach to both research and fabrication processes. Conceptually, there are two main routes: the first starts from micro-systems and miniaturises them ("top-down") and the second mimics nature by building structures starting at atomic and molecular level ("bottom-up"). The former can be associated with assembly, the latter to synthesis. The bottom-up approach is in an early development phase but its potential impact is far reaching with a disruptive potential for current production routes;

- **instrumentation** for the study of the properties of matter at the nanoscale is already having an important direct and indirect impact that is stimulating progress across a wide range of sectors. The invention of the Scanning Tunnelling Microscope was a landmark in the birth of nanotechnology. Instrumentation also plays an essential role for developing the "top down" and "bottom up" manufacturing processes;

- **food, water and environmental** research can advance via nanotechnology-based developments including tools to detect and neutralise the presence of micro-organisms or pesticides. The origin of imported foods could be traced via novel miniaturised nano-labelling. The development of nanotechnology-based remediation methods (e.g. photo-catalytic techniques) can repair and clean-up environmental damage and pollution (e.g., oil in water or soil);

- **security** is expected to be enhanced via e.g. novel detection systems with a high specificity that provide early warning against biological or chemical agents, ultimately down to the level of single molecules. Improved protection of property, such as banknotes, could be achieved by nano-tagging. The development of new cryptographic techniques for data communication is also underway.

Several nanotechnology-based products have been marketed including: medical products (e.g. bandages, heart valves, etc.); electronic components; scratch-free paint; sports equipment; wrinkle- and stain-resistant fabrics; and sun creams. Analysts estimate that the market for such products is currently around €2.5 billion but could rise to hundreds of billions of euro by 2010 and one trillion thereafter.

With the prospect of obtaining greater performance with fewer raw materials, in particular via the realization of "bottom-up" manufacturing, nanotechnology has the potential to reduce waste across the whole life cycle of products. Nanotechnology can contribute towards realising sustainable development and to the goals addressed in the "Agenda 21" and the Environmental Technology Action Plan."

The importance of nanoscale science and technology had already been very well expressed in the preface of the review report of the US national Nanotechnology Initiative entitled *Small Wonders, Endless Frontiers* prepared in 2002, at the request of the Governing Board of the US National Research Council, by a committee of members from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine (emphasis in bold is ours):

"Not only did microtechnology during the second half of the 20th century lead to computers and the Internet, but it also brought us to the beginning of an exciting scientific revolution we now call nanotechnology. In addition to the information technologies currently enjoyed throughout the world, microtechnology has helped develop scientific instruments that make it possible for the first time to image, manipulate, and probe objects that can be more than 1,000 times smaller than the microcircuits of the most advanced computers.

These objects have dimensions on the scale of nanometers, 1/100,000 the width of a human hair, hence the term "nanotechnology." In recent work it has been discovered that these tiny objects can have electrical, mechanical, magnetic, and optical properties completely different from those of the same material in bulk form. These discoveries could lead to powerful devices with new capabilities and also new materials that will impact all sectors of technology, from advanced electronics to advanced medicine.

**Scientists have recently gained the understanding that biology works through highly synchronized interactions among nanoscale objects. For this reason, nanoscale science and technology offer the opportunity to understand life processes at a deeper level, cure**

and prevent disease, heal injured bodies, and protect society against chemical and biological weapons. At the same time, nanotechnology will point the way to the design of synthetic devices with some of the amazing capabilities of living systems. This prospect is nothing short of astounding, and it places the importance of nanoscale science and technology research into the right perspective.

Science and engineering at the nanoscale demand interdisciplinary research. To make, manipulate, and probe matter on this size scale requires chemical knowledge and also a deep understanding of physical phenomena. Furthermore, the organization of nanoobjects into useful products is a monumental task for engineers. To realize the potential of nanoscale science and technology in advanced medicine will require research at the interface between engineering, the physical sciences, and biology. For all these reasons, the development of nanoscale science and technology will require generations of interdisciplinary scientists and engineers who can learn and operate across traditional boundaries."

**"If I were asked for an area of science and engineering that will most likely produce the breakthroughs of tomorrow, I would point to nanoscale science and engineering"**

**Neal Lane**

***Former Assistant to the President of the USA for Science and Technology and former Director of the White House Office of Science and Technology***

Nanotechnology has the potential to profoundly change our economy and to improve our standard of living, similarly to the impact information technology had in the past two decades. Numerous products featuring unique properties of nanoscale materials are already available to consumers and industry today. Most computer hard drives, for instance, contain giant magnetoresistance (GMR) heads that, through nano-thin layers of magnetic materials, allow for a significant increase in storage capacity. Some other current uses that are already in the marketplace include catalysis, coatings for easier cleaning or glare-reducing. It is likely that solar cells can be significantly improved with nanotechnology. The pharmaceutical and chemical industries are also being impacted by nanotechnology, both on advanced drug delivery systems and medical diagnostic tools.

In a report prepared by an independent working group for the Prime Minister's Science, Engineering and Innovation Council of Australia in 2005, we can read (emphases in bold are ours):

"Examples of exciting applications of nanotechnology include:

**Nanopowders** — the unusual properties of particles less than 100 nm allow a range of new and improved materials with a breadth of applications, such as plastics that behave like ceramics or metals; new catalysts for environmental remediation; improved food shelf-life and packaging; and novel drug delivery devices.

**Carbon nanotubes** — graphite can be rolled into a cylinder with a diameter of about 1 nm. These strong but light 'carbon nanotubes' are being developed for a raft of uses, such as sensors, fuel cells, computers and televisions.

**Nanomembrane filtration systems** — these have the potential to address one of the most pressing issues of the 21st Century — safe, clean, affordable water.

**Molecular electronic 'cross bar latches'** — Hewlett-Packard believes that silicon computer chips will probably reach a technical dead end in about a decade, to be replaced by tiny nanodevices described as 'cross bar latches'.

**Quantum dots** — these are small devices that contain a tiny droplet of free electrons — essentially artificial atoms. The potential applications are enormous, such as counterfeit-resistant inks, new bio-sensors, quantum electronics, photonics and the possibility of tamper-proof data transmission.

*New technologies for clean and efficient energy generation.*

Developments of this nature will undoubtedly bring significant risks and rewards, as well as raise social and ethical issues that must be addressed in parallel with scientific advancement.

If just a fraction of its potential for social, economic and technological change is realised, then Australia cannot afford to ignore nanotechnology. Global developments in nanotechnology will certainly impact on many of Australia's most important traditional industry sectors, and will raise social and safety issues that must be addressed. Australia has a strong, but fragmented, research base and nanotechnology capability is growing across a number of industry sectors in Australia, including minerals, agribusiness, health and medical devices, and energy and environment. Australia also has the opportunity to be an important player in the emergence of entirely new industries.

The challenge for the next decade is to ensure that the full potential of this exciting technology can be harnessed, while ensuring that the social, ethical and safety issues are properly addressed.

(...)

**Even large countries are recognising the importance of international cooperation in a field as dynamic, expensive and multidisciplinary as nanotechnology. We cannot possibly remain at the cutting edge of the global nanotechnology revolution if its research is not highly integrated with international centres of excellence.**

(...)

Because nanotechnology is classified by the size of the materials being developed and used, the products of this engineering can have little in common with each other — for example fuel cells, fabrics or drug delivery devices. What brings them together is the natural convergence of all basic sciences (biology, physics, and chemistry) at the molecular level. At this level, these diverse fields are unified by the following common themes:

1. *Characterisation tools* — to be able to examine and see the nanostructures or the building blocks of nanomaterials, characterisation tools such as X-ray diffraction, Synchrotron, Scanning and Transmission Electron Microscopy, Scanning Tunneling and Atomic Force Microscopy are powerful tools across disciplines.

2. *Nanoscale science* — because the properties of materials change in unexpected ways at the nanoscale, the science of understanding the behavior of molecules at this scale is critical to the rational design and control of nanostructures for all product applications.

3. *Molecular level computations* — computation technologies such as quantum mechanical calculations, molecular simulations and statistical mechanics are essential to the understanding of all nanoscale phenomena and molecular interactions.

4. *Fabrication and processing technology* — many nanoparticles, powders and suspensions can be directly applied in paints, cosmetics, and therapeutics. However, other nanomaterials must be assembled and fabricated into components and devices. In addition, processing techniques such as sol-gel, chemical vapor deposition, hydrothermal treatment, and milling are common techniques.

(...)

The increased need for more energy will require enormous growth in energy generation capacity, more secure and diversified energy sources, and a successful strategy to tame greenhouse gas emissions. All the elementary steps of energy conversion take place on the nanoscale. Thus, the development of new nanoscale materials, as well as the methods to characterise, manipulate, and assemble them, create an entirely new paradigm for developing revolutionary energy technologies. A recent workshop led by the US Department of Energy identified the following areas in which nanoscience is expected to have the greatest impact:

- Scalable methods to split water with sunlight for hydrogen production
- Highly selective catalysts for clean and energy-efficient manufacturing
- Harvesting of solar energy with 20 % power efficiency and 100 times lower cost
- Solid-state lighting at 50 % of the present power consumption
- Super-strong, light-weight materials to improve efficiency of cars, airplanes, etc
- Reversible hydrogen storage materials operating at ambient temperatures
- Power transmission lines capable of 1 gigawatt transmission
- Low-cost fuel cells, batteries, and supercapacitors built from nanostructured materials
- Materials synthesis and energy harvesting based on the efficient and selective mechanisms of biology.

(...)

A considerable portion of government investment, such as through the United Kingdom's Micro and Nanotechnology Manufacturing Initiative is being directed towards the infrastructure needs of nanotechnology. This reflects the unique demands of measurements at the nanometre scale (nanometrology), as well as the challenges inherent in prototyping products and processes which cut across sectors and expertise in many research fields. Nanometrology is recognised as a key issue by national measurement institutes worldwide because it underpins the ability to attract international investment and partnerships. It also helps eliminate technical barriers to trade and underpins regulatory frameworks.

This, combined with the intensely multidisciplinary nature of nanotechnology itself, highlights the importance of collaboration on a global scale. Even the largest countries and multinational companies will be faced with the prospect that research efforts in nanotechnology will become more expensive, complex, multidisciplinary and dispersed globally. While these developments pose major problems for smaller players, all players will be seeking strategic alliances, and good research performers, such as Australia, should find plenty of opportunities by pursuing international collaboration."

**Nowadays it is clear that nations most actively participating in the international effort to harness nanoscience and technology by developing innovative platforms of excellence for international cooperation, open an attractive to the leading researchers in the world as international laboratories can be, will benefit earlier and to a greater extent from their benefits, and will be able to play a leading role on the scientific, technical and economic cooperation with other advanced regions as well as with less developed regions in Latin America and Asia.**

## The International Advisory Board

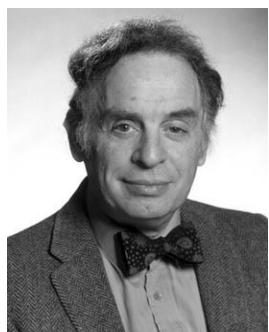
### Knowledgeable and Credible Advice

A research laboratory in the forefront of knowledge and technology needs advice of leading experts in its field. The following experts already accepted to serve on the International Advisory Board of the Portugal-Spain International Research Laboratory:



**Roberto G.M. Caciuffo**

Laurea (cum laude) in Nuclear Engineering, Torino, Italy  
 PhD (cum laude) in Solid State Physics, Parma, Italy  
 Head Actinide Research  
 European Commission Directorate General Joint Research Centre, Institute for Transuranium Elements, Postfach 2340, D-76125 Karlsruhe, Germany



**Thomas Jovin**

B.S. California Institute of Technology, Pasadena, CA, USA  
 M.D. Johns Hopkins Medical School, Baltimore, MD, USA  
 Scientific Member, Max Planck Society  
 Head of Department of Molecular Biology  
 Max-Plank Institute for Biophysical Chemistry, Am Fassberg 11, 37077 Göttingen, Germany



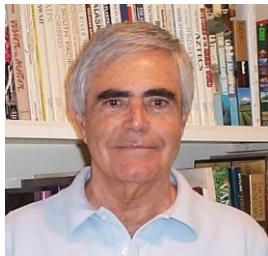
**Emilio Mendez**

PhD Massachusetts Institute of Technology, USA  
 Prize *Príncipe de Asturias* of Scientific and Technical Research 1998  
 Since 1 November 2006 Director of the recently created Center for Functional Nanomaterials, one of the five nanocenters funded by the USA Department of Energy which is being built at the Brookhaven National Laboratory to start operation in April 2007  
 Undergraduate Program Director, Department of Physics and Astronomy, State University of New York at Stony Brook Nichols Road, Stony Brook, NY 11794-3800, USA

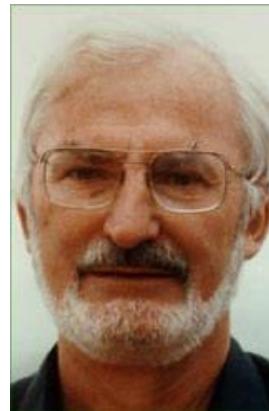


**Christopher B. Murray**

B.Sc. Saint Mary's University, Halifax, Nova Scotia, Canada  
 PhD Massachusetts Institute of Technology, USA  
 American Chemical Society's Nobel Laureate Signature Award in 1997  
 Woodward Fellow by Harvard University's Chemistry Department in 2004  
 Debye Chair Professor, University of Utrecht, the Netherlands in 2004  
 Manager, Nanoscale Materials and Devices, IBM Corp, T. J. Watson Research Ctr. (Rm 20-108), P.O. Box 218, 1101 Kitchawan Rd, Yorktown Heights NY 10598, USA

**Aristides A. Requicha**

Electrical Engineer, Instituto Superior Técnico, Technical University of Lisbon, Portugal  
Ph.D. Electrical Engineering, University of Rochester, USA  
Gordon Marshall Professor of Computer Science and Electrical Engineering  
Director of the Laboratory for Molecular Robotics, nominated in November 2006 as Editor Chief of the IEEE Transactions on Nanotechnology  
Computer Science Department, University of Southern California, 941 Bloom Walk, Los Angeles, CA 90089-0781, USA

**Heinrich Rohrer**

Nobel Prize in Physics 1986 for the invention, with Gerd Binnig, of the Scanning Tunnelling Microscope while working at the IBM Zürich Research Laboratory  
Rebbergstr. 9d, CH 8832 Wollerau, Switzerland

**Mihail C. Roco**

PhD, Received the Carl Duisberg Award in Germany, the Burgers Professorship Award in the Netherlands, the Engineer of the Year Award (twice: 1999 and 2004) by the US National Society of Professional Engineers and NSF  
Was one of the main architects of the US National Nanotechnology Initiative  
Chair of US National Science and Technology Council's subcommittee on Nanoscale Science, Engineering and Technology and Coordinator of the NSF initiative Grant Opportunities for Academic Liaison with Industry  
Senior Advisor for Nanotechnology  
National Science Foundation  
4201 Wilson Boulevard, Suite 505, Arlington, Virginia 22230, USA

# 6

## The Scientific Program

According to the assignment of the first Technical Committee meeting, the following report on the scientific program for the Portugal-Spain International Research Laboratory – International Iberian Nanotechnology Laboratory (INL) was prepared under the responsibility of professors José Rivas (U. de Santiago de Compostela) and Paulo Freitas (Instituto Superior Técnico, U. Técnica de Lisboa, and Instituto de Engenharia de Sistemas e Computadores – Microsistemas e Nanotecnologias (INESC MN), Lisbon).

### **6.1 Introduction**

The INL is an international laboratory created to foster interdisciplinary research in Nanotechnology and Nanoscience. It will provide a state-of-the-art research environment promoting an interdisciplinary effort in addressing the major challenges in the emerging areas of Nanobiotechnology, Nanoelectronics, Nanomedicine, and Materials Science at the Nanoscale. The key research activities are based on existing areas of excellence in Portugal and Spain, as well as on new strategic development areas where PIs (Principal Investigators) will be hired. Key to its success will be the quality of the PIs hired at start-up. The combination of an appropriate level of available research funds, internationally competitive salaries, a state-of-the-art research facility, and the possibility of permanent research positions (about 30% of staff) will be major factors in attracting leading scientists and young and promising researchers to join the founding research team of INL.

The INL will seek strong collaborations with industrial partners and academic research institutions, through a vigorous participation in international research programs, in particular through projects of the 7th Framework Program of the European Union, and by promoting joint post-graduate education programs with major universities. The INL will further foster the creation of spin-off companies in competitive nanotechnology areas, and will manage a strong program in public outreach, popularizing nanoscience and strategic nanotechnology, approaching mass media, science and technology museums, foundations, and publishers.

Finally, but not least, the INL will address ethical questions concerning the societal impact of nanotechnology.

### **6.2 Study group**

This document takes into account most of the recommendations of the INL International Advisory Board. It also received input from selected researchers of Portuguese and Spanish laboratories in the area of nano science and technology, as well as participants in the Portuguese and Spanish Nanotechnology Networks.

This document emphasizes initially a few multidisciplinary strategic research areas, on which the first steps of the INL will focus. The specific projects within these areas will be defined in a greater detail after the Portugal-Spain Summit 2006, taking into account the scientific needs of Portugal and Spain and the international state-of-the-art of nanotechnology.

### **6.3. Portuguese and Spanish Nanotechnology Initiatives Spain**

There are several Spanish activities concerning Nanotechnology and Nanoscience implementation either through the creation of virtual centers, or through the creation of real research infrastructures. The following initiatives are emphasized: in Madrid (3: ISON, Nicolás Cabrera, Microelectrónica), in Catalonia (3: Nanobio, Ciencias Fotónicas, Nanotecnología), in Aragón (1: INA), in Valencia (3: Instituto Fotónico, Instituto Molecular, Instituto Catálisis), in País Vasco (2: Donostia International Physics Center, CIN Biogune), in Asturias (2: Instituto Nanociencia, Instituto del Carbón), and in Galicia (1: Red Gallega de Nanotecnología). Most of these centers participate in the Nanospain Network that incorporates most of the researchers active in this field, with almost 200 groups involving more than 1200 researchers. Among the topics covered, nanomaterials (with important activity in nanoparticles) concentrate about 60% of the efforts, followed by nanoelectronics (with important activity in molecular electronics, nanomagnetism and spintronics) and nanophotonics, nano-(chemistry/

biochemistry), nanomedicine. Most of these groups are located in Madrid and Catalonia. The rest of the high-level groups are dispersed all along the other Spanish Autonomous Communities.

The distribution of this research activity among the different centers in Spain is very heterogeneous: 55% of the activity related to nanotechnology depends from universities. 28% depend from the Spanish Research Council (CSIC), 9% from industry, 4% from technology centers, 3% from foundations and 1% from other kinds of centers.

Regarding financial support, the activities are mainly supported by European funds, national, and regional Ordinary Programmes: MAT, FIS, TIC. On the other hand, it has recently been launched the first specific action for nanoscience and nanotechnology: the Strategic Action in Nanoscience and Nanotechnology, by the Ministry of Science and Education, which turned out to be a very competitive program. In this Strategic Action for Nanoscience and Nanotechnology, the most competitive Spanish groups were found in the following areas: Nanomanipulation & Nanoscale control; Biomedicine & Nanoparticles; Photonics & Nanoelectronics; Nanotechnology & Nanomaterials for Energy conversion and storage. These are the most relevant areas for the research groups in Spain.

## Portugal

In Portugal, activities in the Nanoelectronics, Nanomaterials, and Nanobiotech areas exist centered in Lisbon, at Instituto Superior Técnico and INESC MN (nanofabrication, nanoelectronics, nanobiotech, and electronic nanomaterials), at the Chemical and Biological Engineering Department of Instituto Superior Técnico, Technical University of Lisbon (nanobiotech, colloids, membranes), and at the Universidade Nova de Lisboa (thin film electronics, microfabrication). In the North of Portugal, activities exist at the University of Porto (mostly in the biomedical area, biomedical materials, and physics of nanomaterials), and at the University of Minho in Braga (regenerative medicine materials) and in Guimarães (nano polymer engineering). Ceramic nanocomposites, photonics, and molecular materials are leading research themes at the University of Aveiro. Top down technologies are essentially centered at the Clean Room facilities at INESC MN in Lisbon, and to a lesser extent at Universidade Nova de Lisboa. Most of these groups are now involved in two Associated Laboratories in Nanoscience and Nanotechnology that were created within the Portuguese Science and Technology Foundation, respectively IN (Institute for Nanotechnology) and I3N (Institute for Nanomaterials, Nanosciences, and Nanotech-nologies). The Nanobiotechnology and Nanomedecine area is also covered in the recently created IBB (Institute for Biomaterials and Bioengineering) Associated Laboratory. The ceramic nanomaterials area is mostly covered by the Associated Laboratory CICECO – Research Center in Ceramic and Composite Materials, at U. Aveiro. Most of these centers participate in the Portuguese Nanotechnology Network that incorporates most of the researchers active in this field.

## 6.4 The rationale for the creation of the INL

In summary, the scientific level of Portugal and Spain is internationally competitive from an individual point of view, but it lacks specific weight, i.e., there is need for a critical mass beyond the main nuclei (Madrid, Lisbon) to be internationally sound at a higher level. The INL aims at being a common point of reference for the excellent groups of the Iberian Peninsula for the first time in Portugal and Spain.

On the other hand, most of these groups are working on Nanoscience, only few of them on Nanotechnology. This is one of the main weaknesses of the Iberian Peninsula: good academic level but with few results on the practical side; the opposite to other European countries, USA and Japan. The INL also aims at boosting Nanotechnology, trying to increase practical applications, collaborating with already existing companies as well as stimulating the creation of new spin-off companies. Of course, the fundamentals of Nanoscience will be useful for this strategy.

Finally, the INL will offer new equipment, not existing in many of the Portuguese and Spanish laboratories, and will try to complement the already existing instrumentation of both countries.

## 6.5 Priority research areas

The choice of priority research areas is critical. This choice is based on strategic areas recommended by the International Advisory Board, but also on the existing current areas of excellence in Nanoscience and Nanotechnology in Spain and Portugal and on needs identified in the economical tissue of both countries. Based on these criteria the following priority research areas were selected:

### 6.5.1 Nanomedicine

The focus of this theme is the study, design and fabrication of nanoscale structures and devices for the diagnosis, treatment, and prevention of diseases and genetic disorders. Advanced health technologies will be key drivers of the technological development as the population in developed countries ages and as the full impact of the genome and proteome research becomes available.

Nanomedical nanostructures will include: *in-situ* nanodevices for drug delivery; nanoparticles for selected cell destruction (e.g., hyperthermia in cancer treatment), imaging and diagnostic; biochip platforms for bio-molecular recognition applied to genetic disease diagnosis; DNA, protein and cell-chips; micro and nano-electrodes for neural and cortical implants; neuroelectronics; new biomedical imaging technologies (miniaturized NMR, MRI); and improved MEG and MCG systems.

This theme has a strong societal impact, and will stem from interdisciplinary research between existing teams of engineers, biologists, physicists, physicians, chemists, and others. A strong connection to bioengineering departments and medical schools of major universities, as well as to companies operating in the biotech, medical and pharmaceutical fields will ensure that the research carried

out at the INL will have impact both in the education and in the industry.

### **6.5.2 Environment monitoring and security and food quality control**

This research theme will involve developing point-of-care micro and nano systems targeted at food quality control, at environmental quality analysis (air, water, and soil), as well as at conventional and nuclear explosives, and at other bioterrorism detection. These are areas of great societal concern and enormous economical impact. Developments in these areas can be quickly brought into production and into the market. A Portuguese and Spanish industrial cluster of excellence in these areas has to be envisaged in the near future. This is particularly relevant as the research potential in this area has not been explored in both countries. Seed industries related to the wine, fishing, cheese and olive oil production, as well as coastal water quality monitoring could become global technological leaders.

