

# NANBIOSIS



Infrastructure on Production and  
Characterization of Nanomaterials,  
Biomaterials and systems in  
Biomedicine

# WHO ARE WE?

Infrastructure on Production and characterization of Nanomaterials, Biomaterials and systems in Biomedicine

## In a nutshell...

**NANBIOSIS** is a **Research Infrastructure (RI)** specialised in the design and production of **nanomaterials, biomaterials** and **devices to the preclinical validation.**



## NANBIOSIS main TOP services include:

- **Design** and **production** of **customized biomolecules.**
- Design and **production** of **nanomaterials, nano(bio)conjugates** and **nano-enabled drug delivery systems. Preclinical Validation** from a physicochemical, functional, toxicological and biological point of view.
- Design and **production** of biomaterials by 3D printing, **implants**, surface **coatings** and **Preclinical Validation** from a physicochemical, functional, toxicological and biological point of view.
- Development and Validation of **Diagnostic systems and devices.**

115 Scientists linked to ICTS

1600 Projects since 2008

6000 Services since 2008

4000 Publications since 2008

315 Citations since 2015

32M€ Investment

## ICTS



**NANBIOSIS** is a distributed **ICTS** (Singular scientific and technical infrastructures) accredited by the Spanish Government

## NANBIOSIS is composed by:

**ciber-bbn**

Centro de Investigación Biomédica en Red  
Bioingeniería, Biomateriales y Nanomedicina

Bioengineering, Biomaterials and  
Nanomedicine Networking Biomedical  
Research Centre



Centro de Cirugía de Mínima Invasión  
Minimally Invasive Surgery Centre  
Jesus Usón

Jesus Usón Minimally Invasive Surgery Centre

**bionand**  
Centro Andaluz de  
Nanomedicina & Biotecnología

Andalusian Centre for Nanomedicine and  
Biotechnology

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# YOUR RESEARCH INFRASTRUCTURE OF SCIENTIFIC EXPERTISE

Able to support you in the development of innovative solutions

## OUR MISSION

Provide **services and solutions** to the scientific community and companies ranging from **SMEs** to mid and large **Pharmaceutical, Biotech and Medtech** companies.

Biotech Sector



MedTech Sector



Pharmaceutical Sector



## OUR STRENGTH

Collaboration with research centres of scientific excellence to cover the value chain in the **development of innovative solutions.**

## CUTTING EDGE BIOMEDICAL SOLUTIONS

*for*

PHARMACEUTICAL PRODUCTS

MEDICAL DEVICES

IN VITRO DIAGNOSTIC

Customized biomolecules production & Validation

Customized nanomedicines production & Preclinical Validation

Customized biomaterials production & Preclinical Validation

Diagnostics Devices Development & Validation

# OUR UNIQUE VALUE PROPOSITION

NANBIOSIS is a dual entity: a Research Infrastructure with an academic spirit of scientific excellence

## Research Infrastructure

NANBIOSIS offers cutting edge biomedical services and solutions for entrepreneurs and pharmaceutical companies, from molecules production to pre-clinical validation. This profile allows NANBIOSIS to ensure continuity and quality in the provision of drug, medical devices and in vitro diagnostics development services.

## Our scientists

The main value of NANBIOSIS are its highly qualified and experienced scientists. The scientists that execute the services offered by NANBIOSIS also perform basic research and are at the vanguard of their field, a differentiative value in comparison with other providers of services.

## Being an ICTS

Access to public funds for the continuous improvement and updating of infrastructures. By contracting a service, our clients can benefit of this excellence

## Standard of Quality

NANBIOSIS is capable of offering their services with the standards of quality required in the pharmaceutical, biotech and medtech sector.

