

nanoscience and nanotechnology: small is different



**institute**  
**idea**  
**nanoscience**

 EXCELENCIA  
SEVERO  
OCHOA



# 1121

annual  
**report**





foreword

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na  
2021  
annual  
report



A handwritten signature in white ink that reads "Rodolfo Miranda". The signature is stylized and written over the bottom right corner of the portrait.

## Rodolfo Miranda

Director, IMDEA Nanociencia Institute

June 2022

In 2021 we have untimely lost Isabel Rodriguez, our “Isa”, one of the most beloved founders of the Institute. I am convinced that she would have been proud of what was achieved during this year. 2021 has been indeed a very successful year for IMDEA Nanociencia. Although the pandemic has still affected our lives and work, we have almost fully recovered our activities.

The research output of our Institute in 2021 has been around 230 papers, reaching a total amount of more than 2400 (with 65% of them in Q1 and 30% in D1 journals). The accumulated number of citations of the papers produced by IMDEA Nanociencia researchers has grown to more than 74000 by the end of the year. The institutional h index was 111. We have presented 20 Ph. D. Thesis and attracted new talent both in science and in administration. This gives us a hint as to why IMDEA Nanociencia appears systematically among the highest-ranked research organizations in Spain. Our achievements have been crowned by our receiving the (second) Award as a “Severo Ochoa” Center of Excellence for the period 2022-2025.

The new “Severo Ochoa” Programme includes the reorganization of our already successful research lines and the creation of new ones (specifically in Ultrafast Phenomena at the Nanoscale and Critical Raw Materials and Sustainability), the incorporation of Dr. Fernando Martín as Scientific Director of the SO Programme, as well as a consolidation of the Executive Commission, composed of three Deputy Directors (Strategy, Dr. Julio Camarero; Outreach, Dr. Emilio Pérez, and Infrastructure, Dr. Daniel Granados), the Executive Manager (Bonifacio Vega), the Vicedirector (Dr. Nazario Martín) and the Director (Dr. Rodolfo Miranda).

We have consolidated in 2021 the amazing figure of 70% of our budget being obtained from external, competitive sources, with only 30% coming directly from the administration. It is worth remembering that in 2009 the fraction of competitive funds obtained was 1/3 of the total. In spite of these sustained and unusual figures, I claim that there is more than ever a need to increase the basal financial support in order to ensure the long term competitiveness of the Institute. The administration of the Regional Government in Madrid is committed in this direction.

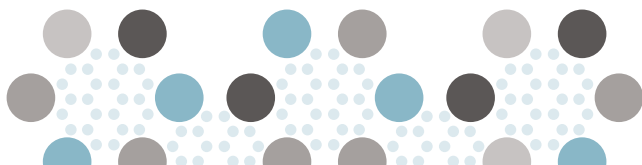
I feel particularly proud of the fact that in 2021 (finally) we have been able to offer stability to an important number of our employees, with a balanced representation of researchers, technicians, managers and administrators, i.e. all the relevant areas of our Institute. This was very well deserved, considering the talent, dedication, commitment and strength that they have shown over the years. I am convinced that this action will be followed in years to come by new opportunities to stabilize our “skeleton” of personnel.

During this year I have witnessed the full commitment of everyone at the Institute, from scientists to technicians, managers or administrators and I have felt proud of all of them. It is an immense honor for me to be still part of this adventure.



# na 2021 no

annual  
**report**



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# 1

## overview

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## 1. Legal Status

IMDEA Nanociencia is a private non profit Foundation created by initiative of the Madrid Regional Government in November 2006, in order to shorten the distance between the research and society in the Madrid region and provide new capacity for research, technological development and innovation in the field of Nanoscience, Nanotechnology and Molecular Design. In 2007 the former Ministry of Education and Science of the Government of Spain decided to also fund part of the creation and equipment of an institute of Nanoscience in the Madrid autonomous region.

The Foundation is governed by a Board of Trustees, which has representatives of the national and regional administration, the Academic Institutions (Complutense, Autónoma and Politécnica Universities, Consejo Superior de Investigaciones Científicas), industries, members of the Scientific Advisory Council, and experts in societal implications of nanoscience and technology transfer.

The Foundation governs the IMDEA Nanociencia Institute, a new interdisciplinary research centre dedicated to the exploration of basic nanoscience and the development of applications of nanotechnology in connection with innovative industries. The IMDEA Nanociencia Institute is part of one of the strategic lines of the Campus of International Excellence (CEI) UAM+CSIC.

## 2. Strategic Goals

In the Madrid region there is a large community of physicists, chemists and biologists working actively on diverse aspects of Nanoscience. Many of these groups have a recognized international prestige in their respective fields.

In spite of this, a new step forward is needed for the future international competitiveness of R+D in Nanoscience and Nanotechnology. A suitable organizational and working environment needs to be created with the aim to promote the continuous interdisciplinary interaction between specialists in physics, chemistry, molecular biology, computer sciences, etc., that the very nature of this new discipline demands.

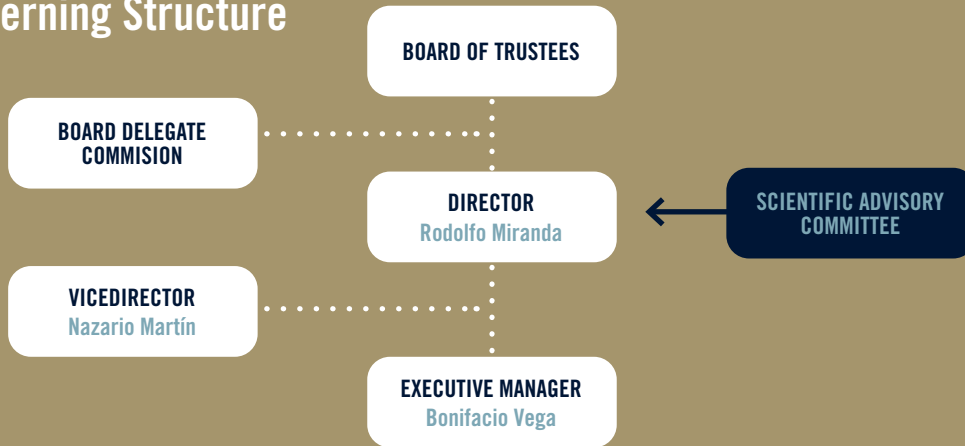
Most importantly, it is essential to be able to recruit and retain new talent and to repatriate young scientists working abroad, to train a new generation of technicians and scientists in a genuine interdisciplinary field, and to create and maintain new experimental equipment and advanced infrastructures.

All this must be done by coordinating efforts with the groups and institutions that already exist, thanks to a flexible structure based on research programmes, which will have to undergo periodic evaluations. IMDEA Nanociencia aims at becoming an internationally recognized research centre, whilst maintaining a clear support from the existing scientific community in Madrid.



### 3. Management Structure

#### Legally Binding Governing Structure



#### Internal Governing Structure





## Executive Commission



## Management Committee



## 4. Severo Ochoa

IMDEA Nanociencia became an accredited Severo Ochoa Centre of Excellence in 2017 (Spanish Ministry of Economy, Industry and Competitiveness) contributing towards the national and international leadership of the Institute in the areas of Nanoscience and Nanotechnology. This award is the highest national recognition for centres in Spain, granted after a rigorous evaluation process carried out by an international scientific committee.

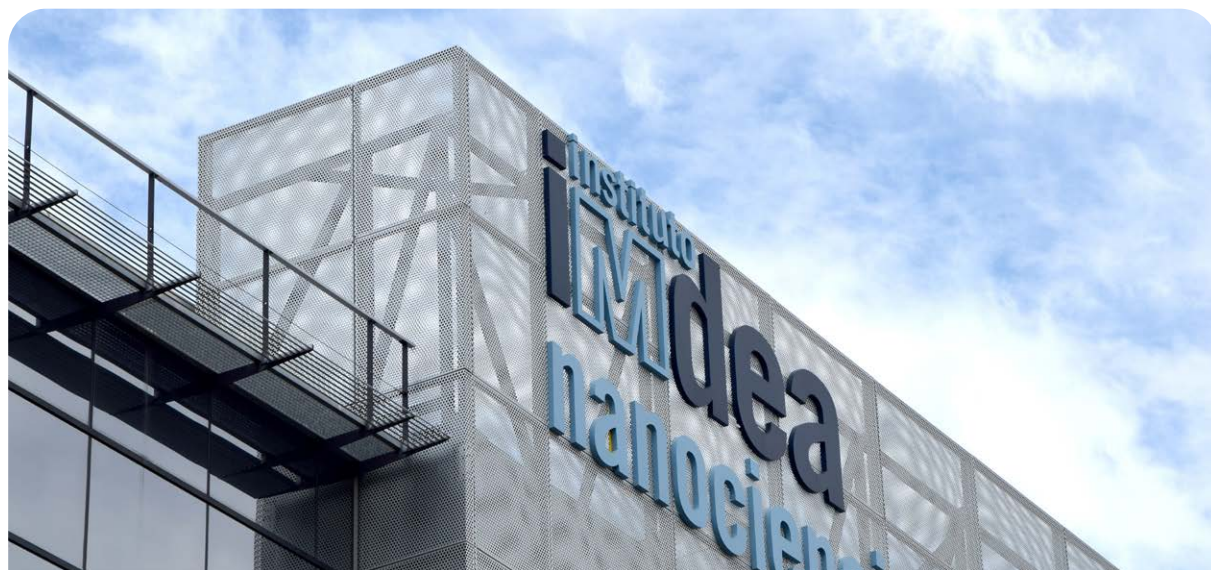
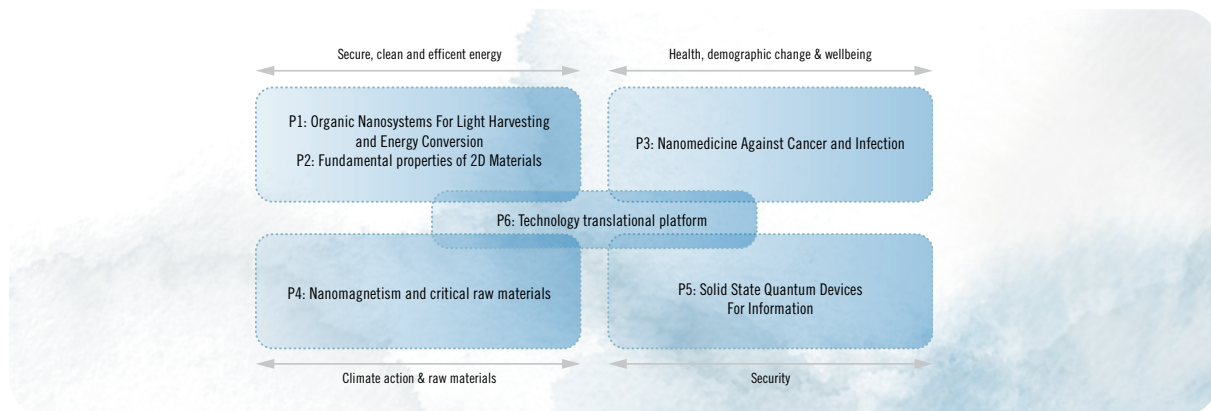
The funding provided by the Severo Ochoa award supports the strengthening of the existing interdisciplinary character of the centre and combines different types of expertise to find innovative solutions for social and economic challenges.

The focus under the Severo Ochoa programme are shown below where the research groups can make real contributions to the advancement of knowledge and technology innovation. The creation of a Translational Platform to encourage cross-programme collaboration for prototyping, proof-of-

concept testing, scaling-up and implementation of technologies developed in order to bridge the gap between our labs and society.

In terms of the support provided for our researchers, a key part of the project allows the strengthening of both the Competitive Projects and Dissemination and Communication offices. Additionally the opening of two new offices for Research Support and Strategic International Partnerships has greatly strengthening the Institute on an international platform.

IMDEA Nanociencia is part of the SOMM alliance (<https://www.somma.es/>) and supports its goals and objectives. The SOMM mission is to internationally promote, strengthen and maximise the value of the groundbreaking research produced by the Spanish 'Severo Ochoa' Centres and 'María de Maeztu' Units of Excellence and the scientific, social and economic impact it generates.





## 5. Board of Trustees

### PRESIDENT OF THE BOARD OF TRUSTEES

**Prof. Ivan K. Schuller**

Expert on transfer of knowledge and nanotechnology.

Advisor of the State of California and the National Nanotechnology Initiative, USA

### MADRID REGIONAL GOVERNMENT

**Mr. Enrique Ossorio Crespo**

Regional Minister for Education, Universities, Science and the Arts C.M.

**Mr. Fidel Rodríguez Batalla**

Deputy Regional Minister for Universities, Science and Innovation

**Ms. Ana Isabel Cremades Rodríguez**

General Director for Research and Technological Innovation

**Ms. Bárbara Fernández-Reuelta Fernández-Durán**

Deputy Director General for

Research of the Consejería de Educación, Universidades, Ciencia y Portavocía C.M.

**Ms. M<sup>a</sup> Dolores Moreno Molino**

Deputy Regional Minister for the Humanisation of Health Care

**Mr. José de la Sota Rius**

Madrid's Scientific-Technical Coordinator

### SPAIN NATIONAL GOVERNMENT

General Direction of Research, Ministry of Science

**Dr. Ángela Fernández Curto**

General Subdirectorate for Scientific and Technical Facilities

### IMDEA INSTITUTES TRUSTEES

**Dr. Fernando Temprano Posada**

Appointed by IMDEA Software

**Dr. Jerry B. Torrance**

Appointed by IMDEA Materiales

### SCIENTISTS

**Prof. Ivan K. Schuller**

Expert on transfer of knowledge and nanotechnology. Advisor of the State of California and the National Nanotechnology Initiative, USA

**Prof. Cayetano López**

CIEMAT, Madrid, Spain

**Prof. Luis Echegoyen**

University of Texas El Paso, USA

**Prof. Hector Abruña**

Ithaca Cornell University New York, USA

**Prof. Miquel Salmerón**

University of California, Berkeley, USA

### UNIVERSITIES AND PUBLIC RESEARCH ORGANIZATIONS

**Prof. M<sup>a</sup> Soledad Martín González**

Spanish National Research Council (CSIC), Spain

**Prof. Ignacio Lizasoain Hernández**

Complutense University of Madrid. Spain

**Prof. Daniel Jaque Garcia**

Autónoma University of Madrid. Spain

**Prof. Fernando Calle**

Polytechnic University of Madrid. Spain

### INDUSTRY

**Mr. Emilio Ramiro Arcas**

Ramem, S.A

**Mr. Manuel Pérez Cortes**

(substitute: Mr. Pedro Golmayor) GMV Aerospace and Defense

## 6. Scientific Advisory Committee

**Chairman: Prof. Ivan Schuller**

Center for Advanced Nanoscience, University of California-San Diego, USA

**Prof. Héctor Abruña**

Department of Chemistry & Chemical Biology, Baker Laboratory, Cornell University, USA

**Prof. Miquel Salmerón**

Department of Materials Science and Engineering, University of California, Berkeley, USA

**Prof. Harald Brune**

Ecole Polytechnique Fédérale de Lausanne (EPFL). Switzerland

**Prof. Luis Echegoyen**

University of Texas at El Paso, USA

**Prof. Johannes Barth**

Department of Physics, Technische Universität München, Germany

**Prof. Maurizio Prato**

Dipartimento di Science Farmaceutiche. Università di Trieste, Italy

**Prof. Rasmita Raval**

Department of Chemistry, University of Liverpool, United Kingdom

**Prof. Dr. Christoph Gerber**

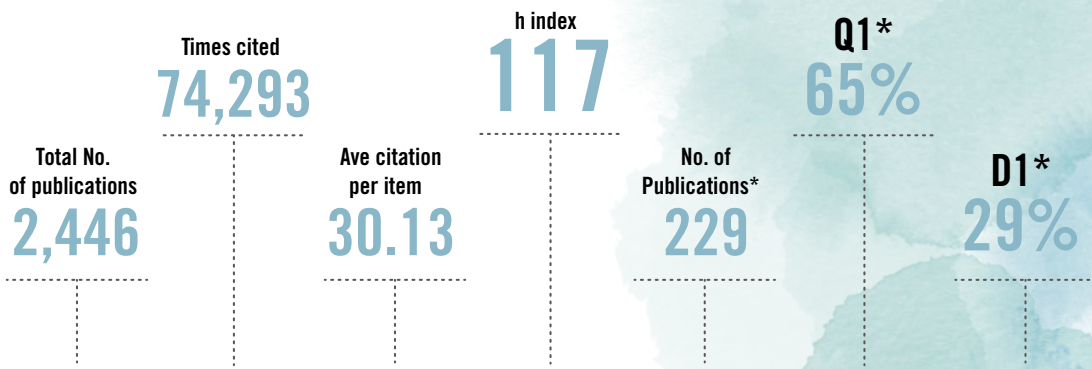
Department of Physics, University of Basel. Switzerland

**Prof. Yvan Bruynserade**

Department of Physics and Astronomy, Katholieke Universiteit Leuven, Belgium

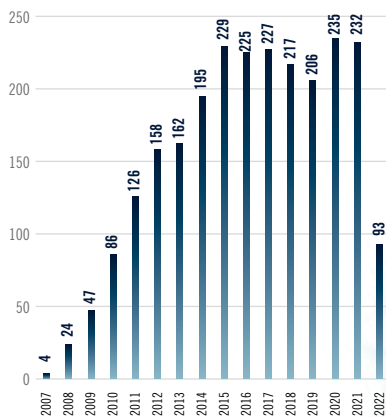
## 7. IMDEA Nanociencia at a Glance

### Scientific Production

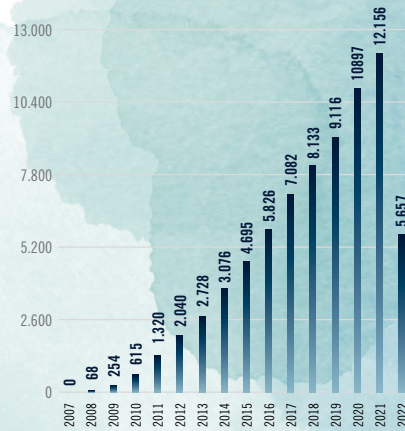


\*WOS (JCR indexes)

### Publications in each year



### Citations in each year



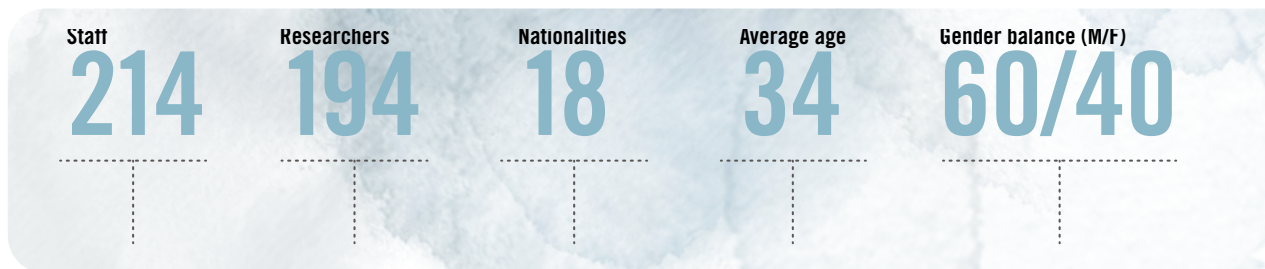
### Highly cited researchers

#### Prof F. Guinea named as one of 2021's Highly Cited Researchers by the Web of Science Group.

This honour recognises the most influential researchers, and is demonstrated by the production of multiple highly-cited papers that rank in the top 1% by citations for field and year in Web of Science.

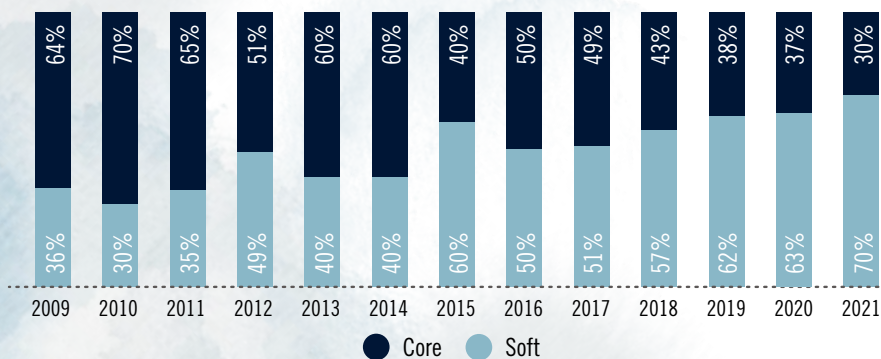


## Talent



## Percentage of Funding from Core vs Competitive sources

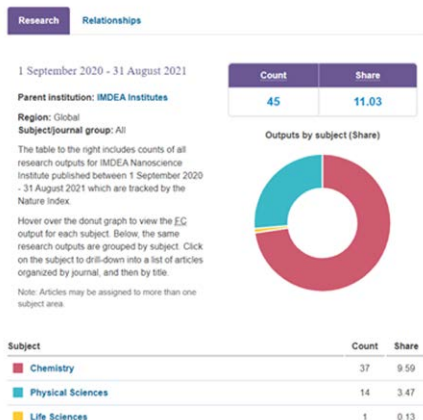
CORE funding is from trustees, SOFT funding includes competitive projects (EU's H2020 programme, the Spanish Ministry of Science and the Madrid Regional Government), industry contracts, and funding from private institutions (La Caixa, etc.)



## Nature index

For a national picture, IMDEA Nanociencia is ranked third by Share in the Nature Index for Governmental funded (non-University) Research Institutions in Spain:

IMDEA Nanoscience Institute  
Spain



Institution	Count	Share
Spanish National Research Council (CSIC)	1142	209.64
Institute of Health Carlos III (ISCIII)	243	24.87
<b>IMDEA Nanociencia</b>	<b>45</b>	<b>11.03</b>
Spanish National Center for Cardiovascular Research (CNIC)	35	9.38
Basque Research and Technology Alliance (BRTA)	52	8.02
ALBA Synchrotron	42	5.42
National Geographic Institute (IGN)	17	4.18
Basque Center for Macromolecular Design and Engineering	27	4.08
Xunta de Galicia	43	3.70
Centre for Energy, Environment and Technology (CIEMAT)	66	3.49

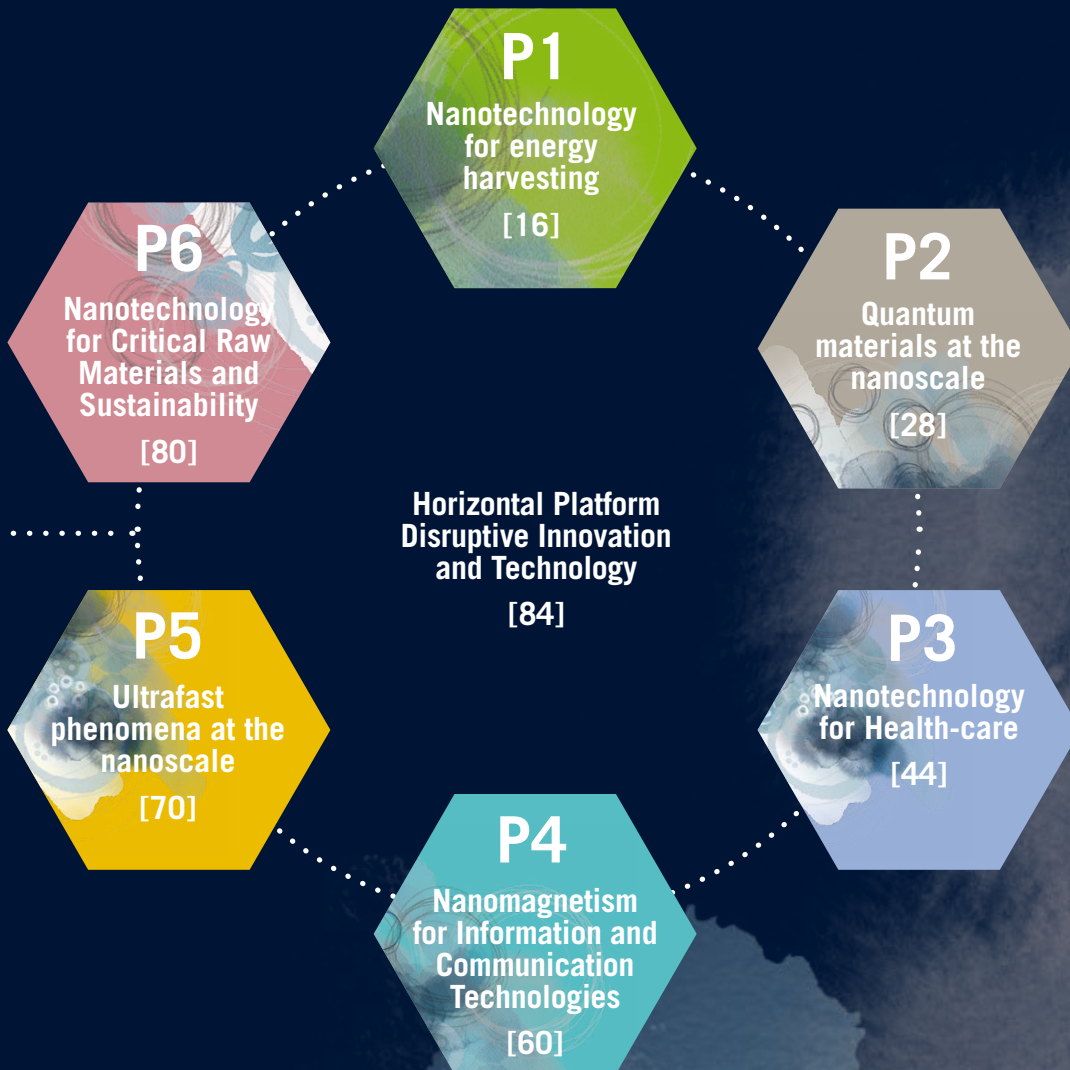
# 2

## research programmes and scientists

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annual  
report



# P1

programme

# Nanotechnology for energy harvesting

Programme Manager: Prof. Nazario Martín

## Research lines

**Nanocarbons and Organic  
Photovoltaics**

Prof. Nazario Martín

**Chemistry of Low-  
Dimensional Materials**

Prof. Emilio M. Pérez

**Switchable Nanomaterials**

Dr. José Sánchez Costa

**Functional Nanoscale  
Materials and Devices**

Dr. Enrique Burzuri

**Molecular Electronics**

Dr. Edmund Leary

**Functional Organic  
Materials**

Prof. Tomás Torres

**Electrochemical  
Biosensors**

Prof. Encarnación Lorenzo

**Covalent Organic  
Frameworks**

Prof. Félix Zamora

**Biosensors**

Prof. José Manuel Pingarrón

**Hybrid Nanomaterials**

Dr. Beatriz H. Juárez



## About the programme

Among the available energy harvesting techniques, and according to the outlook by the International Energy Agency, photovoltaics (PV) is considered as a mainstream technology for the next decade. Solar energy has undergone the largest growth of all renewable energies, being on track to reach the Sustainable Development Scenario level by 2030. Furthermore, future demand for ground-breaking solar technologies looks for easily accessible skin like solar cells adaptable for building integration in smart cities, cars and portable devices.

This programme deals with the design and synthesis of molecular nanostructures and nanomaterials, their spectroscopic characterization, in particular, their time-resolved optical response, and their self-assembly at surfaces. The expertise required includes the functionalization of different nanoforms of carbon, namely fullerenes, carbon nanotubes and graphene, metal-organic frameworks, spin-cross over architectures, organometallic compounds and semiconducting quantum dots to be self-organized on surfaces by means of covalent or supramolecular approaches and the implementation of

various spectroscopic techniques, including spectroscopy of single molecules. Among the objectives of the Programme in basic science one may cite the characterization (and understanding) of the interaction light-organic molecules and the properties of (model) solar cells. The practical objective is the use of this information, if possible, for the corresponding optimization of functional organic devices, such as (prototype) organic solar cells, as well as the preparation of a variety of materials for hole and electron transport, respectively, in perovskite-based solar cells.

In the Programme we search for new nanomaterials for the clean, sustainable production and storage of energy, and for the valorisation of waste chemicals, en route to a zero-waste energy cycle. To address this ambitious goal, we will employ a judicious combination of chemical synthesis, advanced time-resolved spectroscopy (see also P5), theory and device fabrication. It is worth noting that all these issues can be addressed from resources and capabilities at IMDEA-Nano and, quite naturally, involve a close collaboration with other strategic research programmes, specifically P2, P5 and P6.

# Nanocarbons and Organic Photovoltaics

Webpage: <http://www.nazariomartingroup.com>



**Prof. Nazario Martín**  
Research Professor

**PhD:** Universidad Complutense de Madrid, Spain  
**Double Affiliation:** Universidad Complutense de Madrid, Spain

**ORCID:**  
0000-0002-5355-1477  
**Researcher ID:**  
B-4329-2008

## RESEARCHERS

**Dr. Agustín Molina**  
University of Texas at El Paso, USA

**Dr. José Santos**  
Durham University, UK

**Dr. Inés García Benito**  
Ecole polytechnique fédérale de Lausanne, Swiss

## POSTDOC

**Dr. Javier Urieta**  
Universidad Complutense de Madrid, Spain

## PHD STUDENTS

**Eider Sánchez**  
**Jesus Galán**  
**Luis Manuel Mateo**

## Research lines

1. Fullerenes as a singular curved scenario: Discovering new reactions on Fullerenes!
2. Supramolecular Chemistry of Fullerenes. Concave-convex Supramolecular Interactions.
3. On-Surface Chemistry. Exploring the 2D World Wonders.
4. Hole and Electron Transport Materials for Photovoltaic Applications.

I. García-Benito, I. Zimmermann, J. Urieta-Mora, J. Aragón, J. Calbo, J. Perles, A. Serrano, A. Molina-Ontoria, E. Ortí, N. Martín, M. K. Nazeeruddin. **Heteroatom Effect on Star-shaped Hole-Transporting Materials for Perovskite Solar Cells**, *Adv. Funct. Mater.*, **2018**, DOI: 10.1002/adfm.201801734.

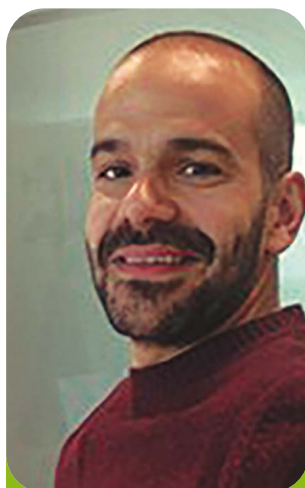
**A systematic study of the effect** that heteroatom-containing central scaffold (N, O, or Se) yields on the photovoltaic efficiency is investigated and compared with their sulfur analogue. The new star-shaped derivatives endowed with three-armed triphenylamine moieties show C3 symmetry and a remarkable performance. This work highlights that chalcogenide-based derivatives are promising hole-transporting material candidates to compete efficiently with spiro-OMeTAD.





# Chemistry of Low-Dimensional Materials

Webpage: <http://nanociencia.imdea.org/chemistry-of-low-dimensional-materials/home>



**Prof. Emilio M. Pérez**  
Senior Research Prof.

**PhD:** University of Edinburgh,  
UK

**Previous Position:**  
Universidad Complutense de  
Madrid, Spain

**ORCID:**  
0000-0002-8739-2777  
**Researcher ID:**  
B-1870-2008

## RESEARCHER

**Dr. Alejandro López**  
CiQUS - Centro Singular de  
Investigación en Química  
Biológica e Materiais  
Moleculares, Santiago de  
Compostela, Spain

## POSTDOCS

**Dr. Manuel Vázquez**  
University of Trieste, Italy

**Dr. Matthew Eaton**  
Northern University, Illinois, USA

**Dr. Natalia Martín**  
Johannes Gutenberg  
University, Mainz, Germany

**Dr. Julia Villalva**  
Universidad Autónoma de  
Madrid, Spain

**Dr. María Lourdes González**  
University of Southampton, UK

**Dr. Marta Gonzalez**  
University Carlos III, Madrid,  
Spain

**Dr. Samara Medina**  
University of Málaga, Spain

## PHD STUDENTS

**Sara Moreno**  
**Alicia Naranjo**  
**Tomás Nicolás**  
**Ion Isasti**  
**Marisol Rivas**

## TECHNICIANS

**Christine Marie Arenas**  
**Dr. Silvia Miranda**

## Research lines

Our group has interests in three main research lines:

1. Novel methods for the chemical modification of carbon nanotubes: We have developed methods for the synthesis of rotaxane-type derivatives of SWNTs, the first example of mechanically interlocked derivatives of SWNTs. MINTs show fundamentally different properties from other types of SWNT derivatives, which might have implications in the reinforcement of polymers, catalysis, and sensing.
2. Chemistry of 2D materials: We are developing improved methods for production of ultrathin 2D materials and van der Waals heterostructures through liquid phase exfoliation from their bulk sources. From these suspensions, we build functioning (opto)electronic devices using dielectrophoresis. Finally, we are interested in fundamental problems in the chemistry of 2D materials, such as chemoselectivity.
3. Fundamental principles of supramolecular chemistry: Lastly, we are very interested in measuring and understanding noncovalent forces, which underlie all the results of the previous two lines. For example, we have developed a method for the determination of association constants of small molecules towards SWNTs and unveiled the different contributions to the stability of the complexes. Optical tweezers (OT) are one of the most successful single-molecule force spectroscopy techniques, to the point of Arthur Ashkin being awarded with the Nobel Prize for Physics 2018, for their use to study biophysics. In these two papers, we use OT to study synthetic supramolecular systems for the first time.

# Switchable nanomaterials

Webpage: <http://www.nanociencia.imdea.org/switchable-nanomaterials-group/group-home>



**Dr. José Sánchez  
Costa**

Assistant Research Prof.  
(tenure track)

**PhD:** University of Bordeaux  
1, France

**Previous Position:** LCC-CNRS,  
Toulouse, France

**ORCID:**  
0000-0001-5426-7956

**Research ID:**  
N-9085-2014

## POSTDOCS

**Dr. Lucía Piñeiro**  
Laboratoire de Chimie de  
Coordination LCC -CNRS,  
Toulouse, France

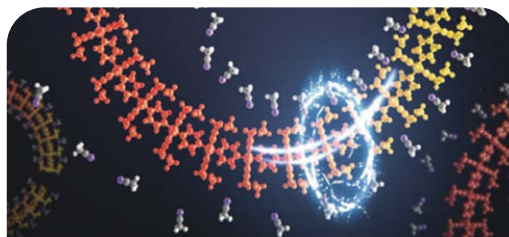
## PHD STUDENTS

**Esther Resines**  
**Ana Martínez**  
**Jorge Sangrador**

## Research lines

At the Switchable NanoMaterials group (SNM) we are mainly focused on the development of coordination complexes at the macro- and nanoscopic scale for their technological application in the fields of quantum computing, spintronic, thermal regulation and environmental science. In addition, we are interested in developing responsive molecules to act as porous materials for energy storage. Our multidisciplinary approach is based on three major themes:

- 1. Iron-based Spin Crossover (SCO) Switchable coordination complexes:** Spintronics and memory storage (*Nat. Comms.* **2021**, 12, 1578); as anticancer drug (*Antioxidants* **2021**, 10, 66), as selective sensor of pollutants (*Advanced Science*, **2021**, 8, 2102619; *Dalton Trans*, **2020**, 49, 7315)
- 2. Functional Metal-Organic Frameworks, MOFs:** MOFs are extended molecular materials formed by metal ions bridged by ligands, thus creating voids to absorb guest molecules. We are interested on increasing the selectivity of the MOF through tuning the shape and size of the pores and/or through the inclusion of specific receptors (*Chem.Commun.*, **2018**, 54, 5526).
- 3. Non-porous crystalline architectures acting as porous compounds:** In some cases, non-porous systems can act as porous materials and absorb target molecules remarkably (*Advanced Science*, **2021**, 8, 210002619; *Chemical Science*, **2021**, 12, 8682-8688; *Chemical Science*, **2019**, 10, 6612-6616; *ACIE*, **2019**, 131, 8, 2332-2337).





# Functional Nanoscale Materials and Devices

Webpage: <http://nanociencia.imdea.org/functional-nanoscale-materials-and-devices/home>



## Dr. Enrique Burzurí

Position: Assistant Research Prof. (tenure track)

PhD: Universidad de Zaragoza

Previous Position: TU Delft, The Netherlands.

### ORCID:

0000-0001-7906-7192

### Researcher ID:

M-3501-2015

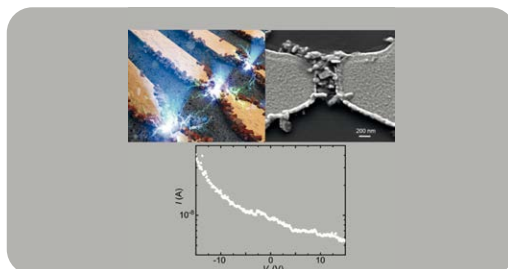
## PHD STUDENTS

Aysegul Develioglu

Lucía Martín

## Research lines

- 2D and 1D materials:** We are interested in the fundamental properties of 2D materials and their integration into (opto) electronics and spintronics devices. We have assembled scalable nano-transistors based on frantckeite heterostructures obtained by liquid-phase exfoliation. We are also involved in the controlled positioning of 1D SWNTs in complex devices. We have fabricated Physically Unclonable Functions (PUFS) and field-effect transistors with chemically modified SWNTs selectively positioned by dielectrophoresis.
- Magnetism of molecular materials:** We are also very interested in fundamental studies of the magnetism of molecules and other nanoscale materials (coordination polymers, 2D materials, mechanically interlocked magnetic molecules). For example, we have studied the magnetism of cylindrite van der Waals heterostructures down to the 2D limit. We have also studied the magneto-electronic response of Fe-based coordination polymers to volatile organic molecules.
- Molecular spin QBits:** Finally, we are exploring the incorporation of SWNT-magnetic molecule hybrids into superconducting circuits as spin QBits for quantum computation.



# Molecular Electronics



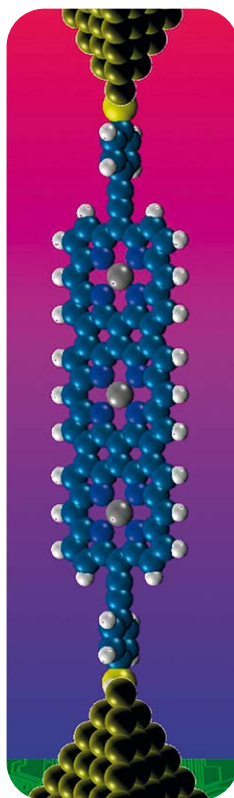
**Dr. Edmund Leary**  
Assistant Research Prof.  
(tenure track)

**PhD:** University of Liverpool, UK  
**Previous Position:** University  
of Liverpool, UK

**ORCID:**  
0000-0001-7541-5997

**Researcher ID:**  
L-1066-2018

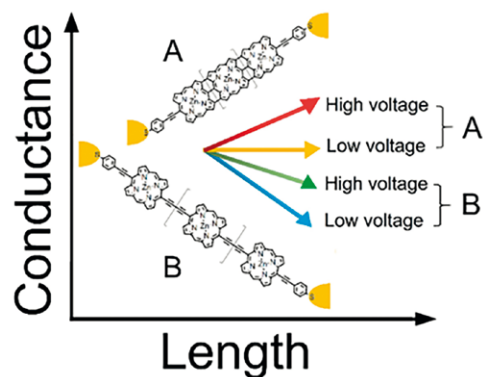
**RESEARCH ASSISTANT**  
**Lydia Abellán**



## Research lines

1. Structure-property relationships in electron transport through single molecules.
2. Effective binding groups for robust attachment of molecules to electrodes.
3. Aromaticity and anti-aromaticity and their effects on electron transport.
4. Quantum Interference at the single molecule level.
5. Long-range electron transport (> 5nm)

**Bias-Driven Conductance Increase with Length in Porphyrin Tapes;** *J. Am. Chem. Soc.* **2018**, 140, 40, 12877–12883 (Open access article).





# Functional Organic Materials

Webpage: <http://www.phthalocyanines.es>



## Prof. Tomás Torres Cebada

Associate Senior Professor

**PhD:** Universidad Autónoma de Madrid, Spain

**Double Affiliation:** Universidad Autónoma de Madrid, Spain

**ORCID:**

0000-0001-9335-6935

**Research ID:**

H-9796-2014

### ASSOCIATE RESEARCHER

#### Dr. Giovanni Bottari

Associate Researcher

**PhD:** University of Edinburgh, United Kingdom

**Double Affiliation:**

Universidad Autónoma de Madrid, Spain

**ORCID:**

0000-0001-6141-7027

**Researcher ID:**

A-8957-2013

### PhD STUDENTS

Álvaro Corrochano

Luis M. Mateo

Miguel Martínez

### TECHNICIAN

Dr. Maxence Urbani

## Research lines

Our research focuses on the preparation and study of molecular materials based on porphyrinoids like phthalocyanines (Pcs), sub-phthalocyanines (SubPcs) and porphyrins (Por), among others. See for example: *Angew. Chem. Int. Ed.* **2021**, 60,1474–1481; *Coord. Chem. Rev.* **2021**, 428, 213605.

1. One research line deals with the use of porphyrinoids as active components in solar cells. See for example: *Adv. Ener. Mater.* **2021**, 2101598; *J. Mater. Chem. C*, **2021**, 9, 16298–16303
2. We are also active in the preparation of photosensitizers for photodynamic therapy of cancer. See for example: *J. Med. Chem.* **2021**, 17436–17447; *Chem. Commun.* **2022**, 58, 669–672.
3. Finally our group is researching on the use of porphyrinoids in “On-surface synthesis”. See for example: *Angew. Chem. Int. Ed.* **2021**, 60, 16208–16214; *Adv. Sci.* **2022**, 2105906.



# Electrochemical Nanobiosensors

Webpage: <http://www.uam.es/gruposinv/biosens>



**Prof. María  
 Encarnación Lorenzo  
 Abad**

Associate Research  
 Professor

**PhD:** Universidad Autónoma  
 de Madrid, Spain

**Double Affiliation:** Univer-  
 sidad Autónoma de Madrid,  
 Spain

**ORCID:**  
 0000-0001-8432-9652

**Researcher ID:**  
 K-9825-2014

## Research lines

- 1. Nanomaterials for Biosensor development:** We have developed amperometric (bio)sensors with improved performance by the inclusion of nanomaterials, such as nanodiamonds, graphene, carbon nanotubes, carbon dots and gold nanoparticles. These nanomaterials have also been chemically modified.
- 2. Electrochemical indicators for DNA biosensors:** the group has pioneering works in Spain concerning the development of redox indicators of hybridization event. These indicators have been successfully applied in the development of very selective DNA biosensor and of biosensor for the detection of gene mutations associated to important human diseases, such as CF. In particular we have recently employed successfully met-  
 allacarboranes as redox indicators in DNA biosensor for the detection of different gene mutations.
- 3. Nanomaterials for the development of supercapacitors:** Lastly, we are very interested in the application of 2D nano-  
 materials for the fabrication of energy storage devices. For example, graphene decorated SiC nanomaterial (graphene@  
 SiC) (fabricated via an adiabatic process), has been phys-  
 icochemically characterised then applied as a supercapacitor  
 material and as an anode within a Li-ion battery (LIB).
- 4. Use of operando methods (Raman-electrochemistry, UV-V- elec-  
 trochemistry) for the mechanistic elucidation of electrochemi-  
 cally driven structural transformation or nanomaterial chemical  
 modification.**



# Covalent Organic Frameworks

Webpage: <https://www.nanomater.es>



## Prof. Félix Zamora

Associate Research Professor

**PhD:** Universidad Autónoma de Madrid, Spain

**Double Affiliation:** Universidad Autónoma de Madrid, Spain

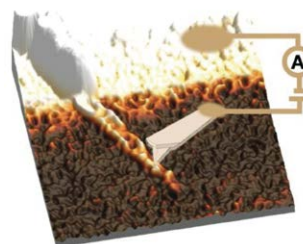
**ORCID:**  
0000-0001-7529-5120

**Researcher ID:**  
E-6265-2014

## Research lines

Our research group is developing the chemistry of low dimensional materials. The research activity deals with the preparation and characterization of nanomaterials with multifunctional properties:

1. One-dimensional coordination polymers with electrical properties, and their potential use as “molecular wires”, and the use of coordination polymers of lamellar structure to produce nanometric films and monomolecular thickness.
2. Two-dimensional materials with a rational chemical design using Covalent Organic Frameworks and Metal-Organic Frameworks: It aims to provide alternative two-dimensional materials using chemical synthesis for a rational design of structures and properties.
3. Two-dimensional materials based on inorganic crystals such as graphene, boron nitride and antimonene: Our aim is to provide novel synthetic routes for the production of suspensions and the characterization of these materials on surfaces.
4. Design and synthesis of porous Materials with potential applications in water and energy based on Covalent Organic Frameworks.



# Biosensors

Webpage: <http://www.imdeananociencia.org/home-en/people/item/dr-jose-manuel-pingarron>



**Prof. José Manuel  
Pingarrón**  
Associate Research  
Professor

**PhD:** Universidad  
Complutense  
de Madrid, Spain

**Double Affiliation:** Universidad  
Complutense de Madrid, Spain

**ORCID:**  
0000-0003-2271-1383

**Researcher ID:**  
M-9402-2014

**Scopus Author ID:**  
7005489861

## Research lines

1. **Fundamental Research:** Synthesis, characterization and application of latest generation nanomaterials, redox polymers/electronic conductors and modern electroanalytical techniques in electrochemical (bio)sensing.
2. **Applied Research:** Development and application of advanced electrochemical (bio)sensors for the determination of relevant (bio)markers in the environmental, clinical and food fields in response to current demands of society.



# Hybrid Nanomaterials

Webpage: <http://nanociencia.imdea.org/semiconductor-nanoparticles-group/group-home>



**Dr. Beatriz H. Juárez**  
Associate Researcher

**PhD:** Universidad Autónoma de Madrid, Spain

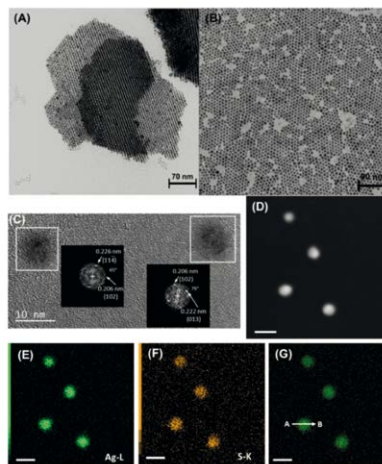
**Double Affiliation:** Universidad Autónoma de Madrid, Spain

**ORCID:**  
0000-0003-1704-060X

**Researcher ID:**  
G-7066-2011  
L-5896-2017

## Research lines

1. The main research line includes the synthesis of colloidal nanocrystal (mainly semiconductor nanocrystals or quantum dots in 0, 1, and 2D as well as hybrid systems) with the aim to design rules for optimal nanocrystals performance. Special emphasis is given to surface chemistry studies by X-ray Photoelectron Spectroscopy and X-ray absorption Spectroscopy and characterization by advanced optical and microscopical techniques.
2. Functional materials for nanothermometry based on semiconductor nanocrystals. Among the fabricated systems for nanoscale thermal monitoring we focus on the synthesis of nanocrystals with adequate size and surface treatment for luminescence nanothermometry in the NIR range, where light attenuation in tissues is minimized and higher sensitivity can be achieved.



# P2

programme

# Quantum materials at the nanoscale

Programme Manager: Prof. Rodolfo Miranda

## Research lines

**Scanning Probe  
Microscopies and  
Surfaces**

Prof. Rodolfo Miranda

**Theoretical Modelling**

Prof. Francisco Guinea

**Quantum Devices  
and Photonics**

Dr. Daniel Granados

**Nanoarchitectures  
at surfaces**

Dr. David Écija

**Spin-Polarized low T STM**

Dr. Fabián Calleja

**Topological surfaces  
states in quantum  
materials**

Dr. Manuela Garnica

**Applied Nanoelectronics**

Dr. Ramón Bernardo

**First-principles modelling  
for quantum materials**

Dr. José Ángel Silva

**Imaging of 2D Materials**

Prof. Amadeo L.

Vázquez de Parga

**Photonic STM**

Dr. Roberto Otero

**Transport in 2D Systems**

Prof. José Luis Vicent

**Thermopower  
at the Nanoscale**

Prof. Nicolas Agrait

**Theoretical Study of  
Molecules on Surfaces**

Prof. Manuel Alcamí



## About the programme

.....

Quantum Technologies play a cornerstone role in the future European economy and competitiveness. They will impact security, counterfeit prevention, drug discovery, material sciences, complex-network optimisation, information storage, artificial intelligence, sensing, weather or stock market forecasts, or metrology.

The programme combines advanced microscopies and spectroscopies with atomic resolution -essential to characterize matter at the nanoscale- with multi-scale theoretical modelling to design, synthesize and characterize quantum materials. With our expertise in scanning probe microscopies we visualize exotic quantum states and build a theoretical framework to correlate structural properties and quantum behaviour. This enable us to design materials ad-hoc, optimized for specific functionality. In-house access to nanofabrication tools will empower us to manufacture devices exploiting these quantum phenomena.

The scientists involved in this programme develop at IMDEA advanced Scanning Probe Microscopes, mostly STM, AFM and Photoelectron Microscopy to investigate problems such as the epitaxial growth of graphene, the chemical functionalization of graphene, the design of metal-intercalated graphene heterostructures, the characterization of topological insulators, the self-assembly of molecules at surfaces, the on-surface synthesis of nanomaterials from molecular precursors, the design of surface-confined metal-organic architectures, the in-situ fabrication and response of nano-catalysts, the realization of scanning tunnelling spectroscopy and inelastic scanning tunnelling spectroscopy at the level of single molecules, the investigation of tip-induced electroluminescence or the spin polarized imaging of magnetic nanostructures. Friction at the nanoscale and theoretical modelling are also involved. Activities of this programme have implications for aeronautics, electronic, magnetic, sensory, and energy applications. This programme is in close collaboration with research programmes P1 and P4.