The development of micro and nano systems for environment monitoring and security, and for food quality control incorporates at a first stage nanotransducer design and fabrication. These transducers will include micro and nano electromechanical systems (MEMS and NEMS), and advanced single/few molecule transducers (based on spintronic, photonic, and electronic detection principles). These transducers will include necessarily chemically and biologically sensitive layers for specific detection of chemical and biochemical signals. In addition to the transducer development, in a second stage, full sensor systems capable of amplifying, conditioning, processing, transmitting and displaying the transducer signal will be a focus of research at INL. The application spectrum is wide, and the immediate societal impact easily recognizable. Interdisciplinary connections with food and environmental engineers, as well as with electrical engineering and computer science Departments will ensure the impact of the INL research.

### **6.5.3 Nanoelectronics (beyond CMOS)**

The focus of this area will be the development of technologies and devices in the “beyond CMOS” area. The electronics industry is the largest industry in the world. Competing directly with the installed infrastructure (“more CMOS”) is deemed impossible due to the enormous amount of financing required. Nevertheless, there is an open opportunity in the development of electronic devices (semiconductor, magnetic, or photonic based) that incorporate novel materials, and unconventional structures, for application in non-commodity products, mostly in the sensor application field. The combination of electronics, photonics and nanoscale materials, is an emerging area that presents a unique opportunity for the research community to influence the future of technology. Fabrication of 2D and 3D photonic crystals cannot only allow the manipulation of light, but also contribute to design novel optical fibers, lasers, etc., with new sensing capabilities.

These new nanoelectronic systems are required to support the previously defined strategic areas (Nanomedecine, Environment Security and Food Quality Control). These novel devices will include merging various state-of-the-art device and sensor technologies (spintronics, NEMS and MEMS, micro- and nanofluidics, optical and semiconductor based devices) in multifunctional microsystems and lab-on-chip platforms targeted at the above defined strategic themes. In addition, novel nanostructures such as carbon nanotubes, single molecules, nanowires, nanoparticles and quantum dots can be incorporated in these platforms.

In a first stage, the Nanoelectronic devices will support applications in Biotechnology and Medicine, as well as in Environmental and Food Monitoring. In a second stage, it is envisaged that the nanoelectronic modules developed can be commercialized as such for incorporation in other products, thus establishing the basis for new start-ups in the nanoelectronics area seeded by the INL.

### **6.5.4 Nano-machines and nanomanipulation**

The INL considers strategic an activity of basic “blue-sky” research on nano-machines and micro-robotics. The objective of the INL is to become one of the leaders in this field of research. Nanomachines are systems that can have a combination of mechanical, sensorial, electronic, computational and communication functions with a size of at most a few tens of micron (the width of a human hair). Another example is “smart dust”, where systems of the size of dust particles can be used for extremely large scale disseminated monitoring.

This area of activity will encompass microfabricated NEMS structures (such as nanoactuators, nanosensors, nano-fuel cells) targeted at single/few molecule detection and/or manipulation. The area also covers the design, synthesis and operation of molecular objects (using self assembly, biomimetic chemistry), and of instruments required to interact with these single molecule structures (such as miniaturized magnetic and optical tweezers). Externally modified self-assembly will be also a key point toward the fabrication of devices using nanoparticles as building blocks. Of major interest is the design of molecular bio-electronic devices merging the physical principles of electronics and computer engineering with the functional and structural principles of biology.

Another possible line of activity concerns the development of sensor/actuator networks at the nanoscale for applications in cellular and molecular systems, first *in vitro* and later *in vivo*. This involves developing sensors, actuators, computing, communications, all at the nanoscale, and building an integrated system with a particular functionality or mission (cell signaling, therapy, etc.). This activity is strongly connected with the priority areas of nanomedicine and nanoelectronics.

### **6.6 Societal impact of nanotechnology**

A crucial part of the mission of INL will be: (i) to enhance the public awareness of nano science and technology, and (ii) to

address the ethical, social and environmental impact of nanotechnology. The INL will at all times drive a strong program in public outreach, popularizing nanoscience and strategic nanotechnology, approaching mass media, science and technology museums, foundations, and publishers.

Public outreach, both to increase public knowledge about nano science and technology, but also to stimulate the young towards science and technology in general, will be an important task of INL. An outreach office will be established, which will form strong connections with schools, universities, and science museums, and collaborate in their activities. INL researchers will be encouraged to give back to the community some of their time, in the form of off-site talks, laboratory visits, and demonstrations. INL will hold "open-days", when both scheduled and spontaneous visits to the Laboratory will be held.

Addressing the ethical, social and environmental impact of a technology with the disruptive potential of Nanotechnology is essential. This will be made through the establishment of protocols with social science and environmental departments of major universities. These agreements will put in contact nano science and technology researchers, who will be mostly engineers, chemists, physicists or biologists, with social scientists and environmental engineers. These teams will be able to have the necessary technical expertise to tackle the complex issues involved.

### **6.7 The scientific infrastructure**

The scientific infrastructure will contain central laboratories (providing services for the INL resident research personnel and visiting scientists) and specialized dedicated laboratories associated with individual PIs or research groups and topics. The central facility will be unique in the Iberian Peninsula in what concerns state of the art nanofabrication and characterization facilities. The dedicated laboratories will further strengthen the world wide competitiveness of the research environment. Besides state of the art instrumentation (so called Class 1), the INL will also promote the realization of Class 0 instruments, that is new instruments with unique capabilities not available anywhere in the world. For instance development of nano and micro sensor based setups to address individual nanoparticle properties.

The central facility will include:

#### **A) Central Micro and Nanofabrication**

Clean Room (around 500m<sup>2</sup>, class 100 and class 10) based on dedicated direct-write e-beam tools capable of 10 to 20nm feature definition. One of the e-beam tools should allow Electron Beam Induced Deposition and Etching. A dual beam FIB system will also provide sample inspection and nanofabrication capabilities. The clean room will include standard deposition tools (multitarget PVD for metal deposition, CVD for oxide and semiconductor deposition), reactive ion etching (metal and oxide), planarization (CMP), and thin film characterization tools (thickness monitor, spectral ellipsometer), ion miller, RTA+ovens, and other equipment required for small scale prototype and device

fabrication on wafer sizes not to exceed 4". A small packaging unit will be formed to dice, wirebond and package various types of devices. The central facility will also incorporate a microfluidics unit (mask aligner, thick resist (SU8), PDMS, and electroplating processing equipment). INL will collaborate with other existent clean room facilities (INESC MN, Lisbon) when larger wafer dimensions are deemed needed (up to 8").

#### **B) A central Scanning Probe Microscopy Laboratory.**

This laboratory will support SPM activity from standard imaging to advanced applications and development of new techniques. A small number (2, expandable as needed) of standard SPMs will be available for regular imaging.

An advanced facility, especially intended for biological/biochemical applications, will provide SPM coupled with confocal optical microscopy. One only similar facility is available in Europe, at EMBL. There will also be one SPM especially intended for the development of new techniques, supported by standard test and measurement equipment. This laboratory will have acoustic and vibration insulation systems as required for SPM.

#### **C) Central Biology and Biochemistry facility**

This facility will provide support for groups developing biology and biochemistry activity. It will provide equipment for FPLC/HPLC protein purification, spectrophotometry/nanochop, mass spectrography with gas chromatography, flow cytometry and cell sorting, real-time PCR, confocal microscopy and centrifugation (ultra and low-speed) and cell culture. The facility will also include the necessary supporting infrastructure, as optical and fluorescence microscopes, -4°C, -20°C and -70°C chambers and freezers, a dark room, a sterile chamber with laminar flow, extraction benches, and a washing and sterilization facility for laboratory material. The possibility of future installation of secure areas needed for bio-hazard work will be contemplated.

#### **D) Central Structural and Interface Characterization Laboratory**

This laboratory will allow in-house detailed structural characterization of thin films, interfaces, and nanostructures. The following techniques will be installed (not exclusive): HRTEM and SEM (combined with SPM and microanalytical tools), X ray (small angle, single crystal and powders, high/low temperatures, etc.), interface and surface analysis (SIMS, Auger, XPS.).

The dedicated laboratories will be associated with particular PI needs, and topical needs (spintronics, NEMS, photonics, high frequency device characterization, nanomaterial synthesis labs, etc...). Funds will be set apart from the beginning to account for these particular infrastructures. Equipment requirements will be discussed with the new PIs as part of the hiring process in order to offer a highly competitive package to attract leading scientists, teams, and young researchers in the designated priority areas.

The Laboratory facilities should accommodate around 400 people (200 scientists, 100 research students, supplemented by technicians, administrative personnel and others). The work space needed, together with support areas (library, meeting rooms, auditory), a residence for up to 50 students and 20 visiting scientists and premises for start ups are estimated to reach a total building area of 13,000 m<sup>2</sup>.

### Annex

#### **Short Description of Current Activity in the Selected Priority Research Areas in Portugal and Spain<sup>2</sup>**

##### 1. Nanomedicine

###### SPAIN

1) Group/Institution: Análisis de Complejos Macromoleculares Estructura de Macromoléculas, Centro Nacional de Biotecnología Consejo Superior de Investigaciones Científicas, Campus de la UAM, Cantoblanco, 28049 Madrid

Contact Person: José L. Carrascosa / José M. Valpuesta

Web page:

[http://www.cnb.uam.es/groups/DEM/lineas\\_dpto4/jose\\_l\\_carrascosa/index\\_html](http://www.cnb.uam.es/groups/DEM/lineas_dpto4/jose_l_carrascosa/index_html)

Short description of the work developed:

- Structural analysis of biological nanomachines.
- Three-dimensional electron microscopy in three dimensions. Determination of structure and mechanical properties of complex biological assemblies at the level of single molecules by atomic force microscopy and optical tweezers.
- Design and manipulation of chimeric macromolecular assemblies.

2) Group/Institution: Grupo de Carbohidratos Química Bioorgánica Instituto de Investigaciones Químicas CSIC, Américo Vespucio, 49. Isla de la Cartuja. Sevilla

Contact Person: Soledad Penadés / Jesús M. de la Fuente

Web page:

<http://www.iiq.cartuja.csic.es/grupocarb/carbohidratos.htm>

Short description of the work developed:

- Activation of the acidic growth factor for fibroblasts
- Cell recognition
- Molecular basis of biological processes of molecular recognition with carbon hydrates
- Structure and molecular recognition of carbohydrates by RMN and molecular simulation
- Glyconanotechnology: Development of metallic and magnetic glyconanoparticles, and quantum dots for cell signaling.

3) Group/Institution: Laboratorio de Nanobioingeniería Bioelectrónica y Nanobiociencia, Centro de Referencia en

Bioingeniería de Cataluña Parque Científico de Barcelona (PCB-UB) CBEN-CREBEC, Baldíri Reixac 10-12, 08028

Contact Person: Josep Samitier / Fausto Sanz / Daniel Navajas

Web pages: <http://www.cben.ub.es/>

<http://wwwpcb.ub.es/homePCB/live/ct/p1.asp>

Short description of the work developed:

- Funcionalization
- Nanobiotechnology
- Nanomanipulation
- NEMS.

4) Group/Institution: Semiconductor and Magnetic Nanostructures – Instituto de Microelectrónica de Madrid-IMM-CNM-CSIC

Contact Person: Monica Luna Estévez / Jose Luis Costa-Kramer/ Fernando Briones

Web page: <http://www.imm.cnm.csic.es/>

Short description of the work developed:

- Development of opto/magnetic biosensors and bioarrays
- Bio-functional magnetic nanoparticles
- SPM and AFM non contact spectroscopy in liquids
- Biomedical applications.

5) Group/Institution: CIC biomaGUNE Parque Tecnológico de S. Sebastián, Paseo Miramon 182 Edif C 20009 San Sebastián- Guipuzcoa

Contact Person: Manuel Martín Lomas

Web page: <http://www.cicbiomagune.com/>

Short description of the work developed:

- Biomaterials and biosurfaces
- Nanoparticles biofunctionalization
- Glyconanotechnology
- Molecular imaging
- Biomedical applications.

6) Group/Institution : Micro y Nanotecnologías, Fundación Tekniker Tekniker, Avda. Otaola, 20 - 20600 EIBAR

Contact Person: Sabino Azcarate / Santos Merino

Web page <http://www.tekniker.es/>

Short description of the work developed

- Nanoreplication
- Nano Imprint Lithography (NIL)
- Soft lithography.

7) Group/Institution Sistemas de Liberalización de Farmacos Farmacia – Tecnología Farmacéutica, Facultad de Farmacia – Universidad de Santiago de Compostela Campus Sur, Santiago de Compostela CP 15706

Contact Person : María José Alonso Fernández

Short description of the work developed:

<sup>2</sup> Illustrative list, it should not be considered complete, as several groups not listed here might fit in.

- Design, development and characterization of new nanostructures with specific biological functions
- Association of drugs and vaccines to nanoparticulate carriers
- Evaluation of the interaction and mechanism of action of drug nanocarriers with the biological environment.

8) Group/Institution: Laboratorio de Estructura y Función de Proteínas Instituto de Biología Molecular y Celular, Universidad Miguel Hernández UMH Edificio Torregaitán. Avda Ferrocarril s/n. Elche (Alicante)

Contact Person : Jesús M. Sanz  
Web page: <http://ibmc.umh.es/jmsanz/jmsanz.htm>

Short description of the work developed :  
• Inmobilization of enzimes.

9) Group/ Institution: Grupo de Sensores Ópticos y Sensores no Invasivos de Aplicación Médica, Instituto de Microelectrónica de Madrid-IMM-CSIC Isaac Newton,8 PTM 28760 Tres Cantos

Contact Person: J.Pedro Silveira / M.Luisa Dotor/ Sonia Lopez/ Ivan Fernández  
Web page: <http://www.imm.cnm.csic.es/>

Short description of work:  
• Non invasive optical sensors (oxygen in blood ) based on laser diodes  
• Implantable micro and nano-mechanical sensors and actuators.

10) Group / Institution: Dept. Química Inorgánica y Bioinorgánica, Facultad de Farmacia Universidad Complutense de Madrid, Ciudad Universitaria. Ramón y Cajal s/n 28040

Contact person: Prof. María Vallet-Regí

Short description of work:  
• Biomaterials and their use in biomedical applications.  
Chemistry of biomolecules and biometrials.

11) Group / Institution: Instituto Nicolas Cabrera, Facultad de Ciencias C-XVI 4a.planta, Universidad Autonoma de Madrid, Cantoblanco. Madrid 280490

Contact person: Dr. J. Ricardo Arias-Gonzalez  
Web page: [www.cnb.uam.es/~jrarias/](http://www.cnb.uam.es/~jrarias/)

Short description of work:  
• Application of optical tweezers to study and manipulation of biological macromolecules  
• Use of single molecule approach for the analysis of behaviour of DNA under different environmental conditions.

12) Group/Institution: Drug Delivery, University of Pamplona

Contact Person: Juan Manuel Irache

Short description of work:

- Nanotechnologies applied to the administration of chemotherapies
- Nanotechnologies applied to the development of vaccines and immunotherapy.

13) Group/Institution: Pharmacy and pharmaceutical technology, Facultad de Farmacia. Paseo de la Universidad nº 7, Universidad del País Vasco. UPV/EHU, 01006 Vitoria.

Contact person: Jose Luis Pedraz Muñoz  
Web page:  
[http://www.vc.ehu.es/castellano/paginas/prin\\_c.htm](http://www.vc.ehu.es/castellano/paginas/prin_c.htm)

Short description of work:  
• Pharmaceutical ways of continuous drug delivery  
• Micro/nanoencapsulation of vaccines  
• Microencapsulation of live cells  
• Micro/nanoencapsulation of AND.

14) Group/Institution: Centro Nacional de Microelectrónica., Madrid

Contact person: Laura Lechuga  
Web page:  
<http://www.imm.cnm.csic.es/biosensores/home.htm>

Short description of work:  
• Development of biosensors, either based on surface plasmon resonance of metallic thin films or on the vibration frequency of cantilevers.

15) Group/Institution Instituto de Nanociencia de Aragón (INA)

Contact Person: M.R. Ibarra  
Web page: <http://ina.unizar.es/>

Short description of work:  
• Nanostructured materials for application in nanodiagnostic and nanotherapy (nanoparticles, thin films, nano and microdevices), spintronics  
• Nanomaterials as nanoporous (J. Santamaría) and dendrimers (J.L. Serrano) are of the most interest.

16) Group/Institution NANOGUNE, País Vasco

Contact Person Miguel Etxenique  
Web page: <http://csic.sw.ehu.es/group/>

Short description of the work developed:

- Study of the Role of the nanoscale in physical phenomena
- Surfaces at atomic level, theoretical approaches.

17) Group/Institution: ICMOL (Instituto de Ciencias Moleculares), Valencia

Contact Person: Eugenio Coronado  
Web page : <http://www.uv.es/~icmol/>

Short description of the work developed:

- Synthesis and characterization of molecules, (molecular magnetism, molecular electronics, nanotechnology, biotechnology, catalysis, ...)

18) Group/Institution: Instituto de Nanociencia y Nanotecnología, Universidad de Barcelona (IN2UB)

Contact Person: Amilcar Labarta

Short description of the work developed:

- Multidisciplinary scientific activity in the field of nanomaterials and applications in different fields. Such as as nanomedicine and biosensors.

19) Group/Institution: Magnetism and Nanotecnology Laboratory, University of Santiago de Compostela/SPAIN

Contact Person: M.A. López-Quintela & J. Rivas

Web page: <http://www.nanogap.es/>

Short description of the work developed:

- Main promoters of a recent spin off company (Nanogap) dedicated to the production of clusters for Nanomedicine .

20) Group/Institution: Group de Sensors i Biosensors, Univ. Autonoma de Barcelona, Spain

Contact Person:S. Alegret

Web page: [http://sensors.uab.es/web\\_eng/default.asp](http://sensors.uab.es/web_eng/default.asp)

Short description of the work developed:

- Electrochemical biosensors

21) Group/Institution: Catalan Institute of Nanotechnology, Universidad Autónoma de Barcelona

Contact person: Víctor F. Puntes

Web page: <http://www.nanocat.org/>

Short description of work:

- Preparation of nanoparticles and hybrid materials and nanostructures by self assembly.

22) Group/Institution: Nanotechnology based biosensors, Catalan Institute of Nanotechnology. Campus UAB 08193 Bellaterra

Contact Person: Arben Merkoçi

Web page: <http://www.nanocat.otg>

Short description of the work:

- Integration of biological molecules into micro- and nanostructures. Nanotechnology-based biosensors.

## PORUGAL

1) Group/Institution: BioEngineering Research Group /Centro de Engenharia Biológica e Química do Instituto

Superior Técnico" and Institute for Biotechnology and Bioengineering

Contact Person: Joaquim M. S. Cabral

Web page: <http://dequim.ist.utl.pt/cebg/berg/f-research.html>

Short description of the work developed:

- Development of biochips (collaboration with INESC - Microsystems and Nanotechnology) for molecular and cellular monitoring and detection
- Thin-film microelectronic technology is used to miniaturize highly selective detection systems containing immobilised biomolecules (oligonucleotides, PNAs, enzymes, antibodies)
- Highly sensitive magnetoresistive sensors are used for magnetic label detection of biomolecules and cells, through biomolecular recognition
- Superparamagnetic microbeads composed of nanometer-sized particles of magnetic material in a polymer matrix covered with different chemical functions can be specifically attached to the biomolecule (proteins, enzymes, monoclonal antibodies, oligonucleotides) target

2) Group / Institution: I3S, INstituto de Investigaçao e Inovaçao em Saude, Porto

Contact Person: Mário Barbosa

Web pages: <http://www.ibmc.up.pt/>, <http://www.ipatimup.pt/>, <http://www.ineb.up.pt>

IBMC – Instituto de Biologia Molecular e Celular, IPATIMUP – Instituto de Patologia e Imunologia Molecular and INEB – Instituto de Engenharia Biomédica are jointly starting the Instituto de Investigação e Inovação em Saúde (I3S), associating more than 500 researchers (220 with PhD) in the field of health sciences and bioengineering. INEB is a member of the European Technology Platform on NanoMedicine – Nanotechnology for Health. I3S could form a coherent interface with the International Nanotechnolgy Laboratory in the area of Nanomedicine.

Short description of work:

- Theranostics, i.e., "find, fight and follow" concept of early diagnosis, therapy and therapy control
- Smart delivery of micro- or nanospheres for inhibition of binding of micro-organisms; identification of new biomarkers
- Targeting cancer cells for imaging technologies and drug delivery; substrate-guided stem cell differentiation
- Self-assembled monolayers as model surfaces to investigate cell-material and protein-material interactions
- Cell-encapsulation
- Non-viral vectors for gene delivery.

3) Group/Institution: INESC MN, Lisbon, Portugal.

INESC MN is a member of the European Technology Platform on NanoMedicine – Nanotechnology for Health.

Contact person: P.P.Freitas  
Web page: <http://www.inesc-mn.pt/>

Short description of work:

- Integrated lab on chip platforms for biomolecular recognition detection (DNA and cell chips) using magnetoresistive sensors and magnetic nanoparticles (application: cystic fibrosis chip), using MEMS and NEMS and using opto electronic detection
- Lab on chip magnetic cell separation (stem cell separation)
- Development of hybrid magnetoresistive/flux guide sensors systems for magnetoencephalography and magneto-cardiography
- Development of micro and nanoelectrodes for neuroelectronic applicatons
- Study of biological systems and processes (cilia growth, parasite invasion) by SPM techniques (AFM, MFM).

4) Group/Institution: 3B's Research Group - 3B's Research Group- Biomaterials, Biodegradables and Biomimetics, University of Minho

Contact Person: Rui L. Reis  
Web page: <http://www.3bs.uminho.pt/>

Short description of the work developed:

- Development of new materials to be used on a range of biomedical and environmental applications, in particular new polymeric and composite biomaterials from natural origin and mainly from renewable resources (starch, casein, soy, chitin, algae, and others)
- Design of innovative biomimetic processing routes and materials
- Study of biodegradable systems for applications related to bone replacement/fixation/cements, tissue engineering scaffolding and tissue regeneration, systems for controlled release of drugs or bioactive agents.

5) Group/Institution: CICECO – Research Center in Ceramic and Composite Materials, U. Aveiro

Contact Person : Joao Rocha  
Web page: <http://www.ciceco.ua.pt/>

Short description of the work developed:

- Functional nanostructures, based on ceramics and polymer nanocomposites, for biological labeling, clinical diagnostics or in photoactive products
- Novel nanostructures based on ferroelectric polymers and perovskite ceramic thin films for biorecognition devices and selective self-assembly of organic and biomaterials. Polarization-dependent chemical reactivity and piezoelectric effect for local probing and control of the surface
- Transition-metal and lanthanides based magnetic nanoparticles for use as contrast agents in MRI and cancer treatment

- Development of functionalised textiles with antimicrobial activity, improved dyeing and barrier properties based on chitin and related biopolymers.

6) Group/Institution: Faculty of Pharmacy, University of Lisbon

Contact Person: Rogério Gaspar  
Web page: <http://www.ff.ul.pt/>

Short description of the work developed

- Vaccines and oncology using nanoparticulate systems (drug delivery and nucleic acid delivery strategies)
- The group is aiming at cytosolic delivery through functionalisation of polymeric and biodegradable nanoparticles for use in oncology (chemotherapy and nucleic acids) and for protein therapeutics (including vaccines)

7) Group/Institution: Centre for Neurosciences and Cell Biology, University of Coimbra

Contact Person: Sérgio Simões  
Web page: <http://www.cnc.pt/>

Short description of the work developed

- Gene delivery with fusogenic liposomes
- Lipoxes, cationic liposomes, pH-sensitive liposomes and sterically stabilized liposomes for drug delivery in oncology
- Viral vectors in neurodegenerative diseases.

2. Environment monitoring and security and food quality control

SPAIN

1) Group/Institution: Electro-Biocatálisis EBC CSIC  
C/ Marie Curie, s/n, Cantoblanco, 28049 Madrid

Contact Person: Victor M. Fernandez Lopez / Jose Maria Abad Pastor / Antonio Lopez de Lacey  
Web page: <http://www.icp.csic.es/bec/becaesp.html>

Short description of the work developed:

- Self assembled monolayers
- Redox enzymes
- Nanoparticles
- Biosensors.

