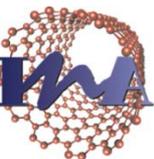




# The Institute of Nanoscience & Laboratory of Advanced Microscopies

M. Ricardo Ibarra

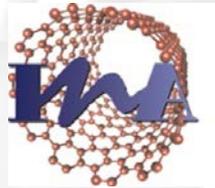
<http://ina.unizar.es/lma>



Instituto Universitario de Investigación  
en Nanociencia de Aragón  
Universidad Zaragoza

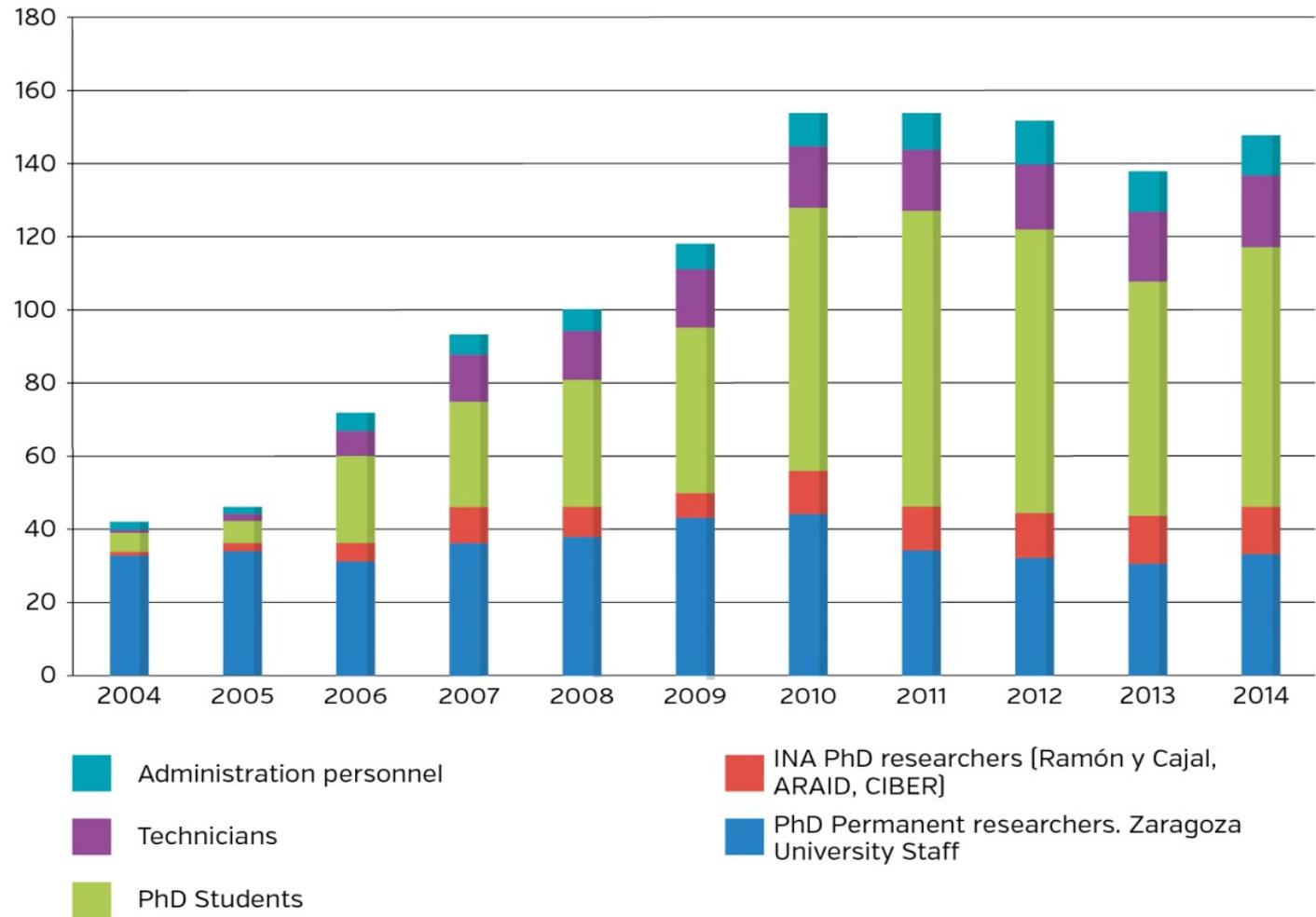


# Institute of Nanoscience of Aragón



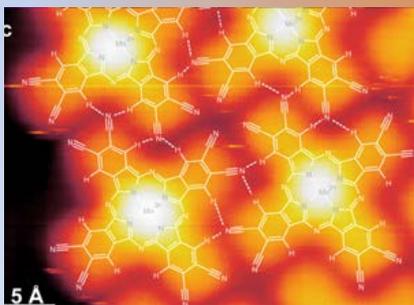
# Human Resources

## Staff. Evolution

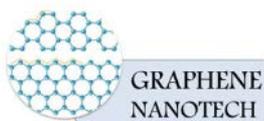


# OBJECTIVES

## TOP LEVEL RESEARCH



## INNOVATION



## EDUCATION

MASTERS DEGREE

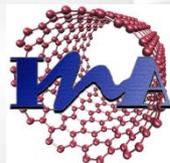


**MASTERS DEGREE IN**

# Nanostructured Materials for Nanotechnology Applications



**Universidad  
Zaragoza**



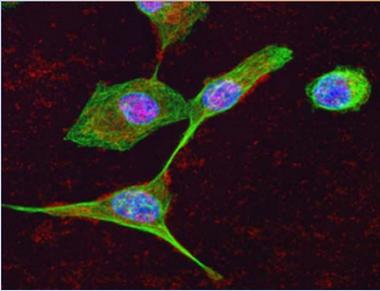
# Universidad de Zaragoza

[www.unizar.es/nanomat](http://www.unizar.es/nanomat)