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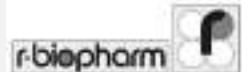
32M€  
Investment

# NANBIOSIS PORTFOLIO OF CLIENTS

We have extensively worked with the pharmaceutical, medtech and biotech sector

**NANBIOSIS** has worked with SMEs, mid and large pharmaceutical companies in the areas of **drug delivery, biomaterials and regenerative medicine.**

## Mid and large pharmaceutical companies:



## SMEs in the pharmaceutical and biotechnology sector

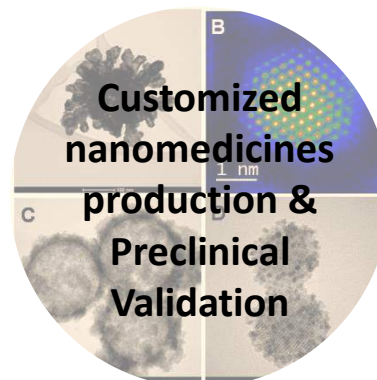
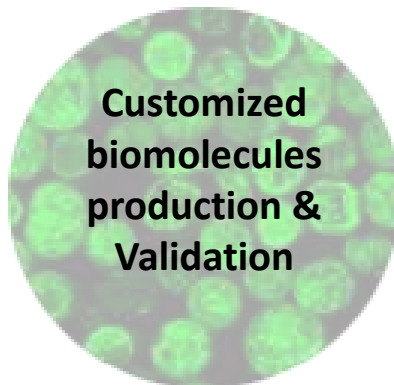


# CUTTING EDGE BIOMEDICAL SOLUTIONS

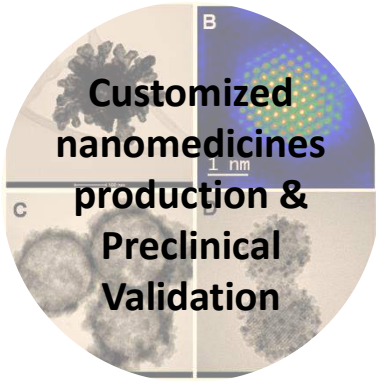
## *NANBIOSIS' highlighted services*

*A new line of action has been launched named **Cutting-Edge biomedical solutions**, where **integrated solutions** are offered to advance challenges in **nanomedicine, tissue engineering and regenerative medicine, diagnostic and medical devices sector.***

NANBIOSIS CUTTING EDGE BIOMEDICAL SOLUTIONS



# OUR SOLUTIONS

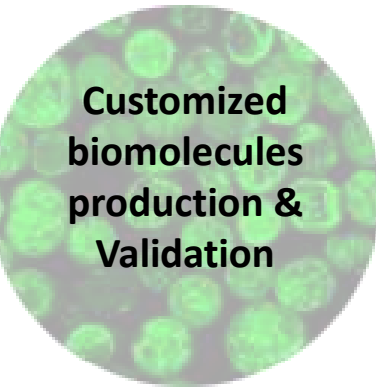


## Design & Production of nanomedicines

Supply nanomaterials, nanoconjugates and nanoencapsulation of active ingredients for applications in Nanomedicine: therapy, drug delivery, contrast agents (MRI, fluorescence) , theragnostic & reagents.

## Preclinical Validation

Preclinical characterisation of nanomedicines including physicochemical properties, *in vitro* and *in vivo* biological properties. Immunology, toxicology and efficacy with appropriated animal models, at either regulatory (cGLP) or non-regulatory conditions. Biodistribution and metabolization follow up in animal models by NMR spectroscopy in tissues & biofluids.



## Design & Production of biomolecules

Customized design and production services of biological molecules for Tissue Engineering, Intelligent Devices, Implants, and specially Therapeutic Nanoconjugates and Biosensors reagents. Applications such as therapeutic agents, targeting, surfaces functionalization (tissue engineering or scaffolds and biosensors), IVD reagents.

## Validation

Purification, characterization, chemical modifications and preservation of the developed biomolecules. Assays development and validation. Biomolecules functionalization and up-scaling.



## Design & Production of biomaterials

Design and production of scaffolds for tissue engineering using 3D printing technologies and others.

