DIRECTORY OF THE SPANISH NANOTECHNOLOGY COMMUNITY

Opportunities for collaboration

2013

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1. INTRODUCTION

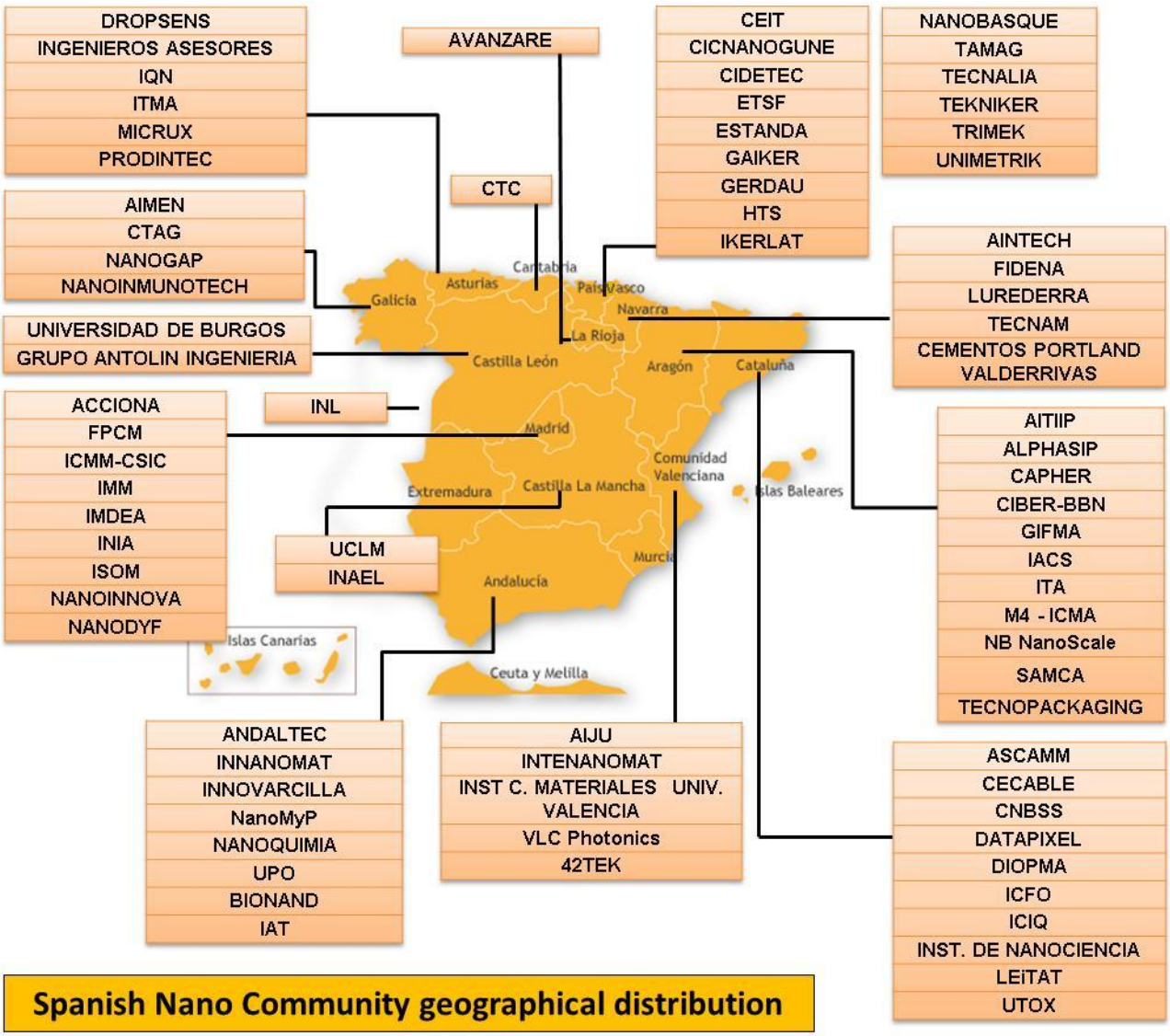
The **"Directory of Spanish Nanotechnology Community"** has been developed to show the capabilities and interest of Spanish Organizations currently involved in activities related to nanoscience and nanotechnology. The main aim of this document is to disseminate at international level relevant information and contact data of the activities of companies and RTD performers with expertise in this field to facilitate networking for business/project collaborations. The organizations listed, private and public show that Spain has a strong base from which to pursue the chances in meeting the current challenges of this technology, both at national and international level. At this respect, Spain is ready and eager to stand up and face the opportunities. This Directory represents an open working document that will be further updated with new Spanish organizations who would like to be included.

The document has been prepared by **PRODINTEC,** Technology Center for Design and Industrial Production (www.prodintec.com), in the framework of **iNNano project** (*Intensification at European level of the Spanish R&D in the field of nanotechnology*), that is co-finance of the Spanish Ministry of Economy and Competitiveness.

PRODINTEC is highly involved in the **NANOfutures initiative** (*European Technology Integrating and Innovation Platform on nanotechnology*, www.nanofutures.eu) that aims to be a long lasting nanotechnology hub connecting all relevant stakeholders and establishing cooperation for the further development and commercialization of nanotechnologies.

1.1. SPANISH ENTITIES LOCATION

The map below shows the different Spanish entities that have relevant skills on nanoscience and nanotechnology ordered by region:



Spanish Nano Community geographical distribution

1.2. SUMMARY OF ENTITIES CAPACITIES

Companies:

NAME	LOCATION	TYPE	characterization	nanocomposites	nanosensors	Synthesis/ functionalization	nanophotoncis	nanobiotechnology	nanoaditives	nanometrology	nanosimulation	nano encapsulates	Knowledge management	Engineering
ACCIONA INFRAESTRUCTURAS	C. Madrid	Large company	●	●					●			●		
ALPHASIP	Aragón	SME			●			●						
AVANZARE	La Rioja	SME	●	●		●								
CAPHER	Aragón	SME			●			●						
CEMENTOS PORTLAND VALDERRIVAS	Navarra	Large company				●			●					
DATAPIXEL	Cataluña	SME	●							●				
DROPSENS	Asturias	SME			●	●								
ESTANDA FUNDICIONES	País Vasco	SME							●					
GERDAU	País Vasco	Large company							●					
GRUPO ANTOLIN INGENIERIA / GRAnPH	Castilla y León	SME	●	●	●	●			●					●
GRUPO SAMCA	Aragón	SME		●	●									
HTS	País Vasco	SME								●				
IKERLAT Polymers	País Vasco	SME							●	●				●
INAEL	Castilla la Mancha	SME					●							
INGENIEROS ASESORES	Asturias	SME			●									
INDUSTRIAL QUIMICA DEL NALON	Asturias	Large company				●			●					
INTENANOMAT	C.Valenciana	SME		●	●	●								
MICRUX	Asturias	SME			●									
NANOGAP	Galicia	SME				●			●					
NANOINMUNOTECH	Galicia	SME				●		●						
NANOINNOVA	C. Madrid	SME	●			●								
NanoMyP	Andalucía	SME			●	●								
NANOQUIMIA	Andalucía	SME			●	●						●		
NanoScale Biomagnetics	Aragon	SME	●											
TAMAG	País Vasco	SME			●									
TECNAN	Navarra	SME	●			●			●					
TECNOPACKAGING	Aragón	SME							●					
TRIMEK	País Vasco	SME								●				
UNIMETRIK	País Vasco	SME								●				
VLC Photonics	C.Valenciana	SME	●				●				●			
42TEK	C. Valenciana	SME	●	●	●	●	●		●			●		

RTD performers:

NAME	LOCATION	TYPE	characterization	nanocomposites	nanosensors	Synthesis/ functionalization	nanophotoncis	nanobiotechnology	nanoaditives	nanometrology	nanosimulation	nano encapsulates	Knowledge management	Engineering
BIONAND	Andalucía	Research Center	●		●	●	●	●	●			●	●	
CECABLE	Cataluña	Research Center												●
CEIT	Pais Vasco	Research Center	●	●	●	●				●	●			
CIBER-BBN	Aragón	Research Center			●	●		●						
CICNANOGUNE	País Vasco	Research Center	●		●	●		●	●					
FIDENA	Navarra	Research Center		●				●	●					
ICIQ	Cataluña	Research Center	●			●						●		
ICMM-CSIC	C. Madrid	Research Center	●	●		●	●			●	●			
IMDEA Nanoscience	C. Madrid	Research Center	●			●		●						
IMM	C. Madrid	Research Center	●		●	●	●	●						
INIA	C. Madrid	Research Center	●											
INL	España-Portugal	Research Center	●		●	●		●						
UTOX	Cataluña	Research Center						●						

NAME	LOCATION	TYPE	characterization	nanocomposites	nanosensors	Synthesis/ functionalization	nanophotoncis	nanobiotechnology	nanoaditives	nanometrology	nanosimulation	nano encapsulates	Knowledge management	Engineering
AIJU	C. Valenciana	Technology Center	•	•										
AINTECH	Navarra	Technology Center	•			•			•					
AITIIP	Aragón	Technology Center		•					•					
ANDALTEC	Andalucía	Technology Center		•		•			•				•	•
ASCAMM	Cataluña	Technology Center	•	•					•			•		
CIDETEC	País Vasco	Technology Center		•		•	•		•					
CNBSS	Cataluña	Technology Center	•	•	•	•		•	•	•		•		
CTAG	Galicia	Technology Center			•				•				•	
CTC	Cantabria	Technology Center	•	•		•			•		•			
GAIKER	País Vasco	Technology Center						•						
IAT	Andalucía	Technology Center									•		•	
INNOVARCILLA	Andalucía	Technology Center	•						•					
ITA	Aragón	Technology Center								•				
ITMA	Asturias	Technology Center	•	•	•	•	•		•					
LEiTAT	Cataluña	Technology Center	•	•	•			•	•	•		•		
LUREDERRA	Navarra	Technology Center				•			•					
PRODINTEC	Asturias	Technology Center											•	•
TECNALIA	País Vasco	Technology Center	•	•		•	•		•		•	•		•
TEKNIKER	País Vasco	Technology Center	•	•	•	•	•	•		•		•		

NAME	LOCATION	TYPE	characterization	nanocomposites	nanosensors	Synthesis/ functionalization	nanophotoncis	nanobiotechnology	nanoaditives	nanometrology	nanosimulation	nano encapsulates	Knowledge management	Engineering
DIOPMA	Cataluña	University	•			•								
GIFMA	Aragón	University								•				
ICFO	Cataluña	University	•				•							
INNANOMAT	Andalucía	University	•	•			•		•	•	•			
ISOM	C. Madrid	University	•	•	•		•				•	•		•
UNIV. VALENCIA	C. Valenciana	University	•	•	•		•							
UNIV. BARCELONA	Cataluña	University	•		•	•	•	•			•			
M4 - ICMA	Aragón	University	•			•		•						
UNIVERSIDAD DE BURGOS	Castilla y León	University	•	•	•			•			•			
PABLO DE OLAVIDE UNIV.	Andalucía	University	•				•							

Others:

NAME	LOCATION	TYPE	characterization	nanocomposites	nanosensors	Synthesis/ functionalization	nanophotoncis	nanobiotechnology	nanoaditives	nanometrology	nanosimulation	nano encapsulates	Knowledge management	Engineering
IACS	Aragon	Other						•						
ETSF	País Vasco	Network/infrastruture		•	•		•	•	•		•		•	
FPCM	C. Madrid	Other-Infrastructure	•											
NANOBASQUE	País Vasco	Other-Agency											•	
NANODYF	C. Madrid	Iberoamerican Network											•	

2. DIRECTORY OF SPANISH NANOTECHNOLOGY COMMUNITY

2.1. COMPANIES

ACCIONA

acciona

University | Technology Center | Other | SME | **Large Company**

Capacities

characterization	**nanocomposites**	nanosensors	Synthesis/funct.	engineering
nanobiotechnology	**nanoadditives**	nanometrology	**nanoencapsulates**	nanophotonics

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Organization profile

ACCIONA Infrastructuras is a leading European construction company constructing and managing buildings and civil infrastructures under the sustainability principles. It has an international presence in more than 30 countries and its total turnover in 2011 was about 3,5billion€, employing by 14.000 people. It is part of ACCIONA Group, whose business lines are Construction, Energy, Water, Real State, Urban-Environmental Services, Logistic and transport. ACCIONA's business strategy is tightly linked to sustainability and in recognition of the company's efforts and commitments in that direction, received in 2009 the Award for Corporate Sustainability of the EU Business Award. ACCIONA uses cutting-edge technology to develop and apply the most advanced materials, components, systems and solutions for sustainability and in particular for energy efficient concepts, design, construction, operation and recycling of buildings.

Main capacities in nanotechnology / nanosciences

ACCIONA has its own R&D Technological Centre in Madrid, composed by a multidisciplinary and international team of about 170 highly qualified researchers from a wide range of disciplines. Moreover, it account with 17 research laboratories and 2 production workshops to build prototypes. Main research areas are Nanotechnology and Advanced materials, New Construction Materials, Products and Systems, ICTs, Energy Efficiency as well as Biotechnology and Environmental Technologies.

ACCIONA main interest in nanotechnology is to use materials with new added value functionalities or improved performance with respect to conventional ones, taking into account cost issues to be competitive. ACCIONA has implemented at several worksites nanomaterials like nanosilica or nanophotocatalytic additives. In fact, ACCIONA has patented a nano-based photocatalytic product.

Main related relevant activities/projects

At European level, ACCIONA plays an active role in the ECTP being part of its Executive Committee, co-leading the FA Cities and Buildings and it is a member on ECTP's Advisory Group on SMEs. It chairs the Energy Efficient Building Association (E2BA) based in Brussels, and it is a member of the AD HOC Advisory Group to the EC on the PPP on Energy Efficient Buildings. It is also a member of EUROACE (European Alliance of companies for energy efficiency), ECCREDI (The European Council for Construction Research, Development and Innovation), ENCORD (European Network of construction companies for Research and Development), FIEC (European Construction Industry Federation) and others ETPs construction/energy related and is actively participating in several initiatives like Smart Energy Home or Inter-ETPs group. At international level, ACCIONA has recently joined to the Executive Committee of the "Caring for Climate" platform of the UN Global Compact initiative for participants seeking to demonstrate leadership on the issue of climate change.

Within FP7, ACCIONA Infraestructuras is currently involved leading and participating on more than 70 European Projects:

MEEFS (Coordinator) (EeB.NMP.2011-3) "*Multifunctional Energy Efficient Façade System for Building Retrofitting*". GREENCAST (Coordinator) (CIP-EIP-Eco-Innovation-2010) "*Demonstration of innovative lightweight construction components made of recycled ashes for sustainable buildings*".; SUSCON: "*Sustainable, innovative and energy-efficient concrete, based on the integration of all-waste materials"*. FP7 Project. 2012-2016. With the participation of ACCIONA. Elements with good thermal and acoustic properties are being achieved; AEROCOINS (EeB.NMP.2010-1) "*Aerogel-Based Composite/Hybrid Nanomaterials for Cost-Effective Building Super-Insulation Systems*"; "Development of PCM-based innovative insulating solutions for the Light-weight building sector". NANOCOM (NMP.2009.1.2.-5) "*Lowering Barriers for Nanotechnology Commercialization Open Innovation*". Regarding Nanosafety Cluster mentioned in the topic, ACCIONA is involved in SCAFFOLD (NMP.2011.1.3-2)"*Innovative strategies, methods and tools for occupational risks management of manufactured nanomaterials (MNMs) in the construction industry*"; etc.

Other information

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ALPHASIP

University	Technology Center	Other	**SME**	Large Company

Capacities

Characterization	nanocomposites	**nanosensors**	synthesis/funct.	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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CEO (founder) ALPHASIP
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Organization profile

AlphaSIP is a nanotechnological company that manufactures Medical Diagnostic Chips. AlphaSIP sensors allow us to develop rapid diagnostics tests, Point of Care.

AlphaSIP is focus on the design; development and production of medical diagnostic chips which allow immediate and effective disease detection promote better health care services for patients and foster personalized medicine.

Mission

AlphaSIP's mission is to provide the Life Science field with accurate, fast, reliable and robust diagnostic devices which will promote a more personalized patient care.

Vision

AlphaSIP aims to become a worldwide benchmark company in the medical diagnostics field, providing solutions for the current unmet demands of the global health care system.

Main capacities in nanotechnology / nanosciences

AlphaSIP has the ability to develop nanoelectronic sensors for biological applications based on nanomaterials, for example, nanotubes.

Main related relevant activities/projects

- CocaChip – Drug Screen Saliva Test Point of Care
- CardioChip - Fast Diagnostic Test for Deep Venous Thrombosis
- Cajal4eu Poject: - Fast Diagnostic Test for Cardiovascular Disease

Other information

AlphaSIP has the commitment to donate part of its benefits to the reforestation of the Pyrenees Mountains, as a part of its Corporate Citizenship.

AVANZARE INNOVACION TECNOLOGICA S.L.

University | Technology Center | Other | **SME** | Large Company

Capacities

characterization | **nanocomposites** | nanosensors | **synthesis/funct.** | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

Address:

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Web: **www.avanzare.es**

Contact:

Dr. Julio Gómez Cordón
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Organisation profile

AVANZARE is a supplier of high-performance nanomaterials and nanotechnology based solutions used in a wide range of products for everyday life. AVANZARE nanomaterials and nanocomposites create added values and competitive advantages for our customers. In many applications, our developments allow the reduction of costs compared to traditional materials.

Our nanomaterials are liquid or solid formulations and custom solutions for big consumers. Principal customers are automotive, aeronautic, fabric, wood, paper, plastic, rubber, paint and building industries, the wire & cable sector and manufacturers of household appliances and packaging.

Most of our materials are multifunctional, allowing obtaining 2 o several properties with just a product. Principal properties of our materials are:

- Fire resistant
- Anti-scratch
- Conductivity & Antistatic
- Hardness
- Wear Resistance
- Anti UV
- Anti IR
- Bactericides
- Fungicides and anti-Mold
- Stain Resistance
- Superhydrophobic
- Superlipophobic
- Anti-odour
- Improvement of polymer and rubber properties

Main capacities in nanotechnology/nanoscience

- Nanoparticles synthesis
- Graphene synthesis
- graphenoids materials synthesis
- Nanocomposites preparation

- Nanomaterials characterization
- Study of the properties of nanomaterials
- Scale up the preparation of nanomaterials

Main related relevant activities/projects

- NANOMASTER
- DIB-BIOPACK
- BOUNAPARTE
- BISNANO
- SAMCOAT
- THERMALCOND

Other information

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CAPHER IDI S.L

University	Technology Center	Other	**SME**	Large Company

Capacities

characterization	nanocomposites	**nanosensors**	Synthesis/funct.	nanofotónica
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Contact:

Laura Bonel Sanmartín
PhD in Chemistry, Researcher
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Organisation profile

CAPHER IDI S.L was established in May 2009. This SME is a technology based company that focuses its activities on the development of electrochemical nanoestructured sensors and biosensors.

The development of these biosensors can have a broad utility in different fields and activities, for example in environmental control of specific pollutants, in the clinical setting as elements to achieve a rapid diagnosis with minimal invasion of the patient by the sensor element and “in situ” food composition control. It offers the possibility of developing a sensor surface that is part of a diagnostic tool and control very easy, fast, inexpensive, easy to use, etc.

This company works in collaboration with the Analytical Spectroscopy and Sensors Group (Recognized by the Government of Aragon, GEAS-E44) at the University of Zaragoza.

Main capacities in nanotechnology/nanoscience

The company CAPHER IDI SL has been working in the development of nanostructured electrochemical biosensors from the first moment it was constituted.

Our main capabilities in nanoscience and nanotechnology are based on the use of different nanoparticles, nanomaterials, nanostructures and nanosystems in order to achieve a sensing surface on which have significantly improved the analytical properties, due to the sensor surface nanostructuring.

The use of nanomaterials, such as carbon nanotubes, gold nanoparticles, magnetic nanoparticles, etc. contributes to always have a greater surface area per unit volume, with all the advantages this entails, and also improves the charge transfer and increases the number of biorecognition elements contributing to the amplification of the electrochemical signal. The ability of the company lies in the possibility of giving these properties and advantages in any sensing surface, to achieve an improvement in analytical properties of the sensor developed.

Main related relevant activities/projects

1. FEASIBILITY OF AN INDUSTRIAL DEVELOPMENT KIT FOR DETERMINING OF OCHRATOXIN A IN CEREAL AND ALCOHOL, January 2011-December 2013, Subprogramme Torres Quevedo, Ministry of Science and Innovation.

2. SERIBIO: DISPOSABLE ELECTROCHEMICAL BIOSENSORS BASED ON TECHNOLOGY SCREEN PRINTED, November 2010 - June 2014 INNPACTO 2010, Ministry of Science and Innovation.

3. DEVELOPMENT OF A MULTISENSOR PLATFORM FOR THE DETERMINATION OF MYCOTOXINS IN FOODS, January 2011-December 2011, INNOEMPRESA 2011, Government of Aragon, Department of Industry, Trade and Tourism.

4. DEVELOPMENT OF AFFINITY BIOSENSORS FOR APPLICATION IN THE DETERMINATION OF SEROLOGICAL MARKERS OF CELIAC DISEASE, January 2011-March 2012, Government of Zaragoza, Department of Development and Infrastructure.

Other information

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Cementos Portland Valderrivas Group

University	Technology Center	Other	SME	**Large Company**

Capacities

characterization	nanocomposites	nanosensors	**synthesis/funct.**	nanophotonic
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	nanoencapsulates

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Webpage: **www.valderrivas.es**

Contact:

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R&D Corporate Director
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Organisation profile

Cementos Portland Valderrivas is the largest Spanish-owned cement producer. It owns, directly or indirectly, production plants in strategic locations in the following Spanish regions: Cantabria, Basque Country, Navarra, La Rioja, Castilla & León, Castilla La Mancha, Madrid, Aragon, Extremadura, Andalusia and Catalonia. It also has a very strong position in the highly competitive market on the US Eastern Coast, and in Tunisia.

It applies the latest technology in all its production processes with a view to optimizing the economics, caring for the environment and enhancing working conditions. Annual production capacity is as follows:

- 18.8 million tons of cement
- 16.5 million tons of aggregate.
- 8.6 million m^3 of concrete
- 3 million tons of mortar.

Main capacities in nanotechnology/nanoscience

Alternative manufacturing technology of cement allowing particle sizes not achievable with current technology resulting in a highly competitive and low-energy industrial manufacturing process.

Main related relevant activities/Projects

“Nanomicrocemento” it’s a R&D National Project inside INNPACTO 2011, under the Spanish public funding provided by the Science and Innovation Ministry. It aims at developing a new generation of advanced cements with particle sizes less than one micron (between 400-1000 nm) and cementious products in nano scale (0-200 nm). These new particles will be able to confer excellent performance to concrete in terms of durability and mechanical resistance, which use will be very beneficial and necessary in both inland and marine extreme climate conditions. This technology is intended to open a new era in the manufacture of cements, and in this case, the wind energy will be based on new applications of concrete, today unthinkable, and strong improvements of the existing ones.

Other Information

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DATAPIXEL

DATAPIXEL
QUALITY CONTROL ENGINEERING

University	Technology Center	Other	**SME**	Large Company

Capacities

characterization	nanocomposites	nanosensors	syntehsis/funct.	nanophotonics
nanobiotechnology	nanoadditives	**nanometrology**	nanosimulation	nanoencapsulates

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Organisation profile

DATAPIXEL was founded in 1999 with the objective of designing, developing and manufacturing systems and solutions in the field of computer vision and dimensional metrology in industrial and professional applications. Its developments are market driven, and provide high-end products to sectors such as automobile, electronics, energy, railway or aeronautics. DATAPIXEL supplies solutions in 3D dimensional inspection, virtual metrology, in line inspection and robot guidance systems by means of its sensor OPTISCAN, the best non-contact dimensional sensor of its kind, not only in accuracy or repeatability, but also in manageability and versatility.

DATAPIXEL holds the Presidency of EMVA (*European Machine Vision Association*) and has actively collaborated in the development of the Strategic Research Agenda of the Photonics 21 Technology Platform, where it plays a key role. It is also part of the micro- and nano-technology expert group set up by the EC in the area of metrology.

DATAPIXEL product and service catalogue is formed by:

- 3D optical micro and nano-sensors. design, manufacture and commercialisation high-precision and high-speed 3D optical sensors for 3D micro and nano-measurement and digitalisation.
- 3D point cloud management & control systems: optical sensor controls and highly flexible 3D point cloud information management systems for integration in complete digitalization and measuring setups.
- 3D point cloud analysis software: 3D point cloud data acquisition and processing modules for automated geometric feature extraction, profile and surface analysis.

The main activities of the company are:

- Design, development and commissioning of non-contact optical instrumentation in production line and measurement laboratory for quality control, dimensional and geometrical inspection.
- Consultancy on development and inline integration of customized non-contact optical sensor technology within the aeronautical, automotive, energy and electronic sectors.

To deliver DATAPIXEL's main products and services, the company has established an outstanding set of collaborations with the main companies at international level in the field of artificial vision such as: Sony

(Japan); Matrox (Canada); KUKA, Staubli, ABB and Fanuc; Renishaw; ZEISS and FARO, among others

Main capacities in nanotechnology/nanoscience

DATAPIXEL has its own R&D laboratory, dedicated to optical developments and experiments in the following fields: optical chain development, artificial vision and digital image processing, 3D data processing algorithms and metrology. This laboratory is equipped with vision systems, image processing SW and HW and some mathematical SW modules. The company has developed the following capacities in the area of nanotechnology:

- Fiber-based confocal and interferometry based 3D point nano-sensing.
- Triangulation-based 3D micro sensing.
- Vision-based inline 3D diffractive micro-structure and micro-tool inspection.
- Inline large-area diffractive optics micro-structure illumination sensing.
- 3D optical nano-sensing control.
- Closed-loop in-process adaptive control.
- Algorithmic for automated multi orientation, multi nano-probe 3D point cloud information stitching and 3D point cloud nano-feature extraction and uncertainty estimation.

Main related relevant activities/projects

DATAPIXEL has participated in the following R&D projects:

1. SCALAB (EC MNT 2010-2012): This project aims at development of scalable solutions for 3D micro-assembly automation of complex products in photonics with highest demands on accuracy. The solution supports the development and optimization of automated manipulation, assembly and inspection processes during prototype production as well as the easy transfer and scaling up for series production.

2. NanoCMM (FP6-NMP 2006-2011): The main objective was to develop a universal Coordinate Measurement Machine that could be able to measure most of 3D geometries at micro and nano scale, including inside holes, steeps and behind obstacles. Nano-CMM instrumentation achieved control of 3D features in micro-part production with accuracies from 20-200 nm in large measurement volumes.

3. FLEXPAET (FP6-NMP 2008-2011): The main goal was to develop a manufacturing process to replicate micro-structures in large area substrates, aiming at enhancing the use of LED as main source of light, energy saving and high efficient lighting products. Flexible Patterning featuring Adaptive Embossing Technology developed a new method to mass replicate micro-structured surfaces (below 100 microns) in large thermoplastic substrates based on inline adaptive quality control.

4. NANOSOST (MCI 2008-2010): Development of metrology equipment for the characterization of nano-particles in nano-manufacturing processes for health and safety considerations**.**

Other information

Innovalia Metrology (www.innovalia-metrology.com/en) is a strategic alliance between UNIMETRIK, TRIMEK and DATAPIXEL – three companies that have joined forces to offer our customers with best-in-class metrology solutions that integrate traditional metrology with the latest technological developments from laboratories to production lines. Our systems and solutions are designed to provide our customers with a guarantee of measurement accuracy for parts and components that are vital to the manufacturing process, and to enable the achievement of higher levels of productivity and efficiency in production processes.

DROPSENS

University	Technology Center	Other	SME	Large Company

Capacities

characterization	nanocomposites	**nanosensors**	**synthesis/funct.**	nanophotonics
nanobiotechnology	nanoaddditives	nanometrology	nanosimulation	nanoencapsulates

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Organisation profile

DropSens is an Innovative Technology-Based Firm specialised in the design and manufacture of instruments for Electrochemistry Research.

We develop screen-printed electrodes, based on thick-film hybrid technology, with the aim of providing researchers with a powerful tool for the development of electrochemical sensors of diverse nature: chemical, enzyme, immune and genosensors, etc. These sensors are aimed for important applications in the fields of clinical analysis, environmental and food control. Screen-printed electrodes offer a number of advantages versus conventional electrodes: they are suitable for working with microvolumes and for decentralized assays (point of care tests), etc.

With the aim of miniaturising electrochemical instruments, we have focused in the design and development of portable potentiostats which offer the main electrochemical techniques while retaining the accuracy of bigger instruments and offering an easy-to-use computer interface.

One of our main strengths is our flexibility for custom products manufacturing. For this reason, we offer the possibility of manufacturing tailored instruments and electrodes following researcher's specifications, including different designs and materials.

Main capacities in nanotechnology/nanoscience

At DropSens, we develop a continuous R&D work in order to incorporate the last technological advances to Electrochemistry, such as the advantages of Nanotechnology; we already supply different nanomaterials-modified screen-printed electrodes based on: Single- and Multi-Walled Nanotubes produced through CVD (Chemical Vapor Deposition). Also functionalized with -COOH and -NH_2 groups. Suitable for mechanical and electrical applications.

Furthermore, we supply different solutions: Carbon Nanofibres solution, Carbon Nanotubes solution, Graphene solution, Graphene Oxide solution, and aqueous graphene oxide solution.

Also p-AminoPhenyl Phosphate, Hydroquinone Diphosphate and Phosphorylated Paracetamol: electrochemical substrates of Alkaline Phosphatase.

Main related relevant activities/projects

This SME offers the development of R&D projects for customers in the different areas of application of electrochemical sensors, designed specifically by customers themselves or adjusted to fit their needs in the improvement of processes and/or products.

To be positioned as the international scientific-technological benchmark company that promotes the Research and Development in the sector, in DropSens:

- we bet for new research lines.

- we collaborate with research groups from Universities and Technological Centres.

- we use innovative technology in the development of electrochemical sensors.

- we advise and collaborate with customers in order to find the best project financial mechanism that better adapts to customer needs.

DropSens offers a high quality service, using rigorous analytical procedures and a state-of-the-art technology, thanks to a highly qualified personnel and a totally equipped laboratory for the execution of research jobs.

We consider research as a strategic field in which is necessary to exploit new and emergent opportunities, for which we are sure that DropSens is the right partner

Other information

For more information please write to us to info@dropsens.com

ESTANDA FUNDICIONES S.A.

University	Technology Center	Other	**SME**	Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct.	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	nanoencapsulates

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Organisation profile

Estanda Fundiciones SA, is a SME, private foundry, established in 1953, specialized in the production of steel alloy castings: stainless steel , heat resistant, wear and impact steels. The production includes casting for cement manufacturers, mining and quarries sector, and components for tracks and railway systems.

Estanda exports 80% of its production worldwide, to EU, Eastern Europe, Asia and America. Estanda employs 200 people, 5 of which are permanently employed for R&D activities (Research & Innovation dpt). Turnover: 45 Million Euros.

The company has developed more than 20 projects in the Spanish (R&D) programmes, for Ministry of Industry and Technology (MITYC), CDTI, and Basque Government . Has also participated in 7 different European Projects (CRAFT, Brite-Euram, NMP, ICT ,..) from the VI & VII Framework Programme .Moreover, it has Quality, Environmental and Safety Management Systems certified according to the international ISO standards (9001,14001 , 18001).

Main capacities in nanotechnology/nanoscience

Our main activity is not in the field of the nanotechnologies, but we are dealing with processes, equipment and materials related with nanotechnologies. Interest in cutting tools covered by nanocoatings for metallic machining processes.

Main related relevant activities/projects

European project NMP: “M3-2S, Multiscale modelling for multilayered surface systems” (2008-2010).

Other information

Relation of some European projects in which Estanda has already participated:

- CRAFT: “MAGNETM: Magnetic Moulding” . (2005-2006).
- Transport - SUSTAINABLE DEVELOPMENT (STREP): “CarCIM :Integration of two component Ceramic Injection Moulding for large-scale Production of Novel Multifunctional Ceramic Components for Automotive and Railway applications” (2006-08)

- IST: “SEVENPRO, Semantic Virtual Engineering Environment for Product Design” (2007-2009).
- NMP: “M3- 2S – Multiscale modelling for multilayered surface systems “2008-2010).
- STREP (ICT): “DEMI: Product and process design for AmI supported Energy Efficient manufacturing Installations “ (2009-2011).

Capacities

characterization | nanocomposites | nanosensors | synthesis/funct | nanophotonics
nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

Gerdau I+D Europa is the Research Company of Gerdau Special Steel Europe, which is the main Spanish special steel producer (capacity 1.000.000 tonnes/year). Gerdau I+D Europa is a non-profit subsidiary company of Gerdau dedicated to the Research and Development of products and processes in the fields of:

- Engineering Steel Long Products
- Stainless Steel Long Products
- Steel Castings and Forgings

It has forty-six employees; most of them research engineers and scientists devoted to research divided in four departments (Steelmaking-CC, Rolling, Product and Laboratory) and has its own Research Laboratory, which is equipped with modern test facilities. The Centre has extensive experience of carrying out former ECSC and present RFCS projects over a number of years, and currently there are about 22 projects under study.