2) Group/Institution: Centro de Innovación en Biotecnología DINAMIC, Universitat Rovira i Virgili URV Avda. Països Catalans, 18 43007 Tarragona

Contact Person :Ioannis Katakis / Joaquim Solana / Barbara Vastenavond  
Web page: <http://www.etseq.urv.es/dinamic>

Short description of the work developed:

- Inmunosensors, DNA Sensors

- Nanobiotechnology
- Cell electronics
- Microreactors.

3) Group/Institution: Grupo de Biosensores Centro Nacional de Microelectrónica (IMM-CNM), CSIC, Tres Cantos Madrid

Contact Person: Laura M. Lechuga Gómez

Web page:

<http://www.imm.cnm.csic.es/biosensores/home.html>

Short description of the work developed:

- Biosensors-SPR- Integrated Mach- Zehnder
- Nanobiotechnology
- Immobilization at nanometer scale.

4) Group/Institution: Bionanomechanics Lab Dpto de Dispositivos, Sensores y Biosensores, Instituto de Microelectrónica de Madrid - CSIC Isaac Newton 8, 28760 Tres Cantos, Madrid

Contact Person: Javier Tamayo / Montserrat Calleja / Johan Mertens

Web page: <http://www.imm.cnm.csic.es/>

Short description of the work developed:

- Nanomechanical biosensors.

5) Group/Institution: Laboratorio de Envases Conservacion y Calidad de los Alimentos Instituto de Agroquímica y Tecnología de Alimentos IATA, CSIC

Contact Person: José María LAGARON

Web page: <http://www.iata.csic.es/>

Short description of the work developed:

- Development of materials, blends and nanocomposites for food packaging applications.

## PORTUGAL

1) Group/Institution: BioEngineering Research Group /"Centro de Engenharia Biológica e Química do Instituto Superior Técnico" and Institute for Biotechnology and Bioengineering, Lisbon

Contact Person: Joaquim M.S. Cabral

Web page: <http://dequim.ist.utl.pt/ceqb/berg/f-research.html>

Short description of the work developed:

- Development of biochips (collaboration with INESC - Microsystems and Nanotechnologies) for molecular and cellular monitoring and detection
- Probe immobilisation and target hybridisation through affinity interaction between biotin-labelled target and streptavidin-modified supermagnetic particles have been demonstrated. This detection method is extended to enzymes (peroxidases), antibodies, DNA and cellular recognition. It is also aimed to extend these concepts to

multienzyme catalysis in microfluidic biochips for chemical and biochemical analysis in the chemical and pharmaceutical industries as well as to ex vivo expansion and differentiation of stem cells.

2) Group/Institution: INESC MN, Lisbon

Contact person: P.P.Freitas

Web page: <http://www.inesc-mn.pt/>

Short description of research activity

- Integrated lab on chip platforms for biomolecular recognition detection ( DNA and cell chips) using magnetoresistive sensors and magnetic nanoparticles (application: Salmonella and e-Coli detection in water, heavy metal ion bioremediation ).

3) Group/Institution: CENIMAT – Centro de Investigação de Materiais, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa

Contact Person: Elvira Fortunato

Web page: <http://www.cenimat.fct.unl.pt/>

Short description of the work developed:

- UV and ozone sensors based on zinc oxide thin films.

## 3. Nanoelectronics (beyond CMOS)

### SPAIN

1) Group/Institution: Reliability and Nanofabrication of Micro and Nanoelectronic Devices, Ingeniería Electrónica Universidad Autónoma de Barcelona, UAB, Departament d'Enginyeria Electrònica, Escola Tècnica Superior d'Enginyeria, Universitat Autònoma de Barcelona, 08193 Bellaterra

Contact Person: Xavier Aymerich / Montserrat Nafría / Marc Portí

Web page: <http://einstein.uab.es/suab72w/>

Short description of the work developed:

- Nanodevices
- Nanooxides reliability
- Nano-oxidation y lihtography
- Dielectrics High K.

2) Group/Institution: Materiales Moleculares Orgánicos Química Orgânica, Facultad de Ciencias Químicas Universidad Complutense de Madrid UCM

Contact Person: Nazario Martín León / Luis Sánchez Martín / Mª Ángeles Herranz Astudillo / Emilio M. Pérez Álvarez  
Web page: <http://www.ucm.es/info/ccquim>

Short description of the work developed:

- Chemistry of Fullerenes

- Electronic transference
- Carbon Nanotubes
- Molecular electronics, electrochemistry.

3) Group/Institution: Institut Català de Nanotecnologia (under construction) ICN, Edificio C, Universitat Autònoma de Barcelona 08193 Bellaterra

Contact Person: Jordi Pascual  
Web page: <http://www.nanocat.org/>

Short description of the work developed:

- Nanopartículas
- Nanociencia molecular
- Nanomagnetismo
- Manipulación atómica

4) Group/Institution: Optical Spectroscopy of Semiconductor Nanostructures Física de Materiales C-IV Facultad de Ciencias Universidad Autónoma de Madrid UAM Campus de Cantoblanco, E-28049 Madrid

Contact Person: José Manuel Calleja / Luis Viña / Herko van der Meulen  
Web page:  
<http://www.uam.es/departamentos/ciencias/fisicamateriales/lvina/>

Short description of the work developed:

- Quantum wires
- Excitons and Polaritons
- Semiconductor microcavities
- Condensation and Coherence.

5) Group/Institution: Química Supramolecular de Coordinación Química Inorgánica, Facultad de Ciencias Universidad Autónoma de Madrid QSCO, Cantoblanco 28049 – Madrid

Contact Person: Felix Zamora / Pilar Amo / Pedro del Castillo  
Web page:  
[http://www.uam.es/personal\\_pdi/ciencias/fzamora/grupo/English/Home.htm](http://www.uam.es/personal_pdi/ciencias/fzamora/grupo/English/Home.htm)

Short description of the work developed:

- Molecular wires
- Supramolecular chemistry and molecular recognition
- Nanoarrays
- CNT and carbon nitrides

6) Group/Institution: Grupo de Modelización y Simulación Teoría de la Materia Condensada, Instituto de Ciencia de Materiales de Madrid Consejo Superior de Investigaciones Científicas CSIC Campus de Cantoblanco, 28049-Madrid

Contact Person: Pedro Amilio Serena Domingo / Samuel Pelaez  
Web page: <http://www.icmm.csic.es/>

Short description of the work developed:

- Molecular Dynamic
- Metallics Nanocontact
- Electric Transport
- Simulation Monte Carlo.

7) Group/Institution: Photonic Crystals Group, Instituto de Ciencia de Materiales de Madrid, CSIC

Contact person: Ceferino López  
Web page: <http://www.icmm.csic.es/cefe/>

Short description of work:

- Synthesis and characterization of photonic crystals (using colloid chemistry) with improved efficiency and design of defects for light propagation

8) Group/Institution: Centro Nacional de Microelectrónica, CSIC, Madrid

Contact person: Pablo Aitor Postigo  
Web page:  
<http://www.imm.cnm.csic.es/cristalfotonico/cristalesfotonicos1.htm>

Short description of work:

- Fabrication of two-dimensional photonic crystals (using lithography) made of semiconductors.

9) Group/Institution Instituto de Nanociencia de Aragón (INA)

Contact Person: M.R. Ibarra  
Web page: <http://www.ina.unizar.es/>

Short description of work:

- Nanostructured materials for application in nanodiagnostic and nanotherapy (nanoparticles, thin films, nano and microdevices)
- Spintronics
- Nanomaterials as nanoporous and dendrimers.

10) Group/Institution IMDEA-Nano (Instituto Madrileño de Estudios Avanzados-Nanociencia)

Contact Person: Rodolfo Miranda  
Web page: <http://www.imdea.org/tabid/117/Default.aspx>

Short description of the work developed

- Characterization of surfaces at atomic level
- Nanomagnetism
- Nanoelectronics
- Nanobiomedicine.

11) Group/Institution: ICMM, CSIC, Madrid

Contact Person: M. Vázquez  
Web page: <http://www.icmm.csic.es/>

- Short description of the work developed:
- Magnetic Nanostrucures

- Arrays of magnetic nanowires.

12) Group/Institution: Instituto de Magnetismo Aplicado. Laboratorio Salvador Velayos, Universidad Complutense de Madrid

Contact Person: A. Hernando

Short description of the work developed:

- Magnetism and Transport in Nanostructures
- Nanocrystalline materials (preparation and characterization)
- Magnetic thin films and multilayers (preparation and characterization)
- Field and thermally activated magnetization reversal processes.

13) Group/Institution: Depart. De Nanociencia Molecular / Inst Ciencia de Materiales, CSIC, Barcelona

Contact Person: Jaume Veciana

Web page: <http://www.icmab.es/dmmis/lmo/>

Short description of the work developed:

- Molecular Nanomaterials
- Molecular self- assembly
- Molecular Electronics
- Molecular magnetism.

14) Group/Institution: Institut de Ciencias Fotónicas de Barcelona (ICFO), Mediterranean Technology Park Av. del Canal Olímpic s/n 08860 Castelldefels (Barcelona)

Contact person: Lluís Torner

Web page: <http://www.icfo.es/>

Short description of work:

- Biophotonics
- Nanophotonics
- Quantum and non-linear optics.

15) Group/Institution: Quantum Transport in Carbon Nanotubes Catalan Institute of Nanotechnology / CSIC. Campus UAB 08193 Bellaterra.

Contact Person: Adrian Bachtold

Web page: <http://www.nanocat.otg/>

Short description of the work:

- Electrical and mechanical properties of nanotubes.

## PORUGAL

1) Group/Institution: INESC MN, Lisbon

Contact Person: P.P.Freitas

Web page: <http://www.inesc-mn.pt/>

Short description or research activity:

- Spintronics (magnetic device nanofabrication: read head elements for hard disk storage, MRAMs-non volatile magnetic random access memories, magnetoresistive sensors (ultra low noise field detectors from nT/sqrt(Hz) to 10pT/sqrt(Hz)), magnetic thin film deposition (magnetic tunnel junctions, spin valves (CIP and CPP) using IBD and PVD systems for 6" and 8" diameter wafers)
- MEMS and NEMS resonators
- Thin film semiconductor devices (TFTs, TFds, LEDs)
- Micro and nanofabrication techniques (e-beam ( minimum features 50nm), and laser( minimum features 0.8um) direct writing, clean room microfabrication techniques).

2) Group/Institution: Group on Physics of Magnetic Materials, Thin films and Nanostructures (IFIMUP)

Contact Person: J. B. Sousa

Web page: <http://www.ifimup.up.pt/>

Short description of the work developed

- Modeling and characterization of spintronics materials and devices ( transport and magnetic properties in spintronic devices )
- Artificial ferromagnetic/ferroelectric nanogranular multilayers for hybrid devices.

3) Group/Institution: CENIMAT – Centro de Investigação de Materiais, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa

Contact person: Elvira Fortunato

Web page: <http://www.cenimat.fct.unl.pt/>

Short description of the work developed

- ZnO-based TFTs deposited at room temperature with high field effect mobility
- Development of porous silicon for room temperature photoluminescence applications.

4) Group/Institution: CICECO – Research Center in Ceramic and Composite Materials, U. Aveiro

Contact Person: Joao Rocha

Web page: <http://www.ciceco.ua.pt/>

Short description of research activities:

- Inorganic and hybrid (inorganic-organic) nanomaterials for optical and magnetic applications.
- Nanostructured semiconductor and oxide materials for electronic and photonic applications, particularly thin and ultra-thin films and complex multilayers.
- Single molecules, rare-earth oxides nanotubes, nanorods, nanoparticles and quantum dots.
- Multifunctional ceramic thin films with improved coupling between magnetic, electric and elastic properties in complex geometries for novel generation of nanoelectronic devices.

5) Group/Institution: Department of Physics, U. Aveiro

Contact Person: M.C.Carmo

Web page: <http://www.fis.ua.pt/>

Short description of research activities :

- Physical characterization of microelectronic and opto-electronic devices and materials (ZnO quantum rods, synthetic quantum dots, magnetic nanoclusters in ZnO, SiGe/Si quantum dots, CVD diamond nanostructured films).

#### 4. Nanomachines and Nanomanipulation

##### SPAIN

1) Group/Institution: Laboratorio Furezas y Túnel Fabricación y Caracterización de Nanoestructuras, Instituto de Microelectrónica de Madrid CSIC c/ Isaac Newton 8, 28760 Tres Cantos, Madrid

Contact Person: Ricardo García García

Web page: <http://www.imm.cnm.csic.es/spm/>

Short description of the work developed:

- Nanolithography
- Spatial confinement of a chemical reaction between an AFM tip and sample surface (Local Oxidation Nanolithography).
- Molecular Electronics Nanomechanics.

2) Group/Institution: Instituto de Ciencia Molecular, U. de Valencia, Doctor Moliner 50. 46100 Burjasot

Contact Person: Eugenio Coronado Miralles

Web pages: <http://www.uv.es/~uimm>  
<http://www.uv.es/~icmol/index.htm>

Short description of the work developed:

- Nanomagnetism
- Molecular Materials with magnetic, electric and optical properties
- Molecular Machines.

3) Group/Institution: Grupo de Nanotecnología Tecnología del silicio y microsistemas, Instituto de Microelectrónica de Barcelona. Centro Nacional de Microelectrónica CSIC Campus de la Universidad Autónoma de Barcelona, 08193-Bellaterra

Contact Person: Francesc Pérez Murano / Joan Bausells Roigé / Jaume Esteve Tintó

Web page: <http://www.cnm.es/>

Short description of the work developed:

- Design and synthesis of molecules and molecular assemblies exhibiting useful physical or chemical properties.

- Exploration of the potential applications of these molecules and materials in different areas of current interest (molecular magnetism, molecular electronics, nanotechnology, biotechnology, catalysis

4) Group/Institution: Departamento de Física, Universidad de Murcia, Facultad de Química,Campus de Espinardo, 30100 Murcia.

Contact Person: Jaime Colchero Paetz

Web page: <http://www.um.es/grupos/grupo-efecto-tunel>

Short description of the work developed:

- Developments in Scanning Tunnelling Microscopy and Scanning Force Microscopy
- Tip-sample interaction in a Scanning Probe Microscope
- Wetting and de-wetting on a nanometer scale
- Nanometer sized constrictions (liquid and solid)
- Application of Scanning Probe Microscopy to Biology.

5) Group/Institution: Laboratorio de Nuevas Microscopias Departamento de Física de la Materia Condensada, Universidad Autónoma de Madrid

Contact Person: Arturo M. Baró

Short description of the work developed:

- Instrumentation in Scanning Probe Microscopy
- Study of surface diffusion in semiconductors by variable low temperature STM
- Electrical transport properties in nanotubes and DNA
- Study of adsorption of liquid water on graphite, mica and gold
- Application of Atomic Force Microscopy to biological systems

6) Group/Institution: Nanotec Electrónica, Centro Empresarial Euronova 3 Ronda de Poniente, 2 Edificio 2 - 1<sup>a</sup> Planta - Oficina A, 28760 Tres Cantos (Madrid)

Contact Person: Adriana Gil, Rafael Fernandez

Short description of the work developed:

- SPM, Design, fabrication and sales
- Nanolithography, Software development, SIESTA
- AFM, liquid cells

7) Group/Institution: Instituto Cajal/CSIC, Madrid

Contact person: Mariano Carrión-Vázquez

Web page:  
<http://www.cajal.csic.es/departam/depneurob/TTNB9/resari.htm>

Short description of work:

- Study of the function of several nanomachines from the nervous system
- Mechanical properties of a selection of critical proteins, some of them involved in human pathology, in particular, nanomachines of the nervous system that are

involved in cell adhesion (e.g., cadherins and L1-CAM, Fig. 1), membrane fusion (e.g., SNAREs) and in the cell “unfoldases” (e.g., molecular chaperons and proteasome).

8) Group/Institution: Departamento de Física de la Materia Condensada C-III, Universidad Autónoma de Madrid, 28049 Madrid

Contact person: Pedro J. de Pablo

Short description of work:

- Study of elastic nanomechanics of nanoparticles
- Force response of biomaterials using Atomic Force Microscopy in aqueous environment
- Analysis of elastic response at nanoscopic scale. Use of viral systems as models.

9) Group/Institution: Bionanomechanics Lab, Institute of Microelectronics of Madrid, IMM-CSIC Isaac Newton 8 (PTM), 28760 Tres Cantos, Madrid, Spain

Contact person: Javier Tamayo

Short description of work:

- Design of novel bio-inorganic devices for several purposes
- Use of biomolecules to generate modified cantilevers and arrays for biosensors
- Microfabrication
- Use of atomic force microscopy for analysis and manipulation.

10) Group/Institution: Department of Structure of Macromolecules Centro Nacional de Biotecnología, CSIC, Campus Universidad Autónoma de Madrid, Cantoblanco, Madrid

Contact person: Jose L. Carrascosa

Web page:

[http://www.cnb.uam.es/groups/DEM/lineas\\_dpto4/jose\\_l\\_carrascosa/index\\_html](http://www.cnb.uam.es/groups/DEM/lineas_dpto4/jose_l_carrascosa/index_html)

Short description of work:

- Structural analysis of biological nanomachines
- Three-dimensional electron microscopy in three dimensions
- Determination of structure and mechanical properties of complex biological assemblies at the level of single molecules by atomic force microscopy and optical tweezers
- Design and manipulation of chimeric macromolecular assemblies.

11) Group/Institution: Grupo de Química Coloidal, Universidade de Vigo

Contact person: Luis M. Liz-Marzán

Web page: <http://webs.uvigo.es/coloides/nano>

Short description of work:

- Nanoparticle assembly for development of localized surface plasmon sensors.
- Modification of carbon nanotubes for sensing/actuating response

12) Group/Institution IMDEA-Nano, Instituto Madrileño de Estudios Avanzados-Nanociencia

Contact Person: Rodolfo Miranda

Web page: <http://www.imdea.org/tabid/117/Default.aspx>

Short description of the work developed:

- Multidisciplinary Institute focused on Nanoscience, develops activities in the fields of characterization of surfaces at atomic level
- Nanomagnetism, nanoelectronics, nanobiomedicine.

13) Group/Institution: Magnetism and Nanotechnology Laboratory, University of Santiago de Compostela

Contact Person: M.A. López-Quintela &J. Rivas

Web page: <http://www.nanogap.es/>

Short description of the work developed:

- Self-assembled technologies for the synthesis of Nanomaterials.

14) Group/Institution: Inst. De Tecnología Química y Textil, CSIC, Barcelona/Spain

Contact Person: C. Solans

Web page: <http://www.iqab.csic.es/colloidalinterfacing.htm>

- Short description of the work developed:
- Nanomaterials templating by self-assembled surfactants
- Surfactant phase behavior in multicomponent systems (micelles, liquid crystals, vesicles, microemulsions)
- Formation and stability of nano-emulsions and highly concentrated emulsions and
- Study of colloidal systems (emulsions, microemulsions, liquid crystals) as novel confined reaction media for the synthesis of nanoparticles and novel mesoporous materials.

## PORUGAL

1) Group/Institution: INESC MN, LISBON

Contact Person: P.P.Freitas

Webpage: <http://www.inesc-mn.pt/>

Short description of activity:

- Magnetic tweezers and molecular motor motion detectors
- SPM characterization of surfaces (metallic, semiconductor, polymer)
- Characterization and manipulation of microtubules
- Deposition of metallic nanostructures by electropulsed AFM
- Nanoindentation

2) Group/Institution: CICECO – Research Center in Ceramic and Composite Materials, U. Aveiro

Contact Person: J. Rocha

Web page: <http://www.ciceco.ua.pt/>

Short description of activities

- Novel and unconventional hybrid (from 2D to 0D) luminescent materials.

- Nanoscale engineering and positioning control of optically and magnetically active colloidal semiconductor quantum dots on the surfaces of epitaxial heterostructures is also a current interest in the field of nanomanipulation.
- Novel actuator materials in which chemical disorder results in small polar clusters embedded in nonpolar matrix with the nm dimensions. Such composites are expected to exhibit extraordinary piezoelectric and electrostrictive effects at the nanoscale.

## Comments of the International Advisory Board Members

The Advisory Board members were individually contacted for obtaining their comments on the initiative.

All of them expressed a very positive opinion about the ambitious initiative to create the Portugal-Spain International Research Laboratory – International Iberian Nanotechnology Laboratory and of its objectives and advanced specific suggestions of scientific and technological nature that should be taken into consideration for the preparation of the final scientific report.

Besides, the Advisory Board members called special attention to the clarification of general necessary conditions for the success of the Laboratory, specially:

- Laboratory specific characteristics of relevance to attract excellent researchers;
- Clear commitment of the Governments of Portugal and Spain to the initiative;

- Assured funding commitment of public funding by the two Governments;
- Clear commitment of the two Governments on the overall size of the scientific staff and the percentage of tenured and tenure-track positions;
- Guarantee of international recruitment based on merit;
- Instruments to attract top researchers from abroad and to facilitate researchers immigration and family regrouping;
- Clear international character of the Laboratory.

Chapter 2 of this progress report, entitled "*Internationally Attractive Conditions – A Favorable Setting for Working at the Forefront of Knowledge*", responds to these recommendations.

## Legal Framework and Governance

Contribution of Professor Jean-Marie Dufour, University of Geneva Law School and President of the Geneva International Academic Network

It was asked to Jean-Marie Dufour, Professor at the Law School of the University of Geneva and President of the Geneva International Academic Network to prepare the legal framework and governance structure for the Portugal-Spain International Research Laboratory.

**Professor Dufour was a legal advisor of CERN – European Organization for Nuclear Research** at Geneva, Switzerland, founded in 1956, and was involved in the creation of the main international research laboratories in Europe, namely **ESO – European Southern Observatory** with headquarters at Garching, Germany, where it also houses the joint ESO/ESA *European Coordination Facility for the Hubble Space Telescope* and with facilities also in the *La Silla Paranal Observatory* in Chile where it operates the *VLT – Very Large Telescope* and the *VLTI – Very Large Telescope Interferometer*, created in 1962, **EMBL – European Molecular Biology Laboratory** at Heidelberg, inaugurated in 1978, and **ESRF – European Synchrotron Radiation Facility** at Grenoble, France, created in 1988.

The following are contributions of Professor Dufour:

The Minister of Science, Technology and Higher Education of Portugal and the Minister of Education and Science of Spain signed a Memorandum of Understanding for creating and operating jointly a *Portugal-Spain Memorandum of Understanding* for creating and operating jointly a *Portugal-Spain International Research Laboratory*, to be located on the Portuguese territory, in Braga, in the vicinity of Porto.

This Laboratory will be the first bilateral research Center in Europe; it is undertaken so as to become an Iberian, European and international pole of excellence in one of the most important and promising fields of research of the XXIth century: nanoscience and nanotechnology. It would be called the “International Iberian Nanotechnology Laboratory (INL)”.

### The International Iberian Nanotechnology Laboratory (INL)

The Laboratory Portugal and Spain intend to set up shall be *common to both countries*, at the research *forefront* and open to large *international collaboration*.

#### A common Laboratory

The Laboratory is conceived with large ambitions – scientific, industrial, economic – and where both countries would concentrate all necessary forces and energies. It shall be a *place common* to both States, where close co-operation policy shall be prepared, approved and implemented.

Its mission will be to provide a close co-operation between Portugal and Spain in nanoscience and nanotechnology, covering fundamental and applied research and related industrial activities. It shall:

- establish a close collaboration between universities and industries of both countries and encourage collaboration between public and private sectors. An adequate intellectual property policy shall be set up: the results of its activities shall be legally protected.
- construct and operate the required buildings, facilities and instrumentations.
- organize and sponsor an active and widespread international co-operation.

#### Unified governance

A unified governance should be set up, commensurate with the political and strategic INL mission; the Laboratory should be placed under *direct leadership of both governments* at ministerial levels, to permit a successful integrated co-operation.

The Laboratory must possess its own decision making process for elaborating scientific and technological

programs. It should be assisted by advisory scientific and industrial committees composed of national and international experts chosen at highest level.