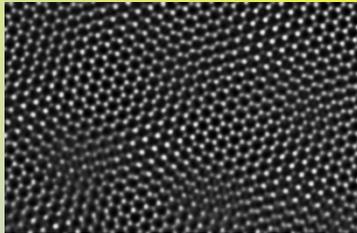


# RESEARCH LINES

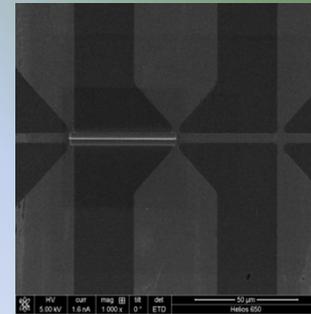
## NANOBIOMEDICINA



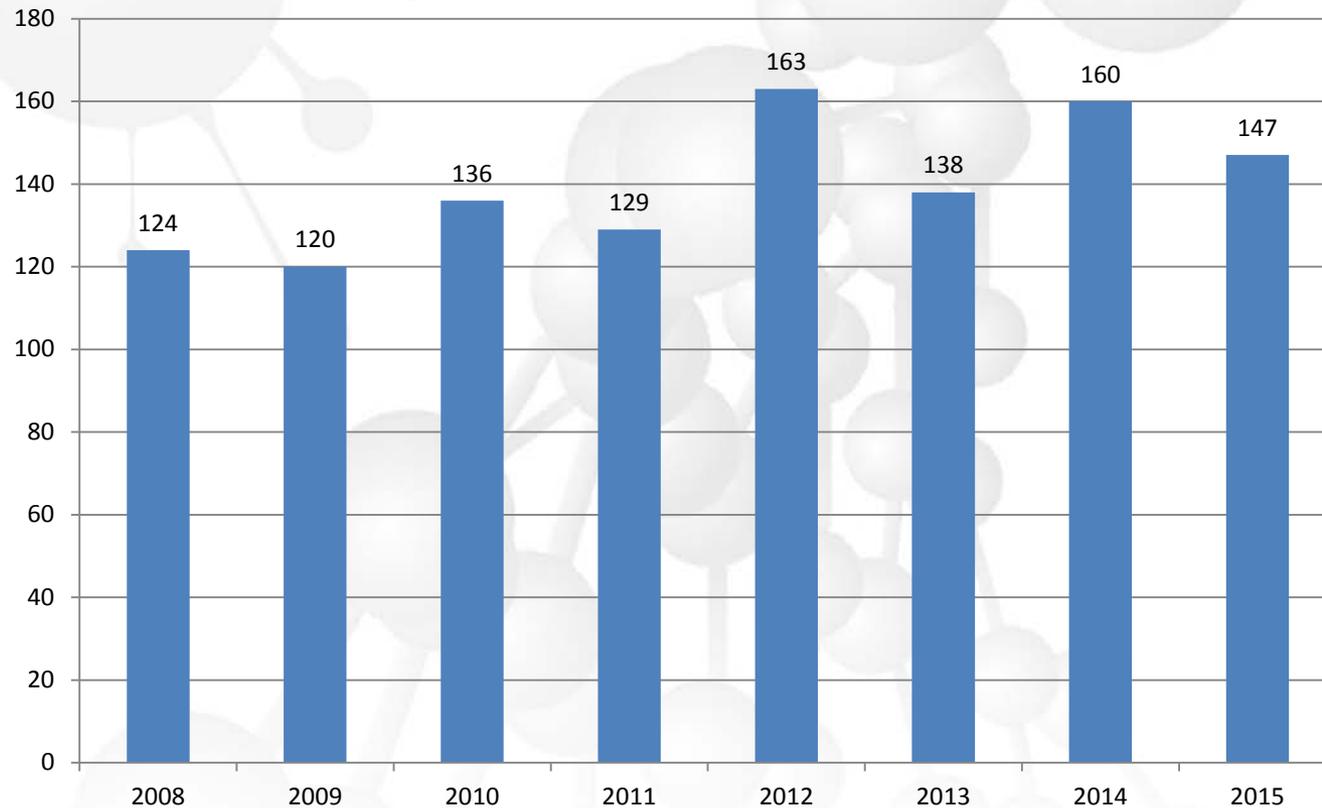
## NANOMATERIALS



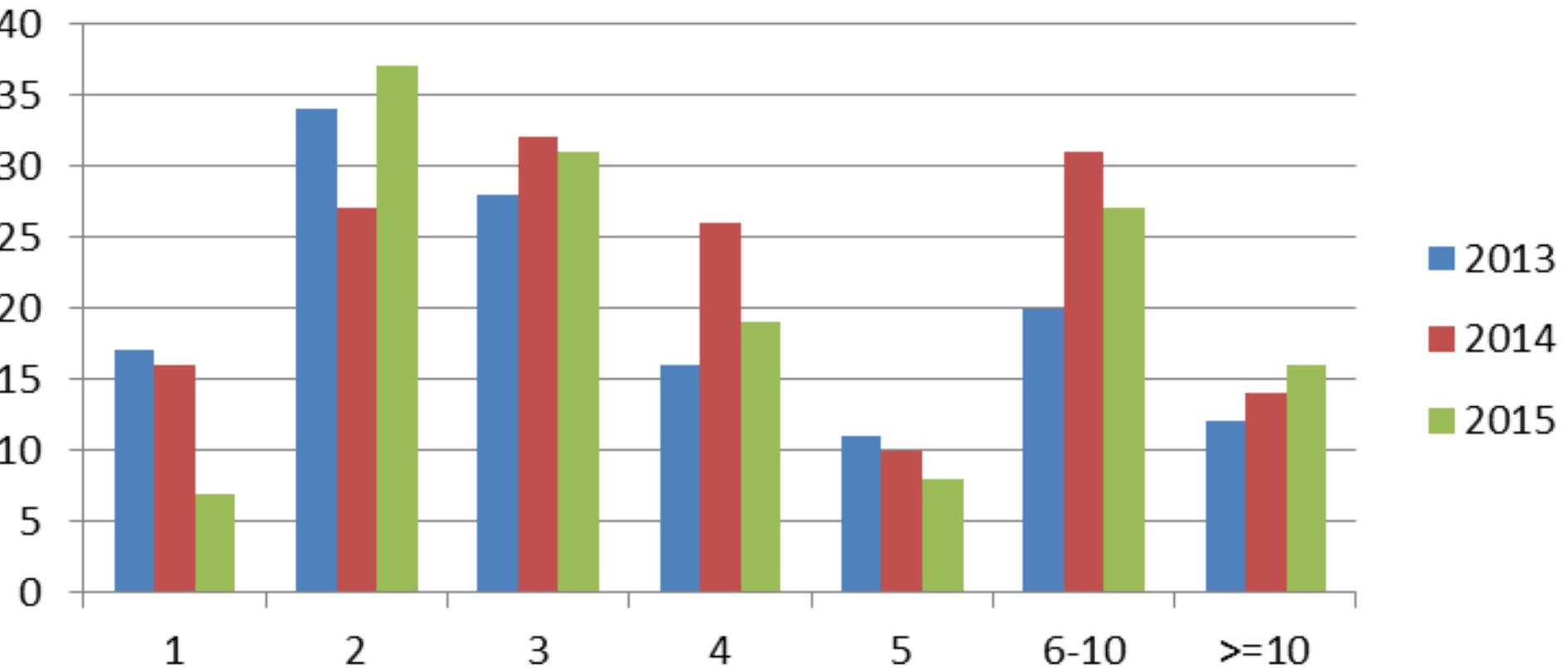
## NANO PHYSICS.



# SCIENTIFIC PUBLICATIONS 2008-2015



# TOP LEVEL RESEARCH



NATURE | LETTER



日本語要約

## Artificial chemical and magnetic structure at the domain walls of an epitaxial oxide

S. Farokhipoor, C. Magén, S. Venkatesan, J. Íñiguez, C. J. M. Daumont, D. Rubi, E. Snoeck, M. Mostovoy, C. de Graaf, A. Müller, M. Döblinger, C. Scheu & B. Noheda

Affiliations | Contributions | Corresponding authors

Nature 515, 379–383 (20 November 2014) | doi:10.1038/nature13918

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NATURE NANOTECHNOLOGY | LETTER



## Control of single-spin magnetic anisotropy by exchange coupling

Jenny C. Oberg, M. Reyes Calvo, Fernando Delgado, María Moro-Lagares, David Serrate, David Jacob, Joaquín Fernández-Rossier & Cyrus F. Hirjibehedin

Affiliations | Contributions | Corresponding author

Nature Nanotechnology 9, 64–68 (2014) | doi:10.1038/nnano.2013.264



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NATURE PHYSICS | LETTER



## Enhancement of long-range correlations in a 2D vortex lattice by an incommensurate 1D disorder potential

I. Guillamón, R. Córdoba, J. Sesé, J. M. De Teresa, M. R. Ibarra, S. Vieira & H. Suderow

Affiliations | Contributions | Corresponding author

Nature Physics (2014) | doi:10.1038/nphys3132

Received 10 January 2014 | Accepted 17 September 2014 | Published online 26 October 2014