## Preclinical Validation

Preclinical validation of biomaterials, implants and surface coatings including surface and mechanical characterization and *in vitro*, *biofilm* and *antibacterial properties studies of implants* and *in vivo* biological properties with appropriated animal models, at either regulatory (cGLP) or non-regulatory conditions.



## In vitro diagnostics & biomarkers & organ-on-a chip

Development and validation of prototypes, biosensing devices, organ-on-a chip devices for diagnostic. Production of bioreceptors against identified biomarkers. Discovery of biomarkers for diagnostic, follow-up and prognostic of diseases by NMR spectroscopy in biofluids and tissues.

## In vivo Bioimaging diagnostics & Validation

In vivo validation of contrast agents and development of nanoconjugates as contrast agents for MRI and fluorescence.

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# CUSTOMIZED NANOMEDICINES PRODUCTION & PRECLINICAL VALIDATION

**NANBIOSIS** supplies customized design and production of nanomaterials, nanoconjugates, nano-enabled drug delivery systems and other innovative drug delivery systems. Preclinical characterization of these products can be performed, including physicochemical properties, in vitro and in vivo biological properties (immunology, toxicology and efficacy with appropriated animal models), **at either regulatory (cGLP) or non-regulatory conditions.**

## Main Services are:

- **Production of nanomaterials, nanoconjugates, nano-enabled drug delivery systems and other innovative delivery systems such as** nanoliposomes, quatsomes, metallic nanoparticles, Au nanoparticles, solid-lipid nanoparticles, polymeric nanoparticles, extracellular vesicles, targeted nanomedicines, among others.
- **Design and production of pure active pharmaceutical ingredients, a wide range of pharmaceutical dosage forms i.e pulmonary delivery and others** with controlled micro and nanostructure.
- **Physicochemical characterization of nanomedicines:** size distribution, composition, purity, surface characteristics or stability, among others, with state-of-the-art equipment and our internationally-renown scientists.
- **In vitro Characterization of Nanomedicines:** immunology, cytotoxicity, haematology or oxidative stress, among others adapted to each client's needs, with state-of-the-art equipment and our internationally-renown scientists.
- **In vivo Characterization of Nanomedicines.** Studies of nanomedicines are conducted in animals (large white pig, sheep, goat, beagle dog, minipig, rabbit, rat and mouse) utilizing a variety of models and imaging techniques (fluorescence, bioluminescence, TAC, MRI, NMR, CT or Ultrasonography) and a wide variety of analysis.

*(at either regulatory (cGLP) or non-regulatory conditions)*



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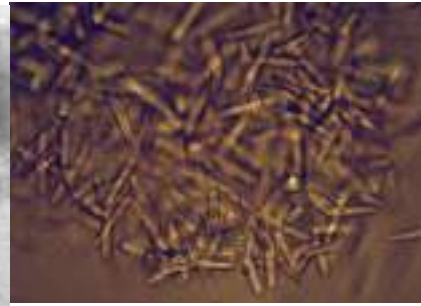
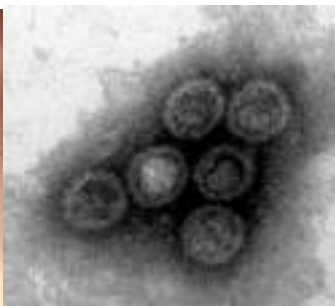
# BIOMOLECULES PRODUCTION & VALIDATION

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**NANBIOSIS** supplies customized design and production of biological molecules necessary for the development of projects in the frame of the strategic lines of **Tissue Engineering, Intelligent Devices, Implants,** and specially **Therapeutic Nanoconjugates and Biosensors.**