# Scanning Probe Microscopies and Surfaces

Webpage: <http://nanociencia.imdea.org/rodolfomiranda/index.php/en>



**Prof. Rodolfo Miranda**  
Associate Research  
Professor

**PhD:** Universidad Autónoma  
de Madrid, Spain

**Double Affiliation:** Universidad  
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0000-0002-1064-6724

**Researcher ID:**  
7102041777

## EMERITUS

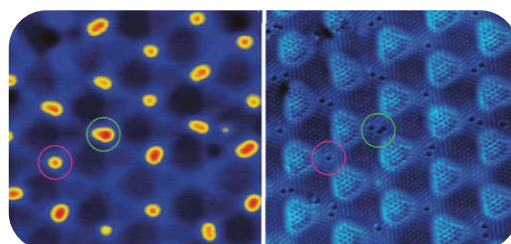
**Prof. Juan M. Rojo**  
Universidad Complutense de  
Madrid, Spain

## Research lines

The use of advanced microscopies and spectroscopies with atomic resolution is essential to characterize matter at the nanoscale. Our main tool for studying nanostructures at the atomic scale is low temperature scanning probe microscopy. The microscopes enable us to image, manipulate, and detect the local properties of nanoscale objects with picometer resolution under extreme conditions, i.e. in ultra-high vacuum, at temperatures down to 700mK and in magnetic fields up to 3T. We measure electronic, vibrational and optical excitations, magnetic interactions and forces, manipulate single atoms and molecules to assemble functional nanostructures.

We investigate problems such as the epitaxial growth of graphene, its spatially-resolved electronic structure or its chemical functionalization, the investigation of tip-induced electroluminescence of molecules, its Kondo response or the spin polarized imaging of magnetic nanostructures.

- Atomic scale tunneling microscopy and spectroscopy.
- Dynamics at surfaces.
- Fundamental properties of low dimensional systems and quantum materials.
- Magnetism of nanostructures.
- Molecular nanoscience at surfaces.





# Theoretical Modelling

Webpage: <http://www.imdeananociencia.org/graphene/group-home>



**Prof. Francisco Guinea**

Senior Research Prof.

**PhD:** Universidad Autónoma de Madrid

**Previous Position:** Instituto de Ciencia de Materiales de Madrid-CSIC, Spain

**Researcher ID:**  
A-7122-2008

**POSTDOCS**

**Dr. Tommaso Cea**  
University of Rome, Italy

**Dr. Yago Ferreiros**  
KTH Royal Institute of Technology, Stockholm, Sweden

**Dr. Pierre A. Pantaleón**  
University of Manchester, UK

**PhD STUDENTS**

**Ignacio Vicent**  
**Alejandro Jimeno**  
**Héctor Sainz**

**Research lines**

The main goal of the research done within the group is the development of models which describe the properties of novel two dimensional materials. The best known case is graphene, which permits the fabrication of films of widths comparable to the radius of a single atom. After the synthesis of graphene, many other two dimensional materials have been fabricated, with a broad range of properties.

Finally, layers of different materials can be combined, leading to "metamaterials" with pre-designed features.

The models developed in the group emphasize those properties which are unique to these materials, and they include geometrical and structural features, electronic properties, and the possible formation of superconducting and magnetic phases. The group also considers devices based on these materials, highlighting those with functionalities which cannot be achieved in devices fabricated using other materials.

The research being carried out is expected to be useful for descriptions of these materials at the atomic scale, and also in samples of sizes much larger than the separation between atoms. A wide variety of techniques in theoretical physics are applied, from numerical calculations to the use of topological arguments, or methods based on the renormalization group.

The models developed in the group are checked against experimental results, and they attribute to their interpretation. A significant fraction of the research done by the group is carried out in collaboration with experimental teams.

# Quantum Devices and Photonics

Webpage: <http://www.nanoscience.imdea.org/quantum-nanodevices/group-home>



**Prof. Daniel Granados**  
Senior Research Prof.

**PhD:** Universidad Autónoma de Madrid. Spain and IMM-CNM-CSIC

**Previous Position:** Toshiba Research Europe Ltd. (TREL), Cambridge, UK

**ORCID:**  
0000-0001-7708-9080

**Researcher ID:**  
A-4090-2011

**Scopus Author ID:**  
55911667100

## POSTDOCS

**Dr. Jorge Trasobares**  
National University of Singapore

## PhD STUDENTS

**Victor Marzoa**  
(co-supervised with Dr. Ramón Bernardo)

**Marina Calero**  
(co-supervised with Dr. Alicia Gomez)

**Cristina García**  
(co-supervised with Dr. Ramón Bernardo)

**Gabriel Caballero**  
(co-supervised with Dr. Mariela Menghini)

## RESEARCH ASSISTANT

**Julia García**

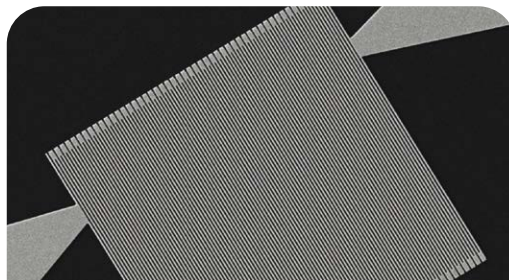
## TECHNICIAN TRAINEE

**Patricia Cancho**

*Superconducting nanowire single-photon detector made of NbTiN manufactured at IMDEA-Nanociencia quantum nanodevices group in collaboration with the Superconducting technologies group of the CAB*

## Research lines

The information society is experiencing a global challenge, with the amount of information to be stored, transmitted or processed growing continuously every year. Quantum technologies are expected to become crucial to address this challenge, with the second quantum revolution blasting off. The Quantum nano-Devices Group (QnDG) was created in 2015 with the purpose of contributing to this revolution. It focuses on micro and nanofabrication of electronic and photonic hybrid devices for quantum information technologies. A solid-state approach is fostered towards the realization of single photon emitters (SPEs), cavity quantum electrodynamics (CQED), single photon detectors (SPDs), random number generators (RNDs) and physically unclonable functions (PUFs). The Quantum Nano Devices Group also collaborates tightly with the Centre of Astrobiology (CAB-INTA-CSIC) in the development of Kinetic Inductance Superconducting Detectors (KIDs) for space exploration. KIDs are expected to become the next generation technologies for the forthcoming missions in the GHz to THz bands. Recently (2018) we have also started working together on the development of hybrid superconducting devices for quantum technologies mixing traditional superconductors with low dimensional quantum confined materials. The group has a long tradition on the development of novel micro and nanofabrication techniques, with emphasis on the tailoring and engineering of low dimensional material via direct nano-patterning methods.





# Nanoarchitectures at Surfaces

Webpage: <http://ecija.hol.es>



## Dr. David Écija

Senior Research Prof.

PhD: Universidad Autónoma de Madrid, Spain

Previous Position: Technical University of Munich, Germany

Researcher ID:  
I-2207-2012

## RESEARCHERS

**Dr. Jose Ignacio Urgel**  
Technische Universität München, Germany

**Dr. Sofia de Oliveira**  
Universidade Federal de Minas Gerais, Brazil

**Dr. Koen Lauwaet**  
Researcher  
ICMM-CSIC, Spain

## POSTDOCS

**Dr. Ana Sánchez**  
IMDEA Nanociencia

**Dr. Ana Isabel Barragan**  
Centro de Física de Materiales, CFM / Donostia, Spain

**Dr. Daniel Moreno**  
IMDEA Nanociencia, Spain

## PhD STUDENTS

**Cristina Martin**  
**Kalyan Biswas**  
**Kotapalayam Mathialagan Shanmugasibi**  
**Elena Perez Elvira**

## VISITOR

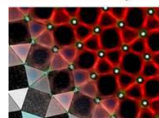
**Dr. Jose Maria Gallego**  
ICMM-CSIC, Spain

## Research lines

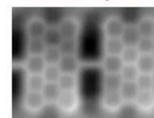
Our group is focused on the design of organic products and nanomaterials on surfaces, including three main lines of research:

- 1. Surface-confined metal-organic materials.** Our main interest is to rationalize the coordination chemistry of functional metals like lanthanides on surfaces, creating unique architectures with advanced functionalities for sensing, catalysis, light emission and nanomagnetism.
- 2. On-surface synthesis of functional nanomaterials.** We focus on the design of unprecedented organic complexes and nanomaterials, paving the way for modern organic optoelectronics, nanomagnetism and non-trivial quantum phases of matter.
- 3. Nanocatalysis for energy applications.** We pursue the on-surface design and atomistic characterization of metal-oxide nanocatalysts of relevance for water splitting and CO<sub>2</sub> reduction.

Coordination chemistry on surfaces



On-surface synthesis



Chemistry at Surfaces



On-surface model oxide catalysts



# Spin-Polarized low T STM

Webpage: <http://www.imdeananociencia.org/nanoscale-imaging-of-2d-materials/group-home>



**Dr. Fabián Calleja**  
Assistant Research Prof.  
(tenure track)

**PhD:** Universidad Autónoma de Madrid, Spain  
**Previous Position:** Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland

**Researcher ID:**  
I-7964-2012

## PHD STUDENT

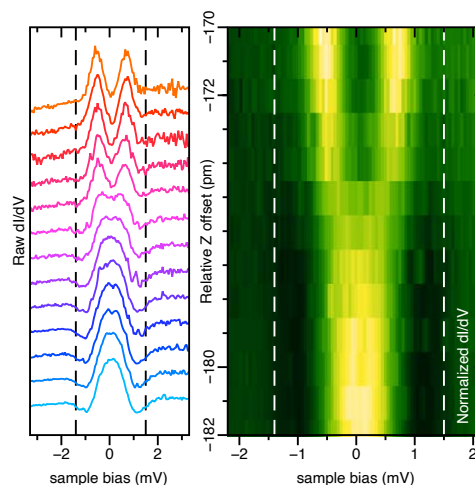
**Cosme González**  
(co-supervised with Dr. L.Vazquez de Parga)

**Ivan Martínez**  
(co-supervised with Dr. L.Vazquez de Parga)

## Research lines

1. Electronic and magnetic properties of graphene-based systems at the atomic level.
2. Modification, functionalization and development of chemical reactions on graphene.
3. Electronic correlation effects on transition metal dichalcogenide 2D systems.

We have functionalized a superconducting niobium STM tip with a TCNQ molecule that accepts charge from the tip and develops a magnetic moment. As a consequence, Yu-Shiba-Rusinov bound states develop within the Nb superconducting gap. We detect these states by means of STS on a graphene/Ir(111) surface and follow their evolution as the interaction strength between the tip and the molecule is fine-tuned by controlling the vertical position of the STM scanner in the picometer range.





# Topological surfaces states in quantum materials

Webpage: <http://nanociencia.imdea.org/nanoscale-imaging-of-2d-materials/group-home>



## Dr. Manuela Garnica

Assistant Research Prof.  
(tenure track)

PhD: Universidad Autónoma  
de Madrid, Spain

Previous Position: Technical  
University of Munich, Germany

ORCID:  
0000-0002-7861-9490

Researcher ID:  
AAG-8254-2019

## PHD STUDENTS

### Pablo Casado

(co-supervised with Dr.  
Amadeo L. Vázquez de  
Parga)

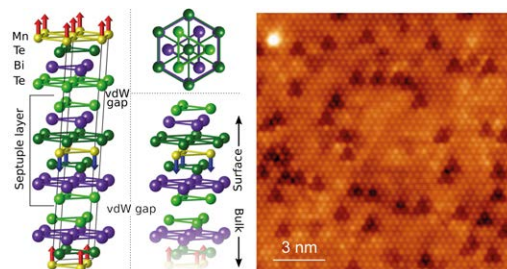
### Joan Ripoll

## Research lines

Our research interests deal with quantum materials and new topological states of matter. In recent years, quantum materials have attracted a wide range of attention not only for the possibility to study many aspects of fundamental physics but also because of their potential applications.

- Epitaxial growth of 2D quantum materials
- Phase engineering of transition metal dichalcogenides (TMDs)
- Correlation of the crystalline, electronic and topological structure of quantum materials at atomic scale to macroscopic properties

"Native point defects and their implications for the Dirac point gap at MnBi<sub>2</sub>Te<sub>4</sub> (0001)", Manuela Garnica *et al.* npj *Quantum Materials* 7, 1-9



# Applied Nanoelectronics



**Prof. Ramón Bernardo**  
Assistant Research Prof.  
(tenure track)

**PhD:** Universidad Autónoma de Madrid, Spain

**Previous Position:** Lancaster University, UK

**ORCID:**  
0000-0001-6881-2599

**Researcher ID:**  
N-3945-2019

**Scopus Author ID:**  
55922273000

## PhD STUDENTS

### Victor Marzoa

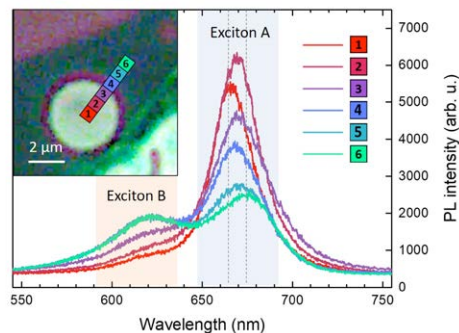
co-supervised with  
Dr. Daniel Granados)

### Cristina García

(co-supervised with  
Dr. Daniel Granados)

## Research lines

1. We are focused on the development of practical electronic and optical devices by exploring new routes to exploit physical phenomena traditionally difficult to harness.
2. Physical cryptoprimitives from non-linear electronic devices. Information security is crucial in an interconnected society. We are developing cryptographic primitives based on the atomic imperfections in the interfaces of semiconductor devices for unique identification in local and network authentication schemes.
3. Lateral two-dimensional and hybrid devices. We are working on band-gap engineering via high-vacuum chemical etching of two dimensional materials to fabricate in-plane junction field effect transistors and designing hybrid tunneling devices combining 2D semiconductors with the quantum confined electronic structures of colloidal nanocrystals.
4. Two-dimensional optomechanical resonators. We are fabricating single- and few-layer electro-mechanical resonators from two-dimensional semiconductors to obtain tunable and spatially modulated light emitters.





# First-principles modelling for quantum materials



## Dr. José Angel Silva Guillén

Assistant Research Prof.  
(Tenure track).

**PhD:** PhD: Universitat Autònoma de Barcelona, Spain.

**Previous position:** Wuhan University, China.

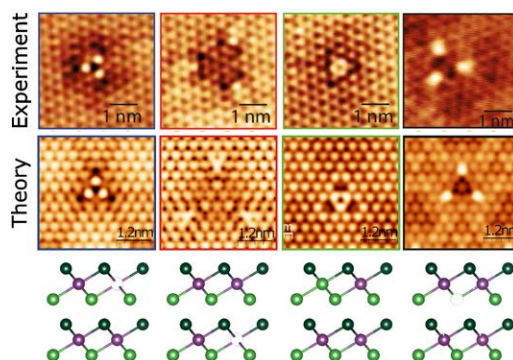
**ORCID:**  
ORCID: 0000-0002-0483-5334

**Researcher ID:**  
J-8636-2017

## Research lines

We are interested in the electronic properties of different two-dimensional materials. Our goal is to understand their structural and electronic properties from a fundamental point of view so we can tune those properties in a desired way by applying different stimuli to the materials, for example, by changing the number of layers, applying strain or twist. To achieve this, we mainly use first-principles calculations. We also work closely with experimental colleagues.

Defects on the 1T-PtTe<sub>2</sub> surface. Top row: Experimental STM images of different defects found in the sample. Middle row: Simulated STM images for a Pt vacancy in the first layer, a Pt vacancy in the second layer, a substitutional Te of a Pt of the first layer and a Te bottom vacancy in the first layer. Bottom row: Model of the identified defects.



# Imaging of 2D Materials

Webpage: <http://www.imdeananociencia.org/nanoscale-imaging-of-2d-materials/group-home>



**Prof. Amadeo L. Vázquez de Parga**  
Associate Research Professor

**PhD:** Universidad Autónoma de Madrid, Spain  
**Double Affiliation:** Universidad Autónoma de Madrid, Spain

**ORCID:**  
0000-0003-0551-1603

**Researcher ID:**  
L-2418-2013

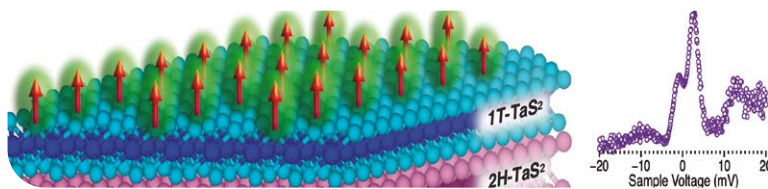
## PHD STUDENTS

**Iván Martínez**  
(co-supervised with Dr. Calleja)

## Research lines

1. Electronic structure of 2D materials.
2. Chemical functionalization of 2D materials.
3. Highly correlated electrons.
4. Superconductivity in low dimensions

A 2D Kondo lattice is detected in a 1T/2H-TaS<sub>2</sub> polymorphic heterostructure by means of low temperature STM-STS. The resulting quantum-coherent electronic state is demonstrated by the appearance of a gap-like structure within a Kondo resonance below a characteristic temperature lower than the Kondo temperature of the system.





# Photonic STM

Webpage: <http://www.imdeananociencia.org/home-en/people/item/roberto-otero-martin>



**Prof. Roberto Otero**  
Associate Researcher

**PhD:** Universidad Autónoma de Madrid, Spain

**Double Affiliation:** Universidad Autónoma de Madrid, Spain

**ORCID:**  
0000-0001-6936-4003

**Researcher ID:**  
E-4516-2011

## PHD STUDENT

**Óscar Jover**

## MSC

**Alba Santos**

Universidad Autónoma de Madrid, Spain

**Hussein Shams**

Universidad Autónoma de Madrid, Spain

## VISITOR

**Dr. José María Gallego**

ICMM-CSIC, Spain

## Research lines

In our group we fabricate low-dimensional materials and quantum systems by deposition of organic and inorganic materials on solid surfaces, and investigate their unique properties by Low-Temperature Scanning Tunnelling Microscopy, Spectroscopy and Luminescence. In particular, we are interested in:

1. Effects of quantum confinement within nanostructures (discretization of energy levels, quantization of effective masses). Our recent investigations have unraveled the discretization of energy levels in graphene quantum boxes and the origin of the finite mass of electrons confined in such nanostructures.
2. Luminescence of single molecules excited by STM. We have added to our STM a system to collect the light emitted from the tunneling junction due to the injection of hot carriers. The experimental setup has already been tested with individual fullerene nanocrystals (*in preparation*), and we are now moving to individual molecules.
3. Interaction of spin polarized electrons with organic nanostructures. The interaction between organic molecules and the electron sea at solid surfaces leads to interesting electronic phenomena such as the existence of Kondo resonances or the existence of 1D electronic channels for interfacial electrons. We intend to explore the new effects that be expected when such organic molecules are supported by substrates with a non-trivial spin texture.

# Transport in 2D Systems

Webpage: <http://www.imdeananociencia.org/home-en/people/item/jose-luis-vicent-lopez>



**Prof. José Luis Vicent**  
Associate Research  
Professor

**Double Affiliation:** Universidad  
Complutense de Madrid

**ORCID:**  
0000-0001-9343-7671

**Researcher ID:**  
7006735519

## ASSOCIATED RESEARCHERS

**Prof. Elvira M. González**

**PhD:** Universidad  
Complutense de Madrid  
**Double Affiliation:**  
Universidad Complutense de  
Madrid  
**ORCID:** 0000-0001-9360-3596

**Dr. Alicia Gómez**

**PhD:** Universidad  
Complutense de Madrid  
**Double Affiliation:** CSIC-  
INTA, Torrejon de Ardoz

**Dr. Álvaro Muñoz**

**PhD:** Universidad Autónoma  
de Madrid, Spain  
**Double Affiliation:**  
Universidad Complutense de  
Madrid  
**ORCID:** 0000-0003-3236-5509

## PhD STUDENT

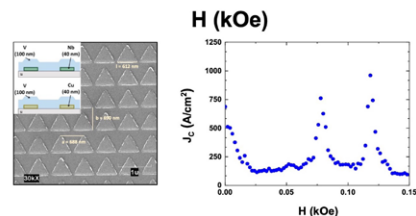
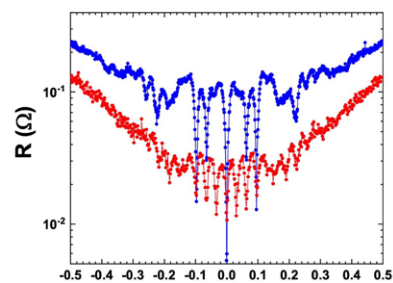
**Marina Calero**

(co-supervised  
with Dr. Daniel Granados)

## Research lines

1. Nanostructured superconductor-ferromagnetic hybrid systems and superconductor-2D heterostructures.
2. Quantum Hall effect in graphene-based devices and resistive switching phenomena in 2D materials.
3. Metal-insulator transition in strongly correlated materials.

**Vortex dynamics controlled by local superconducting enhancement;** *New J. Phys.* 21, 113059 (2019); <https://doi.org/10.1088/1367-2630/ab5994>; Open Access





# Thermopower at the Nanoscale

Webpage: <http://www.nanociencia.imdea.org/home-en/people/item/nicolas-agrait-de-la-puente>



## Prof. Nicolás Agrait

Associate Research Professor

PhD: UNED, Spain

Double Affiliation: Universidad Autónoma de Madrid, Spain

### ORCID ID:

0000-0001-8177-7919

### Researcher ID:

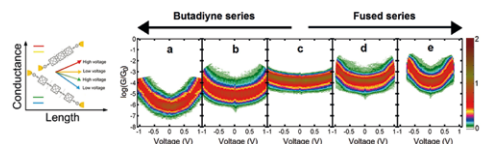
I-2207-2012

## Research lines

Using scanning tunneling microscopes (STMs) made in house, we assemble and study circuits formed by a single organic molecule chemically bond to two metallic electrodes. We work mainly in ambient conditions, and explore the electrical properties of these molecular circuits, including their thermopower, this is the electrical voltage created between the extremes of the molecule under a thermal gradient.

More specifically, we study:

1. Electrical properties of organic molecule families: oligo(phenyl ethynylene)s, oligoynes, phthalocyanines, porphyrins... (*JACS* **2013**, *JACS* **2014**, *JACS* **2015**, *JACS* **2018**).
2. Thermo power of single-molecule junctions: we explore to ability to a single molecule of different compounds to generate an electrical potential when they are under a thermal gradient (*Nano Lett.* **2013**, *Nature Mater.* **2016**, *Chem. Soc. Rev.* **2016**).
3. Key factors involved in the formation and stability of molecular junctions (*J. Chem. Phys. C* **2013**, *J. Am. Soc.* **2013**, *Chem. Soc. Rev.* **2015**, *J. Phys. Chem. C* **2018**).
4. Graphene-like molecules containing non-hexagonal rings (*Chem. Sci.* **2017**).
5. Other electrode materials different from gold.



# Theoretical Study of Molecules on Surfaces

Webpage: <http://www.imdeananociencia.org/home-en/people/item/manuel-alcami-pertejo>



**Prof. Manuel Alcamí**  
Associate Research  
Professor

**PhD:** Universidad Autónoma  
de Madrid, Spain

**Double Affiliation:** Universidad  
Autónoma de Madrid, Spain

## Research lines

His field of expertise is the theoretical study of molecules both in gas phase and deposited on surfaces.

His current research lines are:

1. Theoretical study of self-assembly and charge transfer processes of molecules deposited on surfaces. We have focused our research in this topic in donor or acceptor organic molecules as TCNQ or TTF deposited on metal surfaces.
2. Carbon nanostructures (fullerenes, nanotubes and graphene), in the last years we have developed simplify models to understand the stability of charged fullerenes, fullerene derivatives (*J. Am. Chem. Soc.* 139, 1609, 2017) or He-decorated fullerenes.
3. Fragmentation and stability of highly charged and highly excited molecules, in his field we have performed Molecular Dynamic simulations on excited states to describe the coupling between nuclear and electronic dynamics, or to determine the energy deposit in ion collisions with biomolecules.



# P3

programme

# Nanotechnology for Health-care

Programme Manager: Prof. Rodolfo Miranda

## Research lines

**Nucleic Acids  
and Nanoparticles  
in Nanomedicine**

Prof. Álvaro Somoza

**Advanced fluorescence  
nanoscopy**

Dr. Cristina Flors

**Molecular Motors  
Manipulation Lab**

Dr. Borja Ibarra

**Metallo drugs**

Dr. Ana Pizarro

**Magnetic nanoparticles**

Dr. Gorka Salas

**Neural Interfaces**

Dr. M<sup>a</sup> Teresa González

**Protein Engineering**

Dr. Begoña Sot

**Mechanical properties  
of Biostructures**

Dr. Johann Mertens

**Intracellular temperature  
measurements**

Dr. S. Thompson

**Biosensors  
in neuroscience**

Dr. Valle Palomo

**Engineering Biofunctional  
Nanostructures**

Dr. Aitziber L. Cortajarena

**Hyperthermia**

Dr. Daniel Ortega

**Magnetic Nanoparticles  
in Biomedicine.**

**Cell-particle Interactions**

Prof. Angeles Villanueva



## About the programme

This programme is focused on the development of novel nanotechnologies for medical applications on three different areas: NanoOncology (Translational developments for cancer treatment and diagnosis), NanoDiagnosis (development of new colorimetric tests for biological threats), and NanoNeurology (Nanotech-based developments for neurodegenerative diseases). The programme is highly multi- and interdisciplinary character, combining the concerted effort of biologists, chemists, physicists and medical doctors pursuing a common objective, which is only possible in few places worldwide, among them IMDEA Nano. We build on the translational aspects of some of our technologies to bring them closer to the clinic with the aim for better, more efficient, and cost-effective therapeutic and diagnostic tools. The programme is in close collaboration with research programmes P1 and P4.

One of the important areas is the preparation and use of multifunctional nanoparticles (NPs) in Oncology, in particular for cancer treatment and diagnosis. Magnetic NPs selectively target tumours for multimodal treatment as drug nanocarriers and heating inductors. In search of efficiency in the fight against cancer, the need to reduce toxic side effects associated with cancer therapies is investigated by using different strategies, (i) self-immolative linkers that attach drugs to nanoparticles and release a drug once in target cells and (ii) design of new pH-sensitive chemotherapeutic agents that can be activated by the tumor micro-environment. The development and utilisation of nanotechnology can further the search for new cancer therapies and this knowledge will impact across this multidisciplinary community.

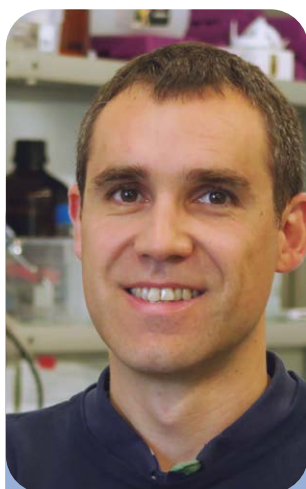
The generation of sensors based on nanoparticles for detection of targets of medical interest aims to exploit the higher sensitivity and specificity of nanostructure-based diagnostics platforms for Biological Threats (including emergent viruses). One example is the use of nucleic acid conjugated gold nanoparticles to detect different biomarkers involved in diseases such as uveal melanoma, pancreatic cancer, Duchenne muscular dystrophy, and virus SARS COV-2. Another area of interest is the use of nanotechnology-based solutions to the growing problem of antibiotic-resistant bacteria. Nanostructures and NPs with antibacterial properties that rely on different antibacterial mechanisms are being investigated as promising alternatives to antibiotics. Selective bacterial entrapping nanotextures are also under development as bacteria sensor platforms.

NanoNeurology investigations face the challenges related to neurological disorders from two fundamental complementary approaches: pharmacological and technological, with a special focus on the advantages of nanoscopic systems and nanodevice fabrication in the search for solutions that help understand, alleviate and/or prevent these disorders. The activities are basis on the development of sensors for the precise measurement of pharmacological action of tailored multi-target compounds as well as on the development of neural interfaces based on nanotechnology that allow monitoring and stimulating the activity of the nervous tissue. We focus in particular on neurodegenerative diseases, which are increasingly prevalent in developed countries due to increased life expectancy.



# Nucleic Acids and Nanoparticles in Nanomedicine

Webpage: [www.nanobioimdea.com](http://www.nanobioimdea.com)



**Prof. Álvaro Somoza**  
Senior Research Prof.

**PhD:** Universidad Autónoma de Madrid, Spain

**Previous Position:** Instituto de Investigación Biomédica Barcelona (IRB Barcelona), Barcelona, Spain

**Orcid**  
0000-0001-9873-435X

**Research ID**  
F-8781-2010

## POSTDOC

**Dr. Milagros Castellanos**  
IMDEA Nanociencia, Spain

**Dr. Rocío Coloma**  
CNB-CSIC, Spain

**Dr. Hernán Alarcón**  
Universidad Autónoma de Madrid, Spain

**Dr. Jordi Royes**  
Laboratoire Pasteur, ENS Chimie y IBPC, France

**Dr. Miriam Domenech**  
Universidad Complutense de Madrid, Spain

**Dr. Mario Martinez**  
Universidad Autónoma de Madrid, Spain

**Dr. Ana Belen Latorre**  
IMDEA Nanociencia, Spain

## PhD STUDENTS

**Paula Milán**  
**Eduardo García**  
**Ciro Rodríguez**  
**Demian Pardo**  
**Nuria Lafuente**  
**Catarina Castanheira**  
**Rama Prajapati**

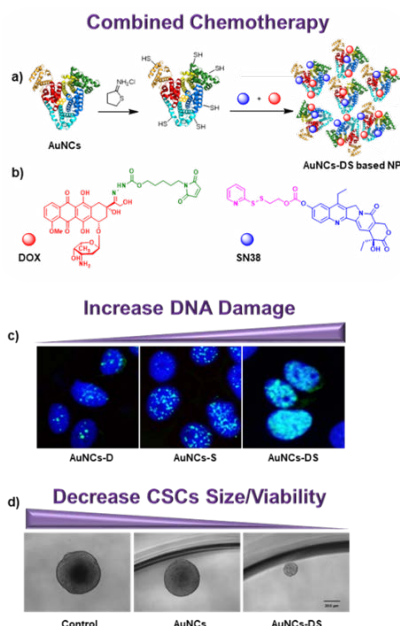
## RESEARCH ASSISTANTS

**Irene de la Iglesia**  
**Irene Pardo**

## Research lines

1. Nanocarriers of bioactive molecules.
2. Sensors of nucleic acids based on nanomaterials.
3. CRISPR-based gene editing systems.
4. Diseases addressed: Uveal Melanoma, Pancreatic Cancer, Breast Cancer, Duchenne Muscular Dystrophy.

**Multifunctional Albumin-Stabilized Gold Nanoclusters for the Reduction of Cancer Stem Cells.** *Cancers (Base)*. 2019, 11 (7), 969. <https://doi.org/10.3390/cancers11070969>. Open Access





# Advanced fluorescence nanoscopy

Webpage: <http://imdeananotools.wix.com/flors>



**Prof. Cristina Flors**  
Senior Research Prof.

**PhD:** Institut Quimic de Sarria,  
Spain

**Previous Position:** University  
of Edinburgh, Edinburgh, UK

**ORCID:**  
0000-0001-5688-9150

**Researcher ID:**  
C-2123-2017

## POSTDOCS

**Dr. Joaquim Torra**  
Institut Químic de Sarrià,  
Barcelona, Spain

**Dr. Felipe Viela**  
UC Lovain, Belgium

**Dr. Patricia Bondia**  
IMDEA Nanociencia

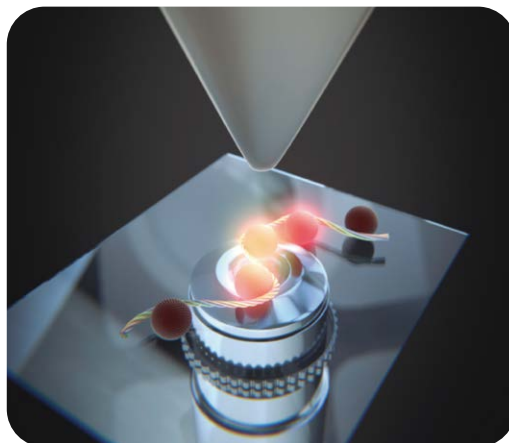
## PhD STUDENTS

**Ingrid Ortega**

## Research lines

1. Novel methods for super-resolution fluorescence imaging.
2. Advanced correlative fluorescence and atomic force microscopy.
3. Photosensitizing fluorescent proteins for advanced microscopy.

Our laboratory works on the development of advanced fluorescence microscopy methods and their application in biology and materials science. We have built a novel correlative microscope that can perform in situ super-resolution imaging combined with atomic force microscopy (Monserrate et al, *ChemPhysChem* **2014**), and have used it to study hybrid bionanomaterials (Bondia et al, *Small* **2017**), the mechanisms of action of amyloid-targeting drugs (Bondia et al, *J. Am. Chem. Soc.* **2020**) and mechanically-induced bacterial death (del Valle et al, *ACS Appl. Mater. Interfaces* **2020**). In parallel to our super-resolution work, we are also interested in the development and characterization of fluorescent proteins as genetically-encoded photosensitizers, and their potential use in phototherapy and advanced microscopy (Ruiz-González et al, *J. Am. Chem. Soc.* **2013**; Rodríguez-Pulido et al *Chem. Commun.* **2017** & *ChemPhotoChem* **2019**)



# Molecular Motors Nanomanipulation Lab

Webpage: [www.borjaibarralab.com](http://www.borjaibarralab.com)



**Dr. Borja Ibarra**  
Assistant Research Prof.  
(tenure track)

**PhD:** Universidad Autónoma Madrid

**Previous Position:** UC Berkeley, USA

**ORCID:**  
0000-0001-6597-797X

**Researcher ID:**  
H-5840-2015

## ASSOCIATE RESEARCHER

**Dr. Francisco Javier Cao**

**PhD:** Universidad Complutense de Madrid

**Double Affiliation:**  
Universidad Complutense de Madrid

## PHD STUDENTS

**Carlos Rodríguez**

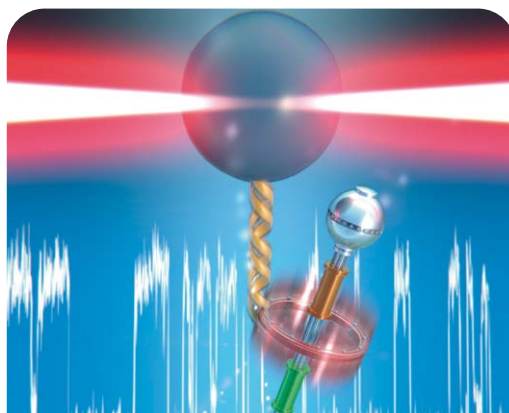
**Ismael Plaza**

## RESEARCH ASSISTANT

**María Ortiz**

## Research lines

- Biological machinery involved in nucleic acids metabolism.** We are measuring the operational dynamics of the biological machinery involved in: i) mitochondrial DNA replication (*NAR* 2020; *NAR* 2019; *NAR* 2017) and ii) transcription of Influenza A viral genome.
- Cell membrane nanomechanics.** We have developed a single-molecule method to measure the dynamics of motor proteins involved in remodeling of cell membranes (*Nature Comms* 2019).
- Synthetic molecular motors:** We have developed new methods to measure the mechanical strength of non-covalent interactions (*Chem. Science* 2017) and the dynamics and mechanistic principles of operation of individual synthetic molecular switches (*Nature Comms* 2018).
- Technology development.** We are working to combine optical manipulation with RAMAN (TERS). This exciting marriage of techniques will open up a wealth of new promising applications.





# Metallodrugs

Webpage: <http://nanociencia.imdea.org/metallodrugs-to-modulate-cancer-cell-machinery/group-home>



**Dr. Ana M. Pizarro**  
Assistant Research Prof.

**PhD:** Universidad Autónoma de Madrid, Spain

**Previous Position:** University of Warwick, UK

**ORCID:**  
0000-0003-3037-9835

**Researcher ID:**  
L-8348-2014

## POSTDOC

**Dr. Sonia Infante**  
IMDEA Nanociencia, Spain

## PhD STUDENTS

**Ana Cristina Carrasco**  
**Sonia Infante**  
**Arturo Villechenous**  
**Claudia Pierina Cardozo**

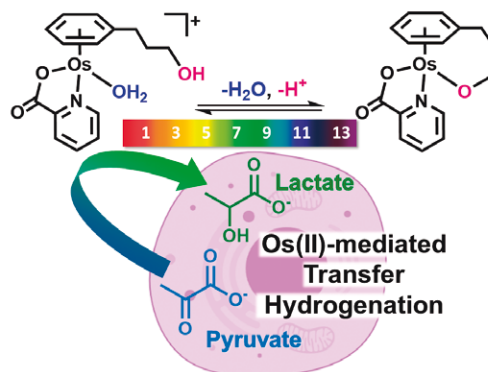
## TECHNICIAN

**Catarina Leis**

## Research lines

1. Exploit metal coordination and organometallic chemistry principles to design potent metallodrugs.
2. Organometallic and coordination chemistry inside the human cell.
3. Transition metal chemistry to interfere mitochondrial function.
4. Nanoimaging of location and chemical reactivity of metallodrugs inside cells.

Metallodrug aqueous-speciation drives the chemistry of transition metals inside the cancer cell. Osmium(II) complexes bearing labile ligands are prone to produce inert species due to the high acidity of the resulting Os-aqua adducts. Furnishing the complexes with a tethered alcohol group inhibits the formation of inert species, resulting in Os-complexes unexpectedly reactive in water, and strikingly, also inside the tumour cell. See: **Osmium(II) Tethered Half-Sandwich Complexes: pH-dependent Aqueous Speciation and Transfer Hydrogenation in Cells.** *Chem. Sci.* **2021**, *12*, 9287–9297.



# Magnetic Nanoparticles

Webpage: <http://www.imdeananociencia.org/magnetic-nanoparticles/group-home>



**Dr. Gorka Salas**  
Assistant Research Prof.  
(tenure track)

**PhD:** Universidad de  
Valladolid, Spain  
**Previous Position:** CNRS,  
France

**ORCID:**  
0000-0002-1196-8813

**Researcher ID:**  
F-6503-2011

## POSTDOC

**Dr. David Garcia**  
IMDEA Nanociencia, Spain

## RESEARCH ASSISTANTS

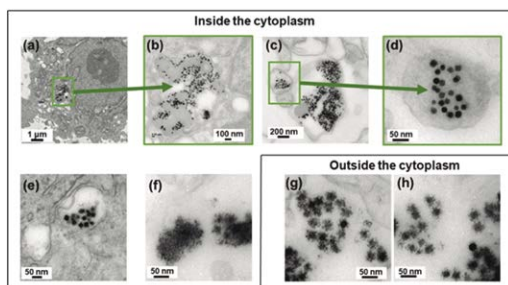
**Monica Dhanjani**  
**Cesar del Valle**  
**Nadia Pastor**

## Research lines

Our research deals with the preparation of magnetic hybrid nanostructures for biomedicine and other technologically relevant applications. Magnetic nanoparticles can be used for medical imaging and treatment of different diseases. Many intrinsic and extrinsic factors (e. g. size, crystallinity, magnetism, aggregation, colloidal stability, dispersion medium, applied field, interactions with biological media) can influence the efficiency of nanoparticles and they can be designed to respond to different stimuli.

Stimuli-responsive nanomaterials are very attractive for biomedical applications. They can be activated through external stimuli or by the physico-chemical conditions present in cells or tissues. Iron oxide-manganese oxide core-satellite shell nanostructures that change their contrast mode in magnetic resonance imaging (MRI) from T2 to T1, after being internalized by cells. This occurs by the dissolution of the MnO<sub>2</sub> of the shell, preserving intact the iron oxide at the core.

García-Soriano, D. et al. *J. Colloid Interface Sci.* **2022**, 613, 447-460.  
<https://doi.org/10.1016/j.jcis.2022.01.070>





# Neural Interfaces

Webpage: <http://nanociencia.imdea.org/molecular-electronics-laboratory/group-home>



**Dr. M. Teresa González**  
Assistant Research Prof.  
(tenure track)

**PhD:** University of Santiago de Compostela, Spain  
**Previous position:** Basel University

**ORCID:**  
0000-0002-7253-797X

**Researcher ID:**  
H-5527-2012

## PHD STUDENTS

Lucía Palomino

Ana Arché

Arturo Vera

## Research lines

We fabricate and characterize nanostructured devices to be used as neural interfaces of enhanced performance respect to classic neural electrodes. We follow two parallel lines:

1. Electrical electrodes covered by vertical conducting nanowires for electrical stimulation of the neural activity.
2. Sensors of neural activity base on magnetoresistive materials. We aim to demonstrate that magnetoresistive materials can be used to sense the neural activity without the use of cryogenic liquids (as SQUIDS detectors need).

Using template-assisted electrochemical deposition, we prepare metallic electrodes covered with a network of vertical-standing nanowires of enhanced effective area and reduced impedance. We use different materials and different nanowire sizes and organizations. Together with our biologist collaborators at the CSIC (Madrid) and SISSA (Trieste), we have characterized the enhanced adhesion of neural cells to the electrode nanostructure surface as well as the ability of the electrodes to stimulate neural tissue. See: *Adv. Biosys.* **2020**, 2000117 and *Adv. Mater. Interfaces* **2021**, 8, 2002121. On the other hand, the magnetoresistance (MR) effect is widely used in technologies that pervade the world, from magnetic reading heads to sensors. We develop sensing devices for the detection of neural activity based on half-metallic manganites. We work to optimize our devices to reach the subnanoTesla regime in a configuration free from magnetic shields. We have demonstrated the ability to induce a dominant switchable magnetoresistance in La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> epitaxial films at room temperature. The dominant extrinsic AMR exhibits large variation in the resistance in low field region, showing high sensitivity to applied low magnetic fields. See: *Adv. Funct. Mater.* **2017**, 1700664

# Protein Engineering

Webpage: [www.nanociencia.imdea.org/protein-engineering-and-nanobiotechnology/group-home](http://www.nanociencia.imdea.org/protein-engineering-and-nanobiotechnology/group-home)



**Dr. Begoña Sot**  
Assistant Research Prof.  
(tenure track)

**PhD:** Universidad del País Vasco, Spain.

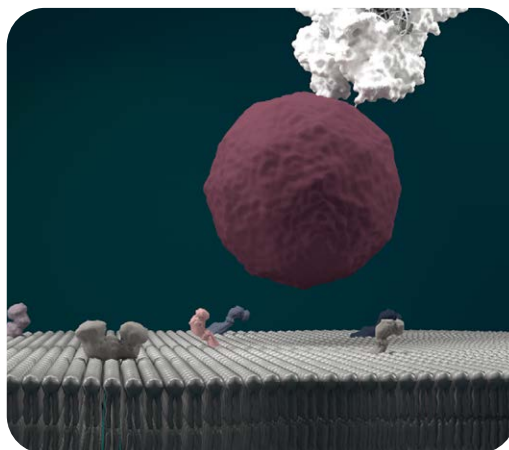
**Previous position:** CNB, Spain

**Researcher ID:**  
H-2882-2015

**PhD STUDENT**  
Carmen Escalona  
María López Valls

## Research lines

1. The design of new strategies for an efficient delivery of CRISPR proteins. CRISPR/Cas system is a promising therapeutic tool. But its efficient delivery is a bottle neck of this strategy. We combine protein engineering and nanotechnology to deliver CRISPR proteins (Cpf1, Cas9 or Cas13) to specific tissues.
2. Antibacterial activity of Ag-Fe inorganic nanoparticles. The bacterial antibiotic resistance makes essential the design of new bactericides.
3. Characterization of  $\alpha$ -synuclein amyloid assembly, responsible of Parkinson's Disease.





# Mechanical properties of Biostructures

Webpage: <http://www.imdeananociencia.org/home-en/people/item/johann-mertens>



## Dr. Johann Mertens

Assistant Research Prof.  
(tenure track)

**PhD:** University of Burgundy,  
France

**Previous Position:** Madrid  
Microelectronics Institute,  
Spain

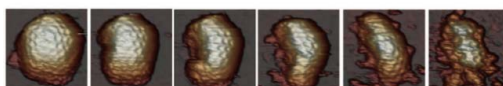
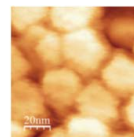
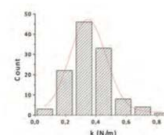
**ORCID:**  
0000-0002-1312-8914

**Researcher ID:**  
I-4208-2015

## Research lines

The group has varied interests in the mechanical properties of macromolecular assembly of proteins.

1. We have implemented Atomic Force Microscopy (AFM) measurements in physiological conditions to study both structural and mechanical properties of individual viral particles. We have recently showed that ribonucleoprotein complexes establish strong interactions with the inner surface of the viral shell in IBDV mature virions (Scientific Reports 2015). We are also developing new tools for the combined study of the nano-mechanical properties of biomolecules using atomic force microscopy and spectroscopy.
2. We use microcantilevers as tools in biomedical applications of biosensor technology or molecular biophysics. In relation with our previous work in the field, we are developing a line related to protein and DNA biosensors as well as the study of mechanical properties 2D-systems (Nature Nanotechnology 2008, Nanotechnology 2012).



# Intracellular temperature measurements



**Dr. Sebastian A. Thompson**  
Assistant Research Prof.  
(tenure track)

**PhD:** City University of New York,  
USA

**Previous Position:** Marie  
Curie Fellow, CNC, Coimbra,  
Portugal

**ORCID:**  
0000-0002-0196-1124

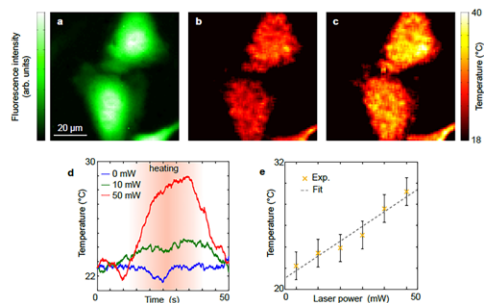
**Scopus Author ID:**  
55937663100

**Researcher ID:**  
P-4606-2017

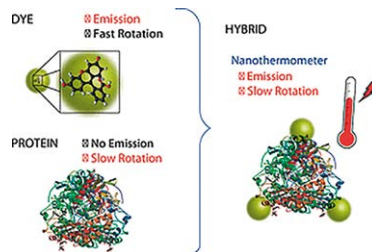
## Research lines

1. Intracellular temperature measurements for cancer theranostics.
2. Next-generation of nanothermometers.
3. Photothermal & Photodynamic therapies.

**Mapping Intracellular Temperature Using Green Fluorescent Protein**  
*Nano Letters. American Chemical Society, 2012, 12, pp.2107 - 2111.*



**Plug and play anisotropy-based nanothermometers.** *ACS Photonics* 2018, 5, 7, 2676–2681.





# Biosensors in neuroscience

Webpage: <https://nanociencia.imdea.org/research/research-programs>



## Dr. Valle Palomo

Assistant Research Prof.  
(tenure track)

**Previous position:** Centro de Investigaciones Biológicas Margarita Salas CSIC.

### Orcid:

0000-0002-1473-4086

Research ID:

N-2932-2016

## PHD STUDENTS

Carlota Tosat

Rebeca París

Paula Fernández

Carmen Pérez

## Research lines

Our lab is focused in discovering new drugs for neurodegenerative diseases and unveil their mechanism of action and potential in modifying or reversing the progression of the pathology. We focus in three different research lines:

- **Quantum Dots for the Understanding of Neurodegenerative Diseases.** We are working in establishing a semiconductor Quantum Dot (QD) platform to study neurodegenerative diseases in human models. We work with conjugates of QD and monoclonal antibodies and with dynamic sensor to monitor key enzymes in living cells.
- **Design and Discovery of New Drugs for Neurodegenerative Diseases.** We use the combination of biosensors and nanotechnological tools to select and optimize drug candidates, or to select drugs with fewer neurological side effects. We also develop multitarget compounds with synergistic activities towards the treatment of these diseases.
- **Study of extracellular vesicles and their role in disease.** We characterize the extracellular vesicles of our human models of disease and develop tools to phenotype them and quantify their molecular cargo.

From Kinase Inhibitors to Multitarget Ligands as Powerful Drug Leads for Alzheimer's Disease using Protein-Templated Synthesis. Nozal V, García-Rubia A, Cuevas EP, Pérez C, Tosat-Bitrián C, Bartolomé F, Carro E, Ramírez D, Palomo V\*, Martínez A\*. *Angew Chem Int Ed Engl.* **2021**, 60, 19344-19354.

CdSe Quantum Dots in Human Models Derived from ALS Patients: Characterization, Nuclear Penetration Studies and Multiplexing. Tosat-Bitrián C, Avis-Bodas A, Porras G, Borrego-Hernández D, García-Redondo A, Martín-Quero A, Palomo V. *Nanomaterials* **2021**, 11, 671

# Engineering Biofunctional Nanostructures

Webpage: <http://www.nanociencia.imdea.org/research/research-programs/nanomedicine/engineering-biofunctional-nanostructures>



**Prof. Aitziber L. Cortajarena**  
Associate Research Professor

**PhD:** Universidad del Pais Vasco, Spain

**Previous Position:** Yale University, USA

**ORCID:**  
0000-0002-5331-114X

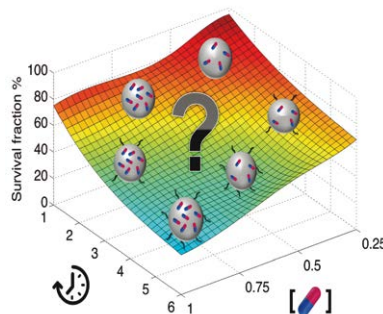
**Researcher ID:**  
J-6202-2012

**RESEARCH ASSISTANT**  
Elena Sanz

## Research lines

The group has varied interests at the interface of biochemistry, bioconjugation, functional materials and nanomedicine. The two main research lines of the group are:

1. Bio-functionalization of nanoparticles for biomedical applications. The objective of this research line is the generation of versatile functional nanoparticles with a selection of biomolecules and optimized properties for targeting and diagnosis of several diseases. In this context, multifunctional nanoparticles are utilized as drug carriers and as sensors for in vivo and ex-vivo applications (*Sci Reports* **2016** doi: 10.1038/srep35786; *Chem-NanoMat* **2017** doi: 10.1002/cnma.201600333; *Nanoscale* **2017** doi: 10.1039/c7nr04475e).
2. Biomolecular design for functional nanostructures and biomaterials. In this research line we use mainly proteins as platforms for the fabrication of multiple protein-based hybrid functional nanostructures and biomaterials for their use in different technological and biomedical applications. (*Nanoscale* **2014** doi: 10.1039/c4nr01210k, *Biomacromolecules* **2015** doi: 10.1021/acs.biomac.5b01147; *ACS Applied Mat Interfaces* **2017**).