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NATURE COMMUNICATIONS | ARTICLE OPEN



## A 3D insight on the catalytic nanostructuring of few-layer graphene

G. Melinte, I. Florea, S. Moldovan, I. Janowska, W. Baaziz, R. Arenal, A. Wisnet, C. Scheu, S. Begin-Colin, D. Begin, C. Pham-Huu & O. Ersen

Affiliations | Contributions | Corresponding authors

Nature Communications 5, Article number: 4109 | doi:10.1038/ncomms5109





## Strain-induced coupling of electrical polarization and structural defects in SrMnO<sub>3</sub> films

Carsten Becher, Laura Maurel, Ulrich Aschauer, Martin Liliënblum, César Magén, Dennis Meier, Eric Langenberg, Morgan Trassin, Javier Blasco, Ingo P. Krug, Pedro A. Algarabel, Nicola A. Spaldin, José A. Pardo & Manfred Fiebig

Affiliations | Contributions | Corresponding author

Nature Nanotechnology 10, 661–665 (2015) | doi:10.1038/nnano.2015.108

Received 01 September 2014 | Accepted 21 April 2015 | Published online 01 June 2015



## Dynamic interplay between catalytic and lectin domains of GalNAc-transferases modulates protein O-glycosylation

Erandi Lira-Navarrete, Matilde de las Rivas, Ismael Compañón, María Carmen Pallarés, Yun Kong, Javier Iglesias-Fernández, Gonçalo J. L. Bernardes, Jesús M. Peregrina, Carme Rovira, Pau Bernadó, Pierpaolo Bruscolini, Henrik Clausen, Anabel Lostao, Francisco Corzana & Ramon Hurtado-Guerrero



## Synthesis of 'unfeasible' zeolites

Michal Mazur, Paul S. Wheatley, Marta Navarro, Wieslaw J. Roth, Miroslav Položij, Alvaro Mayoral, Pavla Eliášová, Petr Nachtigall, Jiří Čejka & Russell E. Morris