Gerdau I+D Europa has access to production plants to carry out the required experimental work and to obtain the required process data with wide experience in investigations on the area of steelmaking, casting, rolling and finishing.

Main capacities in nanotechnology / nanoscience

-Capacity of working with nanoparticles (TiO_2, CeO_2) in microalloyed and carburizing steels in experimental scale.

-Development of new steel grades with improved mechanical properties by the addition of nanoparticles

-Development of the appropriate addition technique during casting for nanoparticle dispersion in the steel.

Main related relevant activities / projects

- Generación de aceros de automoción mediante dispersión inducida de nanopartículas (DISAUTO) Proyecto Estratégico de Investigación Industrial – ETORGAI 2010
- Nanoparticle addition into molten steel (NAMOS). RFCS-PR10057

Other information

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GRUPO ANTOLIN INGENIERÍA, S.A.
GRAnPH® NANOTECH

University | Technology Center | Other | SME | **Large company**

Capacities

characterization	**nanocomposites**	**nanosensors**	**Shyntesis/funct.**	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	**Engineering**

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Organisation profile

GRAnPH® Nanotech is a trade mark of Grupo Antolin, in the field of nanotechnology, providing superior quality graphene products for high tech applications, as well as other carbon based nanocomposites. The SME is comprised of an international group of experts on carbon and composite materials formed by chemists, physicists and research engineers.

The mission of is to become a leader in the restricted market of high quality graphene materials and products and contributing to the development of new graphene-based electronics, energy devices and structural applications. It counts on the technical and commercial support of Grupo Antolin in 25 countries.

Main capacities in nanotechnology/nanoscience

Production of high quality graphene products. GRAnPH® Nanotech products are graphene oxide powdered or exfoliated by sonication forming suspensions and reduced graphene oxide suspensions or powdered

Main related relevant activities/projects

During 2012 we have attended to:

- Nano Tech 2012, Tokyo, Japan
- GRAPHENE 2012, Brussels, Belgium

Additionally, in 2011 we have been speakers and sponsors of the following conferences

- Nano Tech 2011, Tokyo, Japan
- ImagineNano, Bilbao, Spain
- NanoMaterials, London, United Kingdom
- NSTI Nanotech 2011, Boston, USA
- Nano Tech Korea, Seoul, South Korea

During 2011 the works for the pilot plant has been completed, it houses a new laboratory for characterization and production of graphene. It is attached to the existing plant of carbon nanofibres Burgos.

Other information

5 filed patents related to Nanotechnology

GRUPO SAMCA

Capacities

Characterization | **nanocomposites** | **nanosensors** | synthesis/funct. | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

SAMCA Group is a family company located in Aragon (Spain) whose activities are centred in the sectors of mining, agriculture, energy, plastics, synthetic fibres and real estate promotion. Overall, it gives employment to approximately 3,500 people, with an annual turnover of nearly 850 million euros. It has installations distributed throughout Spain as well as other countries such as France and Italy.

SAMCA has a wide range of resources for research, development and innovation and ensures constant support for the same, which, along with the continuous reinvestment of the funds generated and priority on training and social policy makes it possible for it to be in the vanguard of the sectors in works in.

Main capacities in nanotechnology/nanoscience

From its beginning, the SAMCA Group has worked with the conviction that innovation is an essential capital for the future; thus, the resources devoted to Research, Development and Innovation are seen as elements of progress, added value and sources of competitive advantage. The R&D Department of the group coordinates the different research groups of all the business areas and promotes both the improvement of processes and the development of new products and technologies or the implementation of new businesses, with a clear orientation to the market and in a permanent.

Currently, Samca group has four chemistry PhD and six engineers, working on nanotechnology programs, with seven published Patents so far.

The group collaborates with numerous Spanish and foreign Universities and Technological Institutes. The most recent agreement was signed in June 2011 together with the University of Zaragoza and the Institute of Nanoscience of Aragon for the creation and financing of the SAMCA Department of Nanotechnology, with the aim of generating advanced research in this field and its application in industry, as well as of training new specialized.

Our R&D facilities consist of:

Polymerization facilities:

- Lab-scale polycondensation reactor: Batch reactor designed for the product definition at lab-scale.
- Pilot-scale polymerization plant: Universal polymerization pilot plant, integrated by a batch reactor, distillation tower condensers, automatic valves, vacuum line, extrusion and cutting system.
- Solid State Postcondensation pilot plant: This equipment is optimum to dry or post condensate

polymers in solid state.

Plastics processing units:

- Pilot-scale Twin screw compounder: Twin screw extruder designed for the production of plastic compounds, blends and masterbatches. Its main applications are the development of new products and sample production, or small batch production of engineering plastics.
- Injection moulding machine: Its main function is the production of test samples or small parts.
- Cast and Blown Film pilot lines: Designed for product development and sample production.

Spinning facilities:

- Two Pilot Spinning Plants POY / FDY (7000 m/min)

Characterization Laboratory:

Our laboratory is fully equipped in order to achieve a complete mechanical and chemical characterization of every polymer and fibre for any application.

Main related relevant activities/projects

Synthetic fibers

Working for the textiles of the future, by incorporating revolutionary nanotechnologies into the textile processes with programmes such as nanotechnology, smart textiles and the functionalisation of textile materials.

Plastic polymers

Developing specific solutions for specific needs, thanks to the combination of the accumulated experience in polymers (PA and PET) and the latest technologies in nanocompounds and co-polymers, to be in the forefront of innovation.

HIGH TECHNOLOGY SOLUTIONS

University	Technology Center	Other	**SME**	Large Company

Capacities

Characterization	nanocomposites	nanosensors	synthesis/funct.	nanophotonics
nanobiotechnology	nanoadditives	**nanometrology**	nanosimulation	nanoencapsulates

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Organisation profile

High Technology Solutions, SL (HTS), is a company founded in early 2011 as a spin-off from the Egile Group, a European Group leading high precision manufacturing with very high technological and innovative capabilities. The goal of HTS is to provide integrated solutions to the science industry, from engineering stages to manufacturing and test. The engineering capabilities are not only mechanical but also in other fields like RF & microwaves, ultra high vacuum and cryogenics. As specialists in providing effective solutions to the problems of design and engineering for large scientific infrastructures, in some cases acts as a long-term technology partner and other timely agent. HTS, unlike other engineering, is distinguished by its strong culture of production, it is based on the Egile Group's know how.

Main capacities in nanotechnology/nanoscience

Among its capabilities in the field of multiphysics engineering, mechanical engineering (high precision), RF & microwave engineering, cryogenics and ultra high vacuum engineering.

HTS is able to provide solutions combining technologies at the state of the art like but also manufacture, integrate and test devices. The workshop is specialized in high precision manufacturing: Micro diamond hybrid machining (50 nm precision, ~ 1nm surface roughness); Continuous high speed micromachining 5-axis (180,000 Rev/m); Precision hybrid turning machining; Micro EDM (Electro Discharge Machining). Minimum white layer; 5-axis MicroGrinding - MicroGrinding; flat & cylindrical; Coordinate MicroGrinding; MicroCutting and grinding of all types of gears (Hirth, hypoid, spiro-conical, cylindrical, curvic-coupling ...) in all kind of materials.

Another key aspect is the metrological park. Point of reference in Europe, has among other devices, scanning machines with 6 three-dimensional coordinates, two interferometers, 1 optical 3D, three 3D scanners ...

Highlights include: The high precision micro-manufacturing (nano-scale), only understandable knowing the extensive metrological park which enables to close the loop with the manufacturing facilities.

Main related relevant activities/projects

Apart from the prototyping and development phases in projects of extreme complexity or precision, HTS also leads industrial phases and long runs because of their group culture management tools (ERP / MRP) and strong activity in sectors such as Aeronautics, Aerospace, Scientific, Medical, ... where each area works with world leaders such as, Turbomeca, Messier Dowty, SNECMA, SENER, CERN, ESRF, CEA, ...). This is essential in order to support large projects where needed documentation, plan generation and ensure the robustness of the manufacturing processes in the technological limit, while giving risk management solutions. In just over a year of existence, HTS has developed more than 15 projects. Among its customers is the CERN (European Organization for Nuclear Research, the largest research laboratory in the world of particle physics). The Drift Tubes of LINAC 4 (whose function is to accelerate and focus the particles, will provide twice luminosity to the highest collider ever built, the LHC). These drift tubes have been manufactured in the workshops of the Egile Group, including the development of future accelerator structures for the CLIC project which leads HTS. In all cases, HTS has been selected for its high quality in processes where greater precision is required. On the other hand, sub-micron movers and phase shifters were designed and manufactured for the German accelerator XFEL. These projects represented a different approach to institutions and companies.

Other Information

HTS has a select team, professionally well trained and motivated, composed mostly by industrial engineers, aeronautical engineers and physicists highly skilled. Through the presentation of papers at conferences and careful training of its engineers HTS is able to offer advanced design and development with the common denominator of high precision. The high capacity for innovation along with engineering capabilities makes HTS able to take on different challenges leading research projects, with different partners worldwide and technology centers nationwide.

IKERLAT Polymers, S.L.

University	Technology Center	Other	**SME**	Large Company

Capacities

Characterization	nanocomposites	nanosensors	synthesis/funct.	nanophotonics
nanobiotechnology	**nanoadditives**	**nanometrology**	nanosimulation	nanoencapsulates

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Organisation profile

IKERLAT Polymers, S.L., a private company founded in 2000, is specialized in the microspheres world. Its activity is directed to chemistry and micro- and nanotechnology fields. Nowadays, with a background of more than ten years, the company has been consolidated as a reference in the market of polymeric dispersions.

Main capacities in nanotechnology/nanoscience

Due to the solid background and experience, IKERLAT Polymers can play a key role in all the projects that require the use of specific polymer particles. The commitment of IKERLAT Polymers is to offer the best support to the companies / Universities / Technological Centres in the different fields they are working. We take pride in not only our polymer particles, but also our personalized technical service giving to the customer a satisfactory selection of beads for each application.

We offer the possibility of developing the customer required product, adjusting characteristics as the particle size, particle surface chemistry and density, colour of the dispersion …

The aim of IKERLAT Polymers is to drive to our customers to the exact product they need (for clinical and veterinary diagnostics reagents, for a quite particular colloidal dispersion, products for separation and purification of proteins, fluorescent particles, magnetic particles; conducting polymers, model colloids ...). IKERLAT Polymers products have been used in different research areas like diagnostics, colloidal models, photonic crystals, protein purification systems ...

The products of IKERLAT Polymers stand out due to the high reproducibility lot to lot offering accurate process and final products characteristics control.

If you don't find the product you are looking for, do not hesitate to contact us. In addition, if you need technical support for a specific application, our R&D Department will be pleased to collaborate with you.

Main related relevant activities/projects

R&D is a key aspect in IKERLAT Polymers. Our R&D efforts are focused in three main areas:

1) Internal:

We are constantly working developing new products. At this moment, our R&D is focused on fluorescent

and magnetic particles.

2) Collaborations with companies:

Since the first contacts with different companies, IKERLAT Polymers has aided his customers in the development of new diagnostic kits. Due to its solid background and experience, it can play a key role in all the projects that require the use of specific polymer particles. The aim of IKERLAT Polymers is to offer a personalized support, working together with the customer. Collaborations:

- Personalized: customer-IKERLAT Polymers.

-Consortium: Enterprises, Technological Centres, Universities. This SME has been participated in different projects of the Basque (Gaitek) and Spanish Governments (Petri, CDTI, Torres Quevedo).

3) Collaborations with universities:

IKERLAT Polymers provides their products to renowned universities and technological centres all over the world. They have been used in different research areas like diagnostics, colloidal models, photonic crystals, protein purification systems ...

Other information

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INAEL Electrical Systems

University	Technology Center	Other	**SME**	Large Company

Capacities

Characterization	nanocomposites	nanosensors	synthesis/funct.	**nanophotonics**
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organisation profile

INAEL Electrical Systems:

- Funded 1977
- Privately owned
- Core business: equipment for energy transmission and distribution
- 110 employees
- 20% staff actively engaged in R&D activities
- Factories in Spain and Brazil
- R&D investment ≈ 4 %

Main capacities in nanotechnology/nanoscience

INAEL has created a Division of Advanced Materials, stemming from the ceramic semiconductor manufacturing plant that has been producing ZnO-based polycrystalline semiconductors for the last 12 years.

We have focused on the development of a new generation of durable, low-cost/high efficiency/solar-active photocatalyst materials based on new forms of TiO_2, either as hierarchical microspheres, self-assembled from nano-building blocks or as morphology controlled anatase nanoparticles exposing high percentages of reactive facets. In all cases production routes are mild, environmentally friendly, easily scalable and do not make use of aggressive or harmful surfactants. Doping and extension of optical absorption towards the visible range is also achieved through low-cost/high-yield processes.

Main related relevant activities/projects

- PROJECT "Solar Generation of Hydrogen by Semiconductor-based Photocatalytic Materials (GESHTOS)" FINANCIAL ENTITY: MICINN, INNPACTO (2010–2013). Coordinator: INAEL Electrical Systems
- PROJECT "Nanostructured photocatalysts for the decontamination of residual waters through low cost and high efficiency processes (NANOBAC)" FINANCIAL ENTITY: MICINN, INNPACTO

(2011–2014). Coordinator: INAEL Electrical Systems

- PROJECT “Bottom-up fabrication of nano carbon-inorganic hybrid materials for photocatalytic hydrogen production (CARINHYPH)” FINANCIAL ENTITY: FP7– NMP–2012–SMALL-6 (2013–2016), Coordinator: IMDEA Materials
- PROJECT “Energetic efficiency in protection against overvoltage (EFESOT)”. FINANCIAL ENTITY: MICINN, INNPACTO (2010–2012); Coordinator: INAEL Electrical Systems

Other information

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Ingenieros Asesores S.A.

University	Technology Center	Other	**SME**	Large Company

Capacities

Characterization	nanocomposites	**nanosensors**	synthesis/funct.	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Perfil de la organización

Ingenieros Asesores S.A. (Envira) is a private SME company located in Spain. Ingenieros Asesores (IA) has more than 25 years experience in the field of air quality monitoring. With ~150 employees and ~12M€ of turnover divided in 3 departments (consulting, continuous air quality monitoring and chemical analytics), the current brand of IA's portfolio includes the most complete environmental services offer for both, private companies and public administrations. Currently, IA manages the most important air quality networks (AQN) in Spain (~40% of total networks), such as Madrid or Canarian Islands. IA provides full requirements for any AQN, from equipment supplying to AQN data centre implementation. In recent years, the company starts to research and integrate different sensors technologies for environmental monitoring, developing a flexible hardware-based platform for such sensor integration. That platform includes enhanced features like integrated wireless communications (GPRS, Zigbee®, Bluetooth®), internal data logging, D/A input-output, etc. Besides sensors division of IA keeps active collaboration at international level with some of most relevant research centers as a NILU, EMPA, JRC, etc.

Main capacities in nanotechnology/nanoscience

Ingenieros Asesores has a long experience in the field of sensors nanostructured Metal Oxide Semiconductor (MOS) especially for outdoor air quality monitoring. The company has successfully developed equipments based on sensors for continuous monitoring ozone in the range of parts per billion (ppb) and CO/H_2S for indoor environments. The mission of the company in this field is to develop applied research in the areas of calibration and optimization of these sensors to position this technology as an alternative for future environmental monitoring.

Main related relevant activities/projects

-"Desarrollo de microanalizadores de calidad del aire basados en nanotecnología". TRANS06-18. 2006. PCTI (regional).

-"Desarrollo de microanalizadores de calidad del aire" 2007-2008. Programa Innova-Idepa (regional).

-Diseño desarrollo e implementación de nuevas tecnologías para la reutilización integral del agua RIA. PEST07-14. 2009-2010. PCTI-ESTRATÉGICOS.

-Desarrollo e implantación de una red de nanosensores de CO para detección temprana de incendios en zonas boscosas. IAP-600100-2008-3 IE07-279. 2008-2010 y 2009-2010. FiCYT-PCT.

-Nuevo sistema de sensores basados en nanotecnología para control de contaminación atmosférica en túneles. PPT-420000-2009-004. 2009-2010. Colaborativo-MICINN.

-“Desarrollo de nanosensores para monitorización en continuo de la calidad de aire en interiores. IE09-023C1. 2009-2012. PCTI (regional)

-“Design and development of a software platform for the monitorization and control of gas emissions and absorptions” Forestales. TSI-020100-2010-289. 2010-2012. AVANZA I+D MICINN (National)

-Desarrollo e integración de nanosensores de medida de calidad atmosférica integrados en vehículos en movimiento. 2011-2012. PCTI (regional)

Other Information

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INDUSTRIAL QUÍMICA DEL NALÓN S.A.

Industrial Química del Nalón, S.A.
NalónChem

University | Technology Center | Other | SME | **Large Company**

Capacities

Characterization	nanocomposites	nanosensors	**synthesis/funct.**	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	nanoencapsulates

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Organisation profile

Industrial Química del Nalón, S.A., (NalonChem) is an independent and private family Company whose activity is focused on the carbochemical sector. It has been operating its own technological processes, based on solid entrepreneurial values since its foundation in 1943.

Belonging to Ibérica de Servicios e Inversiones, S.A., an important Asturian entrepreneurial group, provides a strong financial backing to Industrial Química del Nalón,S.A.

Since its foundation, it has gradually grown through a permanent effort of technological, commercial and management improvements, increasing its presence in both national and international markets and becoming a leader in technology, quality and service.

Industrial Química del Nalón, S.A. develops its corporate activity along two business lines:

1.-Carbochemical: based on the distillation of high temperature coal tar for obtaining pitch, naphthalene and oils (carbolic, anthracene, etc).

2.-Coke: obtained by means of high-temperature dry coking coal distillation, with applications in iron foundries, non-ferrous smelting, insulation sector, the chemical and sugar industries, ferrous alloys, etc.

It is also present in the Power Generation and Logistics sectors through its subsidiaries and associated companies.

Main capacities in nanotechnology/nanoscience

Industrial Química del Nalón, S.A., based on the development of its own technology, has the capacity of manufacturing high specification nanoparticle dispersions.

This versatile technology enables the synthesis of a wide range of nano-products such as nano-metals, nano-metal oxides and nano-mixed oxides, allowing an outstanding level of product control (composition, particle size, size distribution and morphology) and flexibility to perform *in-situ* surface modification, thus providing dispersion stability and compatibility between the solvent and the formulated final product.

Industrial Química del Nalón, S.A. nanoparticles are currently available in titanium dioxide (TiO_2). Titanium dioxide nanoparticles are used in a wide variety of applications including catalysis, cosmetics,

solar cells, smart coatings, etc. For further information regarding our TiO_2 final specifications do not hesitate to contact us.

Likewise, Industrial Química del Nalón, S.A., offers the possibility to develop tailor-made nanomaterials along with our customers in order to optimize the required end product properties, and therefore maximizing the provided added value.

Main related relevant activities/projects

Industrial Química del Nalón, S.A. is currently participating as an industrial partner in a CENIT project called INFINITEX which has the aim of creating and enhancing a national value chain that works on high added-value functionalized textiles incorporating nanomaterials.

Other information

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InteNanoMat S.L.

niversity | Technology Center | Other | **SME** | Large Company

Capacities

Characterization | **nanocomposites** | **nanosensors** | **synthesis/funct.** | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

INTENANOMAT is a spin-off of the University of Valencia that was founded at the end of 2009. Currently, it commercializes several types of nanoparticles based on noble metals (Au, Pt) and dielectric materials (nano-diamond, SiO_2) for the cosmetic industry and related fields. The company also develops an intense R&D activity on metal, metal oxide and fluorescent semiconductor nanoparticles (CdS, CdSe, CdTe, PbS, PbSe, CdSe / ZnS, ...) and their application in other fields such as biomedicine, sensors, environmental science and photonics technology (photovoltaics, telecommunications, LEDs, displays, etc.).

Main capacities in nanotechnology/nanoscience

* Synthesis/Preparation of:

- Metal nanoparticles: Ag, Au, Pt, Pd, …
- Superparamagnetic nanoparticles (Fe_2O_3)
- Monodisperse nanoparticles (SiO_2)
- Quantum dots (fluorescent semiconductor nanocrystals): CdS, CdSe, CdTe, PbS, PbSe and CdSe/ZnS
- Surface Modification of nanoparticles for nanomedicine and other applications
- Inks based on nanoparticles
- Multi-functional polymers (based on SU8, Novolak, PVA, PMMA, …) containing nanoparticles for optical and e-beam lithographies.
- Technologies for adhesive surface coating of nanoparticles
- Surface coatings by oxide (ZnO, SiO_2 and TiO_2) based nanocomposite containing metal nanoparticles (Ag, Au); transparent coatings by ZnO-nanocomposite are conductive.

* Development of chemical nanosensors based on multi-functional polymers and nanocomposites using the localized surface plasmon resonance (LSPR) of metal nanoparticles.

Our multi-functional nanomaterials are the basis for many applications, because they have properties far superior to bulk materials. One of their most important benefits lies in their use as “inks”, allowing our nanomaterials to be deposited in practically any substrate by using very simple techniques: spin-coating, dip-coating, inkjet printing, dispensing/micro-plotting, spray, ... Colloidal suspensions of nanoparticles can be also appropriately formulated to coat different material surfaces.

Main related relevant activities/projects

INTENANOMAT, given its condition as a spin-off company, performs an intensive R & D activity in collaboration with the group UMDO (Institute of Materials Science, University of Valencia). In this collaboration should be mentioned the provision of nanoparticles, polymers and multifunctional nanocomposites for the national project TEC2011/QD-NANOTICS and European projects NAVOLCHI and NANOPV, other than its own research activities. Its R & D lab was launched in 2010 with a grant IMPIVA-FEDER.

Other information

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Micrux Technologies

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | **nanosensors** | synthesis/funct. | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

MicruX Technologies is an innovative technology-based company focused on the design, development and manufacture of miniaturized and portable analysis systems. It works in Lab-on-a-Chip (LOC) technologies being expert in microfluidic chips and electrochemistry field.

MicruX product lines cover all the items you need for starting to work with microfluidic systems. Thus, the product lines include:

» Microfluidic Devices Reusable electrophoresis chips with integrated electrodes for electrochemical measurements

» Microfluidic Platforms Easy-handle interfaces for the use of microfluidic chips with integrated electrodes

» Instrumentation Portable instruments for an easy use of microfluidic chips with electrochemical detection

» Teaching Laboratory practice kits for acquiring skills in separation techniques and electrochemical detection

Microfluidic devices and related products can be used for achieving new food, environmental and clinical applications.

Technologies develops by MicruX can be also employed for manufacturing customized products.

Main capacities in nanotechnology/nanoscience

MicruX Technologies develops miniaturized and portable analysis systems. Integration of multiple steps carried out in a laboratory (sample pretreatment, mixing, reaction, separation, detection) on a single device is possible through miniaturization. This fact gives rise to a real Lab-on-a-Chip (LOC). Thus, these devices allow the separation, detection, identification and quantification of compounds with analytical interest in real samples.

Moreover, MicruX Technologies has key knowledge in microfluidic and electrochemical detection systems. In microfluidic field, we have extensive experience in developing, manufacturing and application

of microchips electrophoresis (ME). Moreover, our know-how in the electrochemistry field, allow us the integration of a miniaturized electrochemical detection system on a simple end effective way.

Otherwise, MicruX has also the know-how for achieving food, environmental and clinical applications using these microdevices with an integrated electrochemical detection system

Main related relevant activities/projects

MicruX main activities are focused on research and development of new products as well as on improving current ones in order to cover the all customer's requirements.

MicruX is accomplishing several internal and collaborative research projects in order to develop new and innovative products.

MicruX works in optimization of recognition phase using nanostructures in their microelectrodes.

Other information

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NANOGAP SUBNM POWDER, S.A.

NANOGAP® SUBnmPARTICLES

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | nanosensors | **synthesis/funct.** | nanophotonics

nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

NANOGAP SUB-NM-POWDER, Inc. (NANOGAP) was established in 2006 and is a spin-out of the University of Santiago de Compostela (USC). In 2010 it established a subsidiary in California, USA

Currently, NANOGAP SUBNM POWDER, SA has production facilities of 400m^2 in Milladoiro (Ames) where the production plant and the R&D laboratory are located. This facilities host two 50L pilot plant reactors with power and control equipment, and instruments for quality control and testing for physical and chemical characterization of materials. NANOGAP has developed proprietary knowledge allowing scaling the production of the materials developed in the laboratory to the annual volume of 1 Ton of final product while maintaining control over the morphological and functional properties designed in the laboratory. NANOGAP currently has a staff of 12 people divided into the following areas:

- I + D + I: 3 Chemical doctors CC, 3 CC graduates. Degree in Chemical and 1 CC. physical
- Production: 2 Chemical Engineering and Technical Production 1
- Administration: 1 Degree in Economics
- Commercial: 1 Ph.D. and 2 degrees in DC. Chemicals, all with MBA

Main capacities in nanotechnology/nanoscience

All the products developed and fabricated by Nanogap are manufactured by wet chemical procedures. This technology has a number of advantages

• Excellent control over the dimensional properties: our nanomaterials have a defined size in a narrow range of variability, with excellent homogeneity and dispersion.

• Several choices for the product final presentation of: our nanomaterials are dispersed in a variety of organic solvents and / or inorganic, to facilitate their integration into our customers' products and optimize the incorporation of new features.

• Ease of scaling from the laboratory to the production plant: methods based on wet chemistry can be rapidly transferred from the laboratory scale to semi-industrial production.

• Security: our nanomaterials are confined by the dispersion in which are synthesized, which increases safety for workers, consumers and the environment.

A key competitive advantage lies in the quality and stability of dispersions of nanomaterials. This is a key

requirement for optimal performance when incorporating nanomaterials into industrial applications, and is evidenced by the success of customers who are using Nanogap products. Recently, an internationally recognized reference materials laboratory chooses Nanogap products among many others commercially available as source of reference materials.

Nanogap currently offers the following products:

• AQC's: The atomic quantum clusters (AQC's) are stable clusters of 2 to 150 atoms in the range of 0.5 to 2 nm. The AQC are available in silver and gold, and can be prepared according to specific customer requirements including changes to the cluster size, surface functionalization, concentration and the solvent. Nanogap is the only industrial producer worldwide of this product, which owns the exclusive exploitation rights.

• Nanoparticles: available in silver and iron oxide with sizes between 5 and 50 nm. Our nanoparticles can be prepared according to specific customer requirements, including changes in particle size, surface functionalization and the solvent chosen.

• Nanofibers Silver: products with a high aspect ratio supplied in dispersion, containing a low amount of a polymer to prevent aggregation.

• Conductive Inks: based on proprietary technology Nanogap, this product uses silver nanoparticles that give excellent conductive properties and injection.

Main related relevant activities/projects

- INFENA: Spain´s R&D Agency INNCORPORA program-TU 2011 for the incorporation of a graduate in the research project "Investigation of new formulations of nanodispersions hetero dimensional conductive metal"
- FP7-CLIP: Project funded under the 7th Framework Programme, with the aim of developing low cost conductive inks for printed electronics. The new inks contain different sized nanoparticles to improve the packing of the particles and decrease the sintering temperature of the ink.
- FLEXAD: Collaborative project funded under the EUREKA program. This project aims to develop high performance conductive adhesives to replace lead-based solder used in the manufacture of electronic components. NANOGAP develops and supplies dispersions of conductive silver nanofibers used as a key component in the new adhesives.
- FP6-FLUOROMAG: FP6-EU Project that aims to integrate the development bioconjugates of atomic quantum clusters of noble metals as new probes highly absorbent, fluorescent and magnetic survey techniques for molecular and cell with improved sensitivity.

Other information

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Nanoimnunotech

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | nanosensors | **synthesis/funct.** | nanophotonics

nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

Nanoimmunotech is the first European company in the Nanobiotechnology sector, dedicated to the biological and biological characterization (*in vivo* and *in vitro*) and physico-chemical characterization and to the conjugation (functionalization) of nanoparticles and products containing them.

The company has highly qualified and internationally recognized human resources, state-of-the-art laboratory capabilities, standardized protocols and finally, the know how to perform proper supervision, advice and validation of different nanosystems, as a first step to the previous use of nanoparticles in biotechnological applications for different sectors (biomedical, pharmaceutics, cosmetics, veterinary, agro-food, environmental, etc.).

Main capacities in nanotechnology/nanoscience

- nitcharacter : Physico-chemical characterization of nanosystems:

This service allows developing a complete physico-chemical characterization of nanomaterials, taking into account the different particularities of each case. For each application, nitcharacter will give to its customers the information they need to improve the process of synthesis and/or chemical functionalization of their nanomaterials. Nitcharacter offers a structural characterization (NMR, IR, EM, MALDI, XRD, XPS), and microscopy techniques (TEM, SEM, SEM/FIB, AFM, confocal) and also chromatography techniques (GC, MPLC, HPLC, GPC).

nitcharacter services not only consist in executing the physico-chemical measures of products, but also on the added value that it offers to its customers through the interpretation of results and advices given to improve the synthesis and properties of nanostructured materials.

- nitbiosafe : Biological (*in vitro* and *in vivo*) characterization of nanosystems:

This service allows performing a full set of *in vitro* and *in vivo* assays to check the risks of our customers' nanomaterials: toxicity, biocompatibility (hemo- and cytotoxicity), biodistribution, immunogenicity, sterility, among other assays. Nitbiosafe services are based on standardized protocols and experimental environments that ensure optimal laboratory results, implementing USA recommendations and all EU regulation regarding nanosafety. Nanoimmunotech also counts with an animal facility that allows the use of animal models for *in vivo* confirmation of nanotoxicity and immunogenicity, offering the ultimate biological characterization assays for our customers' products.

Nitbiosafe offers: Aggregation analysis and colloidal stability; Nonspecific adsorption of proteins; SterilityTargeting; Phagocytosis assay; Oxidative Stress Study, Determination of the production of reactive oxygen species; Cytotoxicity analysis of two methodologies (MTT, Quick Cell); Inflammation Study: Production of cytokines; Complement activation test; Study of haematological parameters; Biological characterization *in vivo* (Lethal Dose DL50, TDAR (T cell dependent antibody response); Biodistribution and pharmacokinetics.

- Conjugation / functionalization of NPs / nanomaterials / surfaces with biomolecules or drugs:

The research area of synthetic materials is approaching a new era of multifunctional materials. Today we need materials with customizable functions, to be designed on demand, with a direct objective, let's say an intelligent design of functional materials. These multifunctional nanostructured systems are reaching a great interest and development for improving different biosensors (human and animal health, contaminants or toxins detection (environment, food, etc.), better medical imaging systems for early identification of diseases, removal of tumors by hyperthermia, improving drug targeting and drug delivery, increasing cosmetic products absorption, improving food packaging properties, improving the quality of water for environmental applications, etc.

Nanoimmunotech has a vast experience and own protocols for the functionalization of different biomolecules in an oriented way on the surface of different supports, guaranteeing the activity and stability of these biomolecules.

Main related relevant activities/projects

Nanoimmunotech developed its own nanosystems functionalization / conjugation technology: nitzipper®. It is a new revolutionary technology that allows to quickly, easily and effectively joining different types of micro/nanostructures, biomolecules, dyes, linkers, drugs and many other molecules, in practically any combination. Nitzipper® is also a multi-functionalization tool that allows joining more than one type of molecule or micro/nanostructure to another molecule or micro/nanostructure.

nitzipper® may be used for a wide range of applications allowing to innovate within various markets and sectors (biomedical, pharmaceutics, cosmetics, veterinary, agrofood, environmental, etc.).

Other information

The Nanoimmunotech business model is flexible and we have experience in participating in research or on demand projects, licensing, customer-supplier relationships, etc.

As project example that Nanoimmunotech can add value in, we could mention our participation in the project COLIVAC (INNTERCONECTA), for the improvement ofvaccines through the use of nanotechnology.

NANOINNOVA TECHNOLOGIES S.L.

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | nanosensors | **synthesis/funct.** | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

Nanoinnova Technologies SL is a spin-off of the Autonomous University of Madrid located in the Science Park of Madrid that develops graphene technology and its application in new products.

Nanoinnova Technologies SL has designed, developed, produced and marketed CVD reactors (reactors for chemical vapor deposition) as new tools for optimizing the synthesis of nanostructures particularly graphene. In parallel Nanoinnova Technologies SL synthesized graphite oxide by oxidative exfoliation of graphite. Its transformation into a series of chemical derivatives of graphene with a wide range of new functionalities through sustainable synthetic processes (green chemistry).

Proprietary chemically modified graphene are on the basis for the development of

- new catalysts for the synthesis of fine chemicals (oxidations, C-C couplings, etc.),
- new stationary phases for purification processes (solid phase extraction) and
- new nanostructured transducers for building new biosensors

Main capacities in nanotechnology/nanoscience

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nanoMyP
Nanomateriales y polímeros S.L.