# Hyperthermia

Webpage: <http://nanociencia.imdea.org/applied-nanomagnetics-group/group-home>



**Dr. Daniel Ortega**  
Associate Researcher

**PhD:** University of Cadiz, Spain

**Previous Position:** University College London, United Kingdom

**ORCID:**  
0000-0002-7441-8640

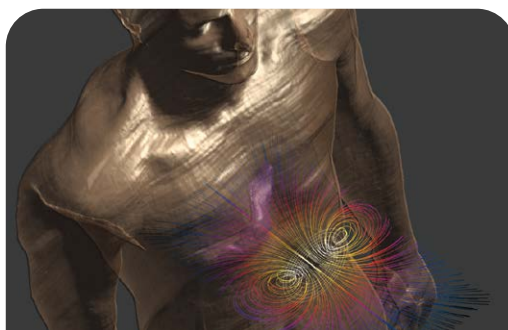
**Researcher ID:**  
D-7940-2012

**PhD STUDENT**  
Irene Rubia

**RESEACH ASSISTANTS**  
Antonia Santana  
Javier Ortega

## Research lines

1. Computational electromagnetism for *in silico* testing. Starting from animal and human computable phantoms, we perform computer simulations of therapies and diagnostic techniques based on the interaction of electromagnetic fields and magnetic and optical nanomaterials in the frequency range of kHz. Our mission is to provide clinicians with powerful tools to choose the best therapeutical conditions by predicting body response. The group collaborates closely with hospitals and medical devices manufacturers within the remit of the European project *NoCan-Ther* focused on treating pancreatic cancer through magnetic hyperthermia, and is involved in the preparation of the clinical studies. We also aim to a wider validation of *in silico* temperature predictions with dedicated experimental measurements at the nanoscale in the NANOLICO project.
2. Design of multifunctional magnetic nanomaterials. We design and synthesise a wide range of magnetic nanomaterials applied to biomedicine; for example, magnetic hyperthermia (MH), brain imaging contrasts, and magnetic particle imaging (MPI) tracers. Within this research line, the combination of magnetic hyperthermia and MPI is our current priority. These lines are embodied in the international collaborative networks we participate/coordinate: *MyWAVE*, *RADIOMAG*, *NanoBioAp*, *NANO*.



# Magnetic Nanoparticles In Biomedicine. Cell-Particle Interactions

Webpage: <http://www.imdeananociencia.org/home-en/people/item/angeles-villanueva>

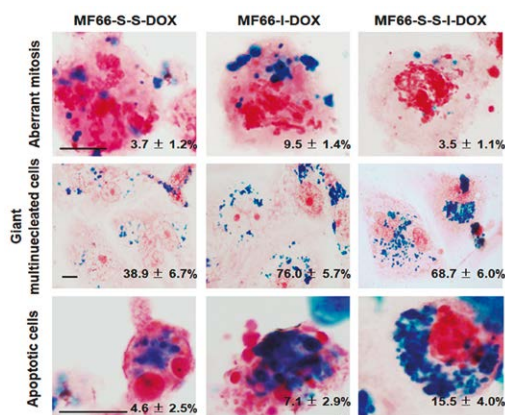


**Prof. Ángeles Villanueva**  
Associate Research Professor

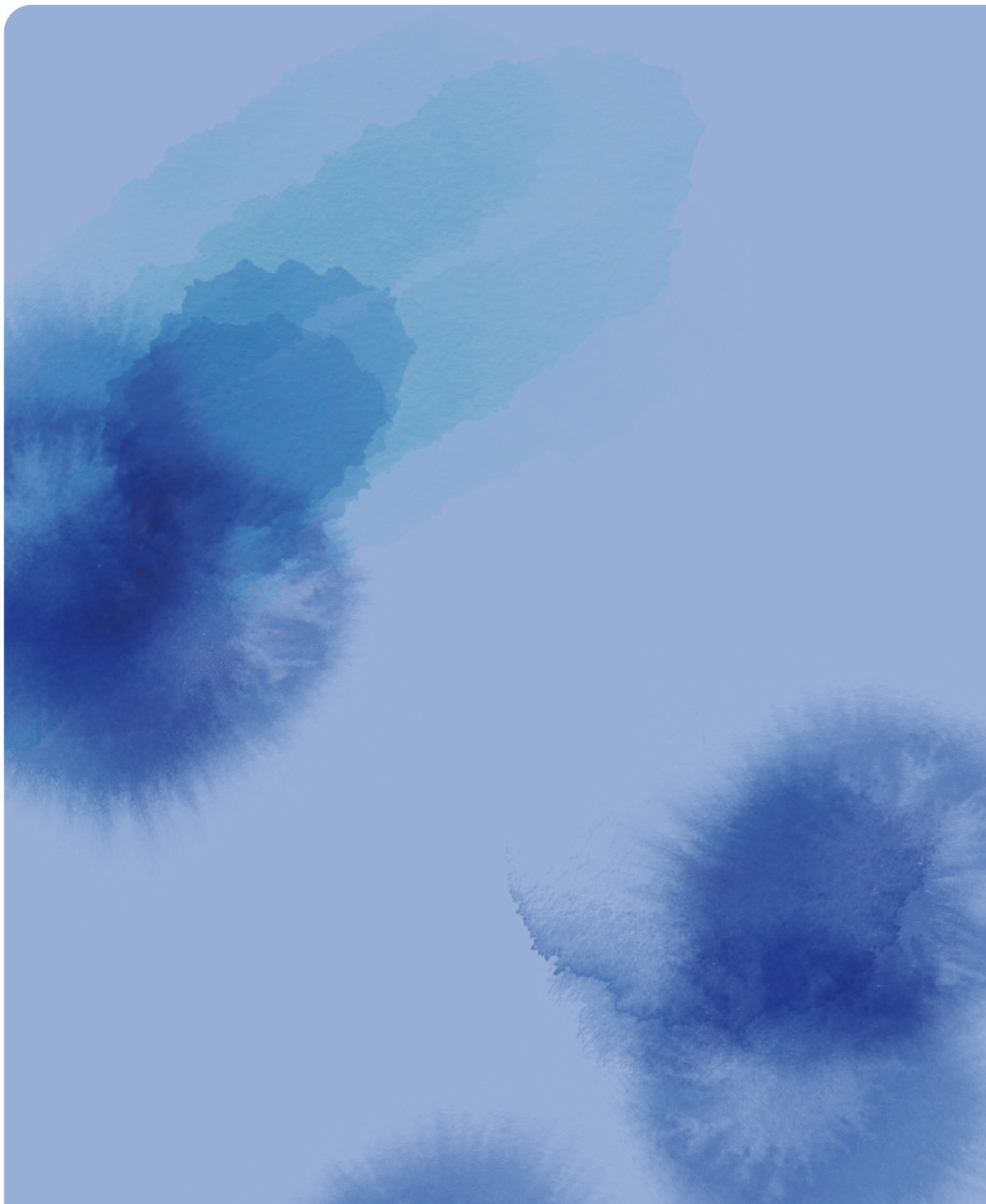
**PhD:** Universidad Autónoma de Madrid, Spain  
**Double Affiliation:** Universidad Autónoma de Madrid, Spain

## Research lines

1. Medical applications of nanoparticles. Cell cultures.
2. Biocompatibility of magnetic nanoparticles.
3. Mechanisms of cell death.
4. Alterations in adhesion and cytoskeletal proteins.
5. Liposomal drug delivery.
6. Evaluation in cell cultures and in vivo experimental models of new antitumor agents.
7. Signaling pathways involved in cell death.



Efficient uptake and morphological effects in MDA-MB-231 cells analysed by Prussian blue staining. Scale bar: 10  $\mu$ m. Percentages included are the mitosis, number of giant multinucleated cells or apoptosis over the total number of cells. *Tailored Functionalized Magnetic Nanoparticles to Target Breast Cancer Cells Including Cancer Stem-Like Cells. Cancers* 2020, 12(6), 1397.



# P4

programme

# Nanomagnetism for Information and Communication Technologies

Programme Manager: Prof. Julio Camarero

## Research lines

**Advanced  
Magneto-Optics**  
Prof. Julio Camarero

**Technological  
and biomedical  
applications of magnetic  
nanoparticles**  
Dr. Francisco Terán

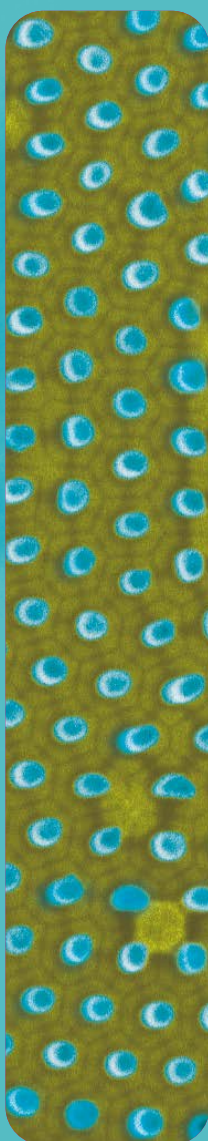
**SpinOrbitronics**  
Dr. Paolo Perna

**Magneto-photothermia**  
Dr. A. Espinosa

**Transport properties  
of quantum materials**  
Dr. Mariela Menghini

**Spin-resolved ARPES**  
Dr. Miguel Ángel Valbuena

**3D Nanomagnetism**  
Dr. Lucas Pérez



## About the programme

The scientific activity of the Nanomagnetism Programme is at the forefront of both fundamental and applied research on magnetic nanostructures, dealing with the preparation and characterization of advanced multifunctional magnetic nanomaterials with enormous impact for our society, including sensing & information storage (spintronic & spin-orbitronic), energy production & conversion (permanent magnets), and biomedical (magnetic nanoparticles) applications. The programme addresses important and interrelated societal challenges: a) Reducing energy consumption by exploiting spin-orbitronic systems in the information era; b) Developing efficient, spintronic-based, hardware brains, or neuro-inspired circuits; c) Developing efficient, magnetic-based, devices for bioapplications. This programme is in close collaboration with research programmes P2, P3, and P6.

We are equipped with a powerful battery of techniques that enable the investigation of many properties of multifunctional magnetic nanostructures, including both

inorganic and organic materials, grown by Molecular Beam Epitaxy (MBE) or sputtering in ultra-high vacuum environment, as well as by chemical synthesis routes. These are ultrathin films, superlattices, or nanoparticles and their properties are characterized by morphological, chemical, structural, electronic, transport, and (mostly optic-based) advanced vectorial magnetometry techniques. Particular emphasis is paid to the growth, the magnetization reversal processes (in both quasi-static and dynamic regimes), their magnetoresistance responses, and their spin-resolved band structures (spin-ARPES). Additionally, external large scale experimental facilities (i.e., synchrotron, neutron, or ion-accelerator sources) are often used to elucidate some fundamental aspects.

We aim at a better understanding of fabrication processes and physical properties of new materials and functionalities as a first step towards the development of devices with custom-chosen properties, with potential for sensing, information storage, energy, and biomedical technologies.

# Advanced Magneto-Optics

Webpage: <http://www.nanociencia.imdea.org/research/research-programs/nanomagnetism/group-of-advanced-magneto-optics>



**Prof. Julio Camarero**  
Associate Research  
Professor

**PhD:** Universidad Autónoma  
de Madrid, Spain

**Double Affiliation:** Universidad  
Autónoma de Madrid, Spain

**ORCID:**  
0000-0003-0078-7280

**Researcher ID:**  
C-4375-2014

## EMERITUS

**Prof. Antonio Hernando**  
Universidad Complutense de  
Madrid, Spain

## PhD STUDENTS

**José Manuel Díez**

**Adrián Gudín**

**Alejandro López**

**Juan Carlos Martín**

## Research lines

We design and take use of advanced magneto-optic based instrumentation for nanotechnology research and development. Research is focused on low-dimensional artificial magnetic structures, such as ultrathin magnetic films and multilayers, magnetic nanostructures, magnetic nanoparticles and adsorbed molecules, with a particular emphasis on magnetization reversal processes and magnetoresistive responses.

We aim at probing and understanding both magnetization reversal and transport properties of magnetic nanostructures by systematically tuning intrinsic parameters, such as magnetic anisotropy and magnetic coupling, and extrinsic ones, like temperature and external fields (including dynamic effects). The current activities are focused on:

### Magnetization reversal and magnetoresistive studies:

- Influence of anisotropies (in-plane vs. perpendicular) & nanostructuration.
- Static vs. dynamic and thermal effects; superparamagnetism.
- Exchange bias, spin-valves, tunnel-junctions, multiferroics, nanoparticles, molecules.

### Polarization dependent element-resolved x-ray spectroscopy and microscopy studies:

- X-ray magnetic circular/linear dichroism, (XMCD/XMLD).
- X-ray photoemission electron microscopy, X-PEEM.
- Soft x-ray resonant magnetic scattering & Magnetic holography imaging.



# Technological and biomedical applications of magnetic nanoparticles

Webpage: <http://www.nanociencia.imdea.org/nanomagnetics-for-biomedical-and-tecnological-applications/group-home>



**Dr. Francisco J. Terán**  
Assistant Research Prof.  
(tenure track)

**PhD:** Université Joseph Fourier –  
Grenoble 1, France

**Previous Position:** Fundación  
Gaiker, Spain

**ORCID:**  
0000-0002-2466-6208

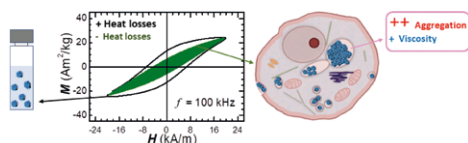
**Researcher ID:**  
F-1285-2010

**PhD STUDENT**  
Claudia Lozano

**RESEARCH ASSISTANTS**  
Diego Gómez  
Lydia Abellán  
Pablo Palacios

## Research lines

1. The study of the influence of intrinsic (size, chemical composition) and extrinsic (field conditions, aggregation, concentration, viscosity, etc..) parameters on the AC magnetic response (including magnetic heating) of magnetic nanoparticles.
2. The study of the influence of biological matrices and fluids on the AC magnetic response of magnetic nanoparticles. We are highly interested on understanding the effects of cell processing on the intracellular magnetic response of magnetic nanoparticles in order to find solutions for its preservation.
3. The use of magnetic nanoparticles as magnetic transducer for sensing molecular markers in biological fluids. We have developed a novel methodology for detection of biomolecules dispersed in blood based on variation of AC hysteresis loops of magnetic nanoparticles after interacting with the targeted biomolecule.
4. Heating losses of iron oxide nanoparticles activated by optical means. We are interested on probing the parameters that influence the heat losses of magnetic nanoparticles subjected to laser irradiation.
5. The development and validation of instrumentation for advanced magnetic measurements. In the last 5 years, the Advanced Instrumentation Unit has developed high-tech instrumentation for reliable characterization of magnetic nanoparticles in colloidal dispersions or inside biological matrices.



# Spinorbitronics

Webpage: <https://sites.google.com/site/spinorbitronics/>;  
<http://nanociencia.imdea.org/spinorbitronics/group-home>



**Dr. Paolo Perna**  
Assistant Research Prof.  
(tenure track)

**PhD:** University of Caen  
Basse-Normandie, France &  
University of Cassino, Italy  
**Previous Position:** CNR-SPIN, Italy

**ORCID:**  
0000-0001-8537-4834  
**Researcher ID:**  
C-3862-2012  
**Google scholar:** <https://scholar.google.com/citations?user=FL0BE08AAAAJ&hl=it&oi=ao>  
**Research Gate:** [https://www.researchgate.net/profile/Paolo\\_Perna](https://www.researchgate.net/profile/Paolo_Perna)

## POSTDOCS

**Dr. Alberto Anandon**  
Universidad de Zaragoza, Spain

**Dr. Iciar Arroy**  
Universidad Complutense de  
Madrid, Spain

## PHD STUDENTS

**Leticia de Melo**

**Pablo Olleros**

**Raúl Solís**  
(co-supervised with Prof  
Stéphane Flament de Université  
de Normandie ENSICAEN -  
GREYC UMR 6072)

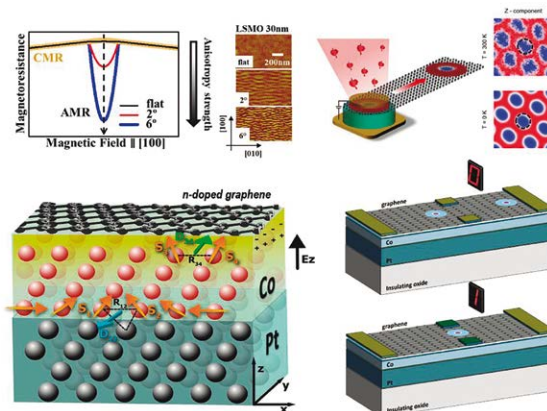
**José Manuel Díez**  
(co-Alejandra Guedeja-  
Marrón)

## TECHNICIAN

**Sergio de las Heras**

## Research lines

1. The group explores novel concepts in spintronics based on spin-dependent transport in low dimensional magnetic materials in which spin-orbit coupling plays an important role. These include thin films and multilayer stacks, combining ferromagnetic (FM), antiferromagnetic (AFM), perovskite oxides and 2D materials.
2. We resort to epitaxial growth, surface/interface and magneto-transport (including synchrotron-based) investigations, as well as nanofabrication, to engineer, characterize and design novel architectures and merge in a single device the functionalities of their individual constituents.





# Magneto-photothermia



PhD STUDENT  
Rosalía López

**Dr. Ana Espinosa**  
Assistant Research Prof.  
(tenure track)

**PhD:** Universidad  
Complutense de Madrid, Spain  
**Previous Position:** Université  
Paris VII, France (MSCA  
Fellow) and ICMM-CSIC,  
Madrid

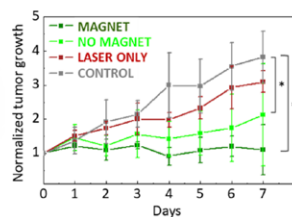
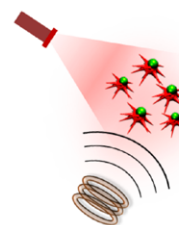
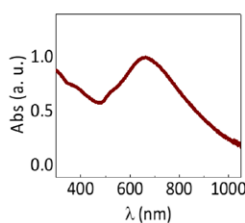
**ORCID:**  
0000-0002-5626-6129

**Researcher ID:**  
G-9162-2011

## Research lines

1. New nanothermal strategies based on multifunctional materials for cancer treatment.
2. Physical biotransformations of therapeutic nanoparticles.
3. Combined synergy of thermal nanotherapies and other nano-based multimodal associations.
4. Nanothermometry based on X-ray spectroscopies.

**Janus Magnetic-Plasmonic Nanoparticles for Magnetically Targeted and Thermally Activated Cancer Therapy.** Espinosa A, Reguera J, Curcio A, Muñoz-Noval A, Liz-Marzán L, Wilhelm C (2020). *Small* 16, 1904960.



# Transport properties of quantum materials



**Dr. Mariela Menghini**  
Researcher

**PhD:** Instituto Balseiro, Universidad Nacional de Cuyo, Argentina

**Previous position:** Department of Physics and Astronomy, KU Leuven, Leuven, Belgium

**ORCID:**  
0000-0002-1744-798X

## PHD STUDENTS

**Ignacio Figueruelo**

**Gabriel Caballero**

(cosupervised with Prof. Daniel Granados)

## MSC

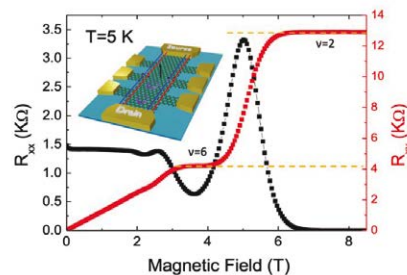
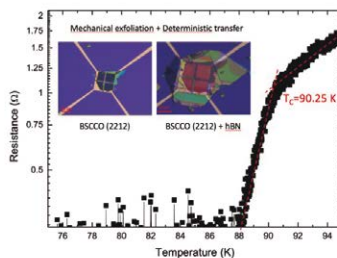
**Andrés Taborda**

Universidad Complutense de Madrid

## Research lines

Quantum materials are in the spotlight of condensed matter physics research as they offer an exceptional venue to uncover the role of interactions associated with spin, charge, lattice and orbital degrees of freedom and their effect in macroscopic properties. Our research is focused in transport properties of quantum materials such as:

1. Nanostructured superconductor-ferromagnetic hybrid systems and superconductor-2D heterostructures.
2. Quantum Hall effect in graphene-based devices and resistive switching phenomena in 2D materials.
3. Metal-insulator transition in strongly correlated materials.





# Spin-resolved ARPES



**Dr. Miguel Ángel Valbuena**  
Researcher

**PhD:** Laboratoire, pour l'Utilisation du Rayonnement Électromagnétique (LURE, Orsay, France)

**Previous position:** Catalan Institute of Nanoscience and Nanotechnology (ICN2, Barcelona), Spain

**ORCID:**  
0000-0002-0585-5636

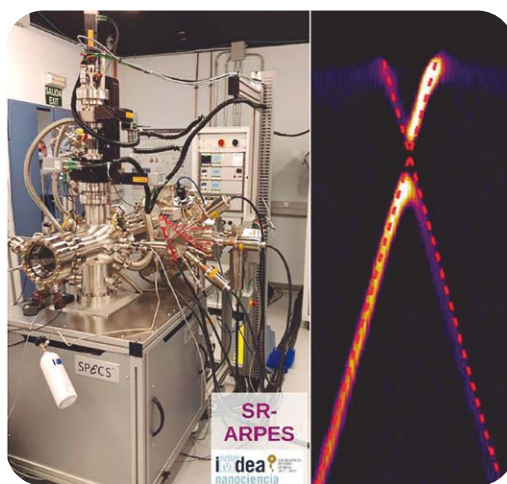
**Researcher ID:**  
M-2196-2014

**Scopus Author ID:**  
12785881400

**PhD STUDENT**  
Beatriz Muñiz

## Research lines

The new Spin and Angle Resolved Photoemission Spectroscopy (SR-ARPES) setup is dedicated to the study of the electronic structure of two-dimensional materials, with special interest in the study on new emergent phenomena based on the reduced dimensionality and spin-orbit coupling which may result in exotic phases of matter as quantum topological phases. This instrument was installed and put into operation during the first semester of 2021 and it is currently operating at 100% of its capacities, being the first operative system of this kind in Spain.



*SR-ARPES setup at IMDEA Nanociencia. Band-gap opening at the Dirac point of Graphene/Tellurium heterostructure.*

# 3D Nanomagnetism

Webpage: <http://nanociencia.imdea.org/electrodeposited-nanowires/group-home>



**Dr. Lucas Pérez**  
Associate Researcher

**PhD:** Universidad Complutense de Madrid  
**Previous Position:** Paul-Drude-Institut für Festkörperelektronik, Berlin

**ORCID:**  
0000-0001-9470-7987

**Researcher ID:**  
C-2362-2011

## PHD STUDENTS

Beatriz L. Rodilla  
Claudia Fernández

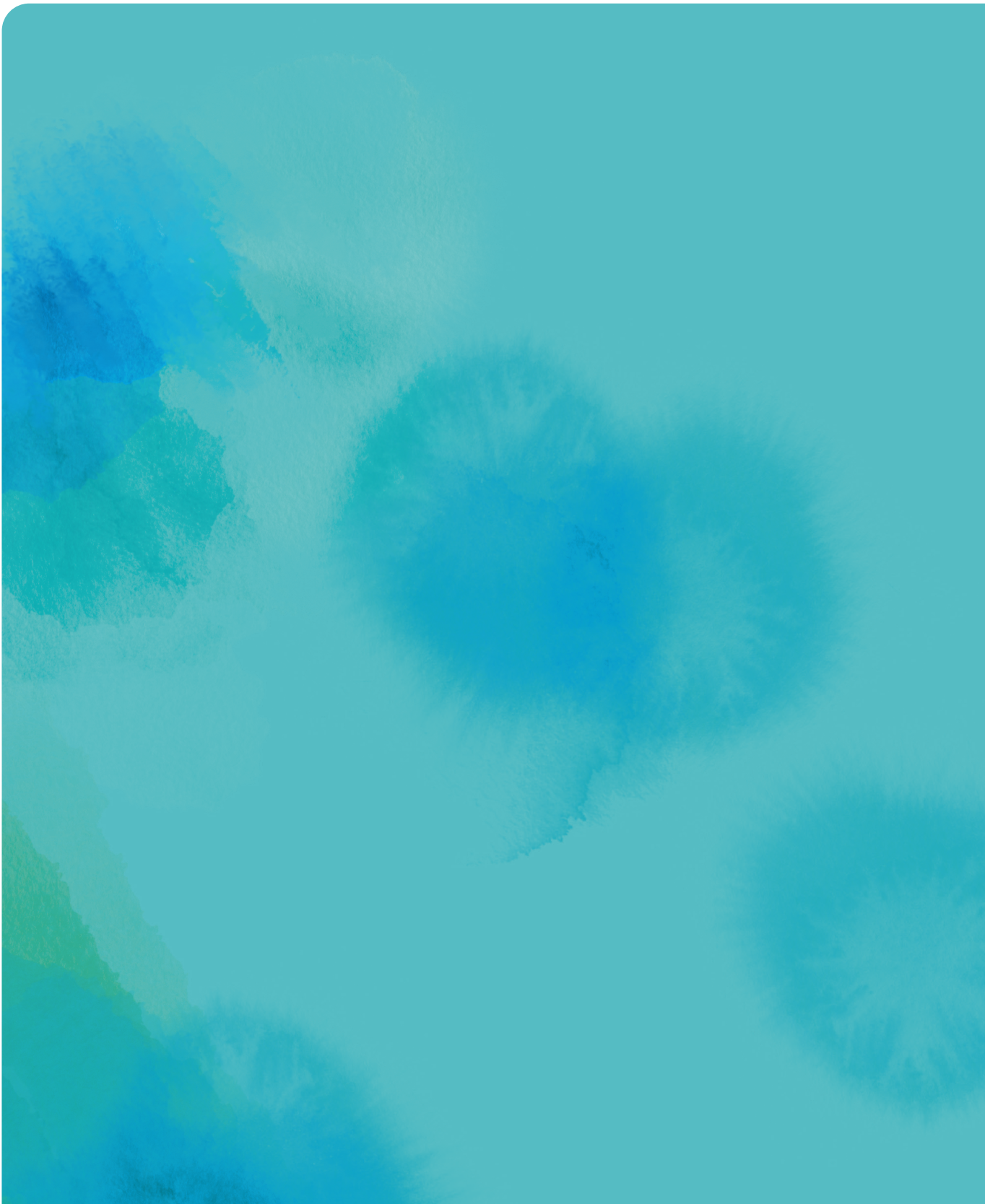
## RESEARCH ASSISTANTS

Laura Álvaro  
Clara Guillen

## Research lines

We have interests in three main research lines, mainly focused on the study of the fundamental properties and applications of electrodeposited nanowires.

- 1. Domain wall spintronics.** We study the domain wall structure and the magnetization processes of low dimensional systems – mainly cylindrical nanowires. We are interested in stabilizing domain walls in artificially created defects and in controlling the depinning of the different domain walls, induced by magnetic fields and by spin-polarized currents. Understanding the dynamics of the domain walls in individual nanowires as well as the global magnetization dynamics in arrays of nanowires would allow us to incorporate these nanostructures in spintronics devices. Part of this research is carried out in synchrotron radiation facilities.
- 2. Transport properties of Bi-based materials.** Bi-based metallic nanowires provide an attractive scenario for fundamental investigation of finite-size effects due to the unusual electronic structure of Bi and the large spin-orbit coupling of Bi atoms. We have already synthesized single-crystal Bi nanowires and reported weak antilocalization effects in the magnetotransport properties. Now, we focus our interest on the synthesis of Bi-doped metallic nanowires. This system is expected to show large spin mixing conductance, as we have already reported in thin films.
- 3. Nanowires for applications.** We prepare nanowires in solution for different applications, from chemical sensors to biomedical applications. We are also developing arrays of metallic nanowires that can be used as active part of nanostructured electrodes in neural interfaces.



# P5

programme

# Ultrafast phenomena at the nanoscale

Programme Manager: Prof. Johannes Gierschner

## Research lines

Photophysics of  
Organic and Hybrid  
Supramolecular  
Nanosystems

Prof. Johannes Gierschner

Pump-probe  
Photoinduced Absorption  
Spectroscopy

Dr. Juan Cabanillas

Nanooptics  
and Nanoacoustics

Prof. Reinhold Wannemacher

Nanostructured  
Photovoltaics

Dr. Enrique Cánovas

Time-resolved X-ray  
Spectroscopy in  
Biological and Chemical  
Catalysis

Dr. Dooshaye Moonshiram

Modelling Physical  
Properties of  
Nanostructures

Prof. Fernando Martín

Femtochemistry

Prof. Luis Bañares

Ultrafast X-ray Science

Prof. Wojciech Gawelda



## About the programme

Photoinduced Exciton and Charge Transport (ET and CT) controls fundamental processes occurring in plants and bacteria, such as photosynthesis, photo-oxidation, electronic transport and molecular damage. They are also at the heart of emerging technologies, such as those based on photovoltaic and optoelectronic devices, molecular wires, molecular junctions, polymer-based transistors, photocatalysis and artificial photosynthesis, all of them the object of thorough investigations at IMDEA Nano. The common denominator for ET/CT processes is the absorption of light, which produces electron-hole pairs (or excitons) that can separate along the material, thus generating an electric current. The initial electron-hole dynamics is very fast: it occurs on a time scale ranging from hundreds of attoseconds to a few femtoseconds. At longer times, from several tens of fs to picoseconds or even nanoseconds, the coupling with nuclear motion can substantially alter the generated electric current and even suppress it due to decoherence effects.

The Programme focuses on the study of ultrafast phenomena with simultaneous high temporal and spatial resolutions. This is achieved by the combination of in-house scanning tunnelling microscopes, transient absorption set ups, and femto-chemistry using ultrashort pulses with extend theoretical tools (to interpret and guide the new experiments). Additionally, extremely intense X-ray flashes at European XFEL are used to elucidate some fundamental aspects. This programme is in close collaboration with research programmes P1, P2, and P4. Our goal is to understand the mechanisms of ET/CT and eventually control them, tracking electronic motion from the very first femtosecond to the picosecond, and this with, ideally, subfemtosecond time resolution. The access to both the nanometer length scale – small enough to see the motion of small molecules – and the femtosecond time scale – fast enough to resolve the vibration of molecular bonds- be able to watch structural changes and electronic energy shifts, as chemical reactions take place in solution or on catalytic surfaces, resulting in the long-sought 'molecular movie'.



# Photophysics of Organic & Hybrid Supramolecular Nanosystems

Webpage: <http://www.nanociencia.imdea.org/photophysics-of-organic-and-hybrid-supramolecular-nanosystems/group-home>



**Prof. Johannes Gierschner**  
Senior Research Prof.

**PhD:** University of Tübingen, Germany

**Previous Position:** Univ. Mons, Belgium

**ORCID:**  
0000-0001-8177-7919

**Researcher ID:**  
K-7938-2014

## VISITING RESEARCHER

**Dr. Begoña Milian**  
Universidad de Valencia,  
Spain

## PHD STUDENTS

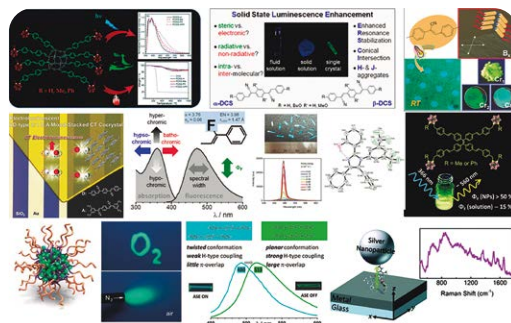
**Juan Carlos Roldao**  
**Liangxuan Wang**  
co-supervised with Prof. Alfred Meixner, University of Tübingen

**Siyang Feng**

## Research lines

Our research is dedicated to the understanding of the photophysics of organic and hybrid supramolecular nanosystems. The ultimate goal, i.e. unbiased, targeted design of tailor-made systems for optoelectronics or life science, can only be reached in an interdisciplinary manner, which we tackle in an integrative spectroscopic & computational approach, based on a strong background in chemistry & materials science.

- 1. Energy Conversion:** The use of organics in solar cells and as photocatalysts for water-splitting or polymerization reactions requires a profound understanding of the generation and fate of excited states; i.e. singlet and triplet state manifolds, charge transfer and localized excitons.
- 2. Luminescent Organic Materials:** The understanding or even prediction of non-/occurrence of luminescence in solution and in the crystalline state is of crucial importance for targeted molecular design, where we achieve a systematic understanding using libraries of well-defined materials.
- 3. Artificial Light-Harvesting** in Supramolecular Polymers for light harvesting applications requires understanding and control of molecular localized and charge-transfer excitons and their dynamics, in particular investigated by polarized techniques.





# Pump-probe Photoinduced Absorption Spectroscopy

Webpage: <http://nanociencia.imdea.org/organic-photophysics-and-photonics/group-home>



## Dr. Juan Cabanillas Gonzalez

Assistant Research Prof.  
(tenure track)

PhD: Imperial College London,  
UK

Previous Position: Politecnico  
di Milano, Italy

Orcid:  
0000-0002-9926-3833

ResearcherID:  
M-1026-2014

<https://juancabanillas>.

### POSTDOCS

#### Dr. Víctor Vega

Jožef Stefan Institute,  
Ljubljana, Slovenia

#### Dr. Sara Hernández

University of Uppsala,  
Sweden

### PHD STUDENTS

#### Javier Álvarez

#### Saúl García

### RESEARCH ASSISTANTS

#### Sergio Iglesias

(co-supervised with  
Dr. R. Wannemacher)

#### Jorge González

(co-supervised with  
Dr. R. Wannemacher)

### TECHNICIAN

#### Luis Colmenar

#### Alejandro Martín

(co-supervised with  
Dr. A. Bollero)

## Research lines

1. Pump-probe and Photoinduced Absorption Spectroscopy
2. Organic lasers. We study the optical gain and stimulated emission properties of p-conjugated polymers with femtosecond transient absorption spectroscopy (TAS) to understand the relation between the chemical structure and exciton dynamics. Based on the information gained we develop optically-pumped laser cavities based either on distributed feedback resonator structures, developed by soft-nanoimprint lithography, or on optical microresonators formed by polymer self-assembly, leading to optical cavities with narrow optical modes.
3. Photophysics of light emitting nanomaterials. We perform variable temperature (TAS) and time-resolved photoluminescence on novel materials for solid state lighting such as thermally activated delayed fluorescence complexes or nanographenes. We are also interested in few atoms metal nanoclusters (MNCs) of less than 2 nm size. Unlike plasmonic nanoparticles, MNCs exhibit a molecular-like electronic structure with discrete levels arising from strong quantum confinement which are optically-coupled and can be exploited in applications such as bioimaging or photocatalysis.

A. Aires et al., *Nano Lett.* **2021**, 21, 21, 9347–9353.

Y. Gu et al., *Angew. Chem. Int. Ed.* **2022**, 61, e202201088.

C. Sun et al., *Chem. Mater.* **2021**, 33, 16, 6383–6393.

Q. Zhang et al., *Adv. Funct. Mater.* **2018**, 28, 1705824.

# Nanooptics and Nanoacoustics

Webpage: <http://www.imdeananociencia.org/home-en/people/item/reinhold-wannemacher>



**Prof. Reinhold Wannemacher**

Senior Research Prof.

**PhD:** University of Darmstadt, Germany

**Previous Position:** University of Leipzig, Germany

**ORCID:**  
0000-0001-7192-3556

**Researcher ID:**  
F-7108-2011

**PHD STUDENT**  
Sergio Ramírez

**RESEARCH ASSISTANTS**

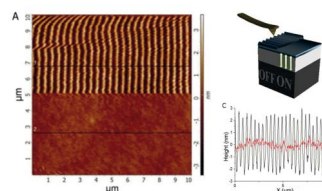
**Sergio Iglesias**  
(co-supervised with Dr. J. Cabanillas)

**Jorge González**  
(co-supervised with Dr. J. Cabanillas)

## Research lines

1. We are studying the photocatalytic, charge and energy transfer properties of carbon-based nanomaterials (carbon dots, nanographenes, graphene) in close collaboration with the groups of Isabel Rodriguez, Feng Luo, Johannes Gierschner and Nazario Martin, IMDEA Nanociencia
2. We study amplified spontaneous emission and lasing and perform low-temperature spectroscopy down to 1.5 K of crystalline and amorphous conjugated organic and hybrid organic/inorganic materials in close collaboration with the groups of Juan Cabanillas, José Sánchez Costa and Johannes Gierschner, IMDEA Nanociencia. We also investigate the low-temperature homogeneous linewidth of carbon nanomaterials.
3. We investigate fluorescent and electrochemical sensors in close collaboration with the groups of Encarnación Lorenzo and Juan Cabanillas, IMDEA Nanociencia
4. We employ high-frequency ultrasonic waves (20-500MHz) for sensing using coaxial probes and combine ultrasonic vibrations (100 kHz-6 MHz) with force microscopy for imaging and manipulation of friction on the nanoscale.

Mechanical wear is often evidenced by the formation of ripples on surfaces of contacting bodies. Using an atomic force microscope (AFM) we have shown that, on the nanoscale, this wear process can be suppressed by the application of ultrasonic vibrations. At the same time the friction coefficient is strongly reduced compared to its value without applying any vibrations. See: *ACS Nano* **2015**, 9, 8859-8868





# Nanostructured Photovoltaics

Webpage: <https://ecanovas6.wixsite.com/nanopv>



## Dr. Enrique Cánovas

Assistant Research Prof.  
(tenure track)

PhD: Universidad Politécnica  
de Madrid (UPM)

Previous Position: Group  
Leader at Max Planck for  
Polymer Research (MPIP).

ORCID:

0000-0003-1021-4929

## POSTDOCS

### Dr. Vasileios Balos

University of Amsterdam, The  
Netherlands.

### Dr. Marco Ballabio

University of Amsterdam, The  
Netherlands.

## PHD STUDENTS

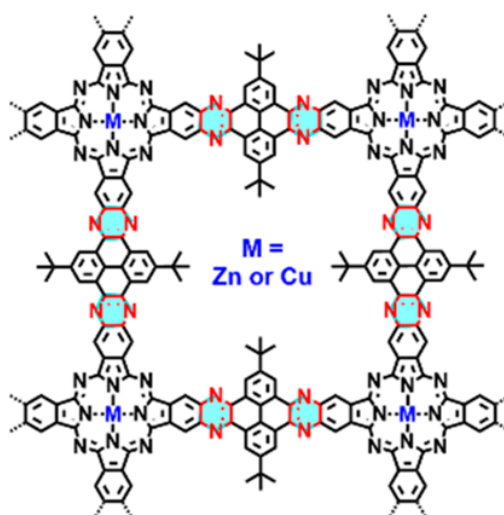
### Sergio Revuelta

### Miguel Ángel Pulido

## Research lines

1. Charge carrier dynamics in bulk materials and at interfaces.
2. Charge transport in organic, inorganic and hybrid materials.
3. Time resolved THz spectroscopy.
4. Solar energy conversion: photovoltaics and photocatalysis.
5. Nanoscience and nanotechnology.

Unveiling Electronic Properties in Metal–Phthalocyanine-Based Pyrazine-Linked Conjugated Two-Dimensional Covalent Organic Frameworks.  
*J. Am. Chem. Soc.* **2019**, 141, 42, 16810–16816, <https://pubs.acs.org/doi/abs/10.1021/jacs.9b07644>



# Time-resolved X-ray Spectroscopy in Biological and Chemical Catalysis

Webpage: <http://www.nanoscience.imdea.org/home-en/people/item/moonshiram>



## Dr. Dooshaye Moonshiram

Assistant Research Prof.  
(tenure track)

PhD: Purdue University, U.S.A

Previous Position: Alexander Humboldt Fellow at Max Planck Institute for Chemical Energy Conversion, Mulheim, Germany

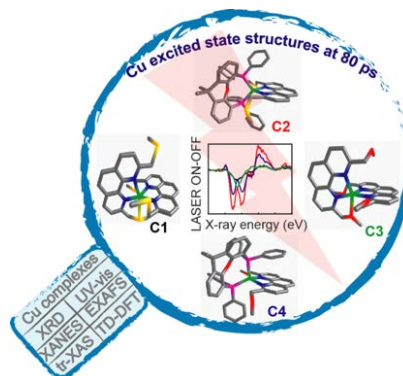
ORCID:  
0000-0002-9075-3035

Researcher ID:  
J-5138-2014

## Research lines

1. Mapping the electronic and energetic requirements for the design of efficient and economical catalysts through synchrotron-based steady-state and time-resolved spectroscopy.
2. Developing molecular approaches to enable catalysts' designs on electrode surfaces for realization of practical hybrid devices.
3. Investigating the time-resolved intramolecular electron transfer dynamics, kinetics, and geometric changes in homogeneous and surface-anchored modules for water oxidation, proton reduction and methane to methanol oxidation reactions.

M. Rentschler, S. Iglesias, M-A. Schmid, C.Liu, S. Tschierlei, W. Frey, X. Zhang, M. Karnahl, D. Moonshiram\*, "The coordination behaviour of Cu(I) photosensitizers bearing multidentate ligands investigated by X-ray absorption spectroscopy", *Chem. Eur. J.*, 2020, <https://doi.org/10.1002/chem.201905601> (doi.org/10.1002/chem.201905601)





# Modelling Physical Properties of Nanostructures

Webpage: <http://nanociencia.imdea.org/fernando-martin-s-group/group-home>



**Prof. Fernando Martín**  
Associate Research  
Professor

**PhD:** Universidad Autónoma  
de Madrid, Spain

**Double affiliation:** Universidad  
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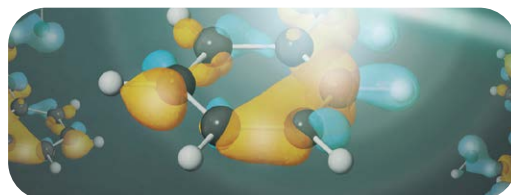
**Juan Reino**

## Research lines

The research carried out by the group has mainly focused on:

1. The theoretical and computational modeling of photoexcitation and photoionization processes in atomic, molecular and solid-state systems induced by synchrotron radiation and ultrashort laser pulses with femto- and attosecond duration, with the aim, of imaging and controlling ultrafast electron and nuclear dynamics occurring in these systems.
2. The study and theoretical prediction of properties of materials and nano-objects of complex molecular systems, aggregates and fullerenes, isolated or deposited on metallic and nonmetallic surfaces, with emphasis on problems with potential interest in chemistry and biology and the design of novel two-dimensional materials, including graphene.

Advances in attosecond science have led to a wealth of important discoveries in atomic, molecular, and solid-state physics and are progressively directing their footsteps toward problems of chemical interest. In this review, we detail the application of attosecond methods to the investigation of ultrafast processes in molecules, with emphasis in molecules of chemical and biological interest. The measurement and control of electronic motion in complex molecular structures is a formidable challenge, for both theory and experiment, but will indubitably have a tremendous impact on chemistry in the years to come. *Chemical Reviews* 117, 10760. DOI: 10.1021/acs.chemrev.6b00453



# Femtochemistry

Webpage: <http://webs.ucm.es/info/dinalaser>



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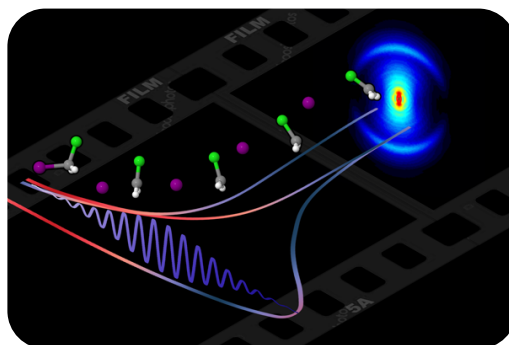
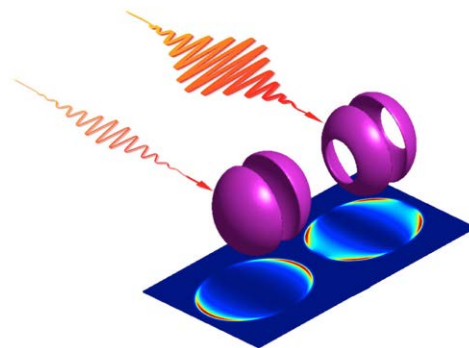
Marta Murillo  
Olivia Borrell

## TECHNICIANS

Dr. Jesús González

## Research lines

1. Dynamics of Photodissociation of Molecules and Radicals.
2. Femtosecond Time-resolved Photodissociation Dynamics.
3. Imaging of Chemical Reactions.
4. Strong Laser Field Control of Reaction Dynamics.





# Ultrafast X-ray Science

Webpage: <http://www.nanociencia.imdea.org/ultrafast-xray-science/home>



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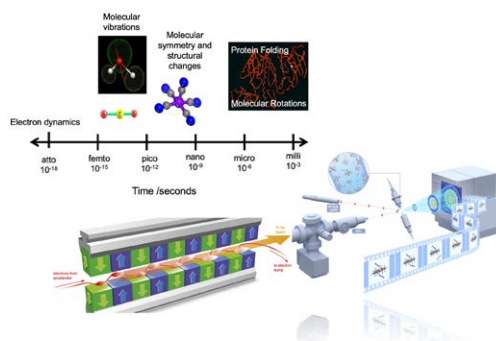
**Juan Francisco Hidalgo**

## Research lines

The Ultrafast X-ray Science (UXS) group focuses its research on the applications of advanced ultrafast X-ray techniques, in combination with femtosecond optical spectroscopies, to study photoinduced structural dynamics in condensed-phase systems. The combined optical and X-ray pump-probe methodologies utilize the state-of-the-art X-ray free electron lasers (XFELs), such as European XFEL (Germany), SACLA (Japan) or LCLS (USA), which are the world’s brightest and most powerful sources of pulsed X-rays.

Among diverse research activities within the UXS, we can highlight 3 main targeted science areas:

1. Mechanistic understanding of the excited-state chemical reaction dynamics in functional molecular assemblies, e.g. light-harvesting photosensitizers, photocatalytic assemblies, MOFs, etc.
2. Disentangling the coupled electronic and molecular dynamics in liquid-phase molecular systems, including the role of the local environment (solvation dynamics)
3. Understanding and controlling excited-state charge carrier dynamics in semiconductor and metallic colloidal nanoparticles



P6

programme

# Nanotechnology for Critical Raw Materials and Sustainability

Programme Manager: Prof. Alberto Bollero

## Research lines

Permanent Magnets  
and Applications  
Prof. Alberto Bollero

Functional Surfaces  
Prof. Isabel Rodríguez



## About the programme

This Programme addresses key challenges indicated by the European Commission on climate actions, environment, resource efficiency and raw materials. Critical Raw Materials (CRMs) are used in environmental technologies, consumer electronics, health, defense, space exploration, aviation... these materials are not only “critical” for key industry sectors and future applications, but also for the sustainable functioning of the European economy. For instance, the EU estimates that the demand for rare-earths (over 90% controlled by China) will rise ten-fold by 2050, boosted by the needs of key industries (energy, transport, aerospace).

The activities of this new programme are fostered toward the development of alternatives based on elements widely available in Europe and it has been created with two specific scientific lines: a) the development of advanced and novel permanent magnets; b) the development of (smart) bioinspired functional surfaces. All under premises of sustainability and reduced CO<sub>2</sub> emissions to achieve the European Green Deal objectives. This programme is in close collaboration with all research programmes.

A top priority for Europe is to develop permanent magnets free of rare earths. We fill the enormous performance gap

existing between ferrites and NdFeB magnets. Among them, we are exploring: a) Improved nanostructured ferrites for electromobility; b) Novel manganese-based nanostructures combining physics, chemistry and metallurgy to synthesize engineered L10-MnAlC; c) synthesis of record magnets inspired by findings in meteorites: creation of the L10-FeNi phase. In addition, we explore additive manufacturing and 4D printing of multimaterials with new properties/functionalities, which permits the fabrication of objects with no restriction in shape, allowing for highly efficient devices and minimizing the use of critical raw materials.

In a transition towards a sustainable production, the demands on efficient surfaces treatments are increasing, specifically targeting and enabling end-products with the purpose of reducing the end-products' energy usage and/or environmental footprint. Our activities on Functional Surfaces take advantage on nanofabrication technologies and particularly emphasizes on cost-effective scalable process to develop surface structured materials with new functionalities or with improved ones. Much of the work in the program is inspired on natural functional surface structures. The special competencies of the program include surface patterning techniques such as nano-imprint lithography, soft lithography and molecular patterning.

# Permanent Magnets and Applications

Webpage: <http://nanociencia.imdea.org/division-permanent-magnets-applications>



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**Cristina María Montero**

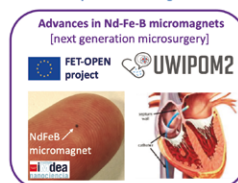
**Alejandro Martín**  
(co-supervised with Dr. J. Cabanillas)

## Research lines

1. Fundamental and applied aspects of permanent magnets (PMs): rare earth-based (Nd-Fe-B and Pr-Fe-B) and rare earth-free (MnAlC, MnBi, L10-FeNi, ferrites).
  - Industrial collaborations: Höganäs (Sweden), IMA (Barcelona), RAMEM (Madrid)...
  - Projects under international Calls: H2020 Innovation Action, H2020 FET-OPEN, M-ERA.NET.
2. Nanostructured PMs (powders and bulk).
3. Additive manufacturing of PMs.
4. Growth of magnetic thin films.
5. Nanoparticle engineering, and electrochemical synthesis of PM nanostructures.
6. Development of micromagnets for microdevices (e.g., micro-robots in microsurgery).
7. Recycling and sustainability of PMs.

Development of advanced and novel permanent magnets under premises of sustainability and reduced CO2 emissions to achieve the European Green Deal objectives: EU H2020 project "PASSENGER" (20 partners; 13 industry partners; 8 European countries. Coordinated by IMDEA Nanociencia).

Sustainable permanent magnets: From disruptive science to innovation in technology





# Functional Surfaces

Webpage: <http://nanociencia.imdea.org/nanostructured-functional-surfaces-program/group-home>



**Prof. Isabel Rodríguez**  
Senior Research Prof.

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**Dr. Jaime J. Hernández**  
Materials Science Institute of Mulhouse, France

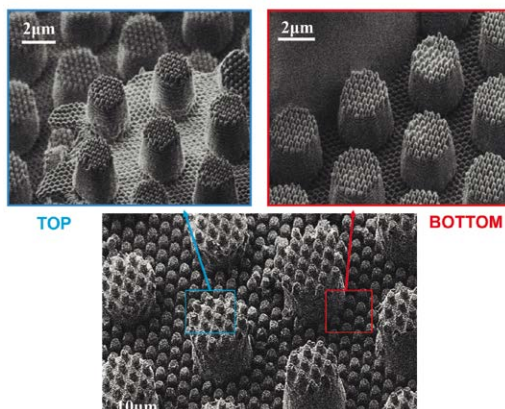
## PhD STUDENTS

**María Teresa Alameda**  
**Sergio Dávila**  
**Miguel Esteban**  
**Alberto Martín**

## Research lines

Our group is focused on the application of micro and nanofabrication technologies on soft polymeric materials, including three main lines of research:

1. **Multifunctional surfaces** based on nano patterned surface nanocomposites and hierarchical micro and nano surface structures, including processes up-scaling by roll to roll nanoimprint technology.
2. **Nanostructured surfaces for biomedical regenerative applications** with bactericidal capacity and topographies capable of directing cellular responses.
3. **Tumor-on-a-chip microfluidic devices** as *in vitro* testing platforms to validate nanomedicines transport related to the extravasation and extracellular tumour matrix penetration capacity.