Affiliations | Contributions | Corresponding authors

Nature Chemistry (2015) | doi:10.1038/nchem.2374

Received 08 May 2015 | Accepted 15 September 2015 | Published online 26 October 2015

## Cell Death & Differentiation

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### Original Paper

Cell Death and Differentiation (2015) 22, 74–85; doi:10.1038/cdd.2014.110; published online 22 August 2014

### Perforin oligomers form arcs in cellular membranes: a locus for intracellular delivery of granzymes

S S Metkar<sup>1</sup>, M Marchioro<sup>2,3</sup>, V Antonini<sup>2</sup>, L Lunelli<sup>2</sup>, B Wang<sup>1</sup>, R JC Gilbert<sup>4</sup>, G Anderlüh<sup>5</sup>, R Roth<sup>6</sup>, M Pooga<sup>7</sup>, J Pardo<sup>8</sup>, J E Heuser<sup>6</sup>, M D Serra<sup>2</sup> and C J Froelich<sup>1</sup>

<sup>1</sup>NorthShore University Health Systems Research Institute and University of Chicago, Evanston, IL, USA  
<sup>2</sup>Consiglio Nazionale delle Ricerche, Istituto di Biofisica & Fondazione Bruno Kessler Via alla Cascata 56/C, Trento 38123, Italy

<sup>3</sup>Center for Integrative Biology CIBIO, University of Trento Via delle Regole, 101 Mattarello (Trento) 38123, Italy

<sup>4</sup>Division of Structural Biology, Henry Wellcome Building for Genomic Medicine, Oxford, UK

<sup>5</sup>Laboratory of Molecular Biology and Nanobiotechnology, National Institute of Chemistry, Hajdrihova 19, Ljubljana, Slovenia

<sup>6</sup>Department of Cell Biology and Physiology, Washington University in Saint Louis, 660 S. Euclid Avenue, St Louis, MO, USA

<sup>7</sup>Institute of Molecular and Cell Biology, University of Tartu, Riia Str 23, Tartu, Estonia

<sup>8</sup>Department of Biochemistry and Molecular and Cell Biology, Biomedical Research Centre of Aragon (CIBA), IIS Aragon and Nanoscience Institute of Aragon (INA), University of Zaragoza/ARAID Foundation, 50009 Zaragoza, Spain





European  
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Council

# PROYECTOS EUROPEOS

## NANOPUZZLE:

“Multifunctional Magnetic Nanoparticles: Towards Smart Drugs Design (**NANOPUZZLE**)” **Starting Grant** al **Dr. Jesús Martínez de la Fuente** dotada con 1.541.510 €



## HECTOR:

“*Microwave-assisted microreactors: development of a highly efficient gas phase contactor with direct catalyst heating* (**HECTOR**)” **Advanced Grant** ERC al **prof. Jesús Santamaría** con un importe de 1.851.000 €.



## NANOHEDONISM:

“A photo-triggered on-demand drug delivery system for chronic pain  
UE 2014-2019

1.570.091 €

**Dr. Manuel Arruebo**



## CADENCE:

“**Advanced Grant** ERC. **Dr. Jesús Martínez de la Fuente** financed with 2.5 M€ for reserch of biocatalysis for cells cancer treatment



# NANOBIOMEDICINE

## *-NANOTHERAPY*

Drug delivery

Local hyperthermia

## *-BIOFUNCIONALIZACIÓN DE NANOESTRUCTURAS*

## *-NANODIAGNOSTIC*

Biosensors

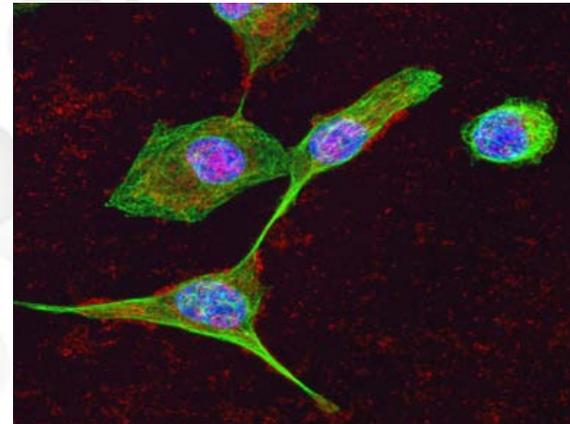
MRI contrast agents

## *-NANOTOXICITY*

Biocompatibility.

Cytotoxicity

Biodistribution



# NANOMATERIALS

*-NANOPARTICLES*

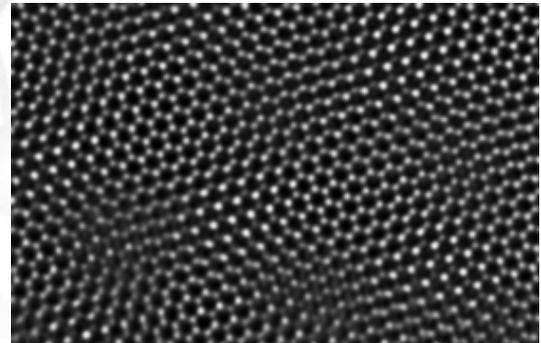
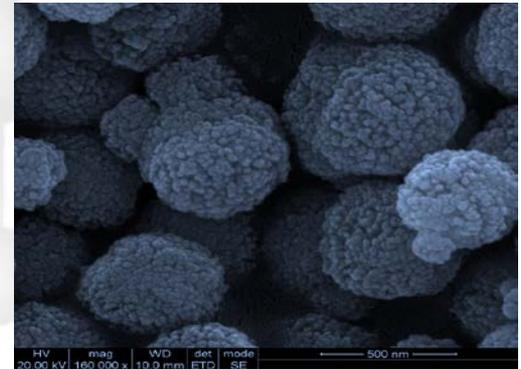
*-NANOWIRES, NANOTUBES AND NANOFIBERS*

*-NANOCOMPOSITES AND COATING*

*-MESOPOROUS INTERFACES*

*-ORGANICS FUNCTIONALS*

*-GRAPHENE*



# Physics of nanosystems

## ***NANOMAGNETISM***

magnetism and properties of the electronic transport in epitaxial thin films and hetherostrcutures

## ***SPINTRONIC & THERMOSPINTRONICS***

Fabrication of nanodevices using advanced nanolithography techniques based in: spin electronics, nanomagnetism, superconductivity, electromechanics.