### **A forefront research Laboratory**

INL is designed to become a master Laboratory in fundamental and applied scientific and industrial research and to elaborate and implement ambitious programs of activities.

#### *Advanced research programmes*

INL will have priority research areas: nanomaterials, nanoelectronics, nanomedicine, nanobioengineering, biomedical applications as well as environmental and food quality control, including building all necessary instrumentations.

#### *Setting up a strong scientific community*

The main purposes will be:

- setting up and integrating a top-level Portuguese-Spanish R&D community, based on close collaboration with major national universities and technical universities.
- favoring integration and networking of national R&D groups with international ones, with an emphasis on participation in the European Union 7th Framework Program.
- promoting the creation of high-level post graduate program.

#### *Developing close collaboration and working relations between the academic community, the industrial and economic sectors*

The Laboratory's activities will include industrial and economic activities related to nanoscience and nanotechnology. To that end, it shall:

- organize a close collaboration with national and international companies, with specific emphasis on European firms.
- help laboratories from private companies and public bodies to collaborate.
- ease access of companies to nanotechnology.
- foster the creation of spin-off companies.
- set up an intellectual property policy for appropriate protection and valorization of the scientific and industrial results of the Laboratory's activities.

#### *Adequate resources: efficient financing, appropriate scientific and industrial staff*

The Laboratory shall be given specific and adequate resources within a long term program to permit a balanced and efficient development of its activities. Its staff will be international: composed of nationals of both countries and people recruited from other countries.

### **An International Laboratory**

The INL program of activities shall be based on a large international co-operation.

#### *Open to other scientists, engineers of other countries.*

INL will be open to scientists and engineers of both countries, of the European Union as well as of other countries.

#### *Close relations with Europe*

It will develop specific and close relations with the EU, be candidate to participation in the European framework Programs.

It shall be pioneering collaboration with European States, including PECOS.

#### *Open to other States*

INL will be open to co-operation with other States. It will also be open to accession by States willing to become members of the Laboratory and to contribute financially to its activities.

#### *A pole of excellence and center of industrial expertise*

INL is deemed to become an international reference: a pole of excellence and a center of industrial expertise for its founding countries, Europe and at international level.

#### *Public relations and vulgarization policy*

An efficient research program in nanoscience and nanotechnology requires a communication plan towards public opinion to avoid difficulties like those met with the GMO. INL will be in charge of it.

### **The institutional framework for INL**

Setting up INL requires an appropriate institutional and legal status, making possible implementing the political and scientific choices of the founding States, namely: allowing an efficient scientific and technological co-operation between Portugal and Spain, with high research and development capacities, open to a large European and international collaboration, with the prospect to become a forefront research laboratory, a pole of excellence and a center for technological expertise.

### ***The most convenient model: An International Organization***

An International Organization would be the most appropriate tool – politically and legally – to match the objectives of both countries. It offers many advantages and only few inconveniences, by the way easy to master. Moreover, a rather long tradition now exists in Europe

concerning research Laboratories established as International Organizations, which could serve for guidance.

Generally called *public International Organization*, existing examples today are: the European Organization for nuclear research (CERN), 1953, (Geneva, Switzerland), the European Southern Observatory, (ESO), 1961, (Garching, Germany), the European Molecular Biology Laboratory (EMBL), 1974, (Heidelberg, Germany). Their members are European States with possible association for non-European States. The institution is created and run by an international treaty; national law does not apply to this type of organization. Its independence on the Host State's territory is ensured, in accordance with international practice, by an international status agreement between the Host State and the Organization.

Within this category, one should also mention the European Space Agency (ESA), 1963-1977, Paris, France. ESA is not quite a research laboratory but rather more an agency with industrial objectives. However, it was established following the CERN model and it implements an important research program besides industrial activities.

However, the existing forms do not quite respond to Portugal and Spain intention to set up a new type of Laboratory corresponding to new requirements of scientific and technological research co-operation in Europe.

INL is the outcome of a strong political initiative, based on a close co-operation between two States, Portugal and Spain, willing to launch and guide a decisive action in nano science and technology research. The Laboratory should offer a framework for implementing active fundamental and applied research activities, based on a *near collaboration between universities and industries* and stimulating interdisciplinarity. In the same time, outcome of its research activities should give rise to strong industrial development and economic spin-off.

Finally, INL is planned to become an *international* Laboratory, open to national, European, global co-operation in research, to other States and to companies willing to collaborate in research and development programmes.

This prospect strongly recommends to set up INL as an *intergovernmental* laboratory.

#### *An intergovernmental Laboratory*

*Intergovernmental*: this word qualifies an institution established within public international law with intergovernmental governance; it is used here as synonymous for "international" or "public international". So INL would be created with an intergovernmental status. In doing so, the founder States do not intend to set up another "classic" international Organization, but to launch a new type of research and development laboratory. They are at least three reasons for that.

#### i. A public body

The Laboratory will be the outcome of two States co-operative effort, whose objective is to improve research capacities in a field of decisive importance. It will be part of a public service mission for research and education, funded with public resources and both governments will be willing to ensure direct guidance on it in consideration of its political, economical, social relevance and value. Moreover, INL will be created with the purpose to become a high stature Laboratory, part of the scientific European area and largely open to international co-operation.

As a consequence, it could hardly be set up in the form of a private institution, giving the impression that its guidance and running would not be set and led at the required level of responsibility. This is a strong indication that INL should be created as a public body.

#### ii. A non-profit body

This feature is generally implied by being a public body. Moreover, INL is designed to be a laboratory where universities and laboratories of both countries, together with European and non-European ones, would closely collaborate and academic activities would play a major role in fundamental and applied research. Therefore INL could hardly be given another feature all the more since funding is of public origin and profit and commercial activity are not primary purposes.

However, it is worth to underline that being a non-profit body would prevent INL neither from collaborating closely with industrial and economic sectors nor from engaging actively in development of its research outcome. Conversely, this status would not oppose that private companies be associated to the Laboratory's research work, e.g. within mixed teams (university-industry).

#### iii. A public international body

##### *INL international stature*

Making INL a master laboratory – a pole of excellence, a center of expertise – at European and global levels, attracting best scientists, new States and forefront industrial companies is a decisive reason to set this laboratory as a public international institution, with adequate means, resources and support to fulfill a high level mission.

##### *Equality between States*

Another relevant reason concerns the political configuration of the Portugal-Spain co-operation.

Would it be decided to establish the Laboratory under national law, the applicable law would be automatically that of the State's territory on which the Laboratory would be located (*the Host State*), with an immediate consequence:

INL would be legally incorporated in the national law of that State, with direct submission to its authorities, rules, regulations, jurisdiction, resulting in a legal and political predominant influence of the latter on the new institution. One could then question INL international character.

As a consequence, both States would be prevented from being on equal footing in running the Laboratory, from benefiting same rights and obligations. Many decisions concerning the Laboratory's life would legally depend only on the Host State, i.e. on one of the partners.

The situation would be especially acute here since the initial number of Members would consist only of two States: that position could easily and quickly generate a risk of excessive *legal and administrative* Host State influence on the Laboratory's operation and it is likely that the international character of the Laboratory would gradually fade.

It is also worth to underline that incorporating a co-operation between States within a national institution, submitted to the law of one of the co-operating States, contradicts the concept of intergovernmental co-operation, which by definition requires partners put on equal footing.

#### *Under international law*

Thus, the most appropriate way to create INL would be establishing it outside any national law, at the level where States are automatically placed on equal legal footing: *public international law*, giving guarantee for a balanced and efficient co-operation, within an institution allowing a unified international governance, a common and direct leadership of the Members on the Laboratory's activities.

For the above reasons, INL should be set up as a public international Laboratory submitted to international law. Useless to repeat that INL is not intended to become a "classic" international organization, as will be clearly shown.

#### *Advantage for international relations*

An International Organization would also be a remarkable tool to enhance international co-operation.

The international personality recognized to every International Organization would be understood as a strong political signal of Portugal and Spain to give INL a real international stature and would constitute a factor of attraction for scientists at global level.

It would also provide INL with a political and legal title to enter into international relations with other States and other International Organizations at highest level without having to go through any particular national diplomatic service.

This status would considerably help establishing co-operation with other States developing important scientific and technological programs like USA, Japan, China, India ...; it will be relevant to open dense and stimulating co-operation with Europe and European countries, to take part

in EU programs and to contribute erecting the pole of excellence both countries intend to create.

It would also ease to welcome other States with important capacities in nanoscience and nanotechnology, wishing to accede to the Laboratory as participating and funding members.

Finally, it could make the laboratory attractive for researchers of the founding States as well as for those of other countries, since an international scientific research organization quite naturally generates an international spirit and offers an attitude of openness to the outside world. In that sense, it would ease international co-operation with Laboratories in other countries, exchange of people, building research networks and communities between researchers and contribute to better understanding and collaboration between public sector and firms.

#### *Openness to industrial, economic world*

INL will face an important challenge: the unusual collaboration it will have to organize between the academic actors on the one hand and the industrial and economic sectors on the other.

An International Organization would offer a framework easing such an achievement, due in particular to its *independence* towards national legislations and its *freedom to create* new type of relations and new rules. For instance, nothing would prevent INL from associating firms, representatives of relevant professions ... to its activities by means of *standing consultative bodies* where these actors would be represented. A status of *Observer* to the Laboratory' organs could be created to encourage and support co-operation between academic, industrial, economic sectors.

A very innovative networking with industrial and economic actors might be created, based on opportunities offered by the status of International Organization. It could help for exchanges of people, innovative intellectual property, advanced industrial collaboration. It could largely contribute to make INL becoming a pole of excellence and a center for industrial expertise.

#### *International Organization: legal aspects*

Creating an International Organization requires to deal with two main questions: its *institutional establishment*, its *territorial location and status*.

##### *Institutional establishment*

An International Organization is most of time created by an *international Convention* between the founding States, to which specific protocols are generally annexed, in particular a *financial one*.

##### *International Convention*

The INL should be set up by *international Convention* to be passed between the founder States, Portugal and Spain. The Convention would contain all the provisions creating directly the Organization at international level, under public

international law. It would set the institutional framework the Laboratory will operate within, giving only the main features and most important aspects following a tradition of the European international research institutions; as usual, the Convention would live to practice care to develop all other tools required by the Laboratory's running, then giving a large freedom and flexibility for implementation.

Accelerated procedures could certainly apply, in consideration of the partners determination to establish their co-operation as soon as possible.

The Convention contains provisions creating *directly* the Organization at international level, within international law, outside any national law.

The text of the Convention would open with a *Preamble* listing the political reasons leading both States to create the Laboratory.

A set of *Articles* would then detail the components of the Organization:

- its name, its international legal personality, independent and distinct from each founding country, the place of its seat;
- the machinery of the new institution;
- its mission would be clearly defined at three levels: purposes, aims, programmes of activities:

#### i. Purposes

This issue addresses the *field* within which the Laboratory will be operating; its purpose is defined in general and open terms: fundamental and applied research in nano science and technology, and related research;

#### ii. Aims

They should address objectives INL should fulfill when implementing its activities: performing excellent research, creating strong scientific communities in nanoscience and nanotechnology, developing collaboration between Universities and industries as well as between public and private sectors, contributing to training researchers and to development of a skilled force for nanotechnology industry, organizing and sponsoring European and international co-operation, setting up intellectual property rules to permit availability of its work results, technology transfer, protection of inventions and know-how, developing systems for preventing and mastering nano-technology risks;

#### iii. Programmes of activities

As a basis for an efficient research policy, the Convention should distribute the Laboratory's activities within specific programmes: the *basic* programme, of compulsory character for every Member State, addressing construction and operation of the Laboratory, appropriate apparatus, necessary buildings and facilities. The Convention should leave opportunity for the Laboratory to decide *additional* programmes when required, subject to availability of appropriate resources. These programmes are optional;

- its Members: Portugal and Spain, with possible accession of new members under defined conditions;

As usual for public international institutions, membership will be open to States only. In addition to founder Members, other States, European or not, may accede to INL, subject to unanimous approval by Council.

Convention leaves to Member States opportunity to create new positions, like Association or Observership, open not only to States but also, under conditions to be defined, to European Union, international Organizations. Companies may be admitted as Observers. Withdrawal of Members is also ruled by the Convention

- its Organs and their respective powers:

They form the central piece of the Laboratory's governance, a simple mechanism whose European practice demonstrated efficiency:

A *Council* – sovereign body of the Laboratory, composed of two Member States Delegates for each country, one of them at least being a scientist, assisted by subordinate bodies;

A *Director-General* (assisted by a Deputy Director-General) – Chief Executive in charge of the whole management of the Laboratory, designated for a fixed period by and responsible to Council.

The Convention rules their respective competences and the decision-making process. As long as the Member States number will not exceed two, decisions should be taken by unanimity. As soon as it will exceed two, a majority system should apply.

- its funding:

As usual, INL would be funded by Member States contributions, on the basis of a scale of contributions. However, as long as the number of Member States will not exceed two, the Convention woul provide for specific mechanism: contributions to Laboratory's financial resources will be equally shared between both Members: 50% - 50%. After accession of a third Member, a scale of contributions would apply. Besides Member States contributions, additional resources might be provided by specific collaborations projects between universities and industries.

The Convention would also provide for customary provisions concerning namely: the Laboratory's capacity to undertake *international co-operation*, amendments to the Convention, *non-fulfilment of obligations* by Member States, INL *legal status*, *dissolution* of the Laboratory, and finally *formal provisions* concerning the Convention (*signature, ratification, entry into force, ...*).

That brief summary shows how the Convention keeps silent on many aspects of the future Laboratory's operation, therefore living room to practice for a large initiative. The conventional framework will have to be completed by people in charge of leading and managing INL, enjoying therefore large flexibility to adapt the Laboratory to needs and circumstances.

From a legal point of view, *questions and decisions* practice will have to face or make relate to *Governance* (e.g. Council and subordinate bodies; Director General and managerial organization), *Activities* (e.g. construction of the Laboratory; scientific and research activities; industrial relations), *Proper rules* (provisions assigned by the Convention – internal rules for Council and its subsidiary bodies, Staff Rules and Regulations, Financial Rules and Regulations – or other provisions such as procurement regulations, general conditions for contracts, rules for intellectual property, transfer of technology, joint ventures, spin-off and safety rules).

The Laboratory, being subject to its own law (Convention, proper rules and regulations) would enjoy a rather large capacity to decide provisions required by its operation. Limits to this freedom are: the legal framework defined by the Convention; the Host State's national law and applicable international conventions setting *legal standards*, which the Laboratory could not go below. In case the Laboratory would lack adequate provisions, the Host State law may apply as subsidiary law.

A small word on collaboration with industrial and economic sectors which will be a decisive challenge. INL, on the basis of its Convention, could build up a very innovative research framework, setting a large bridge between universities and industries. There will be a large freedom to create new types of relations with industrial and economic actors, innovative collaborative activities, like direct common participation in research projects, association in programmes definition through standing consultative bodies, mixed research teams, active development collaboration, innovative networking in research and development. Associate or Observer status to the Laboratory could also apply for collaborating companies.

It is likely that industrial developments and marketing operations will be central issues for INL, since research activities would generate a lot of products, prototypes, patents, creation of spin-off societies. Firms, co-operating with INL within research projects, might propose a common exploitation of these results. However, most of these activities are legally of a *commercial* character and INL itself would not be in a position to perform these activities since, as a *non-profit* research institution, it would not be entitled to act as a commercial body. To overcome this obstacle, INL could appeal to expert societies. They are at least three ways to do it:

- a) First solution would consist in contracting out the task with an external society by means of collaboration convention or specific contract. The contractor should be entrusted with one or more tasks, made fully responsible for their implementation and the benefits shared between the parties according to their convention. The partner society could be changed from time to time.
- b) Second solution: the expert society might be created by INL itself, as a national body within the law of the Host State, legally and economically independent from the Laboratory, under commercial status. It would be

regrouping relevant functions in the field of industrial matters management and would serve as a tool to enhance the industrial and economic development of INL research outcome.

- c) Third solution: companies collaborating with INL on specific research might be willing to assume themselves development and marketing of outcome of the collaboration under way. This situation would certainly happen frequently and the matter could be settled case by case between INL and the company concerned.

These activities would bring INL additional income, Member States would be considering as additional resources for the Laboratory and rise the question of their status. It would be for Member States to decide. Two solutions may be envisaged: either these resources would be deducted from Member States contributions to INL budget or put in a special Fund dedicated to reinvestment in INL research activities.

There are also legal limits INL could not trespass when collaborating with commercial companies; namely it could neither be involved nor taking responsibility in the operation of a commercial society, or even become partner in joint-ventures with it, these operations being considered as commercial activities and not permitted to non-profit bodies. However, the Laboratory would be entitled to become shareholder of societies it would collaborate with, although this position would be at least subject to caution.

This international legal framework has an important consequence: the Laboratory shall be managed outside national administrative mechanisms of the Member States; it allows autonomy in running the Laboratory's activities. Of course, national delegations are dependent on their national home to prepare decisions to be taken by the Organization; however, these decisions are linked to obligations based on the international constituent treaty that prevail on national internal decisions.

It must be underlined that the provisions contained in the Convention cannot, in principle, be modified by the Organization itself. Amendments are only possible by way of revision of the Convention, subject to approval of each founding State as such. However, this principle is tempered by practice: it is always possible to adapt application of the rules by unanimous decision of the Member States Council.

#### *Host State's territory*

INL will be located on the Portuguese territory, in the City of Braga.

Although INL should be established as a public international Laboratory, it is not considered that traditional privileges and immunities (P&I) usually granted to

international organizations, as a guaranty of their independence, would be needed in the present case. It is likely that this protection, to the extent it may be necessary, could be matched by other more appropriate and easier means, better corresponding to the setting up of an international research Laboratory in Europe today.

#### *Territorial status*

This issue concerns the legal status to be granted to INL by the Host State on its territory.

As an international Laboratory, INL will be operating under intergovernmental governance and in accordance with its proper rules on a national territory where this situation should be recognized. Being an international Laboratory, it could not be treated like a national body. On the other hand, as said before, other means than traditional international privileges and immunities (p&i), might be set up to guaranty the independent operation of European international research laboratories established nowadays.

Therefore, a simpler mechanism is proposed. Traditional international organizations headquarters agreements provide for three categories of p&i: the first one addresses the Organization itself, the institution: some of those – a small number – are required for its independent operation. It is proposed to renew them.

The second category consists of diplomatic status, based on the 1961 Vienna convention on diplomatic intercourse, applying automatically to Member States delegations: they would be legally independent from the INL territorial status itself.

The last one includes facilities granted to officials: concerning INL, it is proposed to retain only those of essential character for the Laboratory's operation.

Moreover, p&i are normally granted through specific international agreements between the Host State and the organization concerned, or directly by the Member States by means of a protocol. Here again, a simpler mechanism is proposed: a *declaration* by the competent authorities.

Facilities asked for INL independent operation are proposed to be the following:

#### *a) For Member States Delegations to the Laboratory:*

- a. Confirmation that the diplomatic status applies;

#### *b) For the Laboratory:*

- a. Recognition of its international personality and its civil capacity in Portugal,
- b. Order power on its site,
- c. Freedom of meetings,
- d. Immunity from legal process as far as its proper governance is concerned,
- e. Fiscal exemption from direct and indirect taxes for the Organization's buildings and movable goods,
- f. Free disposal of funds,
- g. Free access and residence to the Portuguese territory for: Delegations of Member States,

Director-General and staff, persons invited by the Laboratory,

h. Exemption from Portuguese social security under the condition that the Laboratory provides its staff with a social protection at least equivalent to that in force in Portugal.

#### *c) For the Laboratory's officials, not of Portuguese nationality:*

- a. Exemption for them, together with their family, from restrictions to immigration and to aliens registration formalities,
- b. Customs exemptions for their own goods (car, furniture...) when settling in Portugal and when moving back.

#### *d) General provisions:*

- a. In case of abuse of any facility, the Director-General or Council will waive the immunity or facility,
- b. In case of dispute arising out of contracts and other disputes in private law to which the Laboratory is party, the latter shall make provision for appropriate methods of settlement,
- c. Any divergence of opinion between the Host State and the Laboratory concerning their official relations, which have not been settled by direct negotiations, may be submitted by either party to international arbitration.

#### *Same territorial status in Portugal and Spain*

Since an important part of INL activities would take place in Spain, it would be advisable that INL enjoys the same status on both territories. In that case, a protocol on facilities enjoyed by INL to be annexed to the basic convention would be the most appropriate instrument.

#### **International Organization: Inconveniences?**

It is sometime argued that an International Organization constitutes a difficult undertaking: making an international treaty takes a long time due to long lasting procedures; it would be also a heavy machinery to move, with high costs for Member States. Experience shows that this is not necessarily so.

#### *Time for creating the Laboratory*

As far as creation of the Organization is concerned, the situation considered here has nothing to do with the constitution of large international institutions, where the number of members amount up to impressive figures like the difficult political issues to meet.

Since Portugal and Spain, as neighbor countries sharing a common culture, affirm their will to create, with high priority, for strategic and scientific reasons, an international common Laboratory, this operation could be achieved within one or one and a half civil year. Accelerated procedures exist in both countries and could apply for that purpose. They are good reasons to believe that the

scientific co-operative goal and the mutual interest of both countries would contribute to accelerate the process.

#### *Costs of an International Organization*

Costs of an International Organization are said to be higher than those of an equivalent national Laboratory. This is confirmed neither by observation nor by statistics. These costs are to a large extent depending on the Member States policy.

Material expenses are often lower than those of equivalent national laboratories due to the less complicated nature of procedures and decisions and to acute controls done by auditing Courts.

As far as staff is concerned, general conditions concerning remunerations depend on the Member States decisions: it is of course up to them to fix the salaries and related allowances, depending on their objectives, for instance attracting the best scientists and engineers. Moreover, an efficient staff policy does not mean applying the same salary conditions to everybody; it may also consist in applying different salaries schemes to different staff categories. This is really a matter of political assessment.

Finally, experience shows that international Laboratories apply efficient and modern management methods and obtain a rather satisfactory ratio as far as managerial expenses are concerned.

#### **Conclusion**

Governments of Portugal and Spain have planned to undertake a strong bilateral co-operation in innovative fields of scientific and technological research.

As a first step, they intend to establish a Laboratory, to be the first bilateral research center in Europe, dedicated to nano science and technology, the *International Iberian Nanotechnology Laboratory (INL)*. This Laboratory shall be common to both countries, a forefront Laboratory in fundamental and industrial research, open to a large international co-operation.

As far as its institutional status is concerned, that of an *International Organization* would offer the *more appropriate*

*political and legal framework* to accurately implement the intentions of both Governments. Also, the fact that INL would be created by two neighbor States, sharing close cultures and the same will, would be a decisive factor to ease this process.

As an International Organization, the Laboratory, whilst being legally independent from both countries and in particular from its Host-State, could be a true *common place* for both partners and ease an *effective common work*: Portugal and Spain would be equal partners, on equal footing, with same rights and obligations, within an institution allowing a *united governance under its own rules and outside any national law system*.

An International Organization *would provide an adequate decision making system giving large freedom for elaborating and implementing its programs and projects*.

It would be a remarkable tool to *enhance a large and fruitful international co-operation* at highest level.

It would allow a *wide spirit of innovation*, particularly helpful for establishing an efficient collaboration between the academic, industrial and economic sectors.

Looking back to the existing European practice, one may trust the choice proposed could contribute to make INL an international pole of excellence and a center of industrial expertise in nano science and technology.

Finally, the international status would make the Laboratory highly attractive for researchers of the founding States as well as at European and global level and ease INL becoming building a large international networking in its field of activities.

INL flexible and adaptable structure would permit people in charge of its operation to meet this decisive challenge by creating new types of collaborations and relations between Universities and industries, public and private sectors, paving the way to the knowledge society Europe called for in Lisbon.

Its international character would be for INL an adequate tool for reaching excellence.

## Administrative Issues

Contribution of Mr. Helmut Krech, Head of Administration of the ESRF at Grenoble

The analysis of the main Administrative Issues regarding the Portugal-Spain International Research Laboratory – International Iberian Nanotechnology Laboratory (INL) was requested to Mr. Helmut Krech.

