

# cinn

Centro de Investigación en  
Nanomateriales y Nanotecnología

Nanomaterials & Nanotechnology  
Research Center



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## Nanomaterials and Nanotechnology Research Center (CINN)





Prof. Ramón Torrecillas (Director)

## About the CINN

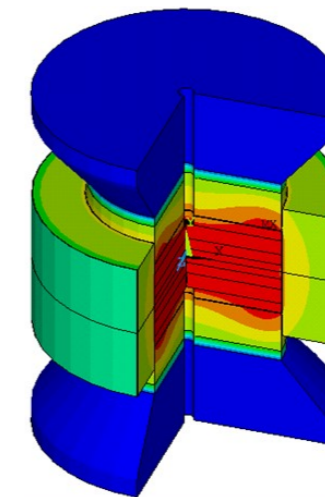
### HIGH-QUALITY AND INTERNATIONALLY COMPETITIVE INTERDISCIPLINARY RESEARCH

The Nanomaterials and Nanotechnology Research Center (CINN) has been created in November 2007 by a joint initiative of 3 institutions, the Spanish Council for Scientific Research (CSIC), the Principality of Asturias and the University of Oviedo.



#### Objectives:

- Combine interdisciplinary high-quality and competitive research with scientific-technological activities.
- Develop an innovation model based in a public-private research space constituted by researchers and technologists coming both from industry and research centres.



### TRANSLATING NANOSCIENCE TO KNOWLEDGE-BASED INNOVATION

"THE CINN PROMOTES A RESEARCH MODEL WITH A STRONG MARKET ORIENTATION IN WHICH COMPETITIVE INNOVATION IS THE GOAL"



## Controlled Design of Multiscale Multifunctional Materials

CINN's research pursues the creation, characterization and understanding of the behaviour of new multifunctional materials on the nano, micro and macro scale

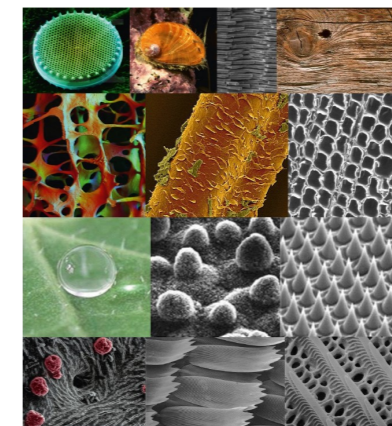
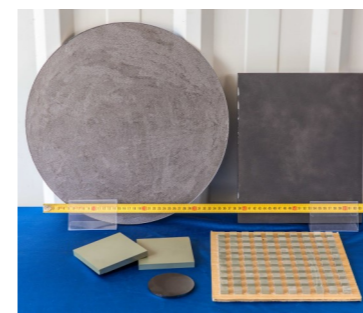
### MODELING AND SIMULATION

- Development of new functionalities in the Density Functional code SIESTA, and in the Non-equilibrium electronic transport code SMEAGOL.
- Simulation of charge and spin transport at the nanoscale.
- Simulation of magnetic properties at the nanoscale.
- Modeling and simulation of micromagnetic properties



### SYNTHESIS AND ADVANCED CHARACTERIZATION OF NANOCOMPOSITES AND BIOINSPIRED MATERIALS

- Synthesis of ceramic nanopowders and nanocomposites
- Spark Plasma Sintering in both Lab (samples up to 80mm) and Pre-industrial (samples up to 400mm) equipments.
- Holographic Optical Elements (HOEs)



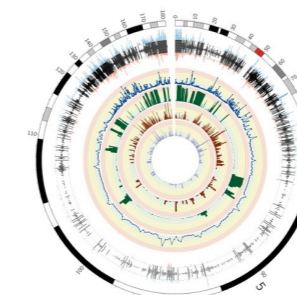
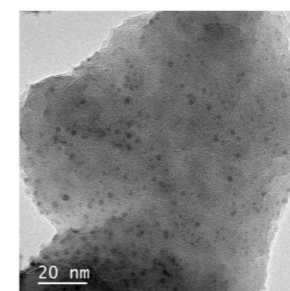
### NANOSTRUCTURED HYBRID SYSTEMS

The research focuses on three relevant topics in nanophysics: confinement, proximity and organization effects.

- Antiferromagnetic coupling and tailoring of magnetic anisotropy in nanostructures, films, and multilayers.
- Novel experimental techniques to fabricate and analyze nanostructured hybrid systems.
- Ratchet and pinning effects in magnetic and superconducting 2D systems.
- Proximity and interface effects in ferromagnetic/semiconductor (F/SM) hybrid nanostructures.
- Plasmon resonance effects in noble metal/ferromagnet (NM/F) hybrid nanostructures and multilayers.

### NANOMEDICINE

- Development of nanocarriers for epigenetic antitumor drug delivery.
- Identification of epigenetic changes in response to nanomaterials.
- Biocidal materials
- Bone scaffolds
- Ceramic nanocomposites for implants



## APPLICATION FIELDS

### HEALTH

- Structural biomaterials for implants
- Regenerative medicine
- Antimicrobials
- Epigenetics

### ADVANCED MATERIALS

Synthesis and processing of multifunctional materials

- Transparent ceramics.
- Superhard nanocomposites.
- Ultra-stable materials for space applications.
- Fully Electroconductive and electromachinable ceramics

### BIG SCIENCE

- Heat Sinks
- IR windows
- ODS Steels
- Joining of dissimilar materials

### ICT

- Quantum electronics
- Information storage
- Magneto-optical materials for electromagnetic shielding.
- Wireless energy transfer