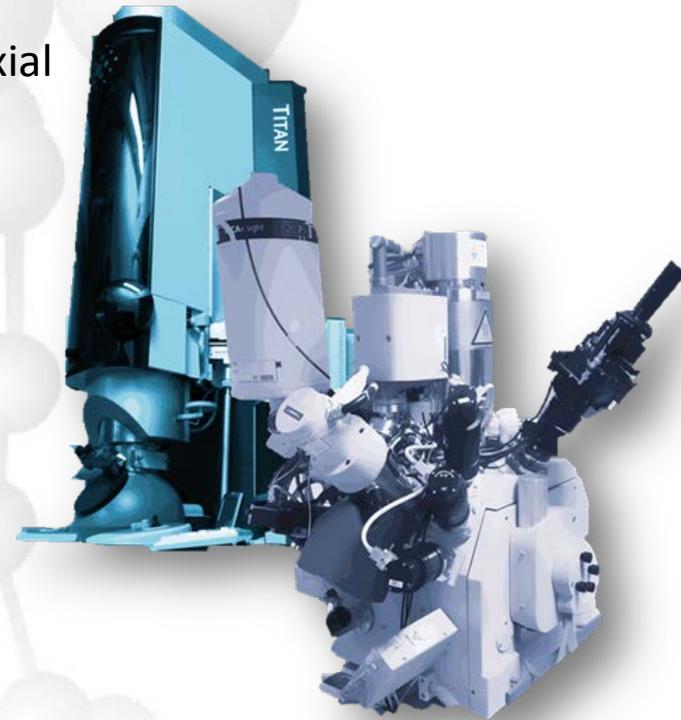
## ***ADVANCED MICROSCOPIES***

Characterization y fabrication of nano objects

## ***SURFACE ATOMIC AND MOLECULAR MICROSCOPY:***

Molecular electronics.

Characterization, manipulation and molecular assembling using SPM

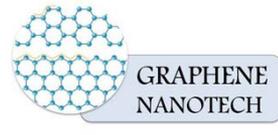


# INNOVACION

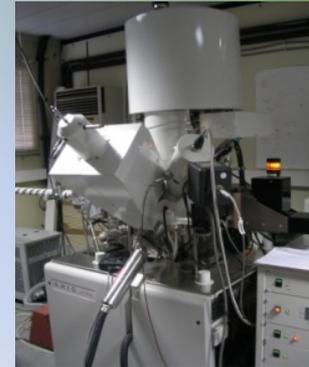
## PROJECT INDUSTRY



## START UP COMPANIES



## SERVICES TO COMPANIES





[www.nbnanoscale.com](http://www.nbnanoscale.com)

COLLOIDS



CELLS CULTURE



MOUSE

DM1

DM2

DM3





# Nanoimmunotech SPIN-OFF Univ. Zaragoza & Vigo

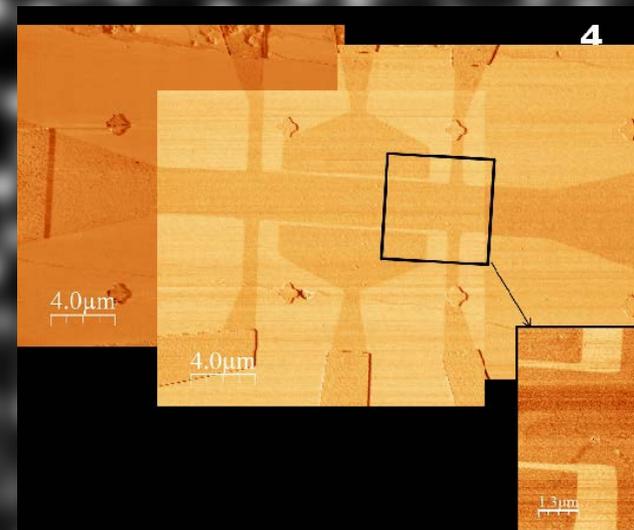
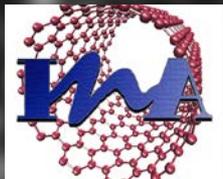
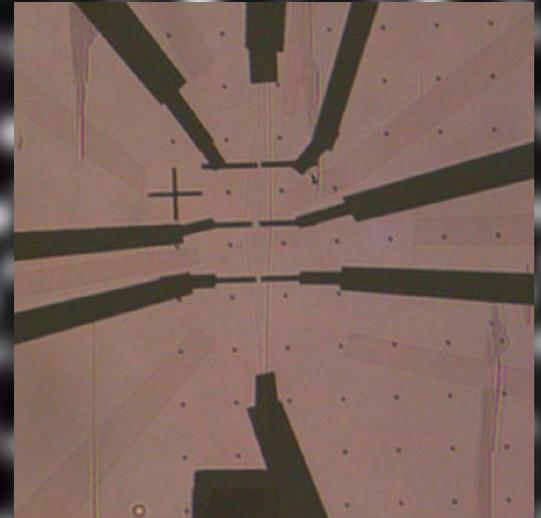
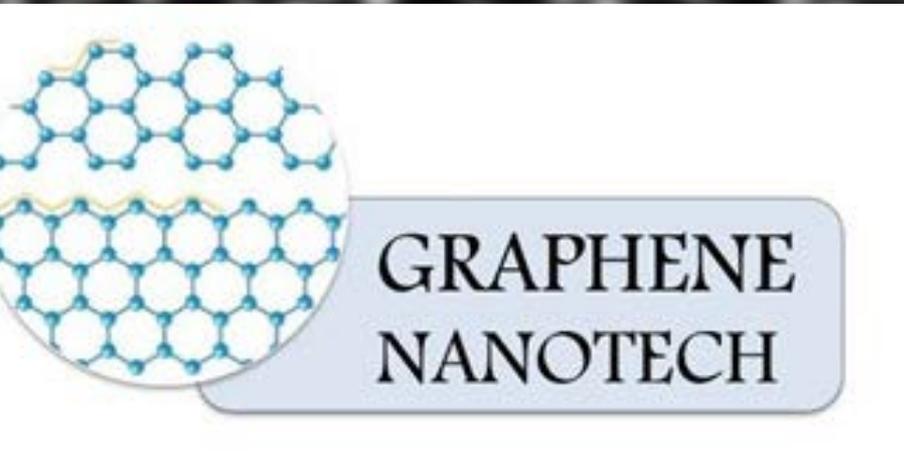