University	Technology Center	Other	**SME**	Big Company

Capacities

Characterization	nanocomposites	**nanosensors**	**synthesis/funct.**	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organisation profile

NanoMyP ® is a spin off of the University of Granada and was founded in June 2011, to commercialize the research results of the FQM-297 Research Group in nanotechnology and optical sensors.

nanoMyP ® is a technology-based company which is specialist in the design and synthesis of nano and microparticles, polymeric and hybrid linear polymers and copolymers and smart materials with physicochemical properties tailored to customer needs (materials "on demand").

Besides these products, nanoMyP ® has its own line of R&D activities. The heart of this line is based on the design and synthesis of new highly innovative smart materials with important applications in biotechnology and the materials industry. Smart materials have the ability to change its color, shape, and electronic properties in response to environmental changes or alterations (light, sound, temperature, voltage). Thus, the materials of "tomorrow" that NanoMyP ® is designing "today" are:

- Biocatalytic textiles (a new generation of smart textiles which can be used for immobilizing biomolecules) to be used on the synthesis of pharmaceutical drugs and in the development of immunoassay kits.
- Biocompatible smart textiles for photodynamic therapies (dermatological and aesthetic treatments such as psoriasis, melanoma, warts, wrinkles, facial peels, etc.).
- Wireless robot for diagnosis of ocular diseases (diabetic retinopathy and glaucoma).

Main capacities in nanotechnology/nanoscience

Main capacities in nanotechnology/nanoscience are reflected in the families of products that the company sells:

- Synthesis of molecularly imprinted polymers (MIPs). They are nanostructured polymers which have been synthesized to selectively interact with a family of molecules or a single molecule.
- Design and synthesis of spherical nano and micro polymeric particles. The technology developed by nanoMyP ® allows, by chemical synthesis, obtaining spherical polymeric nano-and microparticles, perfectly monodisperse and with a wide range of functional groups on the surface.
- Design and synthesis of hybrid superparamagnetic nano and microparticles. The technology developed by nanoMyP ® allows the synthesis of core-shell particles, in which the core is composed of magnetite, and the shell is made of a polymer matrix with different chemical functionalisations.

- Functionalized co-polymers. nanoMyP ® is a specialist in chemical synthesis of organic co-polymers with a wide range of functionalisations and chemical properties (solubility, optical properties, etc.).
- Nanofibered mats. nanoMyP ® is specialised in the production of fibres and core-shell fibres tissues made by electrospinning and co-electrospinning.

Main related relevant activities/projects

NanoMyP® is a collaboration partner of the company IESMAT SA which is the representative in Spain of Malvern Instrument, a leader in providing specialized instrumentation for characterizing nanomaterials.

The most important projects that have been developed or are under development are:

- Development of molecular imprinted polymers for removing contaminants from drinking water.
- Incorporation of nanoparticles in dental materials to improve their physicochemical properties and allow regeneration of the tooth.
- Use of nanoparticles to simplify the production process of biodiesel.
- Application of magnetic nanoparticles and nanofibered mats as nano-remediation new tools.
- Use of electrohydrodynamic techniques for generating new materials with industrial applicability (biocatalytic filters and supports).

Other information

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NanoQuimia

University	Technology Center	Other	**SME**	Big Company

Capacities

Characterization	nanocomposites	**nanosensors**	**synthesis/funct.**	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	**nanoencapsulates**

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Organisation profile

SME founded in 2005 and devoted to research and manufacturing of advanced materials, machines and engineering for environmental and food Industry applications. In our facilities there is an RD&QA laboratory equipped with filter materials testing systems, carbon materials synthesis & testing systems (polymer material preparation, solvent exchange, supercritical drying, pyrolysis and activation) and water quality measurement equipment. There is also a pilot plant area with two filtration pilot plants (precoat a crossflow systems) and pyrolysis pilot plant. In engineering & manufacturing we have a technical office with CAD for planning and designing and 5 numerical control machines for piece manufacturing.

Main capacities in nanotechnology/nanoscience

Our lab is equipped with the following equipment for nanostructured materials synthesis:

- Polymer gels synthesis
- Solvent exchange reactor
- Supercritical drying reactor
- Pyrolisys and activation reactor
- Nanoparticles synthesis reactors

We use this equipment for the synthesis of the following materials:

- Organic aerogels
- Carbon aerogels
- Aerogels-metal nanoparticles composites
- Aerogel-silica composites
- Tailored nanoporous materials with different functionalities

The main areas of application of this materials are for:

- Capacitive deionization systems
- Separation systems
- Catalysis
- Energy storage
- Thermoelectrical devices
- (Bio)chemical sensors

We also have equipments for materials testing like:

- Packed columns

- Electrochemical flow cells
- Potentiostat

Main related relevant activities/projects

- Application of Capacitive Deionization to waste waters (ADECAR). Funded by INNPACTO 2011 program.
- Transformation of organic solids to Fuel. CDTI project.
- Catalytic system for cooking emissions treatment. Private funding.
- Development of carbon aerogel monoliths and membranes for ion adsorption (Partially funded by R&D National Plan, 2007-2008).
- Development of carbon aerogel monoliths and membranes for drinking water production and waste water purification. (Partially funded by R&D National Plan, 2008-2011).
- Application of capacitive deionization to waste water treatment (Partially funded by R&D National Plan, 2011-2014).

Proposals presented in 2012:

- Application of heterogeneous photocatalisys and electrooxidation to disinfection and water regeneration (AFHEDAR). INNPACTO 2012
- Biopolymer colloidal nanoparticles as building blocks in polymer gels (BIOCOLGEL). FP7-NMP-2013-SMALL-7.

Other information

Publications:

- Stability of a carbon gel electrode when used for the electro-assisted removal of ions from brackish water. Carbon, Volume 49, Issue 12, October 2011, Pages 3723-37308.
- Electrochemical response of carbon aerogel electrodes in saline water. Journal of Electroanalytical Chemistry, Volume 671, 15 April 2012, Pages 92-98.
- Carbon black-directed synthesis of ultrahigh mesoporous carbon aerogels. Submitted to Advanced Functional Materials.

In addition, the different results of the above projects have been presented in several Congres:

- Porous features and electrochemical behavior of carbon aerogel monoliths. CARBON 2009.
- Carbons for Energy Storage and Environment Protection. CESEP 2009.
- Capacitive deionization of monolithic carbon aerogels. ISE 2009.
- Computer simulation of cross-linked carbon aerogels. SOFTMATTER 2010.
- Comportamiento electroquímico de aerogeles nanoporosos en fenómenos de deionización capacitiva. NANOUCO 2011.

nanoScale Biomagnetics

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | nanosensors | synthesis/funct. | nanophotonics | nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

nB nanoScale Biomagnetics is a technology based company dedicated to the production of scientific and biomedical instruments.Formed in 2008 as a Spin Off Company coming from the University of Zaragoza, nB enters the market in 2010 as the best resource for researches and technology centers to develop specific or custom made equipment for induction heating experiments of nanostructured materials, whose main application is on Magnetic Hyperthermia.

The conception of DM100 Series comes from an unmet need among the scientific community. Its unique design is the result of the strategic partnership developed with the Aragón Institute of Nanosciences (Spain).

nB nanoScale Biomagnetics is your ideal partner for your needs and initiatives on scientific and biomedical instrumentation.

Main capacities in nanotechnology/nanoscience

- The R & D team of nB nanoScale Biomagnetics specializes in the design and manufacture of alternating magnetic field applicators for lab induction heating purposes.
- Currently undergoing diversifying into devices implementing continuous field for both magnetic separation to delivery and other related technologies using magnetic nanoparticles.
- Other capabilities of the R & D team are
    - Development of power sources
    - Design of mechanical and electromechanical devices for lab.

Main related relevant activities/projects

- Development DM100 Series of inductive heating instruments in laboratory

Other information

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Tamag Ibérica S.L

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | **nanosensors** | synthesis/funct. | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

TAMAG Iberica S.L. is a spin-off enterprise created in 2000 in Spain with the aim to develop magnetically soft microwires with magnetic properties suitable for various applications. Their effects and properties, taking into account their reduced dimension (the diameter is between 1-30 µm), allow their incorporation in microelectronic and sensor industries, among others.

TAMAG Iberica S.L. collaborates with Basque Country University and possesses above 100 scientific publications on studies, applications and technology of glass-coated microwires (including books and articles) and 3 patents on the technology for the fabrication of glass-coated microwires with magnetically soft and magnetically bistable behaviour.

Main capacities in nanotechnology/nanoscience

Main activity is related with study of amorphous and nanocrystalline microwires including

a) Design of Magnetic Properties (Magnetization Process exhibiting bistable character, Giant Magnetoimpedance effect),

b) Applications in the field of Sensors (Magnetic codification and identification, GMI based magnetic sensors, Magnetoelastic signature, magnetic tags for products),

c) Processing by means of different techniques (thermal treatments under the effect of mechanical stress, magnetic field, etc),

TAMAG has partnership with AICHI Steel Company (Japan) emphasized on GMI sensor development.

Main related relevant activities/projects

Apart from their main activity Tamag Ibérica S.L seeks for a continuous improvement and, therefore, takes part in few international research projects such as: Manunet 2011 (ERA-Net) and FP7.

Other information

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TECNOLOGIA NAVARRA DE NANOPRODUCTOS S.L. *(TECNAN)*

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | nanosensors | **synthesis/funct.** | nanophotonics
nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

TECNOLOGIA NAVARRA DE NANOPRODUCTOS S. L. (TECNAN), is a company established in 2007 in Los Arcos (Navarra-Spain). It manufactures advanced industrial scale nanoparticles (nano-simple and complex oxides, nanophosphates and nanocarbonates) as well as other consumer products based on these (water repellent, stain resistant, repelling rain, etc..) for multisectoral applications, having become one of the most competitive suppliers of these new materials nationally and internationally.

TECNAN is committed to continuous improvements and constantly works on expanding its portfolio, offering its customers nanoparticles with small particle sizes (7-25 nm), high purity and higher structural varieties. These can be brought into the market as new high-quality raw materials for high-tech industrial applications. Besides, TECNAN provides its nanoparticles not only in powder form but also dispersed in liquid media and master batches of these polymeric matrix with high stability, in different percentages and with reduced particle sizes, all of them according to customer requirements.

Among the most strategic TECNAN customers some Asian (mainly) and European multinational corporations such as Honda, Yamaha, Mazda, Mitsubishi, Sony, Canon, Samsung, Panasonic, ABCR, Byk, Fujifilm, Hitachi, Konica Minolta, etc. could be highlighted. TECNAN at all times follows in customer's footsteps in their own development, ensuring specific requirements demanded are at all times accomplished by the nanoparticles and dispersions developed.

Main capacities in nanotechnology/nanoscience

The flexibility of the production techniques employed by TECNAN allows the preparation of a wide range of customized nanomaterials which can be used in many different industries, including automotive, energy, construction, textile, cosmetics, paints and varnishes, chemical, etc.

In addition to its commitment to service to industry sector, the quality of its products and ongoing commitment to improve them as well as its production process is the key advantage which distinguishes TECNAN over other companies is a remarkable production capacity while maintaining excellent quality and purity and can satisfy the demands of many different customers. TECNAN nanosynthesisis employs advanced techniques which allow to market nano-oxides and other compounds (carbonates, phosphates ...) of more than 60 elements of the periodic system. Moreover, the techniques used allow the production of these nanomaterials with a competitive cost and in a flexible manner which respects the environment and not originating or waste or byproducts.

To do so TECNAN has advanced equipment for producing both standard and customer customized nanoparticles, as for the subsequent control of their quality.

- Industrial nanoparticle production process line, with a current production capacity of 1 kg / h, currently undergoing construction of a new production line with capacity of 5 kg / h.
- Manufacturing nanoparticles System laboratory scale with a capacity of 100 g / h.
- Coupling-peel-grinding systems for the manufacture and / or modification of laminated nano reinforcements via wet.
- Multisample analyzer of specific surface area of nanoparticles.
- Versatile Glass Reactor for 200 l.
- Versatile Glass Reactor 100 l.
- Industrial extruder with twin screw pelletizing system (150 kg / h)
- Planetary Mill - Micronizer in dry.
- Thermo Scientific Gas Chromatograph.
- IR-FTIR Varian Spectrophotometer.
- Z-Sizer

Main related relevant activities/projects

Participation in the following R+D projects:

- NANOGREEN (ERA-NET)
- NANOFER (project financed by regional government)
- ADVANCE-FSP (FP7)
- NEXTGENCAT (FP7)
- ARTIPHYCTION (FP7)
- SCAFFOLD (FP7)
- RECYVAL-NANO (FP7)

Other:

- Vocal member in Nanotechnologies Standardization Group AEN/GET 15
- Participation in most relevant nanotechnology national and international fairs: NANOTECH JAPAN (Tokyo; attendance in 2009, 2010, 2011 and 2012), RUSNANOTECH (Moscow; 2011), EURONANOFORUM (attendance in 2009 Berlin and 2011 in Budapest), IMAGINENANO (Bilbao; 2011).
- Participation as speakers in both IMAGINENANO fair (march 2011) and Hispano-Austrian Cooperation Day (July 2011), Nanotechnology Commercialization Day (March 2012), Nanosecurity Day (June 2012),

Other information

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TECNOPACKAGING

University | Technology Center | Other | **SME** | Big Company

Capacities

Characterization | nanocomposites | nanosensors | synthesis/funct. | nanophotonics
nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organisation profile

Tecnopackaging is focused on material development and optimization of plastic injection processes, offering technologically advanced solutions for improving products. An interdisciplinary group of technicians and researchers offers a global overview of the plastic materials and injection process development, finding specific solutions to solve technical problems that might arise in customers' products. Tecnopackaging produce cost-effective nanocomposites for the materials industry: plastic, automotive, pharmaceutical, cosmetics and food industry.

Main capacities in nanotechnology/nanoscience

The capabilities of the company covers in an integral way the development process of packaging materials and other products with different industrial applications, the core of the company is based on the development of new nanoadditivated materials and/or biodegradable. Tecnopackaging has different technological equipment available for processing plastics, including injection, extrusion blow moulding machines and extruders-pelletisers.

The main work lines of the company can be summarized in these three:

-Development and innovation of plastic materials

Tecnopackaging offers specific services in the development of new materials, from technical support to the development of nanoadditivated materials. The company has the contribution of qualified human resources together with the state-of-the-art technological resources to achieve these objectives.

Among the specific activities, we must highlight the use of conventional nanoclay (montmorillonite, illite, bentonite, etc. ...) among other nanoadditives such as carbon nanotubes and graphene for the improvement of the materials: increased thermal resistance, increasing barrier properties, mechanical strength, etc.

In addition, another major line of development is composed of biodegradable materials. Tecnopackaging has tools for improvement and thereby achieve a perfect fit in the process of injection and / or extrusion moulding.

-Technical and functional design of packaging

The capabilities of the company in the technical design of packages for different sectors include the simulation and optimization of structures, conceptual design and production of prototypes. Nanoaditivated materials are the base for all these packages.

-Development and innovation in products for different industrial applications

Tecnopackaging covers the full plastic parts value chain, including the final product and its components.

Main related relevant activities/projects

Tecnopackaging is one of 100 European SME that belongs to the - ECOLINK+ 100 Business Club (Europe INNOVA). The company participates in the following projects:

1. *Transferencia tecnológica: fluídos supercríticos aplicados en plásticos para aumentar la sostenibilidad de envases de uso alimentario*. Regional project. 2011
2. NEMIA-PACK. *Desarrollo de Nuevos Envases con Menor Impacto Ambiental y Propiedades barrera mejoradas para alargar la vida útil de los productos envasados, los materiales y sus procedimientos de fabricació*n. INNPACTO 2011 call, National Project, 2011-2014.
3. *Diseño y desarrollo de envases híbridos de madera-plástico para la fermentación y crianza de vinos.* INNPACTO 2011 call, National Project, 2011-2014
4. *Desarrollo de un nuevo envase multifuncional para la conservación de productos de la pesca*. INNPACTO 2011 call, National Project, 2011-2013.
5. *Calipso. Desarrollo de un cabecero ligero por soplado en base a nanotecnología*. INNOVARAGÓN 2011-2012 call. Regional Project, 2011- 2013.
6. *Aumento de la competitividad de Tecnopackaging a través del desarrollo de productos innovadores: sistema pasivo para el control de la difusión en barricas de madera de roble para vinos.* Convocatoria ADIA 2012; regional Project.

Other information

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TRIMEK

University	Technology Center	Other	SME	Big Company

Capacities

Characterization	nanocomposites	nanosensors	synthesis/funct.	nanophotonics
nanobiotechnology	nanoadditives	**nanometrology**	nanosimulation	nanoencapsulates

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Organization profile

TRIMEK is one of the main manufacturers of metrological systems and solutions worldwide, and is the leading company in the Basque Country and Spanish markets in the field of coordinate measurement machines (CMM). TRIMEK develops metrological and dimensional inspection solutions for the automotive, aeronautical, ship building, energy, transport and machine tool industrial sectors. It holds expertise in the area of coordinate measurement machines, robotics, machine integration, metrological software and control development. Trimek also provides consultancy and services related to dimensional metrology processes and metrology SW platforms. Covering any metrological need that a company might have, from machinery maintenance and calibration, to other services such as measurements in house or reverse engineering. TRIMEK's products and services catalogue can be classified as follows:

1. Measurement systems, machines and installations. TRIMEK designs, develops and customizes high-precision 3D inline measurement systems, 3D in-process quality control solutions and 3D CMM. TRIMEK metrology instrumentation provides optimum metrology solutions from very large parts inspection, down to high accuracy 3D micro and nano-dimensional feature analysis.
2. M3 Gages. TRIMEK designs, develops and manufactures automated in-line scanning systems for reliable and efficient 3D information acquisition for multiple types of materials - metallic alloys, aluminum, invar, titanium, composites, thermoplastics… M3 Gages can be directly integrated in the measurement process optimization platform M3® (http://www.innovalia-metrology.com/en/m3/), developed and commercialized by TRIMEK.
3. M3 Server. As part of the company M3 Platform, TRIMEK provides highly efficient, secure and flexible virtual part information management solution for storage of massive 3D point cloud information and high-performance exchange and sharing of virtual part information.
4. M3 Tablet. As part of the company M3 Platform, TRIMEK provides mobile and nomadic virtual metrology workstation solutions for user friendly digital analysis of 3D measurement information and evaluation of production process and part performance. M3 Tablet is fully compliant with TRIMEK measurement process optimization platform M3®.
5. Metrology Assistants. As part of the company M3 Platform, TRIMEK provides integrated software-based automation tools for a customised measurement process to greatly reduce measurement time and significantly increase the dimensional process productivity.

6. Dimensional metrology services. TRIMEK provides a wide range of services based on verification, calibration and retrofitting of measurement machines; training, staff outsourcing, digitalization, reverse engineering, 3D measurements and “in situ” metrology.

7. Consultancy services: TRIMEK provides consultancy services supporting the customer in the procurement and commissioning of metrological equipment, development of turnkey metrological facilities, design and evaluation of measurement process and analysis on customer parts.

Main capacities in nanotechnology/nanoscience

TRIMEK’s equipment and technologies are on the forefront, both at national and international level:

- High-stability, high-precision motion systems and high-speed nano-control system for large volume range (100x100x50 mm) micro-feature characterization – 3D (x-y-z) repeatability <125 nm, resolution 1 nm.
- Multi-probe nano-measurement system.
- Software-assisted nano measurement processes for high-accuracy, low uncertainty, multi-sensor and multi-probe 3D dimensional analysis.
- Automated free-form 3D computational metrology algorithmic for simultaneous, real-time, non-destructive, characterization of dimensions and shapes.
- Embedded web services for semi-automed machine tele-operation
- Semantics for metrology.

Main related relevant activities/projects

TRIMEK carries out a continuous innovation of their products and services assisted by its participation and management of national and European R+D projects in the area of ICT and NMP. TRIMEK has a vast experience in the participation of R+D projects, these are some of the most recent ones:

1. NanoCMM (FP6-NMP 2006-2011): The main objective was to develop a universal Coordinate Measurement Machine that could be able to measure most of 3D geometries at micro and nano scale. Nano-CMM instrumentation achieved control of 3D features in micro-part production with accuracies from 20-200 nm in large measurement volumes (100x100x50 cm).

2. MUPROD (FP7 FoF.NMP.2011-5 2012-2014): The objective is the development of innovative Quality Control Systems that will drastically change the current concept of End Of Line quality control, going beyond currently established methodologies such as Six-sigma and SPC.

3. THERMOBOT (FP7 ICT 2011 2012-2014): Non-destructive testing of components is an important auxiliary process step, not only in post-production but also in regular maintenance. The main goals of the project are the development (a) of a full, parametric model of the thermographic imaging process for the detection of cracks (b) automatic path and motion planning module (c) a thermo-image analysis methods.

4. CLOUDS (EuroStars 2011-2013): Development of a high performance computing platform and a cloud-based solution for the efficient processing of big data-sets of large 3D point clouds. It aims at speeding up the 3D point cloud processing solutions of the manufacturing sector based on the virtual treatment of the data in the cloud.

Other information

Innovalia Metrology (www.innovalia-metrology.com/en) is a strategic alliance between UNIMETRIK, TRIMEK and DATAPIXEL – three companies that have joined forces to offer our customers with best-in-class metrology solutions that integrate traditional metrology with the latest technological developments.

UNIMETRIK

University	Technology Center	Other	**SME**	Big Company

Capacities

Characterization	nanocomposites	nanosensors	synthesis/funct.	nanophotonics
nanobiotechnology	nanoadditives	**nanometrology**	nanosimulation	nanoencapsulates

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Organization profile

UNIMETRIK is a Metrological Service company, oriented to offer solutions for the industry related to Calibration, Measurement and Metrological engineering. UNIMETRIK is accredited by ENAC and acknowledged by the principal aeronautic, automotive and wind power groups in Spain. It is exporting its technology to countries such as USA, Germany, Brazil and the Czech Republic.

With a vast experience of more than 15 years, developed in international centres and technological enterprises, we offer solutions directed to improve the verification and calibration systems, according to the Quality Norms (TS 16949, ISO 9000, ISO 10012, QS 9000,….).

UNIMETRIK product and service catalogue is formed by

- Artefacts and verification software. UNIMETRIK designs, manufactures and commercialises high-precision artefacts and software (TETRACHECK®) for high-speed CMM and machine tool measurement uncertainty verification and calibration.
- Sensor calibration services. UNIMETRIK provides a high precision platform for calibration and characterisation of tactile and optical meso-, micro- and nano-sensors.
- Virtual metrology services. UNIMETRIK based on the M3 platform provides metrology and analysis services for 3D point clouds.
- Calibration and technical assistance services. Dimensional, temperature, Machine tool, Mass, pressure, electricity, environment,

Main capacities in nanotechnology/nanoscience

UNIMETRIK team consists of high qualified engineers with experience in metrology along with advanced facilities, with the most accurate instrumentation for verification of parts and tools. Moreover, they are equipped with advanced software that allows to:

- Measure geometrical properties.
- Measure by comparison with CAD file (IGS, VDA, CATIA, …)
- Digitalization of surfaces.
- Totally automated measurements in all machines with CNC control that allow making serial

measurements minimizing time.

Currently, UNIMETRIK is involved in two working areas within the nanotechnology. On one hand, it is developing new contact probes for nanometrology quality control and micromanipulation. On the other hand, it is pushing the research of new artifacts to allow the calibration of machines and research set up in the nanoscale range.

UNIMETRIK R&D activities are mainly developed in the NMP area, involving the following fields:

- Nano-probing technologies for highly accessible, ultra-precision, 3D isotropic dimensional characterisation of micro-part
- 3D nano-calibration artefacts and rapid Nano-CMM verification processes.
- Calibration techniques for virtual metrology
- 3D auto-compensation and auto-calibration algorithms.
- Micro-manipulation instrumentation for micro-probe assembly.

Main related relevant activities/projects

UNIMETRIK has lead and participated in several R&D projects:

1. NanoCMM (FP6-NMP 2006-2011): The main objective was to develop a universal Coordinate Measurement Machine that could be able to measure most of 3D geometries at micro and nano scale, including inside holes, steeps and behind obstacles. Nano-CMM instrumentation achieved control of 3D features in micro-part production with accuracies from 20-200 nm in large measurement volumes (100x100x50 cm). UNIMETRIK led this Integrated Project.

2. SCALAB (EC- MNT 2010-2012): SCALAB project aims at development of scalable solutions for 3D micro-assembly automation of complex products in photonics with highest demands on accuracy. The solution supports the development and optimization of automated manipulation, assembly and inspection processes during prototype production as well as the easy transfer and scaling up for series production.

3. NANOSOST (MCI 2008-2010): Development of metrology equipment for the characterization of nano-particles in nano-manufacturing processes for health and safety considerations.

1. OPTICALSTRUCT (EC MNT 2008-2010): aims at the development of high aspect ratio micro-structure for diffractive optics applications through high-precision micro-machining processes. Development of tactile probes and 3D calibration which can verify the micro-machining tool status and the dimensional features of the micro-structures in 3D to demonstrate the viability of the manufacturing process.

Other information

Innovalia Metrology (www.innovalia-metrology.com/en) is a strategic alliance between UNIMETRIK, TRIMEK and DATAPIXEL – three Innovalia Group companies that have joined forces to offer our customers with best-in-class metrology solutions. Innovalia Metrology offers solutions that integrate traditional metrology with the latest technological developments, from laboratories to production lines.

Innovalia Metrology systems and solutions are designed to provide our customers with a guarantee of measurement accuracy for parts and components that are vital to the manufacturing process, and to enable the achievement of higher levels of productivity and efficiency in production processes.

Unimetrik is an ENAC-accredited laboratory that provides calibration, advanced measurement and metrology engineering services and solutions to industry.

VLC Photonics

University	Technology Center	Other	**SME**	Big Industry

Capacities

Characterization	nanocomposites	nanosensors	Synthesis/funct	**nanophotonics**
nanobiotechnology	nanoadditives	nanometrology	**nanosimulation**	nanoencapsulates

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Organization profile

VLC Photonics is a photonic design house, who designs custom photonic integrated circuits (PICs) for any requested application. VLC Photonics is fabless, meaning it does not manufacture the PICs in-house, but has an extensive network of foundries in multiple materials which perform the fabrication, being able this way to choose the most suited partner and platform for each integration project. Moreover, as a pure-play design house, our wide expertise in PIC design and knowledge in multiple application fields can guarantee a high rate of first-time-right prototypes for our customers..

Main capacities in nanotechnology / nanosciences

VLC Photonics can offer the following capabilities:

- Techno-economical studies on the feasibility of integrating an optical system into a chip.
- Photonic Integrated Circuit (PIC) design and prototyping in multiple materials: Silica (PLC/SiO_2), Silicon-on-Insulator (SOI), TriPleX (Si_3N_4), Indium Phosphide (InP).
- Foundry and Packaging brokerage
- PIC characterization and testing
- Photonic design kit development

Main related relevant activities/projects

VLC Photonics, as a spin-off from the Telecommunications Research Institute (iTEAM) from the Technical University of Valencia, has been developing its optical engineering activities for more than 20 years, and specifically the expertise on optical integration for the last 10 years. VLC Photonic members have been involved in multiple national and European projects involving the development of PICs for multiple applications, like: OCDMA decoders for optical access networks, Frequency discriminators as optical receivers and Photonic beamformers for microwave photonic applications, Arrayed Waveguide Grating (AWG) based interrogators for Fiber Bragg Grating (FBG) based sensors, etc.

Other information

VLC Photonics belongs to the following photonic associations: Photonics21, Fotonica21, SECPhO, EPIC.

42TEK

University	Technology Center	Other	SME	Big Industry

Capacities

Characterization	**nanocomposites**	**nanosensors**	**Synthesis/funct**	**nanophotonics**
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	**nanoencapsulates**

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Organization profile

42TEK is a highly efficient link between innovation and private industry. The company counts with the full involvement of several prestigious research centers and universities for transforming laboratory research into specific innovative solutions essential to industry in general . We facilitate the process from concept to finished products and the commissioning and presentation of new materials into the marketplace, which are enhanced with properties surpassing those currently available, improving their quality and reducing their costs. At the same time, we have placed a commitment to protecting the environment to which they are exposed. Our scope is international and with particular emphasis in getting solutions to those countries in which these materials are of vital importance to their respective economies and too their sustained development.

Starting with economic and self-sustainable housing such as modular homes, and incorporating water harnessing from the atmosphere, including the purification of wastes and air encased by their environment, we use nanotechnology based solutions to create eco-friendly living spaces which are highly durable, lightweight construction and offer disease protection for its occupants. We can provide access in rural areas making roads without the need to use conventional and expensive materials such as asphalt or concrete. We have currently released exclusive products for the treatment of water from all types of organic and inorganic substances, dissolved metals, pathogens, and emergent contaminants. We can deliver it ultrapure water or provide the means for deliver commerce and academia based on new proprietary developments.

Main capacities in nanotechnology / nanosciences

Production of base nanoparticles based on the latest advancements using continuous hydrothermal processes can be elaborated allowing to produce a large variety of nano-compositions which includes nearly all the oxides (simple or complex), including metallic compositions: precious metals Au, Pt, Pd, Ag and more oxidable metals as Cu, Ni, etc. Many applications are directly applicable to sectors and subsectors in architecture and construction, raw materials production, wood, food, health, mining, water, energy, plastics, packaging, ceramics and textiles.

1.-Finished protective nanocoatings for metal, wood, concrete, bare roads, plastics, nanopigments, and nano encapsulations which are easily applied, fast drying and result in higher durability while increasing desired physical and chemical properties of materials: -Protection from UV radiation - Self-cleaning - Self-maintenance - Anti-odor - Bio-adhesives elimination - Decontamination of gases (NOx and VOCs) - Anti-bacterial protection superhydrophilic or superhydrophobic - Anti-corrosion - Anti-fog - Anti-abrasion -

Improved mechanical, electromechanical, acoustic, and thermal properties.

2.-Purification of water and wastewater, including desalination: - Heterogeneous Photocatalysis - Nano filtration - Carbon nanotubes, graphene, nanoceramics - including selective extraction (contaminants and / raw materials).

3.-The decontamination of both air and water. Nano filtration with carbon nanotubes and graphene , including advanced oxidation processes such as heterogeneous photocatalysis.

4. - Pilot plant and equipment for production scaling nanoparticles Nano materials, Nano pigments, Nano coatings.

5. - Modular Homes: Ultra-light cements, quick construction, and sustainable economic development.

Main related relevant activities/projects

The types of projects currently listed cover a wide range of different sectors, production of goods and materials:

- Currently in the pilot phase of implementation of a new titanium dioxide coating, fast drying and high performance buildings and environments.

- Project in the manufacture of glass: UV protection, Auto cleaning. Decontamination. Easy Maintenance.

Improved properties in the ceramic sector with several entities. Improved hardness, scratch resistance, anti-skid/slip.

All projects/services have the relevant certificates and approvals by accredited entities including "Green Technology".

-We are active participant on the roadmap for the R&D in the fields of nanotechnology for investigation centers.

Other information

We are strongly linked to REDIT**,** a body composed of 14 leading-edge technology centers and including AIDICO, nanotechnology center for the housing, building and construction new materials and products. We hold several patents from our board members which we have exclusive commercialization rights to and can provide technology transfer where needed.

Five published articles on CRC publishers Aquananotechnology presented on June 2013

2.2. RTD PERFORMERS

2.2.1 Research centers

BIONAND - ANDALUSIAN CENTRE FOR NANOMEDICINE AND NANOTECHNOLOGY

University	**Research Center**	Other	SME	Big Industry

Capacities

Characterization	nanocomposites	**nanosensors**	**Synthesis/funct**	**nanophotonics**
nanobiotechnology	**nanoadditives**	nanometrology	**Knowledge mgt.**	**nanoencapsulates**

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Organization profile

The Andalusian Center for Nanomedicine and Biotechnology Centre (BIONAND) is conceived as a multidisciplinary space designed for fostering and promoting cutting-edge research in the field of nanobiotechnology applied to human diseases. The centre is a joint initiative of the Regional Ministry of Economy, Innovation, Science and Employment of Andalusia, the Regional Ministry of Health of Andalusia and the University of Malaga.

BIONAND is the first Spanish nanotechnology research centre entirely focused on nanomedicine. BIONAND is born to be the Spanish Nanomedicine reference centre.

Main capacities in nanotechnology / nanoscience

1.- MAIN AREAS

There are currently three main areas defined where BIONAND will perform its scientific activity:

NANODIAGNOSTIC AREA: This area is focused around the implementation of more efficient diagnostic and prognosis devices, both *in vivo* and *in vitro*, with the objective of optimizing the identification of diseases or predisposition to them, as well as it's progression at a cellular or molecular level by using nanodevices.
THERAPEUTIC NANOSYSTEMS AREA: This area will focus on the development and research of nanosystems which protect, transport and release drugs or therapeutic agents by a controlled method leading to an easier administration, being more selective and effective, and therefore less toxic.
NANOBIOTECHNOLOGY AREA: This area will focus on both basic nanotechnology knowledge research, as well as applied research, leading to the development of new approaches that can be exploited by the two previous areas.