**Mr. Helmut Krech is Head of Administration of the ESRF – European Synchrotron Radiation Facility at Grenoble, France**, which was created in 1988.

The following are contributions of Mr. Krech:

### 1. Issues related to Personnel

#### 1.1 Status of Personnel

##### 1.1.1 INL staff

As an International Organization, the INL has a legal personality, allowing it to hold funds, issue calls for tender, and enter into procurement, employment, insurance and other contracts. Hence, the INL will be employer of staff (foreseen when fully operating: 400 staff, including 200 scientists and 100 PhD students).

##### 1.1.2 Delegates, Secondees, Scientific Guests

Besides employing its own staff, the center will also receive staff from other organizations. These delegates or secondees will either form their own groups working at the Laboratory, or they mix in with groups of INL staff. Since the overall responsibility for management and operation lies with the director, he should have the possibility to reject the acceptance of external staff, either within a formal application procedure, or within a cooperation agreement with the delegating organization.

It goes without saying that delegates and secondees are subjected to the safety and security rules of the Laboratory and to the corresponding instructions by management. They are also subjected to instructions concerning their scientific work, unless they are invited to perform their individual program or are carrying out work for their home institution in the framework of a collaboration agreement between that institution and the INL. The responsibility for

the scientific program of the INL requires, however, the possibility to set the frame conditions for the work of each individual scientific delegate.

In principle, delegates and secondees are paid by their home institution. Exceptions will have to be agreed in cooperation agreements, or even in the statutes of the INL. It is normal practice that the receiving institution pays a subsistence allowance and possibly travel expenses to long term delegates who participate in the scientific program of the Laboratory. Another option is to reimburse the salary costs in full or in part to the home institution. Details depend on the interest of the partners in each individual case. The rules should foresee a variety of options.

The Laboratory might also invite individual scientific guests. Difficulties may arise in case these individuals are not affiliated to an organization who acts as their employer. The contracts have in this case to stipulate that the visitor, before entering the premises of the Center, gives proof to be covered by a sufficient accident and health insurance.

##### 1.1.3 Thesis students

The draft report foresees about 100 PhD students. Since only universities can grant the degree, close relationships have to be established with universities. Formal agreements are not necessary: it is rather up to the senior staff to keep or establish these relationships. An imbalanced privileging of the local universities should be avoided. This is a matter of recruiting senior staff, where local diversity would foster a wide-spread network of university relationships. This is of even accrued importance in case an international opening of the INL is foreseen, beyond the boundaries of the Iberian Peninsula.

PhD students could be employed as regular staff on fixed-term contracts (e.g., 2 years, extendable to 3 years). Other schemes are possible (e.g., sharing of costs with home university). A particularity of the PhD contracts is, however, that enough time must be left for the students to

do their theses work. PhD students are subjected to the instructions by hierarchy to a lesser degree than regular staff.

## **1.2 Recruitment**

### **1.2.1 Internationality**

The recruitment should be fully international. Experience shows that while scientists and senior engineers usually accept a certain mobility in their lives, including the frequent changing of their social context, this readiness is much less obvious with junior engineers, technicians and administrative staff. Here particular efforts have to be made (e.g. installation and adaptation allowances, providing social networks, etc.) to avoid that the administrative and technical infrastructure is rather locally staffed.

### **1.2.2 Language**

In this context the language problem plays an important role. At the beginning it is probably not an issue if the recruitment focuses on Spanish and Portuguese speaking countries. It will, however, be difficult to recruit personnel from other countries if the working language is Spanish and/or Portuguese. Once it is decided (or just accepted) that the working language be Spanish and/or Portuguese, it will be extremely difficult to change this later. It should be considered to fix English as working language in the INL, while accepting that the infrastructure and partly also homogeneous scientific working groups use Spanish or Portuguese, as appropriate, as their main language. In any case, language courses in Spanish and Portuguese should be organized for staff recruited from abroad.

### **1.2.3 National quotas**

A system of national quotas for recruitment should not be established. However, a certain balance of nationalities, in particular with respect to the scientific staff, should be favored. This can be done smoothly in the recruitment process. It is clear that the best candidate has to be selected for the post, but this can be articulated with the idea that national diversity would enhance the international networking with universities, industry, funding agencies.

### **1.2.4 Comparability of diplomas**

When defining the qualifications for a job, in particular for engineers, technicians and administrators, reference should be made to degrees and diplomas of not only one national system. Some work has been done at CERN and by the EIROforum-Group to compare the diplomas in various European countries. The result of these studies can be made available to the INL to be used for recruitment and for the evaluation of candidates.

### **1.2.5 Work permits**

Most national labor administrations require work permits for non-scientists coming from non-EU member states or from newly associated EU members (e.g. Poland). This is an issue in particular for engineers and technicians to be

recruited from abroad. This can limit the international recruitment, but much depends on the local labor administration. The more general (and hence available) a qualification is, the more reluctant the labor administration usually is not to give preference to a local unemployed worker.

Therefore, it should be made clear that the recruitment for the INL is not subject to these rules and that candidates have free access to the INL to work there. If possible, this exemption from the regulation of the national labour market should be expanded on spouses and accompanying children.

## **1.3 Remuneration**

### **1.3.1 General remuneration system**

Unless the founding investors (the Spanish and the Portuguese Governments) decide otherwise, the INL is free to "invent" its own remuneration system. All remuneration systems have in common that they define a couple of career-paths (with some permeability between them) and allow for advancements within these paths, either automatically (e.g., every 2<sup>nd</sup> year) or depending on performance. The system should be as simple as possible, transparent and, to a certain extent, performance-dependent. The elaboration of such a system is a lengthy procedure, and instead of inventing something new, it should be considered, to modify and adapt an existing example, e.g., that of CERN or of the ESRF (the system of the latter, as that of the ILL, being based on the model of the French CEA). Definitions of the relevant career paths/professional groups as well as criteria for advancements and performance bonuses and the procedures for decisions in this context would have to be worked out.

It should be noted that the initial decision on such a remuneration system can be taken unilaterally by the founding investors. Later modifications might have to be discussed with unions, staff representatives, etc.

### **1.3.2 Salaries in other organizations**

The salaries offered by the INL have to be sufficiently high in order to attract international staff. A comparison should be made with CERN, DIAMOND (UK), DESY (D) and ESRF (F).

### **1.3.3 Special elements of remuneration**

Extra elements can have a considerable impact on the overall remuneration. It is common practice that an installation and/or adaptation allowance is paid to a candidate who is recruited from outside the region. These allowances can be more or less generous. They also include the removal expenses at the end of contract.

Shift allowances are paid in case of shift work. However, an effort should be made that no overtime is paid to scientists, senior engineers and senior administrators. They are paid by working days.

Special attention has to be given to the payment of an expatriation allowance to staff recruited from countries

other than the host country. Usually such an allowance is paid to encourage candidates to leave their personal, cultural and administrative context and to make up for difficulties when leaving the country (schooling for children, work for spouse, separation from wider family and friends, etc.). The criteria have to be strictly non-discriminatory. They cannot be based on nationality but only on the place of recruitment. (Hence, it could happen that a Portuguese, recruited from the United States, receives an expatriation allowance). The allowance, if paid, should follow a digressive scheme, in particular in the case of permanent contracts, since the integration is growing over the years, and the main difficulties will fade away. The expatriation allowance, which could amount to between 15% and 25% of a basic salary to be defined, could be paid with its full amount during 5 years and then decrease by 10% every year, so that it expires after 15 years.

#### **1.3.4 Tax-free salaries?**

The INL, being an international organization, could pay tax-free salaries on the condition that a protocol on privileges and immunities is signed with the Portuguese Government containing a corresponding clause.

There might, however, be an effect on mixed working groups consisting of delegates and staff members. Delegates and secondees, even if they are long term, would in principle not enjoy this exemption from taxes on salaries, unless they are also paid by the INL. Large differences in the net income (10 to 30 % depending on the family status) of people working together in a team and doing essentially the same work, are bound to create tensions. It should be seriously considered whether staff's exemption of taxes on their salaries is appropriate.

### **1.4 Permanent and fixed term contracts**

#### **1.4.1 Labor law issues**

Being an international organization, the INL will not be subject to national labour law. In order to avoid the impression of complete discretion, some guiding principles should be fixed on the conclusion of fixed term employment contracts. The regulations at CERN or at EMBL could serve as guidance. 5 year contracts for scientists should be possible without a specific justification, to guarantee a certain turnover. There will be, however, a number of permanent posts, in particular where the infrastructure and the service is concerned.

The fixed term contracts with PhD students should be limited to 2 years, extendable to 3 years, those of postdocs to 3 years extendable to 5 years.

#### **1.4.2 Quotas for scientists?**

There will be pressure on the management of the INL to offer permanent contracts to scientists, to keep the best. In order to maintain a certain balance between keeping experience and stability in house and getting fresh input

from young people it could be advisable to fix a quota (number or percentage) for permanent/fixed term contracts for scientists. However, this requires some flexibility on the management's side. This is why the quota, if any, should not be fixed in the convention or in the statutes, but by decision of the supervisory body (Council), which could be changed, if necessary.

#### **1.5 Social Security, retirement issues**

Retirement issues are certainly not in the focus of a young Laboratory. They are, however, important, in particular for senior staff recruited from abroad. An international organization like CERN has its own social security system and pension scheme. Such a model could be followed. The system, however, requires a very considerable attention and administrative effort. Another option is to apply the Portuguese law by agreement.

If the INL applies Portuguese law, permanent staff will be subject to it. They will be covered by the Portuguese social security (including health insurance) and acquire Portuguese pension rights, which will be added to pension rights acquired in other countries according to bilateral social security agreements. The issue of full consideration of pension rights acquired in other systems, in particular the consideration of waiting times and the cumulation of progression rates, is internationally not settled. In general, people who move to different countries during their professional career, are disfavoured when it comes to pension rights. This is one of the reasons why an expatriation allowance could be justified. Some bilateral international social security agreements allow for the reimbursement of contributions to the social security of the host country in case of short term secondments (up to 1 or 2 years, to be checked in each individual case). The issue is complicated, and the INL should provide advice to senior staff with the help of external consultants.

Delegated and seconded staff who continue to be paid by their home institutions remain in their social system. The national rules might foresee a time limitation for this (e.g. 5 or 6 years). This is usually no problem. It has to be checked, though, in case of long term secondments.

#### **1.6 Staff representation**

##### **1.6.1 Relevance of national law**

It is modern management practice to allow, to a certain extent, a participation of staff in decision making. If the partners agree on the application of national law, this results from the labor codes, where usually the installation of a works committee, eventually with a number of subcommittees with well defined competences is foreseen.

As an international organization the INL is not automatically bound by these rules, but can deviate by convention or invent its own system. The following suggestions are made.

### **1.6.2 Role of Unions**

Besides the elected works committee a separate participation through union delegates should be avoided. This double representation (like in France) is unnecessarily heavy and leads to superfluous meetings where issues are discussed in parallel.

Also should be avoided a monopoly of the unions to establish the lists for the election of staff representatives (again like in France). This gives the unions a very important and unjustified influence, which often is out of proportion to the number of staff members adhering to the unions (the employer, however, has not right to get an information on that). Hence, very few decide on very many, without sufficient democratic legitimacy.

If at all possible, the unions should be kept out of the internal organization of the INL.

### **1.6.3 Co-determination**

There should be a possibility that staff elect a representative body as a partner for management to discuss personnel and organizational matters. The elections should be general and not separate for subsets of salary levels.

To the extent possible it should be avoided that management's decisions depend on the approval of the staff representation. The discussions, however, should be serious, and if management deviates from the recommendations of the representatives, this should be well argued and made public.

The establishment of subcommittees on Health/Safety and on individual personnel/career issues have proven to be helpful

## **1.7 Other personnel issues**

### **1.7.1 Schooling**

To be attractive for international recruiting it is essential to provide for appropriate schooling for the children of staff coming from abroad, allowing for the gradual integration into the Portuguese system (in particular in case of permanent appointments) and/or their reintegration into the educational system of their country of origin. One option is to open the possibility to contracting countries to second teachers to the local school. Details have to be worked out, but the obligation to set up an appropriate educational system for the children of international staff should be laid down in the convention or in the statutes of the INL (example: Art. 9 of the ESRF convention).

### **1.7.2 Other administrative support**

Help should be provided, in particular to non-local staff, as regards

- Housing: contacts with real estate agents;
- Tax declarations: contacts with tax authority or chartered accountant;

- Insurance issues;
- Car registration;
- Advice as to the integration of staff and family in the local environment: private associations, etc.

A newcomers' guide could be useful, established with the help of local administrations.

### **1.7.3 Work for spouses**

There is no general solution for this issue, although this could be an important drawback for the recruitment. Only in exceptional cases the INL will be able to offer a job to the spouse of a newly recruited staff member. The Laboratory could be helpful in work permit issues, and by observing the local labor market. The Laboratory should be able to make suggestions as to social activities, which could be an alternative if a paid job cannot be found.

## **1.8 Personnel service**

It is a general experience that administrative staff in a research Laboratory should be in the order of 10% of the overall staff complement. In the case of the INL this would correspond to ~30 to 35 administrative staff. Of this a fraction of ~11 for the personnel service is not unreasonable.

It is proposed that:

- The calculation of the individual payments and the preparation of the payslips is outsourced;
- The travel service establishes a close collaboration with a local travel agent and that efforts are made to introduce decentralized electronic booking.

## **2. Issues related to Finance**

### **2.1 Sources of Income**

#### **2.1.1 Contributions of founding members**

The main source of income, in particular in the foundation phase, are contributions from the founding investors. The share each member has to be defined in the convention. It is not uncommon that the member representing the host state assumes a larger fraction as a "site premium" and makes available the site at no cost. With respect to the contributions, the convention might distinguish between construction and operation phase.

#### **2.1.2 Late accession of additional members**

Contribution of members which accede later to the INL do not necessarily reduce the contributions of the founding members, they could also go on top. This would allow for an evolution of the Center. Provisions should be made that the latecomers contribute retroactively to the construction costs, in order to avoid "cheap" late entries. The formula of the ESRF is that latecomers contribute annually for 10 years with the same percentage to the original construction costs as corresponds to their share in the

operating costs. Both contributions have to be paid in parallel.

### **2.1.3 Contributions in kind?**

In principal, contributions could also be in kind, especially during construction phase, e.g. by making available a ready-to-move-in building or particularly costly equipment. However, the Director of the Center can only assume the technical responsibility if he has the full control over these contributions. This can be organized (as shows the example of the HERA project in Hamburg), but it should only be envisaged for large contributions, for which the contributor also assumes the responsibility of maintenance during the lifetime of the contribution.

### **2.1.4 European funds**

Funding from European projects will undoubtedly be an important source of income. However, except for the overheads (~20%) these funds cover – as a rule: partly – expenses which the INL is not completely free to plan. The participation in European projects is helpful if they fit into the scientific program of the INL. In general, cooperation in networks are liable to be financed by European projects, which are sometimes complicated to manage. Personnel resources have to be foreseen for following the programs issued by the EU, for planning projects and cooperation,, for writing and submitting applications, for the reporting and accounting. It is no easy money, and it would be prudent not to rely too much on this income.

### **2.1.5 Income from Industry**

Income from Industry could be generated in different ways:

- A formal participation of industry in the INL is unlikely. The industry in general tries to avoid long term commitments, and there is no patent solution to the issue of secrecy and proprietary research in a common organization. There are examples that the participation of industry in a research organization has not really worked out in the long run: BESSY, ANKA, both Synchrotron Radiation Facilities in Germany.
- The INL could offer services to Industry, which are paid at full costs with a calculated gain. This would be the natural option for the INL which is working close to applications. The dependence of the INL from industrial interests has to be considered. These interests might change very quickly, which could jeopardize the existence of the Center. A goal of 50% income from sources other than public funds seems very ambitious for a research Laboratory, it is, however not completely unrealistic, as the example of the Fraunhofergesellschaft in Germany (Association for applied research) shows.
- To a limited extent the INL could also sell products with a very high know-how impact. The same considerations as above are applicable.

- Another realistic option are project-type cooperation with industry. This would favor the policy of short-term involvement, followed by most industries. Here the contribution of industry could be intellectual, financial and/or making manpower available.

- Income from industry could finally be achieved through licenses on intellectual property (protected or not) generated by the INL (see below). The protection of intellectual property, however, is complex and costly. Therefore each case has to be assessed separately, whether realistic chances on the market justify the filing of a patent application. Related to this kind of income is the issue of inventors' remuneration. In most states a law exists setting up a frame for this, which could be filled out by internal rules and procedures. This does not have to be worked out at the start of the INL, but it has to be considered in due time.

### **2.1.6 Independent INL marketing company?**

Conflicts between public funding and commercial activities could be avoided if commercial relations with industry are entrusted to a commercial spin-off of INL, organized as a legally independent company with its own governance. The commercial risk of the marketing activities would lie with this company, while an agreement between this company and INL would regulate the transfer of the net gain to INL. Examples for this kind of outsourcing by large research organizations exist.

## **2.2 Budget and Accounting**

### **2.2.1 Establishment of the budget**

The budget is established by the Director in a bottom-up process and proposed to the governing body. It should be presented in the context of a medium term (5 years) planning. The budget lists the sources and amounts of income and the expenditures. The capital, recurrent and personnel costs are presented for the whole Laboratory and also broken down in projects and programs. The planning figures are compared with the outcome of the preceding year. After approval of the budget by the appropriate body the statutory contributions are guaranteed.

### **2.2.2 Flexibility**

The budget is a planning instrument, and the Management should have maximum flexibility when applying it. Within the global frame of the approved budget, which must not be surpassed, the prime criterion for good management should not be the exact execution of the budget but the scientific and technological result. The flexibility should include

- Shifting between investment and operational budget, with some limitations as to personnel;
- Taking bank credits, if appropriate;

- No strict fixation of staff posts; additional posts, if sustainable additional income.

### **2.2.3 Budget control and reporting**

The high degree of flexibility for the execution of the budget has to correspond to a strict internal budget control and to an efficient and timely reporting system. The budget has to be broken down into programs and projects, and it has to be allocated to the appropriate responsible. A certain percentage of the global budget should be reserved for the central management (the Director) to give him options to act during the budget year. Other parts of the budget might be centrally allocated (Personnel, with the possible exception of personnel directly assigned to a project, costs associated with the infrastructure, with central management, etc.). Each project/ program manager is responsible for the budget allocated to him. He/she has to report monthly/quarterly (as appropriate) to the Director. Much care has to be given to the selection of the supporting software. This should be done with external professional advice, but also with the advice of experienced lab managers, in order to avoid an under- and foremost an over-dimensioned system.

### **2.2.4 Accounting**

Even if the INL is not subject to national rules, its accounting system has to comply with the classical principles as set out e.g. in national and European rules, in order to be auditable. The accounting is the basis for the balance sheet and the profit and loss account, the two central documents which summarize the financial and commercial situation of the Center and which are the basis for the audit, for bank credits, etc. The intended close interface between the INL and industry and its commercial activities require quite a sophisticated, preferably analytical accounting system. This means, e.g., that the activities of personnel for a project or program have to be registered and accounted for, at least for the personnel directly involved. Infrastructural activities could be assigned more globally. Here again, much depends on the selection of an appropriate software.

### **2.2.5 Auditing**

As it is usual practice (and legal requirement) the annual balance sheet and the profit and loss account are audited by external professional chartered accountants, which should be changed in a rhythm of about 5 years. The audit should include the accounting system and the procedures. The external auditors report to the supervisory body (Council).

In the medium or long term run an ISO certification for the INL could be considered.

In addition to the external auditing an internal auditor should be put in place. He/she would assist the Director to supervise and control the internal procedures, but would also help the people in charge of the internal budget to

comply with the rules and to work out appropriate procedures.

### **2.2.6 Cash management**

The daily correspondence with the banks, the placing of funds not immediately needed, the observance of delays for payments, etc. is another important activity of the financial service. The project paper foresees a budget of around 30 M€ at 2006 prices in the steady state (as of 2011).

## **3. Issues related to Purchasing / Commercial Activities**

### **3.1 The procedures**

#### **3.1.1 Internal tendering guidelines**

In order to get best value for money the INL has to follow competitive tendering procedures, which will be fixed in the founding documents of the INL. The tendering rules of CERN or the ESRF give examples of how to establish transparency and fair competition among the bidders, while avoiding long delays, too much formalism of the procedures and the possibility of an unsuccessful bidder to appeal against the decision on the award of a contract.

The internal tendering guidelines would be a simplified and abbreviated version of the public rules and follow essentially their structure. There would be an increasing formalism depending on the value of the contracts, involving advisory committees and the council for the most important ones. If possible, post-tender negotiations should not totally be excluded. This is common practice with commercial companies, and this is where a lot of money can be saved. In order to get competitive bids the procedures have to be observed meticulously. The internal rules should make sure that all commercial contacts are channeled through the purchaser, and that confidentiality is observed internally. Incoming tenders are evaluated by the technical staff and then submitted to an internal, interdivisional tender committee, which prepares the final decision by Management.

#### **3.1.2 Juste retour**

The INL being internationally funded, its investors are likely to be interested in the fraction of funds going back into their country by way of commercial contracts, and they would be satisfied if this fraction corresponds more or less to their share in the overall funding. This issue of "juste retour" is common to all international organizations. The request for a *juste retour* should never impede the overriding principle of "best value for money" which is the goal of any competitive tendering procedure. The compromise could be an "alignment procedure" as practiced, e.g., by CERN and the ESRF. The basis is the distinction between well and poorly balanced countries, meaning those countries which have a return coefficient (share of "returning" money in relation to the share in the funding) well above or well below 1. The best tenderer from a poorly balanced country, if his tender is not more than ~10 % above the best tender (coming from a well

balanced country) is allowed to align and is awarded the contract if he is ready to accept the price offered by the best tenderer. The condition is, of course, that the aligning tenderer fully satisfies the specifications.

### **3.1.3 Electronic purchasing, frame contracts**

To streamline the procedures and to alleviate the purchasers from routine work, simple procedures should be introduced from the beginning for low-value purchases (the limit to be defined between 800 and 2000 €). Electronic purchasing is practically paperless, and the conclusion of frame contracts with the most important suppliers of low value goods makes the individual order extremely simple and quick, without involving much manpower. Appropriate software is available on the market.

### **3.2 Tax and import issues**

As an international Organization the INL is exempt from VAT and import duties. Details have to be settled in the Protocol on Privileges and Immunities. CERN gives an example. Even if no general exemption is granted, the tax and import issues do not constitute a major problem, as show the examples of ESRF, DESY and others:

These centers pay the VAT on each bill and get a refund later. In summary, the budget is not charged with it. Import duties on equipment imported from outside the EU are not refunded. They are usually in the range of 5 % of the value, depending on the kind of equipment and on the country of origin. It is possible to request exemption of import duties for scientific equipment. This exemption is usually granted upon declaration that the equipment is not used for military or commercial purposes. A temporary procedure is possible if equipment from outside the EU is only lent for a period of up to 12 months (renewable). In this case the import duties are suspended.

It often happens in an international scientific Laboratory that scientific guests from abroad bring some of their own equipment with them. They have to carry an ATA carnet with them (ATA: air transport association) to allow the transfer of this equipment from one country to the other.

### **3.3 Stores**

The INL will have to operate a store, moderately decentralized for the daily use of consumables in the various labs. The store should be operated by the purchasing service.

### **3.4 Spin-offs**

Measures to enhance the establishment of spin-offs include:

- A license policy combined with cooperation;
- The offer to staff members to hold their post at the INL open for them for a certain period (e.g. 1 year);
- The offer to place contracts with the spin offs and guarantee a certain turnover at competitive prices for an initial start-up phase;

- The offer to co-use infrastructure of the INL.

All this could be handled through a commercial service, which could be part of the purchasing service. The preferred option, however, would be to separate the commercial activities from the research activities by founding a legally independent commercial company to market the results of the research efforts.