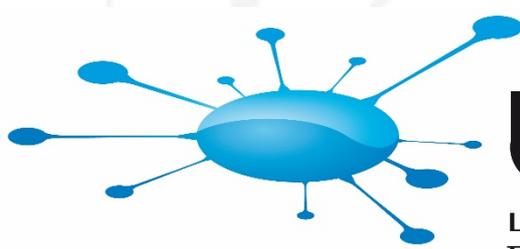
<http://nanoimmunotech.eu>

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# EPITAXIAL GRAPHENE FROM SiC





# LMA

## LABORATORIO DE MICROSCOPIAS AVANZADAS

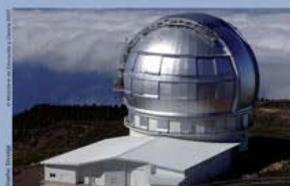
### MAPA DE INSTALACIONES CIENTÍFICAS Y TÉCNICAS SINGULARES



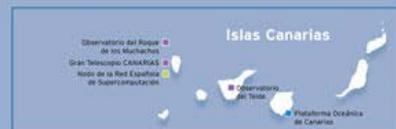
Buque de Investigación Oceanográfica Hespérides



Reserva Científica de Doñana



Gran Telescopio CANARIAS



Observatorio del Roque de los Muchachos  
Gran Telescopio CANARIAS  
Nodo de la Red Española de Supercomputación



Canal de Experiencias Hidrodinámicas de El Pardo



Centro Astronómico de Yebes



Sala Blanca del Centro Nacional de Microelectrónica



Plataforma Solar de Almería



Instalación de Ingeniería Civil del CEDEX

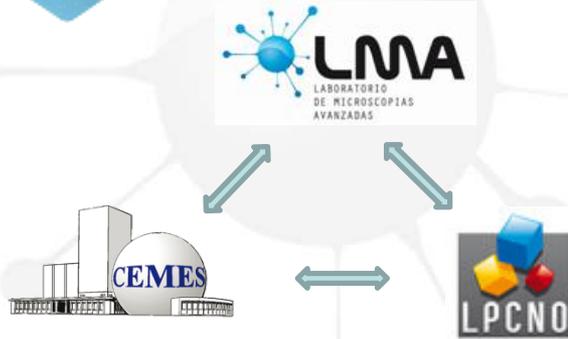
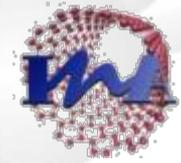


Centro Nacional de Supercomputación

### Áreas de Investigación



# TALEM #2 - Project



- 2014 - 2018
- UNIZAR /LMA - CNRS/CEMES - INSA/LPCNO
- **Microscopies** : TEM & SPM
- **Elaboration** (Chemistry, Physical method, FEBID)
  - Nano-objects
  - local measurements





