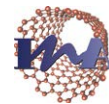


INSTITUTE OF NANOSCIENCE OF ARAGON

TECHNOLOGY TRANSFER



Instituto Universitario de Investigación
en Nanociencia de Aragón
Universidad Zaragoza

The Institute of Nanoscience of Aragon (INA) is an interdisciplinary research institute at the University of Zaragoza (Spain)



INA is dedicated to R&D in nanoscience and nanotechnology. Its activities are based on manufacturing and processing of micro and nano scaled structures and studying their application, in collaboration with companies and technological centers from different areas and activity sectors.

TECHNOLOGY TRANSFER

INA attaches great importance to knowledge transfer between research centers and industry to create innovative ideas and solutions.

The Institute is focused on applied research, trying to meet the technological needs of the industry and providing the best and most advanced solutions in the nanotechnology field for each project.

INDUSTRIAL APPLICATIONS

Nanotechnology is a transversal field with a broad potential in different application sectors:

- ▶ Biomedical & Pharmaceutical Industry
- ▶ Chemical Industry
- ▶ Textile & Footwear
- ▶ Plastic & Polymer Industry
- ▶ Energy
- ▶ ICT & Electronics
- ▶ Environment
- ▶ Nanohealth & Safety
- ▶ Surface Treatments
- ▶ Smart Systems

BIOMEDICAL & PHARMACEUTICAL INDUSTRY

- ▶ Drug delivery systems to treat specific areas and tumors in patients.
- ▶ New cancer therapies based on magnetic hyperthermia.
- ▶ Nanotoxicity: Biocompatibility surveys / Biodistribution and cytotoxicity of nanoparticles.
- ▶ Nanomaterials and biomaterials for biomedical applications: Synthesis and characterization of different types of nanoparticles, biomaterials and biological samples.

- ▶ Development of new biosensors to control different clinical parameters such as cholesterol, glucose, virus presence, specific hormones quantification, etc.
- ▶ Biomedical identification systems: New diagnosis systems using genomic and proteomic techniques / Identification of new tumour markers / New contrast agents for medical imaging based on magnetic nanoparticles.

CHEMICAL INDUSTRY

- ▶ Design, fabrication and characterization of chemical sensors (electronic noses).
- ▶ Design, fabrication and characterization of micro-chemical reactors for environmental applications and chemical synthesis.
- ▶ Development of new nanomaterials and compounds to be used in a wide number of sectors: textile, biomedicine, polymers, environment, energy, etc..
- ▶ Encapsulation of different substances into porous materials (silicas, zeolites, MOFs).

TEXTILE & FOOTWEAR

- ▶ Development of capsules incorporating vitamin E and other additives to be used in textile industry.
- ▶ Design and characterization of new nanomaterials to produce fibers with new properties: anti-moisture, anti-stain, anti-bacterial, etc..
- ▶ Development of embedded sensors into the fibers to measure vital signs of the body.

PLASTIC & POLYMER INDUSTRY

- ▶ Polymer nanocomposites with improved properties: electrical, optical, magnetical and bactericidal.
- ▶ Nanocoatings based on mono/multilayer of organic compounds with defined molecular architecture.
- ▶ Polymeric fibers with micro and nanoencapsulation. Molecule releasing textiles.
- ▶ Composites with enhanced barrier effect.
- ▶ Composite membranes using silicas, layered materials, zeolites and MOFs with enhanced gas & liquid (PV & NF) separation properties.

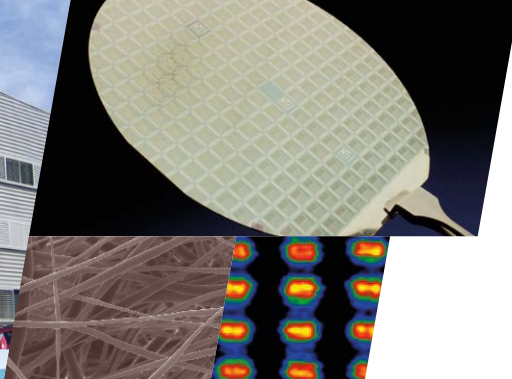


ENERGY

- ▶ Research focused on optimizing efficiency and performance of renewable energy sources.
- ▶ New systems to improve the desalination and treatment of water.
- ▶ Development of micromembranes for hydrogen production in fuel cells.
- ▶ New devices based on spin thermoelectricity to recover energy.
- ▶ Novelty systems to eliminate toxins and pharmaceutical agents in water.