# Horizontal Platform Disruptive Innovation and Technology

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**Dr. Mark William Davies**  
Industrial Liaison

**Dr. Héctor Guerrero**  
Strategic Industrial Partnerships

The objective of the **Horizontal Platform** is to foster disruptive innovation from nanoscience and nanotechnology to boost industrial developments. This initiative is an evolution of the Translational Technology Platform established under the previous SO Programme. The new focus has gained momentum thanks to the European Innovation Council (EIC) leadership.

According to the European Commission the EIC aims to identify and scale-up breakthrough and disruptive innovation. IMDEA Nano is working at the frontier of knowledge, in cutting-edge research that will allow in a natural way the connection with relevant industries for achieving disruptive innovations based on nanotechnology solutions.



## About the Horizontal Platform

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IMDEA Nanociencia foundational goals include the service to Society and the support to the Industry. Reaching final applications from interdisciplinary frontier research takes a long way, normally in connection with other academic, institutional and business actors. By its very nature, research at the nanoscale is consubstantial with the generation of disruptive innovation, something that cannot be anticipated but can be propitiated through an instrument conceived at IMDEA Nanociencia to advance in areas with potential to generate disruptive applications.

The Horizontal Platform provides the specialized framework for the development of new proof-of-concept applications and products based on the cutting-edge research from all Scientific Programmes. The understanding, analysis and

manipulation of nanoscale physical, chemical and biological phenomena, challenged from the six priority Scientific Programmes, will bring to new developments and advanced applications of nanotechnology for key sectors of the economy. We taking advantage of the advanced research services as well as the possibility of directly developing for companies systems and applications focused on the challenges. In parallel, we multiply efforts and increase critical mass at all stages of the value chain, from research to final application establishing strategic alliances with complementary public institutions, close to technology and/or end users designing a suitable path, establishing a common language and, without a doubt, choosing the best travel companions.



## Services

### RMN and Mass Spec. Services



**Dr. Zulay Pardo**  
PhD: Universidad Complutense de Madrid, Spain

### Optical Tweezers



**Dr. Rebeca Bocanegra**  
PhD: Universidad Autónoma de Madrid, Spain

### AFM Service



**Dr. Patricia Pedraz**  
PhD: Universidad Autónoma de Madrid, Spain

### Advanced Optical Microscopy Service



**Dr. Cintia Vequi-Suplicy**  
Universidade de Sao Paulo, Brazil

### Cell Cultures



**Dr. Adriana Arnaiz**  
PhD: Cambridge University, UK



**Dr. Vanessa Rodríguez**  
PhD: Universidad Autónoma de Madrid, Spain

### Workshop



**Mr. Warren Smith**  
Technician



**Ms. Fabiola Mogollón**  
Assistant

### Nanofabrication Services



**Dr. Manuel Rodríguez**  
PhD: Universidad de Santiago de Compostela, Spain

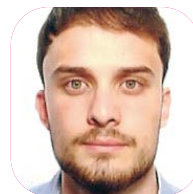


**Dr. Maria Acebrón**  
PhD: Universidad Autónoma de Madrid, Spain



**Mr. Andrés Valera**  
Technician

### Cryogenics



**Ivan Redondo**  
Technician



## Research support



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General Manager



**Ms. Isabel Rodríguez**  
Administration  
and Finance



**Dr. María Jesús Villa**  
Projects, Institutional Relations  
and HR



**Dr. José Luis Casillas**  
Facilities & Infrastructure



**Dr. Mark William Davies**  
Industrial Liaison



**Dr. Héctor Guerrero**  
Strategic Industrial  
Partnerships



**Dr. Elena Alonso**  
Dissemination  
and Communication



**Mr. Ignacio Torres**  
Project Management



**Ms. Mireia Gracia**  
Project Management



**Ms. Patricia López**  
Research Support



**Ms. Mercedes Hernández**  
Projects Manager



**Ms. Laura Lorente**  
Project Promotion



**Ms. Paloma Macua**  
Administrative Assistant



**Ms. Elena Pérez**  
Administrative Assistant



**Ms. Juana Hemoso**  
Administrative Project  
Assistant



**Ms. Margarita Gil**  
A3/ER System Technician



**Mr. Juan Martín**  
Account Technician



**Ms. Paloma Castillo**  
Director's Assistant



**Mr. Gonzalo Hidalgo**  
Network and Systems  
Technician

# 3

## scientific report

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1. **Publications** [89]
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## 1. Publications (as of 02-06-2022)

- 1. Nanostructured gold electrodes promote neural maturation and network connectivity;** Domínguez-Bajo A., Rosa J.M., González-Mayorga A., Rodilla B.L., Arché-Núñez A., Benayas E., Ocón P., Pérez L., Camarero J., Miranda R., González M.T., Aguilar J., López-Dolado E., Serrano M.C.; *Biomaterials*; **2021**; 279, 121186; DOI: [10.1016/j.biomaterials.2021.121186](https://doi.org/10.1016/j.biomaterials.2021.121186)
- 2. Realization of macroscopic ratchet effect based on nonperiodic and uneven potentials;** Rollano V., Gomez A., Muñoz-Noval A., Velez M., de Ory M.C., Menghini M., Gonzalez E.M., Vicent J.L.; *Sci. Rep.*; **2021**; 11, 1, 16617; DOI: [10.1038/s41598-021-96192-z](https://doi.org/10.1038/s41598-021-96192-z)
- 3. Atomic force microscopy comparative analysis of the surface roughness of two posterior chamber phakic intraocular lens models: ICL versus IPCL;** Gros-Otero J., Ketabi S., Cañones-Zafra R., Garcia-Gonzalez M., Villa-Collar C., Casado S., Teus M.A.; *BMC Ophthalmol.*; **2021**; 21, 1, 280; DOI: [10.1186/s12886-021-02039-6](https://doi.org/10.1186/s12886-021-02039-6)
- 4. Two dimensional V2O3 and its experimental feasibility as robust room-temperature magnetic Chern insulator;** Mellaerts S., Meng R., Menghini M., Afanasiev V., Seo J.W., Houssa M., Locquet J.-P.; *npj 2D Mater. Appl.*; **2021**; 5, 1, 65; DOI: [10.1038/s41699-021-00245-w](https://doi.org/10.1038/s41699-021-00245-w)
- 5. Large intrinsic anomalous Hall effect in SrIrO3 induced by magnetic proximity effect;** Yoo M.-W., Tornos J., Sander A., Lin L.-F., Mohanta N., Peralta A., Sanchez-Manzano D., Gallego F., Haskel D., Freeland J.W., Keavney D.J., Choi Y., Stremper J., Wang X., Cabero M., Vasili H.B., Valvidares M., Sanchez-Santolino G., Gonzalez-Calbet J.M., Rivera A., Leon C., Rosenkranz S., Bibes M., Barthelemy A., Anane A., Dagotto E., Okamoto S., te Velthuis S.G.E., Santamaria J., Villegas J.E.; *Nat. Commun.*; **2021**; 12, 1, 3283; DOI: [10.1038/s41467-021-23489-y](https://doi.org/10.1038/s41467-021-23489-y)
- 6. On-surface activation of benzylic C-H bonds for the synthesis of pentagon-fused graphene nanoribbons;** Xu X., Di Giovannantonio M., Urgel J.I., Pignedoli C.A., Ruffieux P., Müllen K., Fasel R., Narita A.; *Nano. Res.*; **2021**; 14, 12, 4754; DOI: [10.1007/s12274-021-3419-2](https://doi.org/10.1007/s12274-021-3419-2)
- 7. Spin-state-dependent electrical conductivity in single-walled carbon nanotubes encapsulating spin-crossover molecules;** Villalva J., Develioglu A., Montenegro-Pohlhammer N., Sánchez-de-Armas R., Gamonal A., Rial E., García-Hernández M., Ruiz-Gonzalez L., Costa J.S., Calzado C.J., Pérez E.M., Burzurí E.; *Nat. Commun.*; **2021**; 12, 1, 1578; DOI: [10.1038/s41467-021-21791-3](https://doi.org/10.1038/s41467-021-21791-3)
- 8. Electron–phonon coupling in superconducting 1T-PdTe2;** Anemone G., Casado Aguilar P., Garnica M., Calleja F., Al Taleb A., Kuo C.-N., Lue C.S., Politano A., Vázquez de Parga A.L., Benedek G., Fariás D., Miranda R.; *npj 2D Mater. Appl.*; **2021**; 5, 1, 25; DOI: [10.1038/s41699-021-00204-5](https://doi.org/10.1038/s41699-021-00204-5)
- 9. Bioinspired antireflective flexible films with optimized mechanical resistance fabricated by roll to roll thermal nanoimprint;** Jacobo-Martín A., Rueda M., Hernández J.J., Navarro-Baena I., Monclús M.A., Molina-Aldareguia J.M., Rodríguez I.; *Sci. Rep.*; **2021**; 11, 1, 2419; DOI: [10.1038/s41598-021-81560-6](https://doi.org/10.1038/s41598-021-81560-6)
- 10. Graphite to diamond transition induced by photoelectric absorption of ultraviolet photons;** Gómez de Castro A.I., Rheinstädter M., Clancy P., Castilla M., de Isidro F., Larruquert J.I., de Lis-Sánchez T., Britten J., Cabero Piris M., de Isidro-Gómez F.P.; *Sci. Rep.*; **2021**; 11, 1, 2492; DOI: [10.1038/s41598-021-81153-3](https://doi.org/10.1038/s41598-021-81153-3)
- 11. Evidence for a spin acoustic surface plasmon from inelastic atom scattering;** Benedek G., Bernasconi M., Campi D., Silkin I.V., Chernov I.P., Silkin V.M., Chulkov E.V., Echenique P.M., Toennies J.P., Anemone G., Al Taleb A., Miranda R., Fariás D.; *Sci. Rep.*; **2021**; 11, 1, 1506; DOI: [10.1038/s41598-021-81018-9](https://doi.org/10.1038/s41598-021-81018-9)



**12. Charge-polarized interfacial superlattices in marginally twisted hexagonal boron nitride;** Woods C.R., Ares P., Nevison-Andrews H., Holwill M.J., Fabregas R., Guinea F., Geim A.K., Novoselov K.S., Walet N.R., Fumagalli L.; *Nat. Commun.*; **2021**; 12, 1, 347; DOI: [10.1038/s41467-020-20667-2](https://doi.org/10.1038/s41467-020-20667-2)

**13. Carbon nanodot-based electrogenerated chemiluminescence biosensor for miRNA-21 detection;** Gutiérrez-Gálvez L., García-Mendiola T., Gutiérrez-Sánchez C., Guerrero-Esteban T., García-Diego C., Buendía I., García-Bermejo M.L., Pariente F., Lorenzo E.; *Microchim. Acta*; **2021**; 188, 11, 398; DOI: [10.1007/s00604-021-05038-y](https://doi.org/10.1007/s00604-021-05038-y)

**14. Influence of coating and size of magnetic nanoparticles on cellular uptake for in vitro mri;** Cortés-Ilanos B., Ocampo S.M., de la Cueva L., Calvo G.F., Belmonte-beitia J., Pérez L., Salas G., Ayuso-sacido Á.; *Nanomaterials*; **2021**; 11, 11, 2888; DOI: [10.3390/nano11112888](https://doi.org/10.3390/nano11112888)

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**16. Time-dependent AC magnetometry and chain formation in magnetite: The influence of particle size, initial temperature and the shortening of the relaxation time by the applied field;** Morales I., Costo R., Mille N., Carrey J., Hernando A., de la Presa P.; *Nanoscale Adv.*; **2021**; 3, 20, 5801; DOI: [10.1039/d1na00463h](https://doi.org/10.1039/d1na00463h)

**17. Nanoparticles for Triple Drug Release for Combined Chemo- and Photodynamic Therapy;** Martínez-Edo G., Xue E.Y., Ha S.Y.Y., Pontón I., González-Delgado J.A., Borrós S., Torres T., Ng D.K.P., Sánchez-García D.; *Chem. Eur. J.*; **2021**; 27, 59, 14610; DOI: [10.1002/chem.202101842](https://doi.org/10.1002/chem.202101842)

**18. Oxidative synthesis of yellow photoluminescent carbon nanoribbons from carbon black;** Khodabakhsh S., Fulvio P.F., Sousaraei A., Kiani S., Niu Y., Palmer R.E., Kuo W.C.H., Rudd J., Barron A.R., Andreoli E.; *Carbon*; **2021**, 183, 495; DOI: [10.1016/j.carbon.2021.07.032](https://doi.org/10.1016/j.carbon.2021.07.032)

**19. 2D MoS2 nanosheets and hematein complexes deposited on screen-printed graphene electrodes as an efficient electrocatalytic sensor for detecting hydrazine;** Villa-Manso A.M., Revenga-Parra M., Vera-Hidalgo M., Vázquez Sulleiro M., Pérez E.M., Lorenzo E., Pariente F.; *Sens Actuators, B Chem*; **2021**; 345, 130385; DOI: [10.1016/j.snb.2021.130385](https://doi.org/10.1016/j.snb.2021.130385)

**20. On-surface synthesis of organocopper metallacycles through activation of inner diacetylene moieties;** Cirera B., Riss A., Mutombo P., Urgel J.I., Santos J., Di Giovannantonio M., Widmer R., Stolz S., Sun Q., Bommert M., Fasel R., Jelínek P., Auwärter W., Martín N., Ćijija D.; *Chem. Sci.*; **2021**; 12, 38, 12806; DOI: [10.1039/d1sc03703j](https://doi.org/10.1039/d1sc03703j)

**21. Molecular-Frame Photoelectron Angular Distributions of CO in the Vicinity of Feshbach Resonances: An XCHEM Approach;** Borrás V.J., González-Vázquez J., Argenti L., Martín F.; *J. Chem. Theory Comput.*; **2021**; 17, 10, 6330; DOI: [10.1021/acs.jctc.1c00480](https://doi.org/10.1021/acs.jctc.1c00480)

**22. Roll-to-roll nanoimprint lithography of high efficiency Fresnel lenses for micro-concentrator photovoltaics;** Jacobo-Martín A., Jost N., Hernández J.J., Domínguez C., Vallerotto G., Askins S., Antón I., Rodríguez I.; *Opt. Express*; **2021**; 29, 21, 34135; DOI: [10.1364/OE.437803](https://doi.org/10.1364/OE.437803)

**23. Dual Emission: Classes, Mechanisms, and Conditions;** Behera S.K., Park S.Y., Gierschner J.; *Angew. Chem. Int. Ed.*; **2021**; 60, 42, 22624; DOI: [10.1002/anie.202009789](https://doi.org/10.1002/anie.202009789)

**24. Microvessel-on-Chip Fabrication for the in Vitro Modeling of Nanomedicine Transport;** Dávila S., Cacheux J., Rodríguez I.; *ACS Omega*; **2021**; 6, 39, 25109; DOI: [10.1021/acsomega.1c00735](https://doi.org/10.1021/acsomega.1c00735)

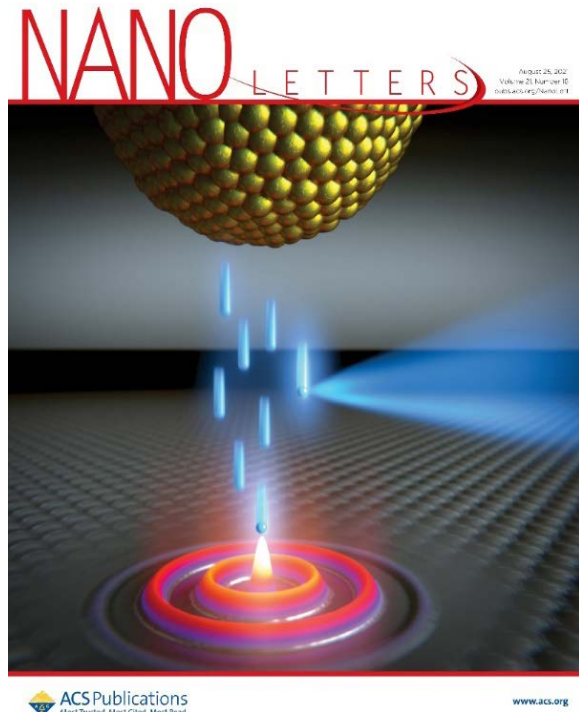
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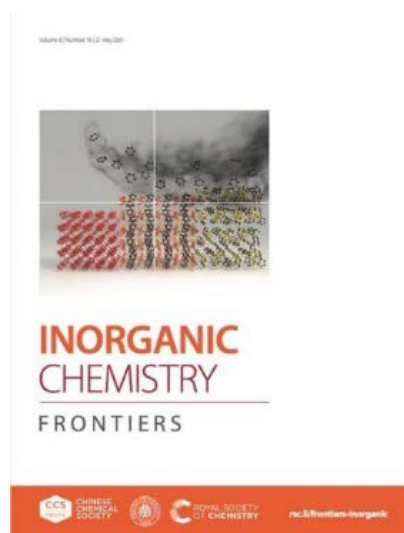
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208. **ARL3 activation requires the co-GEF BART and effector-mediated turnover;** ElMaghloob Y., Sot B., McIlwraith M.J., Garcia E., Yelland T., Ismail S., Pfeffer S.R.; *eLife*; **2021**; 10, e64624, 1; DOI: [10.7554/eLife.64624](https://doi.org/10.7554/eLife.64624)



209. **Water soluble iron-based coordination trimers as synergistic adjuvants for pancreatic cancer;** Cordani M., Resines-Urrien E., Gamonal A., Milán-Rois P., Salmon L., Bousseksou A., Costa J.S., Somoza Á.; *Antioxidants*; **2021**; 10, 1, 66, 1; DOI: [10.3390/antiox10010066](https://doi.org/10.3390/antiox10010066)

210. **Long-lived charged states of single porphyrin-tape junctions under ambient conditions;** Leary E., Kastlunger G., Limburg B., Rincón-García L., Hurtado-Gallego J., González M.T., Bollinger G.R., Agrait N., Higgins S.J., Anderson H.L., Stadler R., Nichols R.J.; *Nanoscale Horiz.*; **2021**; 6, 1, 49; DOI: [10.1039/d0nh00415d](https://doi.org/10.1039/d0nh00415d)

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212. **The interaction of a thiosemicarbazone derived from R-(+)-limonene with lipid membranes;** Marquezin C.A., de Oliveira C.M.A., Vandresen F., Duarte E.L., Lamy M.T., Vequi-Suplicy C.C.; *Chem. Phys. Lipids*; **2021**; 234; 105018; DOI: [10.1016/j.chemphyslip.2020.105018](https://doi.org/10.1016/j.chemphyslip.2020.105018)

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215. **Magnetic, Mechanically Interlocked Porphyrin-Carbon Nanotubes for Quantum Computation and Spintronics;** Moreno-Da Silva S., Martínez J.I., Develioglu A., Nieto-Ortega B., De Juan-Fernández L., Ruiz-Gonzalez L., Picón A., Oberli S., Alonso P.J., Moonshiram D., Pérez E.M., Burzurí E.; *J. Am. Chem. Soc.*; **2021**; 143, 50, 21286; DOI: [10.1021/jacs.1c07058](https://doi.org/10.1021/jacs.1c07058)

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## BOOK CHAPTER

1. **Editorial: New Approaches to Tackle EMT and Fibrosis: From Epigenetics to Nanotechnology;** Battistelli C., Cordani M., Diederich M., Somoza Á., Valente S., Strippoli R.; *Front. Pharmacol.*; **2021**; 12, 742777; DOI: [10.3389/fphar.2021.742777](https://doi.org/10.3389/fphar.2021.742777)

2. **Editorial: Novel Cancer Treatments Based on Autophagy Modulation;** Cordani M., Somoza Á., Tafani M., Dando I., Kumar S.; *Front. Pharmacol.*; **2021**; 12, 650559; DOI: [10.3389/fphar.2021.650559](https://doi.org/10.3389/fphar.2021.650559)

3. **Introduction to Nanomaterials Applied to Life Sciences;** Espinosa A., Teran F.J., Ortega D.; *Nanoscale Adv.*; **2021**; 3, 5, 1165; DOI: [10.1039/d1na90011k](https://doi.org/10.1039/d1na90011k)

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7. **Optical Tweezers to Investigate the Structure and Energetics of Single-Stranded DNA-Binding Protein-DNA Complexes;** Morin J.A., Cerrón F., Cao-García F.J., Ibarra B.; *Methods Mol. Biol.*; **2021**; 2281, 273; DOI: [10.1007/978-1-0716-1290-3\\_17](https://doi.org/10.1007/978-1-0716-1290-3_17)

8. **Measurements of Real-Time Replication Kinetics of DNA Polymerases on ssDNA Templates Coated with Single-Stranded DNA-Binding Proteins;** Cerrón F., Ibarra B.; *Methods Mol. Biol.*; **2021**; 2281, 289; DOI: [10.1007/978-1-0716-1290-3\\_18](https://doi.org/10.1007/978-1-0716-1290-3_18)

9. **Singlet oxygen quantum yield determination using chemical acceptors;** Bresoli-Obach R., Torra J., Zanocco R.P., Zanocco A.L., Nonell S.; *Methods Mol. Biol.*; **2021**; 2202, 165; DOI: [10.1007/978-1-0716-0896-8\\_14](https://doi.org/10.1007/978-1-0716-0896-8_14)

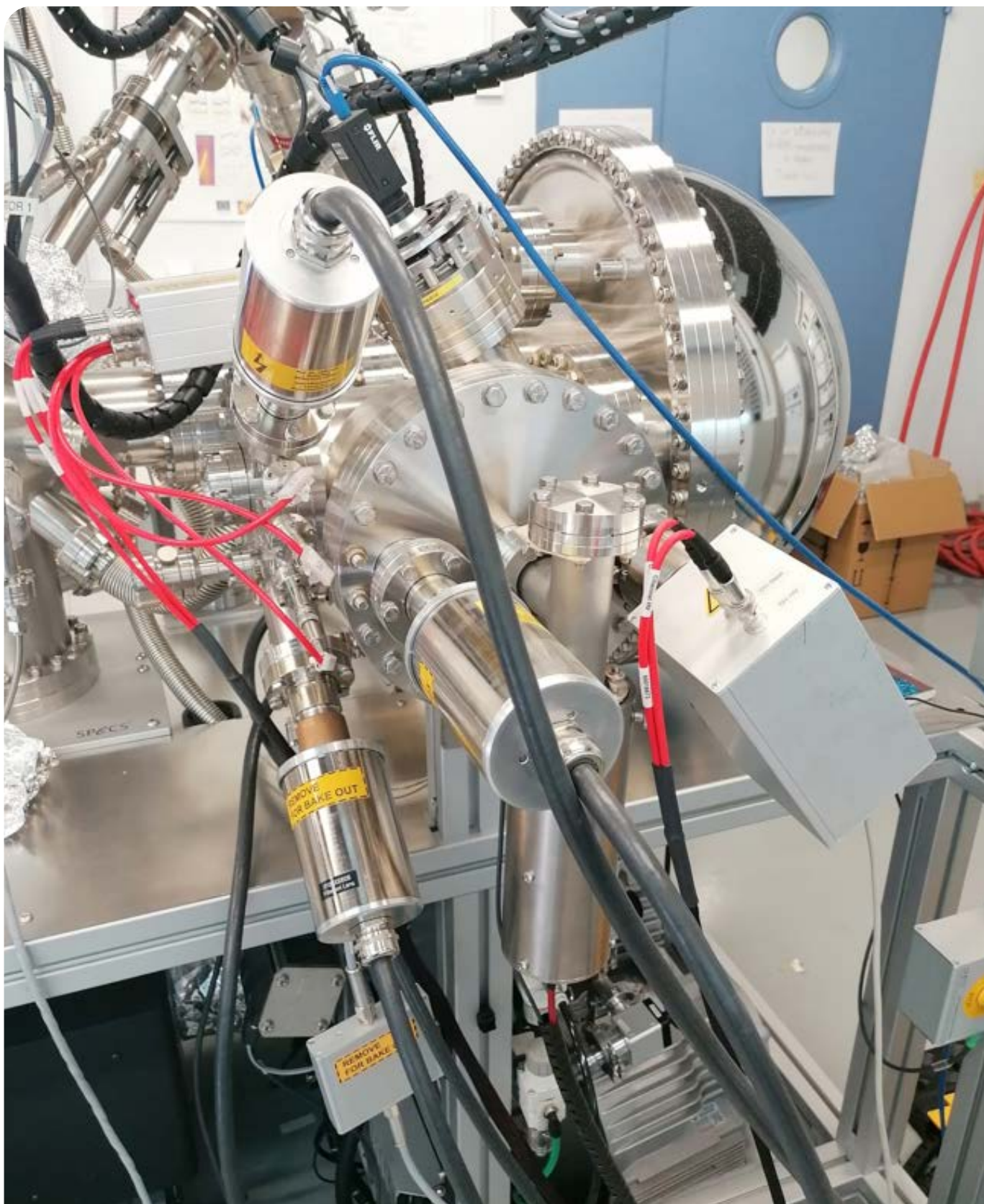
## 2. Patents

Title	Inventors	Applicants	Publication number	Earliest priority	Publication date	Earliest publication
Modified solid support for the synthesis of oligonucleotides	Somoza Calatrava Alvaro [Es] Latorre Lozano Alfonso [Es]	Fundacion Imdea Nanociencia [Es]	US2016075680A1	2013-04-30	2016-03-17	2014-11-05
Systems and methods for obtaining unique identifiers and measuring displacements by sensing and analyzing spatial magnetic field variations	Pedrosa Ruiz Francisco Javier [Es] Camarero De Diego Julio [Es] Bollero Real Alberto [Es]	Fundación Imdea Nanociencia [Es]	EP3246722A1 EP3246722B1	2016-05-20	2017-11-22 2019-01-09	2017-11-22
Anticancer compositions containing mirna mimics and uses thereof	Somoza Calatrava Álvaro [Es] Milán Rois Paula [Es] Latorre Lozano Alfonso [Es]	Fundación Imdea Nanociencia [Es]	EP3626820A1	2018-09-20	2020-03-25	2020-03-25
Functionalised magnetic nanoparticle	López Cortajarena Aitziber [Es] Somoza Calatrava Alvaro [Es] Couleaud Pierre [Es] Ocampo García Sandra [Es] Aires Trapote Antonio [Es] Latorre Lozano Alfonso [Es]	Fundación Imdea Nanociencia [Es]	W02016150521A1	2015-03-26	2016-09-29	2016-09-29
Colorimetric detector	Sánchez Costa José [Es] Resines Urién Esther [Es] Gamonal Ruiz-Crespo Arturo [Es] Piñeiro Lucia [Es]	Fundación Imdea Nanociencia [Es]	EP3789761A1	2019-09-05	2021-03-10	2021-03-10
Polymeric composites with functional surfaces	Hernandez Rueda Jaime [Es] Rodríguez Fernandez Isabel [Es] Navarro Baena Ivan [Es] Viela Bovio Felipe [Es]	Fundación Imdea Nanociencia [Es]	US2019091950A1	2016-03-31	2019-03-28	2017-10-05
Method for detection of an analyte	Cabrera Carrasco David [Es] Aires Trapote Antonio [Es] Artes Ibanez Emilio Jose [Es] Camarero De Diego Julio [Es] Lopez Cortajarena Aitziber [Es] Teran Garcinuno Francisco Jose [Es]	Fundación Imdea Nanociencia [Es]	US2020284787A1	2017-11-10	2020-09-10	2019-05-16
Detection and treatment of gnaq mutant uveal melanoma cells with gold nanoparticles	Urda Susana Ortiz [Us] Somoza Calatrava Alvaro [Es] Latorre Lozano Alfonso [Es] Posch Christian [Us]	Univ California [Us] Fundacion Imdea Nanociencia [Es]	W02015116502A1	2014-01-31	2015-08-06	2015-08-06
Ferrite type materials and process for the production thereof	Real Alberto Bollero [Es] Deledda Stefano [No] Camarero De Diego Julio [Es] Guzik Matylda [No] Rodríguez Javier Rial [Es]	Inst Energiteknik [No] Fundación Imdea Nanociencia [Es]	W02018211121A1	2017-05-18	2018-11-22	2018-11-22



Title	Inventors	Applicants	Publication number	Earliest priority	Publication date	Earliest publication
Preparation of corrugated and porous graphene from cof for use as supercapacitors (machine-translation by google translate, not legally binding)	Coronado Miralles Eugenio [Es] Ribera Hermano Antonio Luis [Es] Abellan Saez Gonzalo [Es] Zamora Abanades Félix [Es] Mas Balleste Rubén [Es] Rodríguez San Miguel David [Es]	Uni De València [Es] Univ Madrid Autonoma [Es] Fundación Imdea Nanociencia [Es] Univ De València Univ Madrid Autonoma Fundación Imdea Nanociencia [Es]	ES2538604A1 ES2538604B1	2013-11-22	2015-06-22 2016-04-20	2015-05-28
Functionalized metal nanoparticles and uses thereof for detecting nucleic acids	Somoza Calatrava Alvaro [Es] Latorre Lozano Alfonso [Es] Ortiz Urda Susana [Us] Posch Christian [Us]	Fundación Imdea Nanociencia [Es] Univ California [Us]	EP2902503A1	2014-01-31	2015-08-05	2015-08-05
Position-sensitive photodetector, method for obtaining same and method for measuring the response from the photodetector	Cabanillas Gonzalez Juan [Es] Campoy Quiles Mariano [Es]	Fundacion Imdea Nanociencia [Es] Consejo Superior Investigacion [Es]	EP2650939A1	2010-12-10	2013-10-16	2013-10-16
Graphene covalently modified (machine-translation by google translate, not legally binding)	Calleja Mitja Fabián [Es] Leret Garcia Sofía [Es] Navarro Ocana Juan Jesús [Es] Stradi Daniele [It] Black Morocoima Andrés [Es] Bernardo Gavito Ramón [Es] Garnica Alonso Manuela [Es] Granados Ruiz Daniel [Es] Lopez Vazquez De Parga Amadeo [Es] Perez Alvarez Emilio [Es] Miranda Soriano Rodolfo [Es] Navarro Ocana Juan Jesús [It] Stradi Daniele [Es] Perez Alvarez Emilio Miranda Soriano Rodolfo	Fundación Imdea Nanociencia [Es] Univ Madrid Autonoma [Es]	ES2578997A1 ES2578997B2	2015-02-02	2016-08-03 2017-01-27	2016-08-03
Position-sensitive photodetector, method for obtaining same and method for measuring the response from the photodetector	Cabanillas Gonzalez Juan [Es] Campoy Quiles Mariano [Es]	Fundacion Imdea Nanociencia [Es] Consejo Superior Investigacion [Es] Fundacion Imdea Nanociencia Consejo Superior Investigacion	ES2384766A1 ES2384766B1	2010-12-10	2012-07-12 2013-05-22	2012-06-14
Substrates for culturing and stimulating cells	Rodríguez Fernández María Isabel [Es] González Pérez María Teresa [Es] Hernández Rueda Jaime Javier [Es] Pérez García Lucas [Es] Camarero De Diego Julio [Es] Miranda Soriano Rodolfo [Es] Ballerini Laura [It] Calaresu Ivo [It] Rauti Rossana [It] Scaini Denis [It]	Fundación Imdea Nanociencia [Es] S I S S A Scuola Int Superiore Di Studi Avanzati [It]	EP3805373A1	2019-10-10	2021-04-14	2021-04-14
Method of detection of marked structures (machine-translation by google translate, not legally binding)	Hernandez Juarez Beatriz Arias Gonzalez De La Aleja José Ricardo Rodríguez Rodríguez Héctor Acebron Rodicio María Iborra Rodríguez Francisco José	Univ Madrid Autonoma [Es] Fundación Imdea Nanociencia [Es] Consejo Superior Investigacion [Es]	ES2745070A1 ES2745070B2	2018-07-27	2020-02-27 2021-07-06	2020-01-30
Method for the synthesis of covalent organic frameworks	Zamora Abanades Félix Juan [Es] Mas-Balleste Rubén [Es] Rodríguez San Miguel David [Es] Segura Castedo José Luis [Es] De La Pena Ruigomez Alejandro [Es]	Fundación Imdea Nanociencia [Es] Univ Autónoma De Madrid Uam [Es] Univ Madrid Complutense [Es]	EP2832767A1	2013-07-31	2015-02-04	2015-02-04

Title	Inventors	Applicants	Publication number	Earliest priority	Publication date	Earliest publication
Graphene dried powder and method for its preparation	Miranda Soriano Rodolfo [Es] Zamora Abanades Félix Juan [Es] Mas-Ballesté Rubén [Es] Azani Mohammad-Reza [Es] Carcelén Valero Verónica [Es] Doblaré Castellano Manuel [Es]	Fundación Imdea Nanociencia [Es] Univ Autónoma De Madrid Uam [Es] Abengoa Res SI [Es]	EP2832689A1	2013-07-30	2015-02-04	2015-02-04
Periacene biradical polymers	Écija Fernández David [Es] Urgel Tendero José Ignacio [Es] Lauwaet Koen [Es] Sánchez Grande Ana [Es] Miranda Soriano Rodolfo [Es] Martin León Nazario [Es] Santos Barahona José Manuel [Es] Jelínek Pavel [Cz]	Fundación Imdea Nanociencia [Es] Univ Madrid Complutense [Es] Fyzikalni Ustav Av Cr V V I [Cz]	EP3843109A1	2019-12-23	2021-06-30	2021-06-30
Catalyst anchoring method, oligomeric ruthenium-ligand compositions therefrom and their use in water oxidation	Llobet Dalmases Antoni [Es] Gimbert Suriñach Carolina [Es] Maseras Cuni Feliu [Es] Moonshiram Dooshaye [Es] Gil Sepulcre Marcos [Es] Shi Yuanyuan [Be] Hoque Asmaul [In] Matheu Montserrat Roc [Es] De Aguirre Fondevila Adiran [Ch] Sala Román Xavier [Es] Schindler Dorothee [De] Würthner Frank [De]	Fundacio Institut Catala Dinvestigacio Quim [Es] Fundacion Inst Madrileno De Estudios Avanzados En Nanociencia Imdea Nanociencia [Es] Univ Wuerzburg J Maximilians [De] Univ Autònoma De Barcelona Uab [Es]	W02022018243A1	2020-07-24	2022-01-27	2022-01-26
Bidirectional medical devices for monitoring and stimulating neurons	González Pérez María Teresa [Es] Camarero De Diego Julio [Es] Pérez García Lucas [Es] Rodríguez Fernández María Isabel [Es] Miranda Soriano Rodolfo [Es] Perna Paolo [Es] Martínez Ramírez Isidoro [Es] Guerrero Sánchez Rubén [Es] Rodilla González Beatriz Loreto [Es] Arché Núñez Ana [Es] Vera García Arturo [Es] Enger Luiz Guilherme [Fr] Flament Stéphane [Fr] Guillet Bruno [Fr] Lam Chok Sing Marc Ah-Liong [Fr] Mechin Laurence Liliane [Fr] Rousseau Olivier Henri Marc [Fr] Ballerini Laura [It] Scaini Denis [It] Calaresu Ivo [It] Serrano López-Terradas María Concepción [Es] Dominguez Bajo Ana [Es] López Dolado Elisa [Es] González Mayorga Francisco Ankor [Es] Lebargy Sylvain [Fr]	Fundación Imdea Nanociencia [Es] Centre Nat Rech Scient [Fr] Scuola Int Superiore Di Studi Avanzati [It] Consejo Superior Investigacion [Es] Servicio De Salud De Castilla La Mancha Sescam [Es]	EP3939497A1	2020-07-15	2022-01-19	2022-01-19



### 3. Congresses

**76** events  
60 on line

**165** contributions

**40** invited lectures  
and **125** regular contributions,  
65 oral and 60 as posters

indico nanoscience institute

Annexes

#### 1. National and international Congresses: invited lectures and regular contributions

**76** events  
60 on line  
**165** contributions  
**40** invited lectures  
and **125** regular contributions,  
65 oral and 60 as posters

**01/02/2021**  
**Faraday Discussions 228: Time-resolved imaging of photo-induced dynamics, Bombay, India**  
Online  
*Invited talk*  
Attosecond laser control of photoelectron angular distributions in XUV-induced ionization of H2  
Fernando Martín

**03/02/2021**  
**Congreso Anual de Estudiantes de Doctorado de la Universidad Miguel Hernández, Elche**  
Online  
*Oral contribution*  
Amperometric hydrazine sensing platforms based on a molybdenum disulfide ternary complex  
Ana M. Villo-Viñosa, Noemía Revenga-Piña,

Mariano Vera-Hidalgo, Emilio M. Pérez, Félix Pariente, Encarnación Lorenzo  
*Poster contribution*  
Liquid-Phase Exfoliation of Cylindrite: A Natural Van der Waals Superlattice with intrinsic magnetic interactions.  
Lucía Martín, Yue Wu, Julia Willms, Riccardo Frisenda, Mar García-Hernández, Emilio M. Pérez, Andrés Castellano-Gómez and Enrique Burzuri

**SR-APES: A new powerful tool to resolve the spin polarized electronic structures**  
S. Maier\*, M. A. Valbuena, J. Camarero, R. Miranda

**20/02/2021**  
**TriMano Transpreenean Nanotechnology Workshop 2021**  
Online  
*Oral contribution*  
On-Surface synthesis of diradical organic one-dimensional polymers  
K. Louswat

**23/02/2021**  
**20th International Workshop on computational physics and materials science: total energy and force methods, Trieste, Italy**  
Online  
*Poster contribution*  
Strain tuning of the anisotropy in the optoelectronic properties of the two-dimensional transition metal trichalcogenide TSS  
Jose Angel Silva Guillen\*, Enrico Carabelli, Pablo Ordóñez, Francisco Guinea, Rafael Roldán

**01/03/2021**  
**Deutscher Physikalischen Gesellschaft (DPG) Spring Meeting 2021, Germany**  
Online  
*Invited talk*  
Spin Orbit driven effects in Graphene-FM systems  
P. Poma

**10/03/2021**  
**Molecular quantum dynamics beyond bound states, Rostock, Germany**  
Online  
*Invited talk*  
Molecular fragmentation as a way to reveal early electron dynamics induced by attosecond pulses  
Fernando Martín

**15/03/2021**  
**The Minerals, Metals & Materials Society Annual Meeting and Exhibition 2021**  
Online  
*Invited talk*  
MnBi thin film micromagnets with tunable anisotropy for high temperature applications  
M. Villanueva, E.H. Sánchez, P. Pedraza, P. Dilleros, P. Poma, P.S. Nornho, C. Navío, J. Camarero, J. A. de Toro\*, and A. Balcells

**18/03/2021**  
**ELASERA RRI workshop, Romania**  
Online  
*Invited talk*  
Spin Orbit functionalized Graphene for resistive-magnetic MEMories SDgraphMEM  
P. Poma

**18/03/2021**  
**American Physical Society 2021 March Meeting**  
Online  
*Invited talk*  
Phase diagram of twisted bilayer graphene near a magic angle  
Francisco Guinea



**NANOLITO 2021:**  
SUMMER SCHOOL IN BASICS AND  
APPLICATIONS OF  
NANOLITHOGRAPHY  
June 29-30 & July 1<sup>st</sup> 2021  
UNIVERSITY OF SALAMANCA

## 4. Funding

We include all research grants that were active during the whole part of 2019 funded by the European Commission, national and regional governments and other public and private agencies.

### 4.1. International programmes

#### EUROPEAN PROJECTS



#### ERC GRANTS



#### ERC SYNERGY GRANTS

TOMATTO



**The ultimate Time scale in Organic Molecular opto-electronics, the ATTOsecond**

Grant Agreement number: 951224

From 2021 to 2027

Principal Investigator: **Dr. Fernando Martín, Fundación IMDEA Nanociencia (CHI)**

Other Principal Investigators: **Dr. Nazario Martín (Universidad Complutense de Madrid), Mauro Nisoli (Politecnico di Milano)**

Additional Beneficiaries: **Universidad Autónoma de Madrid**

#### ERC CONSOLIDATOR GRANTS

ELECnano

**ELEC  
nano**

**Electrically Tunable Functional Lanthanide Nanoarchitectures on Surfaces**

Grant Agreement number: 766555

From 2018 to 2023

Principal Investigator: **Dr. David Écija**

#### ERC PROOF OF CONCEPT

PINT

**Ultrastrong Composites through Polymers Interlocked with carbon NanoTubes**

Grant Agreement number: 842606

From 2019 to 2020

Principal Investigator: **Dr. Emilio Pérez**



## COLLABORATIVE PROJECTS

### PASSENGER



#### Pilot Action for Securing a Sustainable European Next Generation of Efficient RE-free magnets

H2020-SC5-2020-2

Grant Agreement number: 101003914

From 2021 to 2025

Coordinated by IMDEA Nanociencia

Principal Investigator: [Dr. Alberto Bollero](#)

<https://passenger-project.eu/>

### GRAPHENECORE2



#### Graphene-based disruptive technologies

##### GRAPHENECORE 3

Graphene Flagship Core Project 3

H2020-SGA-FET-GRAPHENE-2019

Grant Agreement number: 881603

From 2020 to 2023

Principal Investigator: [Dr. Francisco Guinea](#)

### NOCANTHER



#### Nanomedicine upscaling for early clinical phases of multimodal cancer therapy

H2020-NMP-2015-two-stage

Grant Agreement number: 685795

From 2016 to 2021

Coordinated by IMDEA Nanociencia

Principal Investigators: [Dr. Rodolfo Miranda](#) and [Dr. Álvaro Somoza](#)

<http://www.nocanther-project.eu/>

### UWIPOM2



#### Ultra-efficient wireless powered micro-robotic joint for health applications

H2020-FETOPEN-2018-2020

Grant Agreement number: 857654

From 2019 to 2022

Principal Investigator: [Dr. Alberto Bollero](#)

### EVO-NANO



#### Evolvable platform for programmable nanoparticle based cancer therapies

H2020-FETOPEN-2016-2017

Grant Agreement number: 800983

From 2018 to 2021

Principal Investigator: [Dr. M<sup>a</sup> Isabel Rodríguez](#)

<http://evonano.eu/>

### A-LEAF



#### Towards An Artificial Leaf

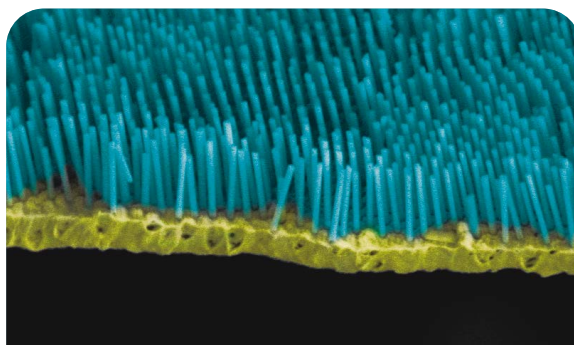
H2020-FETPROACT-2016-2017

Grant Agreement number: 732840

From 2017 to 2021

Principal Investigators: [Dr. Rodolfo Miranda](#) and [Dr. David Écija](#)

<http://www.a-leaf.eu/>



## MARIE SKŁODOWSKA-CURIE ACTIONS (MSCA) I H2020



### IDEAL



#### IMDEA Nanociencia Postdoctoral Training Programme in Nanoscience

H2020-MSCA-COFUND-2020

Grant Agreement number: 101034431

From 2021 to 2025

Principal Investigator: **Dr. M. J. Villa** (Projects, Communication and Research Support Offices)

<http://www.idealcofund-project.eu/>

## EURAMET – EMPIR



The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

### ISO-G-Scope

#### Standardisation of structural and chemical properties of graphene

H2020-EMPIR-2019-Normative

Reference: JRP-N10 / 19NRM04

From 2020 to 2022 (36 months)

IMDEA Nanociencia is Partner in a consortium of 10 coordinated by the National Physics Laboratory / NPL (UK)

Principal Investigator: **Dr. Emilio Pérez**

### MEMQuD

#### Memristive devices as quantum standard for nanometrology

H2020-EMPIR-2020-Normative

Reference: 20FUN06

From 2021 to 2024 (36 months)

IMDEA Nanociencia is Partner in a consortium of 15 coordinated by the Istituto Nazionale di Ricerca Metrologica (INRIM) / NMI (Italy) Principal Investigator: **Dr. Mariela Menghini**

### COMET

#### Two dimensional lattices of covalent- and metal-organic frameworks for the Quantum Hall resistance standard

H2020-EMPIR-2020-Normative

Reference: 20FUN03

From 2021 to 2024 (36 months)

IMDEA Nanociencia is Partner in a consortium of 10 coordinated by the Centro Español de Metrología (CEM) / (Spain) Principal Investigator: **Dr. Enrique Cánovas**

## European Cooperation in Science and Technology (COST Actions)

### ATTOCHEM

#### Attosecond Chemistry (CA18222)

From 2019 to 2023

Chair: **Prof. Fernando Martín**

[https://www.cost.eu/actions/CA18222/#tab\\$Name:overview](https://www.cost.eu/actions/CA18222/#tab$Name:overview)

## OTHER INTERNATIONAL PROGRAMMES

### DEFROST



#### Development of hybrid graphene-superconductor detectors for quantum and space applications

Funding: Office of Naval Research (United States)

From 2019 to 2021

Principal Investigator: **Dr. Daniel Granados**

### MiniPINS



#### Miniaturized Sensor Packages and Delivery Systems for In-Situ Exploration

From 11-2019 to 04-2023 (18 months)

ESA Contract No. 4000128070/19/NL/KML

IMDEA Nanociencia is subcontractor of in a consortium of 7 coordinated by the Finnish Meteorological Institute / FMI (FI)

Principal Investigator: **Dr. Héctor Guerrero**



## 4.2. National Programmes

### ACCIÓN ESTRATÉGICA EN SALUD (INSTITUTO DE SALUD CARLOS III)



Convocatoria de expresiones de interés para la financiación de proyectos de investigación sobre el SARS-COV-2 y la enfermedad COVID19 con cargo al FONDO – COVID19 (Resolución COVID19, de 19 de marzo)

**Desarrollo de sensores colorimétricos basados en nanopartículas de oro para la detección del SARS-COV2**

Ref.: COV20/00122.

From: 2020 to 2021

Principal Investigator: [Dr. Rodolfo Miranda](#)

**Transmisión de SARS-CoV2 por el aire: detección en hospitales y tecnologías innovadoras**

Ref.: COV20/00144.

From 2020 to 2021

Principal Investigators: [Dr. A. Alcami \(CSIC\)](#)

Investigator: [Dr. Álvaro Somoza](#)

### PROYECTOS I+D+I - MODALIDADES «RETOS INVESTIGACIÓN» Y «GENERACIÓN DE CONOCIMIENTO»

Call 2020

#### NEXUS

**Síntesis de Nanoestructuras L10-MNALC Monofásicas Diseñadas y de la Fase Cosmológica L10-FENI para la fabricación de Imanes L10 mediante Impresión 2D**

Ref.: PID2020-115215RB

From 2021 to 2024

Principal Investigator: [Dr. Alberto Bollero](#)

#### PICANTE

**Polímeros mecánicamente enlazados con nanotubos de carbono para electrodos de baterías**

Ref.: PID2020-116661RB-I00

From 2021 to 2024

Principal Investigator: [Dr. Emilio M. Pérez](#)

#### NANORARE

**Herramientas nanobiotecnológicas para detección y tratamiento de enfermedades raras: cáncer pancreático, melanoma de uvea y distrofia muscular de Duchenne**

Ref.: PID2020-119352RB-I00

From 2021 to 2024

Principal Investigator: [Dr. Álvaro Somoza](#)

#### THEXP

**Propiedades magnéticas y coloidales de nano-ensamblados formados tras la interacción específica entre nanopartículas magnéticas y biomarcadores**

Ref.: PID2020-117080RB-C53

From 2021 to 2024

Principal Investigator: [Dr. Francisco Terán](#)

#### POMELO

**Diseño de potentes metalofármacos y su seguimiento en el nanoespacio intracelular**

Ref.: PID2020-117766GB-I00

From 2021 to 2024

Principal Investigator: [Dr. Ana M. Pizarro](#)

#### REGINNA

**Nanomateriales Innovadores Regenerativos**

Ref.: PID2020-120202RB-I00

From 2021 to 2024

Principal Investigator: [Dr. Isabel Rodríguez](#)

## Call 2019

### MADE

**Fabricación de detectores superconductores multi-frecuencia para futuras misiones espaciales en el FIR/sub-mm/mm**

Ref.: PID2019-105552RB-C44

From 2020 to 2023

Principal Investigator: [Dr. Daniel Granados](#)

### NAISMAHT

**Nanoestructuras para imagen, detección y calentamiento magnético de células tumorales**

Ref.: PID2019-106301RB-I00

From 2020 to 2023

Principal Investigators: [Dr. Gorka Salas](#)

### NEO-CHEM

**Química Orgánica fuera del equilibrio: sistemas químicos compartimentalizados hacia la construcción de una protocélula sintética**

Ref.: PID2019-106327GA-I00

From 2020 to 2023

Principal Investigators: [Dr. I. Colomer](#)

### ERA-SOLAR

**Dinámica de electrones en interfaces punto cuántico-coóxido metálico: estudios fundamentales y desarrollo de dispositivos de alta eficiencia para la conversión de energía solar**

Ref.: PID2019-107808RA-I00

From 2020 to 2023

Principal Investigators: [Dr. Enrique Cánovas](#)

### pi-CONJUNANO

**Diseño en superficies y propiedades físico-químicas de polímeros pi-conjugados**

Ref.: PID2019-108532GB-I00

From 2020 to 2023

Principal Investigators: [Dr. David Écija](#)

### CATDesign

**Hacia la comprensión de requisitos electrónicos y atómicos de catalizadores económicos para la división de la molécula de agua**

Ref.: PID2019-111086RA-I00

From 2020 to 2023

Principal Investigators: [Dr. D Moonshiram](#)

### AIRE

**Arquitecturas Conmutables Avanzadas para detección molecular**

Ref.: PID2019-111479GB-I00

From 2020 to 2023

Principal Investigators: [Dr. J. Sanchez-Costa](#)

## SUBPROGRAMA ESTATAL DE GENERACIÓN DE CONOCIMIENTO Y FORTALECIMIENTO CIENTÍFICO Y TECNOLÓGICO DE I+D+I

### Proyectos I+D+i «Generación de Conocimiento»

## Call 2018

### MICRUNC

**Microscopía de super-resolución con fluoróforos no convencionales**

Ref.: PGC2018-094802-B-I00

From 2019 to 2021

Principal Investigator: [Dr. Cristina Flors](#)

### TOPSURF

**Investigando los estados de superficie topológicos de materiales cuánticos**

Ref.: PGC2018-097028-A-I00

From 2019 to 2021

Principal Investigator: [Dr. Manuela Garnica](#)

### SpOrQuMat

**Spin-orbit driven physics at surfaces and interfaces of quantum materials**

Ref.: PGC2018-098613-B-C21 / PGC2018-098613-B-C22

From 2019 to 2021

Principal Investigators: [Dr. Rodolfo Miranda](#) and [Dr. Francisco Guinea](#)

**SIN\_FLU****Caracterización de la dinámica transcripcional del virus de la gripe, influenza a, a nivel de moléculas individuales**

Ref.: PGC2018-099341-B-I00

From 2019 to 2021

Principal Investigator: **Dr. Borja Ibarra****MECAVIRINF****Caracterización nano-mecánica y detección en tiempo real de la infección de células eucariotas con calicivirus**

Ref.: PGC2018-099713-B-I00

From 2019 to 2021

Principal Investigator: **Dr. Johann Mertens****Equipamiento científico****Spin-ARPES****Sistema de fotoemisión resuelta en ángulo con polarización en espín**

Ref.: EQC2019-006304-P

From 2019 to 2021

Principal Investigator: **Dr. Rodolfo Miranda****Centros de Excelencia «Severo Ochoa»****Severo Ochoa Centre of Excellence (Call 2017)**

Ref.: SEV-2016-0686

From 2017 to 2021

Scientific Director: **Dr. Francisco Guinea**

IMDEA Nanociencia became an accredited Severo Ochoa Centre of Excellence by the Spanish Ministry of Economy, Industry and Competitiveness in 2017. This award is the highest national recognition for centres of excellence in Spain and is granted after a rigorous evaluation process carried out by an independent international committee of prestigious scientists.