## **4. General Issues**

### **4.1 General Services**

#### **4.1.1 Legal Services**

It is normal that the INL will have to face legal problems concerning labor law, purchasing issues, etc. The Head of the Personnel Service and the Head of the Purchasing Service will have some legal expertise and/or experience. For the rest and more specialized issues the advice of an external legal office should be contracted.

#### **4.1.2 Internal Audit**

The size of the INL would justify an own internal audit service, under the direct responsibility of the Director. Its role is to watch that the rules and procedures are observed and to give advice. Together with the Head of Finance it would also be the partner of external auditors. 1 staff would be sufficient, having access to the support of the Director's secretariat.

#### **4.1.3 Safety**

The diversity of labs, installations and methods requires a safety engineer and a security service (site entrance control). In addition some expertise in biological safety might be required (handling of biomaterials). This service should be directly attached to the Director's office.

#### **4.1.4 Communication/Public Relations /Public Outreach**

The popularizing of nanoscience and strategic nanotechnology, approaching mass media and scientific museums, foundations, publishers, etc. will be among the statutory goals of the INL. A newly founded institute has to become known by the broad public who wants to know what it is all about, what are the expectations and chances, and how one could avoid dangers (at the recent opening of the Nanoscience pole MINATEC in Grenoble there were massive demonstrations by the Nanoscience critics). The staff involved should not just be sales-oriented but have an understanding for the scientific and technical issues and have a certain sensitivity concerning the risks involved. The service, staffed with two highly qualified staff plus a secretary, reports directly to the Director.

#### **4.1.5 Medical Service**

The medical service should be completely outsourced.

#### **4.1.6 Library**

The INL should to the largest extent possible subscribe to the electronic versions of the relevant journals. Whether a library in the classical sense is still needed, should be discussed. Experience shows that the existing libraries are not much used as reading and working places any more. There should be a librarian, though, to organize the relation towards publishers and other libraries, collect and archive publications of the INL including theses, do some statistics, etc.. 2 staff positions for this purpose should be sufficient.

#### **4.1.7 Guest houses, restaurant**

These services should be outsourced.

### **4.2 Technical Infrastructure**

#### **4.2.1 Building**

Construction items and maintenance issues should, to a large extent, be outsourced. Some competence has to be in house for the organization and to supervise the external companies. Details have to be studied further. No proposal for the staffing is made at this point.

#### **4.2.2 Mechanical and electronic workshop**

Details have to be discussed and studied further, including the issue of centralized and decentralized workshops.

#### **4.2.3 Computing, Web related issues**

To be discussed further.

### **4.3 Intellectual property**

The generation, protection and commercializing of know-how is an important activity of the future Laboratory. It is suggested that the commercial activities are dealt with in a separate commercial company to be founded in parallel to the INL. This commercial spin-off would not be an international organization, but closely collaborate with the INL. For more technical and legal issues it would contract the services of patent attorneys..

Some guidelines (not exhaustive!):

- Know-how generated by staff belongs to the INL;
- Know-how generated solely by external partners while working in the INL belongs to the employer of that staff, who grants a non-exclusive license to the INL for its own, non-commercial use;
- Know-how generated jointly by external partners and INL staff: belongs jointly to the external employer and the INL, the share to be decided jointly; in case of non-agreement: settlement procedure;
- Know-how generated by INL staff in execution of a contract with industrial partner: belongs to the INL, however exploitation rights lie with the industrial partner; cost-free license for INL's own non-commercial purposes should be agreed; inventors' premium to be paid by external partner.

## Required Infrastructures, Budget Planning for the Installation Phase and Budget Appropriations for 2007

As announced publicly by the heads of government of Portugal and Spain at the end of the XXI Portugal-Spain Summit, the Portugal-Spain International Research Laboratory – International Iberian Nanotechnology Laboratory (INL) should be made to have a scientific staff of 200 researchers.

With an additional of 100 PhD students, and about 100 technicians and administrative personnel, the head count will be close to 400. So, the facilities should be planned to host around 400 people. The first draft of the scientific report estimates a need of a work area of around 8000 to which 2000 m<sup>2</sup> of supporting social areas (library, meeting rooms, auditory) must be added, as well as a student and visiting scientist residence for up to 50 students and 20 visiting scientists, estimated at 1500 m<sup>2</sup>, and space for company start ups of about 1000 m<sup>2</sup>. This leads to an estimated maximum building area of about 13000 m<sup>2</sup>.

Besides the space to accommodate a built area estimated at about 13000 m<sup>2</sup>, the installation site must satisfy technical requirements of being located away from railroad lines, freeways, or high voltage cables (at least 50 m away).

Although we are in a preliminary phase of planning, taking into account that the installation phase will begin in 2007 and that it is necessary to propose the budget appropriations for the 2007 in Portugal and Spain, it is proposed the following:

- 1) To adopt, as a first estimate, the pluriannual budget planning for the installation period in the table bellow, with the total cost to be assured in equal parts by the Governments of Portugal and Spain:

	Millions of Euros			
	2007	2008	2009	2010
Installation	8	15	7	0
Operation	2	10	23	30
<b>Total</b>	<b>10</b>	<b>25</b>	<b>30</b>	<b>30</b>

- 2) To establish that the Operation budget for 2007 would have three components:

- Contracts of Technical Assistance: to manage the installation process, the international recruitment of human resources and the international information campaign needed to rapidly raise the international

awareness of the Laboratory, its mission, objectives and opportunities;

- Expenses of the Core Management Group: Director, Vice-Director, and Financial, Human Resources and Facilities managers, as well as staff for basic clerical and technical support to those functions, required to oversee and process the financial costs of the installation phase and of the beginning of the recruitment process, and the running costs of this group;
- An Iberian Capacity Building Program in Nano Science and Technology, whose details should be further developed, but, including: (i) grants for Post-Docs and PhD students who would pursue research in existing research centers in Portugal and Spain with activities in nano science and/or technology related to the INL research themes, establishing a network based on concrete collaboration work; (ii) grants for Portuguese or Spanish Post-Docs, PhD students, researchers or technicians for work in top research laboratories in other countries related to the INL research themes, subjected to a requirement of return to a nano science and/or technology research center existing in Portugal or Spain; (iii) grants for joint R&D projects involving research teams with participants of both countries in areas of nano science and/or technology related to the INL research themes (a first call for proposals should be issued around the time of the Portugal-Spain Summit of 2006, to allow for the projects to begin as early as possible in 2007).

- Advanced International Research Workshop: to organize an important international meeting on nano science and technology in Braga, as a first scientific initiative of the new Laboratory.

- 3) To establish that the hiring of researchers would be conducted so that activities begin in 2008 with a gradual increase to reach a steady state by 2010, with the corresponding increases of human resources and running costs to be accommodated by the planned increase of the Operation budget previewed in 1) and a

gradual decrease of the funding for the Capacity Building Program.

- 4) To adopt the principle that in the mature phase after installation the Laboratory should seek to obtain about half of its total public operational budget on a competitive basis, from national and/or European

sources, and assure about one third of its total funding from private sources.

**According to this plan, the budget appropriations for 2007 are estimated at 10 million euros, half to be assured by the Government of Portugal and the other half by the Government of Spain.**

## Annex 1

# Call for Proposals of R&D Projects in Nanotechnology

## Iberian Capacity Building Program in Nano Science and Technology

It was agreed in the Technical Committee to launch, on the 25<sup>th</sup> of November 2006, a call for proposals for R&D projects in areas of nanotechnology related to the INL with research teams involving participants of both countries, as a first concrete initiative of the Iberian Capacity Building Program in Nano Science and Technology associated to the INL.

The research themes considered in this call were decided in a bilateral meeting organized by the Portuguese Science and Technology Foundation (FCT) and the Spanish Dirección General de Investigación (DGI) with scientists representing the Portuguese and the Spanish Nano Science and Technology Networks. They are as follows:

- Nanomedicine:
  - Diagnostics Systems;
  - Therapeutic Applications and Drug Delivery;
- Nanotechnology for:
  - Environmental Control;
  - Food Safety and Quality.

The evaluation of submitted proposals will be done by an international evaluation panel of independent evaluators established in other countries, who will be nominated by agreement between FCT and DGI. The final definition of funding for the selected proposals will be decided by a bilateral commission, involving an equal number of representatives of FCT and DGI.

The actual Portuguese and Spanish announcements are provided in the following pages.



## Cooperação Científica e Tecnológica entre Espanha e Portugal

### - LABORATÓRIO INTERNACIONAL IBÉRICO DE NANOTECNOLOGIA -

#### Projectos de Investigação Científica e Desenvolvimento Tecnológico em Nanotecnologia

#### CONCURSO

No âmbito do Memorando de Entendimento estabelecido entre o Ministério da Ciência, Tecnologia e Ensino Superior da República Portuguesa e o Ministério da Educação e Ciéncia do Reino de Espanha para o desenvolvimento de planos de cooperação científicos e tecnológicos específicos, com vista ao reforço mútuo das capacidades de intervenção internacional, e tendo em conta o acordo entre os governos de Espanha e Portugal para a criação do Laboratório Internacional Ibérico de Nanotecnologia, a Fundação para a Ciéncia e a Tecnologia (FCT) e a Dirección General de Investigación abrem, simultaneamente em Portugal e Espanha, concurso público para financiamento de **Projectos de Investigação e Desenvolvimento nos seguintes temas de Nanotecnologia:**

- Nanomedicina:
  1. Sistemas de Diagnóstico;
  2. Aplicações Terapêuticas e “Drug Delivery”;
- Nanotecnologia para:
  1. Controlo Ambiental;
  2. Segurança e Qualidade Alimentar.

O concurso realiza-se em duas fases. A primeira fase estará aberta no período compreendido entre 25 de Novembro e 25 de Janeiro e destina-se à apresentação de pré-propostas. De entre as pré-propostas avaliadas nesta fase, serão seleccionadas para passar à segunda fase, um máximo de 10. Nesta fase, que estará aberta entre os dias 1 e 30 de Abril, serão avaliadas as propostas desenvolvidas com base nas pré-propostas seleccionadas na primeira fase e nas recomendações do painel de avaliação.

#### DESTINATÁRIOS

Podem candidatar-se equipas multidisciplinares de investigação de exceléncia científica e tecnológica internacional nos referidos temas e mistas, isto é, envolvendo investigadores integrados em instituições públicas, ou privadas sem fins lucrativos, portuguesas e espanholas, sendo necessário que em cada projecto esteja envolvida pelo menos uma equipa de cada um dos países.

#### FINANCIAMENTO

Os projectos a financiar terão a duração máxima de dois anos. As partes portuguesas das equipas serão financiadas pela FCT e as partes espanholas pela Dirección General de Investigación. O financiamento total previsto para este concurso é de 1,6 M€, a assumir em partes iguais pela FCT e pela Dirección General de Investigación. O valor máximo indicativo para o financiamento global de cada projecto é de 300 a 400 mil euros.

Espera-se que as instituições de investigação, dos dois países, com actividades nos temas considerados se articulem de forma a poderem preparar um número de candidaturas compatível com os financiamentos disponíveis.

## **FORMULÁRIO E REGULAMENTO**

Os formulários para as primeira e segunda fases do concurso estarão disponíveis na Internet em

[www.fct.mctes.pt/projectos/concursos/nano](http://www.fct.mctes.pt/projectos/concursos/nano)

e o regulamento em

[www.fct.mctes.pt/projectos/concurso2006/regulamento](http://www.fct.mctes.pt/projectos/concurso2006/regulamento).

Informações sobre o conteúdo dos formulários de candidatura podem ser solicitadas ao Serviço de Programas e Projectos da FCT (10.00-12.30/14.30-17.00h), pelo telefone 21 3924300 ou através de [projectos@fct.mctes.pt](mailto:projectos@fct.mctes.pt)

Informações sobre questões de carácter informático, podem ser solicitadas pelo telefone 21 3924489 ou através de [concursoprojectos2006@fct.mctes.pt](mailto:concursoprojectos2006@fct.mctes.pt)

## **AVALIAÇÃO E SELECÇÃO**

Todas as pré-candidaturas e candidaturas são submetidas à FCT sendo a avaliação efectuada por um painel internacional de avaliadores independentes estabelecidos noutras países, designados por acordo entre a FCT e a Dirección General de Investigación. A definição final de financiamento será efectuada por uma comissão mista, envolvendo um número igual de representantes destes dois organismos.

O processo de avaliação e selecção dos projectos de investigação é baseado nos seguintes critérios:

- Mérito científico, relevância, originalidade, e resultados esperados da actividade proposta;
- Mérito e produtividade científicos da equipa de investigação e suas qualificações para executar o projeto;
- Exequibilidade do programa de trabalhos e razoabilidade orçamental;
- Quando apropriado, nível de envolvimento institucional e de co-financiamento por parte de utilizadores, empresas e outras entidades.

Serão ainda tidos especialmente em consideração os seguintes aspectos:

- Adequação das candidaturas aos objectivos de cooperação e aos temas de nanotecnologia acima enunciados;
- Resultados dos projectos realizados anteriormente pelos membros da equipa de investigação face ao valor dos financiamentos atribuídos;
- Envolvimento de jovens investigadores em formação;
- Disponibilidade da equipa e não sobreposição de objectivos face a outros projectos em curso

## **CANDIDATURAS**

As candidaturas devem ser apresentadas em formulário electrónico próprio (em língua inglesa) e enviadas, através da Internet, até às 24 horas do dia 25 de Janeiro de 2007.



## Cooperación Científica y Tecnológica entre España y Portugal (Laboratório Internacional Ibérico de Nanotecnología)

### Proyectos de Investigación Científica y Desarrollo Tecnológico sobre Nanotecnología

#### Convocatoria

En el ámbito del memorando de entendimiento establecido entre el Ministerio de Ciencia, Tecnología y Enseñanza Superior de la República Portuguesa y el Ministerio de Educación y Ciencia del Reino de España para el desarrollo de planes de cooperación científica y tecnológica específicos, con vistas al reforzamiento mutuo de las capacidades de intervención a nivel internacional, y teniendo en cuenta el acuerdo entre los gobiernos de España y Portugal para la creación de un Laboratorio Internacional Ibérico de Nanotecnología, la Fundación para la Ciencia y la Tecnología (FCT) y la Secretaría de Estado de Universidades e Investigación (SEUI-MEC) abren, simultáneamente en Portugal y España, la convocatoria pública de financiación para Proyectos de Investigación y Desarrollo en los siguientes temas de Nanotecnología:

#### -Nanomedicina:

1. Sistemas de Diagnóstico
2. Aplicaciones terapéuticas y liberación controlada de fármacos

#### -Nanotecnologías para:

1. Control ambiental
2. Seguridad y calidad Alimentaria

La convocatoria se realizará en 2 fases. La primera fase estará abierta dentro del periodo comprendido entre el 25 de noviembre 2006 y el 25 de enero de 2007 y está destinada a la presentación de pre-solicitudes. De entre estas pre-solicitudes evaluadas en esta fase se seleccionarán un máximo de 10 para pasar a la segunda fase de solicitud. En esta segunda fase de solicitud que estará abierta en el periodo del 1 al 30 de abril del 2007 se evaluarán las solicitudes desarrolladas, en base a las pre-solicitudes seleccionadas en la primera fase y a las recomendaciones del panel de selección.

#### Destinatarios

Podrán presentarse a esta convocatoria los equipos multidisciplinares de investigación de excelencia científica y tecnológica internacional en los temas referidos anteriormente y mixtos, compuestos de investigadores integrados en instituciones públicas, o privadas sin ánimo de lucro, portuguesas y españolas, siendo necesario que en cada proyecto solicitado esté participando al menos un equipo de investigación de cada país.

#### Financiación

Los proyectos a financiar tendrán una duración máxima de dos años. Los participantes portugueses de los equipos de investigación serán financiados por la FCT, y las partes españolas de los equipos por la SEUI-MEC a través de las convocatorias vigentes de las Acciones Complementarias de 2007. La financiación total prevista para esta convocatoria es de un millón seiscientos mil euros, que se asumen a partes iguales por la FCT y la SEUI-MEC. El valor máximo indicativo para la financiación global de cada proyecto se sitúa entre los trescientos y lo cuatrocientos mil euros.

Se espera que las instituciones de investigación de ambos países, con actividades en los temas considerados se coordinen de forma que puedan preparar un número de solicitudes congruente con la financiación disponible.

### **Formulario y regulaciones**

Los formularios de la primera y la segunda fase de esta convocatoria estarán disponibles en internet en la dirección en: [www.fct.mctes.pt/proyectos/concursos/nano](http://www.fct.mctes.pt/proyectos/concursos/nano) y las regulaciones en: [www.fct.mctes.pt/proyectos/concurso2006/regulamento](http://www.fct.mctes.pt/proyectos/concurso2006/regulamento).

Información sobre el contenido de los formularios de solicitud se puede solicitar en Infociencia 902218600 o a través de [infociencia@mec.es](mailto:infociencia@mec.es).

Información de carácter informático pueden ser solicitadas al teléfono +351 21 3924489 o a través de [concursoproyectos2006@fct.mctes.pt](mailto:concursoproyectos2006@fct.mctes.pt)

### **Evaluación y selección**

Todas las pre-solicitudes y solicitudes serán enviadas a la FCT siendo evaluadas por un panel internacional de evaluadores independientes establecidos en otros países, designados por mutuo acuerdo entre la FCT y la SEUI-MEC. La decisión final sobre la financiación será efectuada por una comisión mixta que tenga un número similar de representantes de los dos organismos.

El proceso de evaluación y selección de proyectos de investigación estará basado en los siguientes criterios:

- Mérito científico, relevancia y originalidad de los resultados esperados de las actividades propuestas
- Mérito y productividad científica de los equipos de investigación y sus cualificaciones para ejecutar el proyecto
- Plan y metodología de programa de trabajo
- Cuando corresponda, el nivel de compromiso institucional y de co-financiación por parte de los utilizadores , empresas u otras instituciones

Serán tenidos en consideración especialmente los siguientes aspectos:

- Adecuación de las solicitudes a los objetivos de cooperación y a los temas prioritarios de nanotecnología enunciados anteriormente
- Resultados de proyectos realizados anteriormente por los miembros de los equipos de investigación, en relación a la financiación de los subsodichos proyectos previos
- Participación e integración de jóvenes investigadores en formación
- Disponibilidad del equipo de trabajo en superposición a los objetivos y dedicaciones a otros proyectos en curso

### **Solicitudes**

Las solicitudes deben ser presentadas en un formulario electrónico específico (en lengua inglesa) y enviadas a través de Internet, antes de las 24 horas del día 25 de enero de 2007.

Las solicitudes de proyectos aprobadas podrán ser financiadas por fondos nacionales y por fondos estructurales de la unión europea, de acuerdo a sus respectivos reglamentos.

## **Annex 2**

# **Draft Statute of the International Iberian Nanotechnology Laboratory (INL)**

**The Portuguese Republic**

**and the**

**Kingdom of Spain,**

### **CONSIDERING**

The Scientific and Technological Co-operation Agreement between the Portuguese Republic and the Kingdom of Spain, signed on 8 November 2003, with a view to strengthening their scientific and technological co-operation;

The Memorandum of Understanding between the Ministry of Science, Technology and Higher Education of the Portuguese Republic and the Ministry of Education and Science of the Kingdom of Spain concerning the creation and the joint management of a Portuguese and Spanish Institute of I&D (Portuguese and Spanish International Research Laboratory), signed on 19 November 2005, demonstrating commitment to enter into ambitious joint ventures in the future, thus starting a new stage in their bilateral relations in the field of development of knowledge-based economy by creating a joint research laboratory to work together for the future of modern international science;

Nowadays, the importance of research in nanosciences and technologies for the improvement of human knowledge, its impact on the development of societies and its potential to profoundly change our economy and to improve our standard of living, is similar to the impact the information technology had in the last two decades;

### **HAVING REGARD TO**

The Communication from the European Commission, dated 12 May 2004, "Towards a European Strategy for Nanotechnology" underlining the need for a coherent action to increase investment and coordination of R&D to reinforce the industrial exploitation of nanotechnologies whilst maintaining scientific excellence, interdisciplinarity and competition, as well as to develop poles of excellence taking into account the needs of both industry and research organizations;

The European Union general policy on research and technological development within which the development of nanoscience and nanotechnology is one of the key issues for the European research and industry;

## **CONSIDERING**

The benefits of creating an international nanotechnology laboratory;

That such a laboratory should become part of the European scientific area and set an example of a new type of research collaboration between European Union Member States;

That it shall be open to European and non-European States willing to become Members;

That it shall be international in character and offer a global-scale research site, capable of attracting scientists and technicians from around the world;

That it shall foster international co-operation with other regions, such as North America, Latin America, Asia and others;

**Agree as follows:**

## **PART I INTRODUCTION**

### **ARTICLE 1 Establishment of the Laboratory**

An International Iberian Nanotechnology Laboratory, hereinafter referred to as "the Laboratory", is hereby established.

### **ARTICLE 2 Purposes**

The Laboratory shall provide a basis for scientific and technological co-operation between Member States, especially in nanoscience and nanotechnology by carrying out both fundamental and applied research as well as research essentially related thereto.

### **ARTICLE 3 Activities**

1. The Laboratory's activities shall aim at:
  - a) Assuring world-class research excellence in its areas of activity;
  - b) Creating across Member States strong scientific communities in the field of nanoscience and nanotechnology, in close liaison with global-scale laboratories;
  - c) Developing collaboration between universities and industries, as well as between public and private sectors, training researchers, and contributing to the development of a skilled work force for the nanotechnology industry;
  - d) Organizing and sponsoring European and international co-operation in nanoscience and nanotechnology research;
  - e) Setting up intellectual property rules to make the results of its work and know-how available, enable the technology transfer and protect its inventions;
  - f) Developing systems to prevent and master nanotechnology risks.
2. The basic programme shall comprise:
  - a) The construction of an international laboratory focused on fundamental and applied research

- in nanoscience and nanotechnology, that shall consist of:
- i. The relevant instrumentation;
  - ii. The necessary ancillary apparatus;
  - iii. The buildings capable of containing such equipments necessary to the administration of the Laboratory and the fulfilment of other duties;
- b) The operation of the Laboratory;
  - c) The organization and sponsoring of international co-operation in nanosciences and nanotechnologies.
3. Any additional programmes shall be created pursuant to paragraphs 1 and 2 above.
  4. When a programme of activities comes to an end, the Council shall be responsible for terminating it, subject to any arrangement between the Member States participating in that programme which may be made at the time of the termination.
  5. The Laboratory shall co-operate to the fullest possible extent with the Member States' laboratories and institutes as well as with those at European and world level.

#### **ARTICLE 4 Legal Status**

1. The Laboratory shall have international legal personality.
2. The Laboratory shall enjoy in the territory of each of its Members such legal capacity as may be necessary for the exercise of its functions and the fulfilment of its purposes.

#### **ARTICLE 5 Seat of the Laboratory**

1. The Laboratory shall be located in Braga, Portugal.
2. The status of the Laboratory in the territory of the State of the seat shall be governed by a headquarters agreement between the Laboratory and the State of the seat, to be concluded as soon as possible after the entry into force of the present Statute.

#### **ARTICLE 6 Membership**

1. The membership of the Laboratory shall be open to all States.
2. A State wishing to be admitted as a Member of the Laboratory shall present its application to the President of the Council, who shall inform all Member States thereof.
3. If the application is accepted by the Council, a State shall become a Member after acceding to the present Statute.
4. A State shall only be entitled to become or to remain a Member of the Laboratory if it participates, at least, in the basic programme.
5. The Council may determine a minimum initial period of participation in any programme of activities together with a limit on the expenditure that may be incurred for that programme during that period.

6. If a Member fails to fulfil its obligations under the present Statute, it shall cease to be a Member of the Laboratory by decision of the Council.

## **ARTICLE 7** **Associated States**

The Laboratory may admit Associated States before its admission as a full Member State, in accordance to a statute to be decided by the Council.

## **ARTICLE 8** **Collaborative Entities**

The Laboratory may admit the participation of companies, associations of companies, as well as private and public organisations of investigation as Collaborative Entities, in accordance to a statute to be decided by the Council.

