

Institute for Advanced Materials

InaMat

inamat@unavarra.es

www.unavarra.es/inamat

Contact: J. Iñaki Pérez-Landazábal (Director)

Public University of Navarra (UPNa)



InaMat

New research Institute created on November 2014

Objectives:

- Consolidate and activate **expertise and resources** in the field of **Science and Technology of Materials** for the development of the economic and social environment
- **International competitive:** increase the international collaborations on projects that involve Universities, Research Centers and Industrial Companies.

Multidisciplinarity

- 7 Departments
- 18 Research groups
- 41 senior researches

Optics

Chemistry

Sensors

Catalysis

Informatics

Nanotechnology

Acoustics

Physics

Biotechnology

Magnetic Materials

Metallurgy

Mathematics

Mechanical Engineering

Statistics and Operation Research



Human Resources and Production

41 Senior researchers

+

14 Junior researchers

- 1 Post-Doc
- 2 New Talent researchers
- Incorporation Call Technologists NG

Main indicators (data for 2012-2016)

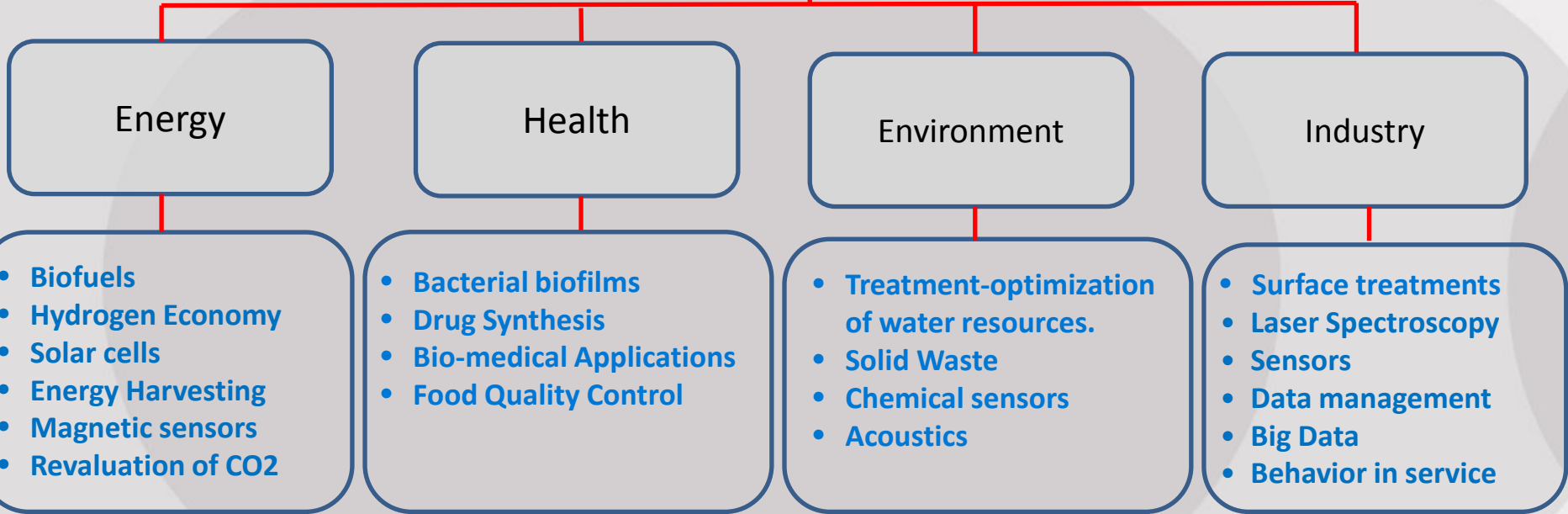
Number of Departments	7
Number of Senior researchers	41
Number of Collaborators	14
Number of PhD students	3
Projects with public funding	76
Public financing through projects	6.304.232 €
R & D contracts with companies	47
Private financing through projects	276.991 €
TOTAL number projects	123
TOTAL funding	6.581.223 €
Publications WoS	343
Priority patents + extensions	8

InaMat focuses its research activity in the following General Lines:

- **Materials: Alloys, Magnetic Materials, Polymers, Semiconductors**
- **Magnetic and electromagnetic devices.**
- **Catalysts, drugs, hybrid materials and surface functionalization**
- **Development of physical, chemical and bacterial sensors**
- **Mathematical modeling. Statistics and Big Data**

STRATEGIC Areas (Application)

Institute for Advanced
Materials
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Mathematical support (group theory, differential equations, statistics, finite elements, Monte Carlo simulation etc.)