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art experiments

<http://ina.unizar.es/lma>



# Three areas of advanced microscopy

Transmission Electron  
Microscopy



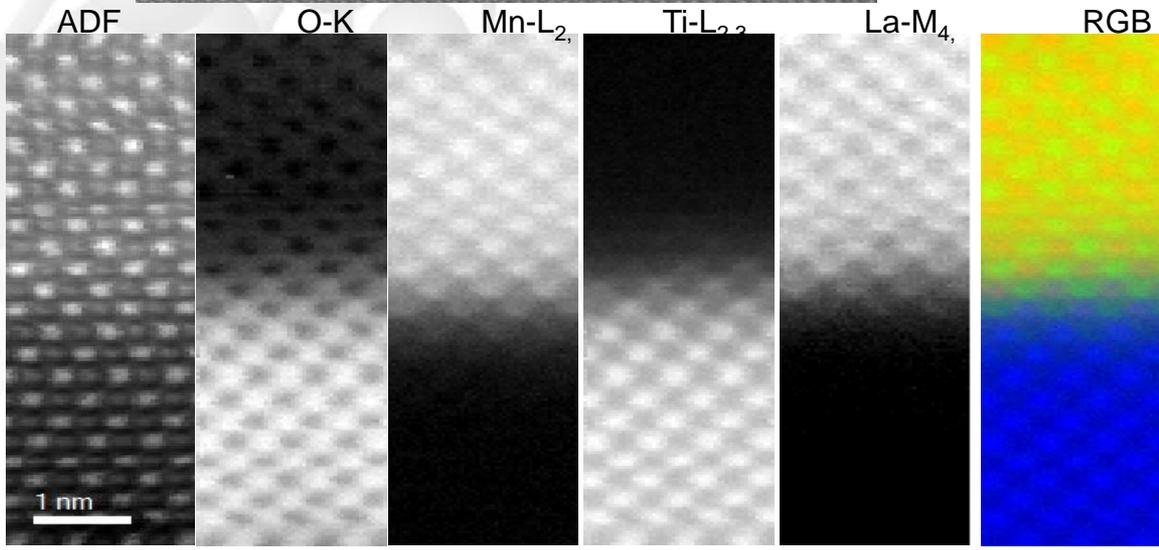
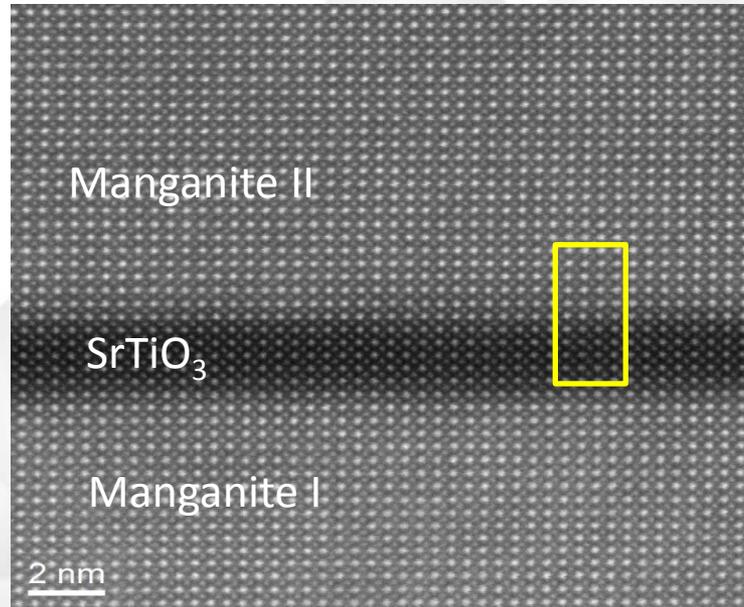
Dual Beam Microscopy



Scanning Probe  
Microscopy



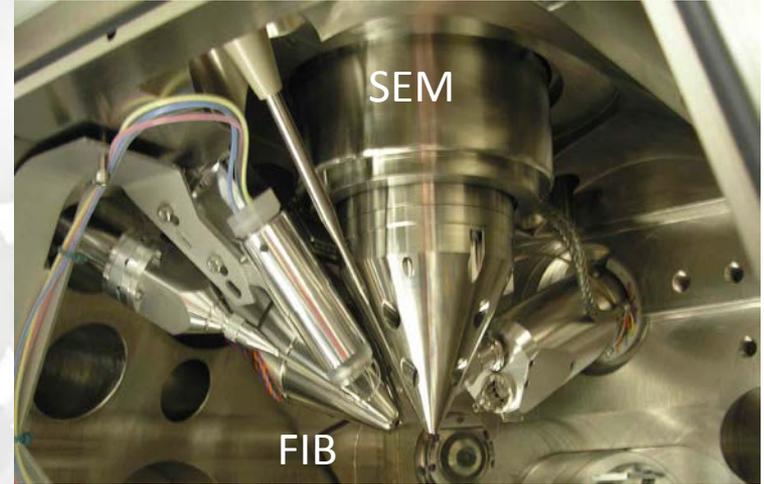
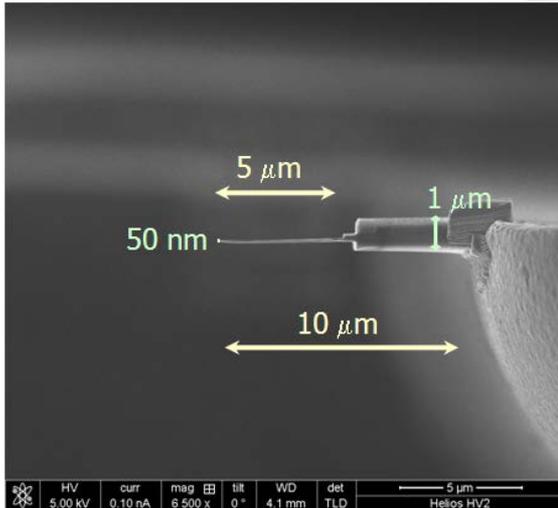
# Transmission Electron Microscopy with aberration correctors



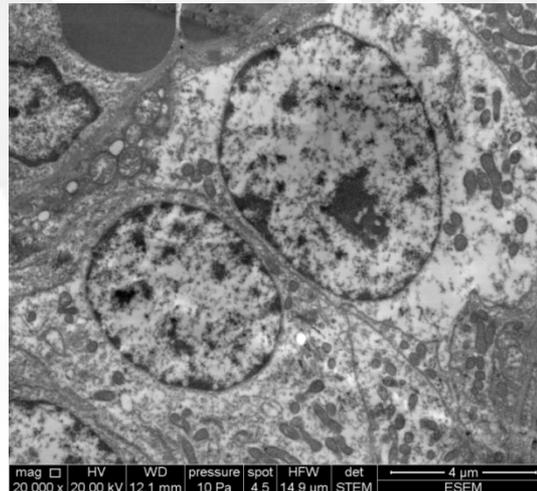
# Dual Beam microscopy for fabrication and characterization of nanomaterials plus SEM, ESEM, XPS, XRD