## **ARTICLE 9** **Co-operation**

1. The Laboratory shall co-operate with States, International Organizations and other institutions and companies belonging to industrial, economical and commercial sectors, within its purposes.
2. Co-operation agreements shall be subject to approval by the Council.

## **PART II** **ORGANS AND OPERATION**

### **ARTICLE 10** **Organs**

The Laboratory shall have a Council and a Director-General and Staff.

### **CHAPTER I** **COUNCIL**

#### **ARTICLE 11** **Composition**

1. The Council shall be composed of three representatives from each Member State, one of whom shall be a scientist, who may be assisted by experts.
2. The Council shall elect a president and one vice-president who shall hold office for four years and may be re-elected on not more than one consecutive occasion.

## **ARTICLE 12** **Functions**

The Council shall, subject to the provisions of the present Statute:

- a) Determine the Laboratory's policy in scientific, technical and administrative matters;
- b) Approve and alter the programmes of activities of the Laboratory and its by-laws;
- c) Adopt the parts of the budget which apply to the different programmes of activities and determine the Laboratory's financial arrangements;
- d) Review expenditures, as well as approve and publish the Laboratory's audited annual accounts;
- e) Decide on the staff establishment required and approve the recruitment of senior personnel;
- f) Publish an annual report;
- g) Have such other powers and perform such other functions as may be necessary for the purposes of the present Statute.

## **ARTICLE 13** **Voting**

1. Each Member State shall have one vote in the Council.
2. The Council shall decide:
  - a) By unanimity the admission of Member States to the Laboratory as well as their expulsion from it;
  - b) By a two-thirds majority:
    - i) The approval and alteration of the programmes of activities;
    - ii) The financing of the Laboratory;
    - iii) The establishment of subsidiary organs;
    - iv) The appointment of the Director-General;
    - v) The delegation of powers to the Director-General;
    - vi) The approval of Agreements;
  - c) By simple majority any other matter not contemplated in the previous subparagraphs.
3. For the decisions of the Council referred to in subparagraphs b.i), b.ii) and b.iv) of paragraph 2 above, the two-thirds majority shall include the affirmative votes of the Portuguese Republic and of the Kingdom of Spain.
4. A Member State shall not be entitled to vote:
  - a) On the activities specified in any supplementary programme of activities, unless it has agreed to make a financial contribution to that supplementary programme or unless the matter voted upon relates to facilities it helped to pay;
  - b) If the amount of its unpaid contributions to the Laboratory exceeds the amount of the contributions due from it for the current financial year and the immediately preceding financial year;
  - c) On a particular programme of activities, if the amount of its unpaid contributions to that programme exceeds the amount of the contributions due from it for the current financial year and the immediately preceding financial year.
3. Where the number of Member States is equal to two, all Council's decisions shall be taken by unanimity.

## **ARTICLE 14**

### **Procedures**

1. Where a matter is brought before the Council, the presence of representatives from a majority of the Member States entitled to vote on that matter shall be necessary to constitute a quorum.
2. The Council shall meet at least once a year at such places as it shall decide.
3. Subject to the provisions of the present Statute, the Council shall adopt its own rules of procedure.

## **ARTICLE 15**

### **Subsidiary organs**

1. The Council shall establish a Scientific Policy Committee of international composition, a Finance Committee, and such other subsidiary organs as may be necessary for the purposes of the Laboratory.
2. The creation and the terms of reference of such organs shall be determined by the Council.
3. Subject to the provisions of the present Statute, such subsidiary organs shall adopt their own rules of procedure.

## **CHAPTER II**

### **DIRECTOR-GENERAL AND STAFF**

## **ARTICLE 16**

### **International character**

1. The responsibilities of the Director-General and of the staff towards the Laboratory shall be exclusively international in character and as so, in the discharge of their duties, they shall not seek or receive instructions from any government or from any authority external to the Laboratory.
2. Each Member State shall respect the international character of the responsibilities of the Director-General and the staff and shall not seek to influence them in the discharge of their duties.

## **ARTICLE 17**

### **Director-General**

1. The Council shall appoint the Director-General of the Laboratory for a term of four years amongst international renowned scientists.
2. The Director-General shall be the chief executive officer of the Laboratory as well as its legal representative.
3. As regards the financial administration, the Director-General shall act in accordance with the financial provisions of the present Statute.
4. The Council may delegate to the Director-General such of its powers and functions as may be necessary to act on behalf of the Laboratory in other matters.
5. The Director-General shall submit an annual report to the Council and shall attend all its

meetings, but without being entitled to vote thereat.

6. The Director-General is assisted by a Deputy Director-General, who shall be designated by the Council in the same manner as set forth with respect to the Director-General.

## **ARTICLE 18** **Staff**

1. The staff is composed of all scientific, technical, administrative and clerical personnel working in the Laboratory.
2. The staff shall be appointed following criteria of excellence, competitiveness and publicity.
3. The staff shall, as may be considered necessary and authorized by the Council, assist the Director-General.
4. The Director-General, acting under the Council's delegation of power, shall appoint and dismiss all staff in accordance to rules adopted by the Council.
5. Any persons who are not members of the staff and are invited by or on behalf of the Council to work at the Laboratory shall be under the direction and control of the Director-General and work under the general conditions approved by the Council.

## **PART III** **FINANCING**

### **ARTICLE 19** **Budget**

1. The financial year of the Laboratory shall run from the first day of January to the thirty-first day of December.
2. The Director-General shall, no later than the first day of September of each year, submit to Council for its consideration and approval, detailed estimates of income and expenditure for the following financial year.
3. The estimates of income and expenditure shall be grouped under general headings.
4. The exact form of the estimates shall be determined by the Finance Committee, following advice from the Director-General.
5. Budget transfers shall not be permitted except by authority of the Finance Committee.

### **ARTICLE 20** **Contributions by Members**

1. Where the number of Member States is equal to two, each Member State shall contribute to half of both the capital expenditure and the current operating expenses of the Laboratory.
2. Each Member State shall contribute both to the capital expenditure and the current operating expenses of the Laboratory in accordance with scales which shall be decided every three years by

the Council.

3. When a State is admitted as a Member to the Laboratory, besides the annual contribution, it shall pay an admission fee for the amortization of the initial expenses made by the States for the setting of the Laboratory.
4. The provisions of paragraphs 2 and 3 above shall not apply:
  - a) Where the Council, in respect of any programme of activities, defines a percentage as the maximum proportion of the total amount of contributions assessed by the Council which any Member State may be required to pay to meet the annual cost of that programme;
  - b) Where the Council decides to take into account any special circumstances of a Member State and adjust in the meanwhile its contribution accordingly.
5. During the initial period of the financial year, the approved budget expenditure shall be met by contributions from Member States.
6. Where a State, whether on becoming a member of the Laboratory or at a later stage, first participates in a programme of activities, then the contributions of the other Member States concerned shall be reassessed and the new scale shall take effect as from the beginning of that financial year.
7. Reimbursements shall be made, if necessary, to ensure that the contributions made by all Member States for that year have been paid in accordance with the new scale.
8. The Finance Committee shall, following consultation with the Director-General, determine the terms on which payments in respect of contributions shall be made consistently with the proper financing of the Laboratory.
9. The Director-General shall thereafter notify Member States of the amount of their contributions and of the dates on which payments shall be made.
10. Resources other than Member States contributions shall be managed in accordance with rules to be defined by the Finance Committee.

## **ARTICLE 21** **Supplementary contributions**

1. In addition to the Member States contributions, the Laboratory may receive additional resources within the framework of collaborations with public or private institutions.
2. These resources shall be managed in accordance with the Financial Rules of the Laboratory.

## **ARTICLE 22** **Currency**

1. The budget of the Laboratory and the Member States' contributions shall be expressed and paid in euros.
2. The Council shall determine the payment arrangements.

## **ARTICLE 23**

### **Working Capital Funds**

The Council may create working capital funds.

## **ARTICLE 24**

### **Financial Rules**

The Council shall, following consultation with the Finance Committee, adopt rules relating to the financial management and administration of the Laboratory, which shall be the Financial Rules.

## **ARTICLE 25**

### **Accounts and Auditing**

1. The Director-General shall keep a full and accurate account of all receipts and disbursements.
2. The Council shall appoint auditors who will serve in the first instance for a period of three years and may thereafter be re-appointed.
3. The auditors shall examine the accounts of the Laboratory, particularly in order to certify that the expenditure conformed to the limits specified in the Financial Rules as well as to the budget provisions. They shall discharge such other functions as are set out in the Financial Rules.
4. The Director-General shall provide the auditors with such information and help as they may require for the purposes of carrying out their duties.

## **ARTICLE 26**

### **Finance Committee**

1. The Finance Committee shall be composed of representatives of all Member States.
2. When reaching any decisions, the Finance Committee shall abide by the voting and quorum rules prescribed for the Council.
3. The Finance Committee shall examine the budget forecast presented by the Director-General and then submit it, together with its report thereon, to the Council.

## **PART V**

### **FINAL PROVISIONS**

## **ARTICLE 27**

### **Depository**

The Government of the Portuguese Republic shall be the depository of the present Statute.

## **ARTICLE 28**

### **Amendment**

1. The Council may propose amendments to the present Statute.
2. The amendments shall be subject to ratification, acceptance or approval by the Member States.
3. The amendments shall enter into force on the thirtieth day following the date of deposit of the last instrument of ratification, acceptance or approval.

## **ARTICLE 29**

### **Accession**

1. The present Statute shall be open for accession from the date on which the Statute has entered into force.
2. The present Statute shall enter into force for the acceding State on the thirtieth day following the date of deposit of the respective instrument of accession.

## **ARTICLE 30**

### **Entry into force**

The present Statute shall enter into force thirty days following the date on which the Portuguese Republic and the Kingdom of Spain notify each other, by writing and through diplomatic channels, of the fulfilment of their constitutional requisites for the manifestation of their consent to be bound to the present Statute.

## **ARTICLE 31**

### **Reservations**

No reservations may be made to the present Statute.

## **ARTICLE 32**

### **Termination and withdrawal**

1. The present Statute can be terminated by agreement between the Member States, which shall agree upon the date from which the provisions of the Statute will cease to be in force.
2. After the present Statute has been in force for seven years, any Member State may withdraw from the present Statute, provided the intention to withdraw is notified in writing to the depositary with at least twelve months notice.

## **ARTICLE 33**

### **Dissolution**

1. The Laboratory shall be dissolved if the number of Member States becomes less than two, or if the Member States so agree.
2. In the event of dissolution, the State of the seat shall be responsible for the liquidation.

3. The surplus shall be distributed among those States that are Members of the Laboratory at the time of dissolution in proportion to the contributions actually made by them from the date they became Members to the Laboratory.
4. Should there be deficit, it shall be distributed among those States that are Members of the Laboratory at the time of dissolution in proportion to the contributions as assessed for the current financial year.

## **ARTICLE 34**

### **Registration**

After the entry into force of the present Statute, the depositary shall transmit it for registration to the Secretariat of the United Nations, according to article 102 of the Charter of the United Nations, and shall notify the Parties of the conclusion of this proceeding, indicating the respective number of registration.

## **ARTICLE 35**

### **Settlement of disputes**

1. All disputes arising out of the interpretation or application of the present Statute shall be settled by consultation, negotiation or other agreed mode of settlement.
2. If the dispute is not settled in accordance with paragraph 1 of this article within three months following a written request by one of the parties to the dispute, the dispute shall, at the request of either party to the dispute, be referred to an international arbitral tribunal according to the procedure set forth in paragraphs 3 to 7 of this article.
3. The arbitral tribunal shall be composed of three arbitrators, one to be chosen by one of the parties to the dispute, another to be chosen by the other party to the dispute, and the third, who shall be the chairman of the tribunal, to be chosen by the other two arbitrators.
4. If either party to the dispute has failed to make its appointment of an arbitrator of the tribunal within three months of the appointment of the arbitrator by the other party, that other party may invite the President of the International Court of Justice to make such appointment.
5. Should the first two arbitrators fail to agree upon the appointment of the chairman of the tribunal within two months following their appointment, either party may invite the President of the International Court of Justice to choose the chairman.
6. Unless the parties to the dispute otherwise agree, the arbitral tribunal shall determine its own procedure and the expenses shall be borne by the parties to the dispute as assessed by the tribunal.
7. The arbitral tribunal, which shall decide by a majority of votes, shall reach a decision on the dispute on the basis of the provisions of the present Statute and the applicable rules of international law. The decision of the arbitral tribunal shall be final and binding on the parties.

IN WITNESS THEREOF, the undersigned, being duly authorised thereto, have signed the present Statute.

Done in Badajoz, on the 25th of November of 2006, in Portuguese, Spanish and English languages, all texts being equally authentic.

**For the Portuguese Republic**

**For the Kingdom of Spain**

## Annex 3

# Agreement Between Braga Municipality and the Portuguese State

Transfer of Rights over Land for Construction of the  
International Iberian Nanotechnology Laboratory (INL)  
(in Portuguese, signed 17 November 2006)

## PROTOCOLO DE CONSTITUIÇÃO DE DIREITO DE SUPERFÍCIE

Celebrado entre

**O MUNICÍPIO DE BRAGA**, neste acto representado pelo Presidente da Câmara Municipal, Francisco Soares Mesquita Machado,

E

**O ESTADO PORTUGUÊS**, neste acto representado pelo Ministro da Ciência, Tecnologia e Ensino Superior, José Mariano Gago

### Cláusula 1.<sup>º</sup> Direito de superfície

Pelo presente título o Município de Braga constitui direito de superfície a favor do domínio privado do Estado sobre todo o prédio descrito na conservatória do registo predial sob o nº. 27911 e a favor do município de Braga sob o nº. 56 670 e parcelas adjacentes, omissos à matriz, delimitado na plana anexa, o qual é propriedade do Município de Braga.

### Cláusula 2.<sup>º</sup> Duração e objecto

O direito de superfície é constituído gratuitamente pelo prazo de 50 (cinquenta) anos, renovável por iguais períodos, e destina-se à construção e manutenção de obras, designadamente das edificações ou construções que forem necessárias à instalação e funcionamento do Laboratório Internacional de Nanotecnologia.

**Cláusula 3.º  
Edificabilidade**

O terreno objecto da constituição do direito de superfície, melhor descrito na clausula primeira é susceptível de ser edificado para o fim em vista.

**Cláusula 4.º  
Entrega do terreno**

1 - O terreno objecto do direito de superfície será entregue ao superficiário o mais tardar até ao dia 31 de Dezembro de 2007.

2 – Sem prejuízo do disposto na cláusula anterior, o superficiário tem, desde já, acesso ilimitado ao terreno descrito na clausula primeira para proceder a todas os estudos, medições e outras diligências que se mostrem necessárias à construção da obra.

3 – Se for necessário ou conveniente proceder a alguma instalação técnica previamente ao prazo disposto no número um da presente clausula, o Município envidará os melhores esforços para que a mesma possa ser feita em terrenos imediatamente adjacentes.

**Cláusula 5.º  
Registo**

O Município de Braga procederá à inscrição no registo predial do direito de superfície e dos seus diversos elementos, após ratificação do presente título pela Câmara Municipal, fornecendo todos os elementos que se mostrem necessários.

**Cláusula 6.º  
Extinção**

O direito de superfície é extinto com a extinção do Laboratório Internacional Ibérico de Nanotecnologia.

**Cláusula 7.º  
Indemnização**

Com a extinção do direito de superfície, o superficiário terá direito a uma indemnização relativa ao valor da obra edificada que for fixada para o efeito por uma comissão de peritos, sendo um designado pelo Município de Braga, um pelo superficiário e o terceiro designado pelos próprios peritos.

**Cláusula 8.º  
Regime aplicável**

Em tudo o que for omissa no presente título, as partes diligenciarão pela melhor solução aplicável, tendo sempre presente as regras gerais de Direito.

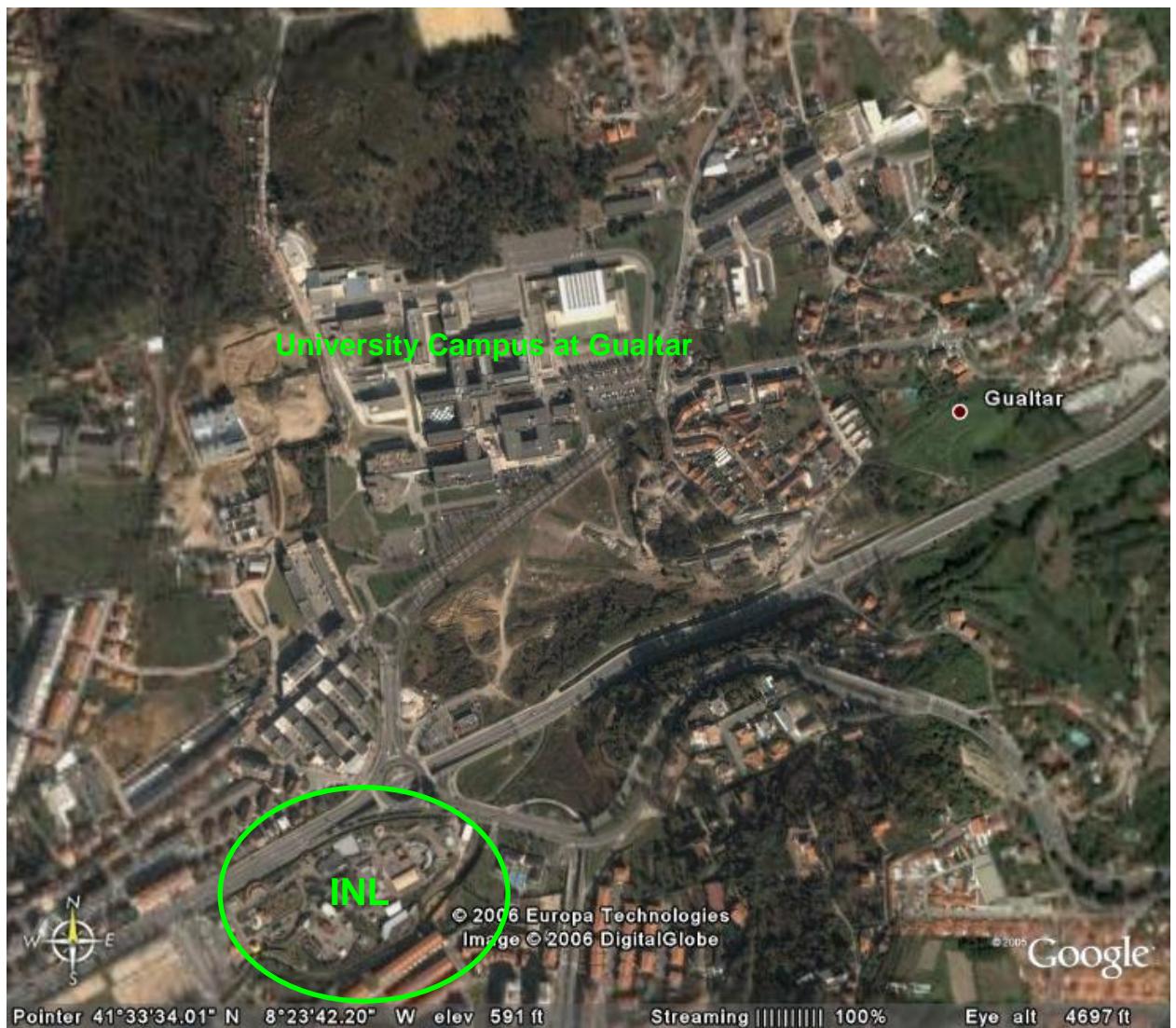
Feito em Braga, a 17 de Novembro de 2006, em dois originais de igual valor.

**Pelo Estado Português**  
José Mariano Gago  
Ministro da Ciência, Tecnologia e Ensino Superior

**Pelo Município de Braga**  
Francisco Soares Mesquita Machado  
Presidente da Câmara Municipal

## Annex4

### Localization Views of Site for the International Iberian Nanotechnology Laboratory (INL)





## **Annex 5**

# **Agreement Between University of Minho and Ministry of Science, Technology and Higher Education Space for the Commission Preparing the Installation of the International Iberian Nanotechnology Laboratory (INL) (in Portuguese, signed 17 November 2006)**

## **Protocolo entre a Universidade do Minho e o Ministério da Ciência, Tecnologia e Ensino Superior**

### **1. Introdução**

Decidiram os Governos de Portugal e de Espanha em Cimeira Ibérica, criar um Instituto de Investigação, centrando a sua actividade nas áreas de investigação emergentes, regendo-se por objectivos de afirmação internacional de elevado nível, nos diferentes sectores de ID seleccionados e que virá a acolher investigadores de reputação internacional.

### **2. Finalidades e âmbito do Protocolo**

A Universidade do Minho (UM) e o Ministério da Ciência, Tecnologia e Ensino Superior (MCTES) estabelecem entre si o seguinte Protocolo com o fim de promover a instalação do Laboratório Internacional de Nanotecnologia.

No âmbito do presente Protocolo, a UM cede instalações para a Comissão Instaladora do referido Laboratório.

Essas instalações estão localizadas no Edifícios dos Congregados (Av. Central, Braga), nos termos da correspondência trocada entre as partes.

Mais, compromete-se a UM a disponibilizar o acesso ao respectivo Salão Nobre e a um Anfiteatro para iniciativas específicas que o Laboratório pretenda promover.

Por seu lado, o Laboratório será responsável pelas eventuais obras de adaptação e conservação, bem como pela aquisição e instalação do mobiliário, infra-estruturas dedicadas de comunicação e encargos de financiamento.

### **3. Disposições finais**

Este Protocolo é válido pelo período de dois anos, renovável automaticamente por outro ano se não existir denúncia antecipada de qualquer dos outorgantes, com aviso prévio de 90 dias.

O protocolo pode também ser revogado por qualquer das partes com um aviso prévio de 120 dias.

Braga, 17 de Novembro de 2006

Pelo Ministério da Ciência, Tecnologia e  
Ensino Superior

Prof. José Mariano Gago  
(Ministro)

Pela Universidade do Minho

Prof. António Guimarães Rodrigues  
(Reitor)

## **Annex 6**

# **Decree of the Portuguese Government Creating a Nonprofit Private Association of Public Interest to Prepare the Installation of the International Iberian Nanotechnology Laboratory (INL)**

*(in Portuguese, approved 23 November 2006)*

### **Exposição de motivos**

Na XXI<sup>a</sup> Cimeira Luso-Espanhola, ocorrida em Novembro de 2005, os Primeiros Ministros de Portugal e Espanha anunciaram a decisão de criar e operar em conjunto um instituto de investigação internacional. Com esta decisão, os Governos ibéricos deixaram claro o seu compromisso de reforçar a colaboração científica e tecnológica entre os dois países, abrindo um novo ciclo nas suas relações e na construção de economias nacionais baseada no conhecimento.

Foi também assumido que esse instituto, com sede em território português e gerido sob a responsabilidade conjunta de Portugal e Espanha, teria um carácter internacional e estaria aberto à participação de instituições e de especialistas de todo o mundo, visando constituir-se como pólo de investigação internacional de excelência, desenvolvendo parcerias com instituições do ensino superior e com o sector económico, a promoção da transferência de conhecimento de valor acrescentado e gerador de emprego e a formação de profissionais especializados, contando, para tanto, com um investimento público de cerca de trinta milhões de euros por ano.

Esta decisão foi recebida com especial interesse pela União Europeia, tendo inclusivamente sido referida como um exemplo de boas práticas de cooperação internacional na primeira reunião dos coordenadores nacionais da implementação da Estratégia de Lisboa, que teve lugar em Lisboa em 6 de Outubro 2006.

Nos termos do Memorando de Entendimento assinado entre os ministros da Ciência, Tecnologia e Ensino Superior de Portugal e o Ministro da Educação e Ciência de Espanha nesta Cimeira, a definição dos detalhes da implementação e operacionalização deste instituto couberam a uma Comissão Técnica bilateral a qual, dentro do prazo de um ano, devia apresentar o seu relatório final à XXII<sup>a</sup> Cimeira luso-espanhola.