ICT & ELECTRONICS

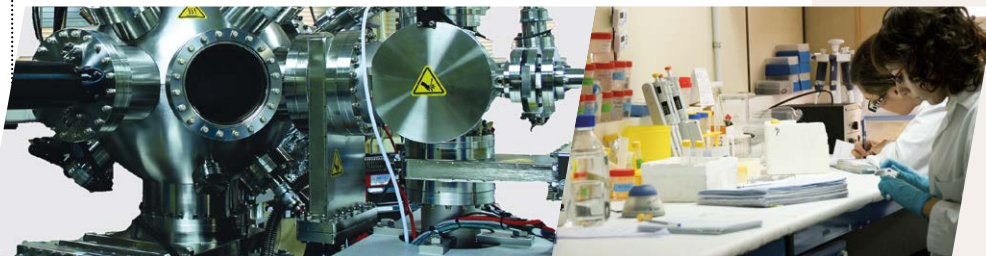
- ▶ MEMS and NEMS (Micro and Nano-Electro-Mechanical Systems) to measure different contaminants in the environment.
- ▶ New nanoelectronic sensors and biosensors molecules and compounds useful in diagnosis: magnetoresistive sensors for quantitative pregnancy test and glucose sensors, among others.
- ▶ Micro- and nanofabrication using optical lithography and focused beam of electrons and ions in clean room.



- ▶ Design, manufacturing and repairing of microcircuits.
- ▶ Study and development of new systems based on magnetoresistance to increase the storage capacity of hard drives and other data storage devices.

ENVIROMENT

- ▶ Solutions focused on environmental monitoring, impact reduction and removal of contaminants.
- ▶ Development of high sensitivity gas sensors capable to capture and detect TNT explosives and other Volatile Organic Compounds (VOCs) such as hexane, toluene, etc..
- ▶ Systems based on nanostructured materials covering membranes and filters to capture and remove pollutants from the environment using adsorption technologies.
- ▶ Solutions aiming at reducing climate change impact, such as new structures to capture and remove CO₂.
- ▶ Research and development of drug delivery systems in plants to detect and prevent plagues and undesirable agents.



NANOHEALTH & SAFETY

- ▶ Characterization of nanoparticle dispersions and aerosols in controlled environments.
- ▶ Monitoring of nanomaterials behavior in occupational settings and in natural environments.
- ▶ Design of protocols and procedures for a safe handling of nanomaterials.
- ▶ Labelling and traceability of nanomaterials.

SURFACE TREATMENTS

- ▶ Design of thin films and surface coatings to provide advanced properties to products: high corrosion resistance, mechanical reinforcement, antibacterial, flame retardant, magnetic properties, etc.
- ▶ Characterization and functionalization of nanopaints, adhesives and general coatings for a wide variety of industrial applications as surfaces of ovens, molds, cables, appliances, bearings, etc., in sectors as automotive, aerospace, jewelry, furniture, packaging or ceramic industry among others.
- ▶ Laboratories equipped with the most relevant techniques: pulsed laser ablation (PLD), sputtering, epitaxial growth by molecular beam techniques (MBE) and chemical vapor deposition assisted by plasma (PECVD).

SMART SYSTEMS

- ▶ R&D in new concepts of intelligent systems based on sensors and actuators, industrial application of the thermoelectricity and spintronics or new generation and energy transfer methods.

INFRASTRUCTURES

INA has a complete set of laboratories equipped with latest-generation devices, providing to the companies R&D services with the most advanced technologies for synthesis, characterization and study of material properties:

Thin film growth / Lithography / Local probe microscopy / Electron microscopy / Biomedical applications / Synthesis and functionalization of nanosystems / Characterization of nanostructures.

As part of the infrastructures, the Advanced Microscopy Laboratory (LMA) is worth mentioning.



ICTS

ADVANCED MICROSCOPY LABORATORY (LMA)

LMA represents a unique initiative nationally and internationally. Its aim is to provide the scientific community with the most advanced existing equipment and infrastructures in local probe and electron microscopy for the observation, characterization, nanopatterning and handling of materials at atomic level, as well as a wide range of scientific tools devoted to characterization, processing and handling procedures at nanometer scale.