2.- CORE FACILITIES

Research groups in the different areas and also external companies are supported by different Research Support Units. These Units provide researchers with all the tools necessary for the synthesis of novel

nanostructured materials and subsequent characterization at physical, chemical, functional and nanotoxicological levels:

- Nanoimaging Unit: composed of different equipment for imaging, both *in vitro* and *in vivo*. From which the following can be noted: fluorescence/confocal microscopy (Leica SP5 HyD confocal, Leica SP5 HyD Multiphoton, Nikon N-Storm super-resolution, Nikon Eclipse Ti Nikon TIRF), transmission/scanning electron microscopy (FEI Quanta FEG 250 and FEI Tecnai G^2 20 Twin) , Cryo-TEM and sample preparation through Cryo-Inmovilization, Magnetic Resonance Imaging (Bruker Biospec™ 94/20), High Resolution NMR (Bruker ASCENDTM 400 MHz, Bruker AVANCETM III600 MHz, High Resolution Magic Angle Spinning HR-MAS probe), Whole animal intravital multi-modal imaging (Carestream Xtreme and Albira).

- Cell/Tissue Culture Unit: unit provided with the equipment (cabins, liquid nitrogen containers, inverted microscopes, etc...Cell Culture Rooms Cat1 and Cat2), from which the following can be noted: Equipment for High Content Screening (Perkin Elmer Operetta).

- Flow Cytometry Unit: Unit equipped with Flow Cytometer Beckman Coulter Gallios and Cell Sorter MoFlo XDP.

- Histology and Immunohistochemistry Unit: Unit equipped with Exakt 310 Cutting System, Tissue Processor LeicaTP1020 and Rotary Microtome Microm HM 360.

- Animal facility: this unit will accommodate laboratory animals required to carry out pre-clinical trials regarding technologies and products developed in the centre.

- Other core facilities, like Biological and Chemical Analysis Unit, Biological Sample Preparation/Imaging Processing Room, Freezer Room, Centrifuge Room, Cold Room and Cryopreservation, Dark Room, Store Rooms.

Main related relevant activities / projects

The construction of the Andalusian Centre for Nanomedicine and Biotechnology BIONAND has been co-financed, with a distribution of 70% of the total cost, by the European Fund of Regional Development (EFRD) together with the Ministry of Economy and Competitiveness in the frame of the Spanish National Plan for Scientific Research, Development and Technological Innovation 2008-2011 (IMBS10-1C-247, quantity: 4.979.567,61€).

The equipment of the NanoImaging Unit and the equipment of the Support Units has been co-financed by the European Fund of Regional Development (EFRD) together with the Economy and Competitiveness in the frame of the Spanish National Plan for Scientific Research, Development and Technological Innovation 2008-2011 (PCT-420000-2010-003, quantity: 4.305.000€; INP-2011-0023, quantity: 2.424.447€).

Other information

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CECABLE -Cable Studies Center

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | synthesis/func. | nanophotonics | nanobiotechnology | nanoadditives | nanometrology | nanosimulation | **engineering**

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Organization profile

CECABLE is an international research center that conducts and disseminates research on cable telecommunications, broadband, nanotechnology and related services. Its mission is to provide an on-going analysis of the global technological revolution from social, humanistic, technical, and scientific perspectives.

Main capacities in nanotechnology / nanoscience

Applications in cable telecommunications and broadband.

Main related relevant activities / projects

Applications in cable telecommunications and broadband (FTTx, HFC, EuroDOCSIS 3.0).

Other information

-

CEIT -Centro de Estudio e Investigaciones Técnicas

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | **nanocomposites** | **nanosensors** | **synthesis/func.** | nanophotonics
nanobiotechnology | nanoadditives | **nanometrology** | **nanosimulation** | engineering

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Organization profile

CEIT was formed in 1982 as a spin-off of the School of Engineering of the University of Navarra. It is a non-profit independent research institute located at San Sebastian, Spain, and committed to the promotion and development of applied technical studies and research, and training of PhD students. A big fraction of the activity of the Materials Department is devoted to research in collaboration with local and European industry in the framework of bilateral contracts or within consortia in publicly sponsored projects. For the development of projects related with micro and nanotechnologies, the Department is equipped with state-of-the-art experimental facilities for fabrication, structural characterization (OM, SEM-EDX-OIM (EBSP), TEM-EDX, Dual Beam FIB, X-ray diffraction with texture goniometer) and mechanical characterization (AFM, nanoindentation, different high temperature mechanical testing equipments, laser speckle interferometry, etc.)

Main capacities in nanotechnology / nanoscience

Fabrication:

- Powder atomizer with gas or water for fabrication or pre-alloyed powder
- Equipment for milling and treatment of powder for the fabrication of ultrafine size powder and second phase dispersion
- Equipment for powder compaction and sintering (cold and hot, uniaxial and isostatic) for simple and actual piece fabrication
- Clean room equipment for fabrication and characterization of micro sensors and MEMs (class 100, 1000 and 10000), including LPCVD, PECVD, PVD (sputter), lithography, RIE, etc.

Structural and Mechanical characterization:

- Optical microscopy
- Scanning and Transmission Electron Microscopy (FEG SEM and TEM) with chemical analysis and EBSD detectors
- Dual Focus Ion Beam for simple preparation for TEM, micro/nanofabrication and analysis of thin films and coatings

- X-ray diffractometers for identification of crystalline phases and residual stress state characterization both for bulk materials and for coatings
- 2 nanoindenters for local mechanical characterization (elastic modulus, hardness, toughness and wear resistance) of sub micrometric phases and coatings
- 2 Atomic Force Microscopes (AFM) for surface characterization including the possibility of loacal measurements and mapping of magnetic domains

Modelling:

- Experience in modelling thermo mechanical behaviour of all kind of materials using FEM code ABAQUS
- Development of user subroutines for specific applications (cohesive elements for fracture, gradient dependent crystal plasticity,…)
- Software for Thermodynamics calculations (THERMOCALC and DICTRA) for engineering of complex material systems.

Main related relevant activities / projects

- Development of ultra-fine grain stable microstructures in Aluminum alloys through ECAE. CICYT. 1999-2002.
- Micromechanics for thin films and coatings. MCYT. 2001-2004.
- A design tool for materials and polycrystalline/multiphase systems. Gobierno Vasco – UET. 2001-2003.
- Development of bulk materials with sub-micrometric structure through Severe Plastic Deformation (SPD) processes. CICYT. 2002-2007.
- Fracture phenomena in ultra-thin patterned films by cross-sectional nanoindentation. Intel Corporation, USA. 2003-2006.
- Mesoscopic modelling of strain gradient dependent plasticity. MCYT. 2003-2007.
- Innovation in SPD processes: Continuous ECAE and processing with high plastic gradients. CICYT. 2006-2007.
- Nanoscience and nanotechnology for micro and nano-systems. Gobierno Vasco. 2006-2011.
- Mechanical test to assess reliability of Si/assembly interaction during flip chip packaging. Intel Corporation, USA. 2006-2009
- Interfacial engineering in copper carbon nanofibre composites (Cu-C MMCs) for high thermally loaded applications. Comisión Europea. 2006-2010.
- Nano-structuring bulk materials through continuous severe plastic deformation (SPD) processes and new processes maximizing internal plastic gradients. CICYT. 2006-2009.
- Advanced tools for modelling manoindentation tests. Gobierno Vasco. 2007-2010.
- Physics based multilevel mechanics of metals. IAP. 2007-2011.
- A practical mesoscopic gradient-dependent dislocation density based crystal plasticity model implemented in an FEA commercial code. ArcelorMittal Research. 2008-2010.
- Inanogune. Gobierno Vasco. 2009-2011.
- Experimental and modeling tools to assess fracture of thin films in interconnect structures. Intel Corporation, USA. 2009-2012.
- Functional materials: Processing by SPD and micro/nanomechanical characterization with in-situ SEM testing. CICYT. 2011-2013

Other information

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CIBER-BBN

University | **Research Center** | Other | SME | Large Company

Capacities

characterization | nanocomposites | **nanosensors** | **synthesis/funct** | nanophotonics

nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

The Biomedical Networking Research Center in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN) is a multidisciplinary and multi-institutional translational Biomedicine research center integrating basic, clinical and technological research. CIBER-BBN brings together some of the main Spanish research groups in these fields, including both universities and hospitals or other technological centers. At present, 47 research groups belonging to 27 different institutions compose CIBER-BBN.

The scientific areas comprised within the CIBER-BBN are: Bioengineering and Biomedical Imaging, Biomaterials and Tissue Engineering and Nanomedicine. The Center's research is focused on the development of prevention, diagnostic and follow-up systems and on technologies related to specific therapies.

Among the research programs of the CIBER-BBN's Master Plan, there is one named Equipment Platform Program. This Program is based on a Research Infrastructure on Biomedicine which is constituted by high-tech equipment that offers top-level technological resources, not only to the CIBER-BBN research groups, but also to external groups and companies.

These Units or research services are coordinated by 19 of the 47 group leaders that form the core of the CIBER-BBN. This RI comprises 19 distributed research Units grouped in 5 platforms:

- Production of Biomolecules
- Production of Biomaterials and Nanoparticles
- Tissue, Biomaterial and Surface Characterization
- Bioimaging
- High Performance Computing

Main capacities in nanotechnology / nanoscience

The Nanomedicine area research is focused in the following areas: development of nanoparticles, biomarkers, development of nanostructures, biofunctionalization, treatment, drug delivery, molecular characterization, biosensors and validation

Main related relevant activities / projects

BIO-GATES: New nanoparticles containing bio-gated scaffoldings for diagnosis and delivery applications

CELL-NANO_THYROID: New orthotopic/ectopic nude mice model of human thyroid undifferentiated/anaplastic carcinoma: Useful tool for new cell-therapies, drug testing and validation in humans

GLYCOHIV: Glyconanoparticles and glycodendrimers as new tools to fight HIV transmission

LIVERPOC: Advanced Diagnostic Tool for Early Identification of Liver Failure

METALOTRIGGER: Development and biological evaluation of metalloproteinase-sensitive multifunctional carriers for the combined therapy of advanced colorectal cancer

NADD: Nucleic acids derivatives as potential

NAINBO: Nano-engineering inclusion bodies as new biomaterials for cell proliferation

NANOBICIDE: New nano approaches for HIV microbicide drugs

NANOCOMETS: Development of nanoparticles as vehicles for the treatment of metastatic colorectal cancer

NANOFABRY: Development of nanomedicines for enzymatic replacement therapy in Fabry disease

NANOHYPERTERMIA: Development of new nanoparticles and protocols for enhanced hyperthermia

NANOMEDIAG: Nanobioanalytical platforms for improved medical diagnosis of infectious caused by pathogen microorganisms

NANOPHOR: Developing of electrophoretic and photonic techniques for pathogenic microbes identification and monitoring

NANOPROVIR: Tuning nano- architecture and funcion in protein-only artificial viruses

NANORETINA: Nano-scaffolds for the reimplantation of detached retina

NANO-TRANS-BRAIN: Nanocarriers for antiapoptotic drug transport across the Blood-Brain-Barrier

NANOXEN: Use of optical molecular nanoswitches to control nervous functions in xenopus tropicalis

OLIGOCODES: A universal Diagnostic Platform

PEPSIN: Unraveling the mechanisms of action of cell-penetrating and anticancer peptides: bringing together single molecule, cell assays and bulk characterization

PHOTOTHERAPY: Gold nanoparticles for the thermal ablation of tumor cells and for the activation of therapeutic genes

Other information

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CIC nanoGUNE

University	**Research Center**	Other	SME	Large Company

Capacities

characterization	nanocomposites	**nanosensors**	**synthesis/funct**	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

NanoGUNE is a nanoscience cooperative research center created with the mission of addressing world-class nanoscience research for the competitive growth of the Basque Country. NanoGUNE also faces the challenge of fostering cooperation among various research and technological groups in the Basque Country and exploring new models to fill the gap between basic research and innovation.

With the aim of placing the Basque Country at the forefront of nanoscience research, it has been nanoGUNE´s commitment to incorporate highly qualified outstanding researchers and state-of-the-art research equipment. We have been successful in putting together seven research groups, in addition to an advanced electron- microscopy facility, which with researchers coming from 21 different countries are already fully operational and making important research contributions in the fields of nanomagnetism, nanooptics, self assembly, nanobiotechnology, nanodevices, nanomaterials and theory. New groups will be opened in the future, with a total of up to ten research laboratories.

Main capacities in nanotechnology / nanoscience

The building is a unique infrastructure of 6,200 m^2 that includes a five floors tower and a research area composed by six cubes, allocating in the basement the necessary space for 15 ultra-sensitive laboratories, free of electromagnetic interference, with an ultra-low level of vibration and acoustical noise, and a nanofabrication cleanroom of about 300 m^2. The following list summarizes the laboratories and the most important tools installed at nanoGUNE:

- Transmission Electron Microscopy: High-Resolution (Scanning) Transmission Electron Microscope (HR-TEM/STEM) image-aberration corrected Titan 60-300
- Environmental Scanning Electron Microscopy: Environmental Scanning Electron Microscope (ESEM) Quanta FEG
- Dual-Beam Focused-Ion-Beam Nanofabrication: Dual-Beam Focused-Ion-Beam (FIB) instrument Helios NanoLab
- Scanning Tunneling Microscopy
- Chemical Synthesis
- Sample Preparation for Nanobiotechnology: Real-Time PCR System
- Biochemical Characterization: Confocal Laser Microscope, Laser Flow Cytometer, Polarimeter, Fluorimeter, UV-VIS Spectrophotometer, Isoelectric Focusing System, Microsquid, Microcalorimeter

- Nanooptics: Scattering-type Near-Field Optical Microscopes, Supercontinuum Infra-Red and THz Lasers, Scattering-type Near-Field Optical Microscope, Raman Spectrometer with an AFM setup, Supercontinuum Infra-Red and THz Lasers
- Deposition and Magneto-Optic Characterization: Ultra-High-Vacuum Sputter System, Dual-Chamber Organic/Metallic Ultra-High-Vacuum Evaporator System, Magneto-Optical Kerr-Effect Setup for reflection, diffraction, and ellipsometry
- Advanced Physical Characterization: Physical Properties Measurement Systems (PPMS), SQUID - Vibrating Sample Magnetometer, Variable Temperature Probe Station, System for semiconducting characterization, Nanovoltemeter and Keithley source, X-Ray Diffractometer
- Probe Microscopy: Atomic/Magnetic Force Microscopes, Magneto-Optical Kerr-Effect Microscope
- Cell culture: Sterilizer, CO2 incubator, Biological Hood, Washing Machine, Ultracentrifuge, Cell Microscope and Fluorescence microscope
- Clean room:
  - Electron Beam Lithography Bay (ISO 5 - Class 100, ISO 6 -Class 1000): E beam lithography
  - Photo Bay (ISO 5 - Class 100, ISO 6 -Class 1000): Photolithography
  - Etching Bay (ISO 7 - Class 10000): Reactive and Ion Beam Etcher
  - Deposition Bay (ISO 7 - Class 10000): E beam/ thermal deposition tool; atomic layer deposition, Profilometer; variable-angle Spectroscopic Ellipsometer, SEM.

Main related relevant activities / projects

- Nanomagnetism: Magnetization reversal, dynamics, and related characterization methods. Fabrication and magnetic properties of multilayered magnetic materials.Fabrication and characterization of magnetic nanostructures

- Nanooptics:Focused on near-field optics, optoelectronics, plasmonics, the development of microscopic optical equipment, and the development of nanodevices and their effect on nanophotonics

- Self Assembly: Plant viruses as scaffolds for nanoscale structures, Electrospinning of self-assembling molecules to wires, Self-assembling organic spintronics, Porous carbon electrodes for electrochemical capacitors and batteries

- Nanobiotechnology

- Nanodevices:Spintronics: organic spin valves and magnetic transistors; spin transport in metals and grapheme, Multifunctional devices: resistive memory in simple oxides; organic spin field-effect transistors, Advanced nanofabrication: development of su-10 nm gaps for single molecule transistors; fabrication of nanostructures on insulating substrates

- Theory: Computational and theoretical condensed matter physics. Complex solids and liquids, using first-principles molecular dynamics based on density functional theory and on linear-scaling density-functional theory. Nanoscale oxide heterostructures including multiferroics, liquid water and water/solid interfaces, and non-adiabatic processes related to radiation damage of materials

- Nanomaterials: Synthesis and Functionalization of Materials: Thin-film coatings for functionalization of materials for corrosion protection, flexible electronics, sensing, or energy applications using Atomic Layer Deposition (ALD) Techniques; Hybrid inorganic-organic materials for applications as textiles, automotive industry, or aeronautics; Bio-inorganic nanomaterials for particular applications in nanomedicine related to molecular biomimetics, drug delivery, and screening.

Other information

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FideNa (R+D Foundation in nanotechnology)

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | **nanocomposites** | nanosensores | synthesis/func. | nanophotonics

nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

The Foundation for the R+D in Nanotechnology is a non-profit research centre constituted in 2007 promoted by SODENA following an initiative by the Government of Navarra, beginning its activity in August 2008. The Public University of Navarra (UPNA) joined this initiative and together opened a research centre in Nanotechnology in Navarra, in the Campus of the Public University, which has been operational since August 2008.

The foundational aim of FideNa is to achieve the impact of Nanotechnology in the business base of Navarra while increasing wealth and welfare of society. Towards this end, the strategy of FideNa seeks to establish firm foundations of knowledge throughout the implementation of r+d projects, generally in collaboration, which generate critical mass for research into higher performance techniques and technologies. This critical mass is what enables FideNa to implement further developments that could be exploited economically.

The ultimate aim is, therefore, to work mainly in applied projects in which technology in key stages of development could be transferred to products with real competitive advantages.

Main capacities in nanotechnology / nanoscience

FideNa focuses its efforts in 3 main areas that allow the centre delivering services to the four most relevant sectors in Navarrian economy: automotive, agri-food industry, energy and biomedicine

- NANOFAB

Expertise: Nanostructured surfaces in large areas via interference lithography. FideNa can manufacture line, column and hole patterns with pitches down to 180 nm and features down to 30 nm, over areas as large as 100 cm^2. Typical materials would be silicon or glass, coated with metals or semiconductors if necessary.

Applications: Energy (photovoltaic and thermo-solar) and optics (emission control and energy transmission)

Collaborations: MIT groups (RLE), Tecnalia, Polytechnic University of Madrid, CENER.

- NANOBIO

Expertise: Self-assembly of bio-molecules on surfaces or nanoparticles. This area is so far working in functionalized biosensors using the advantage of the nano-patterned surfaces to assemble the sensing biomolecules. Developments in functionalized nanoparticles as bio-carriers are also under way.

Applications: Biosensor analysis using biofunctionalized gold surfaces and optical detection (SPR, Surface Plasmon Resonance). Drug Delivery, therapy and bio-catalysis. Direct, indirect and sandwich formats using microplates and spectrophotometric reader (ELISA, FIA...)

Collaborations: MIT groups, IdAB, CNIO, UNAV.

- NANOMAT

Expertise: Additives for nanocomposites or coatings. Particularly: use of nanowhiskers and nanoclays to improve the properties of eco-friendly polymers, development of coatings with tailored functionality, use nanoparticles to improve properties in paints

Applications: Biodegradable packaging improving their properties and adding new ones (antibacterial, gas barrier, UV filter) filter for water installations. Paints with special properties

Collaborations: UPNA, Oulu University, EMPA, Gamesa, CENER.

Main related relevant activities / projects

- AZIMUT | TYPE: CENIT | CLIENT: Gamesa | DESCRIPTION: development of special paints for wind power.
- EuropeAid Argentina | Bidding | CLIENT: European Commission | DESCRIPTION: contribution to the development of Argentinean SMEs by means of nanotechnology | PARTNERS: ACE, GOPA y CNTA
- NanoMicro | TYPE: contract INNPACTO | CLIENT: Portland | DESCRIPTION: nano cements for value-added applications.
- HardBlades | TYPE: contract | CLIENT: INDEOL | DESCRIPTION: paints with special paints.
- Nanotextured Photovoltaic Cells | TYPE: GN | PARTNERS: CENER | DESCRIPTION: nanostructures to improve the efficiency of photovoltaic cells.
- SABioD | TYPE: GN | PARTNERS: IdAB | DESCRIPTION: development of bio-optic sensors and functionalized nanoparticles.
- MNpBiofilms | TYPE:GN | PARTNERS:UPNA,UNAV,Idifarma,3P,IdAB,Lurederra
- Susfoflex | TYPE:FP7 | PARTNERS: VTT, GiorgiaTech, Andaltec, Cidetec | DESCRIPTION: smart packaging.
- NanoSelect | TYPE:FP7 | PARTNERS: VTT, Oulu, Acondaqua, Imperial College
- NanoFab | TYPE : own | PARTNERS: MIT | DESCRIPTION: development of nanofabrication technology to use in other projects.
- NabioCo | TYPE: own | PARTNERS: UPNA (Tecnología Alimentaria) | DESCRIPTION: development of nanoaditives technology for other projects.
- Dual Core Antiguides | TYPE: own | PARTNERS: UPNA | DESCRIPTION: development of the same name patent done in collaboration with UPNA.

Other information -

INSTITUTE OF CHEMICAL RESEARCH OF CATALONIA (ICIQ)

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | **synthesis/func.** | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | **nanoencapsulates**

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Organization profile

The Institute of Chemical Research of Catalonia (ICIQ) is a non-profit organization founded in 2004 by the Generalitat de Catalunya devoted to research in the area of chemistry. The institute is sponsored by leading chemical and pharmaceutical companies and it is funded by the Generalitat de Catalunya, the European Union (FEDER funds) as well as by competitive research funding and the revenues from industrial collaborations.

ICIQ hosts 18 research groups covering three main research areas:

- Catalysis of the chemical process: Health and Sustainability.
- Supramolecular chemistry: Nanoscience and New Materials.
- Renewable energies: Molecular Photovoltaic and Artificial Photosynthesis.

ICIQ has consolidated its position as one of the top level institutions for chemical research.

Main capacities in nanotechnology / nanoscience

- Synthesis of metal nanoparticles modified by ligands.
- - Synthesis of superparamagnetic nanoparticles.
- - Functionalization of nanoparticles for copper catalyzed alkyne-azide cycloaddition (CuAAC) reactions (Click Chemistry).
- - Preparation of functional nanoparticles for chemical and biomedical applications using CuAAC reactions.
- - Synthesis and design of functional molecules and supramolecules at the nanometer scale.
- - Molecular inclusion and molecular encapsulation. Towards the development of nano-scale reaction vessels for applications in catalysis and as a tool to perform organic reactions in water.
- - Design and development of synthetic strategies for the preparation of planar and curved polyarenes for molecular electronics.

- Preparation and characterization of metal oxide, metallic and semiconducting nanoparticles.
- Preparation and characterization of quantum dots.
- Preparation and characterization of molecular photovoltaic devices (organic solar cells, dye sensitized solar cells, quantum dot solar cells.
- Preparation and characterization of nanoparticles for bio-applications (theragnostics).
- Preparation and characterization of molecular sensors at nanoscale combining optical and electrical measurements.
- - Quantum Chemistry studies on the electronic structure and properties of nanocapsules. Molecular dynamics simulations on molecular metal oxide nanocapsules.

Main related relevant activities / projects

Projects related to NANOtechnologies:

- 7th Framework programme:
  - 2 ERCs projects : Nanosonwings, PolyDot
  - Several Collaborative projects (NMP, ICT, Energy): i.e.: PICOINSIDE, AtMol
  - ITN: Mag(net)icFun
  - 3 Cost actions
- Several projects from the R&D National Programme: i.e.: CTQ2012-38594-C02-01, CTQ2011-29054-C02-02, CTQ2011-23014, NAN2004-08881-C02-02.

Other information

Facilities presents at ICIQ:

- NMR, MS and X-ray.
- Absorption, Emission and Vibrational Spectroscopies.
- Isothermal Titration Calorimetry (ITC).
- Clean room.
- Full equipped system for the controlled evaporation of small organic molecules.
- Full equipped system for the controlled evaporation of metals, metal oxides and organic molecules. Thin films with thickness down to 2 nm can be prepared.
- A full equipped laboratory to characterize opto-electronic devices such as organic thin film transistors, organic solar cells, organic light emitting devices.
- Nanosecond-to-second laser transient absorption spectroscopy in the UV-IR (2500nm) range.
- Atomic Force Microscopy equipped for magnetic, optical and electronic measurements.
- High Resolution Scanning Electron Microscopy.
- Laboratory for device fabrication (thin organic transistors, organic solar cells and organic light emitting devices).
- Laboratory and equipment for the controlled synthesis of semiconductor nanoparticles, quantum dots and metallic nanoparticles.
- Confocal microscopy.

INSTITUTE OF MATERIALS SCIENCE OF MADRID

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | **nanocomposites** | nanosensors | **synthesis/func.** | **nanophotonics**
nanobiotechnology | nanoadditives | **nanometrology** | **nanosimulation** | nanoencapsulates

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Organization profile

The Instituto de Ciencia de Materiales de Madrid (ICMM) belonging to Spanish National Research Council (CSIC) was created in December 1986. Its mission is to create new fundamental and applied knowledge in materials of high technological impact, their processing and their transfer to the productive sectors at local, national and European scales (the true value of materials is in their use), the training of new professionals, and the dissemination of the scientific knowledge. Therefore, the objective is to become an international reference Centre for Materials, contributing in an effective manner to the development of the Knowledge Society, a centre that promotes excellence for new professionals demanding training, and/or for established scientists requiring to broaden or update their knowledge. Simultaneously, the ICMM should be a national reference for the innovative industry, particularly at the nanometer scale and emergent fields.

Main capacities in nanotechnology / nanoscience

ICMM/CSIC activity is focused into different research lines:

- Biomaterials and Bioinspired Materials
  - *Bioinspired Materials*
  - *Multifunctional Composite Materials*
  - *Colloidal Nanocrystals and Chemistry*
- Energy, Environment and Sustainable Technologies
  - *Materials for fuel cells, electronic and magnetic systems*
  - *Materials nanocharacterization*
  - *Advanced Batteries and Supercapacitors*
- Materials for Information Technologies
  - *Electroceramics for InformationTechnologies*
  - *Heterostructures, Optoelectronic and Magnetic Materials*
  - *Nanomagnetism and Magnetization Processes*
- Nanostructures and Surfaces and Coatings
  - *Advanced force microscopy and nanolithography*
  - *Growth and properties of heterostructures in the nanoscale*
  - *Surface Nanostructuring for Space and Terrestrial Communications*

  - *Theory of surfaces and nanostructures*
  - *Low-dimensional Advanced Materials*
  - *Structure of Nanoscopic Systems*
  - *Surface Engineering and Advanced Coatings Force Microscopy and Spectroscopy*
- New Architectures in Materials Chemistry
  - *Functional and Supramolecular Materials*
  - *Nanostructured Hybrid, Biohybrid and Porous Materials*
  - *Organic Electronics Materials*
- Photonic Materials
  - *Electroactive and laser materials*
  - *Photonic Crystals*
  - *Sol-Gel materials*
- Theory and Simulation of Materials
  - *Graphene models*
  - *Propagation of photons and electrons in Nanostrcutures*
  - *Materials Simulation and Modeling*
  - *Quantum Trabnsport in the Nanoscale*
  - *Quantum effects and correlations in novel materials and nanostructures*

Main related relevant activities / projects

- Multifuncional nanotechnology for selective detection and treatment of cancer (FP7, 2011-2015),
- Targeting Hernia Operation Using Sustainable Resources and Green Nanotechnologies. An Integrated Pan-European Approach (FP7, 2011-2015).
- Lithium-Air Batteries with split Oxygen Harvesting and Redox (FP7, 2011-2014).
- Nanestructured lithium conducting materials (FP7, 2011-2014).
- Rare-earth free permanent magnets (FP7, 2012-2015).
- New solar collector concept for hight temperature operation in CSP applications (FP7, 2010-2013)
- The Piezo Institute-European expertise centre for multifunctional and integrated Piezoelectric Device, (FP7, 2012-2015).
- Single Nanometer Manufacturing for beyond CMOS devices (FP7, 2013-2016).
- Multiscale Modelling of Femtosecond Spin Dynamics (FP7, 2012-2015).
- Implantable Organic Nano-Electronics (FP7, 2012-2015).
- Nanophotonics for Energy Efficiency (FP7, 2010-2013).
- Novel Uses for Graphene (FP7, 2012-2017).

Other information

Main nano-facilities for characterization and preparation:

- Clean room fotolitography.
- AFM, SEM and TEM characterization microscopy.
- Scanning Tunneling Microscope in Ultra High Vacuum (STM-UHV).
- X-ray Photoelectron Spectroscopy (XPS) with lateral resolution.
- Magnetic force microscopy and SQUID magnetometry.

IMDEA Nanoscience

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | **nanocomposites** | **nanosensors** | **synthesis/func.** | **nanophotonics**
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

IMDEA Nanoscience (IMDEA-N) is an international multidisciplinary scientific research institute focused on advanced studies at the nanoescale that was created in 2007 through a collaboration agreement between the Regional Government of Madrid and the Government of Spain. The objective of this agreement was to create and run together a new international research centre of excellence focused on frontier science and technology at the nano scale with the economic help of the European Union Structural Funds and the financial aid of the European Investment Bank. It has a public research institute profile but with a model of governance that promotes transparency and openness. Its top most government body is a board of trustees with representatives from academia, government, business and science.

Since its creation IMDEA-N has been steadily shaping itself as a key European player in the advanced field of Nanoscience and it is already the largest purpose build institution in Spain specialized in this area of knowledge. At IMDEA-N work together biologist, chemist, physicist, engineers and technicians from all over the world, at pulling together novel projects in such hot topics as graphene, permanent magnets or anticancer nanoparticles.

IMDEA-N is located in a new state of the art 8.500 m^2 building, at the UAM+CSIC Cantoblanco Campus in Madrid. It includes convenient office space, large handy laboratories for carrying out physics, chemistry and bio experiments, highly specialized facilities and workshops. Located at the basement of the building is the Nanofabrication Facility of the UAM+CSIC International Excellence Campus.

The objective of IMDEA-N is the creation of new knowledge that together with technology centres and companies may be transformed into disruptive innovations that generate value that may help our region become more competitive. IMDEA-N therefore focuses on attracting scientific talent to Madrid and on providing R&D advanced services. The Science and Business relations model adopted by IMDEA-N provides a specialised framework for the development of new applications and products based on the fundamental understanding, analysis and manipulation of nanoscale physical, chemical and biological phenomena.

Main capacities in nanotechnology / nanoscience

The scientific capabilities of IMDEA-N are organized strategically in 6 research programmes:

Programme 1. *Molecular Nanoscience*

Deals with the design and synthesis of molecular nanostructures and nanomateriales, their spectroscopic characterization, in particular, their time-resolved optical response, and their self-assembly at surfaces.

Programme 2. *Scanning Probe Microscopies and Surfaces*

The scientists involved develop advanced Scanning Probe Microscopes, mostly STM, AFM and other Probe Microscopies to investigate problems such as the epitaxial growth of graphene, the self-assembly of molecules at surfaces, the realization of inelastic spectroscopy at the level of single molecules or the spin polarized imaging of magnetic nanostructures.

Programme 3**.** *Nanomagnetism*

This Programme deals with the preparation and characterization of Advanced Magnetic Nanomaterials and explores some of their biomedical applications.

Programme 4. *Nanobiosystems: Biomachines and Manipulation of Macromolecules*

Includes research lines which deal with the study of macromolecular complexes, their structure and functional properties, as well as their interaction with defined substrates to build synthetic tools

Programme 5. *Nanoelectronic and superconductivity*

Deals with the Electric Transport in Nanosystems. Alternative approaches to the silicon-based semiconductor industry may involve devices based on grapheme nanostructures or transport through single molecules.

Programme 6. *Nanoacustics and Nanophotonics/ Nanooptics*

The programme deals with Nanoacoustics and Nanophotonics, which have to do with phenomena in which either the (acoustic or optical) radiation or the matter are confined at sub-micrometer dimensions.

Main related relevant activities / projects

Seveal FP7 Collaborative projects. Some examples:

- FP7-NMP-2012-SMALL-6 NANOPYME: *Nanocrystalline Permanent Magnets Based on Hybrid Metal-Ferrites.* nº 310516

-Initial Training Networks. FP7-PEOPLE-2011-ITN. POCAONTAS: *Polymer-Carbon Nanotubes Active Systems for Photovoltaics.* nº 316633. // *ESTABLIS: Ensuring STABiLIty in organic Solar cells* nº 290022.

Other information

Main Characterization LABS:

- Scanning Probe Microscopies
- Low Temperature Scanning Tunnelling Microscope (STM)
- Atomic Force Microscopy AFM/Fluorescence
- Single Molecule Transport
- Nanomagnetism
- Chemical Synthesis
- Organic MBE
- Nanophotonics/Advanced Optical Characterization
- (SNOM)
- Optical Nanomanipulation

IMM- Institute of Microelectronics of Madrid (CNM-CSIC)

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | nanocomposites | **nanosensors** | **synthesis/func.** | **nanophotonics**
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

IMM is a research institute that belongs to the National Scientific Reseach Council in Spain (CSIC), together with IMB (Instituto de Microelectrónica de Barcelona) and IMS (Instituto de Microelectrónica de Sevilla). These three institutes form the Microelectronic National Center, (Centro Nacional de Microelectrónica-CNM). The objective of IMM is the advance in fundamental research and applications inside nanoscience and nanotechnology.