**Acciones de Dinamización “Redes de Investigación”****Materiales orgánicos disruptivos para energía fotovoltaica**

Ref.: RED2018-102815-T

From 2020 to 2021

Principal Investigator: **Dr. Nazario Martin****Nanotecnología en hipertermia traslacional**

Ref.: RED2018-102626-T

From 2020 to 2021

Principal Investigator: **Dr. D. Ortega****Europa Redes y Gestores - Europa Centros Tecnológicos 2020****IMPULSA****Plan estratégico para el impulso de la participación de IMDEA Nanociencia en Horizonte Europa (IM-PULSA)**

Ref.: ECT2020-000746

From 2021 to 2022

Principal Investigator: **Dr. M. J. Villa****SUBPROGRAMA ESTATAL DE I+D+I ORIENTADA A LOS RETOS DE LA SOCIEDAD****Proyectos I+D+i «Retos Investigación»****Call 2018****SMS-QUTE****Espintrónica molecular aplicada a tecnologías cuánticas**

Ref.: RTI2018-096075-A-C22

From 2019 to 2022

Principal Investigator: **Dr. Enrique Burzuri****AMAPOLA****Materiales avanzados para la optimización de láseres orgánicos y aplicaciones nanotecnológicas**

Ref.: RTI2018-097508-B-I00

From 2019 to 2021

Principal Investigators: **Dr. Juan Cabanillas and Dr. Reinhold Wannemacher**

## FUN-SOC: FEST

### Nuevas funcionalidades dirigidas por interacciones espin-orbita: texturas de espines quirales rápidas y eficientes

Ref.: RTI2018-097895-B-C42

From 2019 to 2021

Principal Investigator: [Dr. Paolo Perna](#)

## INTRA\_TEMP

### Interpretación de la temperatura intracelular para el diagnóstico y tratamiento del cáncer

Ref.: RTI2018-101050-J-I00

From 2019 to 2021

Principal Investigator: [Dr. Sebastian Thompson](#)

## Call 2017

## OptoCT

### Espectroscopia óptica de estado estacionario y resuelto en el tiempo de sistemas orgánicos de transferencia de carga innovadores

Ref.: CTQ2017-87054-C2-1-P

From 2018 to 2021

Principal Investigators: [Dr. Johannes Gierschner](#) and [Dr. Larry Luer](#)

## NanoSmart

### Nanoestructuras inteligentes contra el melanoma de úvea y el cáncer de páncreas

Ref.: SAF2017-87305-R

From 2018 to 2021

Principal Investigators: [Dr. Álvaro Somoza](#) and [Dr. Begoña Sot](#)

## BiSURE

### Superficies nanoestructuradas biofuncionales como nueva generación de implantes en medicina regenerativa

Ref.: DPI2017-90058-R

From 2018 to 2021

Principal Investigators: [Dr. M. Isabel Rodríguez](#) and [Dr. Teresa González](#)

## Programación Conjunta Internacional

## Call 2019

## COSMAG

### From the cosmos to the lab: Development of the L10-FeNi phase as a disruptive permanent magnet alternative

Funding: M-ERANET 2019

From 2020 to 2023

Principal Investigator: [D. Alberto Bollero](#)

Coordinated by IMDEA Nanociencia

## SOgraphMEM

### Spin Orbit functionalized GRAPHene for resistive-magnetic MEMories

Funding: FLAG ERA 3

From 2020 to 2022

Principal Investigator: [Dr. Paolo Perna](#)

Coordinated by IMDEA Nanociencia

## Call 2018

## BIOMAG

### Advanced magnetic nanoparticles for detection and quantification of biomarkers in biological fluids

Funding: M-ERANET 2018

From 2019 to 2022

Principal Investigator: [Dr. Francisco Terán](#)

Coordinated by IMDEA Nanociencia

## AMYLIGHT

### Desarrollo de estrategias fototerapéuticas para la amiloidosis mediante visión nanoscópica del daño fotoinducido al material amiloide

Funding: Japan-Spain 2018

From 2019 to 2021

Principal Investigator: [Dr. Cristina Flors](#)



## Acciones de Dinamización “Europa Investigación”

Call 2020

### 2DTONIC

#### Materiales topológicos 2d para valleytronic

Ayudas del ERC “Starting Grants” (StG)

Ref.: EIN2020-112223

From 2020 to 2022

Principal Investigator: [Dr. Manuela Garnica](#)

### METALpHACT

#### Metalofarmacos para modular el flujo de protones en las células cancerosas

Ayudas del ERC “Consolidator Grants”(CoG)

Ref.: EIN2020-112423

From 2020 to 2022

Principal Investigator: [Dr. Ana Pizarro](#)

### Intra\_Temp

#### Temperatura intracelular para el diagnóstico y tratamiento del cáncer

Ayudas del ERC “Consolidator Grants”(CoG)

Ref.: EIN2020-112419

From 2020 to 2022

Principal Investigator: [Dr. Sebastian Thompson](#)

#### Multicolour molecular profiling of neurodegenerative diseases with quantum dots

Ayudas del ERC “Starting Grants” (StG)

Ref.: EIN2019-103140

From 2019 to 2022

Principal Investigator: [Dr. Valle Palomo](#)





## CONVOCATORIA DE AYUDAS PARA EL FOMENTO DE LA CULTURA CIENTÍFICA



### Nanociencia to-go



Ref.: FCT-18-14139

From 2019-2020

Principal Investigator: [Dr. M.J.Villa](#) (Projects and Communication Offices)

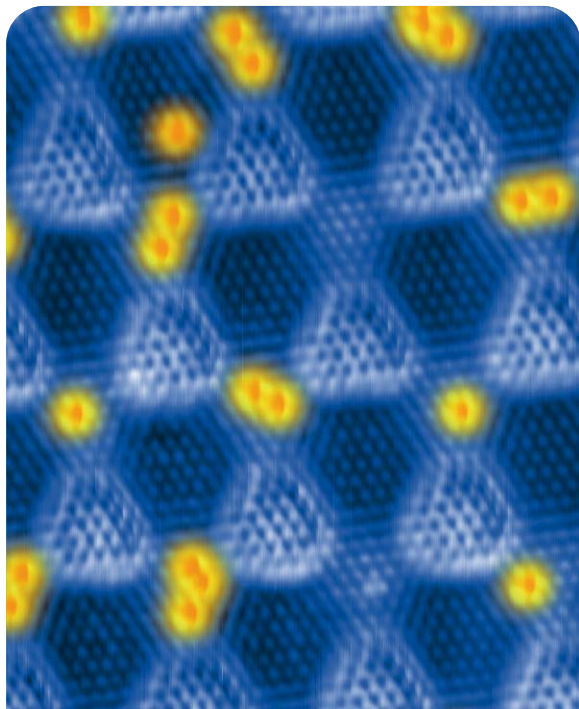
### Nanociencia entretenida



Ref.: FCT-20-16224

From 2021-2022

Principal Investigator: [Dr. M.J.Villa](#) (Projects, Communication and Research Support Offices)



## OTHER PROJECTS

### ASOCIACIÓN ESPAÑOLA CONTRA EL CÁNCER. IDEAS SEMILLA 2019



#### AECC Semilla 2021

#### Nuevo tratamiento de Glioblastoma basado en dual termonanopartículas

From 2021-2023

Principal Investigator: [Dr. Sebastian Thompson](#)

#### AECC Semilla 2019

#### Enhancement of tumor radiation dose response via magnetophothermal nanostructures for effective cancer treatment

From 2020-2022

Principal Investigator: [Dr. Ana Espinosa](#)

### FONDO SUPERA COVID-19

#### Nanoseek



#### Nanotech-based PCR-free SARS-CoV-2 quantitative detection kit

From 2020-2021

Principal Investigator: [Dr. Rodolfo Miranda](#) (UAM) (col. IMDEA Nanociencia and Hospital Ramón y Cajal)

### La Caixa Health Research 2021

#### Drugs4ALS



#### Targeting TDP-43 with protein kinase inhibitors: an effective and measurable therapy for ALS

Principal Investigator: [Dr. Valle Palomo](#)



### 4.3. Regional programmes

**Fondo Europeo De Desarrollo Regional – Recursos REACT-UE**  
**Programa Operativo de Madrid 2014-2020**  
**Línea de actuación de proyectos de I+D+i en materia de respuesta a COVID 19**

#### NANOCOV-CM

**Nanotecnología para detección del SARS-CoV-2 y sus variantes**

Coordinator: IMDEA Nanociencia

From 2020 to 2022

Principal Investigator: **Dr Rodolfo Miranda**

**Programas de Actividades de I+ D entre grupos de investigación de la Comunidad de Madrid**

### SINERGIAS 2018

#### FULMATEN-CM



**Fotónica ultrarrápida para el diseño de nuevos materiales y la captura eficiente de energía**

Coordinator: IMDEA Nanociencia

From 2019 to 2022

Principal Investigator: **Dr. Fernando Martin**

#### QUIMTRONIC-CM

**Química disruptiva en la nanoescala por electrónica y flexibles**

Coordinator: Universidad Complutense de Madrid

From 2019 to 2022

Principal Investigators: **Dr. David Écija and Dr. Nazario Martín**

### CONVOCATORIA TECNOLOGÍAS 2018

#### NMAT2D-CM



**Nuevos materiales bidimensionales: caracterización, propiedades y aplicaciones**

Coordinator: IMDEA Nanociencia

From 2019 to 2022

Principal Investigator: **Dr. Francisco Guinea**

#### NanomagCOST-CM



**Soluciones del nanomagnetismo a los retos sociales**

From 2019 to 2022

Coordinator: Universidad Autónoma de Madrid

Principal Investigators: **Dr. Rodolfo Miranda, Dr. Alberto Bollero and Dr. Paolo Perna**

#### TEC2SPACE-CM



**Desarrollo y explotación de nuevas tecnologías para instrumentación espacial en la Comunidad de Madrid**

Coordinator: Centro de Astrobiología (CAB)

From 2019 to 2022

Principal Investigator: **Dr. Daniel Granados**

#### MADRID-PV2-CM

**Materiales, dispositivos y tecnologías para el desarrollo de la industria fotovoltaica**

Coordinator: Instituto Energía Solar (Universidad Politécnica de Madrid)

From 2019 to 2022

Principal Investigator: **Dr. Isabel Rodríguez**

FotoArt-CM



**Nueva generación de materiales multifuncionales para fotosíntesis artificial**

From 2019 to 2022 Coordinator: IMDEA Energía

Principal Investigators: [Dr. Emilio M. Pérez](#) and [Dr. Miguel A. Niño](#)

**CONVOCATORIA BIOMEDICINA 2017**

RENIM-CM



**Red Madrileña de Nanomedicina en Imagen Molecular**

Ref.: B2017/BMD-3867

From 2018 to 2021

Coordinator: Fundación para la Investigación Biomédica Hospital Gregorio Marañón

Principal Investigators: [Dr. Cristina Flors](#)

**4.4. Industrial projects**

The Office of Strategic Alliances (OSA) is led by H. Guerrero since 2019. The office plays a key role in establishing new strategic alliances, partnerships and collaborations with the private sector. The office also fosters collaboration with unique institutional partners to create synergies thanks their complementarity with IMDEA Nanociencia.

A system has been introduced to manage all the contacts (90 companies accumulated in 2019-21) and monitor the maturity of the relationships using a proprietary set of metrics Partnership Readiness Level (PRL). 52 of these companies represents for IMDEA Nanociencia an Industrial opportunity. These are spread across several research areas: Aerospace, Security & Defence; Health & Food; Nanomaterials, Sensors & Metrology; Transport & Logistics; Information (Artificial Intelligence); Energy & Environment. These companies are now potential partners, part of the IMDEA Nanociencia eco-system.

Partnerships Readiness Level (PRL) proprietary to IMDEA Nano.





CELSA



2021 (12 months)

Principal Investigator: **Dr. Gorka Salas and Dr. A. Bollero**

SYLENTIS



From 2021 to 2022

Principal Investigator: **Dr. Álvaro Somoza**

Höganäs (Sweden)



ECNanoManga

Up-scaled production of a new generation of Exchange/ Coupled Nano-crystalline Mn-based RE-free PMs.

From 2018 to 2022

Principal Investigator: **Dr. Alberto Bollero**

Nanocore Aps (Denmark)



TSUNAMI

From 2020-2023

Principal Investigator: **Dr. Emilio M. Pérez**

Airbus Defence and Space SAU (Spain)



GONDOLA

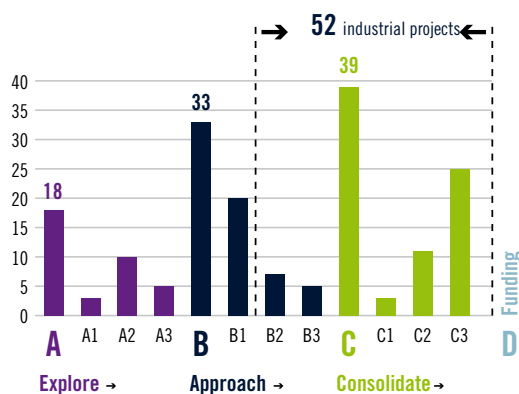
From 2021-2024

Principal Investigators: **Dr. Isabel Rodriguez and Gorka Hernandez**

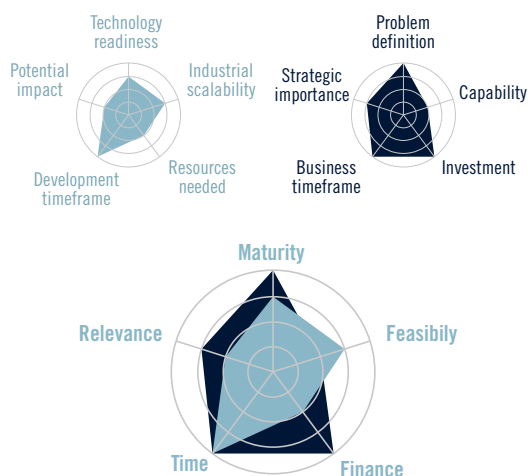
Partnerships Readiness Level (PRL)

proprietary to IMDEA Nano

Industrial Opportunities (accumulated data 09/2019 - 11/2021)



Nanotechnology Roadmapping



## 4.5. Fellowships

### 4.5.1. International



#### MARIE SKŁODOWSKA-CURIE ACTIONS (MSCA) | H2020

##### PhoMOFs

*Accessing Electron-Phonon interactions of two-dimensional Metal Organic Frameworks by Ultrabroadband Terahertz Spectroscopy based on the Spintronic Trilayer Emitter*

H2020-MSCA-IF-2020

Grant Agreement number: 101030872

Duration: 2021-2023

Fellow: [Dr. Vasileios Balos](#)

##### OssCaNa

*On-Surface Synthesis, Transfer and Device Fabrication of Novel Carbon-based Nanomaterials*

H2020-MSCA-IF-2019 MSCA-IF-EF-ST

Grant Agreement number: 886314

Duration: 2021-2023

Fellow: [Dr. José Ignacio Urgel](#)

##### 4f-Mag

*On-surface design of lanthanide coordinated networks featuring single atom magnetism*

H2020-MSCA-IF-2019 MSCA-IF-EF-ST

Grant Agreement number: 894924

Duration: 2021-2022

Fellow: [Dr. Sofia de Oliveira Parreiras](#)

##### TweeTERS

*Coupling of Optical tweezers with Tip-enhanced Raman Spectroscopy for single-molecule investigation of supramolecular systems*

H2020-MSCA-IF-2019 MSCA-IF-EF-ST

Grant Agreement number: 892667

Duration: 2020-2022

Fellow: [Dr. Natalia Martín](#)





## 4.5.2. National

### PROGRAMA ESTATAL DE PROMOCIÓN DEL TALENTO Y SU EMPLEABILIDAD EN I+D+I

#### *Ayudas para la contratación de doctores «Ramón y Cajal»*

Call 2019 [Dr. Valle Palomo](#)

Call 2015 [Dr. José Sánchez Costa](#)

#### *Ayudas para la contratación de doctores «Juan de la Cierva»*

##### *Incorporación*

Call 2020 [Dr. Ester Palmero](#), [Dr. Sara Hernández](#), [Dr. Iolanda di Bernardo](#)

Call 2018 [Dr. José Ignacio Urgel](#)

##### *Formación*

Call 2020 [Samara Medina](#), [Elisa Fresta](#)

Call 2017 [Dr. Lucía Piñeiro](#)

#### *Ayudas para la contratación de personal técnico de apoyo a la I+D+i*

Call 2019 [Sergio de las Heras](#)

Call 2018 [Patricia Pedraz](#), [Cintia de Vequi](#)

Call 2017 [Silvia Miranda](#)

#### *Contratos predoctorales para la formación de doctores (FPI Programme)*

Call 2020 [Luis Calahorra](#), [Ignacio Figueruelo](#), [Rosalia López](#), [Héctor Sainz](#), [Miguel Ángel Pulido](#)

Call 2019 [Claudia](#), [Cardozo](#), [Alberto Martín Asencio](#), [Saúl García-Orrit](#), [Ana Martínez](#), [Ismael Plaza](#)

Call 2018 [Alicia Naranjo](#), [Ana Arché](#), [Jesús Galán](#), [Alejandro Jimeno](#), [Joel Gabriel Fallaque](#), [Ingrid Ortega](#)

Call 2017 [Paula Milian](#), [Daniel Moreno](#), [Tomás Nicolas](#)

Call 2016 [Patricia Bondia](#)

#### *Contratos predoctorales para la formación del profesorado universitario (FPU Programme)*

Call 2020 [Cristina García](#), [Alejandro López](#)

Call 2018 [Nuria Lafuente](#)

#### *Ayudas para la promoción de empleo joven e implantación de la Garantía Juvenil en I+D+i*

2018 (6 ayudantes de investigación)

## 4.5.3. Regional (Comunidad de Madrid)



Comunidad de Madrid

### PROGRAMA DE ATRACCIÓN DE TALENTO INVESTIGADOR

#### *Ayudas para la contratación de doctores con experiencia (Modalidad 1)*

Call 2019 [Dr. Edmund Leary](#)

Call 2018 [Dr. Ana Espinosa](#)

Call 2017 [Dr. Enrique Cánovas](#), [Dr. Enrique Burzuri](#)

#### *Ayudas para la contratación de jóvenes doctores (Modalidad 2)*

Call 2020 [Dr. Sara Hernández](#)

Call 2019 [Dr. Ramón Bernardo](#), [Dr. José Ignacio Urgel](#), [Dr. Víctor Vega](#)

Call 2018 [Dr. Yago Ferreirós](#), [Dr. Alberto González](#)

#### *Ayudas para la Contratación de Doctorados Industriales*

Call 2020 [Alodia Farmacéutica S.L. \(IND2020/ IND-17517\)](#). [Arturo López](#) (Dr. [Álvaro Somoza](#))

Call 2017 [Synthelia Organics S.L. \(IND2017/ IND-7809\)](#). [D Demian Pardo](#) (Dr. [Álvaro Somoza](#))

#### *Programa Operativo de Empleo Juvenil y la Iniciativa de Empleo Juvenil (YEI). Contratación de Investigadores predoctorales y postdoctorales*

##### Total 13:

2019 (3 Predocs & 1 PostDoc)

2018 (8 Predocs & 1 PostDoc)

#### *Programa Operativo de Empleo Juvenil y la Iniciativa de Empleo Juvenil (YEI). Realización de contratos de Ayudantes de investigación/ Técnicos de Laboratorio*

##### Total 13:

2020 (4 Ayu.)

2019 (4 Ayu. & 2 Tec.)

2018 (3 Ayud.)

#### 4.5.4. Others Programmes



***Becas postdoctorales en Centros de Investigación y Universidades Españolas (Junior Leader)***

Call 2018 **Dr. Manuela Garnica**

***Programa de Becas de Doctorado InPHINIT***

Call 2020 **Alonso Joséé Campos**

Call 2018 **Raman Prajapati**



***Ayudas Predoctorales en Oncología (APRO)***

Call 2019 **Dr. Catarina Coutinho**





## 5. Training

### 1. Seminars

**03 SEMINAR** **FRONTIERS IN SARS-COV-2 DETECTION SYSTEMS**

20<sup>th</sup> 2021 Jan

San Diego 09:30  
Madrid 18:30

Laura Lechuga · Arbén Merkoçi  
Pablo Castán · Melanie Ott

instituto imdea nanociencia EXCELENCIA SIVERO OCHOA

ICN2 UNIVERSIDAD CARLOS III DE MADRID  
MIRNAX  
UCSF UNIVERSITY OF CALIFORNIA SAN FRANCISCO

Frontiers in nanoscience Online Global Seminar Series

**04 SEMINAR** **FRONTIERS IN MOIRÉ SEMICONDUCTOR PHOTONICS**

15<sup>th</sup> 2021 jul

Madrid 18:00  
San Diego 09:00 CEST

Prof. Brian D. Gerardot

instituto imdea nanociencia EXCELENCIA SIVERO OCHOA

HERIOT WATT UNIVERSITY

Frontiers in nanoscience Online Global Seminar Series  
hosted through zoom

**24<sup>th</sup> nov** 11:30 CET

**Recent highlights from European XFEL**  
It is all about the time scale

Robert Feidenhans'l Manager Director European XFEL

instituto imdea nanociencia EXCELENCIA SIVERO OCHOA



**instituto imdea nanociencia** EXCELENCIA SEVERO OCHOA

# seminars 2021

calendar

January	February	March
26 <sup>th</sup> <b>Dr. Jose Silva</b> School of Physics and Technology, Wuhan University, China	9 <sup>th</sup> <b>Dr. Miguel Ángel Valbuena</b> IMDEA Nanociencia	9 <sup>th</sup> <b>Dr. Álvaro Somoza</b> IMDEA Nanociencia
	23 <sup>rd</sup> <b>Dr. Ester Palmero</b> IMDEA Nanociencia	23 <sup>rd</sup> <b>Dr. Gorka Salas</b> IMDEA Nanociencia
April	May	June
13 <sup>th</sup> <b>Prof. Wojciech Gawelda</b> IMDEA Nanociencia / UAM	4 <sup>th</sup> <b>Prof. Jorge A. R. Navarro</b> Universidad de Granada	1 <sup>st</sup> <b>Dr. David Écija</b> IMDEA Nanociencia
20 <sup>th</sup> <b>Dr. Milagros Castellanos</b> IMDEA Nanociencia	18 <sup>th</sup> <b>Dr. José Requejo-Isidro</b> Centro Nacional de Biotecnología (CNB/CSIC)	

UNIÓN EUROPEA FONDOS ESTRUCTURALES

GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

CSIC

**26<sup>th</sup> 2021**  
**jan**  
12:00 CET  
Online seminar

**A first-principles approach to the electronic and structural properties of single-layer NbSe<sub>2</sub> and TiS<sub>3</sub>**

**J. A. Silva-Guillén**  
School of Physics and Technology  
Wuhan University

**23<sup>rd</sup> 2021**  
**feb**  
12:00 CET  
Online seminar

**Novel routes for developing rare earth-free permanent magnets: from the synthesis of tuned composites to additive manufacturing**

**Dr. Ester Palmero**  
IMDEA Nanociencia

**16<sup>th</sup> 2021**  
**feb**  
12:00 CET  
Online seminar

**Recent advances in photoemission spectroscopy: Nano-ARPES and Spin Resolved ARPES. The new Spin-ARPES instrument at IMDEA Nanociencia.**

**Dr. Miguel Ángel Valbuena**  
IMDEA Nanociencia

**9<sup>th</sup> 2021**  
**mar**  
12:00 CET  
Online seminar

**Gold nanoparticle-based sensors for the detection of SARS-CoV-2**

**Dr. Álvaro Somoza**  
IMDEA Nanociencia

**23<sup>rd</sup>**  
2021  
**mar**  
12:00 CET  
Online seminar

**Playing with the composition and structure of nanoferrites for biomedical applications**

**Dr. Gorka Salas**  
IMDEA Nanociencia

seminars

**20<sup>th</sup>**  
2021  
**jul**  
12:00 CEST  
Online

**Introduction of PAH curvature by six-, seven- or eight-membered rings**

**Prof. Dr. Michael Mastalerz**  
Ruprecht-Karls-Universität Heidelberg

seminars

**13<sup>th</sup>**  
2021  
**apr**  
12:00 CET  
Online seminar

**New era in structural dynamics research: why will X-ray Free Electron Lasers revolutionize the X-ray Science?**

**Prof. Wojciech Gawelda**  
IMDEA Nanociencia / UAM

seminars

**8<sup>th</sup>**  
2021  
**oct**  
16:00 CEST  
Conference room

**Topological Polymers**

**Prof. Thomas Heine**  
Technische Universität Dresden

seminars

**20<sup>th</sup>**  
2021  
**apr**  
12:00 CET  
Online seminar

**Eukaryotic transcription factors can track and control their target genes using DNA antennas**

**Dr. Milagros Castellanos**  
IMDEA Nanociencia

seminars

**5<sup>th</sup>**  
2021  
**nov**  
12:00 CET  
Online

**Experimental possibilities for Nanoscience at CMAM**

**Gastón García López**  
Centro de Micro-Análisis de Materiales (UAM)

seminars

**1<sup>st</sup>**  
2021  
**jun**  
12:00 CET  
Online seminar

**Engineering pi-conjugation on surfaces**

**Prof. David Écija**  
IMDEA Nanociencia

seminars

**16<sup>th</sup>**  
2021  
**nov**  
12:00 CET  
Online & Conference room

**Coulomb interaction, correlations and superconductivity in twisted bilayer graphene**

**Dr. Tommaso Cea**  
IMDEA Nanociencia

seminars



**16<sup>th</sup> NOV 2021**  
10:00  
Conference room

**A versatile FIB-SEM nanofabrication instrument and its applications in nanoscale science and engineering**

workshops

VELION

**23<sup>rd</sup> NOV 2021**  
12:00 CET  
Online & conference room

**3D spin textures and magnetization dynamics in chemically-modulated nanowires**

Dr. Lucas Pérez  
UCM/ IMDEA Nanociencia

seminars

**2&10 dec 2020 | 13&20 jan 2021**

**Curso básico en Innovación y Propiedad Industrial e Intelectual**

online

sessions

www.nanociencia.imdea.org

**15<sup>th</sup>, 17<sup>th</sup>, 18<sup>th</sup> mar 2021**

**Managing myself & working with my team: a skills upgrade for Junior staff**

Trainers: Gavin Lucas and Tobias Maier, *The Paper Mill*

online

sessions

www.nanociencia.imdea.org

thepapermill

## 2. Conferences and Courses

**60** courses and conferences  
**26** international institutions



### 3. Training programmes

As part of the Severo Ochoa programme a series of new training programmes have been launched over the past year.

**IMDEA Nano Postdoctoral Programme in Nanoscience** – a 2 year training plan developed to provide technical excellence in the multi-disciplinary fields on offer at IMDEA Nanociencia.

**IMDEA Nano Doctoral Programme in Nanomedicine** – a 3 year programme that allows our doctoral students in nanomedicine to gain a cutting-edge education in the developing area of nanomedicine.

**IMDEA Nano Bachelor and Graduate Education in Nanotechnology** – the aim of this particular programme is to engage undergraduate students from local Universities at an early stage and encourage them to gain experience in the IMDEA Nanociencia laboratories.

**Transferable Skills Courses** – the aim of this programme is to provide transversal training support in both research derived needs and non-scientific skills, these courses are open to all IMDEA Nanociencia staff.

### 4. PhD thesis

22/01/2021

Nicolas Muñoz Casellas

*Polímeros supramoleculares funcionales: Diseño, síntesis, caracterización y aplicaciones*

Supervisor(s): Tomas Torres and Miguel Garcia Iglesias  
Universidad Autonoma de Madrid

26/01/2021

Mónica Mediavilla Supe

*Biosensores para la determinación de biomarcadores basados en nanoestructuras 3D de carbono*

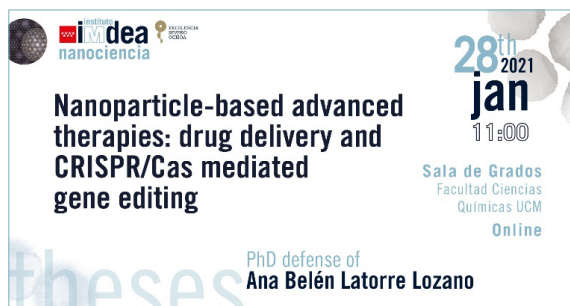
Supervisor(s): Encarnacion Lorenzo and Mónica Revenga-Parra  
Universidad Autonoma de Madrid

28/01/2021

Anabel Latorre Lozano

*Nanoparticle-based advanced therapies: drug delivery and CRISPR/Cas mediated gene editing*

Supervisor: Álvaro Somoza  
Universidad Complutense de Madrid



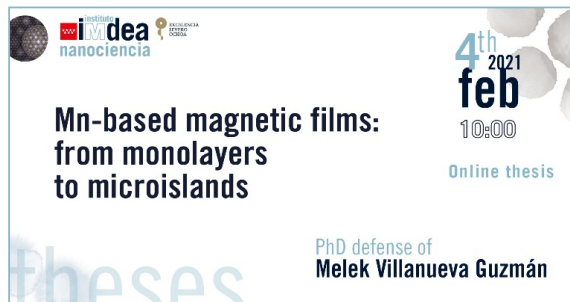
28<sup>th</sup> 2021  
jan  
11:00  
Sala de Grados  
Facultad Ciencias  
Químicas UCM  
Online  
PhD defense of  
Ana Belén Latorre Lozano

04/02/2021

Melek Villanueva Guzmán

*Mn-based magnetic films: from monolayers to microislands*

Supervisors: Alberto Bollero and Cristina Navío  
Universidad Autónoma de Madrid



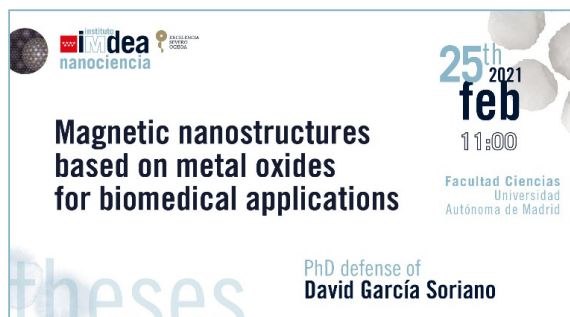
4<sup>th</sup> 2021  
feb  
10:00  
Online thesis  
PhD defense of  
Melek Villanueva Guzmán

25/02/2021

David García Soriano

*Magnetic nanostructures based on metal oxides for biomedical applications*

Supervisor: Gorka Salas  
Universidad Autónoma de Madrid



25<sup>th</sup> 2021  
feb  
11:00  
Facultad Ciencias  
Universidad  
Autónoma de Madrid  
PhD defense of  
David García Soriano



26/02/2021

Lucía Palomino Ruiz

*Síntesis y estudio de las propiedades de compuestos poli aromáticos orgánicos de interés en electrónica molecular*

Supervisor: Teresa González

Universidad de Granada

PhD defense of  
**Lucía Palomino Ruiz**

26<sup>th</sup>  
2021  
**feb**  
10:30  
Online defense

Síntesis y estudio de las propiedades de compuestos poli aromáticos orgánicos de interés en electrónica molecular

theses

09/07/2021

Pablo Casado Aguilar

*Growth and characterization by scanning tunneling microscopy of transition metal ditellurides*

Supervisors: Amadeo L. Vázquez de Parga and Manuela Garnica

Universidad Autónoma de Madrid

PhD defense of  
**Pablo Casado Aguilar**

9<sup>th</sup>  
2021  
**jul**  
11:00 CEST  
Online defense

Growth and characterization by scanning tunneling microscopy of transition metal ditellurides

theses

18/03/2021

Luis M. Mateo De Doni

*Novel Electron Acceptors and On-surface Synthesis of Porphyrin-Based Nanostructures*

Supervisors: Giovanni Bottari and Tomás Torres

Universidad Autónoma de Madrid

PhD defense of  
**Luis M. Mateo De Doni**

18<sup>th</sup>  
2021  
**mar**  
11:30  
Online defense

Novel electron acceptors and on-surface synthesis of porphyrin-based nanostructures

theses

16/07/2021

Veronica García Vegas

*Nanoscale coordination polymers with molecular recognition. From nanocarriers and selective separations to 3D printing*

Supervisor: Félix Zamora

Universidad Autónoma de Madrid

22/07/2021

Leticia de Melo Costa

*Exchange coupling effects in hybrid Gr-4f-3d systems*

Supervisor: Paolo Perna

Universidad Autónoma de Madrid

PhD defense of  
**Leticia de Melo Costa**

22<sup>th</sup>  
2021  
**jul**  
11:00 CEST  
Online defense

Exchange coupling effects in hybrid Gr-4f-3d systems

theses

26/03/2021

Arturo Sopena Moros

*Study of relativistic effect in non-linear interaction between molecules and XUV/soft X-ray short laser pulses*

Supervisor(s): Fernando Martín and Henri Bachau

Universidad Autónoma de Madrid

01/06/2021

Giulia Lavarda

*Synthesis and properties of subphthalocyanine-based systems for solar energy conversion*

Supervisor(s): Tomas Torres

Universidad Autónoma de Madrid



24/09/2021

Alejandra Jacobo Martín

*Functional structures surfaces scaled up via roll-to-roll nanoimprint lithography*

Supervisor(s): Isabel Rodríguez and Jaime Hernández

Universidad Carlos III de Madrid

24/09/2021

Tae Kyu Choi

*Ultrafast Dynamics in Light-Harvesting Molecules with Optical and X-ray Spectroscopies*

Supervisor(s): Prof. Wojciech Gawelda, Prof. Gabriel Bester

29/09/2021

Pablo Olleros Rodríguez

*Skyrmion Stabilization and Non-Equilibrium Nucleation Routes in Ultrathin Cobalt-Based Magnetic Trilayers*

Supervisor(s): Paolo Perna

Universidad Autónoma de Madrid

14/10/2021

Sonia Infante Tadeo

*Reversible Activation Dynamics of Tethered Osmium(II) Half-Sandwich Complexes for Biological Application*

Supervisor(s): Ana Pizarro

Universidad Autónoma de Madrid

15/11/2021

Rama Prajapati

*Albumin-based nanocarriers for cancer therapy*

Supervisor(s): Dr. Álvaro Somoza

Universidad Complutense de Madrid

16/11/2021

Daniel Moreno Cerrada

*Engineering electronic and magnetic properties of surface-confined lanthanide-directed metal-organic networks*

Supervisor(s): Prof. David Écija

Universidad Autónoma de Madrid

24/11/2021

Marco Ballabio

*THz spectroscopy of semiconductors and their interfaces*

Supervisor(s): Prof. Mischa Bonn and Dr. Enrique Cánovas

University of Amsterdam, The Netherlands

16/12/2021

Eduardo García

*Multi-functionalized gold nanoparticles for the delivery of biomolecules*

Supervisor(s): Dr. Álvaro Somoza

Universidad Autónoma de Madrid



## 5. Master

05/05/2021

**Cristina Sánchez**

*Adding nanothermometers to nanoparticles*

Supervisor(s): Sebastián Thompson

15/06/2021

**Harsha Vardhan Raja**

*Silicon nanowire device self-assembly via automated control dielectrophoresis*

Supervisor(s): Julio Camarero and Daniel Granados

20/06/2021

**Arturo Rodríguez Sota**

*Implementing AC modes for simultaneous conductance and thermopower measurements using STM*

Supervisor(s): Nicolás Agrait

07/07/2021

**María Cantero Gil**

*Síntesis química de nanopartículas magnéticas con potenciales aplicaciones en terapia y diagnóstico médico*

Supervisor(s): Gorka Salas

09/07/2021

**Carmen Pérez de la Lastra**

*Caracterización de exovesículas y agregados proteicos en modelos celulares de pacientes de ELA*

Supervisor(s): Valle Palomo and Ana Martínez

17/07/2021

**Fco. Javier Castillo Tortosa**

*Global and local characterization of the thermal capacity of magnetic and photo-activated nanomaterials for cancer treatments (Supervisor: Ana Espinosa)*

Supervisor(s): Julio Camarero

19/07/2021

**Huixuan Kang**

*Doxorubicin (DOX) and superparamagnetic iron oxide nanoparticles (SPIONs)-loaded lipid nano-formulations for mild magnetic hyperthermia and controllable drug release as a potential cancer therapy*

Supervisor(s): Ana Espinosa and Celia Sousa

01/09/2021

**Elena Pérez Elvira**

*Study of thiophene-containing  $\pi$ -conjugated polymers synthesized on metal surfaces via scanning tunneling microscopy"*

Supervisor(s): Dr. José I. Urgel

**Shanmugasibi Kottapalayam Mathialagan**

*Topography and electronic characterization of a negatively curved nanographene self-assembled on a metal surface*

Supervisor(s): Prof. David Écija

06/10/2021

**Marina Paris**

*Estudio de la respuesta plasmónica de nanopartículas metálicas en diferentes entornos para aplicaciones biomédicas*

Supervisor(s): Ana Espinosa and Dr. Aida Serrano

09/10/2021

**Juan David Cortes**

*Desarrollo de termometría a escala nanométrica mediante técnicas espectroscópicas de rayos X: diseño experimental y análisis de datos*

Supervisor(s): Dr. Ana Espinosa and Dr. Álvaro Muñoz Noval

**Juan José Velasco Horcajada**

*Theoretical modeling and fabrication of a thermal probe for STM*

Supervisor(s): Nicolás Agrait



## 6. Degree

05/01/2021

Clara Garcia-Abad

*Nuclear activity using anisotropy-based nanosensors*

Supervisor(s): Sebastián Thompson

06/01/2021

Ruth Sánchez

*Developing anisotropy-based nanothermometers*

Supervisor(s): Sebastián Thompson

03/06/2021

Amalia Coro

*Termometría de luminiscencia en medios biológicos*

Supervisor(s): Beatriz Hernández Juárez

María José de Vicente Cañellas

*Nanopartículas para aplicaciones biomédicas: comportamiento y localización en el entorno celular*

Supervisor(s): Beatriz Hernández Juárez

14/06/2021

Laura Cristina Alonso Pardo

*Towards probing protein conformation change via hysteresis measurements*

Supervisor(s): Prof. Stefan Eisebitt and Francisco J. Teran

06/10/2021

David Marqués García

*Transporte cuántico a través de átomos, moléculas y nanoestructuras*

Supervisor(s): Nicolás Agrait

Irene Forcada Casares

*Caracterización del transporte cuántico en uniones metálicas de oro mediante microscopía de efecto túnel*

Supervisor(s): Nicolás Agrait

09/10/2021

María José de Vicente

*Nanopartículas para aplicaciones biomédicas: comportamiento y localización en el entorno celular*

Supervisor(s): Ana Espinosa and Dr. Álvaro Muñoz Noval





## 7. Scientific Conferences (co-organized)

20/01/2021

*International Workshop "SARS-CoV-2: Online Meeting on Detection Systems"*

RNA\_NanoTest project

<http://nanociencia.imdea.org/home-en/events/item/5iws>

5<sup>th</sup> international workshop on  
**SARS-CoV-2:  
 Online Meeting on  
 Detection Systems**

20<sup>th</sup> 2021  
**Jan**

Laura Lechuga · Pablo Castán · Arbën Merkoçi · Melanie Ott

Logos: imdea nanociencia, SEVERO OCHOA INTERNATIONAL WORKSHOP SERIES, EXCELENCIA SEVERO OCHOA, UCSF, MIRNAX, ICN2, European Union, Spanish Government, and others.

10/06/2021

*XFEL workshop: Scientific Opportunities for the Spanish Community at XFELs*

<https://nanociencia.imdea.org/xfel-workshop-2021/>

**XFEL**  
 workshop

10-11<sup>th</sup> june 2021

Scientific Opportunities  
 for the Spanish Community at XFELs

Logos: UAM, CSIC, imdea nanociencia, UAM, European Union, Spanish Government, and others.

30/06/2021

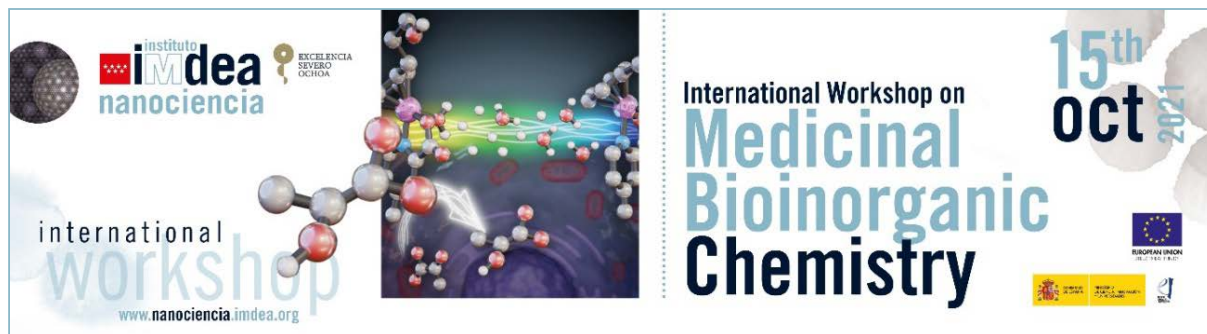
*1st meeting Excellence Network RED-MODE Photovoltaics*

RED  
**mode**  
 fotovoltaica

15/10/2021

*International Workshop on Medicinal Bioinorganic Chemistry*

<https://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/international-workshop-on-medicinal-bioinorganic-chemistry>



16/11/2021

*A Versatile FIB-SEM Nanofabrication Instrument and its Applications in Nanoscale Science and Engineering*

<https://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/a-versatile-fib-sem-nanofabrication-instrument-and-its-applications-in-nanoscale-science-and-engineering>



01/12/2021

*11th Early Stage Researchers Workshop ESRW*

<https://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/11esrw>

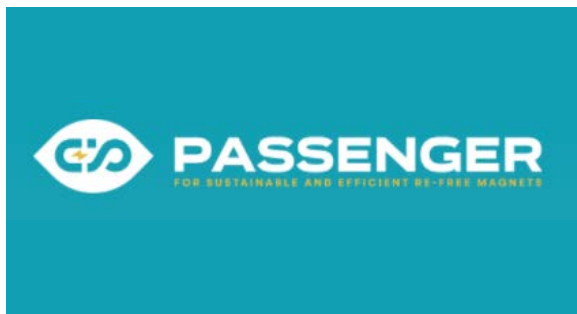




## Kick OFF Meeting Passenger

24-25th November 2021

IMDEA Nanociencia



PASSENGER at the Raw Materials Week - Passenger (passenger-project.eu)

## 8. Alumni Programme events

25/06/2021

Career prospects with Belén Nieto Ortega

<https://youtu.be/S9InThlevUM>



**Dr. Belén Nieto-Ortega**  
 DSM (Switzerland)

**Career prospects series**

**25<sup>th</sup> jun 2021**  
 Friday  
 12:30 CET

#BeyondPhD

25/06/2021

Career prospects with Christin David



**Dr. Christin David**  
 Friedrich-Schiller-Universität Jena (Germany)

**Career prospects series**

**18<sup>th</sup> oct 2021**  
 Monday  
 13:00 CEST

#BeyondPhD

## 9. Collaborations with top Research Institutions

To increase our external collaborations (both national and international) we have supported our researchers at all levels to carry out placements in research institutes and industry >90 mobility months have been accumulated (incoming/outgoing) -funded by the SO, ERASMUS, EMBO etc. Some notable collaborations that have started this year are highlighted below



Collaboration between D Granados and R J Young (Programme 5)



Equipment Development Agreement between F J Terán and T Pellegrino (Programme 3)



Group of E Canovas has become an official Max Planck Partner Group, work will focus on a subclass of graphen-like 2D metal organic frameworks (Programme 1)



D Granados DEFROST Project (Programmes 1, 4, 5)



Strategic Alliance (Programmes 1, 4, 5)



Collaboration agreement between the European XFEL and IMDEA Nanociencia





## 10. Other collaborations



CENTRO ESPAÑOL DE METROLOGÍA (CEM) – A framework agreement was signed with IMDEA (issued in the BOE 30 March 2020). This agreement is focus in the areas of R&D, measurement methods and metrological traceability, education and outreach in Metrology. Thanks to this approach to CEM, IMDEA Nanociencia is participating in projects and proposals of EURAMET (the European Association of National Metrology Institutes) and its initiative EMPIR (European Metrology Programme for Innovation and Research) an initiative co-funded by the Horizon 2020 and the EMPIR participating states. EMPIR coordinates research projects to address grand challenges, while supporting and developing the SI system of measurement units.

### NATO

Dr. Héctor Guerrero was selected in June 2020 by Secretary General of the North Atlantic Treaty Organization (NATO) as one of the twelve members of the high level Advisory Group on Emerging and Disruptive Technologies. His nomination was proposed by Spanish Ministry of Defence. The principal role of the Advisory Group will be to provide insights, advice and help challenge NATO approach on Emerging and Disruptive Technologies.



## 6. High-quality research infrastructure

### 1. Center for nanofabrication

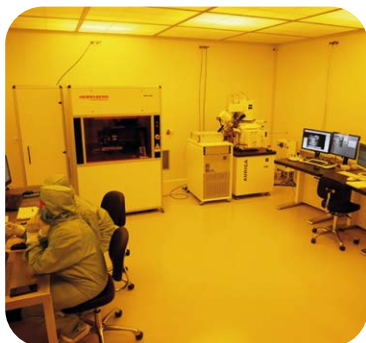


The Centre for Nanofabrication is a joint proposal between the IMDEA Nanociencia and Campus of Excellence UAM+CSIC to create a facility of excellence for the fabrication of nanostructures and devices based on a wide range of nanosciences. The manufacturing of such nanostructures and devices is crucial for fundamental research, but also for the development of prospective nanotechnologies with commercial applications. The Centre for Nanofabrication is hosted in a latest generation clean room, with more than 200m<sup>2</sup> of clean room surface and more than 500m<sup>2</sup> in total,

including the technical gray area. The clean room is divided in two main areas. The smaller section is approximately 60m<sup>2</sup> and has a certified air quality of ISO-5 (Class-100). This section is devoted to lithography processes. It is equipped with electron beam Lithography (e-Beam), Focused Ion Beam Lithography (FIB), Gas Assisted Ion/Electron beam lithography (Multi-GIS), Mask-less Optical lithography and Nano-Imprint Lithography. This section is also equipped with a small wet chemistry room for all the processes related to nano and micro lithography. The largest section of the clean room is about 140m<sup>2</sup> and has a certified air quality of ISO-6 (Class-1000). This part is dedicated to sample and device processing. It is equipped with several thin film evaporators (Thermal, eBeam), an unique Atomic Layer Deposition (ALD), inductively Coupled Plasma Reactive Ion etching (ICP-RIE) for deep cryo etching, Reactive Ion Etching for Metals and Insulators (RIE), Rapid thermal Processor (RTP), Profilometer (Dektak), Plasma Cleaner, Ozone Cleaner, Optical Micros-

copy, Wire Bonder, Diamond Scriber, Probe Satiation and Parameter analyzer. This section is also equipped with an encapsulation room and a large wet chemistry room.

The Centre for Nanofabrication provides the researches and users within the Cantoblanco campus of the UAM and in the framework of the Campus of Excellence project, with an efficient access to the necessary nanofabrication resources to be internationally competitive. Since IMDEA Nanociencia is an institute created and financed jointly by the regional Government of Madrid and the Government of Spain, the Centre for Nanofabrication is intentionally planned to be able to provide under demand services of nanofabrication to researchers of public institutions as well as to private companies.



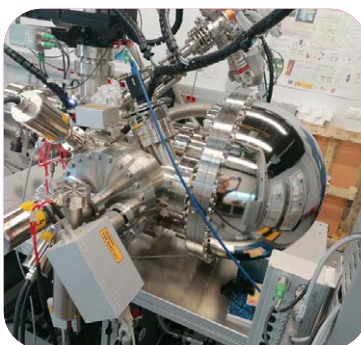


## 2. New infrastructure

New infrastructure and equipment are being geared in the direction of accomplishing world leading research and discoveries in Nanoscience and Nanotechnology, creating and reinforcing the different research programmes by implementing unique facilities and making them available to the scientific community.