## Main Services are:

- **Production of antibodies and design and synthesis of haptens:** customized antibodies (monoclonal and polyclonal) for clinical applications.
- **Production of peptides.** Development and design of specific peptides to be bound to therapeutic nanoconjugates or peptide drug conjugates.
- **Production of anti-peptide antibodies as a diagnostic tool:** Peptide sequence selection is likely the most difficult and critical step in the development of anti-peptide antibodies.
- **Production of recombinant proteins:** “Tailored” service for the design, production and purification of recombinant proteins using both prokaryotic and eukaryotic expression systems.
- **Production of protein-only nanomaterials and their characterization:** Engineered multifunctional proteins are generally easy to produce and purify allowing an easy and time saving screening of different protein building blocks for a wide range of applicability.
- **Production of oligonucleotides and its derivatives such as siRNA or DNA:** Microgram to milligram amounts of DNA and RNA derivatives carrying several modifications as well as oligonucleotide conjugates carrying lipids, membrane-receptor ligands, carbohydrates and peptides designed for therapeutic or diagnostic purposes.



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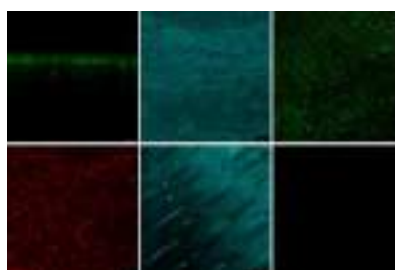
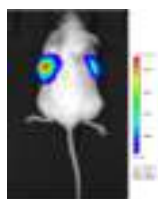
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# BIOMATERIALS PRODUCTION & PRECLINICAL VALIDATION

**NANBIOSIS supplies customized design and production of biomaterials by 3D printing and related techniques, as well as the complete Preclinical characterization of biomaterials, implants, prosthesis or surface coatings, including physicochemical properties, surface and mechanical characterization, microbial adhesion studies, in vitro and in vivo biological properties (immunology, toxicology and efficacy with relevant animal models), at either regulatory (cGLP) or non-regulatory conditions.**

## Main Services are:

- **Production of biomaterials and scaffolds by 3D printing.** Scaffolds and biomaterials production using different materials, and production techniques including the 3D bioprinting for regenerative medicine and tissue engineering.
- **Physicochemical characterization of biomaterials:** mechanical, surface composition and surface characteristics by using the most sophisticated equipment and taking advantage of the expertise of scientist internationally recognized in the matter.
- **Surface and Mechanical Characterization of Biomaterials,** including standard mechanical and surface composition studies.
- **In vitro Characterization of Biomaterials:** toxicity assays, bacterial adhesion and biofilm formation and antibacterial characteristics of materials by using the most sophisticated equipment and taking advantage of the expertise of scientist internationally recognized in the matter.
- **In vivo Characterization of Biomaterials:** NANBIOSIS offers a preclinical study plan tailored to meet the demands of each biomaterial based medical product, developed in collaboration with the user and starting from a set of basic analytical tests to more sophisticated experiments under either GLP and non-GLP conditions.
- **In silico modelling:** NANBIOSIS supplies expertise in customized computational solutions for different tissues (cardiovascular system, human eye and others). Mainly expertise in the numerical-experimental models and experimental electrophysiology processing and modelling in cardiology and modelling of functional behaviour of tissues and organs is offered.



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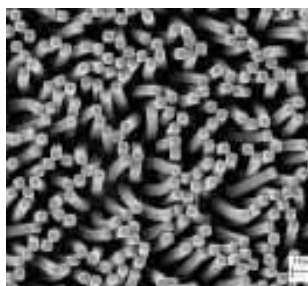
# DIAGNOSTIC DEVICES DEVELOPMENT & VALIDATION

## *In vitro* Diagnostics Devices & Biomarkers & Organ-on-a-chip

**NANBIOSIS** supplies the development and validation of prototypes, biosensing devices, organ-on-a chip devices for diagnostic. **Production of bioreceptors** against identified biomarkers. **Diagnosis of biomarkers** for diagnosis, follow-up and prognosis of diseases by NMR spectroscopies in biofluids and tissues.