Since 1985 IMM has reached a strong experience in advanced fabrication techniques like molecular beam epitaxy (MBE), electron beam lithography and tools based on scanning probe microscopy (SPM) for the fabrication, characterization and manipulation of nanostructures. This cumulative experience is in the base of its multidisciplinary research activity.

Actually IMM has around 90 people involved, 38 as doctor researchers and 30 Ph D students.

Main capacities in nanotechnology / nanoscience

IMM activity is focused into different subjects:

- Semiconductor nanostructures for quantum information devices and photovoltaic.
- Metallic nanostructures for devices based on magnetoplasmonic.
- Nanostructured thermoelectric devices.
- Nanobiomecanic sensors.
- Development of image techniques in the nanoscale.

IMM also offers technological support through its **nanofabrication service**, attending to the most demanding requirements based on fabrication and characterization facilities at IMM:

- Molecular beam epitaxy (MBE) of III-V semiconductors (Ga, In, Al – As, P, Sb).
- UHV sputtering of metals and compound semiconductors.

- UV lithography and colloidal lithography. Preparation and characterization of molecular photovoltaic devices (organic solar cells, dye sensitized solar cells, quantum dot solar cells.
- Nanolithography by e-beam, focused ion beam and oxidation by AFM.
- Structural characterization: AFM, RX.
- Electrical characterization: Hall effect, I-V, C-V.
- Optical characterization: Macro and micro photoluminscence (PL), time resolved PL (TRPL) at T= 4 – 300 K, magnetic field from 0 to 9 Tesla. Spectral elipsometry. Scanning Near-field Optical Microscopy (SNOM), Optical absorption spectrometry.
- Magneto-optical characterization: Magneto-optical spectrometry in polar and transverse configurations. Hysteresis loops in polar and transverse configurations. Magneto-optical torque.
- Plasmonic interferometry
- Magneto-plasmonic characterization in Kretschmann configuration
- Magnetic Force Microscopy (MFM)
- Characterization of nems and mems.
- Fabrication of semiconductor nanostructures: III-V semiconductors quantum wells (QW), wires (QWR) and dots (QD) by MBE. Si nanowires by CVD
- Fabrication of magnetic, plasmonic and magnetoplasmonic nanostructures in UHV by sputtering (DC and RF), Knudsen cell and e-beam evaporator
- Fabrication of 2D photonic crystals.
- Electrochemical fabrication processes: Porous alumina membranes (15 nm < Φ <400 nm). Electrodeposition of semiconductors.
- Metal deposition: e-beam, thermal evaporation, sputtering.
- Chemical etching: wet etching, dry etching by reactive ions (RIBE, RIE).

Main related relevant activities / projects

- Starting Grant del European Research Council:
  - Nano-engineered high performance Thermoelectric Energy Conversion devices.
  - Development of a nanomechanical tool-box for the investigation of cell mechanics.
- FP7: Nanomagma nanoHITEC NEXTEC, IPMAGNA
- FP6: Forcetools, Naimo, Nanotribology y 2 NoE: Phoremost, Sandie
- FP5: Nanomat, Nanomagic, Hidemar, Monalisa, Optonanogen

Other information

2003-2011:

- 30 PhD theses.
- Patents Requested :22
- Patents Licensed: 8 (Sensia, Scriba, Asylum, Mecwins)
- Spin-off companies: Sensia, Mecwins, Advanced Dispersed Particles S.L

INIA
National Institute for Agricultural and Food Research and Technology

University | Technology Center | **Research center** | SME | Large Company

Capacities

characterization | **nanomat. toxicity** | nanosensores | synthesis/func. | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

The National Institute for Agricultural and Food Research and Technology (INIA) is a Public Research Organisation (OPI) of the State Secretariat of Research, Development and Innovation of the Ministry of Economy and Competitiveness. Its unique mandate entailsa dual responsibility: 1) as coordinator of the national network of agrifood research centres is responsible for the harmonisation, resource allocation, monitoring and evaluation of scientific and technical research activities and 2) as an agrifood research institution, is responsible for the execution of its own research and technology projects (including technology transfer) under the General Deputy Directorate of Research and Technology (SGIT).

Main capacities in nanotechnology / nanoscience

At the INIA and in the Department of Environment, the research group Endocrine Disruption and Toxicity of Contaminants works on the mechanisms underlying the toxic action of a variety of substances including nanomaterials. The work of the group is mostly based on in vitro techniques (keeping in mind the three R principle as an alternative to the use of laboratory animals: Reduction, Replacement, Refinement) using fish and mammalian cell lines. In these in vitro assays, the induction of cellular detoxification activities is evidenced and quantified, together with oxidative stress and modifications in the expression of related genes. In addition, toxicity and bioaccumulation studies are carried out in vivo using fish. These assays allow determining if the mechanisms characterized in vitro are also working in vivo and if they could serve as biomarkers of exposure to nanomaterials. Of course, and previously to any experiment, a detailed physicochemical characterization of the used nanoparticles is performed, determining frequency size distribution of the particles (TEM, SEM, DLS), Z-potential, or shape (TEM, SEM) among other features. This thorough physicochemical characterization is usually performed for all the exposure concentrations and at different exposure times.

Main related relevant activities / projects

The research group acts as technical assistant (advisor) to different Spanish administrative departments in a variety of themes related with nanomaterials. Specifically, members of the research group participate at the Working Party on Manufactured Nanomaterials (WPMN) of the OECD or the Working

Group on Nanomaterials (WG-NM) of the ECHA.

The group participates in a large FP7 Project that studies the risks associated to the use of engineered nanoparticles: MARINA (MAnaging RIsks of NAnomaterials). Research about the toxicity of nanoparticles is also carried out in the framework of a Marie Curie Initial Training Network (ITN): ECO (Environmental ChemOinformatics). And it works also on this issue with a national project.

There exists a continuous participation in a variety of courses (Master in Sciences and courses in Ministries and different agencies) devoted to the toxicity of nanoparticles.

Other information

-

INL – INTERNATIONAL
Iberian Nanotechnology Laboratory

University | Technology Center | **Research center** | SME | Big Industry

Capacities

characterization	nanocomposites	**nanosensors**	**synthesis/func.**	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

INL is the first International Intergovernmental Organisation (IGO) in Europe focused on Nanosciences and Nanotechnology and it counts on Spain and Portugal as member states. The laboratory has been projected for a research community of about 400 people at full operation, including around 200 postdoctoral scientists exclusively dedicated to address the major challenges of Nanosciences and Nanotechnologies. The INL scientific program includes four main research areas:

- **Nanomedicine**: Drug Delivery systems, molecular diagnosis systems and chips, cell therapies, imaging solutions, regenerative materials, biomolecular labels, synaptic process monitoring, tissue engineering, etc.
- **Environmental and food control**: Nanotechnology applied to Food industry, food safety and environmental control. Water and Soil control, air pollution monitoring, artificial nanopore sensors, lab-on-a-chip technologies, Smart Packaging and labels, food control process, biosensing technologies.
- **Nanoelectronics**: NEMS/MEMS, Spintronics, Photonics, Nanofluidics, Molecular electronics, Organic electronics, Nanotechnologies to support the previous research areas.
- **Nanomanipulation**: Single molecule/atom manipulation, molecular motors, nanotwezzers, Sellf assemby controlled processes of building blocks for nanodevices.

Main capacities in nanotechnology / nanoscience

INL is equipped with a clean room for micro and nanofabrication (class 100 and 1000) with an area of approximately 600 m2. Cleanroom equipment (mostly single-wafer tools accepting up to 200mm diameter wafers) gives INL the top-down micro- and nanofabrication capability to make devices down to 10nm features. Instrumentation includes electron beam and laser lithography tools, photo and e-beam resist tracks, wet benches and ovens, mask aligners, deposition systems (multi target PVD and CVD tools) etching tools (metal etch, oxide etch, deep-Si etch), and clean room characterization equipment for electrical and surface profile measurements.

INL also offers significant capabilities on nanoparticle synthesis and functionalization: including the preparation of different nanoparticles sizes, shapes and functionalization approaches. Nanoparticle range

includes Ag, Au, Fe, among others. Depending on size, composition, structure and properties, nanoparticles have demonstrated a diverse range of useful applications from imaging, diagnostic, hyperthermia, separation, drug-delivery to catalysis. The research carried out at INL combines a balanced mix of basic and applied research that involves collaborations with companies that produce nanoparticle and other nanostructures and advanced research in close cooperation with research groups in the area of biophysics, nanomedicine and nanoelectronics.

INL is also equipped with a Central Biology and Biochemistry facility that acts as an interface for groups working on nanoelectronics, biology and chemistry research. This unit includes all the necessary instrumentation for sample preparation, luminescence, absorbance and fluorescence measurements and imaging and other techniquesrelated with Molecular Biology and Microbiology research.

Finally, INL also offers significant characterization capabilities at the Nanoscale level. Instrumentation includes the latest atomic resolution electron microscopy-probe and image corrected TEM/STEMs, dual FIB, UHRSEM, CD SEM, surface and interface analysis-XPS, scanning probe microscopy and X Ray). Characterization services are open to a wide variety of samples.

Main related relevant activities / projects

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Other information

Access rules:

INL has the optimal framework and legal structure for bringing together researchers and engineers from around the world. The technical staff of the INL has been trained with the latest technologies and it offers an experienced team of engineers and technicians from all over the world.

INL has recently installing its state-of-the-art equipment and defined its hosting procedures. Companies and research groups from Universities could take advantages of prompt, reliable and personalized services offered. For more information about policies and hosting rules, please contact INL at office@inl.int

UNIT OF EXPERIMENTAL TOXICOLOGY AND ECOTOXICOLOGY (UTOX)

Plataformes Tecnològiques
Unitat de Toxicologia Experimental i Ecotoxicologia

University | **Research Centre** | Public Centre | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | synthesis/funct | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

The Unit of Experimental Toxicology and Ecotoxicology (UTOX) is positioned as the Platform of Toxicology from the Barcelona Science Park (PCB) and as a Centre of Research, Innovation and Services in toxicology with more than 10 years of experience, serving both the public and the private sector while conducting their own research projects or in collaboration with other research groups. Simultaneously, UTOX is part of GRET (Group consolidated for Research in Toxicology) and CERETOX (Toxicology research center, TECNIO agent) together with the Toxicology Unit, Faculty of Pharmacy of Barcelona University (UB).

Main capacities in nanotechnology / nanoscience

Our laboratory is able to perform different types of assays to evaluate the risk associated to nanomaterials according to the required quality (GLP). We propose, as more suited for nanomaterials, the following:

- Toxicology
  - Systemic toxicity: (all routes of administration)
    - *In vivo*: acute exposure and repeated dose
    - *In vitro*: cytotoxicity test (MTT) in different cell lines (A-549, HepG2, HaCat…)
  - Genotoxicity: Micronucleus test (MNT), Mouse Lymphoma, cromosomic aberrations, Comet Assay and Ames test.
  - Carcinogenicity: Cell Transformation Assay (CTA)
  - Reprotoxicity: WEC, Micromass, Embryonic Stem-cell Test (EST)
  - Local effects and sensitization (including phototoxicity)
- Ecotoxicology
  - Seed germination and growing test
  - *Eisenia foetida* lethality test
  - *Daphnia* immobilization test
  - Embriotoxicity test in zebrafish embryos (Fish Embryo Teratogenicity assay, FET)

- Uptake and biodistribution
    - *In vivo* and *in vitro*.

The techniques used will vary depending on the kind of material to be studied.

Main related relevant activities / projects

We started studying nanotoxicology in 2008, in the frame of the project **"NANOSOST:** *Towards a sustainable, responsible and safe nanotechnology***"**. The project was led by IQS (Institut Químic de Sarrià) within the framework of Specific Projects and Strategic (Proyectos Singulares y Estratégicos) and Miquel Borràs was the coordinator of the SP3-Risk for health subproject, where we used *in vivo* and *in vitro* techniques to assess the effect of different nanoparticles over people and the environment.

Nowadays, we are taking part in **NANOBIOMED**, a CONNECT-EU Project of Generalitat de Catalunya (Catalan Government) (Talència/ACC1Ó) (2011) with the objective to study and systematize the possibilities and needs of companies and research centers in Catalonia that work in the field of nanomedicine; and bring them to the relevant organisms of the EU, in order to get the catalan point of view reflected in the future calls of VII and VIII FP of european Research.

Recently, we have been accepted in the project COPONAMRI (*COordination POlymer NAnoparticles: an evaluation of their toxicity and efficiency as MRI contrasts agents & biomarkers*). It is an ERA.NET RUS project coordinated by Institut Charles Gerhardt (ICG), France with the aim of evaluating the toxicity and efficiency of polymer nanoparticles as MRI contrasts agents & biomarkers.

Other information

Our experience can be proven by our publications in the field:

- Toxicology review in metal nanoparticles: approximation in gold and cobalt ferrite nanoparticles. Constança Porredon, Joaquín de Lapuente, Jesús Pablo García, Judith Sendra, Argelia Castaño, Ainhoa Egizabal, Marc Ramis, Javier Margareto, Miquel Borràs; Advanced Science Letters, 5: 1-16, 2012.
- Claudia Di Guglielmo, Joaquín De Lapuente, Constança Porredon, David Ramos-López, Judith Sendra, and Miquel Borràs (2012) In Vitro Safety Toxicology Data for Evaluation of Gold Nanoparticles–Chronic Cytotoxicity, Genotoxicity and Uptake. J. Nanosci. Nanotechnol. 12, 1-6
- Embryotoxicity of cobalt ferrite and gold nanoparticles: A first in vitro approach. Claudia Di Guglielmo, David Ramos López, Joaquín De Lapuente, Joan Maria Llobet Mallafré, and Miquel Borràs Suárez, Reproductive Toxicology, 30(2):271-276, 2010
- Absorption, biodistribution and acute toxicity of cobalt ferrite NP, gold NP hyaluronic acid-coated gold nanoparticles in rats. C. Porredon, D. Ramos, J. De Lapuente, L. Camps, M. Borràs. Toxicology Letters 196S:S280 (2010)
- Behavior of gold nanoparticles coated with hyaluronan: citotoxicity, cell internalization and rat biodistribution. M. Borras, J. Sendra, C. Di Guglielmo, H. Parkkola, M.Ramis J. De Lapuente, C. Porredon. Toxicology Letters 196S:S282 (2010)
- In vitro cytotoxicity and cellular uptake of gold nanoparticles. J. De Lapuente, D. Ramos, C. Porredon, C. Di Guglielmo, M. Borràs. Toxicology Letters 196S:S284 (2010).
- Gemini imidazolium amphiphiles for the synthesis, stabilization and drug delivery from gold nanoparticles. Perez-Garcia, Lluisa; Amabilino, David; Casal-Dujat, et al., Langmuir, 28(5):2368-81, 2012.

2.2.1 Technology Centers

AIJU

AIJU CENTRO TECNOLÓGICO

University | **Technology Center** | Other | SME | Big Industry

Capacities

characterization | **nanocomposites** | nanosensores | síntesis/func. | nanofotónica
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

AIJU research centre is a private, non-profit making organisation founded in 1985 and located in an industrial area in Spain (Ibi, Alicante). Its aim is the research, development and technological innovation within children's products and leisure industries, thus making it possible the achievement of a constant competitiveness increase in the sector. During 2011 the number of associated companies surpassed 560, most of them SMEs.

AIJU constantly adapts and evolves along with its industries to provide them with timely and proper solutions. Therefore, AIJU does carry out a key role for the benefit of the regional industry since most companies are SMEs with limited possibilities to undertake the actions to achieve competitiveness and innovation by themselves.

The organization comprises disciplines such as materials and processes, additive manufacturing and prototyping, logistics, environment, pedagogy/product, energy, social technology, innovation, management and toy safety regulations. In fact, AIJU was the first body recognized by the Spanish Government to carry out tests and laboratory reports according to the European Directive on safety of toys.

AIJU supports its associates through specific departments with high expertise: Technologies and Testing Department, Product Development and TIC, Innovation & Sustainability and Child consumer & Leisure achieving a remarkable level of confidence and cooperation with our associates. It also has other transversal support units as the training unit, which works closely with industry so as to be aware of their needs and be able to offer tailored courses and continuous and occupational training to professionals, unemployed and students as suitable as possible according to industry requirements. Both training in attendance and distance/e-learning are offered to introduce new technology and procedures in the industry and ensure the acquisition of knowledge coming from the latest R&D activities.

AIJU has experience in the development of plastic formulations containing carbon nanofibers and in transferring its knowledge to SMEs.

Main capacities in nanotechnology / nanoscience

- Introduction of nanoparticles in polymeric matrixes to develop new materials.
- Characterization of nanocompounds by means of different technologies

Main related relevant activities / projects

- Improvement of the electromagnetic behaviour of electrical toys by developing new electrically conductive plastic formulations. Ref: IMIDIC/2010/40 & IMDEEA/2011/73
- Introduction of carbon nanofibers in polymers to obtain electrically conductive materials for different sectors – NANOCARB. Ref. IMDECA/2011/4 & IMDECA/2012/8
- InNANO, Innovation with nanotechnology for SMEs. SUP-040100-2010-0039

Other information

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NAVARRE INDUSTRY ASSOCIATION

University | **Technology Center** | Other | SME | Big Industry

Capacities

characterization | nanocomposites | nanosensors | **synthesis/funct** | nanophotonics
nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

Technological Center working on:

- Materials Technology: Surface Engineering & Nanostructured Materials
- Condition Monitoring, Artificial Vision, Robotics.
- Sustainable building, security, energy and environment.

Main capacities in nanotechnology / nanoscience

- Ion Bombarding Surface treatments (Ion Implantation: directional & plasma immersion).
- Physical Vapor Deposition Coatings (PVD): Electric Arc & Magnetron.
- Plasma Treatments: Activation, Plasma Polymerization, CVD Plasma.
- Polymer / MWCNT compounding.
- Synthesis & functionalization of nanoparticles.
- Analysis & Characterization Facilities: Electron Microscope (FE-SEM) , AFM, GD-OES Analysis, XRD, Nanoindentation, Nanotribology

Main related relevant activities / projects

NMP-IP-SME- 026279 NEWBONE**:** *Development of load-bearing fibre reinforced composite based non-metallic biomimetic implants.*

FP7-CP-TP-214459-SME: DEPHOTEX: *Development of Photovoltaic Textiles based on novel Fibres.*

CSD2008-00023 CONSOLIDER – FUNCOAT: *Funcionalización superficial de materiales para aplicaciones de alto valor añadido* (FUNCOAT).

MAT2011-29698-C03-02**:** *Estrategias de funcionalización superficial de aleaciones cocrmo para la mejora del rendimiento de protesis articulares metal-sobre-metal* (MoM4LIFE)

Other information

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AITIIP TECHNOLOGY CENTER

University	**Technology Center**	Other	SME	Big Industry

Capacities

Characterization	**nanocomposites**	nanosensors	Synthesis/funct	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

The main objective of Aitiip Technological Centre is to promote the business development, cultural and technological within industry. Aitiip offers technological services to companies related with the plastic transformation and other strategic sectors. We promote activities that contribute to the development of a new business culture and enhancing competitiveness of enterprises.

Main capacities in nanotechnology / nanoscience

Aitiip Technological Centre has extensive experience and capabilities in the processing of nanomaterials and their integration in plastics to obtain composite materials with advanced functionalities.

The main R&D lines within Aitiip where nanomaterials are relevant are summarized below:

- Composite materials, (based on carbon nanotubes, graphene, metallic nanoparticles, nanoclays among others) are developed with application in different technological sectors such as, transport, aeronautics, renewable energies, civil infrastructures, etc…)
- Manufacturing processes. Aitiip has extensive experience in several manufacturing processes based on different nanomaterials. The most relevant are:
  - Automatization processes
  - Thermoset resins processing (RTM, infusión, oven molds, etc…)
  - Thermoplastic processing (injection, extrusion, compounding, blow extrusion, etc…)
  - Additive manufacturing
- Plastic packaging. Aitiip has also capabilities in the development of nanoadditivaded plastic packaging. These materials present not only enhanced properties but also multifunctionalities with a great impact on the market. All packaging materials have applications in different technological sectors. Aitiip is responsible of concept design to the industrial implementation of the nanoadditivated packaging.

Main related relevant activities / projects

- DIBBIO PACK. Development of injection and blow extrusion molded biodegradable and multifunctional packages by nanotechnology: improvement of structural and barrier properties, smart features and sustainability. CP-IP FP7-NMP-2011-LARGE-5 - 280676-2.
- NEMIA-PACK Desarrollo de Nuevos Envases con Menor Impacto Ambiental y Propiedades

barrera mejoradas para alargar la vida útil de los productos envasados, los materiales y sus procedimientos de fabricación. Subprograma INNPACTO 2011, National Project, 2008-2011.

- *Desarrollo de un nuevo envase multifuncional para la conservación de productos de la pesca*. Subprograma INNPACTO 2011, National Project, 2008-2011.
- TANOCOMP. *Training on the nANOtechnology aspects of plastic COMPosites with enhanced properties for use in high-strength applications*. LIFELONG LEARNING PROGRAMME. LEONARDO DA VINCI 2010.
- INNANO. Mejora tecnológica de 35 Pymes en base a la implantación de nanotecnología. Financiado por el Ministerio de Industria, Turismo y comercio. Programa Innoempresa Suprarregional.
- NANOTRIM. *Investigación aplicada a la creación de nanocompuestos de poliolefinas y poliamidas reforzados con nanotubos cerámicos para su aplicación en componentes del interior del automóvil.* Programa de "apoyo a la I+D+i" convocatoria ARAID 2010. Regionla project.
- NANOPLAST. *Creación de blends nanocompuestos en base a poliolefinas y poliamidas mejoradas con nanotubos de hallowsite (HNTs) y de carbono (CNTs*). Subprograma de Centros Tecnológicos del Programa Nacional de Proyectos de Desarrollo Experimental. Proyecto Financiado por el Ministerio de Ciencia e Innovación. Plan Nacional I+D+I 2008-2011. Anualidad 2009-2010
- ULTREX: *Investigación de un nuevo sistema de transformación de termoplásticos, asistido por ultrasonidos, de aplicación a procesos de alta productividad por extrusión*. National Project. Proyecto Financiado por el Ministerio de Ciencia e Innovación. Plan Nacional I+D+I 2008-2011. Anualidad 2009-2010.

Other information

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ANDALTEC I+D+I FOUNDATION
PLASTIC TECHNOLOGY CENTER

University	**Technology Center**	Other	SME	Big Industry

Capacities

characterization	**nanocomposites**	nanosensors	**synthesis/funct.**	**engineering**
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	**knowledge mng.**

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Organization profile

ANDALTEC is a research foundation created in 2003 and recognized as National Plastic Technological Centre in Andalusia (Spain). Its main objectives focus on improving the competitiveness of companies mainly of plastic sector and strengthening the economy through research, technological development and innovation. It is made up of a professional staff of over 70 employees from diverse technical specialization, most of them with wide experience gained within the automobile and plastic industry. Current areas of activity include:

- Development of new products and processes (by means of designing; thermal, mechanical and process simulations; prototyping and small scale test bath production).
- New materials (i.e. nano- and bio- composites, biopolymers, light-weight and cost-effective materials).
- New packaging (active and intelligent packaging).
- Productivity improvement, techniques in processes and optimisation of resources.
- Lighting Systems (development of new lighting systems, novel optical systems, innovative automotive lighting technologies, LED technology).
- Environment (new applications for biodegradable plastics, life cycle assessment, reuse of plastic waste, and the use of residues from any other industry as plastic additives).

Our infrastructures include different laboratories (physical-chemical, metrological, small production assays and prototyping) and a wide range of specific design and simulation software to develop products and processes. ANDALTEC is extending its facilities by building a Lab of light testing and experimentation (tunnel lighting system), a Simulation Lab of vehicle-pedestrian impact, prototype manufacturing and surface appearance workshops and Pilot Plant.

Main capacities in nanotechnology / nanoscience

ANDALTEC has in-depth know-how in research and development of innovative materials improving its characteristics and properties, advance in new applications, determination of technical specifications and validation of new plastic materials. Related to materials, research and development of new nanocomposites is carried out with a view to improve the characteristics and properties of conventional

plastics through dispersion of additional materials (such as vegetable fibre or nanoclays) in the polymer matrix. In addition, testing and analysis are conducted in the Physic and Chemistry Laboratory in order to determine technical specifications and validate new plastic materials.

Main related relevant activities / projects

ANDALTEC collaborates with the majority of companies in the plastic sector in Andalusia, several universities and international companies with whom key R&D projects have been carried out. Between our noteworthy R&D projects :

- TELURIS: Optimization of plastic materials through addition of nanoclays to polymer- matrix in order to improve physicochemical properties.
- ECOPLAST. Minimization of plastic waste. Substitution of metals by bioplastics.
- INJECTION PROCESSES. Injection process simulations prior to mould manufacturing. Advice on faults with mould design and making of proposals for manufacturing improvements.
- OPTIMIZA: Improvement of quality and productivity in the manufacturing of assembled plastic parts. New working methodologies according to the model EFQM.
- MANUFACTURING-PRODUCTIVITY. New techniques oriented to the improvement of productivity in plastic pieces, based in a record of production incidents.
- JOINTS SIMULATION. Study and definition of the conditions and interactions between assembled hybrid (plastic-metal) parts under vibration energy.
- PS ISA: Development of technologies associated with the lighting with LEDs for car headlight.
- FUSISENS. Plastic screening equipment based on sensorial fusion technologies to automate plastic recycling (IR, Vis, and others).
- SUSFOFLEX: Advanced and flexible technologies for active, intelligent and sustainable food packaging. (FP7-KBBE 2011-5)
- PMJOIN: Development of a Direct Laser Joining of hybrid Plastic-Metal components for industrial applications. (FP7-NMP.2012.2.1.1)

Other information

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ASCAMM

University	**Technology Center**	Other	SME	Big Industry

Capacities

characterization	**nanocomposites**	nanosensors	Synthesis/funct	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	**nanoencapsulates**

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Organization profile

The nanotechnology unit (U-NANO) from ASCAMM, in collaboration with the NANOSFUN research group (leadered by Dr. Daniel Ruiz-Molina) of the Centro de Investigación en Nanociencia y Nanotecnología (ICN), works in the research, development and scaling of nanotechnological new materials with the aim of satisfying concrete needs of companies in numerous sectors.

The unit's objective is the industrialisation and scaling of innovating solutions based on nanomaterials and nanostructures aiming interest towards the development of new products with advanced properties and high-added value production processes of nanotechnological origins. The goal is to respond to the demands and needs of an ever-increasingly competitive and demanding market that requires products with increased functionality and optimised processes.

The unit possesses significant experience in this area and is currently collaborating with various national and international companies on the improvement of their activities, participating in numerous local, national and European projects.

Main capacities in nanotechnology / nanoscience

During the active participation to local, national and European projects, the Unit developed different investigation areas. The main activities carried out in U-NANO can be summarized as follows:

- Development of hydro- and oleo-/ hydrophobic materials.
- Micro- and nanoencapsulation of active materials.
- Integration on the nano scale of thermochromic and photochromic materials.
- Formulation of nanomaterials with new electric and/or mechanical properties.

Moreover the Unit also provides a full series of company-orientated services:

- Chemical classification and morphology of surfaces and nanostructured materials,
- Micro and nanoencapsulation of additives and aromas,
- Incorporation of hydrophobic properties to various surfaces and end products,
- Manufacture of high-added value products with thermal and photochromic properties,

- Personalised services and assessment in projects and financing

Main related relevant activities / projects

N-AUTO: during this project (NUCLIS) preliminary experiments have been carried out evaluate the nanoadditives addition to plastic materials that find application on the automotive area. Therefore it has been studied the dispersability of different types of nanoparticles within polymeric materials by using different strategies: extrusion, ultrasounds, etc. The project was carried out with Spanish partners.

RECAT: during this project (VALOR) have been synthesised and patented catechols-based polymeric materials that give oleo/hydrophobic or only hydrophobic properties to the surfaces treated with these materials. The product, dispersed in an organic solvent, can be applied to surfaces of different nature, simply by immersion or spraying. Once dried (2-5 min) the treated surfaces (wood, textile, metals, plastics, composites, papers, etc.) enhanced hydrophobic or oleo/hydrophobic properties are obtained (verified by an increase of the contact angle of the treated surfaces respect to those not treated).

ENERGOS: this is a CENIT national project, in which the U-NANO is participating with a work-package which consists of the use of the nanotechnology to achieve a direct detection system for electrical failures in the high tension electric cables that determine the cables heating. The solution is being developed is based on the use of microstructured thermochromic materials that change their colour when temperature rises indicating the worming up of the failing cable. Some of the partners of this project are Gas Natural Fenosa, Visual Tools, Indra, AIA, etc.

SUPERBLEND: this project (CleanSky) carried out in collaboration with the COMPOSITES Unit of ASCAMM consisted of the development of materials with mechanical properties similar to PEEK, but presenting lower costs and a lower processing temperature than PEEK (370ºC). The Unit NANO attempted solutions involving nanotechnology by adding nanometric scale additives such as CNTs o inorganic nanoparticles.

NANODIM: with this national project (INNPACTO) it was started the development of a coating with photochromic properties for optical surfaces. The coating is based on polymeric material and contains nanostructured photochromic molecules and becomes darker or clearer depending on the amount of light reaching the coating. This project was carried out with Spanish partners.

Other information

The Unit has two recent laboratories. One of these is located in the UAB campus. In this lab proof-of-concept experiments are carried out to generate and characterise new materials based on nanotechnology. The other lab is located in ASCAMM. In this laboratory scaled-up synthesis are carried out to reproduce pilot plants for the synthesis of micro and nanomaterials of different types

CIDETEC FOUNDATION

IK4 CIDETEC Research Alliance

University | **Technology Center** | Other | SME | Big Industry

Capacities

characterization | **nanocomposites** | nanosensors | **synthesis/funct** | **nanophotonics**
nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

The Centre for Electrochemical Technologies, CIDETEC, was created in 1997 as a non-profit Foundation with the mission of serving the industry to enhance its competitiveness through the implementation of innovative procedures and products. CIDETEC had an annual turnover of 9.5 M€ in 2011 and at the present time employs a highly qualified staff of 122 people (including 38 PhD) capable of conducting specialised research, development and innovation, technical assessment, technological diffusion, information sourcing and training.

CIDETEC addresses electrochemical technology mainly from an applied research point of view. Its experience and "know-how" cover three main areas of activity: Energy (Batteries, Fuel Cells and other electrochemical storage systems), Surface Finishing (Coatings and Processes) and New Materials (Nanotechnologies, Biomaterials, Sensors and Photonics).

CIDETEC's facilities are housed in approximately 5000 m^2 of laboratory space, including a dry room designed for battery-testing experiments (the only one in Spain) and available to all departments. The laboratories are designed to accommodate project-specific work patterns and scientific equipment and are equipped with state-of-the-art instrumentation that permits the synthesis and comprehensive chemical, mechanical, optical and electrochemical characterization

Main capacities in nanotechnology / nanoscience

- Synthesis and functionalization of nanoparticles, nanorods and nanowires (metallic, polymeric, oxides, sulphides, semiconductors).
- Arrays of 1-D nanostructures (e.g. nanowires and nanotubes) of multifunctional metal oxides and conductive polymers (e.g. PEDOT).
- New electrochemical routes for the production of graphene.
- Synthesis of magnetic fluids (ferrofluids).
- Synthesis and characterization of (electro)catalysts for the energy (fuel cells, batteries, hydrogen production, water oxidation and electrosynthesis processes).
- Metallic, ceramic and polymeric nanocomposites with tailored properties (anti-scratching, self-cleaning, self-healing, anti-fouling, super-hydrophobic, with high mechanical and tribological properties,

photocatalytic, etc.).