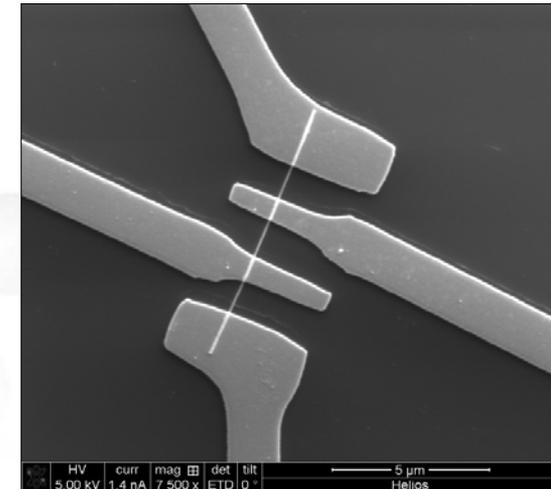
Lamella for TEM



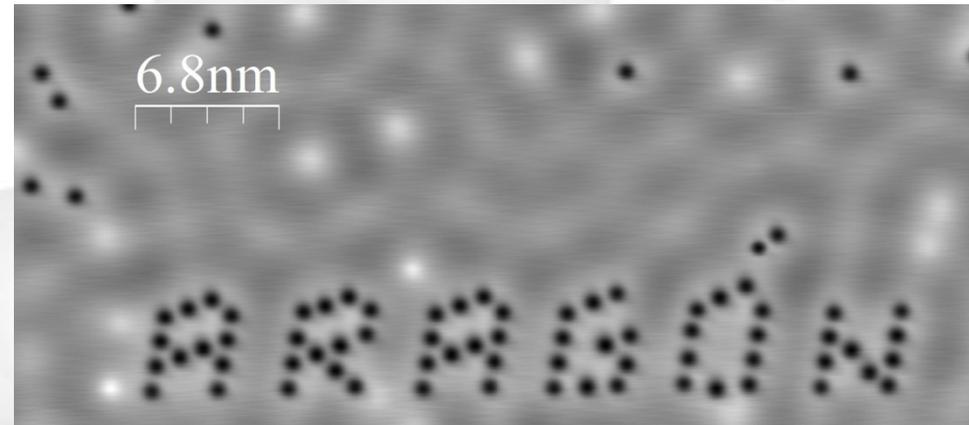
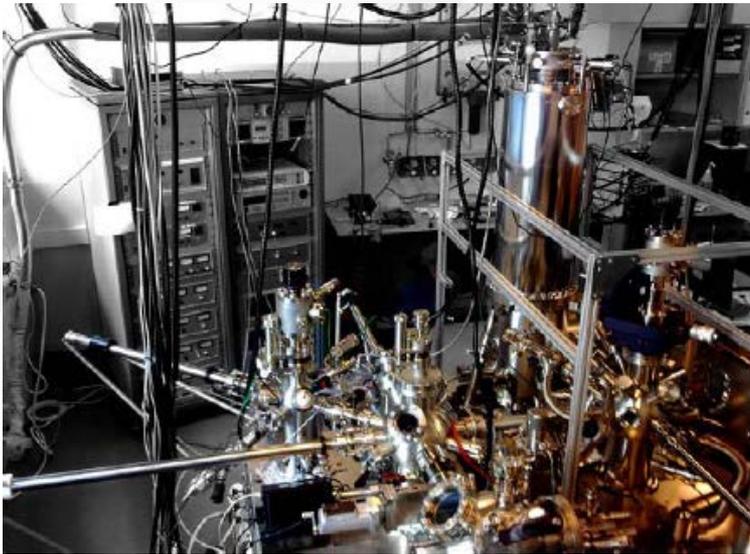
Mouse kidney



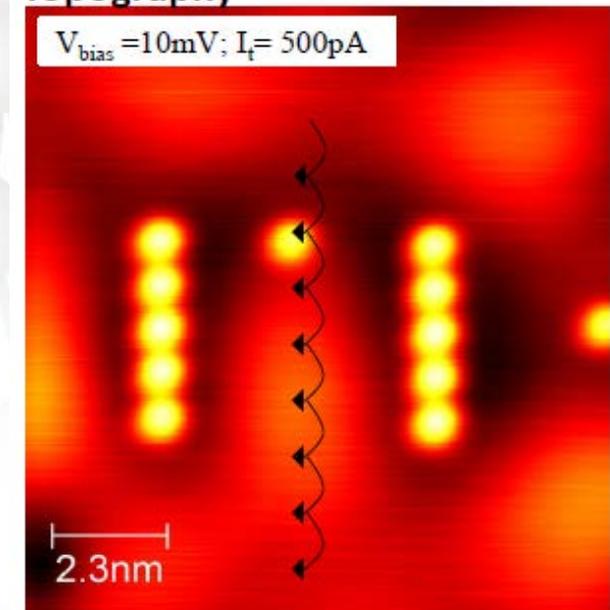
Nanocontacts



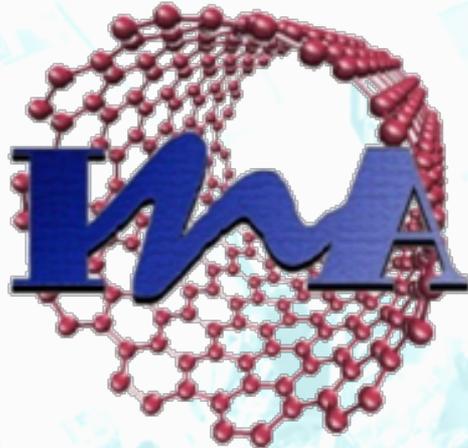
# Scanning probe microscopy at low temperatures and high fields



Topography







**INSTITUTO UNIVERSITARIO  
DE INVESTIGACIÓN EN  
NANOCIENCIA DE ARAGÓN**



# **LMA**

**LABORATORIO  
DE MICROSCOPIAS  
AVANZADAS**

**THANK YOU FOR YOUR ATTENTION**