### Main services are:

- **Affinity biomolecules production for diagnostics:** production and characterization of affinity receptors and reagents for *in vitro* diagnostic devices.
- **In vitro diagnostic Development & Validation.** Core Facilities in nanofabrication, biosensors development, microfluidics, bionano characterization and micro-nano technologies in Spain. NANBIOSIS supported the whole MNBS fabrication steps of the device and validation procedures of the developed IVD.
- **Biomarker's discovery:** Discovery and quantification of biomarkers by NMR. Singular facilities for acquiring unique metabolic profiles of biofluids, cell lines and tissues by NMR techniques and others.
- **Organ-on-a-chip devices development & Validation.** Experts in microfluidics for the device's development & validation. The customization of the technology needed, the design of the devices, the complete fabrication process, their encapsulation, micro electrodes incorporation and the characterization and test up to the technological support on the experimental uses. Several organ-on-a-chip devices have been developed based on organoids and IPSCells, scaffolds and others).
- **Data-enabled techniques:** Experts related to the use of personalized virtual and augmented reality for pre-intraoperative planning, data-intensive methodologies, artificial intelligence techniques (machine learning) for virtual patients' personalization (digital twins).



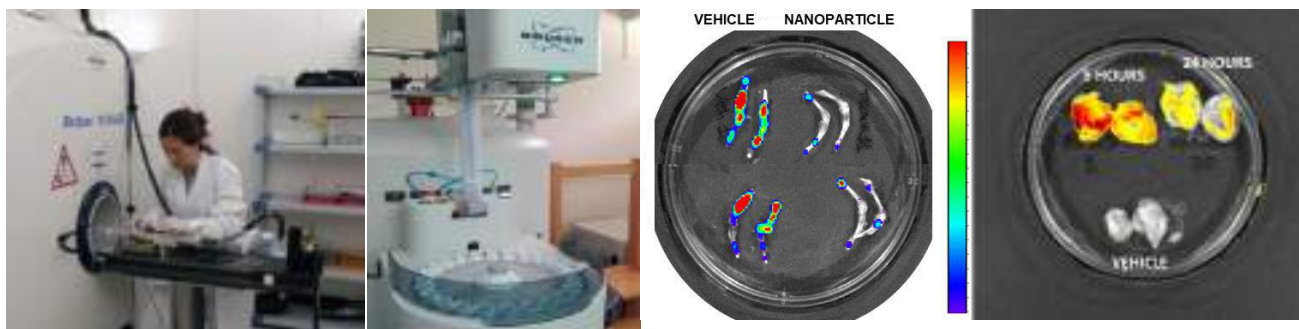
# DIAGNOSTIC DEVICES DEVELOPMENT & VALIDATION

## *In vivo* Bioimaging Diagnostics & Validation

NANBIOSIS supplies *in vivo* validation of contrast agents and development of nanoconjugates as contrast agents for MRI and fluorescence by providing services such as

### Main services are:

- **Nanoparticles as contrast agents for MRI and OCT:** NANBIOSIS approach offers novel synthetic strategies and experimental setup for the advanced preparation of a wide range of nanoparticles for MRI contrast agents.
- **Nanoconjugates for fluorescence:** NANBIOSIS approach offers novel synthetic strategies and experimental setup for the advanced preparation of a wide range of nanoparticles for fluorescence.
- **Validation of nanoparticles for glioma:** analysis of potential therapeutic agents to be used in glioblastoma.
- **Validation of contrast agent for MRI:** a complete pathway for synthesis, physicochemical characterization, biocompatibility and toxicity evaluation. Preclinical validation through magnetic resonance of new compounds with potential for contrast agents in magnetic resonance imaging (MRI).



# NANBIOSIS



Centro de Grupo de Mínima Inversión  
Minimally Invasive Surgery Centre  
Jesús Usón



In collaboration with

RESEARCH INSTITUTES



EXCELENCIA SEVERO OCHOA



Centre Nacional de Microelectrónica IMB



Institute for Bioengineering of Catalonia



Institut Català de Nanociència i Nanotecnologia

EXCELENCIA SEVERO OCHOA

HOSPITALS



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UNIVERSITAT DE VALÈNCIA



Universidad Zaragoza



UNIVERSIDAD DE EXTREMADURA



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