- Synthesis and characterization of sol-gel films (antireflective, protective, antifouling…)
- Synthesis of nanocristaline metallic coatings of high corrosion resistance and advanced tribological properties.
- Design and synthesis of nanoporous surfaces (e.g. porous alumina templates).
- Fabrication and characterization of nanostructured solar cells: thin absorber, Grätzel and hybrid metal oxide/polymer solar cells

Main related relevant activities / projects

EU projects:

- ADDNANO: The development and scale-up of innovative nanotechnology-based processes into the value chain of the lubricants market
- POCO: Carbon nanotube confinement strategies to develop novel polymer matrix composites
- LENS: Lithography Enhancement towards Nanoscale
- ORION: Ordered Inorganic-Organic Hybrids using Ionic Liquids for Emerging Applications
- MULTIPOL: Multifunctional Polymer Materials and Systems with Tailored Mechanical, Electrical and Optical Properties
- SAVEME: A Modular Active Nano-Platform for Advanced Cancer Management
- PARYLENS: parylene based artificial smart lenses fabricated using a novel solid-on-liquid deposition process
- ECLIPSE: Renewable Eco-Friendly Poly(lactic acid) nanocomposites from waste sources
- SUSFOFLEX: smart and sustainable food packaging utilizing flexible printed intelligence and materials technologies
- SUSHGEN: Sustainable Hydrogen Generation
- ARTEMIS: Automotive PEMFC Range Extender with High Temperature Improved Meas and Stacks
- E^3CAR: Nanoelectronics for an Energy Efficient Electrical Car
- AMBIO: Advanced nanostructured surfaces for the control of biofouling.
- KMM: Knowledge-based Multicomponent Materials for Durable and Safe Performance
- ACTIVATION: Superhigh energy milling in the production of hard alloys, ceramic and composite materials

Other information

Fully equipped facilities for the synthesis of nanomaterials and nanosurfaces: potentiostats and multipotentiostats, current sources, electrochemical cells, dip-coater, spin coater, thermal evaporation, screen-printing, Doctor Blade, aerographic techniques, plasma processing and four laser instruments (CO2, UV, IR and green). Fully equipped laboratories for the characterizations: microscopic and spectroscopic techniques (AFM, FE-SEM), chemical analysis techniques (XRF, UV/VIS, FTIR,…), facilities for the analysis of protective, mechanical and tribological properties (ball-on-disc, scratch tester..

CENTRE FOR NANOBIOSAFETY AND SUSTAINABILITY

University | **Technology Centre** | Public Centre | SME | Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

The Centre for NanoBioSafety and Sustainability (CNBSS) was established in 2009 as a joint initiative of the Catalan Institute of Nanotechnology (ICN) and LEITAT Technological Centre, two well-known institutions in Nanoscience and Nanotechnology, both located in Catalonia, Spain. The Centre was created in response to the emerging needs to rationalise and assess the risks of new nanotechnologies. Centre goals are:

- To develop new tools and methods to determine the safe and rational use of nanomaterials in products throughout their complete life-cycle. The quantification of risk and environmental impact will facilitate market acceptance of innocuous nanoproducts and therefore, accelerate their acceptance by society (and consequently, facilitate returns on capital investment).

- To develop new, safe and sustainable applications of Nanoscience and Nanotechnology in a broad spectrum of fields, including Environmental Remediation, Drug Delivery, Energy, Semiconductors, Construction and Food. This goal also includes development of Metrology, as a fundamental tool needed to facilitate efficient standardisation and regulation, and the establishment of new standards.

- To promote the use of Nanotechnology-based solutions in strategic sectors, via activities such as training, education, and dissemination, and by making Nanotechnology more available to society and industry.

The CNBSS aims to develop a permanent observatory. The Centre endeavours to support scientific research and to harness it to create safe and sustainable applications of Nanomaterials and Nanotechnology. It is committed to interlinking science, applications, regulation, dissemination and social responsibility, which it believes can only be accomplished by contributing directly to the generation of scientific knowledge and technology.

Main capacities in nanotechnology / nanoscience

Based on LEITAT's industrial technical knowledge and ICN's scientific expertise, the CNBSS is currently pursuing diverse initiatives:

- A broad range of technical services and products with direct impact on industry, commerce and society, including Scientific and Technical Services (Sample Characterisation and Analysis, Provision of High-Quality Nanoparticles, etc.), Scientific & Technical Training and Workshops, and Technical Consulting Services. Beyond service provision, the CNBSS is helping industrial and

academic partners choose the most adequate analyses, products or R&D strategies for their development of safe and sustainable Nanotechnology products for use in society.

- An observatory on Good Practices and Regulation, through a robust open-access system comprising a complete repository dedicated to Nanosafety and Sustainability, featuring an optimised interface. The Observatory will include a comprehensive collection of published information on the effects of exposure to nanoparticles and nanostructured materials on human health and the environment. The repository will centre on three axes: Regulation, Good Laboratory Practice, and Knowledge Dissemination.
- A platform of resources for experts involved in the field. By writing, and responding to, editorial articles, members of and contributors to the CNBSS can provide their expert opinion, focus on specific issues, engage in debates or simply share ideas. For example, the CNBSS has organised various workshops and events to promote the safe and sustainable lab-to market development of Nanotechnology (NanoSustainability Workshop, Re-Thinking Nano Workshop, etc.).
- A platform for dissemination and education that reaches a general audience. The CNBSS is committed to disseminating and promoting the safe and sustainable application of Nanoscience and Nanotechnology among the general public, especially amongst young people. For example, the Centre recently collaborated with Fundació La Caixa at CosmoCaixa, Barcelona's largest science museum, to help them develop a new exhibition (currently open) on the power and beauty of nanoparticles. Furthermore, to facilitate advances in the multidisciplinary field of Nanotoxicology, the CNBSS has also developed a free-online nanoparticle concentration convertor (www.cnbss.eu/nanoparticlesconvertor).

Main related relevant activities / projects

In 2010, the Centre was granted its initial funding by the local and national governments (Generalitat de Catalunya and the then Spanish Ministry of Science and Innovation, respectively).

The CNBSS is currently researching safe and sustainable applications of nanomaterials and Nanotechnology. For example, it is studying the integration of nano-objects in polymers and the safety of the resulting materials; the development of sustainable (more efficient) materials; health and safety issues for labourers that work with nanomaterials; and the development of nanomaterials in the field of Energy.

Despite its young age, the CNBSS boasts a scientific background based on numerous national and European projects on Nanotechnology—above all, in the field of Nanosafety, inlcuding QNano (FP7-INFRASTRUCTURES), NanoTOES (FP7-MARIE CURIE ITN), NanoPolytox (FP7-NMP), CONSOLIDER – NANOBIOMED (Spanish Government) and DIPNA (FP6-NMP-STRP).

Other information

Sample characterisation and analysis: The CNBSS offers its expertise in several characterisation techniques (AFM, TEM, SEM, EDX, EELS, XRD, SAED, UV-VIS, XPS, ICPMS, DLS, zeta-potential, gel electrophoresis, Western blot, fluorimetry, and chromatography) to industry partners and to the general public. We characterise diverse sample types (water, food, medical, etc.) and provide in-depth analyses of the results.

Supply of high-quality nanoparticles: A section of the CNBSS staff, has an established track record as a supplier of high-quality, optimally designed nanoparticles (see, for example: *Science* 2011 (334), 1377-1380), for academic research, R&D applications, and industrial and commercial enterprises. Also, depending on the nature of the destination project, the CNBSS can provide these samples at minimum cost.

CTAG – GALICIAN AUTOMOTIVE TECHNOLOGY CENTER

University	**Technology Centre**	Public Centre	SME	Large Company

Capacities

characterization	nanocomposites	**nanosensors**	synthesis/funct	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	nanosimulation	**knowledge mng.**

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Organization profile

CTAG is a technology centre providing R&D and innovation services to the Automotive sector. CTAG develops solutions for improving the competitiveness of enterprises thanks to the accumulated experience in different fields of knowledge and technology. The convergence of different areas of expertise allows CTAG to address comprehensive projects from applied research to product and process validation.

CTAG is mainly specialized in new materials, process engineering, electronics, active and passive safety, powertrain, validation tests, emission reduction and NVH. CTAG carries out several research projects in theses fields in conjunction with the Industry, Universities and other Technology Centres.

With a team of more than 300 engineers and technicians, CTAG is an ideal partner for developing new innovative products using CAD product design and CAE simulations tools. On validations side, CTAG is equipped with climatic, vibration & acoustics, fatigue, materials, engine, electronics and ergonomics laboratories fitted with the ultimate testing facilities such as triaxial shakers integrated in acoustic and climatic chambers, a dynamic drive simulator.

CTAG is currently expanding and planning the opening of a new Electronics and HMI Innovation Centre for Intelligent Vehicles at the end of 2012.

Main capacities in nanotechnology / nanoscience

- Design and development of products with high value-added: EMI shielding, antistatic, bactericide, etc.
- Design and development of products based on polymers or textiles with integrated sensor function, active to external stimuli (impact, pressure or contact).
- Non-destructive analysis of structural damage in composites, development of the corresponding test procedures and the results analysis programme.
- Specifications definition, validation tests and methodology development for tests on products based on nanomaterials.
- Knowledge transfer to enterprises to implement in the market projects for the development of product/processes based on new materials.

Main related relevant activities / projects

- Coordination of the **CarbonInspired** network for nanomaterials knowledge transfer (www.carboninspired.com). This network bases its work in a virtual platform with integrated online tools such as: a daily updated technological observer, a data base for new ideas and projects, a debate community in LinkedIn, a quarterly newsletter, seminars and workshops, news, development of three nanotechnology demonstrators, etc.
- Member of the **Nanocit Alliance** (www.nanocit.es) where CTAG became responsible for automotive case studio. CTAG built a prototype demonstrator of a pedal break with integrated senor response for the detection of emergency breaks.
- Coordinator of **Nanocontroller** project for the research and development of a new integrated impact sensor for non destructive analysis of structural damage, thanks to the development of the material, the testing methodology and the results analysis programme.
- Partner of **Nanocav** project for the research and development of an advanced catalytic system based on platinum nanoparticles, to increment the efficiency on the reduction of the exhaust emissions, to lighten the system and to decrease costs.

Other information

Please, visit our website for further information: www.ctag.com

COMPONENTS TECHNOLOGY CENTER FOUNDATION (CTC)

University | **Technology Centre** | Public Centre | SME | Large Company

Capacities

characterization	**nanocomposites**	nanosensors	**synthesis/funct**	nanophotonics
nanobiotechnology	**nanoadditives**	nanometrology	**nanosimulation**	nanoencapsulates

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Organization profile

The Technological Centre of Components (CTC) was created in 2000 as a private nonprofit foundation to serve the society and industry fabric.

Its main objective is to contribute toward economic and social development by helping companies assess the technological feasibility of their ideas, as well as technically run their projects in research, development and innovation, as part of the science-technology-industry system.

The CTC has an operating model based on business units with a clear customer focus, and adds value to each project developed. This is due to the expertise, training and efficient management of its human team, consisting of 30 people, among them college and higher degree graduates and doctorates.

Projects taking place at the CTC have as part of their objectives to minimize the impact on the environment and maintain a proper environmental performance. This is done through sustainable management of their resources, implementing responsible environmental policies for their subcontractors and evaluating the environmental impact of their projects.

Our work focuses on the following sectors: aerospace, nuclear power, renewable energy, automotive, and a technological line of advanced materials

Main capacities in nanotechnology / nanoscience

- Development of polymer nanocomposite.
- Dispersion of nanomaterial within matrices (organic and inorganic). Types of matrices: water, organic solvents, polymeric resins, cement,…). Key technologies: Three roll milling, sonication, homogenizer, mechanical stirring.
- Nanomaterial functionalization (surface treatment). Key technologies: chemical methods
- Nanomaterials characterisation (size and morphology), thermal, electrical, magnetic and mechanical properties properties. Key technologies: Atomic Force Microscopy (AFM).

- Microencapsulation of nanomaterial. Key technologies: spray drying.
- Synthesis and characterisation of graphene. Key technologies: chemical methods.

Main related relevant activities / projects

- Development of low cost polymer nanocomposite consists of: matrix: polyester resin, nanoreinforcement: carbon nanostructures and reinforcement: glass fiber. NANOCIT Alliance.
- Development of cement with improvement mechanical properties using nanomaterials.
- Development of nanocoating with anti-corrosion properties by flame spray (ANTIOXIGUN project).
- Synthesis of graphene and graphene oxide from different graphites.
- Development of metallic materials with phase change materials incorporated (PCMat project).

Other information

Publications

- Carmen Manteca, Angel Yedra, Iñaki Gorrochategui, Roberto Miguel. "*Mechanical study of sandwich panels manufactured by pultrusion*". XXVI ENCUENTRO DEL GRUPO ESPAÑOL DE FRACTURA (2009)
- Gorrochategui, C. Manteca, A. Yedra, R. Miguel and F. J. del Valle. *"Composite material pedestrian bridge for the Port of Bilbao"*. IOP Conference Series: Materials Science and Engineering (MSE). (2012)
- P. Mantilla, A. Yedra, M. Gonzalez and C. Manteca. *"Development of PCM/carbon-based composite materials"*, Solar Energy Materials and Solar Cells. Article in press. (2012)
- A. Yedra. "CTC and the phase change materials: efficient thermal management". Revista Interempresas (2012)

Thesis of Master

- Marina González. *"Syntesis* of graphene and graphene oxide from different graphites*"*. Máster Interuniversitario de Nuevos Materiales (University of Cantabria and Basque Country University). 2012.
- Carmen Manteca. *"Development of low cost polymeric nanocomposite materials with high mechanical performances".* Máster en Ciencia de Materiales (University of Cantabria). 2010.
- Pablo Mantilla, "*Development of PCM/carbon-based composite materials"*. Máster en Ciencia de Materiales (University of Cantabria). 2010.

GAIKER TECHNOLOGY CENTER

University | **Technology Centre** | Public Centre | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | synthesis/funct | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

GAIKER-IK4 Technological Centre, located in the Technological Park of Bizkaia, is devoted to the up-take of own knowledge and to the development of new technologies that are later transferred to customers coming from sectors such as the Pharmaceutical Industry, Chemical Industry, Human and Animal Health, Engineering and Consultancy Firms, Public Administrations, Automotive Industries, Construction, Packing and Packaging, and Home Appliances, amongst others.

From 1985, the Centre has carried out close to 1.500 R+D Projects related to its Knowledge Areas: Biotechnology, Environment and Recycling and Plastics and Composites. Besides its activity in R+D, GAIKER-IK4 offers to its customers Advanced Technological Services, Analysis and Tests and Technological Dissemination Services.

GAIKER-IK4, which at present counts on more than 130 employees, was awarded in 2008 by the European Foundation for Quality Management (EFQM) with the “Prize Winner” for the best European organisation in “Management for Process and Facts”. The quality of its management based on the EFQM model has also meant other recognitions for the Centre which place it as a reference point on this matter. GAIKER-IK4 also has other certifications such as ISO 9001 or ISO 14001, which show its strong commitment with quality and continuous improvement.

Main capacities in nanotechnology / nanoscience

Nanotoxicology expertise

Gaiker has relevant experience in a wide number of in vitro technologies currently recommended to assess nanotoxicity and which have been deeply reviewed by us for their suitability in the area of Nanotoxicology in different FP7 projects, these include assessment of genotoxicity, cytotoxicity, generation of oxidative oxygen species, inflammation and intracellular fate. Our experience covers both human safety and ecotoxicity assessment.

Regarding innovation, Gaiker is currently working on the development of complex in vitro systems which are more relevant to in vivo experimentation and therefore could provide significant nanotoxicity data towards in vitro in vivo toxicity correlations. Likewise we are currently assessing the suitability of in vitro physiological barrier models of the skin, Blood brain barrier, intestinal and airway epithelium for their use in

nanotoxicology. Besides, as an ADME-tox service provider Gaiker is up to date with the rules, regulations and guidelines at the international level regarding current toxicity assays.

Main related relevant activities / projects

GAIKER coordinates the project NANOther (http://www.nanother.eu). Nanother aims to successfully transform polymer nanomaterials into nanocarriers via biofunctionalisation and to select the best ones by rigorously testing toxicity, biocompatibility, efficacy and biodistribution.

Other projects of interest include:

- SkinTreat. Novel approaches for the development of customized skin treatments and services. Work Package Leader NMP-2007-3.1-2.
- Nanoreg. A common European approach to the regulatory testing of nanomaterials. Work Package coLeader NMP-2012.1.3-3.

We take an active role at international platforms such as the Nanomedicine platform and the IVTIP platform (European in vitro platform).

Other information

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ANDALUSIAN INSTITUTE OF TECHNOLOGY

University | **Technology Centre** | Public Centre | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | synthesis/funct | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | **nanosimulation** | **knowledge mng.**

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Organization profile

IAT, the Andalusian Institute of Technology is a Technological Center constituted in 1989 as a private foundation, of non profit character, recognized as being of public interest. We have wide experience in the Technology Development, New Technologies companies assimilation, studying new means to finance R + TD, designing Regional Innovation Systems, promoting R+TD in Europe or marketing the results of technological projects, counting on the support of the Regional Government for most of these activities and services, due to our close relation with governmental and public bodies .

In addition, IAT is the co-ordinator of the ANDALUSIAN INNOVATION NETWORK, a network of 100 Andalusian Enterprises (SMEs), and takes part of the CESEAND (Southern Europe Innovation Relay Center - Andalusia). Because of its regional dimension, IAT is related to Public Regional Authorities, Agencies and Universities.

Furthermore, IAT has high experience in the participation in European projects in the 5th, 6th 7th FP , standing out INTERREG III B (MEDOCC, AA and SUDOE) and INTERREG III C projects.

The R+D work areas for IAT are the following:

- Sustainable management models for the organizations
- Human Resourches Development.
- Models and tools for the improvement and development of products and services.
- Regional systems of innovation. Business competitiveness factors.

Main capacities in nanotechnology / nanoscience

IAT can perform simulation at micro and nanoscale. We perform simulation (preprocessing, calculation and postprocessing) at nanoscale of the following particles and their dynamics and model types: atoms; coarse-grained particles (e.g. bead-spring polymers); united-atom polymers or organic molecules; all-atom polymers, organic molecules, proteins, DNA; metals, granular materials; coarse-grained meso-scale models; extended spherical and ellipsoidal particles; point dipolar particles; rigid collections of particles; hybrid

combinations thereof.

The software IAT uses allows handling large scale models, thanks to parallel computing on supercomputers.

Main related relevant activities / projects

- Project INSOPRO: Products&Processes Sustainability Research, co-funded by Junta de Andalucía (Regional Government). Sub-line of research: On the influence of the sustainability of carbon-based materials properties. Budget: 1.076.057,50 €

In execution:

- Project MICROCAPS: Research on the inclusion of nanocapsules with additives on films for fish conservation. Co-funded by Innovation&Science Ministery. Partners: HTMasterbatch, Scanfisk, Tecnopackaging, AITIIP, Universidad de Málaga. Budget: 1.522.214,00€

Other information

The activities of IAT Simulation and Industrial design area are developed as both a service provider for industries and an R&D unit. Some of the specific services and skills in this area are as follows:

- Transient and static analysis, linear and non-linear analysis of stress, fatigue, strains, thermal analysis, with a wide variety of material behaviour laws (such as composite materials) including very large deformations.
- Simulation at nanoscale.
- Simulation of multi-physics coupled problems.
- Fluid simulations: interaction with solids, chemical reactions, heat transfer.
- Design and redesign of components or products by means of CAD/CAE techniques.
- Design and redesign of industrial processes by means of process simulation techniques, either of complete plants or isolated production lines.
- CNC programming, optimisation and validation.

INNOVARCILLA FOUNDATION

University | **Technology Centre** | Public Centre | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | synthesis/funct | nanophotonics
nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

Foundation Innovarcilla is a technology centre located in Bailen, where is placed one of the most important ceramic cluster in Spain, both artistic and structural. The activities of the centre are focused in the development of new ceramic products and provide advanced services in this field.

Currently, the research lines are addressed to improve the insulation features as well as decreasing the environmental impact taking into account the whole cycle life of the new ceramics. In summary, the centre can offer its expertise in different fields as:

- Design of new constructive systems more energy efficient as ceramic ventilated façade.
- Lightweight materials with interesting characteristics for the construction as the ceramic foams.
- Reuse of industrial byproducts to figure out new clay blends to obtain improving ceramic products with better thermal and acoustic insulation.
- Research in new coatings to achieve new ceramic functionalities.

One of the most interesting properties of the ceramic is its flexibility and inert properties, being capable to adapt to the hardest working conditions better than any other material, doing it an ideal component to integrate in complex constructive solutions and in other uses in extreme conditions.

Apply the new developments in nanotechnology is a field still unexplored but with huge expectations due to the inert character aforementioned and its particle size, close to nanometric dimensions. At the beginning and in a short term, it's expected that the nanotechnology will allow removing some of the restrictions of the ceramic and improving its properties.

Main capacities in nanotechnology / nanoscience

Nowadays, the activities carried out by Innovarcilla in the nano field, are very limited, although due to the reasons above, it's developed the bases to can execute the first major projects.

With the means already exist in Innovarcilla, it's possible to carry out the next activities:

- Adjustment of the traditional ceramic materials to undergo nanostructured coatings.
- Potential application of nanostructured coatings by means of dipping and airbrushing techniques.

Characterization material trials, including microstructural analyzes.

Main related relevant activities / projects

As noted above, current expertise of Innovarcilla Foundation in nano topic is not very wide. However, some feasibility studies and preliminary tests have been accomplished:

- Characterization of ceramic samples obtained from the blend of traditional clays and carbon nanotubes.
- Feasibility study and preliminary tests in order to develop advanced photocatalytic coatings over traditional ceramics.

Other information

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TECHNOLOGICAL INSTITUTE OF ARAGON

University	Technology Centre	Public Centre	SME	Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct	nanophotonics
nanobiotechnology	nanoadditives	**nanometrology**	nanosimulation	nanoencapsulates

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Organization profile

The Aragón Technology Centre (ITA, Instituto Tecnológico de Aragón) has a long experience in the design of complex mechatronic systems for the industry and, in the last years, this knowledge has been applied to the development of actuation systems based on smart materials for positioning, tracking and active vibration control in nanotechnology.

As a non-profit technology centre our main objective is to foster the introduction of these new technologies in the industry for strengthening the competitiveness of the firms. ITA collaborates in the applied research and development required for the design of high added value innovative products, from the specifications phase to the integration and analysis of system prototypes.

Main capacities in nanotechnology / nanoscience

The nano-scale technologies are experiencing an important growth in the last years, with an extension of their application range from scientific to industrial systems (automotive industry, construction, energy, just to name a few). In this context, the ITA has arranged an intense activity for the development of demonstrative devices capable of fast and accurate positioning movements in one and three dimensions. The experience of the ITA includes:

- Flexure-based mechanical design for assuring friction-free movements and absence of backlash.
- Installation and control of amplified piezoelectric actuators with advanced control algorithms capable of compensating hysteresis phenomena, and developing smooth tracking movements.
- Design of the prototype power electronics.

The developed techniques have also been applied in active vibration control systems for isolating measuring devices from oscillatory noise from a larger supporting structure.

Main related relevant activities / projects

The activities described in the previous section are mainly arranged inside the research line of the ITA inside the project “RICAT+ project, supported by FEDER funds (Programa Operativo de Cooperación Territorial España-Francia-Andorra 2007-2013)”. This project contemplated:

- Electromechanical design of a single axis test bench for evaluation of active vibration control

algorithms.

- Electromechanical design of a three DoF platform for nanopositioning.
- Design of new control algorithms for active vibration damping, positioning and tracking using piezoelectric actuators.

The results obtained during the project have been published and presented in international journals and congresses.

Other information

ITA is interested in going further in the design and control of nanopositioning and active vibration damping systems using smart materials, both in flexible and rigid structures.

ITMA MATERIALS TECHNOLOGY

University	Technology Centre	Public Centre	SME	Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

ITMA is a technological center located in Asturias (Spain) focused on the development of materials science and technology. The activity is market-oriented and R&D projects are currently developed for Refractory, Steelmaking, Energy, Electronic and Ceramic sectors.

Main capacities in nanotechnology / nanoscience

Main research lines are:

- Thin film solar technology for building integrated photovoltaics (BIPV)
- Physical (sputtering, evaporation) and chemical (PECVD, thermal) vapor deposition technology
- Synthesis of single and multiwall carbon nanotubes by chemical vapor deposition
- Synthesis of graphene by chemical vapor deposition and development of transfer processes for different substrates
- Design and development of metallic nanostructures for plasmon enhancement in solar cells
- Novel transparent conductors (nanowires, graphene, PEDOT:PSS) as an alternative to transparent conductive oxides. Development of low-cost coating technologies.
- Advanced polymer technology for different industrial sectors
- New encapsulants with spectral conversion for solar industry
- Luminescent solar concentrators: second generation concepts and complete device manufacturing

Main related relevant activities / projects

-ETFE-MFM (FP7-ENERGY): Development and demonstration of flexible multifunctional ETFE module for architectural façade lighting

-INSIDDE (FP7-ICT): Integration of technological solutions for Imaging, detection, and digitisation of hidden elements in artworks

-BIPHOCAL (EUROSTARS): Building Integrable Photovoltaics: Coloured and light-transparent modules

-DINNAMIC (INNPACTO, National): Carbon-silver based nanomateriales for functional elements in automotive industry

-ATON (CENIT;national): Research and development in novel materials and processes for thin film solar technology

-CETICA (CENIT, National): La Ciudad Eco-Tecno-Lógica

-NANOCIT (CONSORCIA): Added value products based on carbon nanocomposites

-NANOSID (CONSORCIA): Nanotechnology for steelmaking products

Other information

-

LEITAT TECNOLOGICAL CENTER

University | **Technology Centre** | Public Centre | SME | Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Contact information

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Organization profile

LEITAT is a Technological Centre specialized in production technologies. LEITAT develops R+D activities in the areas of biomedicine, bioinvitro, nanohealth and safety, nanomaterials, industrial biotechnology, new production processes, fast moving consumer goods, smart systems, renewable energies, advanced polymers, environment, surface treatments, analytical chemistry and textile technologies, with deep knowledge and experience on the technological transfers to several industrial sectors. LEITAT takes part each year in many projects financed by the regional and national government, participates in projects co-funded by the European Commission, and develops private R&D projects funded by industrial partners. Its International Projects Office has broad experience and competencies to prepare and submit proposals and execute projects in several funding initiatives.

Main capacities in nanotechnology / nanoscience

LEITAT Technological Center has a wide experience in nanotechnology and nanoscience. Our expertise include:

- Chemical Modification and Production of Nanoparticles: Functionalization of carbon nanotube, organic modification of nanoclay, large scale synthesis of magnetite nanoparticle (Fe3O4)
- Nanofiber by Electrospinning: Production of aligned and randomly organized polymeric (PAN, PA, PS, Cellulose...) or ceramic (LiCoO2. LiFePO4, TiO2, SiO2...) nanofibres. Core-shell nanofiber.
- New Nanocomposite: Fibres for fabric manufacturing (Compounding of nanoclays, nanoparticles and carbon nanotubes in polymeric blends)
- Functionalization of Textiles Through innovative surface treatments (Plasma polymerization, grafting of chemically modified nanoparticle)
- Multifunctional and Smart Materials Thermochromic and phosphorescent polymer blend, nanoencapsulation by electrospraying and microemulsion procedure.

Moreover, LEITAT is actively involved in the Nanosafety. The Nanohealth and Safety division activities include:

- Nanotoxicology (*in vitro* and *in vivo* evaluation of nanomaterials)
- Evaluation of physical-chemical properties of nanomaterials included in industrial products during their life cycle (from synthesis, processing, manufacturing, use, recycling, to final disposal)
- Accelerated aging/ weathering of products containing NM (simulation of nanomaterials/ nanocomposites use)
- Determination of the release of NM from complex matrices during simulating aging processes

- Correlation analysis of the physical-chemical properties of nanomaterials and their toxicity
- Design and development of novel filtration techniques, recycling and disposal techniques for nanomaterials based on nanofiber-based filters
- RA/LCA analysis of nanomaterials included in commercial products
- Design and development of worker protective equipment for workers manipulating nanomaterial
- Design and development of nanobiosensors for several applications, such as, vaccine monitoring, disease diagnostics, explosive and gas detection…
- Synthesis and functionalization of metallic nanoparticles for biological applications
- Development of nanoparticle-based drug delivery systems
- Design of nanoparticle-based markers to study biological processes

Main related relevant activities / projects

European Projects

NANOPOLYTOX (Coordinator): Toxicological impact of nanomaterials derived from processing, weathering and recycling of polymer nanocomposites used in various industrial applications, NMP-2009-1.3-1.
EUROTAPES**:** European development of superconducting tapes: Integrating novel materials and architectures into cost effective processes for power applications and magnets, NMP-2011-2.2-1
NANOMICEX: Mitigation of risks and control of exposure in nanotechnology based inks and pigments, NMP-2011-1.3-2;
SANOWORK: Safe nano worker exposure scenarios, NMP-2011-1.3-2
CERAMPOL: Ceramic and polymeric membranes for heavy metal and drug water purification, NMP-2011-1.2-3,
NEXTEC: Next generation nano-engineered thermoelectric converters. From concept to industrial validation; NMP-2010-1.2-3
NANOSOLUTIONS: Biological Foundation for the Safety Classification of Engineered Nanomaterials (ENM): Systems Biology Approaches to Understand Interactions of ENM with Living Organisms and the Environment
NANOREG: A common European approach to the regulatory testing of nanomaterials

National Projects

nAUTO2. Nanomaterials for automotive industry. NUCLIS COOPERATIUS de Recerca Industrial i Desenvolupament Experimental 2010 Financed by ACC1O 2010 RD10-1-0017
NANOTHERM. Tailoring electronic and phononic properties of nanomaterials: Towards ideal Thermoelectricity
Nanocit: Design of high added value product based on carbon nanostructure and polymeric resin
Nanotech: Development of conducting fibres of high resistance using polymers and carbon nanotubes
Nanocotton: Application of nanotechnology in textiles for UV protection
VACMON: Nanobiosensor for fast vaccine monitoring
NANOSOST: Towards a sustainable, responsible and secure nanotechnology
ELECTROCLAY: Development and processing of conductive nanoclays to obtain multifunctional conductive polymers.

Other information

LEITAT has Access to state-of-the-art equipment for characterization of nanomaterials including:Zeta Potential, DLS, BET, UV-Vis, FT-IR, TGA, DSC, ICP-MS, Ultrasonic horn, Electrospinning, Aging chambers, Tensiometer, Tween screw extruder, Characterization of the physical and mechanical properties of nanocomposites, Other techniques used in external facilities (TEM, SEM, XPS, XRD, CLSM)

LUREDERRA TECHNOLOGICAL CENTRE

University | **Technology Centre** | Public Centre | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | **synthesis/funct** | nanophotonics
nanobiotechnology | **nanoadditives** | nanometrology | nanosimulation | nanoencapsulates

Address

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Contact information

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Organization profile

LUREDERRA founded in 1999, is a non-profit private Technological Centre which performs Research & Technological Development activities on behalf of the industry, followed by implementation of the innovations developed at their production sites. The organisation is a Spanish CIT (Centre of Innovation and Technology) registered by the Spanish Ministry of Science with the number 98. Its main technological know-how is related to the fields of nanoparticles, non-metallic materials, advanced environment and fine chemistry.

LUREDERRA counts with modern facilities which include 5.500 m^2 industrial area, where the laboratories and industrial scale machinery are located. This fact makes easier the industrial explotation of the results of projects RTD to its clients. On the other hand, the most important asset of the organisation is its very highly qualified personnel (over 50 people) from both technical and managerial points of view, and with extensive expertise in the design and execution of RTD national and international projects.

Regarding international RTD projects, LUREDERRA has carried out a large number of them related to new ceramic, rubber and plastic materials, innovative polymer recycling systems, new solid and liquid waste treatment systems developments, industrial production of advanced nanoparticles and nanodispersions for multisectorial applications, among others. It is also worth highlight that the Centre is very active in EU Framework Programme projects (participating in 17 projects, 6 as Coordinator), as well as other international programmes such as EKA, INTERREG, LIFE+ , ERA-NET (Manunet, Lead-Era, Eurotransbio), and CIP.

On the top of the priorities is its focus on the market and on the industrial application of its developments; indeed it has several international patents, having also established in 2007 its first NTBFs (New Technology-Based Firms) for the industrial production of advanced nanoparticles, nanodispersions and nanoproducts with multisectorial applications, which is already top reference in such market as Europe, Asia, Russia and USA. The next outcome exploitation of RTP projects would other NTBFs in the field of polymer recycling, chemistry and nanotechnology, continuing thus with its strategy of creating new high-value industrial technology based-enterprises. These enterprises will be run by the Centre or jointly with their clients.

Main capacities in nanotechnology / nanoscience

- Advanced nanoparticle production: simple and complex (mixed, doped, core-shell) nano-oxides, phosphates and carbonates for multisectorial applications - laboratory scale (100g/h) and large-scale

(1kg/h).

- Production of customised nanoparticle dispersions in different concentrations with high stability for multisectoral applications - laboratory and large-scale (100l/h).
- Ready for use nanoproducts: developments with different functionalities (water repellence, selfcleaning, anti-scratch, conductivity, fire-resistance, etc.) - laboratory and industrial scale (300l/h).
- Synthesis of specific functional compounds (coupling agents for surface treatment, hyperbranched polymers for the solubilisation of certain compounds, organometallic complex components for the production of nanoparticle) - laboratory and industrial scale (100l/h).
- Synthesis and modification of nanoclays with suitable compatibility for its incorporation and use in polymeric, elastomeric and ceramic materials.