Some specific research Lines (basic)

- Electromagnetic design.
- Functional nanoparticles.
- Giant Magneto-impedance, magneto-induction and magneto-elasticity
- Ferromagnetic Shape Memory Alloys
- Hyperthermia.
- Magnetic nanoparticles.
- Xerogels.
- Surface functionalization.
- Catalyst and Chemical Reactors. Immobilized catalysis.
- Heterogeneous photo oxidation and absorption processes.
- Science of Color (brilliance, metamerism, etc.).
- Laser-induced breakdown spectroscopy.
- Data treatment. Mathematical models.
- Molecular modeling for chemical and biological activity design.
- Molecular Antennas.
- Surface engineering.
- Bacteria Biofilms.
- Asymmetric synthesis
- Corrosion and mechanical properties

- Promote the **Research in the field of materials** technology oriented to solve the challenges of society and make InaMat a reference in the field.
- Define the own **strategic future lines** of the institute and its consolidation (Internal Collaboration).
- Promote the **collaboration** with Private Companies, Universities and Research Centers.
- Increase the number of **Young Researchers** (collaborators and PhD students)

Materials Characterization Skills

Processing

Microstructure

Properties

Nanoscopic



Microscopic



Mesoscopic



Macroscopic

Å

nm

μm

mm

m

10⁻¹⁰

10⁻⁰⁹

10⁻⁰⁸

10⁻⁰⁷

10⁻⁰⁶

10⁻⁰⁵

10⁻⁰⁴

10⁻⁰³

10⁻⁰²

10⁻⁰¹

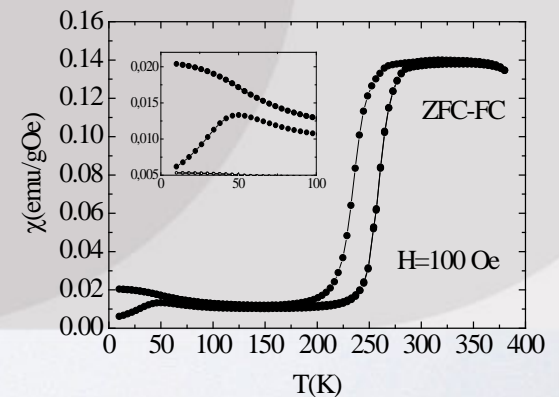
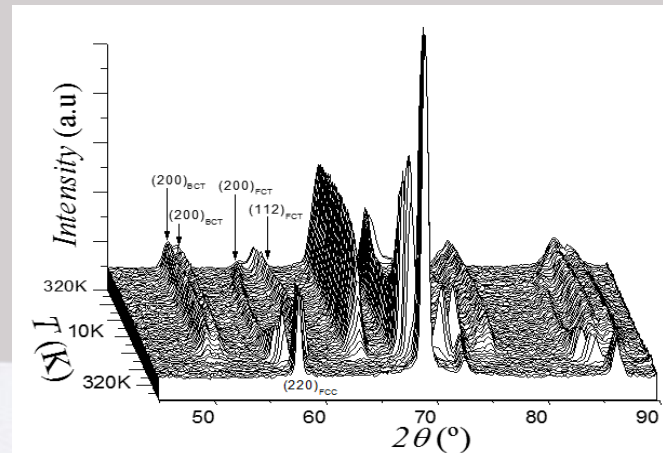
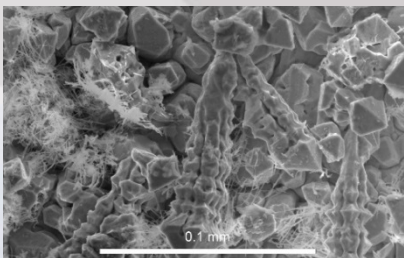
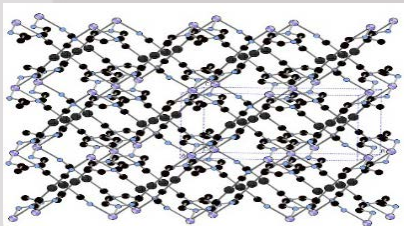
10⁰

10¹

- Crystallographic and magnetic structures.
- Point, linear and planar defects.
- Nano-micro-mesoscopic morphology: nanoparticles, multilayers, foams
- Residual stress and deformation.
- Textures and preferential growth.
- Phase transformations, inclusions, secondary phases, precipitations ...
- Porosity, vacancies, cracks

Materials Characterization Skills

- Chemical and Magneto-Structural Characterization (DSC, X-ray, Squid, SEM, Hyperthermia, testing machine....)
- Atomic and magnetic structures.
- Phase transitions, chemical reactions kinetics, recrystallization processes, polymeric reactions, thermal ageing and stability.
- Molecular dynamics in polymers, proteins, etc.
- Atomic diffusion. Vibrational and magnetic dynamics.
- Sample environments: controlled atmosphere, magnetic field, hydrostatic pressure, mechanical stresses....Experience in large facilities (ILL..).
- Mechanical properties



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