Its location within the Institute of Nanoscience of Aragón (INA) guarantees an environment of associate infrastructures and excellence scientific and technical human resources which, together with the unique equipment of LMA, will boost research capacity in nanoscience in Spain, as well as in the development of new associate technologies.

Among the LMA equipment, it is worth mentioning the Transmission Electron Aberration-Corrected Microscopes (TITAN), currently the most advanced microscopes.

LMA has been recognized by MINECO (Ministry of Economy and Competitiveness) as a Singular

Scientific-Technical Infrastructure (ICTS) in Spain. This recognition implies that LMA belongs to the exclusive group of scientific strategic facilities prepared to carry out R&D work of international excellence, providing service to the scientific and industrial community.



SPIN-OFF COMPANY ACTIVITIES

Two spin-off companies have been the result of the technology transfer plan of the INA:



NanoScale Biomagnetics nB: technology-based company dedicated to the design and production of scientific and biomedical instrumentation. Founded in 2008, nB introduced in 2010 their field applicators and accessories for inductive heating experiments of nanostructured materials, whose main application is in the field of magnetic hyperthermia.

www.nbnanoscale.com



Nanoimmunotech: first European company in the field of nanobiotechnology, dedicated to biological and physical characterization and chemical conjugation of nanoparticles and products containing them. Founded in 2009 and recognized as EIBT [Company of technological innovation].

nanoimmunotech.eu

HIGHLIGHTED PROJECTS WITH INDUSTRY



NATIONAL PROJECTS

CAPHITEX. Hybrid capsules for functionalization of new textile fibers.
IPT-2011-0878-420000.

Companies: NUREL & GRUPO IQE.
INNFACTO. MINECO

HELLO KIT. Development of a universal remote controlled kit for drug delivery via magnetic hyperthermia for oncology applications.
IPT-2012-0212-010000.

Companies: NANOSCALE BIOMAGNETICS & ORYZON GENOMICS & NANOIMMUNOTECH.
INNFACTO. MINECO

IMMUNOSWING. Nanomechanic sensor for lung cancer diagnosis.
IPT-2011-0821-010000.

Companies: PROTEOMIKA & MECWINS.
INNFACTO. MINECO

Development of new technologies for recovery, purification and liquefaction of helium adapted to hospitals, companies and research centers.

IPT-2012-0442-420000.

Company: INTEGRACION Y CONTROL.
INNFACTO. MINECO

HYDROCESPED. Development of a new turf fiber with hydrophilic properties.

IPT-2011-1560-420000.

Company: MONDO TUFTING.
INNFACTO. MINECO

NANOSENSOR. Smart lampposts with nanosensors for monitoring the air quality. IPT-2012-0749-31000.

Companies: TELNET REDES INTELIGENTES & SARGA.
INNFACTO. MINECO

NANOPTSEG. Development of smart printing inks based on nanoparticles for anti-counterfeiting purposes.

IPT-2012-0764-420000.

Company: TIPOLINEA.
INNFACTO. MINECO

Development of Immuno-Magnetic Biosensors with mono and multi analyte quantification.

IPT-010000-2010-0002.

Company: CESTEST BIOTECH.
INNFACTO. MINECO

Research and development of granular systems on industrializable substrates targeted to obtain new robust sensors without contact and low cost.

IPT-420000-2010-21.

Company: ACP.
INNFACTO. MINECO

INTERNATIONAL PROJECTS



ESTEEM2 ▶ Integrated infrastructure network of electron microscopy facilities providing access for the academic and industrial research community.
FP7-Cooperation.



M4CO2 ▶ Mixed matrix membranes for CO₂ capture.
FP7-Cooperation.



NANOVALID ▶ Development of new reference methods and certified reference materials.
FP7-Cooperation.



ZEOCELL ▶ Nanostructured electrolyte membranes based on polymer / ionic liquids / zeolite composites for high temperature PEMFCs.
FP7-Cooperation.



GRAPHENE FLAGSHIP ▶ European Commission initiative focused on the development of graphene and related two-dimensional materials.
EU FLAGSHIP Programmes.



DENDREAMERS ▶ Synthesis of new materials, resource for new applications.
FP7-Cooperation.



SASSYPOL ▶ Hierarchical self assembly of polymeric soft systems.
FP7-Cooperation.



TRAIN² ▶ Transpyrenees Action on Advanced Infrastructures for Nanosciences and Nanotechnologies.
SUDOE Interreg IV B.





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