This is highlighted by the following scientific infrastructures:

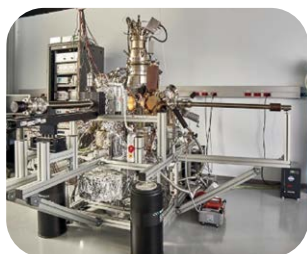
- The spin-ARPES (spin & Angle Resolved Photoemission Spectroscopy) system, which was installed in December 2020, has successfully commissioned during 2021 (P2 and P4). This equipment, unique in Spain, permit the characterisation of the electronic structure of spin polarised bands in surfaces and interfaces.
- The UHV e-beam evaporator installed in the centre of nanofabrication as part of our framework collaboration with UAM, and partially funded by a National Infrastructure Grant, has successfully commissioned during the first semester 2021 and now is available in the instrument's portfolio of the Center for Nanofabrication (all programs).
- The new closed-circuit helium cryostat with ultra-low vibrations for optoelectronic characterisation (AttoDry800) is operative since March 2020.
- We have also continued to reinforce the other research programmes including the following cross-disciplinary laboratories: a non-contact new STM laboratory in UHV at cryogenic temperatures has been installed as part of Dr. Ecija's ERC Project (P2) (CoG -ELECNAO), now in commissioning.



- Cell Culture and Microbiology Unit expansion to now host two laboratories working under BioSafety Level 2 are fully operative since beginning 2021. Enabling in-house projects and encouraging transversal transfer of knowledge between programmes (P3, P4, and P5) potentiating external collaborations.
- Laboratory for PhotoHyperthermia AECC seed funding is assisting in the set-up of this unique facility (P3, P4 A. Espinosa).
- A new laboratory focused on nanoparticles and chemical biology has been set-up during second semester 2021 (P3 V. Palomo). The Biosensors in Neuroscience lab aims at developing tools to help find those drugs with the potential of making a difference in the treatment of rare and devastating neurodegenerative diseases, in particular amyotrophic lateral sclerosis (ALS), that currently lacks of effective therapy.
- Two complete laboratories associated with strategic projects of the institute have been implemented: Nanocore (P1) y Passenger (P6)



### 3. RedLab – Network of laboratories of the Regional Government of Madrid



**278**  
Laboratory of Surfaces  
Contact: F. Calleja



**279**  
Laboratory of Advanced Optical Characterization  
Contact: J. Cabanillas



**280**  
Laboratory of Femtosecond Spectroscopy  
Contact: L. Lüer



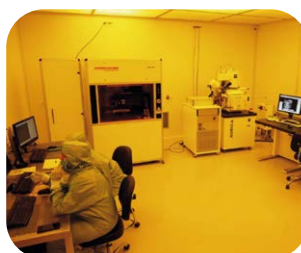
**282**  
Laboratory of Nanomagnetism  
Contact: P. Perna



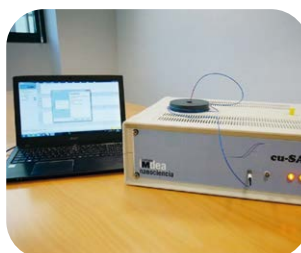
**293**  
Laboratory of Atomic Force Microscopy  
Contact: C. Flors



**349**  
Laboratory of Cell Cultures  
Contact: A. Pizarro



**363**  
Laboratory of Nanofabrication  
Contact: D. Granados

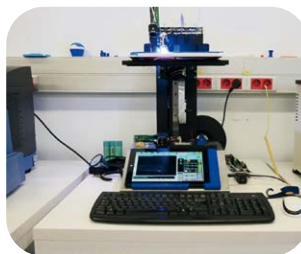


**398**  
Laboratory of the Instrumentation Service  
Contact: F. Terán



**416**  
Laboratory of Molecular Motors Manipulation

Contact: B. Ibarra



**436**  
Laboratory of Processing and Characterization of Multifunctional Materials

Contact: E. Palmero



**417**  
Laboratory of Oligonucleotides and Modified Particles

Contact: Á. Somoza



**438**  
Laboratory of Biomolecules Preparation for Nanotechnological Applications

Contact: B. Sot



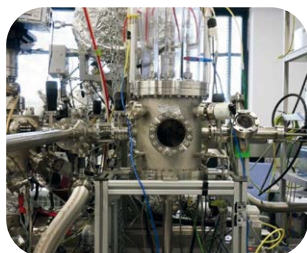
**432**  
Laboratory of Nanostructured Functional Surfaces

Contact: I. Rodríguez



**441**  
Laboratory of Photovoltaic Energy

Contact: A. Molina



**433**  
Laboratory of Catalytic Surfaces Spectroscopy in Controlled Atmosphere

Contact: M. A. Niño



**447**  
Laboratory of Electromagnetic Trials in silico

Contact: D. Ortega



**435**  
Laboratory of Nanomaterials Characterization

Contact: Y. Luengo

## 7. Awards and honours

**Embajador del Madrid  
Convention Bureau 2020  
Rodolfo Miranda**



<https://www.comunidad.madrid/noticias/2021/11/05/comunidad-madrid-concede-i-premio-margarita-salas-cientificos-vallet-san-millan#:~:text=El%20Premio%20Miguel%20Catal%C3%A1n%20a,40%20a%C3%B1os%20a%20Alejandro%20Gonz%C3%A1lez>

<https://www.europapress.es/madrid/noticia-cientificos-maria-vallet-alvaro-san-millan-consiguen-premio-margarita-salas-20211105144703.html>

<https://www.uam.es/uam/noticias/catedratico-uam-rodolfo-miranda-premio-investigacion-miguel-catalan-2021>

17/05/2021

**Acto de entrega de los Premios Nacionales  
de Investigación 2020  
Nazario Martín**

Nazario Martín León, académico de número de Real Academia de Ciencias Exactas, Físicas y Naturales



<https://www.youtube.com/watch?v=PTwnrLNWnT4>

<https://tribuna.ucm.es/news/nazario-martin-leon-academico-de-numero-de-real-academia-de-ciencias-exactas-fisicas-y-naturales>



07/04/2021

**Ana Carrasco**

*Group of Ana Pizarro*

**Best publication awards 2020 to young members of the AEBIN**

Spanish Association of Bioinorganic Chemistry



03/06/2021

**Carla Muñoz**

*Group of Alberto Bollero*

**Young Researcher Award at the 2021 E-MRS Spring Meeting**

European Materials Research Society



01/07/2021

**Patricia Bondia**

*Group of Prof. Cristina Flors*

**3rd Prize in "Your research in one image or 1000 words"**

Científicos españoles en Bélgica (CEBE)



25/10/2021

**Julia Villalva**

*Group of Emilio Pérez*

**Best PhD Thesis 2020**

GENAM - Nanoscience and Molecular Materials Group of the Spanish Royal Society of Chemistry RSEQ



31/05/2021

**Ana Arché**

*Group of María Teresa González Pérez*

**Young Researcher Award**

E-MRS 2021 Spring Meeting

01/12/2021

**Ana Arché**

*Group of María Teresa González Pérez*

**Best Oral Communication Award**

11th Early Stage Researchers Workshop in Nanoscience

15/09/2021

**Vanesa Nozal**

*Group of Valle Palomo*

**Premio ALMIRALL, S.A.**

XX Convocatoria de Premios de la Sociedad Española de Química Terapéutica

07/10/2021

**Vanesa Nozal**

*Group of Valle Palomo*

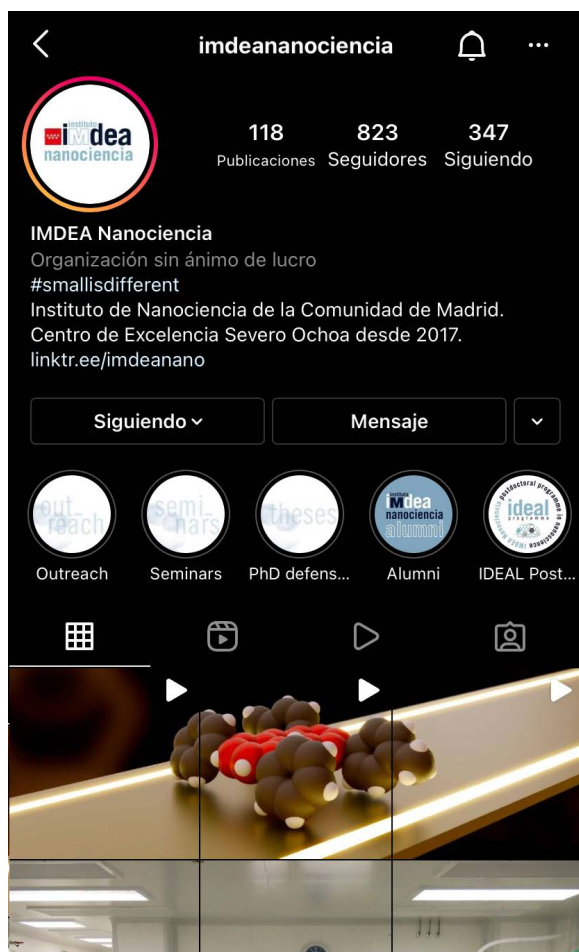
**Áccesit Best Communication**

5th Call PhDay Complutense (EDUCM)  
Universidad Complutense de Madrid, Spain

## 8. Communication and Outreach

### IMDEA Nanociencia on Instagram!

Easier access for students to videos/virtual tours.  
Virtual exhibition of journal covers #IMDEANanoPics



### Virtual Lab tours

Part of Nanociencia para todos, allows continuity with our visits and keeps Institute commitment to “open-doors”.



### Nanociencia para todos



*Nanociencia para Todos* is the outreach programme of IMDEA Nanociencia. We believe that one of our duties is to contribute to the creation of links between Science and Society in our region. For this purpose, through this programme, *Nanociencia para Todos*, we showcase the Nanoscience directly from our labs.





# Nanociencia to-go



This programme is aimed at educational centres for the older generations. It consists in live or online tours with “take-away” experiments –supported by videos (science at home). 22 students of the Universidad de Mayores Rey Juan Carlos (URJC) participated in an organized tour at IMDEA Nanociencia on February 26th. On November 23th an online tour took place.

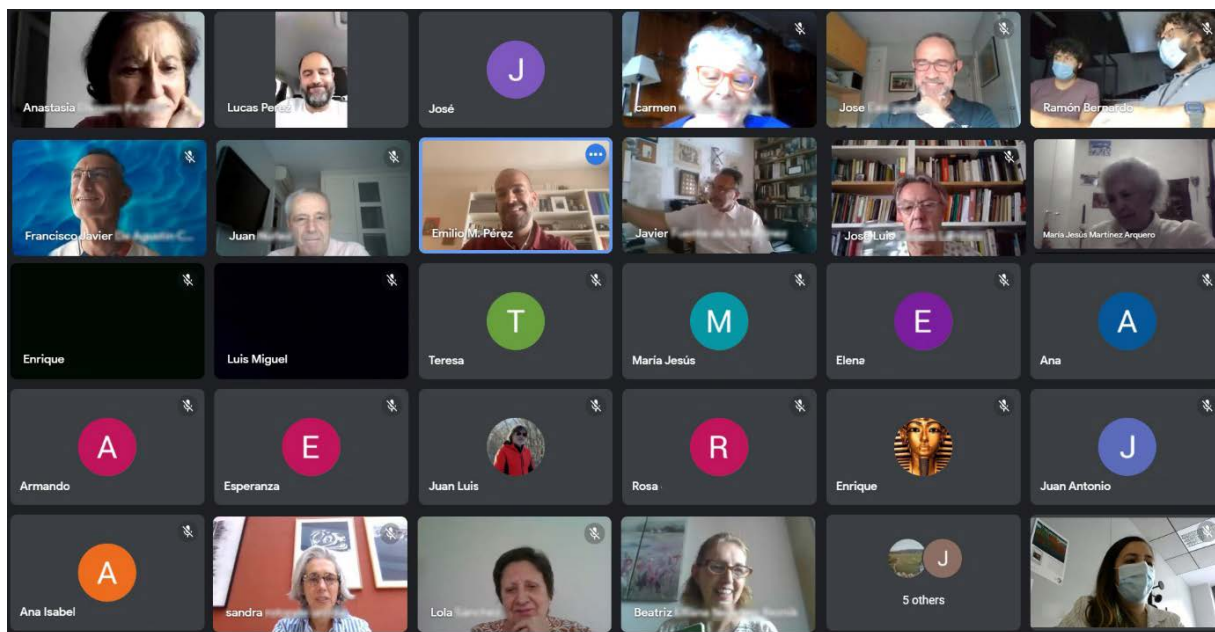
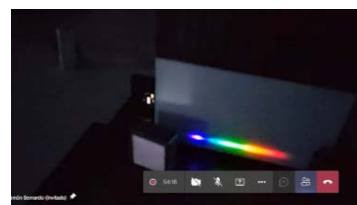
## Un experimento de premio Nobel



## Difracción de la luz y color



## El atardecer en un vaso de agua



Online workshop for the older students (80 attendees) from Universidad Autónoma de Madrid

## Nanociencia entretenida




**"Nanociencia entretenida"** es una actividad lúdica de divulgación y fomento de la cultura científica, que hace uso del tiempo libre de los mayores con la colaboración de las residencias. La actividad pretende acercar la Nanociencia a los mayores institucionalizados y, a la vez, diversificar la oferta de actividades que se les ofrece habitualmente.

El equipo de divulgación del proyecto se desplazará a las residencias para desarrollar *días de la ciencia* en los que se visualizarán películas, habrá espacio para debates y visitas virtuales a las instalaciones de IMDEA Nanociencia. Además se entregarán kits de experimentos, materiales atractivos y recursos que puedan utilizar posteriormente.

El Instituto Madrileño de Estudios Avanzados (IMDEA) en Nanociencia es un Centro de Investigación de Excelencia Severo Ochoa constituido por iniciativa de la Comunidad de Madrid en 2006, en el que se investiga Nanociencia fundamental, en conexión con industrias innovadoras en el campo de la Nanotecnología.

el instituto  
**IMDEA**  
nanociencia

acerca  
**la ciencia a los mayores**

en colaboración con



## Semana de la Ciencia y la Innovación 2021

02/11/2021

Visita del Colegio Alameda de Osuna





Nazario Martín

Encuentro en torno al conocimiento y la creatividad ante los grandes retos globales - Evento de apertura de la Semana de la Ciencia y la Innovación en el Instituto Cervantes

https://www.semanacienciamadrid.org/actividad/encuentro-en-torno-al-conocimiento-y-la-creatividad-ante-los-grandes-retos-globales



Tecnologías Inspiradas en la Naturaleza: Taller de Nanotecnología y Computación Bacteriana, en la Universidad Complutense de Madrid.

https://www.semanacienciamadrid.org/actividad/tecnologias-inspiradas-en-la-naturaleza-taller-de-nanotecnologia-y-computacion- https://www.madridiario.es/comienza-semana-ciencia-innovacion-40-municipios-region

# Noche Europea de los Investigadores

24/09/2021

Noche Europea de los Investigadores - Y tu, ¿qué haces por mejorar el planeta? - Actividad conjunta de los institutos IMDEA en la Residencia de Estudiantes

http://www.madrimasd.org/lanochedelosinvestigadores/actividad/imdea-software-que-haces-tu-por-mejorar-el-planeta?lan=es



Noche Europea de la Investigación en Caixa Forum Madrid (Fundación la Caixa)

https://caixaforum.org/es/madrid/p/feria-de-la-investigacion\_a35594395

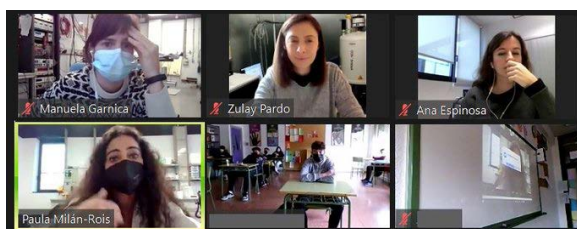


# 1. Exhibitions

## Día Mujer y Niña en la Ciencia 11F

Online meeting

<https://11defebrero.org/2020/12/15/acercate-a-la-nanociencia-lo-pequeno-es-diferente-3/>



## Festival 10alamentos9 – Taller online para los alumnos de 5º de primaria del CEIP Santo Domingo (40 asistentes) - online

[https://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/festival-10alamentos9?category\\_id=47](https://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/festival-10alamentos9?category_id=47)



12/04/2021

## Vermú de Nanociencia - ciclo de charlas de divulgación online de la red 10ALAMENOS9

<http://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/vermu-de-nanociencia>

Jorge González - Modos de galería susurrantes

Sergio Revuelta - Capturando el movimiento ultrarrápido

Saül Garcia Orrit - Cómo adivinar si alguien nos quiere envenenar

Cristina Martín Fuentes - Más allá del microscopio óptico: ¿Hasta dónde hemos llegado con la microscopía?





## 2. Appearances in TV/radio

25/02/2021

**Telediario 21 horas RTVE**

RNA\_NanoTest project

<https://www.rtve.es/alacarta/videos/telediario/21-horas-25-02-2021/5804322/?t=26m31s>

12/03/2021

**Telediario - 15 horas RTVE**

RNA\_NanoTest project

<https://www.rtve.es/alacarta/videos/telediario/15-horas-12-03-2021/5817217/?t=38m48s>

17/05/2021

Acto de entrega de los Premios Nacionales de Investigación 2020

<https://www.youtube.com/watch?v=PTwnrLNWnT4>



25/05/2021

Alberto Bollero sobre el proyecto PASSENGER en “Hoy por Hoy Madrid” de Cadena Ser

**PASSENGER project**

[https://play.cadenaser.com/audio/ser\\_madrid\\_hoyporhoymadrid\\_20210525\\_122003\\_140000/](https://play.cadenaser.com/audio/ser_madrid_hoyporhoymadrid_20210525_122003_140000/)

10/11/2021

SER Las Palmas - Divulgando Ciencia para conocer la nanotecnología de frontera y combatir los bulos - Pura Ciencia con el profesor de la Universidad de La Laguna, Jorge Méndez - Sección de divulgación científica en HxH El Drago sobre la nanotecnología del carbono con el premio nacional de Química, Nazario Martín

<https://play.cadenaser.com/audio/081RD01000000059710/?ssm=whatsapp>

## 3. Video/film/podcast

17/05/2021

Nazario Martín, Premio Nacional de Investigación 2020 en Ciencia y Tecnología Químicas

<https://www.youtube.com/watch?v=9nvSdhvBy0U>

24/05/2021

**Paco Guinea**

“La materia en dos dimensiones” – Vídeos de ACIERTAS, proyecto de Aprendizaje de las Ciencias promovido por la COSCE.

<https://www.youtube.com/watch?v=qLmsLdy3BJE>

28/06/2021

**Rodolfo Miranda**

Cienciando #52: IMDEA Nanociencia, programa de la Asociación Española para el Avance de la Ciencia AEAC

<https://www.youtube.com/watch?v=a-2GWPgjj8>

01/07/2021

Promotional video IDEAL Postdoctoral Programme

<https://www.youtube.com/watch?v=qVkWFO7YvR8>



## 9. Projects Offices

### Competitive Projects Office (CPO)

CPO works to promote the participation of the researchers in funding programmes to develop ambitious, innovative and high-quality research.

#### FOCUS 1: VISIBILITY

- Monthly Internal Newsletter
- Factsheets & Tools
- Training (*Skills development support programme*)
- Research Projects Office Web page



#### FOCUS 2: TALENT ATTRACTION

The CPO engages in talent attraction campaigns to recruit outstanding researchers:

- CPO-led initiatives (CO-FUND, ITN, large consortium)
- Open-Training
- *Expressions of interest* ERC



# ideal programme

IMDEA Nanociencia postdoctoral programme in nanoscience

## IDEAL

### IMDEA Nanociencia Postdoctoral Training Programme in Nanoscience (FP)

H2020-MSCA-COFUND-2020

First Call launched July 2021

**IDEAL Postdoctoral Programme** @idealfund · Sep 23, 2021

🕒 One week left!

Is your application to the @idealfund Postdoctoral Programme ready?

Be prepared to submit it before the call deadline 📅 30th Sept. 2021.

👉 [idealfund-project.eu/apply/](https://idealfund-project.eu/apply/)



124 views 0:01 / 0:57

**IDEAL Postdoctoral Programme** @idealfund · Jul 19, 2021

Looking for an exciting #postdocjob? @IMDEA\_Nano seeks motivated researchers in the field of #Nanoscience to join the IDEAL Programme.

👁️ Take a look to the topics: [idealfund-project.eu/research-topics](https://idealfund-project.eu/research-topics)

#energyconversion #ultrafastphenomena #bioelectronics #metalprinting #hightarvesting



MarieSkłodowskaCurie and 7 others

22 26

**IDEAL Postdoctoral Programme** @idealfund · Jul 14, 2021

IDEAL is the Postdoctoral Programme in #Nanoscience of @IMDEA\_Nano.

The call for applications is open. Apply now for a postdoc in Spain, see the research topics at [idealfund-project.eu](https://idealfund-project.eu)

Supported by the @MSCAactions #COFUND. #mscajobalert #postdocjobs



madrimsd and 8 others

1 15 21

**Euraxess India** @EuraxessIndia · Jul 6, 2021

An ideal #postdoc #fellowship is awaiting researchers in nanoscience at the @Fundación IMDEA Nanociencia in #Spain

The MSCA-Cofund project #IDEAL is offering 6 postdoc positions in the field of nanoscience.

More information 📄 [bit.ly/3hIGtZX](https://bit.ly/3hIGtZX)

1 8 10

**IMDEA Nanociencia** @IMDEA\_Nano · Jul 1, 2021

IDEAL is the Postdoctoral Fellowships Programme of IMDEA Nanociencia. @idealfund #MSCA #COFUND

📺 [youtube.com/watch?v=qVkwFO...](https://youtube.com/watch?v=qVkwFO...)

Apply now:

[idealfund-project.eu](https://idealfund-project.eu)  
IDEAL Programme - IDEAL COFUND

14 22

**IMDEA Nanociencia**

6<sup>th</sup>, 8<sup>th</sup> & 10<sup>th</sup> sep 2021

## How to write a successful MSCA Postdoctoral Fellowship

online sessions



**FOCUS 3: ASSISTANCE**

---

- Active Funding identification
- Proposal Revision Service
- Support service to find partners
- Projects Report Service
- Innovation-based proposal (EIC)



**FOCUS 4: SUSTAINABILITY**

---

Europa Redes y Gestores - Europa Centros Tecnológicos

**IM-PULSA**

Plan estratégico para el impulso de la participación de IMDEA Nanociencia en Horizonte Europa (IM-PULSA)

Ref.: ECT2020-000746

From: 2021-2022

Principal Investigator: **Dr. M.J.Villa** (Projects, Communication and Research Support Offices)

**Research Support Office (RSO)**



RSO, launched in 2019, centralizes and enhances human resources services to support research staff and their career development.

**FOCUS 1**

---



HR EXCELLENCE IN RESEARCH

Final Phase of the HRS4R procedure to obtain the HR Excellence in Research award

03/01/2022

The European Commission granted IMDEA Nanociencia the "HR Excellence in Research" award

**FOCUS 2**

---

Support talent attraction through personal assistance with emphasis on international staff.

**Actions:**

Personal assistance for researchers

Creation of specific informative content for different profiles



# 4

## research focus

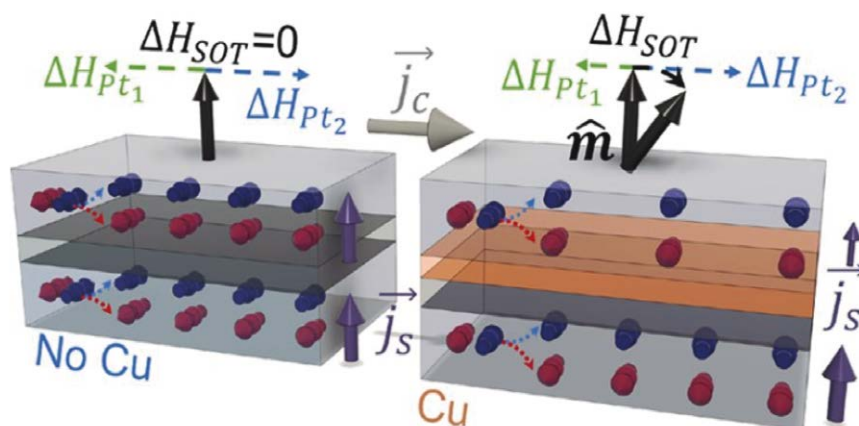
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1. **Research Highlights** [157]
2. **Projects** [161]



# 1. Research Highlights

## A promising approach to spintronic devices based on cheap and abundant materials



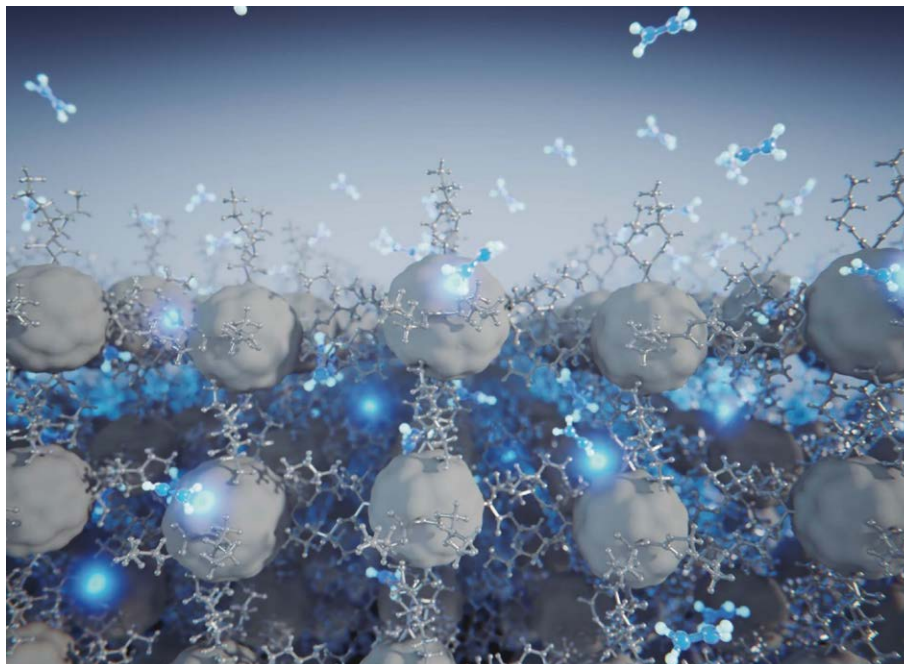
The latest advances in spintronics are based on nanometric thin film structures with perpendicular magnetic anisotropy in which the spin currents are used to produce changes in the magnetization of a magnetic layer. This effect is known as spin-orbit torque (SOT) and can be enhanced by suitably engineering multilayer stacks composed by alternated magnetic/non-magnetic metals. The typical structures employed to manipulate the magnetization via SOT are multilayers whose basic constituent is a ferromagnetic layer adjacent to heavy metal(s), which confer large spin-orbit coupling and promote the perpendicular magnetic anisotropy. These systems are the basic elements for spin-orbit torque magnetization switching, used in the next generation of magnetoresistive random access memory (MRAM) devices.

This work published in **ACS Applied Nano Materials** is from the SpinOrbitronics team guided by Dr Paolo Perna observed the emergence of an interfacially enabled increase of the spin-orbit torque when an ultrathin Cu interlayer is inserted between Co and Pt in symmetric Pt/Co/Pt trilayer, in which the effective spin-orbit torque is expected to vanish. The enhancement of SOT is accompanied by a reduction of the spin-Hall magnetoresistance, indicating that the spin memory loss effect in the Co/Cu and Cu/Pt interfaces is responsible of both enhanced SOT and reduction in the spin-Hall magnetoresistance.

The observed enhancement of the spin-orbit torque provides new insight into the interfacial nature of spin currents that can lead to develop more efficient spintronic devices for MRAM spin-orbit torque memories and spin logic using cheap, easy to fabricate, and abundant materials like Cu.

The SOgraphMEM consortium is composed by seven research institutions from four EU countries and is coordinated by Dr Perna looking at the promise of graphene in spintronics. This work is funded by the FLAG-ERA grant SOgraphMEM (funded by AEI Ref. PCI2019-111867), an initiative that aims to create synergies between new research projects and the Graphene Flagship.

## Playing with the weakest supramolecular interactions in a fullerene compound



Controlled reorganization of a fullerene-based compound (grey), purely governed by the weakest van der Waals interactions (dihydrogen) and the entry of small molecules into its interior (hydrazine molecules in blue).

In a chemical reaction, the bonds that stick atoms to each other break and set up to form new compounds. Apart from ionic or covalent bonds, there are also other types of interactions --the weak van der Waals forces-- which can play an essential role in chemical reactions. Controlling these subtle forces in the processes of molecular reorganization through the application of a thermal or chemical stimulus is one of the long pursued goals of Supramolecular Chemistry.

The work published in **Chemical Science** was led by Dr José Sanchez Costa (Switchable Nanomaterials group IMDEA Nano), proposes a novel synthesis strategy based on the controlled reorganization of a fullerene compound, purely governed by the weakest van der Waals forces: the dihydrogen bond.

The authors highlight two outstanding features that make their work particularly original. First, it significantly advances knowledge about dihydrogen binding, also called “sticky fingers”, a type of cumulative interactions found in nature that are responsible for, for example, geckos climbing walls or interactions in cells lipid layers. Secondly, the transformation of the material as a whole is controllable. The application of an external perturbation allows to modify the character of the interactions and to switch the system from one phase to another. Each phase of the material interacts in different ways with external molecules that pass through the “sticky fingers” and give rise to different reactions within the same material.

Specifically, supramolecular reorganization was selectively controlled by an external stimulus: exposure of the crystal to hydrazine vapours (N<sub>2</sub>H<sub>4</sub>). Depending on the material’s phase, hydrazine hydrogens the C<sub>60</sub> ball to a greater or



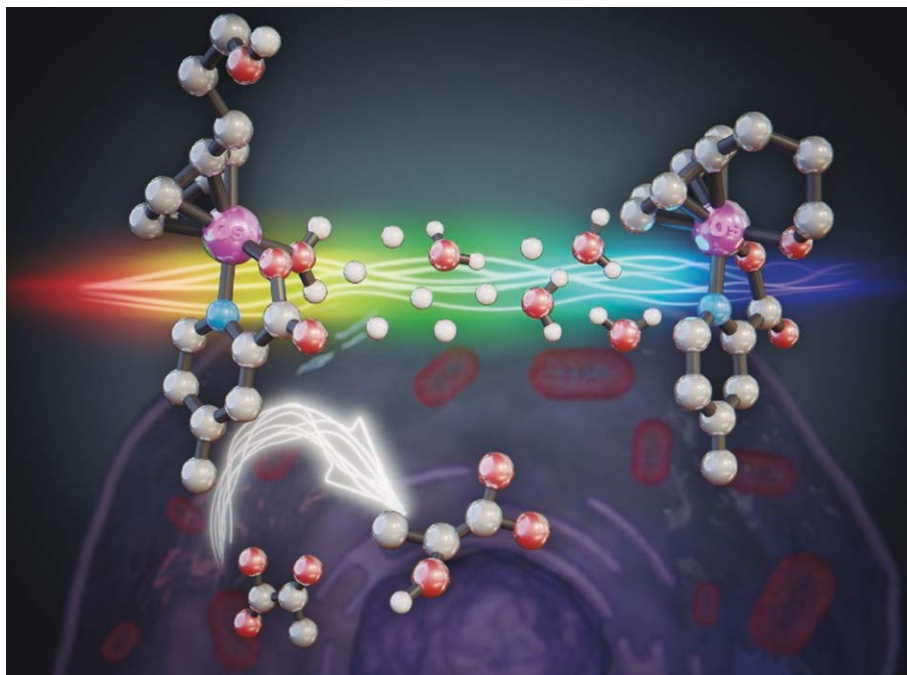
lesser extent. In addition, the monitoring of the reaction through single crystal diffraction allowed the direct observation of molecular movements within the network and the subsequent hydrogenation reaction. This reaction is also accompanied by a colour change of the system from orange to yellow.

Separating the different key supramolecular contributions to the stability of 3D systems is still a major challenge. Therefore, the authors' ability to dictate reorganization in a controlled manner, separating supramolecular contributions, satisfies one of the main targets of Supramolecular Chemistry, and helps to understand the intrinsic nature as well as the chemical reactivity of supramolecular ensembles.

This strategy has allowed for the first time to selectively and in a controlled manner hydrogenate the C60 and may these materials could have potential application in hydrogen storage.

This work was carried out in collaboration with Prof. Nazario Martín (Complutense University of Madrid/IMEDEA Nano) and Carolina Sañudo (University of Barcelona).

## Osmium activation in cancer cells



A new family of osmium compounds with chemical reactivity inside the cancer cell is presented. Aquation promotes reversible tether-ring formation as a “swinging-gate”, stopping the formation of inert osmium species.

Cancer is a complex disease, and as such, there is not just a single method to tackle it. While cancer treatments are evolving towards personalised procedures, in most cases standard chemotherapy treatments are still required. In chemotherapy, platinum drugs such as cisplatin (approved 42 years ago by FDA) are used, killing both cancerous

and healthy cells and causing unwanted side effects. In this regard, there is plenty of room for improvement for clinical treatments.

The Metallodrugs Group at IMDEA Nano, led by Dr Ana Pizarro, focuses on exploiting the peculiar nature of transition metals and the unique types of chemical interactions that these metals can carry out inside the cell. This uniqueness of metal-based drugs, in combination with current knowledge in molecular biology, allows for the development of new compounds for more specific and targeted chemotherapies as a natural step forward.

In their recent **Chemical Science** publication, Pizarro and co-workers study the possibilities of osmium (Os) to modify the cancer cell machinery. These compounds are largely unexplored due to their apparent inertness. The group saw an opportunity to exploit this inertness in order to control their reactivity in the cell. They discovered the unprecedented reactivation of an osmium compound in aqueous solution by introducing in the structure a pendant terminal alcohol that furnishes the complex with an entirely new reactivity profile.

Osmium arenes often generate inactive species due to the acidity of the metal. The Os-OH triggers intramolecular rearrangement culminating in the binding of the pendant oxygen to the metal centre (formation of a closed tethered complex) thus protecting the complex towards irreversible inactivation –the otherwise unreactive osmium species reactivates thanks to the tethered alcohol.

The activity of osmium compounds was tested within breast cancer cells in vitro. It was found that these compounds help convert pyruvate to lactate, both of which are essential metabolites in the intricate metabolism of the cancerous cell.

This fundamental research adds to the knowledge of organometallic compounds modulating cell machinery towards fighting cancer. The Pizarro group have demonstrated that the osmium compounds can be candidates for modulating the lactate/pyruvate balance within human cells, a crucial aspect of cancer progression.

This research has been partially funded by the EU 7th Framework Programme through the MEMOTUMCELLMACH project and the Severo Ochoa Centre of Excellence Award (2017-2021).



## 2. Projects

### GLOBAL RECOGNITION

#### Severo Ochoa (SO) Centre of Excellence 2017-2021 and 2022-2025



In July 2021 IMDEA Nanociencia was once again awarded the Severo Ochoa (SO) Centre of Excellence accreditation by the Spanish State Agency of Research (Agencia Estatal de Investigación; AEI). The Institute will receive € 1M/year for the period 2022-2025 **to consolidate its position as a reference centre for research, both nationally and internationally.** The strategic vision of the SO programme is to continue strengthening the interdisciplinary character of the Institute, boosting the synergies of the research programmes. Additionally, we will continue the successful strategy of interaction with industry, based on a model that identifies the strategic needs of companies and selects problems that contain both enough basic science to inspire our researchers and tactical interest for the company.

Through this we aim to tackle, using nanoscience and nanotechnology, specific societal challenges addressed by the EU in the Horizon Europe programme. We will reshape and further strengthen four well-established and successful Programmes (P1-P4), implement a new one (P5) to explore phenomena at the nanoscale in the ultrashort time regime (going down to attoseconds), and give a new emphasis to another (P6) on critical raw materials and sustainability, which is of utmost practical importance in the framework of Horizon Europe, to support the programmes we will evolve to a new Platform for Disruptive Innovation.



# COVID-19 RESPONSE

## Nanotecnología para detección del SARS CoV-2 y sus variantes

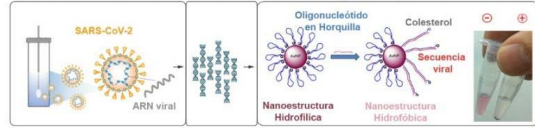
PROYECTOS DE I+D EN MATERIA DE RESPUESTA A COVID-19 FINANCIADOS POR EL FEDER – RECURSOS REACT-UE

The COVID-19 pandemic has highlighted the need for specific, sensitive and accessible viral detection methods for the world's population. The availability of accessible systems at a local level would ensure better control of infections and reduce their spread.

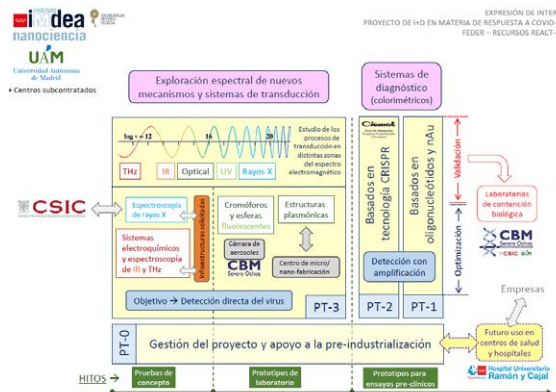
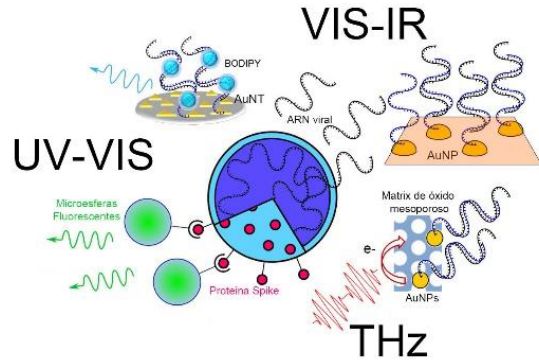
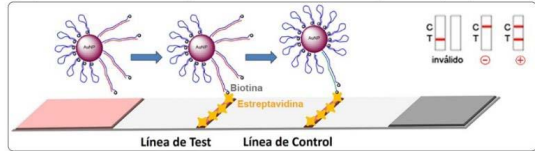
Successful projects carried out at IMDEA Nanociencia since April 2020 (funded by the Instituto de Salud Carlos III and Santander/CRUE) allowed the development of simple and accurate methods capable of detecting the presence of virus in real clinical samples.

In the REACT project IMDEA Nanociencia coordinates a joint effort with groups from CBM-CSIC, CIEMAT and Hospital Ramón y Cajal-IRYCIS to not only increase their sensitivity of this technology, but also to adapt them to a "Point-of-Care" (PoC) format and validate them clinically, making them comparable to the most sophisticated current systems. Likewise, thanks to the multidisciplinary nature of the team, new signal transduction mechanisms will be developed to enable ultrasensitive direct detection of this, or other pathogens in liquid samples and in the environment (aerosols). The Institute's experience and proven ability to combine conceptual and technological strategies in the pursuit of a common goal will enable the achievement of specific objectives that will materialize in the market and in society in the short term for the detection of pathogens and their variants of clinical/epidemiological interest both in this and in future health emergencies.

T1.1) Obtención de muestra + Amplificación + Detección por precipitación de AuNPs



T1.2) Optimización del sistema y transformación en tira de flujo lateral (PoC)





## TOMATTO

### The ultimate Time scale in Organic Molecular opto-electronics, the ATTOsecond

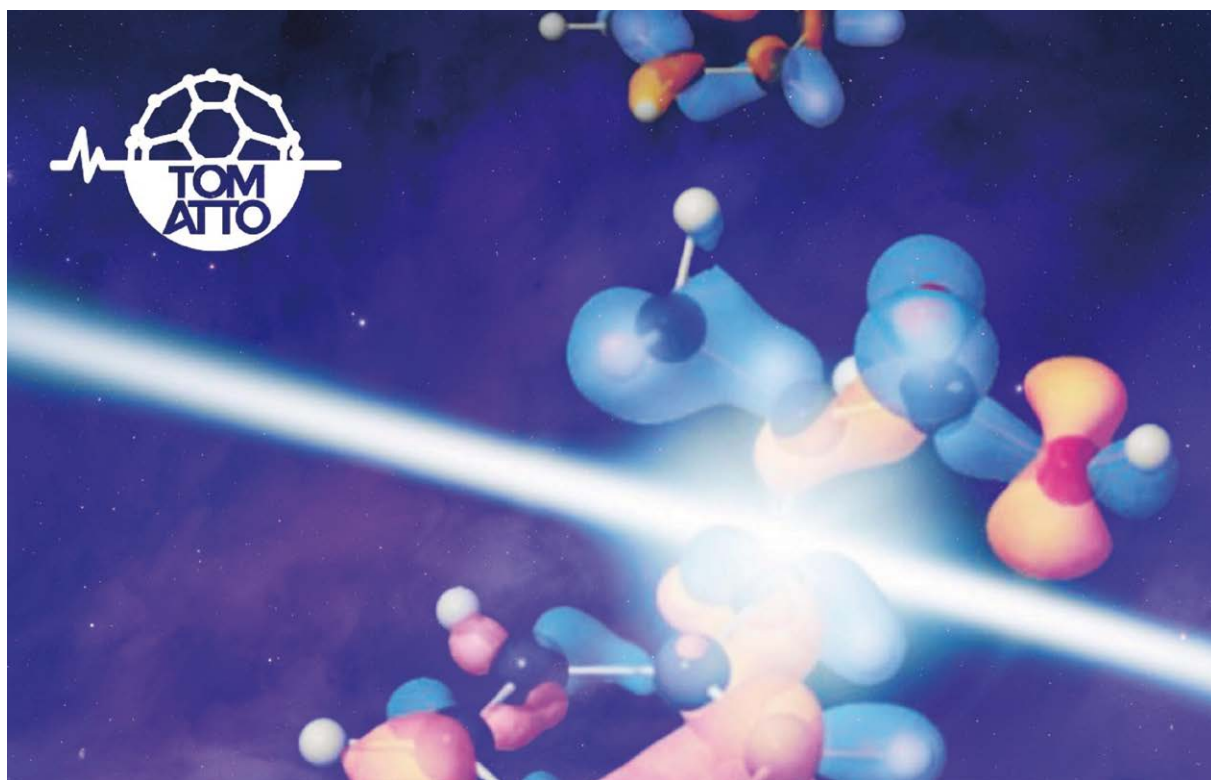


The generation of electric currents that power human activities in a clean and sustainable way is a top priority for mankind. In this respect, getting a handle on the intricacies of photoinduced electron and charge transfer processes in organic materials is fundamental to enhancing the efficiency of energy conversion in solar energy devices. Given that the early stages of these processes occur on ultrafast (attosecond) time scales, their access is technically quite challenging. The TOMATTO project plans to take a closer look at this problem through advances in attosecond science and organic synthesis and the support of computational modelling.

This €12M six-year project, coordinated by IMDEA Nanociencia, aims to capture ultrafast electron dynamics to enhance solar energy conversion efficiency receiving its funding from the prestigious European Research

Council (ERC) under its Synergy programme. The consortium consists of 2 nodes, one in Madrid which consists of the coordinator Prof. Fernando Martín (IMDEA Nano and UAM) and Prof. Nazario Martín (UCM and IMDEA Nano) another in Italy with the group of Milan Prof. Mauro Nisoli (Polytechnic Institute of Milan).

This project has received funding from the European Union's Horizon 2020 research and innovation programme (grant agreement No 951224).



## PASSENGER

### Pilot Action for Securing a Sustainable European Next Generation of Efficient RE-free Magnets. For sustainable and efficient rare-earth-free permanent magnets



The European production of permanent magnets depends on the import of expensive rare-earth materials, which are hard to recycle, and have a high environmental impact. PASSENGER proposes improved Strontium Ferrite and a Manganese-Aluminum-Carbon alloy as substitutes that guarantee a sustainable production based on widely available European resources (importantly rare-earth free). By 2025, PASSENGER will upscale the production of its novel magnets and fully integrate them into e-bike, e-scooter, and e-motorbike motors, while additionally implementing them into multitude of appliances in e-cars, actuators and pump systems for water supply.

Coordinated by IMDEA Nanociencia, the consortium consists of 20 partners, including major European industries, academic leaders, and associations dealing with the manufacture of permanent magnets, alloy production, powder fabrication, electric motors and pumps, e-vehicles, eco-design, product and process standardisation.

This project has received funding from the EU research and innovation programme under grant agreement no. 101003914





# IDEAL

## IMDEA-Nanociencia Postdoctoral Programme in Nanoscience



Coordinated by the Competitive Project Office, IDEAL is a fellowship programme promoted by IMDEA Nano that over 5 years aims to attract 12 talented postdoctoral researchers to undertake excellent research in any of 6 areas of research carried out at the institute. This initiative is funded through the COFUND Marie Skłodowska-Curie Actions (MSCA) grant. Specifically, IMDEA has received €1.1 million, out of the €100 million awarded in this programme. IMDEA Nanociencia is one of the 11 Spanish entities and the only one in Madrid to receive this grant in the 2020 call.

A full research training and career development programme will be provided, with a series of training activities and opportunities. IDEAL aims to provide a dynamic research community and a lively international atmosphere making Madrid a destination of choice for young talented scientists.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie agreement No. 101034431

- Severo Ochoa Centre of Excellence in 2017
- In the edges of Madrid city
- Highly competitive world-class research environment

**12 postdoctoral grants**  
to be awarded

**Two calls for applications**  
July 2021  
March 2023

**44 laboratories**  
infrastructure of the highest level for conducting research in nanoscience and nanotechnology

**Research areas**

- Organic nanosystems for light harvesting and energy conversion
- Fundamental properties of 2D materials
- Nanomedicine against cancer and infection
- Nanomagnetism and critical raw materials
- Solid state quantum devices for information technologies

**Mobility encouraged to top partner organizations for 2-6 months stay**

**Training & Career Development activities**

**Mentoring programme**

**Interdisciplinary research**

**€1.1 million funding**  
from EU COFUND MSCA



## TSUNAMI PROJECT

### Introduction

The Tsunami Project is a >15 scientists, >3M€ fully privately funded, 3+ year collaboration between the group of Prof. Emilio M. Pérez and the Danish nanotech company Nanocore. The novel and proprietary technology, was developed at IMDEA Nanociencia during the course of the prestigious ERC Starting Grant (MINTS: GA No 307609) and ERC Proof-of-Concept grants awarded to Prof Perez. The ambitious aim is to finally unleash the enormous potential of carbon nanotubes as fillers in polymer composites.

### Background

The ERC Starting Grants fund high-risk, high-reward proposals that have the potential to revolutionise science and potentially lead to innovation. The aim of the MINTs project was to make mechanically interlocked derivatives of single-walled carbon nanotubes (MINTs), this was very successful and resulted in multiple publications and collaborations.

One such example was a collaboration with partners at the University of Pisa and the Multifunctional Nanocomposites Group at IMDEA Materials

that led to the publication of a paper showing that MINTS could be used as superior polymer fillers improving the properties of the parent materials. (<https://pubs.acs.org/doi/abs/10.1021/acsnano.6b04028>)

This paper kick-started a collaboration with Nanocore which led to the award of the ERC Proof-of-concept grant (PINT: GA 842606) that funded the development of novel and proprietary technology. The birthplace of this important industrial collaboration is a perfect example of going from blue sky science to a marketable technology in a relatively short timescale.

### Vision and Mission

This technology will allow the incorporation of the strongest molecules known, carbon nanotubes, into composite materials. Making composites several fold stronger than the carbon fibre composites used today, in products such as airplanes, cars, wind turbines, and sporting goods.





# LINES OF ACTION

## the path to disruptive innovation

IMDEA Nanociencia foundational goals include the service to Society and the support to the Industry. Reaching final applications from interdisciplinary frontier research takes a long way, normally in connection with other academic, institutional and business actors.

By its very nature, research at the nanoscale is consubstantial with the generation of disruptive innovation, something that cannot be anticipated but can be propitiated through the concept of the line of action, an instrument conceived at IMDEA Nano-ciencia to advance in areas with potential to generate disruptive applications.

A line of action starts after identifying a future scenario to aim for from cutting-edge research and which also serves to encourage other organizations to join forces to complete it. The success of a line of action depends on designing a suitable path, establishing a common language

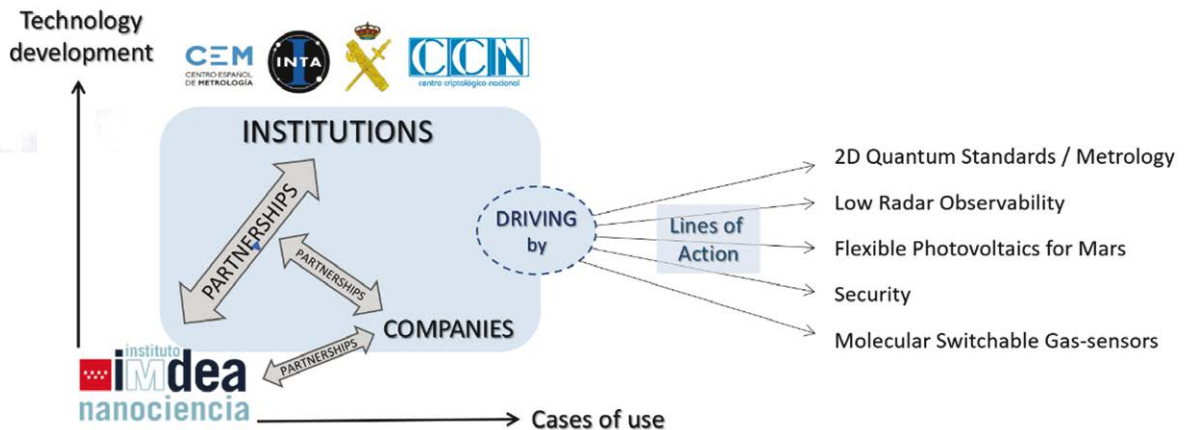
and, without a doubt, choosing the best travel companions. The goal is to multiply efforts and increase critical mass at all stages of the value chain, from research to final application.

In this sense, IMDEA Nanociencia seeks to establish strategic alliances with complementary public institutions, close to technology and/or end users. Companies have great interest in these alliances because they address to a substantial part of the value chain associated with the line of action.

The figure shows some examples of lines of action initiated in 2020/2021 and the public institutions with which IMDEA Nanociencia complements itself to address them. These synergies are a pole of attraction for the business sector, since they are perceived as a real opportunity to innovate disruptively.