Main related relevant activities / projects

Participation in the following R+D projects:

- NANOCOOP (national project funded by Regional Goverment and Ministry of Economy -MINECO)
- NANOFILLERS (national cooperative project funded by Regional Goverment)
- NANOCONS (national cooperative project funded by Regional Goverment)
- NANOFER (national project funded by Regional Goverment)
- FUNCLAY (national project funded by MINECO)
- NANOCAT (national project funded by MINECO)
- NANOCAV (national cooperative project funded by MINECO) - **Coordinator**
- VINILCLAY (national cooperative project funded by MINECO)
- ELECTROCLAY (national cooperative project funded by MINECO)
- FLARETPOL (EU FP6)
- NANORUB (EU FP6) - **Coordinator**
- NANOPOLYTOX (EU FP7)
- ADVANCE-FSP (EU FP7) - **Coordinator**
- MANANO (EU FP7)
- NEXTGENCAT (EU FP7)
- ECONANOSORB (EU FP7) - **Coordinator**
- ARTHIPYCTION (EU FP7)
- STABLE (EU FP7)
- RECYVAL-NANO (EU FP7) - **Coordinator**
- NATURAL (EU FP7)
- Another 8 ERA-NET project in the field of nanotechnology for industrial applications.

Others:

- Member of Nanosafety Cluster
- Vocal member in Nanotechnologies Standardization Group AEN/GET 15

Participation in most relevant nanotechnology national and international fairs: NANOTECH JAPAN (Tokyo; attendance in 2009, 2010, 2011 and 2012), RUSNANOTECH (Moscow; attendance in 2011), EURONANOFORUM (attendance in 2009 Berlin and 2011 in Budapest), IMAGINENANO (Bilbao; attendance in 2011).

Other information

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PRODINTEC
Technology Center for Industrial Design and Manufacturing

University	Technology Centre	Public Centre	SME	Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct	**engineering**
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	**knowledge mng.**

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Organization profile

PRODINTEC is a technology centre specialized in industrial design and production**.** Our mission is to foster the competitiveness of industrial firms by applying technological advances both to their products and to their manufacturing and management processes. It is a private non-profit entity created in 2004 and was registered as an Innovation and Technology Centre (no. 99) by the Spanish Ministry of Industry on 2007.

PRODINTEC is structured into six technological units:

- PRODUCT DESIGN that addresses all the stages of product design: strategic definition, concept design, detailed design, technical office and product engineering, and preproduction. It has several design software tools: SolidWorks, Catia, Solid Edge, Ansys, RapidForm, Polyworks, among others.
- PRODUCT ENGINEERING: definition of the formal profile of the product; determination of the technical specifications (drawings, materials ...); mechanical, electrical and electronic design; and definition of the manufacturing system (including design validation in terms of use under realistic conditions). PRODINTEC has advanced software to perform simulations using Finite Element Method (FEM), mechanical and electromechanical design and industrial process automation.
- INSPECTION PROCESSES. Different technologies for dimensional measurement and inspection of products, as well as for improving the manufacturing processes.
- PROCESS ENGINEERING. Improvements in manufacturing processes, including: improvement of production processes, reengineering of plants, industrial process simulation, design of job positions, etc.
- MANUFACTURING TECHNOLOGIES. PRODINTEC posses in-house cutting edge equipment for manufacturing, such as additive manufacturing withs several materails, robot machining, 5-axis high speed machining, micromachining, microinjection,…
- PROJECT MANAGEMENT. Extensive experience and capabilities for the management of R + D + I

projects at international, national and regional level, technological protection, technological survillance, technological audit and internationalization of R + D + i.

Main capacities in nanotechnology / nanoscience

PRODINTEC is member of the steering committee of the European Technology Integrating and Innovation Platform on Nanotechnology, NANOfutures, and is also responsible of the networking working group. Thus, PRODINTEC has continuous contact with the stakeholders in the field of nanotechnology.

From the technical point of view, PRODINTEC provides:

-Engineering for the design of new reactors/pilot plants for the large scale manufacturing of nanomaterials and the design and manufacturing

-Design and optimisation of industrial processes

-Design and manufacturing of devices/equipments

Main related relevant activities / projects

PRODINTEC regularly works with other technology centers and institutions of the Spanish Science and Technology System. AT international level, is a member of the following networks and technology platforms:

- European Technology Integrating and Innovation Platform for nanotechnology (NANOFutures)- *Steering Comitte*
- Additive Manufacturing European Technology Platform - *Steering Comitte*
- European Technology Platform for Micro and Nanomanufacturing (MINAM)
- European Technology Platform for Advanced Manufacturing (MANUFUTURE-EU)

The most recent projects related to nanotechnology:

- FP7 project **NANOEIS,** *Nanotechnology Education for Industry and Society***.** 2012–2015 www.nanoeis.eu
- FP7 project **NANOfutures:** *a cross-ETP Coordination Initiative on Nanotechnoloy*. FP7. 2010–2012. www.nanofutures.eu
- Nanotechnology for Market **(NANO4M).** INTERREG IVC. 2008 –2011.www.nano4m.eu
- National Project**,** *Intensificación a nivel europeo de la I+D española en el campo de la nanotecnología* **(iNNano).** Spanish Ministry of Economy and Competitiveness. 2011 –2013

Other information

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TECNALIA FOUNDATION
Research & Innovation

University	Technology Centre	Public Centre	SME	Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct	nanophotonics
nanobiotechnology	nanoadditives	Engineering	nanosimulation	nanoencapsulates

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Organization profile

TECNALIA is a private, non-profit technological research centre, settled in the Basque Country (Spain) and created in 2011 from the merger of eight research centres: Cidemco, ESI-European Software Institute, European Virtual Engineering, Fatronik, Inasmet, Labein, Leia and Robotiker. As a result of the merger, TECNALIA has combined the capacities to generate and develop business opportunities through applied research. The members of TECNALIA are regional administration bodies of the Basque Country and numerous enterprises of industrial/service sectors from Spain. With 1400 employees and a wide range of testing laboratories, is organised in six divisions: Energy and Environment, Sustainable Construction, Industry and Transport, Innovation Strategies, ICT – European Software Institute, and Health.

Nanotechnology activity in Tecnalia (100 persons) is distributed in its different divisions and encloses the areas of Nanomaterials, Nanophotonics, Multiscale simulation, and Safety, with technologies such as organic-inorganic hybridation, materials encapsulation, nanoparticles and nanostructures synthesis, functionalization, and matrix-reinforcement. In this context, Tecnalia is provided with 10 types of patents, 1 spin-off (NACOALIA, S.L), more than 90 papers, more than 100 communications, and more than 10 doctoral theses. Current research lines in nanotechnology are: (i) Nanoparticle addition into molten steel for the mechanical improvement; (ii) Production of nanostructured steel; (iii) Nanotechnology for cement-based materials; (iv) Nanotechnology for the development of functional coatings.

Main capacities in nanotechnology / nanoscience

- Wide expertise in steel processes modelling, with several software resources: (i) System for numeric modelling of solidification processes; (ii) Thermocalc and Dictra software-packages; (iii) Test platform for liquid steel models, control system and laser anemometry.
- Extended background in the fabrication and characterization of metallic and no metallic nanomaterials: (iv) System for experimental casting (Ar/Air), (v) Induction vacuum levitation melter assisted with Copper-Mold-Casting; (vi) Induction generator equipped with double vacuum chamber (11 Kg); (vii) Muffle-type furnace; (viii) Atomic force microscope, Environmental scanning electron microscope coupled with EDX, and Optical microscope; (ix) Vertical lamellar air flow chamber and Glove chamber; (x) Laboratories for metallographic, chemical, and nanoparticle analysis; (xi) Dilatometer; (xii) IR and UV-VIS spectrophotometers; (xiii) X-ray Diffractometer; (xiv) Machines for mechanical testing: Instron, Gleeble; (xv) Hardness indenter and micro-indenter; (xvi) Z-Sizer.

Main related relevant activities / projects

Projects with industry: (i) Optimización material, reparación, OPTIREP; (ii) Hormigón de ultra-alta resistencia, HUR.

Regional projects: (i) Nanotecnología en Acero, NANOTAC; (ii) Acción Transversal en Nanotecnología, NANOLAB; (iii) Desarrollo de nuevas tecnologías para la adición de nanopartículas en acero, TECADIN; (iv) Generación de aceros de automoción mediante la dispersión inducida de nanopartículas, DISAUTO; (v) Acero Amorfo – Nanoestructurado, ACAN; (vi) Desarrollo de un revestimiento nano-estructurado sobre vidrio, NACO-Vidrio; (vii) Nanotecnología inanoGUNE; (viii) Desarrollo prototipo industrial revestimiento nano-estructurado, Prototipo NACO; (ix) Revestimientos nano-estructurados, RECO; (x) Materiales auto-reparables, AUTOREP II; (xi) Nanotecnología inanoGUNE2; (xii) Desarrollo de materiales cementicios de ultra altas prestaciones a través del control de los procesos de formación y auto-ensamblado de su micro-nano estructura, MATCONFOR; etc.

National projects: (i) Aplicación de la Nanotecnología en los Procesos y Productos Siderúrgicos, NANOSID, TECNALIA (Coordinator); (ii) Estudio y desarrollo de tratamientos superficiales para materiales de interés tecnológico, MATINTEC; (iii) Diseño y desarrollo de materiales base-cemento multicomponentes con propiedades mejoradas para el confinamiento de residuos radiactivos, MBCRADIOAC; (iv) Desarrollo de nuevo conocimiento y tecnología inteligente en materiales y componentes orientados a la mejora de la productividad y la creación de negocio en el ámbito de una edificación más sostenible, DOMINO; (v) Creación del un nuevo centro de I+D para la coordinación, desarrollo y gestión de la investigación en Nanociencias en el País Vasco; (vi) Desarrollo de nuevo conocimiento y tecnología inteligente en materiales orgánicos y cerámicos orientado a la mejora de la productividad y la creación de negocio en el ámbito de una edificación más sostenible, PROMETEO; (vii) Estudio de la modificación de la nanoestructura de los materiales cementicios, para el desarrollo de nuevos materiales en base cemento con capacidad de auto-reparación, MONACEM, TECNALIA (Coordinator); (viii) Optimización de interacciones interfaciales en materiales poliméricos híbridos orgánico-inorgánicos, INTERHYBRID; (ix) Metamateriales para elementos radiantes en comunicaciones inalámbricas en radiofrecuencias y micro-ondas, METAWIRELESS; (x) Desarrollo de productos de altas prestaciones, derivados del cemento, DALPREC; (etc.

European projects: (i) Nanoparticle Addition into Molten Steel, NAMOS, TECNALIA (Coordinator); (ii) Computationally driven design of innovative cement-based materials, CODICE, TECNALIA (Coordinator); (iii) Safe, Integrated & Controlled Production of High Tech Multifunctional Materials and their Recycling, SAPHIR; (iv) High Performance (Cost-competitive, Long-life and Low-maintenance) Composite Bridges for Rapid Infrastructure Renewal, HP Future-Bridge; (v) Red de Excelencia Nanoscale Quantum Simulations for Nanostructures and Advanced Materials, NANOQUANTA; (vi) Towards the setting up of a network of excellence in Nanotechnology in construction applications, NANOCONEX, TECNALIA (Coordinator); (vii) Aerogel-Based Composite/Hybrid Nanomaterials for Cost-Effective Building Super-Insulation Systems, AEROCOINS, TECNALIA (Coordinator); (viii) Nano-systems for the conservation of immoveable and moveable polimaterial Cultural Heritage in a climatic, NANOMATCH; (ix) Halogen free Flame Retardant ABS nanocomposites for electric and electronic devices, TECNALIA (Coordinator); (x) Smart fire retardant coatings based on intumescent nanocomposites, HEFEST, TECNALIA (Coordinator).

Other activities: Organisation of the international workshops: I) NANOSID (NANOTECHNOLOGY IN STEEL). 2010; (ii) Challenges and promises of multi-scale modelling schemes for cementitious materials. Derio, March 2009; (iii) TECNALIA is member of the Advisory Group of the European platform Spire PPP.

Other information

Wide expertise in regional, national, and international projects, having led a high number of them.

TEKNIKER

IK4 TEKNIKER Research Alliance

University	Technology Centre	Public Centre	SME	Large Company

Capacities

characterization	nanocomposites	nanosensors	synthesis/funct	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

IK4-TEKNIKER is a non-profit private research organization specialized on manufacturing. There are three specialization areas:

- "Manufacturing": processes, manufacturing systems and assets.
- ICTs: information technologies, control, automation, electronics and autonomous systems.
- Surfaces and materials.
- Integrated heterogeneous systems.

IK4-TEKNIKER has around 260 persons in the staff and a total year income around 21 million euros.

Regarding nanotechnologies, IK4-TEKNIKER is represented by IK4 Research Alliance in NANO*futures*.

Main capacities in nanotechnology / nanoscience

A 150 m^2 clean room is available with different cleanness levels: 100/1000/10000. The room is equipped with:

- Micro and nanomanufacturing: UV photolithography, PVD coatings by sputtering and electron gun, plasma attack, metals electrodeposition, nanoimprint photolithography and encapsulation.
- Characterization: FE-SEM, Atomic Force Microscopy, mechanical and interpherometric profilometry, high sensitivity fluorescence microscopy.
- Molecular detection: plasmons resonancy, voltammetry and impendances spectroscopy.
- Nanocoatings and nanostructured coatings deposition in the range of nanometric depth by PVD and sol-gel.
- Nanoparticles functionalization and encapsulation.
- Nanoparticles and grapheme additive to produce high added-value products.
- Nanoparticles applied to medicine, soil remediation, thin film photovoltaic technologies, change phase materials, etc.

It is necessary to highlight the expertise on Nanoimprint Photolithography (NIL) and Soft-Lithography, to produce nanostructures in silicon, oxides, nitrides, metals and glass: combining high resolution (up to 20 nm) with a reasonable productivity.

Main related relevant activities / projects

European projects in Nanomanufacturing (Nanoimprinting, Soft-Lithography):

- Nanopatterning emerging methods (2004-2008). NMP-FP6. Integrated Project.
- Mastering sweet cell-instructive biosystems by copycat nano-interaction of cells with natural surfaces for biotechnological applications (2010-2013). NMP-FP7. STREP.
- Integrating European research infrastructures for micro-nanofabrication of functional structures and devices out of a knowledge-based multimaterials repertoire (2010-2013). Capacities-FP7, Integrated Project.

Fundamental research projects in Nanomanufacturing (Nanoimprint, Soft-Lithography) into the frame of the National Programme for R&d&I:

- Micromanufacturing techniques in the Microsystems and nanodevices production. Applications in medical diagnosis and surgery (MC 2002-2004).
- Nanoimprint lithography development. Applications to proteomic biochips and linear encoders (MEC 2006-2008).
- Solid state organic lasers for distributed feedback produced by nanoimprint techniques (2009-2011).
- Solid state organic lasers for distributed feedback by nanoimprint lithography and optimized for biosensoring (2012-2014).

Projects on nano chemistry:

- NANOIKER: grapheme into polymeric composites.
- ACTIMAT: new smart functional materials, special composites.
- NANOPIGMY: more than colour: applying nanotechnologies for the multifunctional ceramic pigments.
- NANOPCM: new nanotechnology based high performance insulation systems production and use.
- ENe-HVAC: energy efficient heat exchangers for HVAC applications.
- EHS-ADVANCE: competence centre in health and security in nanoscience and nanotechnology.
- POCO: carbon nanotube confinement strategies to develop novel polymer matrix composites.
- NANOCIT: high added-value products design based on carbon nanostructures and polymeric resins.
- CARBONINSPIRED: cooperation and transference network for the application of high added-value materials based on carbon nanoparticles for the automotive and building sectors.

Other information

Member of the International Conference on Micro and Nanoengineering (MNE http://www.men-conf.org/GENERAL/index.php) Scientific Committee.

Member of the Scientific Committee of the Spanish Network in Nanolithography (NANOLITO: http://www.unizar.es/nanolito/).

Member of the Scientific Committee of the Spanish Network in Nanotechnology (NANOSPAIN: http://www.nanospain.org/).

More than 20 indexed articles regarding Nanoimprint Lithography and its different applications throughout the last 7 years.

2.2.2 Universities

DIOPMA (Centre of Design and Optimization of Processes and Materials)- University of Barcelona

University | Technology Center | Other | SME | Large Company

Capacities

characterization | nanocomposites | nanosensors | **synthesis/func.** | nanophotonics
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

The Centre of Design and Optimization of Processes and Materials, DIOPMA, is a scientific research centre at the University of Barcelona, formed at the Department of Materials Science and Metallurgical Engineering.The centre DIOPMA is constituted by a group of PhD, Graduates, and Engineers.

DIOPMA is a consolidated group by the Generalitat de Catalunya (2009 SGR 645), is part of the network that brings together the leading technology transfer centers and agents in Catalonia (TECNIO), is member of the Reference Network in Advanced Materials for Energy (XaRMAE) of the Generalitat de Catalunya, and the Spanish Network of Thermal Energy Storage. DIOPMA counts with members of the Institute of Nanoscience and Nanotechnology (IN2UB) and of the Sociedad Española de Cerámica y Vidrio.

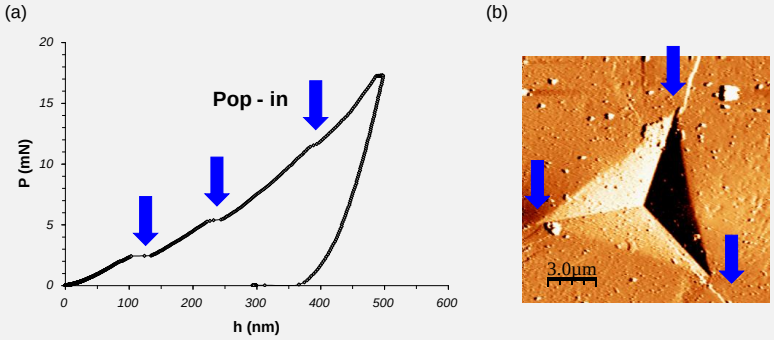
Our objective has always been to increase the industrial leadership improving industrial methods, emphasizing environmental-related aspects. Our work is based on the idea that knowledge is the key to the development of an innovative and sustainable society capable of facing global competition. This is due to that we ensure that our knowledge is used to create an impact on society. The impact is apparent in areas such as: 1) materials for energy: preparation and characterization of Solid Oxide Fuel Cells and storage of renewable energy; 2) mechanical characterization of materials for energy: by using nanoindentation technique; 3) materials for environment: recycling, valorization and inertization of by-products; 4) industrial processes: pilot plants and optimization of processes.

Main capacities in nanotechnology / nanoscience

The DIOPMA activity in the nanotechnology field is focused on two topics:

1) **Synthesis of nanostructure materials**: manufacturing of solid oxide fuel cells (SOFCs) components (electrolyte and electrodes), and superconductors, using the polyacrylamide gel combustion method. We also synthesized nanoparticles for biological applications by different ways, and its characterization. For instance, nanoparticles of Ni synthesized by magnetic separation.

2) **Nanomecanic characterization** using Nanoindentation technique of different electrolytes in SOFCs: YSZ (yttria stabilized zirconia), GDC (gadolinia doped ceria), and LSGM (lanthanum strontium gallium magnesium oxide perovskite). Mechanical properties such as Young's modulus (*E*), hardness (*H*) and fracture toughness (K_{IC}), and the different fracture mechanisms induced during indentation process, using Nanoindentation technique and atomic force microscopy (AFM).



a) P-h curves (applied load versus indentation depth), corresponding to an indentation of GDC electrolyte, with different changes of tendency (pop-ins) associated to the first stage of plastic deformation. B) AFM image of GDC electrolyte with the fracture mechanisms (radial cracks).

Main related relevant activities / projects

- Diseño y optimización de pilas de combustible de óxido sólido de temperatura intermedia. Nuevos componentes y configuraciones. MAT2008-06785-C02-01/MAT/national
- Celdas reversibles de óxido sólido de temperatura intermedia. MAT2011-23623/national
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- J.J. Roa, E. Jiménez-Piqué, T. Puig, X. Obradors, M. Segarra. Nanoindentation of multilayered epitaxial $YBa_2Cu_3O_7$-δ thin films and coated conductors. Thin Solid Films, 512 (2011) 2470-2476

Other information

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GIFMA (Manufacturing Engineering and Advanced Metrology Group)-University of Zaragoza

GIFMA
Manufacturing Engineering and Advanced Metrology Group

Capacities

University	Technology Center	Other	SME	Big Industry

characterization	nanocomposites	nanosensors	synthesis/func.	nanophotonics
nanobiotechnology	nanoadditives	**nanometrology**	nanosimulation	nanoencapsulates

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Organization profile

The Manufacturing Engineering and Advanced Metrology Group (GIFMA) is a member of the Aragón Institute of Engineering Research (I3A), which belongs to the University of Zaragoza, and has been recognized as a "*Grupo de Investigación Consolidado*" (Quality Research Group) by the Regional Government of Aragón.

The main lines of research have focused on the following issues:

- Manufacturing metrology: development of measuring and calibration methods for quality control and production Systems verification. Optimisation of the measuring with Coordinate Measuring Machines, calibration and traceability analysis.
- Mecatronics and microtechnologies: design, manufacturing and calibration of systems and prototypes for manufacturing and contact or noncontact - high-precision measuring. Developments in precision mechanics and microtechnologies. Industrial vision. 2D and 3D measuring applications.
- Manufacturing and integrated quality: integration of the production planning, quality and maintenance; quality assurance and continuous improvement; statistical process control and capacity analysis; quality in design and development of new products; total productive maintenance.
- Computer integrated manufacturing: CAX/CIM systems; rapid prototyping, reverse engineering; manufacturing processes optimisation and automation.

Main capacities in nanotechnology / nanoscience

- Development of new positioning or displacement platforms or stages for nanotechnology applications.
- Measuring and positioning systems integration for micro and nanotechnology applications.
- Development of new calibration and verification procedures for high precision measuring

instruments.

Main related relevant activities / projects

Development and calibration of a long range 2D nanopositioning stage. (Desarrollo y calibracion de una etapa para nanoposicionado 2d de amplio rango). This project is supported by the Spanish “Ministerio de Ciencia e Innovación”. DPI2010-21629-C02-01. 2011-2013.

Other information

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ICFO-The Institute of Photonic Sciences

University	Technology Center	Other	SME	Big Industry

Capacities

characterization	nanocomposites	nanosensors	synthesis/func.	**nanophotonics**
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

The Institute of Photonic Sciences was created in 2002 by the regional Government of Catalonia, Spain - through the Department of Universities and Research - and the Technical University of Catalonia. ICFO is a research centre of excellence devoted to the study of the optical sciences, with the mission to become one of Europe's foremost photonics research centres. The centre has a triple mission of frontier research, post-graduate education, and knowledge and technology transfer. ICFO collaborates actively with many leading research centres, universities, hospitals, health care centres, and a variety of private corporations worldwide.

Opening: April 2002

Activity Areas

Research at ICFO is organized in four wide-scope areas: Nonlinear Optics, Quantum Optics, Nano Photonics and Bio Photonics. Research is organized in 3 major programs: Light for Health, Light for Energy and Light for Information.

Employees

ICFO currently hosts more than 250 researchers, including group leaders, post-doctoral researchers, PhD students and research engineers, organized in 20 research groups working in 60 state-of-the-art research laboratories, equipped with the latest experimental facilities and supported by a range of cutting-edge facilities for nanofabrication, characterization, imaging and engineering. The Institute is located in a specially designed, 14.000 m2-building situated in the Mediterranean Technology Park in the metropolitan area of Barcelona.

Main capacities in nanotechnology / nanoscience

The Nanophotonics Fabrication Laboratory (NPL) at ICFO is a transversal facility devoted to the fabrication and characterization of nanostructured photonic devices. This laboratory, which is open to users both within and outside ICFO, includes state of the art nanofabrication tools and techniques for a wide range of optical applications, ranging from biosensing to optical communications, and spanning a broad range of materials, including polymers, semiconductors, metals, or crystals, among others. All these tools and facilities are housed in a class-10000 clean-room environment. The laboratory also

includes tools for advanced material and device characterization and is complemented by other transversal facilities like the Post-Processing Lab, the Chemical Lab, the Advanced Engineering Labs or the Super Resolution Light Nanoscopy and Microscopy Facility at ICFO. Available techniques at the NPL include:

- Optical lithography
- Electron-beam lithography (2 systems, one of them with interferometric stage for large-field stitching)
- Focused Ion Beam
- Atomic Layer Deposition
- Inductively and Capacitively-coupled Plasma etching
- Sputtering
- Thermal and electron-beam evaporation. Ion-beam densification available as an option
- Scanning electron microscopy. Energy-dispersive X-ray Spectroscopy (EDX) available as an option
- Spectroscopic ellipsometry
- Atomic force microscopy

Main related relevant activities / projects

ICFO has been involved in a range of projects funded by the European Union such as SCALA, QAP, QUROPE, PLASMOCOM, ASPRINT, BIO-LIGHT_TOUCH, FASTDOT, MIRSURG, SPEDOC, NANOVISTA, NANOMATCELL, etc. We have been partners in European networks like QGates, EMALI, COCOS, PHOREMOST, PLASMO-NANO-DEVICES and projects supported by the European Space Agency. ICFO currently belongs to the European Networks of Excellence Photonics 4 Life Europe and Nanophotonics for Energy Efficiency, to the Integrated Infrastructure Initiative Laserlab Europe, to the European Nanophotonics Association, and to the Biophotonics4Life World Consortium. Today, ICFO hosts 11 ICREA Research professors, 8 European Research Council awardees and 5 Fundacio Cellex Barcelona Nest Fellows. ICFO researchers are recipients of many international high-profile science awards.

Other information

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University of Cadiz -Research Group Materials and Nanotechnology for Innovation (INNANOMAT)

University	Technology Center	Other	SME	Big Industry

Capacities

characterization	**nanocomposites**	nanosensors	synthesis/func.	**nanophotonics**
nanobiotechnology	**nanoadditives**	**nanometrology**	**nanosimulation**	nanoencapsulates

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University Professor/ Head of Group
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Organization profile

The research group Materials and Nanotechnology for Innovation has developed specific methodologies to determine the structure, morphology, strain and composition of materials with spatial resolution ranging from the atomic scale up to the microscale. In addition to this, it has developed nanofabrication methods that improve production processes and quality control of advanced materials. These methodologies are based on nanoscopic and microscopic techniques that use electron and ion beams to analyze materials. These methods are complemented by the development of image simulation techniques supported by parallel supercomputing facilities.

Its research is focused in materials that can be grouped under the denomination of **Materials for Nanotechnology**, as we pursue the knowledge of the added value that its fabrication and structuration to nanoscale of these materials represent for their functionality. In addition to knowing the improved and new properties emerging from nanostructured materials, other central aspect of our activity is to give economical value to these properties exploiting them through the development of innovative products.

In summary, our vision is to create value from the generation of knowledge in the frame of the Science and Engineering of materials for Nanotecnology, that it is transferred to the Society through our portfolio of Technological Services and the creation of Technological Spin-off Companies.

Main capacities in nanotechnology / nanoscience

- Analysis of composition and strain from nanoscale down to the atom scale (advanced electron microscopy and FIB).
- Aberration-corrected high resolution electron microscopy of nanomaterials and molecular materials.
- Design and nanofabrication of nanomaterials.

Research topics:

- Plasmonic metallic nanomaterials

- Electron and ion nanoscopies of materials
- Atomscopy for atom-to-atom characterization of nanomaterials and molecular materials
- Nanostructures for highly efficient photovoltaic devices.
- Nanocomposites with graphene for aerospace, plasmonics and other industrial sectors.
- Materials and Nanotechnology for high-end products

UCA facilities for Electron Microscopy:

7 electron microscopes (4 TEM/STEM, 3 SEM), another aberration-corrected scanning transmission electron microscope to be installed in 2013, 1 dual-beam focused ion beam, two labs for sample preparation (5 ion mill thinners), 1 supercomputer for image and structure simulations.

Main related relevant activities / projects

- Project (Spanish National Programme of Research) TEC2011-29120-C05-03: Quantum semiconductor nanostructures as the key for disruptive technologies (from the nanophotonics to nanoplasmonics): Nano-characterization. Date: 01/01/2012 - 31/12/2014
- Project CONSOLIDER CSD2009-00013. IMAGINE: Material Science Down To The Sub-Angstrom Scale. Date: 16/03/2010 - 16/12/2014
- Project (Andalucian Research Excellence Programme) P09-TEP-5403. Engineering of new monophase alloyed nitrides for optoelectronics, photonics and electronics. Date: 03/02/2010 - 02/02/2014
- Project (Andalucian Research Excellence Programme) P08-TEP-035164, Contribution to the development of semiconductor nanostructures of interest for the Andalucian productive sector. Date: 14/01/2009 - 13/01/2012
- Project (Spanish National Programme of Research) TEC2008-06756-C03-02/TEC: Contribution to the development of nanostructures for application in quantum integrated photonics. Date: 01/01/2009 - 31/12/2011
- European Consortium SANDiE (born from the European Network of Excellence SANDiE). Programa Marco Europeo.

Other information

This group is integrated in the UCA Research Institute of Electron Microscopy and Materials (90 researchers, 9 research groups).

Instituto de Sistemas Optoelectronicos y Microtecnología (ISOM)

University	Technology Center	Other	SME	Big Industry

Capacities

characterization	**nanocomposites**	**nanosensors**	synthesis/func.	**nanophotonics**
engineering	nanoadditives	nanometrology	**nanosimulation**	**nanoencapsulates**

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Organization profile

ISOM is a multi-departmental research institution devoted to graduate research and education in electrical engineering, which is affiliated to the Universidad Politecnica de Madrid (UPM). The ISOM facilities include a 400 m^2 cleanroom (100-1000 class), and 300 m^2 of characterization and system development laboratories. The technology processes available at ISOM allow the fabrication and characterization of materials, their technological processing, and the fabrication of integrated electronic, optoelectronic, optic and magnetic devices. At present, ISOM has the capability to fabricate and develop laser and light emitting diodes for instrumentation, environment and optical communications; microwave transistors for high power and temperature applications; infrared photodetectors for civil and military applications; ultraviolet photodetectors for UV solar radiation monitoring and military applications; magnetic sensors for a wide range of applications, and SAW filters for RF and mobile communications.

Main capacities in nanotechnology / nanoscience

OPTOELECTRONICS

Laser Diodes of 0.9-1.3-1.5 µm based on GaInNAs/GaAs Quantum Wells (QWs) and In(Ga)As/GaAsSb Quantum Dots (QDs)

NanoLED arrays with III-nitrides for phosphor-free white lighting. Micro and nano **optical cavities** with III-Nitrides

Efficient solar cells based on InGaN/Si and GaAsSbN/GaAs heterojunctions

MOEMS: nanocolumnar heterostructures, QDs and QWs based on III-V alloys

OPTICAL SENSOR SYSTEMS

UV and VIS tuneable photodetection: UV solar radiation monitoring systems with III-V nitrides and ZnMgCdO/ZnO. Integrated systems for VIS/UV fluorescence. Biosensors based on AlInGaN for water pollutant detection

IR photodetection: Multispectral integration with AlGaAs/GaAs QWIPs and driving electronics. (Ga)InAs(N)/GaAs(Sb) QDs and InGaN/InN QWs (1.5 µm) photodetectors. In(Ga)N QDs and QWs based photodetectors.

Sensors based on semiconductor heterojunctions: organic-inorganic gas detection and photodetection

Integrated nanophotonics: biochemical sensors and micro-ring resonators. On-chip opto-fluidic systems

MAGNETIC SENSORS AND SYSTEMS: Magnetic **sensors for low magnetic fields**: Flux-gate, piezoelectricmagnetostrictive, magneto-optical and magnetoresistive. Applications to transport and intelligent cards; Magnetic **nanoparticles** and their application to biomedical technology; **Spintronics**: spin valves and GMR multilayers. Spin-transfer in nanopillars and magnetic domain walls

MICROSYSTEMS AND NANOTECHNOLOGY

InAlGaN/GaN and ZnMgO/ZnO high electron mobility **transistors** for high frequency/high power applications. High frequency AlN/diamond based **surface acoustic wave** structures.

MEMS and **NEMS** energy storage with oxides and III-nitrides. Plasmonic effects of epitaxial **metal nanoparticles**

Graphene: Growth, device processing and applications in energy storage, sensors, plasmonics and communications

SIMULATION OF NON-METALLIC MATERIALS: Simulation of non-metallic materials and complex fluids; Monte Carlo and molecular dynamics; Nanostructured materials and adsorption

Main related relevant activities / projects

International Funding

"*3D GaN for High Efficiency Solid State Lighting*". Funding: UE. Contract Nº280694, NMP (2012-14).

"*Substrate nanopatterning by e-beam lithography to growth ordered arrays of III-Nitride nanodetectors: application to IR detectors, emitters, and new Solar Cells*". Funding: UE. Code: SNB09, (2011-2013).

"*Laterally biased Quantum IR detectors*". Funding: European Office of Aerospace Research And Development. Code: Award FA8655-12-1-3006 (2011-2013).

"*Smart Nanostructured Semiconductors for Energy-Saving Light Solutions (SMASH)*". Funding: UE. Code: Nº 228999, FP7-NMP-2008-LARGE-2 (2009-012).

"*Células solares de heterounión InGaN y alta eficiencia crecidas por MBE*". Funding: Acción de Coordinación Internacional con Japón, Ministerio de Ciencia e Innovación. Code: PLE2009-0023 (2009-2012).