Dentro do prazo estabelecido, a Comissão Técnica concluiu que: i) as actividades do INL devem ser centradas nas áreas da Nanociência e Nanotecnologia, sem prejuízo da consideração de outras áreas de interesse comum dentro de um perspectiva interdisciplinar, abrangendo tanto a investigação básica como a investigação aplicada; ii) o instituto deve ser designado por “Laboratório Internacional Ibérico de Nanotecnologia – INL” ; iii) o modelo jurídico a adoptar para o INL deve ser o de organização internacional, abrangendo numa fase inicial Portugal e Espanha mas estando aberto à adesão de outros países, iv) o recrutamento do pessoal científico do INL deve ser feito cautelosa e ambiciosamente, de modo a assegurar que o INL atraia cientistas e estudantes de topo e que funcione, desde o início, com equipas de investigação

que assegurem a sua imediata reputação internacional, e v) com base no estudo de diversas propostas apresentadas, propôs a localização definitiva do local onde vão ser construídas as instalações do INL, no concelho de Braga.

A Comissão Técnica validou ainda a proposta de projecto científico apresentado pelo grupo de trabalho criado para o efeito, incorporando os comentários e observações de um conselho científico internacional composto por personalidades de renome na área e nomeado para apoiar este projecto. Evidenciou, ainda, a necessidade de dar início, o quanto antes, a actividades científicas e de investigação conjuntas, enquanto as instalações do INL estão a ser concebidas e construídas, tendo proposto o lançamento de um programa ibérico de capacitação em nanociência e nanotecnologia dirigido a todos os centros de investigação e universidades de Espanha e Portugal, activos nestas áreas, cuja primeira iniciativa é a abertura de um concurso para projectos cujo edital é, na data da XXII.<sup>a</sup> Cimeira, publicado em Espanha e em Portugal.

Em termos de pessoal, o INL deverá ter como meta a dimensão aproximada de duzentos investigadores a que acrescem estudantes de doutoramento, pessoal técnico e administrativo, no total de cerca 400 pessoas, pelo que as suas instalações devem ser projectadas de modo a acomodar esta expansão. É, assim, previsível que a dimensão das instalações rondem os 13.000 a 14.000 m<sup>2</sup> de área construída, englobando áreas de gabinetes, laboratórios e oficinas, auditório, biblioteca e salas de reuniões, incubadora de base tecnológica e, ainda, um centro Ciência Viva, a implantar num terreno cujo direito de superfície foi cedido pelo Município de Braga, com uma área de cerca de 47.000 m<sup>2</sup>.

Prevê-se que entre 2007 e 2008 sejam elaborados os projectos, lançadas e executadas as obras, adquirido o equipamento de base indispensável e desenvolvido o processo de recrutamento de pessoal.

Considerando que todo o trabalho a desenvolver não é compaginável com os procedimentos nacionais, portugueses e espanhóis, necessários à entrada em vigor do instrumento de direito internacional que vai constituir o INL, foi decidido pelos Governos de Portugal e de Espanha criar uma pessoa colectiva autónoma, de funcionamento flexível e de representação paritária, nomeadamente uma associação de direito privado português, que funcione, desde o dia 1 de Janeiro de 2007 e em instalações já cedidas pela Universidade do Minho, como Comissão Instaladora e que proceda a todas as diligências necessárias, entre as quais o lançamento de concursos internacionais de concepção e/ou construção das instalações, a contratação de pessoal científico e administrativo, bem como a preparação e execução do programa de actividades científicas, até à entrada em funcionamento do INL.

Assim:

Nos termos da alínea a) do n.<sup>o</sup> 1 do artigo 198.<sup>º</sup> da Constituição, o Governo decreta o seguinte:

### **Artigo 1º Constituição**

É constituída, pelo presente Decreto-lei, como associação privada sem fins lucrativos, a “Comissão Instaladora do Laboratório Internacional Ibérico de Nanotecnologia - INL”, adiante designada também por Comissão Instaladora do INL, e são aprovados os respectivos estatutos, publicados no anexo I ao presente Decreto-lei e que dele faz parte integrante.

### **Artigo 2º Natureza e regime**

1 - A Comissão Instaladora do INL é uma pessoa colectiva de direito privado, dotada de personalidade jurídica, e constituída pelo tempo necessário à instalação do INL, organização internacional constituída pela República de Portugal e pelo Reino de Espanha a 25 de Novembro de 2006.

2 - A Comissão Instaladora do INL rege-se pelo disposto no presente Decreto-lei, pelos estatutos publicados como anexo I e, subsidiariamente, pela legislação portuguesa aplicável

3 - O âmbito de actuação da Comissão Instaladora do INL é nacional e internacional.

### **Artigo 3º Utilidade pública**

A Comissão Instaladora do INL é reconhecida como de utilidade pública, para os efeitos do Decreto-lei n.º 460/77, de 7 de Novembro.

### **Artigo 4º Registo**

O presente Decreto-lei constitui título suficiente para todos os efeitos legais, incluindo os de registo, os quais se farão sem pagamento de quaisquer taxas ou emolumentos.

### **Artigo 5º Isenções, benefícios e regime fiscal**

1 - A Comissão Instaladora do INL goza de todas as isenções e benefícios fiscais de que aproveitem as pessoas colectivas de utilidade pública, nos termos da legislação em vigor.

2 – Os donativos concedidos à Comissão Instaladora do INL beneficiam automaticamente do regime estabelecido nos artigos 8.º e seguintes do Estatuto do Mecenato Científico.

### **Artigo 6º Património**

Aquando da entrada em funcionamento do Laboratório Internacional Ibérico de Nanotecnologia - INL todos os bens, móveis e imóveis, direitos e obrigações que se tenha constituído na esfera jurídica da Comissão Instaladora do INL passam para a titularidade daquele pelo título mais adequado.

### **Artigo 7º Entrada em vigor**

O presente Decreto-lei entra em vigor no dia seguinte ao da sua publicação.

## **Anexo I**

### **Estatutos da Comissão Instaladora do INL**

#### **Capítulo I Disposições Gerais**

##### **Artigo. 1.º Denominação**

A presente associação privada sem fins lucrativos e de utilidade pública adopta a denominação de Comissão Instaladora do Laboratório Internacional Ibérico de Nanotecnologia - INL, também designada por Comissão Instaladora do INL, e rege-se pela legislação portuguesa aplicável e pelo disposto nos presentes estatutos.

## **Artigo 2.º**

### **Duração**

A presente associação é constituída pelo tempo necessário à instalação do Laboratório Internacional Ibérico de Nanotecnologia - INL, organização internacional constituída pela República de Portugal e pelo Reino de Espanha a 25 de Novembro de 2006.

## **Artigo 3.º**

### **Âmbito territorial e sede**

- 1 - O âmbito territorial de actuação da Comissão Instaladora do INL é nacional e internacional.
- 2 - A Comissão Instaladora do INL tem a sua sede em Braga, na parte do Edifício dos Congregados assim cedida para o efeito pela Universidade do Minho.
- 3 – A associação pode criar delegações ou quaisquer outras formas de representação onde for julgado conveniente ou necessário para a cumprimento dos seus fins.

## **Artigo 4.º**

### **Fim**

A Comissão Instaladora do INL tem por fim a instalação do Laboratório Internacional Ibérico de Nanotecnologia – INL e o desenvolvimento de toda as acções complementares.

## **Artigo 5.º**

### **Actividades**

Para a realização do seu fim, descrito no artigo anterior, a Comissão Instaladora do INL pode praticar todos os actos considerados necessários ou convenientes pelos seus órgãos, designadamente:

- a) Lançar concurso(s) nacional(ais) e ou internacional (ais) de ideias para a construção das instalações onde o INL vai funcionar, adjudicar a concepção, bem como aprovar os respectivos estudos prévios e projectos finais;
- b) Lançar, em conjunto ou separadamente com o(s) concursos referidos na alínea anterior, concurso(s) nacional(ais) e ou internacional (ais) para a construção das instalações onde o INL vai funcionar;
- c) Lançar concurso(s) nacional (ais) e ou internacional (ais) para promover a contratação de pessoal científico e técnico que vai integrar o INL, podendo assinar acordos prévios, contratos de trabalho ou outros documentos necessários
- d) Promover, acompanhar e finalizar junto das entidades competentes, nacionais e internacionais, todos os procedimentos, processos, consultas, reuniões e outros que se mostrem necessários à concepção, construção e entrada em funcionamento das instalações do INL e à contratação do seu pessoal;
- e) Promover e desenvolver acordos de projectos de investigação, ensino e colaboração com entidades públicas ou privadas, nacionais e ou internacionais, na área de nanotecnologia ou outras afins que se mostrem de interesse ao INL;
- f) Empregar e remunerar o pessoal necessário à realização do seu fim;
- g) Proceder aos pagamentos que, a cada ocasião forem devidos a entidades privadas ou públicas, nacionais ou internacionais, e dar a respectiva quitação;
- h) Aceitar heranças, doações, legados ou quaisquer outras liberalidades em nome próprio ou em nome do INL;

- i) Editar e publicar, sob qualquer forma, de obras ou documentos relacionadas com a área da nanotecnologia ou áreas científicas afins consideradas de interesse para o INL;
- j) Realizar conferências, colóquios, seminários, congressos, debates ou outros sobre as suas actividades, os objectivos e progressos do INL, os outros temas relacionados com a área da nanotecnologia ou áreas científicas afins consideradas de interesse para o INL;
- l) Promover o intercâmbio com instituições suas congéneres ou congéneres do INL, nacionais ou internacionais, que prossigam actividades afins;
- m) Criar de um centro de documentação sobre as suas actividades, os objectivos e progressos do INL, os outros temas relacionados com a área da nanotecnologia ou áreas científicas afins consideradas de interesse para o INL;
- n) Promover a divulgação científica na sua área de actividades, designadamente através da implementação e operação de um centro de ciência especializado dirigido ao grande público (Centro Ciência Viva).

## **Capítulo II Associados e Órgãos**

### **Artigo 6.º Associados**

Os associados da Comissão Instaladora do INL são, do lado de Portugal, o Ministério da Ciência, Tecnologia e Ensino Superior, através da Fundação para a Ciência e Tecnologia, I.P., e da UMIC – Agência para a Sociedade do Conhecimento I.P., e, do lado de Espanha, o Ministério da Educação e Ciência, representado pela sua Secretaria Geral de Política Científica e Tecnológica.

### **Artigo 7.º Contribuições financeiras dos associados**

1 - Durante o período de duração da Comissão Instaladora do INL, cada associado contribui com uma contribuição inicial, devida a partir do mês de Março de 2007, de:

- a) Ministério da Ciência, Tecnologia e Ensino Superior, através da Fundação para a Ciência e Tecnologia, I.P.: 5.000.000,00€ (cinco milhões de euros)
- b) Ministério da Educação e Ciência: 5.000.000,00 (cinco milhões de euros) .

2 - As contribuições seguintes são deliberadas pela Assembleia Geral, por unanimidade.

### **Artigo 8.º Órgãos**

1- São órgãos da comissão Instaladora do INL:

- a) Assembleia Geral
- b) Conselho de Administração
- c) Conselho Fiscal

2 – O Presidente da Comissão Instaladora do INL é o membro do Conselho de Administração que como tal for designado pela Assembleia Geral.

**Artigo 9.º**  
**Assembleia Geral**

A Assembleia Geral da Comissão Instaladora do INL é composta por dois representantes do Ministério da Ciência, Tecnologia e Ensino Superior, um da Fundação para a Ciência e Tecnologia, I.P., e outro da UMIC – Agência para a Sociedade do Conhecimento I.P., e por dois representante do Ministério da Ciência e Educação

**Artigo 10.º**  
**Competência e Funcionamento**

1 – Compete à Assembleia Geral:

- a) Dar parecer, até 15 de Dezembro de cada ano, sobre o orçamento e plano de actividades da Comissão Instaladora para o ano seguinte;
- b) Dar parecer sobre o relatório de gestão e as contas do exercício do ano transacto;
- c) Apreciar genericamente a actuação do Conselho de Administração e do Conselho fiscal, podendo emitir parecer, recomendações sobre as linhas gerais de actuação;
- d) Aprovar os documentos base dos concursos nacionais ou internacionais referidos no artigo 5.º, alíneas a) a c), bem como aprovar as respectivas adjudicações;
- e) Aprovar a aceitação de heranças, doações, legados ou quaisquer outras liberalidades em nome próprio ou em nome do INL;
- f) Proceder às designações ou cooptações que sejam da sua competência, bem como prover à substituição de qualquer dos membros cuja designação ou cooptação seja da sua competência em caso de renúncia ou impedimento definitivo do exercício de funções;
- g) Fixar as remunerações ou a atribuição de senhas de presença aos membros do Conselho de Administração e do Conselho Fiscal;
- h) Dar parecer sobre qualquer assunto que o Conselho de Administração ou o Conselho Fiscal submeta à sua consideração.
- i) Autorizar a aquisição, alienação e oneração de bens imóveis;
- j) Autorizar a contracção de empréstimos;
- k) Designar o Conselho científico internacional referido no artigo 15.º.

2 – A mesa da Assembleia Geral é constituída, por um presidente da mesa e um secretário, cooptados entre os vários membros da Assembleia Geral por um período determinado.

3 – A Assembleia Geral é convocada pelo presidente da mesa, com pelo menos 15 dias de antecedência, e reúne ordinariamente duas vezes por ano, na sede da Comissão Instaladora, podendo os seus membros participar através de conferência audiovisual por qualquer meio tecnológico que assegure a comunicação fidedigna entre os vários membros.

4 - A convocatória pode ser enviada por correio registado ou por e-mail para os endereços para tanto fornecidos pelos vários membros e deve conter o lugar, o dia e a hora da reunião, a ordem do dia, os documentos necessários ao pleno esclarecimento dos assuntos constantes da ordem do dia e os requisitos a que porventura estejam subordinados os meios tecnológicos de participação.

5 - A Assembleia Geral pode reunir extraordinariamente sempre que tal seja solicitado pelo Conselho de Administração, pelo Conselho Fiscal ou por qualquer dos seus membros, mediante requerimento escrito dirigido ao presidente da mesa da assembleia geral, indicando com precisão os assuntos a incluir na ordem do dia e justificando a necessidade da reunião da assembleia.

6 - O presidente ou o secretário da mesa da Assembleia Gera devem fazer uma lista de presenças, presenciais ou à distância, dos membros participantes na reunião, bem como lavrar uma acta de cada reunião da assembleia geral, a qual deve ser aprovada antes de ser assinada pelo presidente ou pelo secretário.

7 - Os membros da Assembleia Geral fazem-se representar pelos seus presidentes ou por quem exiba uma carta de representação para o efeito com poderes deliberatórios.

8 - Além das suspensões normais determinadas pelo presidente da mesa, a assembleia pode deliberar suspender os seus trabalhos, no máximo de duas vezes por sessão, sendo que o recomeço dos trabalhos deve ser logo fixado para data que não diste mais de 90 dias.

9 - A Assembleia Geral delibera por unanimidade e com a presença de todos os seus membros. .

### **Artigo 11.º Conselho de Administração**

1- O Conselho de Administração da Comissão Instaladora do INL é composto por três membros para o exercício de funções por um período de três anos civis, renovável, com inicio a 1 de Janeiro de 2007, sendo dois membros designados por unanimidade pela Assembleia Geral e designando estes um terceiro membro. Um dos membros do Conselho de Administração pode ser designado como Director Executivo, designação que pode, ou não, coincidir com a designação como Presidente da Comissão Instaladora..

2 - Compete ao Conselho de Administração a prática de todos os actos necessários à prossecução do fim da Comissão Instaladora do INL que não estejam, nos termos do presente estatuto, atribuídos a outros órgãos, dispendo dos mais amplos poderes de representação e gestão, designadamente:

- a) Definir e dirigir a organização interna da Comissão Instaladora do INL
- b) Administrar e dispor do património da Comissão Instaladora do INL;
- c) Programar as actividades da Comissão Instaladora do INL;
- d) Preparar, deliberar e aprovar o plano anual de actividades e o respectivo orçamento da Comissão Instaladora do INL;
- e) Preparar e aprovar o relatório anual, o balanço e as contas de cada exercício da Comissão Instaladora do INL;
- f) Contratar e dirigir o pessoal da Comissão Instaladora do INL;
- g) Representar a Comissão Instaladora do INL, em juízo ou fora dele;
- h) Instituir, manter e conservar sistemas internos de controlo contabilístico, por forma a reflectirem correctamente, em cada momento, a situação patrimonial e financeira da Comissão Instaladora do INL;
- i) Pedir a convocação da Assembleia Geral;
- j) A abertura ou encerramento de delegações ou quaisquer outras formas de representação;
- k) Praticar todos os actos inerentes aos cumprimentos dos deveres decorrentes do estatuto de utilidade pública;
- l) Decidir sobre quaisquer outras matérias que respeitem à Comissão Instaladora do INL

3 - O Director Executivo exerce com toda a confiança e liberdade as competências que lhe forem delegadas pelo Conselho de Administração, tendo em vista a célere gestão do processo de instalação do INL.

4 - O Conselho de Administração reúne sempre que for convocado pelo seu Presidente ou pelo Director Executivo, devendo os seus membros reunir, pelo menos, duas vezes em cada mês, presencialmente ou

através de conferência audiovisual por qualquer meio tecnológico que assegure a comunicação fidedigna entre os vários membros.

5 - Os membros do Conselho de Administração devem ser convocados para as reuniões por carta ou por e-mail com a antecedência adequada.

6 - O Conselho de Administração delibera através da maioria dos seus membros.

7 - De cada reunião do Conselho de Administração deve ser lavrada acta no livro respectivo ou nas folhas soltas, assinada por todos os que nela tenham participado

8 - As notificações ou declarações de terceiros à sociedade Comissão Instaladora do INL podem ser dirigidos a qualquer dos membros do Conselho de Administração.

### **Artigo 12.º Vinculação**

A Comissão Instaladora do INL fica obrigada, em quaisquer actos ou contratos, pela assinatura do seu Presidente, do Director Executivo ou pela assinatura conjunta de dois membros do Conselho de Administração com indicação dessa qualidade ou ainda pela assinatura de um ou mais mandatários, nos termos dos respectivos mandatos.

### **Artigo 13.º Destituição**

1 - A Assembleia Geral pode, por unanimidade, destituir qualquer membro do Conselho de Administração com fundamento em justa causa.

2 - Constituem, designadamente, justa causa de destituição a violação grave dos deveres que estão cometidos a esse membro ou a sua incapacidade para o exercício normal das respectivas funções.

### **Artigo 14.º Conselho Fiscal**

1 - O Conselho Fiscal da Comissão Instaladora do INL é composto por três membros, designados por três anos civis completos e renováveis, sendo dois designados pela Assembleia Geral, e o terceiro uma sociedade de revisores oficiais de contas ou um revisor oficial de contas designado pelo Conselho de Administração, que preside.

2 - Compete ao Conselho Fiscal:

- a) Verificar se a administração da Comissão Instaladora do INL se exerce de acordo com a lei e os presentes estatutos;
- b) Vigiar pela observância da lei e dos presentes estatutos;
- c) Verificar a regularidade dos livros, registos contabilísticos e documentos que lhe servem de suporte;
- d) Verificar, quando o julgue conveniente e pela forma que entenda adequada, a existências de bens ou valores pertencentes à Comissão Instaladora do INL;
- e) Verificar a exactidão do relatório anual, do balanço ou das contas de cada exercício da Comissão Instaladora do INL;
- f) Verificar se os critérios contabilísticos conduzem a uma correcta avaliação do património e dos resultados;

- g) Elaborar um relatório anual sobre a sua acção fiscalizadora e dar parecer sobre o relatório e contas anuais apresentados pelo conselho de administração;
- h) Convocar a assembleia geral, quando o presidente da respectiva mesa o não faça, devendo fazê-lo;
- i) Cumprir as demais atribuições constantes da lei ou dos presentes estatutos

3 - Para o desempenho das suas funções, podem os membros do Conselho Fiscal, conjunta ou separadamente, proceder aos actos de inspecção e verificação que tiverem por convenientes para o cabal exercício das suas funções , designadamente obter do Conselho de Administração a apresentação, para exame e verificação, dos livros, registos e demais documentos, bem como verificar as existências de qualquer classe de valores, a prestação de informações ou esclarecimentos sobre o curso das operações ou actividades;

4 - Os membros do conselho fiscal têm o dever de:

- a) Participar nas reuniões do conselho de administração e assistir às assembleias gerais que o respectivo presidente os convoque ou em que se apreciem as contas do exercício;
- b) Exercer uma fiscalização conscientiosa e imparcial;
- c) Guardar segredo dos factos e informações de que tiverem conhecimento em razão das suas funções,
- d) Dar conhecimento ao conselho de administração das verificações, fiscalizações e diligências que tenham feito e do resultado das mesmas;
- e) Informar, na primeira assembleia que se realize, de todas as irregularidades e inexactidões por eles verificados.

5 - O Conselho Fiscal deve reunir sempre que for convocado pelo seu presidente por carta ou por e-mail com a antecedência adequada, devendo os seus membros reunir, pelo menos, trimestralmente, presencialmente ou através de conferência audiovisual por qualquer meio tecnológico que assegure a comunicação fidedigna entre os vários membros.

6 - As deliberações do Conselho Fiscal são tomadas por maioria, devendo os membros que com elas não concordarem fazer inserir na acta os motivos da sua discordância, sendo que o revisor oficial de contas ou a sociedade de revisores oficiais de contas têm voto de qualidade, em caso de empate nas deliberações.

7 - De cada reunião do Conselho Fiscal deve ser lavrada acta no livro respectivo ou nas folhas soltas, assinada por todos os que nela tenham participado

### **Artigo 15.º Conselho científico internacional**

A Assembleia Geral designará um conselho científico internacional, fixando a sua competência, as regras da sua composição e a remuneração dos seus membros.

### **Capítulo III Alteração e Extinção**

#### **Artigo 16. Alteração**

Os presentes estatutos podem ser modificados sob proposta da iniciativa de qualquer associado, a qual deve ser aprovada por unanimidade pela Assembleia Geral.

**Artigo 17.º**  
**Extinção**

1 - Imediatamente após a entrada em funcionamento do Laboratório Internacional Ibérico de Nanotecnologia - INL a Assembleia Geral deliberará, em reunião ordinária ou reunião extraordinária expressamente convocada para o efeito, a extinção da Comissão Instaladora do INL.

2 - Extinta a Comissão Instaladora do INL nos termos do número anterior, os poderes dos seus órgãos ficam limitados à prática de actos meramente conservatórios e dos necessários à transmissão do seu património e ou à ultimação de negócios pendentes.

**Artigo 18.º**  
**Destino do património**

1 - Todo o acervo patrimonial da Comissão Instaladora do INL será transferido, em conjunto ou separadamente e através dos títulos jurídicos mais adequados, para o Laboratório Internacional Ibérico de Nanotecnologia – INL.

2- Os órgãos da Comissão Instaladora devem providenciar para que a transferência patrimonial referida no número anterior seja feita tão cedo quanto possível, preferencialmente ainda antes da deliberação de extinção da Assembleia Geral.

**Artigo 19.º**  
**Moradas de notificações**

1 - As moradas para as notificações previstas nos presentes estatutos são as seguintes:

- Ministério da Ciência, Tecnologia e Ensino Superior:  
Fundação para a Ciência e Tecnologia I.P., Av. D. Carlos I, 126, 1249-074 Lisboa Telefone: (+351) 213 924 300 Fax: (+351) 213 907 481  
UMIC – Agência para a Sociedade do Conhecimento I.P., Tagus Park, Edifício Inovação I, sala 124, 2740 - 122 Porto Salvo; Telefone: (+351) 213 918 400 Fax: (+351) 213 918 448
- Ministério da Educação e Ciência:  
Secretaria General de Política Científica y Tecnológica, Ministerio de Educación y Ciencia, Passeo de La Castellana, 160, E – 2807 Madrid; Telefone 91 349 40 00.

2 – As moradas referidas no número anterior podem ser modificadas pelos associados, devendo as novas moradas ser comunicadas aos restantes associados tão cedo quanto possível através de carta ou por e-mail.