### FEATURES

- Potential for **disruptive innovation**
- **Cutting edge** research
- **Interdisciplinary** approach
- Mid- to long-term focus
- Act on the whole **chain of value**
- Connected to **societal challenges**
- Foster **cooperation** and **partnerships**
- Potential for **attracting funds**



# 5

## annexes

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1. **National and International Congresses** [167]
2. **Pitch Events and Invited Lectures** [177]
3. **Conferences and Courses** [178]
4. **Outreach activities** [180]



# 1. National and international Congresses: invited lectures and regular contributions

**76 events**

60 on line

**165 contributions**

**40 invited lectures**

and **125 regular contributions,**

65 oral and 60 as posters

**01/02/2021**

**Faraday Discussions 228: Time-resolved imaging of photo-induced dynamics, Bombay, India**

Online

*Invited talk*

Attosecond laser control of photoelectron angular distributions in XUV-induced ionization of H<sub>2</sub>  
Fernando Martín

**02/02/2021**

**Congreso Anual de Estudiantes de Doctorado de la Universidad Miguel Hernández, Elche**  
Online

*Oral contribution*

Amperometric hydrazine sensing platforms based on a molybdenum disulfide ternary complex  
Ana M. Villa-Manso, Mónica Revenga-Parra,

Mariano Vera-Hidalgo, Emilio M. Pérez, Félix Pariente, Encarnación Lorenzo

*Poster contribution*

Liquid-Phase Exfoliation of Cylindrite: A Natural Van der Waals Superlattice with intrinsic magnetic interactions.

Lucía Martín, Yue Niu, Julia Villalva, Riccardo Frisenda, Mar García-Hernández, Emilio M. Pérez, Andrés Castellanos-Gomez and Enrique Burzurí

SR-ARPES. A new powerful tool to resolve the spin polarized electronic structures

B. Muñiz\*, M. A. Valbuena, J. Camarero, R. Miranda

**20/02/2021**

**TrNano Transpyrenean Nanotechnology Workshop 2021**

Online

*Oral contribution*

On-Surface synthesis of diradical organic one-dimensional polymers

K. Lauwaet

**23/02/2021**

**20th International Workshop on computational physics and materials science: total energy and force methods, Trieste, Italy.**

Online

*Poster contribution*

Strain tuning of the anisotropy in the optoelectronic properties of the two-dimensional transition metal trichalcogenide TlS<sub>3</sub>

Jose Angel Silva Guillén\*, Enric Canadell, Pablo Ordejón, Francisco Guinea, Rafael Roldán

**01/03/2021**

**Deutschen Physikalischen Gesellschaft (DPG) Spring Meeting 2021, Germany**

Online

*Invited talk*

Spin Orbit driven effects in Graphene-FM systems  
P. Perna

**10/03/2021**

**Molecular quantum dynamics beyond bound states, Rostock, Germany**

Online

*Invited talk*

Molecular fragmentation as a way to reveal early electron dynamics induced by attosecond pulses

Fernando Martín

**15/03/2021**

**The Minerals, Metals & Materials Society Annual Meeting and Exhibition 2021**

Online

*Invited talk*

MnBi thin film micromagnets with tunable anisotropy for high temperature applications

M. Villanueva, E.H. Sánchez, P. Pedraz, P. Olleiros, P. Perna, P.S. Normile, C. Navío, J. Camarero, J. A. de Toro\*, and A. Bollero

**16/03/2021**

**FLAGERA RRI workshop, Romania**

Online

*Invited talk*

Spin Orbit functionalized GRAPHene for resistive-magnetic MEMories SOgraphMEM

P. Perna

**18/03/2021**

**American Physical Society 2021 March Meeting**

Online

*Invited talk*

Phase diagram of twisted bilayer graphene near a magic angle

Francisco Guinea

26/03/2021

**11th international meeting on Visualizing Biological Data**

Online

*Poster contribution*

Amyloid-targeted photodynamic therapy against antibiotic resistant biofilms

P. Bondia,\* C. Flors, J. Torra

11/04/2021

**Materials Challenges for Memory**

Online

*Poster contributions*

Tailoring interfacial phenomena in hybrid V2O3/Co bilayers

José Manuel Díez, José Luis F. Cuñado, Pavel Lapa, Raúl Solís, Iciar Arnay, Patricia Pedraz, Paolo Perna, Alberto Bollero, Rodolfo Miranda, Ivan K. Schuller and Julio Camarero

26/04/2021

**INTERMAG 2021**

Online

*Oral contributions*

Additive manufacturing of rare earth-free and hybrid permanent magnets: from composites synthesized by solution casting to magnetic filament and 3D-printing of magnets

E.M. Palmero\*, D. Casaleiz, J. de Vicente, and A. Bollero

Cation leaching alters the properties of Mn nanoferrites for biomedical applications

David García-Soriano, Rebeca Amaro, Nuria Lafuente-Gómez, Paula Milán-Rois, Álvaro Somoza, Cristina Navío, Fernando Herranz, Lucía Gutiérrez, Gorka Salas

Disentangling the anomalous Nernst and spin Seebeck effect in epitaxial Graphene/Cobalt heterostructures

Alberto Anadón, Ruben Guerrero, P Jiménez-Cavero, Adrian Gudín, Jose Manuel Díez, Pablo Olleros, Letcia de Melo Costa, Fernando Ajejas, I. Lucas, L. Morellón, P.A. Algarabel, M. R. Ibarra, Rodolfo Miranda, Julio Camarero, and Paolo Perna

High-coercive hexagonal MnBi micro-islands with tunable magnetic anisotropy and stripe magnetic domain patterns

M. Villanueva, C. Navío\*, E. Sánchez, P. Pedraz, P. Olleros-Rodríguez, L. Zha, P. Perna, J. Camarero, J. Yang, P.S. Normile, J. de Toro, and A. Bollero

Micromagnetic Study of Stable Skyrmions in Dot-Patterned Graphene-Based Magnetic Trilayers
 Olleros-Rodríguez, Pablo; Guerrero, Rubén; Camarero, Julio, Chubykalo-Fesenko, Oksana; Perna, Paolo

Micromagnetics of Chemical Barriers Inserted within Permalloy Cylindrical Nanowires: Towards the Control of Domain Wall Motion

L. Álvaro Gómez, M. Schöbitz1, C. Fernández González, S. Ruiz Gómez, I.M. Andersen, N. Mille, J. Hurst, M. Foerster, L. Aballe, R. Belkhou, J.C Toussaint, L. Cagnon, C. Thirion, A. Masseboeuf, D. Gusakova, L. Pérez

 MnAlC permanent magnets obtained directly from  $\epsilon$ -phase gas-atomized and milled powder by hot-pressing

C. Muñoz-Rodríguez\*, E.M. Palmero, J. Rial, L. Feng, T. Mix, B. Skårman, H. Vidarsson, P.-O. Larsson, T.G. Woodcock, and A. Bollero

Nucleation of Metastable Skyrmion Lattices following a Non-Equilibrium Laser-Induced Heating Path

Olleros-Rodríguez, Pablo; Strungaru, Mara S.; Ruta, Sergiu; Gavriloea, Paul I.; Perna, Paolo; Chantrell, Roy W.; Chubykalo-Fesenko, Oksana\*

Thermally Activated Processes for Ferromagnet Intercalation in Graphene-Heavy Metal Interfaces

A. Gudín, J.M. Díaz, A. Anadón, C. Ayani, P. Olleros-Rodríguez, F. Ajejas, I. Arnay, R. Guerrero, F. Calleja, J. Camarero, R. Miranda, &amp; P. Perna

*Poster contributions*

Tailoring interfacial phenomena in hybrid V2O3/Co bilayers

José Manuel Díez, José Luis F. Cuñado, Pavel Lapa, Raúl Solís, Iciar Arnay, Patricia Pedraz, Paolo Perna, Alberto Bollero, Rodolfo Miranda, Ivan K. Schuller and Julio Camarero

Tuning work function in Graphene by thermally assisted metal intercalation

Iciar Arnay, Adrián Gudín, Alejandra Guedeja-Marrón, José Manuel Díez, Alberto Anadón, Rubén Guerrero, María Varela, Julio Camarero, Rodolfo Miranda and Paolo Perna

27/04/2021

**International Workshop “XFEL for Beginners”, Poland**

Online

*Invited talk*

Observing coherent atomic motions with ultrashort X-rays

Wojciech Gawelda

28/04/2021

**EGU (EUROPEAN Geosciences Union) General Assembly 2021**

Online

*Oral contribution*

MiniPINS - Miniature Planetary In-situ Sensors
 Maria Genzer, Maria Hietä, Antti Kestilä, Harri Haukka, Ignacio Arruego, Victor Apéstigue, Alejandro Gonzalo Melchor, Jose Antonio Manfredi, Cristina Ortega, Carmen Camañas, Manuel Domínguez-Pumar, Servando Espejo, Héctor Guerrero, Matti Palin, Jarmo Kivekäs, Petri Koskimaa, Matias Meskanen and Matti Talvioja

29/04/2021

**Conference on Organic Materials in Perovskite-based Optoelectronic Devices**

Online

*Invited talk*

Sulfur-rich Hole-Transporting Materials for Highly-Efficient Perovskite Solar Cells

Nazario Martín

04/05/2021

**Bionanomechanics Conference**

Online

*Oral contribution*

Mechanically-induced bacteria death imaged



in real time: a simultaneous nanoindentation and fluorescence microscopy study

A. del Valle, J. Torra, P. Bondia, C. M. Tone, P. Pedraz, V. Vadillo-Rodríguez, C. Flors\*

*Poster contribution*

Micro-nano hierarchical surfaces for mechanocontrol of mesenchymal stem cells and bacterial infection

M.T. Alameda, M.R. Osorio, J. J. Hernández, M.P. Pereira, A. Martínez-Serrano, I. Rodríguez

10/05/2021

**Quantum Information in Spain (ICE-6)**

Online

*Poster contributions*

Hybrid superconducting nanowire single photon detectors

Cristina García-Pérez, Julia García-Pérez,, Marina C. De Ory, María Acebrón, María Teresa Magaz, Ramón Bernardo-Gavito, Alicia Gómez, Daniel Granados

Towards a Graphene-based Quantum Resistance Standard in Spain

I.Figueroelo, J. García, A. Santamaría, I. Redondo, L. Matías, Y. Álvarez, F. Raso, J. Diaz De Aguilar, A. Gómez J.L. Vicent, R. Miranda, H. Guerrero, M. Vazquez, E. Cánovas, D. Granados y M. Menghini

Towards a wearable magnetoencephalograph

Juan Luis Sánchez Toural, Miguel Ángel Ramos, Jose Luis Pau, Ramón Bernardo-Gavito, and Daniel Granados

Towards single-photon emitters on few-layer MoS<sub>2</sub> nano-electro-mechanical-optical devices

Víctor Marzoa, Cristina García-Pérez, Manuel R. Osorio, María Acebrón, Ramón Bernardo-Gavito, and Daniel Granados

14/05/2021

**Jornada científica de jóvenes investigadores de la Red Sensores y Biosensores Electroquímicos ELECTROBIONET**

Online

*Oral contribution*

Plataformas sensoras nanoestructuradas ba-

sadas en un complejo ternario de bisulfuro de molibdeno

Ana M. Villa-Manso, Mónica Revenga-Parra, Mariano Vera-Hidalgo, Emilio M. Pérez, Félix Pariente, Encarnación Lorenzo

26/05/2021

**ESpinRed 2021 School on Spintronics.**

Online

*Oral contribution*

Independent control of the crystallinity and composition of CuBi

A. Guedeja-Marrón, C. Fernández-González, S. Ruiz-Gómez, L. Pérez, M. Varela, P. Perna

30/05/2021

**239th Electrochemical Society Meeting.**

**2021 Spring Meeting**

Online

*Invited talks*

Porphyrinoid-Carbon Nanostructure Ensembles  
Tomas Torres

Porphyrinoids for Photodynamic Therapy (PDT) and Antimicrobial PDT

Tomas Torres

In Control of Surface and Electronic Properties of SWNTs through Mechanical Interlocking

Emilio Pérez

*Oral contributions*

One single step from  $\epsilon$ -phase gas-atomized to L10-phase MnAlC bulk magnet by hot-pressing

C. Muñoz-Rodríguez\*, E.M. Palmero, J. Rial, L. Feng, T. Mix, F. Olsson, B. Skårman, H. Vidarsson, P.-O. Larsson, T.G. Woodcock, and A. Bollero

Planar and sharp nanotechnology-based electrodes for neural activity recording and stimulation

Ana Arché-Núñez, Beatriz L. Rodilla, Ana Domínguez-Bajo, Ankor González-Mayorga, Ivo Calaresu, Rossana Rauti, Denis Scaini, Julio Camarero, Rodolfo Miranda, Elisa López-Dolado, Laura Ballerini, Lucas Pérez, M. Concepción Serrano and M. Teresa González

Rare earth-free and hybrid composites for developing alternative permanent magnets by 3D-printing

E.M. Palmero\*, D. Casaleiz, J. de Vicente, and A. Bollero

02/06/2021

**4th Spanish Conference on Biomedical Applications of Nanomaterials (SBAN21)**

Online

*Invited talk*

Global and local thermal effects on photo-activated gold-based nanoparticles using X-rays for biomedical applications

A. Espinosa\*, J. Reguera, A. Curcio, Á. Muñoz-Noval, L. M. Liz-Marzán and C. Wilhelm.

*Oral contributions*

CRISPR/Cas13-conjugated nanovehicles for achieving an efficient RNA-knockdown.

López-Valls, M., García-Garrido, E; Pardo, D.; Somoza, A. and Sot, B.

Study of the mechano-bactericidal properties of moth-eye nanotopography

M.T. Alameda, M.R. Osorio, J. Hernández, I. Rodríguez

Synthesis of iron oxide-manganese oxide nanoparticles, with tunable shell and morphology, for magnetic heating and switchable T<sub>2</sub>-to-T<sub>1</sub> MRI contrast triggered by intracellular conditions

D. García-Soriano\*, P. Milán-Rois, N. Lafuente-Gómez, C. Navío, L. Gutiérrez, L. Cussó, M. Desco, D. Calle, A. Somoza, and G. Salas

David García-Soriano, Paula Milán-Rois, Nuria Lafuente-Gómez, Cristina Navío, Lucía Gutiérrez, Lorena Cussó, Manuel Desco, Daniel Calle, Álvaro Somoza and Gorka Salas

*Poster contributions*

Behind optical activation of iron oxide nanoparticles for photothermal therapy

Claudia Lozano-Pedraza, Elena Plaza-Mayoral, Ana Espinosa, Begoña Sot, Aida Serrano, Gorka Salas, Cristina Blanco-Andujar, Geoffrey Cotin, Delphine Felder-Flesch, Sylvie Begin-Colin and Francisco J. Teran

CoFe nanoparticles with tuned magneto-thermal response obtained through a scalable co-precipitation, milling and reduction process of CoFe<sub>2</sub>O<sub>4</sub>  
Daniel Casaleiz, Melek Villanueva, Alonso J. Campos, Julio Camarero, Ester M. Palmero, Ana Espinosa, Gorka Salas, Alberto Bollero

CRISPR/Cpf1 nanostructures for the development of improved gene editing tools".

Escalona-Noguero, C. I., Luengo, Y. I., Lafuente-Gómez, N. I., Latorre, A. I., Salas G. I., Somoza A. I., Sot, B. I.\*

Gold nanoparticle-based lateral flow sensors for the detection of cancer-related miRNAs

Catarina Coutinho, Jorge Royes, Milagros Castellanos, Álvaro Somoza

Microfluidic device to study the penetration of nanoparticles in the tumour microenvironment  
A. Martín-Asensio, S. Dávila, J. Cacheux, I. Rodríguez

Nanosystems for magnetic hyperthermia and local drug administration

H. Kang, R. López-Méndez, S. Moraes, C. Nunes, S. Reis, J. P. Araujo, C. T. Sousa and A. Espinosa\*

Plasmonic response of gold nanoparticles in different environments for biomedical applications  
M. París, R. López-Méndez, I. Figueruelo, A. Serrano and A. Espinosa\*

X-ray absorption fine structure characterization of nanoparticles for hyperthermia therapy in tumour cells

R. López-Méndez, J. Reguera, A. Fromain, F. Zheng, E. Fonda, C. Wilhelm, Á. Muñoz-Noval, A. Espinosa\*

#### 07/06/2021

**26th International Workshop on Rare Earth and Future Permanent Magnets and Their Applications REPM2021**

Online

*Invited talk*

Advances in additive manufacturing of rare earth-free and hybrid permanent magnets: from the synthesis of tuned composites by solution casting to 3D-printing

E.M. Palmero\*, D. Casaleiz, J. de Vicente, and A. Bollero

#### 13/06/2021

**20th Federation of European Biochemical Societies FEBS Young Scientists' Forum**

Online

*Poster contributions*

Nanoparticle-mediated delivery of Cpf1 for the generation of improved genome editing tools  
Escalona-Noguero, C. I., Luengo, Y. I., Lafuente-Gómez, N. I., Latorre, A. I., Salas G. I., Somoza A. I., Sot, B. I.\*

**IEEE Advances in Magnetism, AIM2020+21**

Online

*Invited talk*

Developing alternative permanent magnets: from the synthesis of tuned composites to additive manufacturing

E.M. Palmero\*, D. Casaleiz, J. de Vicente, and A. Bollero

#### 14/06/2021

**New Times - New Trends in Materials Science and Engineering, Italy**

Online

*Invited talk*

Advanced microscopies and spectroscopies at IMDEA Nanoscience.

M. Garnica\*

*Poster contribution*

Phase-controlled synthesis of MoTe<sub>2</sub> on Graphene/Ir(111)

J. Ripoll Sau\*, F. Callej, P. Casado Aguilar, R. Miranda, A. L. Vázquez de Parga, M. Garnica

#### 16/06/2021

**40th WOCSDICE - Workshop on Compound Semiconductor Devices and Integrated Circuits, Bristol, United Kingdom**

*Oral contributions*

Hybrid superconducting nanowire single photon detectors

Cristina García-Pérez, Julia García-Pérez, Ma-

rina C. De Ory, María Acebrón, María Teresa Magaz, Ramón Bernardo-Gavito, Alicia Gómez, Daniel Granados

Temperature dependence of the photoluminescence in few-layer MoS<sub>2</sub> suspended membranes

Víctor Marzoa, Cristina García-Pérez, Manuel R. Osorio, María Acebrón, Ramón Bernardo-Gavito, and Daniel Granados

#### 18/06/2021

**Young Research Symposium - Sociedad Española de Química Terapéutica**

Online

*Oral contribution*

Improved controlled release and brain penetration of small molecules with therapeutic potential using PLGA nanoparticles

Vanessa Nozal

*Poster contribution*

Measuring protein aggregation in lymphoblasts from ALS patients with a turbidometric assay  
Carmen Pérez de la Lastra, Carlota Tosat-Bitrián, Vanessa Nozal, Ana Martínez, Ángeles Martín Requero, Valle Palomo

#### 27/06/2021

**Workshop on Attosecond to Few-Femtosecond Ultrafast Science at Future FELs**

Online

*Invited talk*

Discussion leader: Chemical dynamics

Fernando Martín

#### 28/06/2021

**11th International Conference on Porphyrins and Phthalocyanines (ICPP-11)**

Online

*Invited talk*

Particular Aspects of Subphthalocyanines: Chirality, Supramolecular Organization and Single Fission  
Tomas Torres

Porphyroid-based donor-acceptor conjugates containing tetracyanobuta-1,3-diene or



cyclopenta[hi]aceanthrylene: Synthesis, structure, and physicochemical properties

Giovanni Bottari

28/06/2021

**Fritz Haber 2021**

Online

*Invited talk*

Tailoring  $\pi$ -conjugation in polymers synthesized on a metallic surface

D. Ecija

30/06/2021

**Basics and Applications of Nanolithography (Nanolito 2021), Salamanca, Spain**

*Invited talk*

Functional soft-nanoimprinted surfaces

Isabel Rodriguez

*Oral contribution*

Tumour-on-a-chip device fabrication

A. Martín-Asensio, S. Dávila, J. Cacheux, I. Rodríguez

*Poster contribution*

Tumour-on-a-chip device fabrication

A. Martín-Asensio, S. Dávila, J. Cacheux, I. Rodríguez

**COST meeting Superconductors hybrids @ extreme**

Online

*Invited talk*

Francisco Guinea

03/07/2021

**45th Congress of Federation of European Biochemical Societies FEBS**

Online

*Poster contribution*

Nanoparticle-mediated delivery of Cpf1 for the generation of improved genome editing tools  
Escalona-Noguero, C. I., Luengo, Y. I., Lafuente-Gómez, N. I., Latorre, A. I., Salas G. I., Somoza A. I., Sot, B.\*

06/07/2021

**Helicases and Nucleic Acid-Based Machines: Structure, Mechanism and Regulation and Roles in Human Disease 2021**

Online

*Poster contribution*

Mechanism of DNA unwinding by the mitochondrial DNA helicase

I Plaza G-A, B. Ibarra

06/07/2021

**41 st Meeting of the Electrochemistry Group of the Spain Royal Society of Chemistry, Paris, France**

*Oral contribution*

Nanostructured sensing platforms based on the use of ternary complexes as electrocatalysts

M. Revenga-Parra, A. M. Villa-Manso, E. Lorenzo, F. Pariente

*Poster contribution*

Direct determination of monosaccharides in honey by coupling a sensitive new schiff base Ni complex electrochemical sensor and chemometric tools

M. Revenga-Parra, S. N. Robledo, E. Martinez-Periñán, M. M. González-Quirós, A. Colina, A. Heras, F. Pariente, E. Lorenzo

11/07/2021

**International Conference on Nanoscience & Technology (ICNT 2021) Canada**

Online

*Oral contributions*

1H- and 1T'- MoTe<sub>2</sub> islands on Graphene/Ir(111): Growth, Topography and Electronic Structure"

P. Casado Aguilar, J. Ripoll, I. Martínez, F. Calleja, R. Miranda, A. L. Vázquez de Parga and M. Garnica\*

3D Spin Polarized – Angle Resolved Photoemission Spectroscopy (SP-ARPES) setup at IMDEA Nanociencia (Presentation by Ms. Beatriz Muñoz, ph D student)

Miguel Angel Valbuena

Enhancement of the magnetic anisotropy of dysprosium by metal-organic coordination in 2D networks

S. O. Parreiras\*, D. Moreno, B. Cirera, M. A. Valbuena, J. I. Urgel, M. Paradinas, M. Paniguel, F. Ajejas, M. A. Niño, J. M. Gallego, M. Valvidares, P. Gargiani, W. Kuch, J. I. Martínez, A. Mugarza, J. Camarero, R. Miranda, P. Perna, D. Écija

Polarization dependence of ARPES with sub-micron spatial resolution reveals emerging one-dimensionality of electrons in NbSe<sub>3</sub>.  
*Oral contributions* contribution. Session: 2D Materials and non-trivial topological phases. Reduced dimensions

Miguel Angel Valbuena

13/07/2021

**Telluride Research Conference on Advances in Theory of Electronic Resonances**

Online

*Invited talk*

Molecular-frame photoelectron angular distributions in the vicinity of Feshbach resonances. The XChem approach.

Fernando Martín

14/07/2021

**International conference in two dimensional materials 2021. Dubna**

Online

*Invited talk*

Novel properties of twisted bilayer graphene

Francisco Guinea

17/07/2021

**43 Congreso de la Sociedad Española de Bioquímica y Biología Molecular SEBBM**

Online

*Oral contribution*

A naked-eye CRISPR/Cas13a-based nucleic acid detection platform for SARS-CoV2

López-Valls, M., Escalona-Noguero, C., Rodríguez-Díaz, C., Pardo D., Castellanos, M., Martínez-Garay, C., Somoza, A. and Sot, B.

*Poster contribution*

Nanotechnology-based strategies for non-viral delivery of CRISPR proteins”

Escalona-Noguero, C. I., Luengo, Y. I., Lafuente-Gómez, N. I., Latorre, A. I., Salas G. I., Somoza A. I., Sot, B. I.\*

20/07/2021

**32nd International Conference on Photonic, Electronic and Atomic Collisions (XXXII ICPEAC)**

Online

*Invited talk*

Plenary opening talk: Attosecond molecular science: a theoretical point of view.

Fernando Martín

20/07/2021

**Electronic Biological Inorganic Chemistry Meeting (eBIC)**

Online

*Oral contribution*

Osmium(II) Tethered Half-Sandwich Complexes: pH-Dependent Aqueous Speciation and Transfer Hydrogenation in Cells

Sonia Infante-Tadeo

22/07/2021

**Cost Action Nano2Clinics WG2 Online Conference “Characterisation of nanomaterials towards safe and efficient nanodrugs”**

Online

*Oral contribution*

Characterising cell internalization effects on the heat released by iron oxide nanoparticles

C. Lozano-Pedraza, B. Sot, A. Espinosa and F. J. Terán

24/07/2021

**Around-the-Clock Around-the-Globe Magnetism Conference 2021**

Online

*Invited talk*

Advances in developing alternative rare earth-free permanent magnets: from composites synthesis to additive manufacturing

E.M. Palmero\*

25/07/2021

**Controlled Release Society 2021 Virtual Annual Meeting**

Online

*Oral contributions*

Albumin-based nanostructures for drug delivery

Álvaro Somoza, Ana Latorre, Rama Prajapati, Alfonso Latorre, Milagros Castellanos, Nuria Lafuente-Gómez, Ciro Rodríguez Díaz, Mercedes Lecea, Marco Cordani, Sonia Romero-Pérez, Ana Lazaro-Carrillo, Macarena Calero, Ángeles Villanueva, Tania Aguado, José María Sanchez-Puelles, Alejandra Crespo-Barreda, Pilar Martín-Duque

Albumin-based polyplexes for CRISPR/Cas editing

Rama Prajapati, Marco Cordani, Álvaro Somoza

*Poster contribution*

Smart magnetic nanoparticles functionalized with gemcitabine: a promising tool for pancreatic cancer treatment

Nuria Lafuente-Gómez, Paula Milán-Rois, David García-Soriano, Yurena Luengo, Marco Cordani, Hernán Alarcón-Iniesta, Gorka Salas, Álvaro Somoza

26/08/2021

**IS3NA-IRT Virtual Symposium 2021**

Online

*Oral contribution*

Multi-functionalized gold nanoparticles for the delivery of gapmer oligonucleotides to target mutant p53 cancer cells

Eduardo García-Garrido, Marco Cordani, Álvaro Somoza

29/08/2021

**XXVI EFMC International Symposium on Medicinal Chemistry**

Online

*Oral contribution*

Isoform-selective tau tubuline kinase 1 inhibitors reduce TDP-43 hyperphosphorylation: a new hope in the treatment of TDP-43 proteinopathies

Vanessa Nozal

Sensing enzymatic activity with quantum dots in patient-derived neurodegenerative disease models

Valle Palomo

30/08/2021

**19th Congress of the European Society for Photobiology**

Online

*Poster contribution*

Min Oscillations as Reporter of Bacterial Photodynamic Inactivation at the Single-Cell Level

I. V. Ortega,\* J. Torra, C. Flors

05/09/2021

**31st Annual Conference of the European Society for Biomaterials (ESB 2021)**

Online

*Poster contribution*

Nanostructured planar and sharp electrodes for neuronal electrophysiological studies

Ana Arché-Núñez, Beatriz L. Rodilla, Ana Domínguez-Bajo, Ankor González-Mayorga, Ivo Calaresu, Rossana Rauti, Denis Scaini, Julio Camarero, Rodolfo Miranda, Elisa LópezDolado, Laura Ballerini, Lucas Pérez, M. Concepción Serrano and M. Teresa González

06/09/2021

**31st International Conference on Diamond and Carbon Materials, Mallorca, Spain**
*Oral contribution*

Cristina Gutiérrez-Sánchez, Mónica Mediavilla, Tamara Guerrero-Esteban, Mónica Revenga-Parra, Félix Pariente and Encarnación Lorenzo

**06/09/2021****European School of Magnetism, Cluj-Napoca, Romania***Poster contribution*

First results of a new 3D Spin Polarized - Angle Resolved Photoemission Spectroscopy instrument at IMDEA Nanociencia

Beatriz Muñiz, Miguel Angel Valbuena

**07/09/2021****V Jornada de Promoción de la Investigación Básica para estudiantes de Ciencias e Ingenierías, Madrid, Spain***Oral contributions*

Inmunosensor electroquimioluminiscente para la detección de glifosato en muestras alimentarias  
T. Guerrero-Esteban, C. Gutiérrez-Sánchez, E. Martínez-Periñán, M. Revenga-Parra, F. Pariente, E. Lorenzo.

Plataformas sensoras nanoestructuradas basadas en un complejo ternario de ADN

Ana M. Villa-Manso, Mónica Revenga-Parra, Félix Pariente, Encarnación Lorenzo

**20/09/2021****Spanish Conference on Nanophotonics-2021**

Online

*Oral contribution*

Specific biosensors for kinesin and dynein tracking after treatment with microtubule targeting agents

Rebeca París-Ogáyar, María Ángela Oliva, Carlota Tosat-Bitrián, Lucía Barrado-Gil, Francesca Bonato, Inmaculada Galindo, Beatriz Álvarez-Bernad, Daniel Lucena-Agell, Juan Francisco Giménez-Abián, Isabel García-Dorival, Covadonga Alonso, J. Fernando Díaz and Valle Palomo

**21/09/2021****Congreso Internacional de Investigación e Innovación en Enfermedades Neurodegenerativas (CiiiEN)**

Online

*Poster contribution*

Measuring protein aggregation in lymphoblasts from ALS patients with a turbidometric assay

Valle Palomo

**NanoNet**

Online

*Invited talk*

Conductive metal organic frameworks studied by time resolved THz spectroscopy

Enrique Canovas

**27/09/2021****Simposio de la Real Sociedad Española de Química (RSEQ) 2021**

Online

*Oral contribution*

Development of a nanostructured biosensor based on MoS<sub>2</sub> for pathogens detection

Emiliano Martínez-Periñán, Tania Garcia-Mendiola, Estefanía Enebral-Romero, Rafael Del Caño, Mariano Vera-Hidalgo, Manuel Vázquez Sulleiro, Cristina Navio, Félix Pariente, Emilio M- Pérez, Encarnación Lorenzo

*Poster contribution*

Electrochemiluminescent HER2 biomarker aptasensor for early diagnosis of breast cancer

L. Gutiérrez-Gálvez, T. García-Mendiola, E. Martínez-Periñán, I. Bravo, M. Vera-Hidalgo, M. Vázquez Sulleiro, M. Rodríguez-Peña, D. García-Nieto, M. Luna, F. Pariente, E. M-Pérez, E. Lorenzo

Osmium(II) Tethered Half-Sandwich Complexes: pH-Dependent Aqueous Speciation and Transfer Hydrogenation in Cells

Sonia Infante-Tadeo, Vanessa Rodríguez-Fanjul, Abraha Habtemariam, and Ana M. Pizarro

**04/10/2021****Reunión Ibérica de Vacío RIVA 2021**

Online

*Invited talk*

Direct X-ray detection of the spin Hall effect in CuBi

Sandra Ruiz-Gómez, Rubén Guerrero, Muhammad W Khaliq, Claudia Fernández-González,

Jordi Prat, Andrés Valera, Simone Finizio, Paolo Perna, Julio Camarero, Lucas Pérez, Lucía Aballe, Michael Foerster

Tailoring  $\pi$ -conjugation in polymers synthesized on a metallic surface

K. Lauwaet

*Oral contributions*

Magnetic sensing using color centers in diamond

Juan Luis Sánchez Toural, Miguel Ángel Ramos, Jose Luis Pau, Ramón Bernardo-Gavito, and Daniel Granados

MoS<sub>2</sub> optoelectronics: modulation of the optical emission of circular suspended membranes

Victor Marzoa, Cristina García-Pérez, Manuel R. Osorio, María Acebrón, Ramón Bernardo-Gavito, and Daniel Granados

*Poster contribution*

Phase-controlled synthesis of MoTe<sub>2</sub> on Graphene/Ir(111)

J. Ripoll Sau\*, F. Callej, P. Casado Aguilar, R. Miranda, A. L. Vázquez de Parga, M. Garnica

**10/10/2021****240th Electrochemical Society Meeting**

Online

*Invited talk*

Porphyrinoid-Carbon Nanostructure Systems and Fused Porphyrin-Graphene Nanoribbons  
Tomas Torres

**18/10/2021****EPS Colloquium: Spin control in twisted van der Waals heterostructures**

Online

*Invited talk*

Superconductivity in twisted bilayer graphene  
Francisco Guinea

**19/10/2021****IEEE Magnetics Spain-Brasil-Chile Chapters Collaboration Days 2021**

Online

*Invited talk*

Research on permanent magnets to build a sustainable technological horizon

A. Bollero\*

23/10/2021

**C' NANO 2021, Toulouse, France**

*Invited talk*

The Spanish Nanocar

D. Ecija

25/10/2021

**American Vacuum Society (AVS) 67**

**Conference**

Online

*Oral contribution*

3D Spin Polarized – Angle Resolved Photoemission Spectroscopy (SP-ARPES) setup at IMDEA Nanociencia (Presentation by Ms. Beatriz Muñoz, ph D student)

Miguel Angel Valbuena

27/10/2021

**XXXVI Trobades Científiques de la Mediterrània, Menorca, Spain**

*Oral contribution*

Direct X-ray detection of the spin Hall effect in CuBi

S. R-Gómez, R. Guerrero, M. W. Khaliq, C. F.-González, J. Prat, A. Valera, S. Finizio, P. Perna, J. Camarero, L. Pérez, L. Aballe, M. Foerster

07/11/2021

**18th International XAFS Conference 2021, Brisbane, Australia**

*Oral contribution*

X-ray Absorption Fine Structure as an in situ method of nanothermometry for intracellular hyperthermia

A. Muñoz Noval, R. López-Méndez, A. Fromain, E. Fonda, J. Reguera, C. Wilhelm, M. Á. García, A. Espinosa\*

10/11/2021

**IEEE Spanish Chapter - CEMAG. 5th Young Researchers in Magnetism, Girona, Spain**

*Invited talk*

Advances towards the development of sustainable rare earth-free permanent magnets and the additive manufacturing approach

E.M. Palmero\*

*Oral contribution*

Charge-spin current interconversion in high-quality epitaxial Co/Pt systems

Adrián Gudín, Alberto Anadón, Iciar Arnay, Rubén Guerrero, Julio Camarero, Rodolfo Miranda, Sebastien Petit-Watlot, Paolo Perna and Juan-Carlos Rojas-Sánchez

Development of a sustainable manufacturing process of ferrite permanent magnets by combining recycling and additive manufacturing

D. Casaleiz\*, E.M. Palmero, J. de Vicente, A. Seoane, R. Altimira, and A. Bollero

*Poster contributions*

Exploring the ratchet effect in chemically modulated cylindrical nanowires

Claudia Fernández-González, Alba Berja, Lucía Aballe, Michael Foerster, Miguel Ángel Niño, Carolina Martín-Rubio, Ruy Sanz, Arantazu Mascaraque, Lucas Pérez and Sandra Ruiz-Gómez

From magnetically soft to hard FeNi nanowires: In the search of the cosmological L10-FeNi phase  
A.J. Campos-Hernández\*, E.M. Palmero, and A. Bollero

Understanding the initial growth stages in NdFeB films: epitaxial films prepared by Molecular Beam Epitaxy with varying underlayer  
J. Soler-Morala\*, C. Navío, L. Zha, J. Yang, and A. Bollero

15/11/2021

**25th International Electronic Conference on Synthetic Organic Chemistry**

Exploring New Mitochondria-Targetable Theragnostic styrylBODIPYs.

T. Mazuelo, S. Serrano, F. García-Garrido, J. Jiménez, C. Díaz-Norambuena, B. L. Maroto,

F. Moreno, J. Bañuelos, A. R. Agarrabeitia, A. Villanueva, S. de la Moya and M. J. Ortiz  
Chemistry Proceedings. 2022; 8(1):41. <https://doi.org/10.3390/ecsoc-25-11677>

19/11/2021

**Encuentro de Nanomedicina e Imagen Molecular, Madrid, Spain**

*Invited talk*

Presentación Red Madrileña de Nanomedicina en Imagen Molecular

Álvaro Somoza, Ana Latorre, Rama Prajapati, Alfonso Latorre, Milagros Castellanos, Nuria Lafuente-Gómez, Ciro Rodríguez Díaz, Mercedes Lecea, Marco Cordani, Sonia Romero-Pérez, Ana Lazaro-Carrillo, Macarena Calero, Ángeles Villanueva, Tania Aguado, José M

22/11/2021

**16th European Vacuum Conference, Marseille, France**

*Oral contribution*

Tuning work function in Graphene by thermally assisted metal intercalation

I. Arnay; A. Gudín; A. Guedeja-Marron; J. M. Díez-Toledano; A. Anadón; R. Guerrero; M. Varela; J. Camarero; R. Miranda; P. Perna

22/11/2021

**Laserlab-Europe User Meeting, Salamanca**  
Online

*Invited talk*

The ultimate time scale in organic molecular optoelectronics, the attosecond

Fernando Martín  
Nazario Martín

23/11/2021

**ImagineNano2021 International Conference, Bilbao, Spain**

*Oral contribution*

Cove-edged nanographenes as a potential optical-gain media for lasing



Saul Garcia-Orrit, Vactor Vega-Mayoral and Juan Cabanillas-Gonzalez

*Poster contribution*

Towards a Graphene-based Quantum Resistance Standard in Spain

I.Figueruelo, J. García, A. Santamaría, I. Redondo, L. Matías, Y. Álvarez, F. Raso, J. Diaz De Aguilar, A. Gómez J.L. Vicent, R. Miranda, H. Guerrero, M. Vazquez, E. Cánovas, D. Granados y M. Menghini

24/11/2021

**Jornadas Jóvenes Investigadores 2021.**

**Instituto de Cerámica y Vidrio CSIC, Madrid, Spain**

*Oral contributions*

Espectroscopia de absorción de rayos X como técnica nanotermométrica en el entorno tumoral  
R. López-Méndez, J. Reguera, A. Fromain, F. Zheng, E. Fonda, C. Wilhelm, Álvaro Muñoz Noval, Ana Espinosa\*

Estudio de la respuesta plasmónica de nanopartículas en diferentes entornos para aplicaciones biomédicas

M. París Ogáyar, R. López-Méndez, I. Figueruelo, A. Serrano, Ana Espinosa\*

29/11/2021

**13th Meeting of Spanish Drug Discovery Network, Madrid, Spain**

*Poster contributions*

Characterization of extracellular vesicles and protein aggregates in cellular models of ALS patients

Carmen Pérez de la Lastra

Measuring pathological TDP43 in cellular models of ALS patients using QDS in flow cytometry  
Carlota Tosat, Paula Pérez Fernández

Specific biosensors for kinesin and dynein tracking after treatment with microtubule targeting agents

Rebeca París

01/12/2021

**11th Early Stage Researchers Workshop in Nanoscience**

Online

*Oral contributions*

DNA unwinding mechanism of mitochondrial DNA helicase

I Plaza G-A, K.M. Lemishko, G. Ciesielski, L.S. Kaguni, B Ibarra

Electronic structure and spin texture of 1T'-MoTe2 single layer studied by SR-ARPES

Beatriz Muñoz, Miguel Angel Valbuena

Min oscillations as single-cell reporter of sublethal effects of antibacterial agents

I. V. Ortega,\* J. Torra, C. Flors

Modulation of the optical emission of few-layer MoS2 circular suspended membranes

Víctor Marzoa, Cristina García-Pérez, Manuel R. Osorio, María Acebrón, Ramón Bernardo-Gavito, and Daniel Granados

Nanowires-Based Electrodes for Extracellular and Intracellular Neuronal Electrophysiology

Ana Arché-Núñez, Beatriz L. Rodilla, Ana Domínguez-Bajo, Ankor González-Mayorga, Julio Camarero, Rodolfo Miranda, Lucas Pérez, M. Concepción Serrano and M. Teresa González

Novel approach in the development of new materials for detecting/storing pollutant and harmful gases based on switchable coordination complexes

Lucía Piñeiro-López, Ángel Fernández Blanco, A. Lorenzo Mariano, José Sánchez Costa, Roberta Poloni and J. Alberto Rodríguez-Velamazán

Towards a wearable magnetoencephalograph

Juan Luis Sánchez Toural, Miguel Ángel Ramos, Jose Luis Pau, Ramón Bernardo-Gavito, and Daniel Granados

*Poster contributions*

Bifunctional CNDs for highly sensitive HER2 determination based on ECL

T. Guerrero-Esteban, C. Gutiérrez-Sánchez, T. García-Mendiola, M. Revenga-Parra, F. Pariente, E. Lorenzo.

Characterization of extracellular vesicles and protein aggregates in cellular models of ALS patients

Carmen Péreza, J. Alejandro Bueso, Carlota Tosat-Bitrián, Angeles Martín-Requero and Valle Palomo.

CRISPR/Cas13-conjugated nanovehicles for achieving an efficient RNA-knockdown.

López-Valls, M., García-Garrido, E; Somoza, A. and Sot, B.

CRISPR/Cpf1 technology applications for the diagnosis and treatment of genetic diseases

Escalona-Noguero, C.1, Luengo, Y. 1, Lafuente-Gómez, N. 1, Latorre, A. 1, Salas G. 1, Somoza A. 1, Sot, B.1\*

Development of CVD Graphene Field Effect Transistor at IMDEA Nanociencia

Julia García Pérez, María Acebrón, Marina C. de Ory, Ignacio Figueruelo, Mariela Menghini, Alicia Gomez, Ramón Bernardo-Gavito y Daniel Granados

Electrochemiluminescent nanostructured DNA biosensor for SARS-CoV-2 detection

Laura Gutiérrez-Gálvez, Rafael del Caño, Iris Menéndez-Luque, Daniel García-Nieto, Micaela Rodríguez-Peña, Mónica Luna, Teresa Pineda, Félix Pariente, Tania García-Mendiola and Encarnación Lorenzo

Fluorescent probes based on rhodium and iridium metallodrugs

A. Villedenous Rojo, Ana M. Pizarro

Gold nanoparticle-based lateral flow sensors for the detection of cancer-related miRNAs

Catarina Coutinho, Jorge Royes, Milagros Castellanos, Álvaro Somoza

Hybrid superconducting nanowire single photon detectors

Cristina García-Pérez, Julia García-Pérez,, Marina C. De Ory, María Acebrón, María Teresa Magaz, Ramón Bernardo-Gavito, Alicia Gómez, Daniel Granados

Implementing QD-based flow cytometry for pathological quantification of TDP-43 in lymphoblasts from ALS patients

Paula Fernández, Carlota Tosat-Bitrián, Ángeles Martín Requero, Valle Palomo.

Liquid-Phase Exfoliation of Magnetic van der Waals Crystals and its role in the synthesis of 2D-2D covalent heterostructures.

Lucía Martín-Pérez, Manuel Vázquez Sulleiro, Aysegül Develioglu, Mar García-Hernández, Andrés Castellanos-Gomez, Emilio M. Pérez and Enrique Burzurí

Osmium(II) Tethered Half-Sandwich Complexes: pH-Dependent Aqueous Speciation and Transfer Hydrogenation in Cells

Sonia Infante-Tadeo, Vanessa Rodríguez-Fanjul, Abrahá Habtemariam, and Ana M. Pizarro

Pif1 helicase opens DNA in repetitive unwinding cycles

M. Ortiz, R. Bocanegra, R. Galletto, B. Ibarra

Plasmonic response of gold nanoparticles in different environments for biomedical applications

M. París, R. López-Méndez, I. Figueruelo, A. Serrano and A. Espinosa\*

Playing with the weakest supramolecular interactions in a 3D crystalline hexakis[60]fullerene induces control over hydrogenation selectivity

Estefanía Fernández-Bartolomé, Arturo Gamonal, José Santos, ab Saeed Khodabakhshi, a Eider Rodríguez-Sánchez, a E. Carolina Sañudo, cd Nazario Martín\* ab and José Sánchez Costa

Quantum dots biosensors for motor proteins tracking

Rebeca París-Ogáyar, Carlota Tosat-Bitrián, J. Fernando Díaz, Valle Palomo.

Ruthenium- and osmium-arene tethered complexes as anticancer agents

Claudia Cardozo Yusti, Ana M. Pizarro

Tuning the magnetic hardness of FeNi nanowires: In the search of the cosmic L10-FeNi phase  
A.J. Campos-Hernández\*, E.M. Palmero, and A. Bollero

Understanding the initial growth stages in NdFeB films grown by MBE with varying underlayer

J. Soler-Morala\*, C. Navío, P. Pedraz, L. Zha, J. Yang, and A. Bollero

X-ray absorption spectroscopy as a thermal probe in cancer treatments

R. López-Méndez, J. Reguera, A. Fromain, F. Zheng, E. Fonda, J. Camarero, C. Wilhelm, Á. Muñoz Noval, A. Espinosa\*

09/12/2021

**Congreso Internacional: Next Generation Solar Energy – América Latina (NGSE-LatAm)**

Online

*Invited talk*

Tunable emission of azaindole derivative varying the crystalline morphology

Nazario Martín

16/12/2021

**23rd European Molecular Biology Laboratory EMBL PhD Symposium: The Big Picture**

Online

*Oral contribution*

Non-viral CRISPR delivery strategies for the generation of improved gene editing tools

Escalona-Noguero, C.1, Luengo, Y. 1, Lafuente-Gómez, N. 1, Latorre, A. 1, Salas G. 1, Somoza A. 1, Sot, B.1\*

16/12/2021

**The International Chemical Congress of Pacific Basin Societies (Pacifichem) 2021**

Online

*Invited talks*

Engineering the thermoelectric properties of single-molecule junctions

Nicolás Agrait

Phthalocyanine-nanocarbon conjugates and fused porphyrin-graphene nanoribbon hybrids  
Tomas Torres

Unravelling details of the excited states in base metal dyads for photocatalytic proton reduction using ultrafast X-ray spectroscopy

Wojciech Gawelda

17/12/2021

**Jornada de Jóvenes Investigadores del Instituto Nicolás Cabrera en la Cristalera, Miraflores de la Sierra, Madrid, Spain**

*Poster contribution*

Liquid-Phase Exfoliation of Magnetic van der Waals Crystals and its role in the synthesis of 2D-2D covalent heterostructures.

Lucía Martín-Pérez, Manuel Vázquez Sulleiro, Aysegül Develioglu, Mar García-Hernández, Andrés Castellanos-Gomez, Emilio M. Pérez and Enrique Burzurí

17/12/2021

**Scientific Conference ICMol 2021, Valencia, Spain**

*Invited talk*

Attochemistry: Imaging and controlling ultrafast electronic and nuclear motion in molecules at the attosecond time scale

Fernando Martín



## 2. Pitch events / invited lectures

11/01/2021

**Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany**

Design, Synthesis and Optoelectronic Properties of Subphthalocyanines

Tomas Torres

26/01/2021

**National University of Ireland, Dublin, Ireland**

Carbon Nanostructures for Emergent Viruses: Ebola and others

Nazario Martín

27/01/2021

**Mini-CREST-Workshop on Innovative Reactions, Japan**

Processability of imine-based covalent organic frameworks and potential applications

Félix Zamora

11/02/2021

**University of Lisbon, Lisbon, Portugal**

Online

Novel features of twisted bilayer graphene

Francisco Guinea

18/02/2021

**Online cycle lectures organized by the Spanish Royal Society of Chemistry (RSEQ)**

Carbon Nanostructures

Nazario Martín

25/02/2021

**IFIMAC+ICMM Joint Seminars. On line**

Evolution in uses of Antimony: from ancient Egyptian queen make-up to new 2D-materials

Félix Zamora

08/04/2021

**IFIMAC+ICMM Joint Seminars. On line**

Epitaxial growth of 2D materials: Insights from scanning tunneling microscopy

Manuela Garnica

22/04/2021

**IFIMAC+ICMM Joint Seminars. On line**

Molecule-based magnetic heterostructures for spintronics and quantum computing

Enrique Burzurí

01/05/2021

**AttoFridays. Imperial College, London, UK**

Imaging attosecond and few-fs electron dynamics in molecules

Fernando Martín

03/05/2021

**Max Planck Institute für Kernphysik, Heidelberg, Germany. Online**

Imaging attosecond dynamics in molecules: towards attochemistry

Fernando Martín

10/05/2021

**Friedrich-Alexander Universität. Erlangen-Nürnberg. Erlangen Webinar**

Sulfur-rich Hole-Transporting Materials for Highly-Efficient Perovskite Solar Cells

Nazario Martín

17/05/2021

**Encuentro con los Premios Nacionales de Investigación 2020, en la Residencia de Estudiantes**

Nanoestructuras de carbon

Nazario Martín

25/05/2021

**Reunión Red ACIERTAS, Madrid, Spain**

El grafeno y otros materiales bidimensionales

Francisco Guinea

27/05/2021

**9th International Workshop on 2D Materials. Benidorm, Spain**

Beyond Phosphorene: Antimonene and Bismuthene

Félix Zamora

14/06/2021

**Webinar on MSCA European hosting offers. Organized by Euraxess ASEAN**

Online

Mark Davies

23/06/2021

**Encuentro con Investigadores/as ERC.**

**Universidad Autónoma de Madrid, Madrid, Spain**

El nacimiento de la atómica teórica

Fernando Martín

24/06/2021

**13 NATO Brussels, Belgium**

The need for cooperation between Allied Nations in long term Quantum Technology

Héctor Guerrero

25/06/2021

**Universidade Federal de Minas Gerais (UFMG), Brazil**

From the Lab to the Fab: Research on rare earth-free permanent magnets to build a sustainable technological horizon

Alberto Bollero

10/07/2021

**Apertura de la 6ª edición del ciclo internacional Escuela de Verano INFIERI 2021 de la Universidad Autónoma de Madrid, Madrid, Spain**

Rodolfo Miranda

29/07/2021

**Conferencia plenaria de clausura de los Cursos de Verano de El Escorial**

Nanociencia: la importancia de lo pequeño

Nazario Martín

08/09/2021

**VIII Escuela de verano sobre Historia de la Química, Universidad de Logroño**

La Tabla Periódica de Mendeleiev: algunas curiosidades y mi elemento favorito

Nazario Martín

17/09/2021

**CIC bioGUNE, Center for Cooperative Research in Biosciences**

Glycofullerenes for Emergent Viruses

Nazario Martín

28/10/2021

**Synthetic (Chiral) Molecular Nanographenes".  
 Angers-Nantes-Rennes. Scientific Day on-line.**

Talk for the LUMOMAT project: Molecular Materials for Electronics and Photonics

Nazario Martín

02/11/2021

**Encuentro en torno al conocimiento y la  
 creatividad ante los grandes retos globales  
 - Evento de apertura de la Semana de la  
 Ciencia y la Innovación en el Instituto  
 Cervantes, Madrid, Spain**

Nazario Martín

26/11/2021

**Jornada Academia Joven de España 2021:  
 Jóvenes, Conocimiento y Agenda 2030.  
 Madrid. Spain**

Sensores en Biomedicina

Valle Palomo

30/11/2021

**Seminars at the Institute of Physics of the  
 Czech Academy of Science. Prague. Czech  
 Republic.**

STM Nanoplasmonics

Roberto Otero

02/12/2021

**22 Centro Criptológico Nacional, Madrid,  
 Spain**

 Retos y oportunidades para la seguridad en  
 la cooperación internacional en tecnología  
 cuántica

Héctor Guerrero

03/12/2021

**Interdisciplinary PhD Studies TRI-BIO-  
 CHEM, University of Warsaw, Warsaw,  
 Poland**

 Glycosylated Carbon Nanostructures for Emer-  
 gent Viruses

Nazario Martín

### 3. Conferences and Courses

20/01/2021

**Chemical dynamics using ultrashort X-rays**

Online

Seminar series, Dep. de Química.