Public National Funding

"*Convertidores de alta velocidad de conmutación multinivel y multifase para aplicaciones espaciales*". Funding: Ministerio de Economía y Competitividad. Code: TEC2012-38247-C02-01 (2013-2015).

"*Programa integral de Ingeniería Biomédica para el desarrollo de técnicas diagnósticas y terapéuticas en enfermedades neurológicas. NEUROTEC* ". Funding: Madrid. Code: S2010/BMD-2460 (2012-2014).

"*Study of the domain wall dynamics along stripes and magnetization oscillations in multilayer nanostructures driven by spin-polarized currents*". Funding: Ministerio de Ciencia e Innovación. Code: MAT2011-28532-C03-03 (2012-2014).

"*Nanomateriales magnéticos y sus aplicaciones en sistemas de interacción a distancia*". Funding: Ministerio de Ciencia e Innovación. Code: MAT2011-28751-C02-01, (2011-2014).

"*Estudio de titanomagnetitas. Microsusceptómetro para exploración planetaria*". Funding: Ministerio de Economía y Competitividad. Code: PRI-PIBUS-2011-1182 (2011-2014).

Projects in collaboration with Industry and Public Institutions

"*Inspire-Sistemas del Almacenamiento de Energía con Grafenos para vehículos eléctricos*". Funding: REPSOL-UPM. Code: P120920B291 (2012-2014). .

"*Sistema de Aterrizaje de precisión para aviones no tripulados (SAPANT)* ". Funding: Ministerio de Defensa, INDRA S.A y NIT. Code: OTT: PDEF120920466 (2012-13).

"*Análisis, diseño y caracterización de componentes de óptica integrada*". Funding: MEDLUMICS-ISOM (UPM). Code: Referencia: F060001-ISOLAB001 (2012-2013).

Other information

http://www.isom.upm.es/ and http://www.isom.upm.es/eng/index.php

UNIVERSITY OF VALENCIA- INSTITUTE OF MATERIALS SCIENCE

University | Technology Center | Other | SME | Big Industry

Capacities

characterization | **nanocomposites** | **nanosensors** | synthesis/func. | **nanophotonics**

nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

UMDO – Unit for Optoelectronic Materials and Devices. Located with ICMUV, Institute of Materials Science of the University of Valencia

Our group members come from a variety of disciplines such as *Materials Science, Chemistry, Telecommunications, Electrical Engineering, Physics, and Applied and Engineering Physics*. Our expertise ranges from electromagnetism theory to materials, chemistry and device characterization and fabrication. Fabrication is done within our Nanofabrication Facility and/or in collaboration with our external partners.

Main capacities in nanotechnology / nanoscience

Investigation of the physics and applications of nanoscale photonic and plasmonic materials. These can enhance light-matter interactions by orders of magnitude for numerous applications: photovolatic technology, nonlinear phenomena, multi-material devices, sensors, basic physics, etc.

Main related relevant activities / projects

FP7 Positive, FP7 Navolchi, FP7 NanoPV

Other information

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UNIVERSITY OF BARCELONA - NANOSCIENCE AND NANOTECHNOLOGY INSTITUTE

University | Technology Center | Other | SME | Large company

Capacities

characterization	nanocomposites	**nanosensors**	**synthesis/func.**	**nanophotonics**
nanobiotechnology	nanoadditives	nanometrology	**nanosimulation**	nanoencapsulates

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Organization profile

Research institutes are nowadays amongst the most significant organisational units of research within the University of Barcelona. They were created to encourage research and to promote its outcome within society. Many public administrations and other official bodies worldwide organise research and development activities in the field of Nanotechnology by creating specialised research institutes. With a will of following the same organisational pattern, the University of Barcelona created in 2006 the Institute of Nanoscience and Nanotechnology (IN^2UB), which has as an aim to coordinate multidisciplinary research activities carried out by several research groups of this institution. The IN^2UB wants to contribute to the progress of science, while spurring, at the same time, industrial excellence. Researchers who are members of the IN^2UB come from different scientific disciplines, such as Physics, Chemistry, Pharmacy Science, Biochemistry, and Medicine. In this framework, the IN^2UB aims at promoting, both internally and internationally, the collaboration among different groups and research centers by strengthening interdisciplinary activities which integrate both basic and applied research.

Main capacities in nanotechnology / nanoscience

The institute integrates six different research lines:

- **Modeling and Simulation of Systems and Properties of Matter in the Nanoscale:** the theoretic, idealised models that are to replace the much more complex systems we find in reality must prove useful when it comes to the general comprehension of whatever phenomena are under study. These models must also be of help in the establishment of general rules which can guide specialists further in the design of new systems.
- **Nanobiotechnology:** This research area covers the study of the organizational patterns observable in the molecular structures which control the biological systems both at the cellular and the molecular scales. Nanobiotechnology focuses as well in the analysis of the interaction existing between materials and these molecular systems at nanometric scales. Its most relevant applications are the developmrnt of both techniques and devices aimed at prevention and diagnose in nanomedicine, as well as new therapeutic techniques.
- **Nanopharmacotherapy:** This area aims to the development of nanostructures systems for controlled drug release and to the improvement of drug therapeutic efficiency when administered

on target body. A reduction of toxicity on healthy tissues is also sought.

- **Nanomagnetism, nanoelectronics and nanophotonics:** The main objectives of the research in this area are the development of new systems for storing and processing information in the nanoscopic scale, as well as the study of new phenomena related to the small size. The interrelation of properties within nanoscale electronic, magnetic and / or optical materials and devices opens the door to new properties as far as their design is concerned.
- **Nanostructured Materials:** The main aims within these research lines are the development of new nanostructured materials which offer an improvement as far as the properties of already existing materials are concerned.
- **Nanoenergy:** The main aim of this research line is the application of nanomaterials to energy production and storage in order to improve the existing conditions as far as efficiency and duration are concerned. The ultimate challenge is to make these technologies competitive enough.

Since its creation, the researchers and staff at the Institute of Nanoscience and Nanotechnology have been working intently to favor the most suitable synergies among researchers by encouraging interdisciplinary activities that shall result in new frontier-knowledge projects and to encourage relationships between researchers and those corporations with an interest in the different applications of nanotechnologies, by stimulating the implementation of joint projects that shall suit the technologically challenging requirements of the business sector.

Moreover, the University of Barcelona offers the Master in Nanoscience and Nanotechnology, and a Doctoral Studies Programme in Nanosciences, which aim at providing students with a deep and oriented training in both the nanoscience and nanotechnology fields. Teaching is based on research activity, transfer of knowledge and the sharing of experiences and procedures. The academic staff belonging to the IN^{2}UB has a most singular role in these studies' teaching activities.

Main related relevant activities / projects

The IN^{2}UB takes part in national strategic programs and projects, as well as in various international strategic actions:

- Bioingenieria, Biomateriales y Nanomedicina (CB06/01/0045)
- Bioingenieria, Biomateriales y Nanomedicina (CB06/01/1023)
- Imagine, Ciencia de Materiales a Resolución Sub-Angstrom (CSD2009- 00013)
- Funcionalización superficial de materiales para aplicaciones de alto valor añadido (FUNCOAT) (CSD2008-00023)
- Materiales avanzados y nanotecnologías para dispositivos y sistemas eléctricos, eléctricos, electrónicos y magnetoelectrónicos innovadores (CSD2007-00041)
- Nanobiomed (CSD2006-00012)
- Design and Preparation of Functional Molecules for Quantum Computing and Information Processing (EU Reference: 258060)
- Laser printing of organic/inorganic material for the fabrication of electronic devices (nº247868)
- Silicon Nanodots for Solar Cell Tandem (NASCENT) (EU Reference: NMP4- SL-2010-245977)

Other information

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M4-ICMA-University of Zaragoza

University	Technology Center	Other	SME	Big Industry

Capacities

characterization	nanocomposites	nanosensors	**synthesis/func.**	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	nanoencapsulates

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Organization profile

The research group M4 is a highly multidisciplinary group combining chemists, physicists and biologists, medics and engineers with a major research interest in the preparation and study of magnetic materials of molecular, nanoscopic or multifunctional nature. Research includes basic and applied goals and the group is sensitive to technology transfer issues. An important area of activity includes the design, preparation and study of magnetic nanoparticles and ferrofluids for biomedical applications..

Main capacities in nanotechnology / nanoscience

The general objective of the group is the study of multifunctional molecular magnetic material. A broad objective, open to many possibilities, some of which are being intensively explored by different group members. An important area of research for the group is the development of a nanoscale multifunctional platform for biology and medicine. This line falls within the field of nanotechnology applied to biology and medicine. The ultimate goal is to develop tools for diagnosis and therapies, especially for cancer. This activity addresses several issues:

- Novel synthetic routes developed by the group, some have been patented and other are in the process of development,
- Manufacturing and functionalization of nanoparticles,
- Structural characterization of nanoparticles using different methods: XRD, TEM, AFM, SAXS, SANS, DLS, ...,
- Physical studies of nanoparticle properties: magnetic, optical, SANS, ...,
- Effectiveness as contrast agents in magnetic resonance imaging and in hyperthermic treatment,
- Cellular studies in vitro and in vivo (toxicology, immunology, hematology, cellular internalization, acting on cellular organelles, tissue distribution, ...).

In the current state of development the group provides a polymeric nanoplatform, which in addition to magnetic functionality can also incorporate luminescent components, anti-tumoral drugs, a molecular self-calibrating thermometer and anchor groups of biomolecules (proteins in general and specific antibodies). It is composed of biocompatible elements with low toxicity and no hematologic problems. It also has significant magnetothermic response and acts as an effective contrast agent in MRI. This is a multidisciplinary activity carried out in collaboration with other national groups (Faculty of Veterinary Medicine, Clinical Hospital, University of Salamanca, Cancer Research Center of Salamanca,

Polytechnic University of Madrid, ..) as well as international groups abroad (University of Aveiro, University of Pavia, University of Verona, INSA Toulouse, IMEG Sweden, McGill University, ,….).

Main related relevant activities / projects

The group is involved in a wide range of activities and projects as listed below:

- MAT2011-25991 Multifunctional biomedical nanoplatform applied to biology and clinics combined with thermometric magnetothermic imaging system with submicron resolution**.** This national project aims to design a nanometric tool for biomedical purposes.
- MAT2011-27233-C02-01 and MAT2011-27233-C02-02 Preparation and characterization of multifunctional magnetic molecular materials for spintronic and energy**.** This national Project aims to develop and investigate new single molecule magnets self-organized in highly ordered arrays as a necessary step for the development of computer memories of molecular nature.
- NCSD 2007-00010/338 Molecular Nanoscience. The aim of this national project is to provide a suitable framework to develop competitive and high-quality research in Molecular Nanoscience.
- ACI2008-0803 Advancing the field of drug delivery-combined targeted treatment against human breast cancer and human leukemia (network). To selectively abrogate tumor protective functions aiming at improving sensitivity of tumor cells to chemotherapy or finding synergistic combinations that improve the treatment of breast cancer or leukaemia patients.
- Multifunctional magnetic materials: Molecular Materials and new applications of magnetic compounds.. The attention concentrates on multifunctional materials combining magnetic and thermal properties, and magnetic and optic, particularly those photo-induced ones.
- Multifunctional Magnetic Clusters and Nanoparticles. The project has two interwoven goals: (i) Improvement of the methods for the coating and functionalization of magnetic nanoparticles. (ii) Study of the magnetic properties of hybrid polymers Source of Finance: Spain-Austria.
- Multifunctional molecular nanomaterials with optic and magnetic properties**.** Development of new multifunctional nanoparticle systems having magnetic and optical properties.
- Associated Member of the CIBER BBN. The Biomedical Research Networking center in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN) is one of nine CIBER consortia in the country, created under the leadership of the Carlos III Health Institute (ISCIII) to promote research excellence and build a critical mass in the field of Biomedicine and Health Sciences.
- Founding Member of the European Institute of Molecular Magnetism. EIMM is a joint initiative stemming from the European Network of Excellence MAGMANet. (http://www.eimm.eu). The EIMM applied for European funding in 2011 and the proposal “European structured research area for CAtalytic and Magnetic nanoMaterials” (eCAMM) has now been approved for funding by the European Commission. eCAMM is formed by ERIC (European Research Institute of Catalysis) and EIMM (European Institute of Molecular Magnetism). The project started in 2012 and will run for four years.

Other information

Portfolio of patents for the development of magnetic nanoparticles and its coating. Such multifunctionality includes magnetic response, fluorescence, temperature determination and the grafting of elements for the anchoring of antibodies, proteins, drugs,... A major research effort is currently being oriented towards the biomedical uses of these products; however, applications in other areas are also be envisaged.

UNIVERSITY OF BURGOS

UNIVERSIDAD DE BURGOS

University | Technology Center | Other | SME | Big Industry

Capacities

characterization	**nanocomposites**	**nanosensors**	synthesis/func.	nanophotonics
nanobiotechnology	nanoadditives	nanometrology	**nanosimulation**	nanoencapsulates

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Contact:

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Group Director
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Organization profile

The University of Burgos (UBU) is located mainly within the Campus of San Amaro, which boasts an extremely fine historic and artistic enclave: the Hospital del Rey. A former hospital for pilgrims of the Road to Santiago, it was founded in 1195 by Alfonso VII. Within the university campus both the ancient heritage and the most avant-garde facilities and technology coexist in a perfect dialogue of harmony that favours both teaching and innovation. The scientific research activity of UBU is shared between the Science Faculties, the Higher Polytechnic School, the I+D+I institute, The Science and Technology Park, and two new research centres incorporating the most modern technologies: CIBA (*Centre for Research and Innovation in Biotechnology and Food Technology*) and CITI (*Centre for Innovation and Research in Industrial Technology*). The total built area comprises aprox. 140.000 m2, were almost 20.000 m2 are dedicated to research laboratories.

Both Nanotechnology and Materials Science are strong inside this institution. There are relevant groups working in microstructure characterization of materials, structural engineering and materials, simulation of materials like carbon nanotubes and graphene. Strong collaboration among faculties and departments ensures optimal use of knowledge and equipment.Note that the I+D+I centre and the CITI count with modern research infrastructure and equipment. In particular, and of interest to this project, precise instrumentation to work in materials science: NMR, AFM, TAC, XANES, SEM, TEM … among others. In addition, UBU and CITI are in a privileged position, both in terms of relationship and geographic location, to work in close contact with industry, one of the main pillars in technology transfer.

Main capacities in nanotechnology / nanoscience

The Dept. of Advanced Materials, Nuclear Technology & Nanotechnology has the following research lines:

- Multiscale simulation of advanced engineering materials.
- Multiscale simulation and design of Nanomaterials, Nano-compounds and Nano-devices.
- Design, optimization and simulation of Nanoporous metal foams.
- Design of advanced nanotechnological materials under extreme engineering conditions.

- Modelling and design of Nanolayers, surfaces and interfaces.
- Simulation of shock-wave propagation in the framework of nuclear technology and materials science applications. Inertial Fusion Target Designs. Experience as EU delegates for inertial fusion development.
- Design of self-healing materials (nanostructured metal alloys).
- Design and Lifetime estimation of structural materials via advanced modelling. Engineering properties of materials estimation and prediction.

Nanosafety, Nano-toxicity, Genetic and proteomic assays regarding BIO/NANO-TOXICITY.

Main related relevant activities / projects

The Dept. of Advanced Materials, Nuclear Technology & Nanotechnology play a catalytic role in the industrial network surrounding the region. We have developed a strong program of interaction between industry and academics, giving rise to permanent collaborations and successful research contracts. In particular, our group has already signed two agreements with international engineering companies in the fields of Radiation Safety Nano-solutions and Advanced Nano-Materials development.

At present, we are carrying out an international EU-FP7 project *RADINTERFACES:* FP7-NMP-2010-SMALL-4. VII Framework Programme UE, Grant Proposal No. 263273-2. This project is devoted to the development of new nanostructured materials with self-healing properties and enhanced radiation damage resistance.

We have recently implanted a line of Bio-Nanosafety. Implementing toxicity assays of nanomaterials and nanocompounds in mammal and model cells.

We have long experience inside the European Union Framework Program. We have participated in Materials/Nano-materials design and development in the following actions:

- European Union 5th Framework Program of EURATOM “Prototype Design Study – Experimental Accelerator Driven System (PDS-XADS)”, reference FP5-EAECTP C, FIKW-CT-2001-00179.
- European Union 6th Framework Program of EURATOM “Transmutation on Adiabatic Resonance Crossing, TARC”.
- “HiPER: European High Power Laser Energy Research Facility (Preparatory Phase Study)”. Fp7-infraestructures-2007-1. VII Framework Programme UE, capacities work programme.

Other information

Currently our group is involved in the following proposals related to Nanotechnology:

- EU-FP7- NMP.2013.1.4-1. Development of an integrated multi-scale modelling environment for nanomaterials and systems by design. (IP UBU: S.Cuesta-López). 420.000 eur. (Under evaluation). 2013-2016.
- EU-FP7- NMP.2013.2.2-4. Materials solutions for durable energy-harvesters.(IP UBU: S.Cuesta-López). 330.000 eur. (Under evaluation). 2013-2016.
- EU-FP7- Capacities -Benefit for the SMES - NANOSAFEPRO: NANO SAFEty in PROduction technologies for SMEs. (IP UBU: S.Cuesta-López). 220.000 eur. (Under preparation). 2013-2016.

PABLO DE OLAVIDE UNIVERSITY- NANOSTRUCTURED SOLAR CELLS GROUP

University | Technology Center | Other | SME | Big Industry

Capacities

characterization | nanocomposites | nanosensors | synthesis/func. | **nanophotonics**

nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

Research group integrated in the Physical Chemistry Section of the University Pablo de Olavide, in Seville, Spain. Presently formed by two doctors and two PhD students. Focused on fundamental studies of dye-sensitised solar cells and other nanostructured photovoltaic devices, including modelling, numerical simulation of charge transport and photoelectrochemical characterization of solar cells devices and nanostructured thin films. Integrated in the CONSOLIDER-INGENIO network HOPE (www.consoliderhope.uji.es) and in the FQM-205 research group of the Andalusian Science System (PAIDI)

Recent (selected) publications by the group:

- Anta J.A., Guillén E., Tena-Zaera R., ZnO-Based Dye-Sensitized Solar Cells, Journal of Physical Chemistry C, 2012 116,11413–114253.
- Berger T., Anta J.A., IR–Spectrophotoelectrochemical Characterization of Mesoporous Semiconductor Films, Analytical Chemistry, 2012.
- Anta J.A., Electron transport in nanostructured metal-oxide semiconductors, Current Opinion in Colloid and Interface Science, 2012.
- Berger T., Anta J.A., Morales-Flórez V., Electrons in the Band Gap - Spectroscopic Characterization of Anatase TiO2 Nanocrystal Electrodes under Fermi Level Control, Journal of Physical Chemistry C, 2012.
- González-Vázquez J.P., Morales-Flórez V., Anta J.A., How Important is Working with an Ordered Electrode to Improve the Charge Collection Efficiency in Nanostructured Solar Cells?, Journal of Physical Chemistry Letters, 2012, 3, 3, 386–393.
- Guillén E., Peter L.M., Anta J.A., Electron Transport and Recombination in ZnO-based Dye Sensitized Solar Cells, Journal of Physical Chemistry C, 2011, 115, 22622-22632.
- Navas, J., Guillén E., Alcántara, R., Fernández-Lorenzo, C., Martín-Calleja, J., Oskam, G., Idígoras J., Berger T., Anta J.A., Direct estimation of the electron diffusion length in Dye-Sensitized solar cells, The Journal of Physical Chemistry Letters, 2011, 2, 1045-1050.

- Guillén E., Azaceta E., Peter L., Zukal A., Tena-Zaera R., Anta J.A., ZnO solar cells with an indoline sensitizer: a comparison between nanoparticulate films and electrodeposited nanowire arrays, Energy & Environmental Science, 2011.
- González-Vázquez J.P., Anta J.A., Bisquert J. Determination of the Electron Diffusion Length in Dye-Sensitized Solar Cells by Random Walk Simulation: Compensation Effects and Voltage Dependence, Journal of Physical Chemistry C, 2010, 114, 18, 8552–8558.

Main capacities in nanotechnology / nanoscience

- Numerical modeling and Monte Carlo simulation of charge transport in nanostructured metal oxides.
- Photoelectrochemical characterization of dye-sensitised solar cells and related devices: voltammetry, quantum efficiency, electrochemical impedance spectroscopy, intensity modulated photocurrent spectroscopy.
- Supporting techniques: FTIR-ATR, UV/vis, photoelectrochemical studies on nanostructured metal oxide thin films.

Main related relevant activities / projects

- Hybrid Optoelectronic and Photovoltaic Devices for Renewable Energy (HOPE) Financial source: National. Ministerio de Ciencia y Tecnología, HOPE CSD2007-00007 (Consolider-Ingenio 2010).
- Procesos fotoinducidos de transferencia de energía y carga en superficies nanoestructuradas: aplicaciones bioanalíticas y fotovoltaicas Financial source: National. Ministerio de Ciencia e Innovación (CTQ2009-10477, subprograma BQU).
- Desarrollo de materiales más eficaces para la captura y conversión de gases de efecto invernadero. Financial source: regional,: Consejería de Ciencia, Tecnología y Empresa, P07-FQM-02595, Junta de Andalucía.

Other information

www.upo.es/investiga/ccs

www.consoliderhope.uji.es

2.3. OTHERS

ARAGON INSTITUTE OF HEALTH SCIENCES (IACS)

Instituto Aragonés de Ciencias de la Salud

University | Technology Center | **Other** | SME | Big Industry

Capacities

characterization | nanocomposites | nanosensores | síntesis/func. | nanofotónica

nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

IACS is a public body attached to the Health Department of Aragon whose mission is to manage the knowledge in the health system of Aragon.

In order to achieve its objectives, IACS promotes and manages all research developed in health public centres, in addition to its own capacities and researchers. As a result, IACS strategy expands through a network composed of health centres, units, groups and professionals, promoting the interaction among them and fostering the production and translation of knowledge to the health system.

The members of this structure are joined by permanent agreements which encourage them to work together as an opened decentralized organization.

On the other hand, and in a complementary way, it keeps specific research agreements with University of Zaragoza. 120 research groups perform research through IACS, reaching 439 research projects in progress for 2011, including clinical trials.

IACS is currently shaping the Biobanco of Aragón, a decentralized biobank with a networked structure which allows every hospital to become a node of it, having their own biological samples collections stored to do research. This infrastructure is integrated in the National Biobank Network. In this line of work is also developed the clinical research, integrated in CAIBER.

Main capacities in nanotechnology / nanoscience

- Clinical research in several medical specialities as Oncology, Cardiovascular System, Digestive System, Ophthalmology, Rare Diseases, Neurology, Dermatology.
- Search of biomarkers through Genomics, Transcriptomics, Proteomics and Metabolomics Techniques.
- Screening of chemical compounds used for the identification of Chaperones and protein inhibitors or proliferation and cellular transformation regulator compounds.

- Biophysical proteins characterization.
- Culture and cellular characterization.
- Preclinical and Phenotypic Investigation in animal models, anatomophatological files.
- Main interesting available resources in the area: Two University Hospitals with 802 and 1306 beds to attend people.
- Clinical Research Units in the main Hospitals and Primary Care which promotes and give support in the clinical investigation. All of them are integrated in CAIBER.
- A biobank which has liquid and solid samples: Primary Dislipemia, Lysosomal Diseases, Haematological Neoplasms, Gastrointestinal Pathology, Aragon Workers Health Study (AWHS), Tumour Bank; all of them integrated in the National Biobank Network.
- Research Centre with important units in Surgery and Experimental Microsurgery in animals: pig, sheep, rabbit, rat and mouse and Animal Testing facilities: rat and mouse. Technical Services specialized in Transgenesis and Phenotypic (optical image and SPECT-CT, telemetry, metabolism, pharmacokinetics investigation and toxicology).
- Technical services specialized in Genomic, Proteomics, Microscopy, Culture and Cellular characterization and Pathological Anatomy.
- Management and Administration Support specialized in the administration and scientific promotion, support in european projects and Knowledge Transfer Office (OTRI).

Main related relevant activities / projects

IACS participates, with the University of Zaragoza in the Biomedical Research Networking centre in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN).

It also collaborates with researchers from the Nanoscience Institute of Aragon, through its clinical expertise.

Other information

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EUROPEAN THEORETICAL SPECTROSCOPY FACILITY

University | Agency | SME | **Network** | Big industry

Capacities

caracterización | **nanocomposites** | **nanosensores** | síntesis/func. | **nanofotónica**
nanobiotecnología | **nanoaditivados** | nanometrología | **nanosimulación** | **knowledge mng.**

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Organization profile

The European Theoretical Spectroscopy Facility is a research network and e-infrastructure dedicated to providing support and services for ongoing research in academic, government and industrial laboratories. Comprised of 68 research teams across Europe and the United States, the ETSF carries out state-of-the-art research on theoretical and computational methods for studying electronic and optical properties of materials. All fields in need of knowledge about electronic excitations, transport and spectroscopy can benefit from the ETSF, such as condensed matter physics and chemistry, biology, materials and nanoscience. The ETSF gathers the experience and know-how of more than 200 researchers in Europe and the United States, facilitating innovation and rapid knowledge transfer.

Main capacities in nanotechnology / nanoscience

- Nanostructures, nanotubes, nanocapillarity
- Biophysics
- Electronic and thermal transport
- Nanoplasmonics
- Extended systems: solids, surfaces, liquids, and application to photovoltaics
- Open quantum systems
- Strong light-matter interaction and optimal control theory
- Theory development, scientific computing, scientific software engineering
- Training and dissemination

Main related relevant activities / projects

- Semiyearly call for projects needing scientific and/or technical support
- Software Suite: Abinit, APE, AtomPAW, BigDFT, Elk, Exciting, Octopus, Yambo
- LibXC: library of exchange-correlation functionals for density-functional theory calculations
- Databases of pseudopotentials and atomic datasets
- Organisation of international workshops and tutorials

Other information

The ETSF User Community is fundamental to the purpose of the ETSF in widening access to knowledge and expertise in the field of electronic excitations. It is composed of anyone from the public or private sector who has a need to engage with this field. Users are, for example, experimental researchers needing theoretical input into their work, or companies with a need for the specialised resources that ETSF can provide to help developing new products.

The ETSF offers a wide variety of ways of sharing knowledge, depending on the expertise and needs of the user: it covers support for use of specialised software, training of a member of the user's organisation, as well as undertaking of a fully-collaborative project or a service provision in which the user is the customer. Users are also supported through online resources and by an ongoing series of workshops and training events.

MADRID SCIENTIFIC PARK FOUNDATION (PCM)

University | Technology Center | **Infrastructure** | SME | Big Industry

Capacities

characterization | nanocomposites | nanosensores | síntesis/func. | nanofotónica
nanobiotechnology | nanoadditives | nanometrology | nanosimulation | nanoencapsulates

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Organization profile

The PCM has a system for full assistance service to the entrepreneur and for technology company incubation, which provides them with quality spaces and a wide range of professional services to supplement R&D, essential for the feasibility of any business project.

PCM's Business Development Model is consolidated as a national and international leader as regards the creation and incubation of companies, structured in three levels of direct support to the entrepreneurs according to the development stage of their business project, in order to make the technology transfer process in public research more agile and profitable, to attract the R&D of innovating companies to the universities, and to promote cooperation between the universities, the public research agencies, and the business sector.

Main capacities in nanotechnology / nanoscience

The PCM has 21 laboratories from 20 m^2 to 130 m^2 for the incubation of NANO companies, available 24 hours, 365 days a year.

All the rooms are equipped with basic furniture, supplies, access to Internet, free access to electronic scientific journals and specialized press, parking lots, security, cleaning service, meeting rooms, training classrooms, warehouses, lounges, and audiovisual media.

Furthermore, PCM offers the following services:

- Access to scientific equipment and regular technical laboratories.
- Online store with laboratory material and services.
- Used equipment.
- Sample crio-protection service.
- Gas and dry ice supply.
- Washing and sterilization of lab material and preparation of instruments.
- Biological and chemical waste management.

- Access to scientific publications and library materials.
- Training on equipment and techniques.
- Access to services / information about commercial agreements.

In addition, there is a series of secretarial services, such as distribution of regular mail and packages, general maintenance, fax sending and reception, bookbinding, call service, assistance for visitors, document scanning, and reprographics.

The integral support system for the companies associated with the PCM offers, in addition to quality space, a series of business assistance services in the following business areas in order to increase the possibilities of success of the starting business projects:

- Financial management and projects
- Business development
- Technology Marketing and Transfer
- Human Resources
- Communication
- IT
- Quality
- Innovation Management

Main related relevant activities / projects

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Other information

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nanoBasque Agency-SPRI

	University	Technology Center	Agency	SME	Big Industry
Capacities					

characterization	nanocomposites	nanosensores	síntesis/func.	nanofotónica
nanobiotechnology	nanoadditives	nanometrology	nanosimulation	**knowledge mng.**

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Organization profile

NanoBasque Agency, part of SPRI, is the instrument set up by the Department of Industry, Innovation, Trade and Tourism of the Basque Government to facilitate the deployment of the nanoBasque Strategy, industrial diversification strategy based on nanoscience, micro and nanotechnologies.

The nanoBasque Agency is the dialogue and contact point for companies and scientific, technological, political social stakeholders that seek to consolidate the transfer of knowledge and the creation of new business opportunities. The Agency assumes the functions of mobilising Basque businesses, organising a knowledge community and raising the profile in society of the value of nanoscience and micro and nanotechnologies.

Main capacities in nanotechnology / nanoscience

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Main related relevant activities / projects

- Supporting Basque nanoscience, micro and nanotechnologies Innovation System
- Micro and nanotechnologies active stakeholders coordination
- Monitoring of the scientific-technological and business activity in nanoscience, micro and nanotechnologies
- Assessment on nanoscience, micro and nanotechnologies support policies
- Communication and dissemination

Other information

-

RED NANODYF

University | Agency | SME | **Network** | Big industry

Capacities

caracterización | nanocomposites | nanosensores | síntesis/func. | nanofotónica
nanobiotecnología | nanoaditivados | nanometrología | nanosimulación | **knowledge mng.**

Address:

IBEROAMERICAN NETWORK NANODYF – CYTED

http://www.nanodyf.org/

Contact:

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Organization profile

Iberoamerican Network "Jose Roberto Leite" on Dissemination and Training in Nanotechnology, NANODYF (www.nanodyf.org) belongs to area 6 Science and Society of the Iberoamerican Program of Science and Technology for Development, CYTED (www.cyted.org). As its name says, the network's mission and objectives developing dissemination of Nanoscience and Nanotechnology to large masses of people in the Iberoamerican Region, as well as the development of training activities at various educational levels, from secondary education to all variants of university undergraduate and graduate studies.

Main capacities in nanotechnology / nanoscience

The network consists of 14 groups from Spain, Portugal, Cuba, Mexico, Costa Rica, Colombia, Venezuela, Peru, Brazil, Argentina and Chile. NANODYF Network´s Groups members are groups of teachers and researchers from universities and research centers with over 20 years of experience in the field of research and development of Nanoscience and Nanotechnology. Research fields of researchers and teachers from different groups ranging from basic research (theoretical and experimental), applied research, technological developments to some possible industrial innovations. The diversity of different group capabilities encompasses all the capabilities listed above on this form. In addition to teach and research in all groups members of NANODYF Network, they have joined in order to diagnose the state of the dissemination and training in nanotechnology in a representative group of countries in the Iberoamerican region, and finally propose a regional strategy to achieve Iberoamerican population to a nanoeducación appropriated to the scientific and technological present challenges due to the many applications of nanotechnology.

Main related relevant activities / projects

Each group member of the NANODYF Network has its own research projects in different areas of nanoscience and nanotechnology, according to their experience and human and material resources. All of which can be seen in detail in the link "members" www.nanodyf.org website.

The specific objectives of the Network NANODYF are:

- Promote scientific and scientific-methodological stable and continuous interactions between components groups of the network (current and future) in the dissemination and training in Nanoscience and Nanotechnology.
- Perform exchanges of information on national, regional and institutional plans on dissemination and training published as part of the content of the web site of the network
- Allow synergistic enhancement of the activities between the groups in the Network, which allows to perform collaborative actions needed to complete diagnostic work on the dissemination of Nanoscience and Nanotechnology to the general public and to detect their presence in themes, subjects and specializations of the different levels of education, from primary to university levels.
- Support and fund exchanges of specialists of the groups participating in the network as visiting researchers with expertise in popular dissemination of nanotechnology and / or teaching of topics, subjects, Masters and Doctorates address in Nanoscience and Nanotechnology, content or programs closely related to these matters.
- Hold conferences, workshops, meetings between specialists belonging to the network in order to enrich the individual work of the groups and the projection of future joint work.
- Identify, by interaction with companies accessible to participating groups, the professional profiles necessary for the scientific and technical personnel in technology companies that use, implement and/or develop products and/or services based on the current and future advances in nanotechnology.
- Identify possible future lines of Project Coordination Actions for designing Iberoamerican strategies on dissemination of nanotechnology, as well as contained within subjects, teaching modules in curricula of university degrees and/or specific degrees in Nanotechnology.

Other information

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