 Universidad Autónoma de Madrid. Madrid.  
 Spain

Wojciech Gawelda

10/03/2021

**Curso de microscopía y aplicaciones,  
 Instituto de Óptica, CSIC y UCLM**

Online

Microscopía de super-resolución

Cristina Flors

12/03/2021

**The light at the end of the tunnel**

Online

Seminar series, Dep. de Física de la Materia

Condensada

Universidad Autónoma de Madrid. Madrid.

Spain

Roberto Otero

21/04/2021

**Luminescence of Conjugated Organic Materials**

Online

 Lecture Series, South China University of Tech-  
 nology

J. Gierschner

23/04/2021

**Nanoquímica**

Universidad Autónoma de Madrid. Madrid.

Spain

Álvaro Somoza

12/05/2021

**School of Electrical Engineering and  
 Computer Science, University of Ottawa,  
 Canada**

Online

 Subphthalocyanines: Singular aromatic non-  
 planar and chiral molecules: Synthesis and  
 properties

Tomas Torres

24/05/2021

**14th European School on Molecular  
 Nanoscience ESMoNa, Benidorm, Spain**
*Invited talks*

Bottom-up Synthesis of (Chiral) Nanographenes

Nazario Martín

Subphthalocyanine Properties

Tomas Torres

15/06/2021

**Scientific opportunities and challenges for  
 femtochemistry using X-ray free electron  
 lasers**

Seminar series, Dep. de Físico-Química.

Online

Universidad Complutense de Madrid. Madrid.

Spain

Wojciech Gawelda

22/06/2021

**CEU Escuela Internacional de Doctorado  
 (CEINDO). "Jornada de Evaluación de  
 Investigadores en Formación"**

Retos emergentes en la química del carbon

Nazario Martín

28/06/2021

**Flagship School, Centre Européen de Calcul  
 Atomique et Moléculaire (CECAM)**

Online

*Invited talk*
 First-principles simulations of materials with  
 SIESTA

Jose Ángel Silva

13/07/2021

**Photophysics of Conjugated Organic  
 Materials. Lecture Series, Univ. Pisa. Online**

J. Gierschner



17/07/2021

**Virtual Chemistry Course: Functional Pi- Systems - Organic Materials Design by Molecular and Supramolecular Engineering**

Online

Charge Transfer States in Organic Optoelectronics and Energy Conversion

J. Gierschner

19/07/2021

**Molecular Luminescence & Luminescent Molecular Solids.**

Online

Lecture Series, Univ. Würzburg.

J. Gierschner

21/07/2021

**Metanano School - Summer School on Photonics of 2D materials, ITMO University.**

Online

*Invited talk*

Moiré structures in two dimensions

Francisco Guinea

03/08/2021

**Photophysics of Conjugated Organic Materials. Online**

Lecture Series, Univ. Tübingen

J. Gierschner

23/08/2021

**INFIERI 2021 -6th Summer School on Intelligent signal processing for frontier research and industry, Madrid, Spain**

*Invited talk*

Technological solutions for spinal cord injuries

M. Teresa González

29/08/2021

**Smart Composites International School - IV International Baltic Conference on Magnetism, Svetlogorsk, Russia. Online**

*Invited talk*

Magnetic-polymer based composites for bonding and additive manufacturing

E.M. Palmero

23/09/2021

**Perspectivas Actuales en Biología Celular. Universidad Autónoma de Madrid, Madrid, Spain**

Álvaro Somoza

23/10/2021

**Química Biológica**

Universidad Autónoma de Madrid, Madrid, Spain

Álvaro Somoza

01/11/2021

**I Curso De Vacío - Asociación Española De Vacío.**

Online

Daniel Granados

10/11/2021

**II Escuela de Terapias Avanzadas, Universidad Internacional Menéndez Pelayo, Santander, Spain**

Diseño en Biotecnología

Álvaro Somoza

28/06/2021

**Flagship School, Centre Européen de Calcul Atomique et Moléculaire (CECAM)**

Online

*Invited talk*

First-principles simulations of materials with SIESTA

Jose Ángel Silva

21/07/2021

**Metanano School - Summer School on Photonics of 2D materials, ITMO University**

Online

*Invited talk*

Moiré structures in two dimensions

Francisco Guinea

23/08/2021

**INFIERI 2021 -6th Summer School on Intelligent signal processing for frontier research and industry. Madrid, Spain**

*Invited talk*

Technological solutions for spinal cord injuries

M. Teresa González

06/09/2021

**European School of Magnetism, Cluj-Napoca, Romania**

*Poster contribution*

First results of a new 3D Spin Polarized - Angle Resolved Photoemission Spectroscopy instrument at IMDEA Nanociencia

Beatriz Muñoz, Miguel Angel Valbuena

06/09/2021

**Summer School "Conductive Metal-Organic Frameworks – From Synthesis To Functions". Online**

*Invited talk*

Conductive metal organic frameworks studied by time resolved THz spectroscopy

Enrique Canovas

**Doctoral School of the Institute of Physics, Polish Academy of Sciences. Warsaw. Poland**

X-ray Free Electron Lasers course.

Wojciech Gawelda

**4th School on New Computational Methods for Attosecond Molecular Processes, Universidad Autónoma de Madrid.**

Online

Theoretical modeling of attosecond electron dynamics in molecules

Fernando Martín

Ab initio methods in attosecond molecular science

Fernando Martín

Simulation of materials

Rodolfo Miranda

Theoretical Methods for Simulation of Materials

Francisco Guinea, J. Gierschner

Targeted Materials Design

J. Gierschner

**University of Rennes, Rennes, France**

Master in Materials Science Exploring Large Scale Facilities" MaMaSELF+,  
New Experiments with XFEI Sources

Wojciech Gawelda

**Universidad de Alicante, Alicante, Spain**

Máster Internacional Nanociencia y Nanotecnología Molecular.

Nanomagnetismo Molecular

Julio Camarero

**Universidad Santiago de Compostela**

Master Chemistry at the Interface with Biology and Materials Science

Online

*Closing lecture.*

Carbon Nanostructures for Emergent Viruses: Ebola and Beyond

Nazario Martín

**Universidad de Valencia, Valencia, Spain**

Master in Theoretical Chemistry and Computational Modelling

Online

Course "Theoretical Methods for Simulation of Materials"

Nano-Materials: a view from Experimental Chemistry.

Nazario Martín

**Universidad Autónoma de Madrid, Madrid, Spain**

Máster en Biomoléculas y Dinámica Celular, Nanomáquinas moleculares

Rebeca Bocanegra

Fronteras en el Estudio de las Biomoléculas

Borja Ibarra

Nanomáquinas moleculares

Borja Ibarra

Máster en Biofísica y Nanotecnología

Nanociencia de Superficies

Julio Camarero

Máster in Molecular Nanoscience and Nanotechnology

Tomas Torres

Máster en Física de la Materia Condensada y de los Sistemas Biológicos

Online

Fluorescence Microscopy

Cristina Flors

Formación para Inversores en Deep Tech

Hector Guerrero

Técnicas experimentales en Nanofísica y Biofísica

Borja Ibarra

Máster en Biotecnología

Nanomagnetics for biomedical applications

Francisco J. Teran

Diseño en Biocatálisis y Nanobiotecnología

Borja Ibarra

Mechanical modulation of cell behavior by engineered surfaces

Isabel Rodríguez

Chemistry Degree

Nanochemistry

Beatriz H. Juárez

Biology Degree

Física

Enrique Burzurí

**Universidad Complutense de Madrid, Madrid, Spain**

Máster en Química Orgánica

Supramolecular Chemistry

Giovanni Bottari

**Universidad Carlos III de Madrid, Madrid, Spain**

Máster en Tecnología Aplicada a Nanomateriales

Nanomedicina

Gorka Salas

Métodos de síntesis (bottom-up, top-down). Tecnologías de fabricación. Caracterización de nano-materiales y nano-compuestos

Gorka Salas

Bachelor in Energy Engineering,

Chemical Fundamentals of Engineering

Gorka Salas

## 4. Outreach activities

### Exhibitions

11/02/2021

**Día Mujer y Niña en la Ciencia 11F. Online meeting**

<https://11defebrero.org/2020/12/15/acercate-a-la-nanociencia-lo-pequeno-es-diferente-3/>

26/04/2021

**Festival 10alamosos9 – Taller online para los alumnos de 5º de primaria del CEIP Santo Domingo (40 asistentes) - online**

[https://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/festival-10alamosos9?category\\_id=47](https://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/festival-10alamosos9?category_id=47)

12/04/2021

**Vermú de Nanociencia - ciclo de charlas de divulgación online de la red 10ALAMENOS9**

<http://nanociencia.imdea.org/es/imdea-nanociencia/seminarios/item/vermu-de-nanociencia>  
Modos de galería susurrantes

Jorge González

Capturando el movimiento ultrarrápido

Sergio Revuelta

Cómo adivinar si alguien nos quiere envenenar  
Saül García Orrit

Más allá del microscopio óptico: ¿Hasta dónde hemos llegado con la microscopía?

Cristina Martín Fuentes

16/06/2021

**Nanociencia to-go**

Online workshop for the older students (42 attendees) from Universidad Complutense de Madrid

17/06/2021

**Nanociencia to-go**

Online workshop for the older students (80 attendees) from Universidad Autónoma de Madrid



24/09/2021

**Noche Europea de la Investigación en Caixa Forum Madrid (Fundación la Caixa)**

[https://caixaforum.org/es/madrid/p/feria-de-la-investigacion\\_a35594395](https://caixaforum.org/es/madrid/p/feria-de-la-investigacion_a35594395)

**Noche Europea de los Investigadores - Y tu, ¿qué haces por mejorar el planeta? - Actividad conjunta de los institutos IMDEA en la Residencia de Estudiantes**

<http://www.madrimasd.org/lanochedelosinvestigadores/actividad/imdea-software-que-haces-tu-por-mejorar-el-planeta?lan=es>

10/10/2021

**Tecnologías Inspiradas en la Naturaleza: Taller de Nanotecnología y Computación Bacteriana, en la Universidad Complutense de Madrid.**

Jorge Trasobares

<https://www.semanacienciamadrid.org/actividad/tecnologias-inspiradas-en-la-naturaleza-taller-de-nanotecnologia-y-computacion-bacteriana>

02/11/2021

**Semana de la Ciencia y la Innovación 2021**

Visita del Colegio Alameda de Osuna

Emilio M. Pérez, Valle Palomo, Gorka Salas, Ana Pizarro, Adriana Arnaiz, Cristina Flors, Patricia Pedraz, Manuela Garnica, Fabián Calleja, Miguel Ángel Valbuena, Reinhold Wannemacher, Borja Ibarra, Rebeca Bocanegra, Isabel Rodríguez, Alberto Martín

17/11/2021

**Alumnos Máster UAM - Asignatura Láseres de Colorante - Prof Carlos del Valle**

Visita al laboratorio de Juan Cabanillas

19/11/2021

Mes de la Ciencia. Taller "Cocinando Materiales. Guadalajara. Lucas Pérez.

**Appearances in TV/radio**

25/02/2021

**Telediario 21 horas RTVE. RNA\_NanoTest project**

<https://www.rtve.es/alacarta/videos/telediario/21-horas-25-02-2021/5804322/?t=26m31s>

12/03/2021

**Telediario - 15 horas RTVE. RNA\_NanoTest project**

<https://www.rtve.es/alacarta/videos/telediario/15-horas-12-03-2021/5817217/?t=38m48s>

17/05/2021

**Acto de entrega de los Premios Nacionales de Investigación 2020**

<https://www.youtube.com/watch?v=PTwmlNWNt4>

25/05/2021

**Alberto Bollero sobre el proyecto PASSENGER en "Hoy por Hoy Madrid" de Cadena Ser**

PASSENGER project

[https://play.cadenaser.com/audio/ser\\_madrid\\_hoyporhoymadrid\\_20210525\\_122003\\_140000/](https://play.cadenaser.com/audio/ser_madrid_hoyporhoymadrid_20210525_122003_140000/)

10/11/2021

**SER Las Palmas - Divulgando Ciencia para conocer la nanotecnología de frontera y combatir los bulos - Pura Ciencia con el profesor de la Universidad de La Laguna, Jorge Méndez - Sección de divulgación científica en HxH El Drago sobre la nanotecnología del carbono con el premio nacional de Química**

Nazario Martín

<https://play.cadenaser.com/audio/081RD01000000059710/?ssm=whatsapp>

18/11/2021

Radio Club Tenerife de la SER, con motivo del Premio Nacional de Investigación Enrique Moles

Nazario Martín

**Press releases (written by us and disseminated to the media)**

04/02/2021

**Nanothermometry to improve anticancer strategies**

<http://nanociencia.imdea.org/home-en/news/item/nanothermometry-to-improve-anticancer-strategies>

<http://gefes-rsef.org/nanothermometria-para-mejorar-los-tratamientos-contra-el-cancer/>

<http://www.madrimasd.org/notiweb/noticias/nanothermometria-mejorar-los-tratamientos-contra-cancer>

[http://www.uam.es/ss/Satellite?c=UAM\\_NotCientific\\_FA&cid=1446814635365&language=es&pagename=UniversidadAutonomaMadrid/UAM\\_NotCientific\\_FA/UAM\\_notCientific&pid=1242652870949&title=Nanothermetr%3Fa+para+mejorar+los+tratamientos+contra+el+c%3Fncer](http://www.uam.es/ss/Satellite?c=UAM_NotCientific_FA&cid=1446814635365&language=es&pagename=UniversidadAutonomaMadrid/UAM_NotCientific_FA/UAM_notCientific&pid=1242652870949&title=Nanothermetr%3Fa+para+mejorar+los+tratamientos+contra+el+c%3Fncer)

<https://phys.org/news/2021-02-nanothermometry-anticancer-strategies.html>

<https://www.azonano.com/news.aspx?newsID=37772>

[https://www.nanotech-now.com/news.cgi?story\\_id=56556](https://www.nanotech-now.com/news.cgi?story_id=56556)

<https://www.nanowerk.com/nanotechnology-news2/newsid=57246.php>

<https://www.technology.org/2021/02/10/nanothermometry-to-improve-anticancer-strategies/>

<https://zephyrnet.com/nanothermometry-to-improve-anticancer-strategies/>

**Terapia ipertermica e cancro: un nuovo studio**

<https://www.quotidianpost.it/terapia-ipertermica-e-cancro-un-nuovo-studio/>

**Nanothermometría para mejorar los tratamientos contra el cáncer**

<https://www.catalunyavanguardista.com/>

nanotermometria-para-mejorar-los-tratamientos-contr-el-cancer/

**Uso de rayos X para mejorar las nanoterapias contra el cáncer**

<https://www.aecc.es/es/investigacion/proyectos-aecc/uso-rayos-x-mejorar-nanoterapias-contr-el-cancer>

17/02/2021

**A promising approach to spintronic devices based on materials that are cheap and abundant**

<http://nanociencia.imdea.org/home-en/news/item/a-promising-approach-to-spintronic-devices-based-on-materials-that-are-cheap-and-abundant>

25/02/2021

**IMDEA Nanociencia coordinates NoCanTher, a European project now entering a clinical study phase -testing magnetic nanoparticles for hyperthermia against pancreatic cancer**

<http://nanociencia.imdea.org/home-en/news/item/imdea-nanociencia-coordinates-nocanther-a-european-project-now-entering-a-clinical-study-phase-testing-magnetic-nanoparticles-for-hyperthermia-against-pancreatic-cancer>

**El Vall d'Hebron probará un tratamiento de nanopartículas para el cáncer de páncreas NOCANTHER project**

[https://cronicaglobal.espanol.com/vida/vall-hebron-tratamiento-nanoparticulas-cancer-pancreas\\_450315\\_102.html](https://cronicaglobal.espanol.com/vida/vall-hebron-tratamiento-nanoparticulas-cancer-pancreas_450315_102.html)

**El Vall d'Hebron probará un tratamiento de nanopartículas para el cáncer de páncreas**

<https://theworldnews.net/es-news/el-vall-d-hebron-probara-un-tratamiento-de-nanoparticulas-para-el-cancer-de-pancreas>

**Un estudi usará nanopartícules per tractar el càncer de pàncrees avançat**

<https://www.elpuntavui.cat/societat/article/1929729-un-estudi-usara-nanopart>

ticules-per-tractar-el-cancer-de-pancrees-avancat.html

**Un estudio usará nanopartículas para tratar el cáncer de páncreas avanzado**

[https://www.cope.es/actualidad/sociedad/noticias/estudio-usara-nanoparticulas-tratar-cancer-pancreas-avanzado-20210225\\_1159077](https://www.cope.es/actualidad/sociedad/noticias/estudio-usara-nanoparticulas-tratar-cancer-pancreas-avanzado-20210225_1159077)

<https://www.levante-emv.com/vida-y-estilo/salud/2021/02/25/estudio-usara-nanoparticulas-tratar-cancer-35565295.html>

**Vall d'Hebron lidera un estudio clínico que utilizará nanopartículas para el tratamiento del cáncer de páncreas localmente avanzado**

<https://www.vhio.net/es/vall-dhebron-lidera-un-estudio-clinico-que-utilizara-nanoparticulas-para-el-tratamiento-del-cancer-de-pancreas-localmente-avanzado/>

**Vall d'Hebron lidera un estudio que utiliza nanopartículas para tratar el cáncer de páncreas**

[https://www.consalud.es/tecnologia/vall-hebron-lidera-estudio-utiliza-nanoparticulas-tratar-cancer-pancreas\\_93061\\_102.html](https://www.consalud.es/tecnologia/vall-hebron-lidera-estudio-utiliza-nanoparticulas-tratar-cancer-pancreas_93061_102.html)

**Vom Labor zum Medikament: Nanopartikel gegen Krebs**

<https://idw-online.de/de/news/763945>  
<https://nachrichten.idw-online.de/2021/02/26/vom-labor-zum-medikament-nanopartikel-gegen-krebs/>

**Estudio usará nanopartículas para tratar el cáncer de páncreas**

<https://www.milenio.com/ciencia-y-salud/cancer-pancreas-estudio-usara-nanoparticulas-enfermedad>

**IMDEA Nanociencia coordina un proyecto europeo para el tratamiento del cáncer de páncreas avanzado**

<https://www.madrimasd.org/notiweb/noticias/imdea-nanociencia-coordina-un-proyecto-europeo-tratamiento-cancer-pancreas-avanzado>

**Investigadores españoles logran un importante avance en una nueva terapia**

**para el cáncer de páncreas avanzado, letal en el 95% de los casos**

<https://www.cordobabn.com/articulo/salud/investigadores-espanoles-logran-importante-avance-nueva-terapia-cancer-pancreas-avanzado/20210227191510078486.html>

**Vom Labor zum Medikament: Nanopartikel gegen Krebs**

[https://www.jenatv.de/mediathek/59560/Vom\\_Labor\\_zum\\_Medikament\\_Nanopartikel\\_gegen\\_Krebs.html](https://www.jenatv.de/mediathek/59560/Vom_Labor_zum_Medikament_Nanopartikel_gegen_Krebs.html)

**El Vall d'Hebron ensaya un tratamiento con nanopartículas para el cáncer de páncreas localmente avanzado**

<https://isanidad.com/181735/vall-d-hebron-ensaya-tratamiento-nanoparticulas-cancer-pancreas-localmente-avanzado/>

12/03/2021

**Molecules inside carbon nanotubes as spin switches for electrical current**

<http://nanociencia.imdea.org/home-en/news/item/molecules-inside-carbon-nanotubes-as-spin-switches-for-electrical-current>

**Scientists build the smallest cable containing a spin switch**

<https://phys.org/news/2021-03-scientists-smallest-cable.html>

<https://www.agenciasinc.es/Noticias/Como-colocar-el-interruptor-de-spin-mas-pequeno-dentro-de-un-nanotubo>

<https://www.azonano.com/news.aspx?newsID=37839>

<https://www.madrimasd.org/notiweb/noticias/ensamblan-interruptor-spin-mas-pequeno-dentro-un-nanotubo-conductor>

<https://www.nanowerk.com/nanotechnology-news2/newsid=57508.php>

<https://www.bizsiziz.com/scientists-build-the-smallest-cable-containing-a-spin-switch/>

<https://www.explica.co/how-to-put-the-smallest-spin-switch-inside-a-nanotube.html>



**Cómo se comportan las moléculas magnéticas en espacios minúsculos – CORDIS (EU Research Results) in 6 languages (ES, EN, PT, FR, DE, IT, PL) - PINT MINT 2DSPIN projects**

[https://cordis.europa.eu/article/id/430142-understanding-how-magnetic-molecules-behave-in-tiny-spaces/es?WT.mc\\_id=exp](https://cordis.europa.eu/article/id/430142-understanding-how-magnetic-molecules-behave-in-tiny-spaces/es?WT.mc_id=exp)

22/03/2021

**Byaxon project journey finishes, but the road does not end here**

<http://www.byaxon-project.eu/news/2021>

16/04/2021

**Smart nanoparticles to fight the most aggressive cancer of the eye**

<http://nanociencia.imdea.org/home-en/news/item/smart-nanoparticles-to-fight-the-most-aggressive-cancer-of-the-eye>

**The Nanomedicine Daily, blog of Gareth Hughes**

<https://paper.li/ghughesmba/1435077112#>  
<https://www.comunidad.madrid/noticias/2021/05/19/desarrollamos-nanoparticulas-inteligentes-combatir-cancer-ojo-agresivo>

**Las nanopartículas que se desarrollan en Madrid: reducen el tamaño del cáncer de ojo y los efectos de la quimioterapia**

<http://www.programainfociencia.com/Noticia.aspx?id=1355019>

<http://www.programainfosalud.com/Noticia.aspx?id=1355019>

<https://www.20minutos.es/noticia/4700746/0/las-nanoparticulas-que-se-desarrollan-en-madrid-reducen-el-tamano-del-cancer-de-ojo-y-los-efectos-de-la-quimioterapia/>

<https://www.larazon.es/madrid/20210519/inwnytsvebhq5jzimpvlqwjpe.html>

<https://www.immedicohospitalario.es/noticia/23156/utilizan-nanoparticulas-inteligentes-para-combatir-el-cancer-de-ojo.html>

06/05/2021

**Tailoring the Kondo effect: one molecule at a time**

<https://nanociencia.imdea.org/home-en/news/item/tailoring-the-kondo-effect-one-molecule-at-a-time>

<https://www.nanowerk.com/nanotechnology-news2/newsid=57932.php>

<https://www.quimicaysociedad.org/investigadores-manipulan-la-resonancia-kondo-de-las-nanoarquitecturas-de-lantano-porfirina-mediante-la-quimica-inducida-por-la-punta-de-un-microscopio/>

<https://cordis.europa.eu/article/id/430067-tailoring-the-kondo-effect-one-molecule-at-a-time/en>

12/05/2021

**IMDEA Nanociencia coordinates the PASSENGER project: enabling a more sustainable and green Europe**

<https://nanociencia.imdea.org/home-en/news/item/imdea-nanociencia-coordinates-the-passenger-project-enabling-a-more-sustainable-and-green-europe>

<https://www.madrimasd.org/notiweb/noticias/hacia-una-europa-mas-sostenible-ecologica-traves-proyecto-passenger>

<https://cordis.europa.eu/article/id/430137-imdea-nanociencia-coordinates-the-passenger-project-enabling-a-more-sustainable-and-green-eur>

<https://fuenlabradanoticias.com/art/100495/madrid-participa-en-el-proyecto-europeo-passenger-para-la-mejora-del-medio-ambiente>

<https://www.comunidad.madrid/noticias/2021/06/08/participamos-proyecto-europeo-passenger-mejora-medio-ambiente>

30/06/2021

**Osmium activation in cancer cells**

<https://nanociencia.imdea.org/home-en/news/item/osmium-activation-in-cancer-cells>

<https://floridanewstimes.com/activation-of-osmium-in-cancer-cells/297699/>

<https://phys.org/news/2021-07-osmium-cancer-cells.html>

[https://www.madrimasd.org/notiweb/noticias/activacion-osmio-en-celulas-cancerosas#utm\\_source=notiweb\\_newsletter&utm\\_medium=email&utm\\_campaign=noti2\\_05jul21](https://www.madrimasd.org/notiweb/noticias/activacion-osmio-en-celulas-cancerosas#utm_source=notiweb_newsletter&utm_medium=email&utm_campaign=noti2_05jul21)

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29/07/2021

**Filming the thermal death of electrons in matter**

<https://nanociencia.imdea.org/home-en/news/item/filming-the-thermal-death-of-electrons-in-matter>

**¿Cuánto tarda en enfriarse un electrón?**

[https://www.madrimasd.org/notiweb/noticias/cuanto-tarda-en-enfriarse-un-electron#utm\\_source=notiweb\\_newsletter&utm\\_medium=email&utm\\_campaign=noti3\\_29jul21](https://www.madrimasd.org/notiweb/noticias/cuanto-tarda-en-enfriarse-un-electron#utm_source=notiweb_newsletter&utm_medium=email&utm_campaign=noti3_29jul21)

**How long does it take for an electron to cool down?**

<https://todayheadline.co/how-long-does-it-take-for-an-electron-to-cool-down/>

<https://www.technology.org/2021/07/29/how-long-does-it-take-for-an-electron-to-cool-down/>

09/09/2021

**Playing with the weakest supramolecular interactions in a fullerene compound**

<https://nanociencia.imdea.org/home-en/news/item/playing-with-the-weakest-supramolecular-interactions-in-a-fullerene-compound>

<https://www.albasynchrotron.es/es/actualidad/noticias/jugando-con-las-interacciones-supramoleculares-mas-debiles-y-la-hidrogenacion-selectiva-de-materiales>

28/09/2021

### Tailoring the magnetic anisotropy of lanthanides on surfaces

ELEC-NANO project

<https://nanociencia.imdea.org/home-en/news/item/tailoring-the-magnetic-anisotropy-of-lanthanides-on-surfaces>

<https://lightsources.org/2021/08/11/tuning-the-magnetic-anisotropy-of-lanthanides/>

<https://www.cells.es/en/media/news/tuning-the-magnetic-anisotropy-of-lanthanides-on-a-metal-substrate-by-metal2013organic-coordination>

<https://www.nanowerk.com/nanotechnology-news2/newsid=58839.php>

<https://www.madrimasd.org/notiweb/noticias/jugando-anisotropia-magnetica-los-lantanos-en-superficies>

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<https://todayheadline.co/tailoring-the-magnetic-anisotropy-of-lanthanides-on-surfaces/>

28/10/2021

### “Nanociencia para contar”, the new outreach project of IMDEA Nanociencia supported by FECYT

<https://nanociencia.imdea.org/home-en/news/item/nanociencia-para-contar-the-new-dissemination-project-of-imdea-nanociencia-supported-by-fecyt>

<https://nanomedspain.net/nanociencia-para-contar-el-nuevo-proyecto-de-divulgacion-de-imdea-nanociencia-apoyado-por-fecyt/>

15/11/2021

### Raw Materials Week

<https://passenger-project.eu/project-news/events/passenger-at-the-raw-materials-week/>

Alberto Bollero

16/11/2021

### IMDEA Nanociencia warms up engines for the Nanocar Race II, the world's smallest car race.

<https://www.nanowerk.com/nanotechnology-news2/newsid=59164.php>

<https://rseq.org/dos-investigadores-de-la-rseq-y-rsef-participan-en-la-nanocar-race-ii/>

17/11/2021

### Rodolfo Miranda Soriano, Premio de investigación a la carrera científica de la Comunidad de Madrid “Miguel Catalán”

<https://nanociencia.imdea.org/home-en/news/item/rodolfo-miranda-soriano-premio-de-investigacion-a-la-carrera-cientifica-de-la-comunidad-de-madrid-miguel-catalan>

<https://www.comunidad.madrid/noticias/2021/11/05/comunidad-madrid-concede-i-premio-margarita-salas-cientificos-vallet-san-millan#:~:text=El%20Premio%20Miguel%20Catal%C3%A1n%20a,40%20a%C3%B1os%20a%20Alejandro%20Gonz%C3%A1lez.>

<https://www.europapress.es/madrid/noticia-cientificos-maria-vallet-alvaro-san-millan-consiguen-premio-margarita-salas-20211105144703.html>

<https://www.uam.es/uam/noticias/catedratico-uam-rodolfo-miranda-premio-investigacion-miguel-catalan-2021>

30/11/2021

### La gran infraestructura europea XFEL y el instituto IMDEA Nanociencia firman un acuerdo de colaboración que contribuirá a un futuro brillante para la ciencia de rayos-X en España

<https://nanociencia.imdea.org/es/imdea-nanociencia/noticias/item/bright-future-for-x-ray-science-in-spain>

[https://www.xfel.eu/news\\_and\\_events/news/index\\_eng.html?openDirectAnchor=1920&two\\_columns=0](https://www.xfel.eu/news_and_events/news/index_eng.html?openDirectAnchor=1920&two_columns=0)

09/12/2021

### The Early Stage Researchers Workshop in Nanoscience goes international

<https://nanociencia.imdea.org/home-en/news/item/the-esrw-goes-international>

## Press clippings

01/01/2021

### Estos son los proyectos que impulsa la ciencia española frente a la Covid-19

RNA\_NanoTest project

[https://www.consalud.es/pacientes/especial-coronavirus/proyectos-impulsa-ciencia-espanola-frente-covid-19\\_90297\\_102.html](https://www.consalud.es/pacientes/especial-coronavirus/proyectos-impulsa-ciencia-espanola-frente-covid-19_90297_102.html)

02/01/2021

### Conoce los proyectos españoles en el diagnóstico de la Covid-19 más relevantes de 2020

RNA\_NanoTest project

[https://www.consalud.es/pacientes/especial-coronavirus/conoce-proyectos-espanoles-diagnostico-covid-19-relevantes-2020\\_90325\\_102.html](https://www.consalud.es/pacientes/especial-coronavirus/conoce-proyectos-espanoles-diagnostico-covid-19-relevantes-2020_90325_102.html)

12/01/2021

### TOMATTO project

### Lideramos un proyecto de investigación que recibirá 11,7 millones de euros en ayudas europeas

<https://www.comunidad.madrid/noticias/2021/01/12/lideramos-proyecto-investigacion-recibira-117-millones-euros-ayudas-europeas>

<https://fuenlabradanoticias.com/art/98885/un-proyecto-de-investigacion-de-la-comunidad-recibira-117-millones-de-euros-en-ayudas-europeas>

04/02/2021

### 2020, el año de las terapias dirigidas para los pacientes con cáncer



[https://www.abc.es/salud/enfermedades/abci-2020-terapias-dirigidas-para-pacientes-cancer-202102040127\\_noticia.html](https://www.abc.es/salud/enfermedades/abci-2020-terapias-dirigidas-para-pacientes-cancer-202102040127_noticia.html)

**MSCA COFUND: €100 million in grants awarded**

COFUND IDEAL project

[https://ec.europa.eu/research/mariecurieactions/cofund-recipients-2020\\_en](https://ec.europa.eu/research/mariecurieactions/cofund-recipients-2020_en)

**20/03/2021**

**Revolucionaria nanotecnología española para la reparación de lesiones medulares**

BYAXON project

<https://tendencias21.levante-emv.com/revolucionaria-nanotecnologia-espanola-para-la-reparacion-de-lesiones-medulares.html>

**23/03/2021**

**A success story made possible by teamwork and interdisciplinary collaboration**

BYAXON project

<http://www.fetfx.eu/news/byaxon-journey-nanotechnology-talking-neurons/>

**Convocatoria Marie Skłodowska-Curie Actions COFUND 2020: 11 proyectos concedidos a entidades españolas. COFUND IDEAL project**

<https://eshorizonte2020.es/ciencia-excelente/acciones-marie-skłodowska-curie/noticias/convocatoria-marie-skłodowska-curie-actions-cofund-2020-11-proyectos-concedidos-a-entidades-espanolas>

**03/04/2021**

**Una treintena de investigadores de Madrid, entre los más destacados del mundo**

<https://www.larazon.es/madrid/20210403/csdjf5hzkby3p4ffc7myjvzfy.html>

<https://www.madridiario.es/treintena-investigadores-de-madrid-mas-destacados-del-mundo>

**30 investigadores madrileños incluidos en el ranking de profesionales más destacados del mundo**

<https://www.cronicanorte.es/30-investigadores-madrilenos-incluidos-en-el-ranking-de-profesionales-mas-destacados-del-mundo/157067>

**Ciencia ‘made in Madrid’, élite mundial**

[https://www.abc.es/espana/madrid/abci-ciencia-made-madrid-elite-mundial-202104090001\\_noticia.html](https://www.abc.es/espana/madrid/abci-ciencia-made-madrid-elite-mundial-202104090001_noticia.html)

**07/05/2021**

**13 innovations from IMDEA Nanociencia in Innovation Radar EU. BYAXON project**

<https://www.innoradar.eu/resultbykeyword/imdea%20nanociencia>

**17/05/2021**

**El catedrático Nazario Martín León, Premio Nacional de Investigación 2020 en Ciencia y Tecnología Químicas**

<https://www.efe.com/efe/espana/efefuturo/carme-torras-laura-lechuga-y-elias-campo-entre-los-premios-de-investigacion-2020/50000905-4394215>

<https://www.heraldo.es/noticias/nacional/2021/05/17/aragones-elias-campo-recebe-premio-nacional-investigacion-manos-reyes-1492788.html?autoref=true>

[https://monarquia.elconfidencialdigital.com/video/videos\\_monarquia\\_confidencial/reyes-presiden-entrega-premios-nacionales-investigacion-2020/20210518103952067089.html](https://monarquia.elconfidencialdigital.com/video/videos_monarquia_confidencial/reyes-presiden-entrega-premios-nacionales-investigacion-2020/20210518103952067089.html)

**El Ministerio de Ciencia e Innovación otorga las diez modalidades de los Premios Nacionales de Investigación**

<https://cosce.org/el-ministerio-de-ciencia-e-innovacion-otorga-las-diez-modalidades-de-los-premios-nacionales-de-investigacion/>

**El Prof. Nazario Martín Premio Nacional de Investigación “Enrique Moles”, en el área de Ciencia y Tecnología Químicas**

<https://www.nanomatmol.org/noticias>

**El Prof. Nazario Martín Premio Nacional de Investigación “Enrique Moles”, en el área de Ciencia y Tecnología Químicas**

<https://genam.rseq.org/el-prof-nazario-martin-premio-nacional-de-investigacion-enrique-moles-en-el-area-de-ciencia-y-tecnologia-quimicas/>

<https://www.servimedia.es/noticias/1851600>

<https://www.lavanguardia.com/vida/20210517/7459941/rey-pide-aprovechar-momento-impulsar-ciencia.html>

[https://www.abc.es/espana/casa-real/abci-pide-aprovechar-este-momento-para-nuevo-impulso-nuestra-ciencia-innovacion-202105171230\\_noticia.html](https://www.abc.es/espana/casa-real/abci-pide-aprovechar-este-momento-para-nuevo-impulso-nuestra-ciencia-innovacion-202105171230_noticia.html)

<https://www.efesalud.com/ciencia-innovacion-rey-impulso/>

<https://www.elperiodicodearagon.com/sociedad/2021/05/17/rey-ve-ciencia-espacio-esperanza-51915870.html>

<https://www.republica.com/2021/05/17/el-rey-hay-que-aprovechar-este-momento-para-dar-un-nuevo-impulso-a-la-idi/>

[https://www.vanitatis.elconfidencial.com/casas-reales/2021-05-17/letizia-reina-vestido-multisusos-pequena-obsesion\\_3084072/](https://www.vanitatis.elconfidencial.com/casas-reales/2021-05-17/letizia-reina-vestido-multisusos-pequena-obsesion_3084072/)

<https://murcianoticias.es/el-vice-rector-de-la-umu-imparte-una-conferencia-en-la-entrega-de-premios-nacionales-de-investigacion-2020/>

<https://www.um.es/web/sala-prensa/-/el-vice-rector-de-la-umu-jos%C3%A9-manuel-%C3%B3pez-nicol%C3%A1s-imparte-la-conferencia-de-divulgaci%C3%B3n-cient%C3%ADfica-de-la-entrega-de-premios-nacionales-de-investigaci%C3%B3n-2020>

**Entrega de los Premios Nacionales de Investigación 2020**

[https://www.casareal.es/ES/Actividades/Paginas/actividades\\_actividades\\_detalle.aspx?data=14880](https://www.casareal.es/ES/Actividades/Paginas/actividades_actividades_detalle.aspx?data=14880)

<https://www.20minutos.es/noticia/4699021/0/felipe-vi-pide-impulsar-la-ciencia-con-vision-de-largo-plazo-para-garantizar-el-progreso-en-espana/?autoref=true>

<https://sedoptica.es/noticias>

<https://murciaeconomia.com/art/79473/los-reyes-apoya-la-investigacion-como-garantia-de-progreso>

<https://www.radiohuesca.com/sociedad/los-reyes-de-espana-entregan-el-premio-nacional-gregorio-maranon-al-altoaragones-elias-campo-17052021-154420.html>

[https://www.hola.com/realeza/casa\\_espanola/20210517189684/reyes-felipe-letizia-premios-nacionales-investigacion/](https://www.hola.com/realeza/casa_espanola/20210517189684/reyes-felipe-letizia-premios-nacionales-investigacion/)

[https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/ciencia-e-innovacion/Paginas/2021/170521-pn\\_investigacion\\_2020.aspx](https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/ciencia-e-innovacion/Paginas/2021/170521-pn_investigacion_2020.aspx)

<https://www.magazinespain.com/reyes-premios-nacionales-investigacion-2020/>

<http://fisicotronica.com/premios-nacionales-de-investigacion-2020/>

<https://ecsucm.wordpress.com/2020/11/15/enriquemoles2020-nazariomartin/>

<https://www.notimerica.com/sociedad/noticia-rey-felipe-rey-hemos-seguir-trabajando-cientificos-espanoles-ocupen-lugar-les-corresponde-20210517130745.html>

[https://www.65ymas.com/sociedad/premios-nacionales-investigacion-2020-talento-senior\\_27769\\_102.html](https://www.65ymas.com/sociedad/premios-nacionales-investigacion-2020-talento-senior_27769_102.html)

<https://www.laverdad.es/culturas/transferir-conocimiento-clave-20210518001549-ntvo.html>

07/06/2021

**El proyecto de nanotecnología para reconectar neuronas en el que participa el Hospital Nacional de Parapléjicos supera la revisión de la Comisión Europea. BYAXON project**

<https://objetivocastillalamancha.es/contenidos/proyecto-nanotecnologia-reconectar-neuronas-que-participa-hospital-nacional-paraplejicos-supera-revision-comision-europea>  
<https://www.actasanitaria.com/reconectar-neuronas-hospital-paraplejicos/>

**ByAxon cumple todos los objetivos propuestos**

<https://www.castillalamancha.es/actualidad/notasdeprensa/el-proyecto-de-nanotecnolog%C3%ADa-para-reconectar-neuronas-en-el-que-participa-el-hospital-nacional-de>

**La Comisión Europea avala el bypass de reconexión neuronal de Parapléjicos**

<https://ahoraclm.com/2021/06/08/la-comision-europea-avala-el-bypass-de-reconexion-neuronal-de-paraplejicos/>

21/06/2021

**Proyecto Tsunami: la investigación que tiene entre manos el material del futuro**

<https://www.innovaspain.com/imdea-nanociencia-nanotubos-carbono-emilio-perez-nuevos-materiales/>

**El material del futuro se crea en Madrid**

<https://www.telemadrid.es/noticias/madrid/nanotubos-carbono-material-futuro-creado-Madrid-0-2352664766--20210622122458.htm>

30/06/2021

**EIT RawMaterials joins PASSENGER project aiming to produce rare-earth-free permanent magnets**

PASSENGER project  
<https://eitrawmaterials.eu/eit-rawmaterials-joins-passenger-project-aiming-to-produce-rare-earth-free-permanent-magnets/>

03/07/2021

**El conuense Félix Zamora Abanades, nuevo vicerrector de Transferencia, Innovación y Cultura de la UAM**

<https://eldiadigital.es/art/368796/el-conuense-felix-zamora-abanades-nuevo-vicerrector-de-transferencia-innovacion-y-cultura-de-la-uam>

16/07/2021

**IMDEA Nanociencia recibe la propuesta para renovar la acreditación 'Centro de Excelencia Severo Ochoa'**

<https://www.ciencia.gob.es/Noticias/2021/Ju-lio/Siete-centros-y-seis-unidades-consiguen-los-sellos-de-excelencia-Severo-Ochoa-y-Maria-de-Maeztu.html;jsessionid=394B31B6A98AEB6818B0CD9475E92504>

**Siete centros y seis unidades de excelencia reciben los sellos 'Severo Ochoa' y 'María de Maeztu' que otorga la AEI**

<https://www.europapress.es/ciencia/noticia-siete-centros-seis-unidades-excelencia-reciben-sellos-severo-ochoa-maria-maeztu-otorga-aei-20210716200058.html>

16/07/2021

**La ciencia en mayúsculas pone punto y seguido a los Cursos de Verano – Nazario Martín**

<https://tribuna.ucm.es/news/la-ciencia-en-mayusculas-pone-punto-y-seguido-a-los-cursos-de-verano>

01/09/2021

**La ciencia, la mejor aliada del Planeta – Noche Europea de los Investigadores 2021**

<http://www.madrimasd.org/notiweb/noticias/ciencia-mejor-aliada-planeta>

20/09/2021

**Miguel Ángel Alario y Nazario Martín: La ciencia española ya no puede esperar más**

<https://tribuna.ucm.es/news/25-anos-del-manifiesto-del-escorial-la-ciencia-espanola-ya-no-puede-esperar-mas>

23/10/2021

**Nazario Martín participa en el 'Encuentro en torno al conocimiento y la creatividad ante los grandes retos globales' de la XXI Semana de la Ciencia y la Innovación**

<https://www.madrimasd.org/notiweb/entrevistas/madrid-tiene-mas-un-tercio-investigacion-cientifica-toda-espana-por-que-recibir-un-premio-en-comunidad-madrid-es-dificilissimo>



02/11/2021

**La Semana de la Ciencia y la Innovación comienza en 40 municipios de la región**

<https://www.madridiario.es/comienzo-semana-ciencia-innovacion-40-municipios-region>

**Nazario Martín León, académico de número de Real Academia de Ciencias Exactas, Físicas y Naturales**

<https://tribuna.ucm.es/news/nazario-martin-leon-academico-de-numero-de-real-academia-de-ciencias-exactas-fisicas-y-naturales>

05/11/2021

**Artificial leaf taps into full potential of solar energy**

ALEAF project

[https://cordis.europa.eu/article/id/435268-artificial-leaf-taps-into-full-potential-of-solar-energy?pk\\_campaign=tw](https://cordis.europa.eu/article/id/435268-artificial-leaf-taps-into-full-potential-of-solar-energy?pk_campaign=tw)

05/11/2021

**Científicos del Hospital Nacional de Paraplégicos arrojan luz sobre las posibilidades de la nanotecnología con electrodos de oro en el crecimiento de redes neurales**

<https://www.castillalamancha.es/actualidad/notasdeprensa/cient%C3%ADficos-del-hospital-nacional-de-parapl%C3%A9gicos-arrojan-luz-sobre-las-posibilidades-de-la>

16/12/2021

**Las células vivas como ‘minifactorías’, recortar nanofragmentos de grafeno o la nueva ‘attoquímica’, en la XX Jornada Científica del ICMol**

Fernando Martín

[https://www.elperiodic.com/valencia/celulas-vivas-como-minifactorias-recortar-nanofragmentos-grafeno-nueva-attoquimica-jornada-cientifica-icmol\\_791409](https://www.elperiodic.com/valencia/celulas-vivas-como-minifactorias-recortar-nanofragmentos-grafeno-nueva-attoquimica-jornada-cientifica-icmol_791409)

## Social Media

13/01/2021

**“The storm #Filomena rendered thus the access to the institute. Due to the difficulty in accessing the building, the in-person activity at @IMDEA\_Nano is temporarily suspended until Monday, January 18th. We continue working from home.**

**#FilomenaMadrid”**

[https://twitter.com/IMDEA\\_Nano/status/1349320597654786048](https://twitter.com/IMDEA_Nano/status/1349320597654786048)

05/05/2021

**“Teamwork makes the dream work! #eicPathfinder funded company @ByAxon\_project successfully measured the activity of a spinal cord slice by using #nanotechnology and magnetic sensors. Read more on their #innovative solutions here <https://bit.ly/3nDPjn9> #EUeic”**

<https://twitter.com/EUeic/status/1389840242723655680?s=20>

15/07/2021

**Ana Pizarro’s Chemical Science in the cover and Twitter header**



## Newsletters

**Alumni Programme’s newsletter**

1st Issue

<https://mailchi.mp/6800be42e774/the-freshest-news-for-imdea-nanociencia-alumni>  
**Special announcement “Career prospects”**  
<https://mailchi.mp/065e2e4e2bbe/event-career-prospects-with-dr-beln-nieto-ortega>

2nd Issue

<https://us1.admin.mailchimp.com/reports/show?id=4940646>

**Special announcement “Career prospects”:**  
<https://mailchi.mp/ce98d97a4b56/event-career-prospects-with-dr-beln-nieto-ortega-4973638>

**Research Projects Office Newsletter**

17th Issue

<https://mailchi.mp/580242d1d43c/projects-office-newsletter-issue-17>

18th Issue

<https://mailchi.mp/d5853f5b0c78/projects-office-newsletter-issue-18>

## Video/film/podcast

17/05/2021

**Nazario Martín, Premio Nacional de Investigación 2020 en Ciencia y Tecnología Químicas**

<https://www.youtube.com/watch?v=9nvSdhvBy0U>

24/05/2021

**“La materia en dos dimensiones” – Vídeos de ACIERTAS, proyecto de Aprendizaje de las Ciencias promovido por la COSCE.**

Paco Guinea

<https://www.youtube.com/watch?v=qLmsLdy3BJE>

28/06/2021

**Cienciando #52: IMDEA Nanociencia, programa de la Asociación Española para el Avance de la Ciencia AEAC**

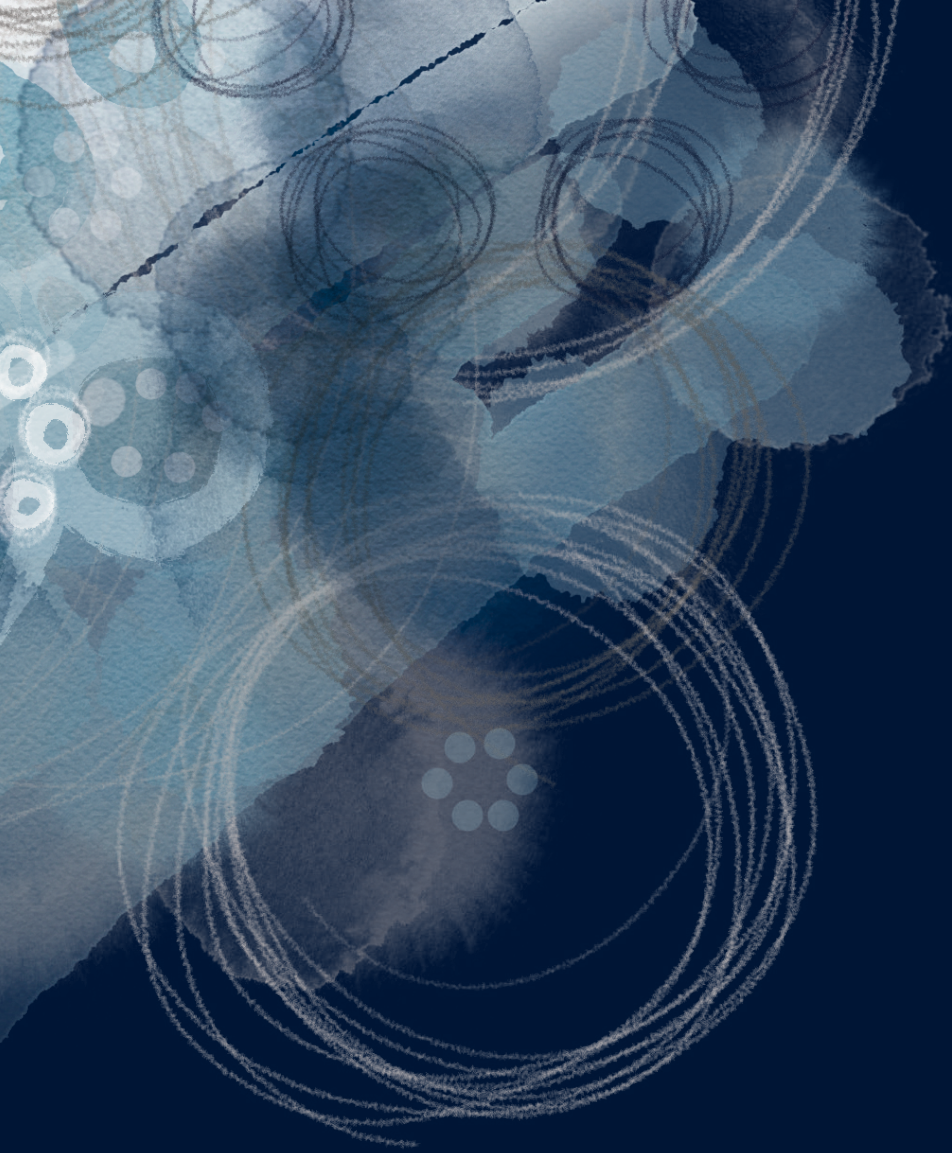
Rodolfo Miranda

<https://www.youtube.com/watch?v=a-2GWPpgjj8>

01/07/2021

**Promotional video IDEAL Postdoctoral Programme**

<https://www.youtube.com/watch?v=qVkwFO7YvR8>



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